



Public Works and Government Services Canada

Requisition No: EZ899 173362 _____

DRAWINGS & SPECIFICATIONS

for

Parks Canada: Rehabilitation of Fire Suppression System at
Three Historic Sites
Fort Langley, BC

Project No. R.076121.001
March 2017

APPROVED BY:



Regional Manager,

2017-04-06

Date

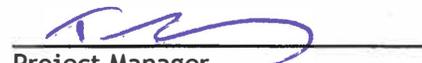


Construction Safety Coordinator

2017.03.24

Date

TENDER:



Project Manager

17/04/07

Date



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Appendix A Pre-construction Hazard Assessment Form

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Part 1 General

1.1 CODES

- .1 Perform work to CURRENT Codes, Construction Standards and Bylaws, including Amendments up to the TENDER closing date.

1.2 DESCRIPTION OF WORK

- .1 This Contract covers the following work at the Historic Site, Fort Langley, B.C.
 - .1 Design, supply and install dry sprinkler fire protection systems for Store House located in the Historic Site.
 - .2 The valuable and irreplaceable contents in Store House will be moved by the Contractor before construction. The remaining valuable and irreplaceable contents remaining in place during the course of construction shall be provided with appropriate protection by the Contractor against construction damage. Contractor to coordinate with the Department Representative prior to any movement of existing contents.
 - .3 Contractor to coordinate with Heritage Consultant for locations and methods of installations of seismic restraints.
- .2 Work to be performed under this Contract includes, but not limited to, the following items covered further in the Contract documents:
 - .1 Provide a detailed work plan including a project schedule
 - .2 Provide a detailed survey of the buildings and drawings of the current floor plan.
 - .3 Design the sprinkler fire protection systems and related items to current floor plan.
 - .4 Submit sealed drawings & hydraulic calculations for review and obtain approval to proceed.
 - .5 Remove existing and install new sprinkler fire protection systems.
 - .6 Provide power to air compressor and fire alarm connections.
 - .7 Provide fire alarm connections and fire alarm necessary for sprinkler fire protection systems.
 - .8 Comply with procedures, specifications and all WorkSafe BC regulations for identified hazardous materials.
 - .9 Commission and test the sprinkler fire protection system and related items
 - .10 Provide as-built drawings and closeout submittals.
- .3 "Green" Requirements:
 - .1 Use only environmentally responsible green materials/ products with no VOC emissions or minimum VOC emissions of indoor off-gassing contaminants for improved indoor air quality - subject of Departmental Representative's approval of submitted MSDS Product Data.
 - .2 Use materials/products containing highest percentage of recycled and recovered materials practicable - consistent with maintaining cost effective satisfactory levels of competition.
 - .3 Adhere to waste reduction requirement for reuse or recycling of waste materials, thus diverting materials from landfill.

1.3 CONTRACT DOCUMENTS

- .1 The Contract documents, drawings and specifications are intended to complement each other, and to provide for and include everything necessary for the completion of the work.
- .2 Drawings are, in general, diagrammatic and are intended to indicate the scope and general arrangement of the work.

1.4 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.

1.5 TIME OF COMPLETION

- .1 Complete the project within 12 weeks after Contract Award.

1.6 HOURS OF WORK

- .1 Restrictive as follows:
 - .1 Schedule deconstruction, removal and construction work after normal operation hours of the building. The normal building operation hours are 0930 hours-1700hours.
 - .2 Notify Departmental Representative with a minimum of 48 hours notice of all after hours work.
 - .3 The Store House shall remain accessible to building occupants during the course of construction.
 - .4 Site works, if not too noisy or disruptive can be done during normal working hours with coordination with the Department Representative.
 - .5 Emergency exits shall not be blocked when working during operation hours of the building.

1.7 WORK SCHEDULE

- .1 Carry on work as per indicated "PHASES" and as follows:
 - .1 Within 10 working days after Contract award, provide a "phasing bar chart" and a schedule showing anticipated progress stages and final completion of the work within the time period required by the Contract documents. 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 trade 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.

1.8 COST BREAKDOWN

- .1 Before submitting the first progress claim, submit a breakdown of the Contract lump sum prices in detail as directed by the Departmental Representative and aggregating Contract price.

1.9 CODES, BYLAWS, STANDARDS

- .1 Perform work in accordance with the National Building Code of Canada (NBC), and other indicated Codes, Construction Standards and/or any other Code or Bylaw of local application.
- .2 Comply with applicable local bylaws, rules and regulations enforced at the location concerned.
- .3 Meet or exceed requirements of Contract documents, specified standards, codes and referenced documents.
- .4 In any case of conflict or discrepancy, the most stringent requirements shall apply.

1.10 DOCUMENTS REQUIRED

- .1 Maintain 1 copy each of the following at the job site:
 - .1 Contract drawings.
 - .2 Contract specifications.
 - .3 Addenda to Contract documents.
 - .4 Copy of approved work schedule.
 - .5 Reviewed/approved shop drawings.
 - .6 Change orders.
 - .7 Other modifications to Contract.
 - .8 Field test reports.
 - .9 Reviewed/approved samples.
 - .10 Manufacturers' installation and application instructions.
 - .11 One set of record drawings and specifications for "as-built" purposes.
 - .12 Current construction standards of workmanship listed in technical Sections
 - .13 Building Safety Plan.

1.11 REGULATORY REQUIREMENTS

- .1 Obtain and pay for - Building Permit, Certificates, Licenses and other permits required by regulatory municipal, provincial or federal authorities to complete the work.
- .2 Provide inspection authorities with plans and information required for issue of acceptance certificates.
- .3 Furnish inspection certificates in evidence that the work installed conforms with the requirements of the authority having jurisdiction.

1.12 CONTRACTOR'S USE OF SITE

- .1 Use of site:
 - .1 Assume responsibility for assigned premises for performance of this work.
 - .2 Be responsible for coordination of all work activities on site
- .2 Perform work in accordance with Contract documents. Ensure work is carried out in accordance with indicated phasing.

- .3 Do not unreasonably encumber site with material or equipment
- .4 Use only services approved by the Departmental Representative.
- .5 Accept liability for damage, safety of equipment and overloading of existing equipment or services.

1.13 EXAMINATION

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

1.14 EXISTING SERVICES

- .1 Where work involves breaking into or connecting to existing services, carry out work at times directed by the Departmental Representative.

1.15 LOCATION OF EQUIPMENT AND FIXTURES

- .1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate. Exact locations and dimensions that affect the work of this contract shall be verified by the contractor.
- .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 his 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.

1.16 CUTTING AND PATCHING

- .1 Cut existing surfaces as required to accommodate new work.
- .2 Remove items so 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 to be watertight to pipes, sleeves, ducts and conduits.
- .6 Patch and make good surfaces cut, damaged or disturbed, to Departmental Representative's approval. Match existing material, finish and texture.
- .7 Making good is defined as matching construction and finishing materials and the adjacent surfaces.

1.17 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.

1.18 ACCEPTANCE OF SUB-TRADES

- .1 Each trade shall examine surfaces prepared by others and job conditions which may affect his work, and shall report defects to the Departmental Representative. Commencement of work shall imply acceptance of prepared work or substrate surfaces.

1.19 QUALITY OF WORK

- .1 Ensure that quality workmanship is performed through use of skilled tradesmen, under supervision of qualified journeyman.
- .2 In cases of dispute, decisions as to standard or quality of work rest solely with the Departmental Representative, whose decision is final.

1.20 WORK 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 Publish minutes of each meeting.
 - .3 Plan and coordinate work in such a way to minimize quantity of service line offsets.
 - .4 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.
- .5 Ensure disputes between subcontractors are resolved.
- .6 Departmental Representative is not responsible for, or accountable for, extra costs incurred as a result of Contractor's failure to coordinate Work.
- .7 Maintain efficient and continuous supervision.

1.21 APPROVAL OF SHOP DRAWINGS, PRODUCT DATA AND SAMPLE

- .1 In accordance with Section 013300 Submittals, 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 Approval of shop drawings.
 - .3 Review of re-submission.

1.22 PRODUCTS SUPPLIED BY DEPARTMENTAL REPRESENTATIVE

- .1 Products supplied by Departmental Representative - refer to following Appendices for details:
 - .1 None

1.23 PROJECT MEETINGS

- .1 Departmental Representative will arrange project meetings and assume responsibility for setting times and recording and distributing minutes.

1.24 TESTING AND INSPECTIONS

- .1 Particular requirements for inspection and testing to be carried out by contractor or as otherwise approved by the Departmental Representative are specified in the related technical sections.
- .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 Testing and adjustment mechanical and electrical equipment and systems.
 - .1 Tests specified to be carried out by Contractor under the Departmental Representative's supervision.
 - .2 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.
 - .4 Contractor shall furnish labour and facilities to: site
 - .1 Notify Departmental Representative in advance of planned testing.
 - .5 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.
 - .6 Pay costs for uncovering and making good work that is covered before required inspection or testing is completed and approved by Departmental Representative.
 - .7 The Departmental Representative may require, and pay for, additional inspection and testing services.
 - .8 Provide Departmental Representative with 2 copies of testing laboratory reports as soon as they are available.

1.25 AS-BUILT DOCUMENTS

- .1 The Departmental Representative will provide 2 sets of drawings, 2 sets of specifications, and 2 copies of the original AutoCAD files for "as-built" purposes.
- .2 As 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.
- .3 Refer to Section 01 33 00 – Submittals Procedures.

1.26 CLEANING

- .1 Daily conduct cleaning and disposal operations. Comply with local ordinances and anti-pollution laws.

- .2 Ensure cleanup of the work areas each day after completion of work.
- .3 In preparation for interim and final inspections:
 - .1 Examine all sight-exposed interior and exterior surfaced and concealed spaces.
 - .2 Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from sight-exposed interior and exterior finished surfaces, including glass and other polished surfaces.
- .4 Use cleaning materials and methods in accordance with instructions of the manufacturer of the surface to be cleaned.

1.27 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.

1.28 MAINTENANCE MATERIALS, SPECIAL TOOLS AND SPARE PARTS

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

1.29 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 plans referred to in the Contract documents.
- .2 Upon request, Departmental Representative may furnish up to a maximum of 10 sets of Contract documents for use by the Contractor at no additional cost. Should more than 10 sets of documents be required the Departmental Representative will provide them at additional cost.

1.30 BUILDING SMOKING ENVIRONMENT

- .1 Smoking within the property is not permitted.

1.31 SYSTEM OF MEASUREMENT

- .1 The metric system of measurement (SI) will be employed on this Contract except where existing installations are in Imperial units of measurement.

1.32 FAMILIARIZATION WITH SITE

- .1 Before submitting tender, visit site - as indicated in tender documents and become familiar with all **conditions likely to affect the cost of the work.**

1.33 SUBMISSION OF TENDER

- .1 Submission of a tender is deemed to be confirmation of the fact that the Tenderer has analyzed the Contract documents and inspected the site, and is fully conversant with all conditions.

Part 2 Products

2.1 NOT USED

.1 Not Used

Part 3 Execution

3.1 NOT USED

.1 Not Used

END SECTION 01 11 55

Part 1 Approvals

- .1 Approval of shop drawings and samples: refer to Section 011155.

1.2 GENERAL

- .1 This Section specifies general requirements and procedures for the Contractor's submissions of shop drawings, product data, samples and other requested submittals to Departmental Representative for review. Additional specific requirements for submissions are specified in individual technical sections.
- .2 Present shop drawings, product data and samples in SI Metric units.
- .3 Where items or information is not produced in SI Metric units, converted values are acceptable.
- .4 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submissions.
- .5 Notify Departmental Representative in writing at time of submission, identifying deviations from requirements of Contract documents and stating reasons for deviations.
- .6 Contractor's responsibility for deviations in submission from requirements of Contract documents is not relieved by Departmental Representative's review of submission unless Departmental Representative gives written acceptance of specific deviations.
- .7 Make any changes in submissions which Departmental Representative may require consistent with Contract documents and resubmit as directed by Departmental Representative
- .8 Notify Departmental Representative in writing, when resubmitting, of any revisions other than those requested by Departmental Representative.
- .9 **Do not proceed with work until relevant submissions are reviewed and approved by the Departmental Representative.**

1.3 SUBMISSION REQUIREMENTS

- .1 Coordinate each submission with the requirements of the work and the Contract documents. Individual submissions will not be reviewed until all related information is available.
- .2 Allow ten (10) days for Departmental Representative's review of each submission, unless noted otherwise.
- .3 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.
- .4 Submissions shall 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.
- .5 After Departmental Representative's review, distribute copies.

1.4 SHOP DRAWINGS

- .1 Shop drawings: original drawings or modified standard drawings provided by Contractor to illustrate details of portions of work which are specific to project requirements.
- .2 Maximum sheet size: 850 x 1050 mm.
- .3 Submit 6 prints of shop drawings for each requirement requested in the specification sections and/or as requested by the Departmental Representative.
- .4 Cross-reference shop drawing information to applicable portions of the Contract documents.

1.5 SHOP DRAWINGS REVIEW

- .1 Review of shop drawings by Public Works and Government Services Canada is for the sole purpose of ascertaining conformance with the general concept. The Sprinkler System and the Fire Alarm shall be reviewed and accepted by the Consultants prior to start of any work.
- .2 This review shall not mean that Public Works and Government Services Canada approves the detail design inherent in the shop drawings, responsibility for which shall remain with Contractor submitting same.
- .3 This review shall not relieve the Contractor of responsibility for errors or omissions in the shop drawings or of responsibility for meeting all requirements of the construction and Contract documents.
- .4 Without restricting the generality of the foregoing, the Contractor is responsible for:
 - .1 Dimensions to be confirmed and correlated at the job site.
 - .2 Information that pertains solely to fabrication processes or to techniques of construction and installation.

.3 Coordination of the work of all sub-trades.

1.6 PRODUCT DATA

- .1 Product data: manufacturers' catalogue sheets, MSDS sheets, brochures, literature, performance charts and diagrams, used to illustrate standard manufactured products or any other specified information.
- .2 Delete information not applicable to project.
- .3 Supplement standard information to provide details applicable to project.
- .4 Cross-reference product data information to applicable portions of Contract documents.
- .5 Submit 6 copies of product data.

1.7 SAMPLES

- .1 Samples: examples of materials, equipment, quality, finishes and workmanship.
- .2 Where colour, pattern or texture is a criterion, submit a full range of samples.
- .3 Reviewed and accepted samples will become the standard of workmanship and material against which installed work will be verified.

1.8 PROGRESS SCHEDULE

- .1 Submit work schedule and cost breakdown as required in Section 011155.

1.9 TEST RESULTS AND INSPECTION REPORTS

- .1 Submit in duplicate test results and inspection reports required by following Sections:
 - .1 21 13 13 Sprinkler System

END OF SECTION 01 33 00

- .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 33 00.
- .2 Work effected by submittal shall not proceed until review is complete.
- .3 Submit the following:
 - .1 Site Specific Health and Safety Plan.
 - .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 current Material Safety Data Sheets (MSDS), and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.
 - .5 Emergency Procedures.
- .4 The Departmental Representative will review the Contractor's Site Specific Health and Safety Plan and emergency 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 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, Territorial and local statutes, regulations, and ordinances, and with Site Specific Health and Safety Plan.

1.7 HEALTH AND SAFETY COORDINATOR

- .1 The Health and Safety Coordinator:
 - .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, revising, daily enforcing, and monitoring the Site Specific Health and Safety Plan.
- .3 Be on site during execution of work.

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 Refer to Pre-construction Hazard Assessment Form Appendix A.

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 speciality permits related to project before start of work.

1.13 FILING OF NOTICE

- .1 The General Contractor is to complete and submit a Notice of Project as required by Provincial authorities.
- .2 Provide copies of all notices to the Departmental Representative.

1.14 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 a site-specific project Health and Safety Plan based on 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.
 - .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.
 - .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 Health and Safety Plan as required, and re-submit to the Departmental Representative.
- .5 Departmental Representative's review: the review of Site Specific Health and Safety Plan by Public Service and Procurement Canada (PSPC) shall not relieve the Contractor of responsibility for errors or omissions in final Site Specific Health and Safety Plan or of responsibility for meeting all requirements of construction and Contract documents.

1.15 EMERGENCY PROCEDURES

- .1 List standard operating procedures and measures to be taken in emergency situations. Include an 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 site staff.
- .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 [site staff].
- .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.

1.16 HAZARDOUS PRODUCTS

- .1 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 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 products intended for use. Submit applicable MSDS and WHMIS documents as per Section 01 33 00.
 - .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 manufacturer's recommendations.
 - .5 The contractor shall ensure that only pre-approved products are brought 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 applicable Provincial / Territorial Regulations.
- .2 Removal and handling of asbestos will be performed as indicated.

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.

1.19 REMOVAL OF LEAD-CONTAINING PAINTS

- .1 All paints 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 applicable Provincial / Territorial Regulations.

1.20 ELECTRICAL SAFETY REQUIREMENTS

- .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 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).

1.24 SCAFFOLDING

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

1.25 CONFINED SPACES

- .1 Carry out work in confined spaces in compliance with Provincial / Territorial Regulations

1.26 POWDER-ACTUATED DEVICES

- .1 Use powder-actuated devices in accordance with ANSI A10.3 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.

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.
- .3 Portable gas and diesel fuel tanks are not permitted on most federal work sites. Approval from the DR 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 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 Health and Safety Plan.
 - .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.
 - .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) documents.
 - .9 Material Safety Data Sheets (MSDS).
 - .10 List of names of Joint Health and Safety Committee members, or Health and Safety Representative, as applicable.
- .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 non-compliance 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".

END OF SECTION 01 35 33

Part 1 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 Departmental Representative for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Departmental Representative.
- .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, Departmental representative 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 4 copies of inspection and test reports to Departmental Representative.
- .2 Provide copies to subcontractor of work being inspected or tested] [manufacturer or fabricator of material being inspected or tested.

1.7 EQUIPMENT AND SYSTEMS

- .1 Refer to Divisions 22, 23 and 26 for definitive requirements.

Part 2 Products

2.1 NOT USED

- .1 Not Used

Part 3 Execution

3.1 NOT USED

- .1 Not Used

END OF SECTION 01 45 00

Part 1 Access and Delivery

- .1 Only the designated entrance may be used for access to building.
 - .1 Maintain for duration of Contract.
 - .2 Make good damage resulting from Contractor's use.

1.2 STORAGE FACILITIES

- .1 Storage space will be limited to designated areas in the building.

1.3 POWER

- .1 Electrical power and lighting at existing building may be used for construction purposes at no extra cost, provided that warranties are not affected thereby and electrical components used for temporary power are replaced when damaged. Do not use emergency power or UPS panels for this purpose.

1.4 WATER SUPPLY

- .1 Water supply is available at existing building and may be used for construction purposes at no cost.

1.5 HEATING AND VENTILATION

- .1 Do not begin work until arrangements have been made with the Departmental Representative for protection of on-floor heating, ventilating and air-conditioning.
 - .1 If there is any dirt in the heating and ventilation system, it will be the Contractor's responsibility to return it to its original state in accordance with the Departmental Representative's specifications.

1.6 SCAFFOLDING

- .1 Construct and maintain scaffolding in rigid, secure and safe manner.
- .2 Erect scaffolding independent of walls. Remove promptly when no longer required.

1.7 REMOVAL OF TEMPORARY FACILITIES

- .1 Remove temporary facilities from site when directed by the Departmental Representative.

1.8 SIGNS AND NOTICES

- .1 Signs and notices for safety and instruction shall be in both official languages or graphic symbols conforming to CAN/CSA-Z321.
- .2 Maintain approved signs and notices in good condition for duration of project, and dispose of off site on completion of project or when directed by Departmental Representative.

END OF SECTION 01 51 00

Part 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.
- .6 Fastenings which cause spalling or cracking are not acceptable.
- .7 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
- .8 Use heavy hexagon heads, semi-finished unless otherwise specified.
- .9 Bolts may not project more than 1 diameter beyond nuts.
- .10 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.
- .11 Deliver, store and maintain packaged material and equipment with manufacturer's seals and labels intact.
- .12 Prevent damage, adulteration and soiling of products during delivery, handling and storage. Immediately remove rejected products from site.
- .13 Store products in accordance with suppliers' instructions.
- .14 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.
 - .4 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.
 - .5 Unless otherwise indicated in the specifications, maintain uniformity of manufacture for any particular or like item throughout the building.
 - .6 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 re-installation 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" (used for complex Mechanical or Electrical Systems): select any one of the indicated manufacturer's 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

Part 1 General

1.1 REFERENCES

- .1 Not Used.

1.2 PROJECT CLEANLINESS

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, other than that caused by User or other parties.
- .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.
- .3 Clear snow and ice from access to building, bank/pile snow in designated areas only.
- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 Provide on-site containers for collection of waste materials and debris.
- .6 Provide and use marked separate bins for recycling. Refer to Section 01 74 19 - Construction/Demolition Waste Management and Disposal.
- .7 Dispose of waste materials and debris at designated dumping areas on off site.
- .8 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.
- .9 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .10 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .11 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .12 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.3 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 other than that caused by Departmental representative 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.
- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

- .7 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.
- .8 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls and floors.
- .9 Clean lighting reflectors, lenses, and other lighting surfaces.
- .10 Vacuum clean and dust building interiors, behind grilles, louvres and screens.
- .11 Wax, seal, shampoo or prepare floor finishes, as recommended by manufacturer.
- .12 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .13 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .14 Remove dirt and other disfiguration from exterior surfaces.
- .15 Clean and sweep roofs, gutters, areaways, and sunken wells.
- .16 Sweep and wash clean paved areas.
- .17 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.
- .18 Clean roofs, downspouts, and drainage systems.
- .19 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.
- .20 Remove snow and ice from access to building.

1.4 WASTE MANAGEMENT AND DISPOSAL

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

1.5 RELATED WORK

- .1 The valuable and irreplaceable content in the Store House and the affected areas of construction will be moved by the Contractor. Provide appropriate protection for the content and equipment/furniture remaining during the course of construction. Coordinate with the department representative prior to any movement of existing equipment/furniture. Refer to drawings for layout.

Part 2 Products

2.1 NOT USED

- .1 Not Used

Part 3 Execution

3.1 NOT USED

- .1 Not Used

END OF SECTION 01 74 11

Part 1 Related Work

- .1 Refer to every technical section for waste management and disposal.

1.2 DEFINITIONS

- .1 Waste Audit (WA): relates to projected waste generation; involves controlled separation of waste.
- .2 Waste Reduction Workplan (WRW): a written report which addresses opportunities for reduction, re-use or recycling of materials.
- .3 Materials Source Separation Program (MSSP): consists of a series of ongoing activities to separate re-usable and recyclable waste material into material categories from other types of waste at point of generation.

1.3 MATERIALS SOURCE SEPARATION

- .1 Before project start-up, prepare Materials Source Separation Program.
- .2 Provide separate containers for re-usable and/or recyclable materials of the following:
 - .1 Gypsum board.
 - .2 Metals
 - .3 Wood.
 - .4 Plastics.
 - .5 Other materials as indicated in technical sections.
- .3 Implement Materials Source Separation Program for waste generated on project in compliance with approved methods and as approved by Departmental Representative.
- .4 Locate containers in locations, to facilitate deposit of materials without hindering daily operations.
- .5 Locate separated materials in areas which minimize material damage.

1.4 DIVERSION OF MATERIALS

- .1 Create a list of materials to be separated from the general waste stream and stockpiled in separate containers, to the approval of the Departmental Representative and consistent with applicable fire regulations.
 - .1 Mark containers.
 - .2 Provide instruction on disposal practices.

1.5 STORAGE, HANDLING AND APPLICATION

- .1 Do work in compliance with Waste Reduction Workplan.
- .2 Handle waste materials not re-used, salvaged, or recycled in accordance with appropriate regulations and codes.
- .3 Materials in separated condition: collect, handle, store on site, and transport off-site to an approved and authorized recycling facility.
- .4 Materials must be immediately separated into required categories for re-use or recycling.
- .5 Unless specified otherwise, materials for removal become the Contractor's property.

- .6 On-site sale of salvaged/recyclable material is not permitted.
- .7 Provide Departmental Representative with receipts indicating quantity of material delivered to landfill.
- .8 Provide Departmental Representative with receipts indicating quantity and type of materials sent for recycling.

END OF SECTION 01 74 19

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 33 00 Submittal Procedures
- .2 Section 01 45 00 Quality Control

1.2 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prepare instructions and data using personnel experienced in maintenance and operation of described products.
- .3 Copy will be returned after final inspection, with Departmental Representative's comments.
- .4 Revise content of documents as required prior to final submittal.
- .5 Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, four final copies of operating and maintenance manuals in English.
- .6 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.
- .7 Furnish evidence, if requested, for type, source and quality of products provided.
- .8 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.
- .9 Pay costs of transportation.

1.3 FORMAT

- .1 Organize data as instructional manual and PDF.
- .2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219mm x 279mm 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 systems under 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.

1.4 CONTENTS – EACH VOLUME

- .1 Table of Contents: provide title of project;
 - .1 Date of submission; names.
 - .2 Addresses, and telephone numbers of Consultant and Contractor with name of responsible parties.

- .3 Schedule of products and systems, indexed to content of volume.
- .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 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.

1.5 AS-BUILT DOCUMENTATIONS

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

1.6 EQUIPMENT AND SYSTEMS

- .1 Each Item of Equipment and Each System: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
- .2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.
- .3 Include installed colour coded wiring diagrams.
- .4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

- .5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- .6 Provide servicing and lubrication schedule, and list of lubricants required.
- .7 Include manufacturer's printed operation and maintenance instructions.
- .8 Include sequence of operation by controls manufacturer.
- .9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .10 Provide installed control diagrams by controls manufacturer.
- .11 Provide complete copy of Fire Alarm Verification Report prepared to the requirements of the most recent edition of CAN/ULC S537, submit to the Departmental Representative for acceptance.
- .12 Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.
- .13 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- .14 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- .15 Additional requirements: as specified in individual specification sections.

1.7 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 site; place and store.
- .4 Receive and catalogue 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.

1.8 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 site; place and store.
- .4 Receive and catalogue 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.

1.9 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 site; place and store.

- .4 Receive and catalogue 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 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.

1.11 WARRANTIES AND BONDS

- .1 Develop warranty management plan to contain information relevant to Warranties.
- .2 Submit warranty management plan to Departmental Representative approval.
- .3 Warranty management plan to include required actions and documents to assure that Departmental representative receives warranties to which it is entitled.
- .4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.
- .5 Submit, warranty information made available during construction phase, to Departmental Representative for approval prior to each monthly pay estimate.
- .6 Assemble approved information in binder and submit upon acceptance of work. Organize binder as follows:
 - .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 applicable item of work.
 - .4 Verify that documents are in proper form, contain full information, and are notarized.
 - .5 Co-execute submittals when required.
 - .6 Retain warranties and bonds until time specified for submittal.
- .7 Except for items put into use with Departmental representative's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.
- .8 Include information contained in warranty management plan as follows:
 - .1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.
 - .2 Listing and status of delivery of Certificates of Warranty for extended warranty items.
 - .3 Provide list for each warranted equipment, item, feature of construction or system indicating:
 - .1 Name of item.

- .2 Model and serial numbers.
- .3 Location where installed.
- .4 Name and phone numbers of manufacturers or suppliers.
- .5 Names, addresses and telephone numbers of sources of spare parts.
- .6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.
- .7 Cross-reference to warranty certificates as applicable.
- .8 Starting point and duration of warranty period.
- .9 Summary of maintenance procedures required to continue warranty in force.
- .10 Cross-Reference to specific pertinent Operation and Maintenance manuals.
- .11 Organization, names and phone numbers of persons to call for warranty service.
- .12 Typical response time and repair time expected for various warranted equipment.
- .4 Procedure and status of tagging of equipment covered by extended warranties.
- .5 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.
- .9 Respond in a timely manner to oral or written notification of required construction warranty repair work.
- .10 Written verification will follow oral instructions. Failure to respond will be cause for the Departmental Representative to proceed with action against Contractor.

1.12 WARRANTY TAGS

- .1 Tag, at time of installation, each warranted item. Provide durable, oil and water resistant tag approved by Departmental Representative.
- .2 Attach tags with copper wire and spray with waterproof silicone coating.
- .3 Leave date of acceptance until project is accepted for occupancy.
- .4 Indicate following information on tag:
 - .1 Type of product/material.
 - .2 Model number.
 - .3 Serial number.
 - .4 Contract number.
 - .5 Warranty period.
 - .6 Inspector's signature.
 - .7 Construction Contractor.

PART 2 Products

2.1 NOT USED

- .1 Not Used

PART 3 Execution

3.1 NOT USED

.1 Not Used

END OF SECTION 01 78 00

Approved: 2009-06-30

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 11 55 General Instruction.

1.2 ADMINISTRATIVE REQUIREMENTS

- .1 Demonstrate scheduled operation and maintenance of equipment and systems to Owner's personnel two weeks prior to date of substantial performance.
- .2 Owner: provide list of personnel to receive instructions, and co-ordinate their attendance at agreed-upon times.
- .3 Preparation:
 - .1 Verify conditions for demonstration and instructions comply with requirements.
 - .2 Verify designated personnel are present.
 - .3 Ensure equipment has been inspected and put into operation in accordance with Section 01 91 00 Commissioning.
 - .4 Ensure testing, adjusting, and balancing has been performed in accordance with Section 01 91 00 - Commissioning (Cx) and equipment and systems are fully operational.
- .4 Demonstration and Instructions:
 - .1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at scheduled times, at the equipment location.
 - .2 Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.
 - .3 Review contents of manual in detail to explain aspects of operation and maintenance.
 - .4 Prepare and insert additional data in operations and maintenance manuals when needed during instructions.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for Departmental Representative's approval.
- .3 Submit reports within [one week] after completion of demonstration, that demonstration and instructions have been satisfactorily completed.
- .4 Give time and date of each demonstration, with list of persons present.
- .5 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

1.4 QUALITY ASSURANCE

- .1 When specified in individual Sections requiring manufacturer to provide authorized representative to demonstrate operation of equipment and systems:
 - .1 Instruct Owner's personnel.

.2 Provide written report that demonstration and instructions have been completed.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION 01 79 00

Part 1 Section Includes

- .1 Includes general requirements for commissioning facilities and facility systems.
- .2 Refer to sections of Plumbing, Sprinklers, Electrical and Communications disciplines.

1.2 DEFINITIONS

- .1 Acronyms:
 - .1 AFD - Alternate Forms of Delivery, service provider.
 - .2 BMM - Building Management Manual.
 - .3 Cx - Commissioning.
 - .4 EMCS - Energy Monitoring and Control Systems.
 - .5 O&M - Operation and Maintenance.
 - .6 PI - Product Information.
 - .7 PV - Performance Verification.
 - .8 TAB - Testing, Adjusting and Balancing.
- .2 Cx - a required program of tests, procedures and checks carried out systematically on systems and integrated systems of the finished Project. Cx is performed after systems and integrated systems are completely installed, functional and Contractor's Performance Verification responsibilities have been completed and approved.

1.3 QUALITY ASSURANCE

- .1 Testing organization: current member in good standing of AABC certified to perform specified services.
- .2 Comply with applicable procedures and standards of the certification sponsoring association.
- .3 Perform services under direction of supervisor qualified under certification requirements of sponsoring association.
- .4 Contractor to engage the services of a third party Commissioning Agent.
- .5 The Commissioning Agent shall not be the TBA organization.
- .6 Commissioning Schedule to be included as a line item in the construction schedule.

1.4 REFERENCES

- .1 Associated Air Balance Council (AABC): National Standards for Field Measurement and Instrumentation, Total Systems Balance, Air Distribution-Hydronics Systems.
- .2 CSA Z320-11 Commissioning Standard.

1.5 SUBMITTALS

- .1 Prior to start of Work, submit name of Commissioning Agent engaged to perform the Commissioning services. Designate who has managerial responsibilities for coordination of entire testing, adjusting and balancing.
- .2 Submit documentation to confirm organization compliance with quality assurance provision.
- .3 Submit 3 preliminary specimen copies of each of report forms proposed for use.

- .4 Ten (10) days prior to Substantial Performance, submit 3 copies of final reports on applicable forms.
- .5 Submit reports of testing, adjusting and balancing postponed due to seasonal, climatic, occupancy, or other reasons beyond Contractor's control, promptly after execution of those services.

Part 2 Procedures - General

- .1 Comply with procedural standards of certifying association under whose standard services will be performed.
- .2 Notify Departmental Representative 3 days prior to beginning of operations.
- .3 Accurately record data for each step.
- .4 Report to Departmental Representative any deficiencies or defects noted during performance of services.

2.2 CONTRACTOR'S RESPONSIBILITIES

- .1 Prepare each system for testing and balancing.
- .2 Cooperate with testing organization and provide access to equipment and systems.
- .3 Provide personnel and operate systems at designated times, and under conditions required for proper testing, adjusting, and balancing.
- .4 Notify testing organization 7 days prior to time project will be ready for testing, adjusting, and balancing.

2.3 PREPARATION

- .1 Provide instruments required for testing, adjusting, and balancing operations.
- .2 Make instruments available to Departmental Representative to facilitate spot checks during testing.
- .3 Retain possession of instruments and remove at completion of services.
- .4 Verify systems installation is complete and in continuous operation.
- .5 Verify equipment such as computers and electronic equipment are in full operation.

2.4 FINAL REPORTS

- .1 Organization having managerial responsibility shall make reports.
- .2 Ensure each form bears signature of recorder, and that of supervisor of reporting organization.
- .3 Identify each instrument used, and latest date of calibration of each.
- .4 The Commissioning Agent is responsible for providing the Final Commissioning Report.

2.5 COMPLETION OF COMMISSIONING

- .1 Upon completion of Cx leave systems in normal operating mode.
- .2 Except for warranty and seasonal verification activities specified in Cx specifications, complete Cx prior to issuance of Interim Certificate of Completion.
- .3 Cx deliverables have been submitted and accepted by Departmental Representative.

- .4 Final Commissioning Report shall be submitted and approved by the Departmental Representative prior to issuance of Interim Certificate of Completion.

END OF SECTION 01 91 00

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 11 55 General Instructions
- .2 Section 01 35 33 Health and Safety Requirements

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.
- .2 WorksafeBC
 - .1 Safe Handling of Asbestos, A Manual of Standard Practices.

1.3 HEALTH AND SAFETY

- .1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with 01 11 55 – General Instructions.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Place materials defined as hazardous or toxic in designated containers.
- .4 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional and Municipal regulations.
- .5 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan
- .6 Fold up metal banding, flatten and place in designated area for recycling.
- .7 Do not dispose of waste or volatile materials such as mineral spirits, oil petroleum based lubricant, or toxic cleaning solutions into storm or sanitary sewers. Ensure proper disposal procedures are maintained throughout project.
- .8 Mercury containing thermostats shall be disposed in accordance with safety regulations (see Recycling Council of British Columbia, <http://rcbc.bc.ca/education/faqs/mercury4>).

1.5 ENVIRONMENTAL PROTECTION

- .1 Do not dispose of waste or volatile materials into watercourses, storm or sanitary sewers.
- .2 Prevent extraneous materials from contaminating air beyond deconstruction area, by providing temporary enclosures during Work.
- .3 Employ reasonable means necessary to protect salvaged materials from vandalism, theft, adverse weather, or inadvertent damage.
- .4 Organize site and workers in matter which promotes efficient flow of materials through disassembly, processing, stockpiling, and removal.

- .5 Remove and transport toxic or dangerous materials from site in accordance with authority having jurisdiction.

1.6 SITE CONDITION

- .1 The existing site and building will be in use during work of this Contract. Maintain building access at all doorways and corridors.
- .2 Investigate site and building to determine dismantling, processing and storage logistics required prior to beginning of Work.
- .3 Develop strategy for deconstruction to facilitate optimum salvage of reusable and recyclable materials.
- .4 Notify Departmental Representative before disrupting building access or services.
- .5 Take preventative measures during demolition process and do not disturb pipe elbow insulation, duct mastic or other suspicious substance which may contain hazardous materials. Exercise caution when cutting existing duct insulation.
- .6 Contractor shall prepare and submit a Site Specific Asbestos and Lead Exposure Control Plan to Departmental Representative within ten (10) working days of Award of Contract for review and approval, prior to start of construction.
- .7 All ACM and hazardous materials removal will be under the control of the Departmental Representative and may be a change order to the contract price in accordance with General Conditions, or removed under a separate contract by the Departmental Representative.
- .8 Locate any existing conduit, rebar, etc. within floor or walls prior to drilling and/or coring. Contractor is responsible for repairing any such conduit, rebar, etc. that is damaged in the course of construction.

Part 2 Products

2.1 NOT USED

- .1 Not used.

Part 3 Execution

3.1 PREPARATION

- .1 Inspect site 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.

3.2 PROTECTION

- .1 Prevent movement, settlement, or damage to adjacent structures, utilities and parts of building to remain in place. Provide bracing and shoring required.
- .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.
- .6 Prevent debris from blocking drainage which must remain in operation.
- .7 Take precaution during demolition to protect all adjacent finished surfaces. Make good any damage to adjacent surfaces.

3.3 SALVAGE

- .1 Refer to demolition drawings and specifications for items to be salvaged for reuse.
- .2 Remove items to be reused and protect items from damage.

3.4 DISPOSAL

- .1 Dispose of removed materials, to appropriate recycling facilities except where specified otherwise, in accordance with authority having jurisdiction.
- .2 The Departmental representative reserves the option to request some or all existing equipment being removed and not required to be relocated to remain the property of the Departmental representative. When directed by the Departmental Representative, remove such equipment and turn over to the Departmental representative. Provide receipt verifying disposition of such equipment.

END OF SECTION 02 41 99

Part 1 General

1.1 RELATED SECTIONS

- .1 Divisions 21, 26.

1.2 DESCRIPTION OF WORK

- .1 Apply firestop sealant and systems around all penetrations through openings in fire rated wall, floor and ceiling assemblies.
- .2 Seal around conduits penetrating fire separations.

1.3 REFERENCES

- .1 ULC-S115-05 – Standard Method of Fire Tests of Firestop Systems.

1.4 PRODUCT DATA

- .1 Submit product data and layout plan in accordance with Section 01 11 55.
- .2 Submit manufacturer's product data for materials and prefabricated devices, providing descriptions are sufficient for identification at job site. Include manufacturer's printed instructions for installation.
- .3 Submit plan showing location of each penetration and product data to indicate type of firestopping being installed at each location.

Part 2 Products

2.1 MATERIALS

- .1 Fire stopping and smoke seal systems: in accordance with ULC-S115.
 - .1 Systems capable of maintaining an effective barrier against flame, smoke and gases in compliance with requirements of ULC-S115 and not to exceed opening sizes for which they are intended.
 - .2 Fire stop system rating: to match wall/floor/roof assembly of rating indicated.
- .2 Service penetration assemblies: certified by ULC in accordance with ULC-S115 and listed in ULC Guide No. 40 U19.
- .3 Prefabricated flange units, with outer metal flange die-stamped from 0.3 mm thick 316 stainless steel, with inset of premoulded silicone elastomeric ring, factory moulded, U.L.C. or W.H. listed as a through penetration fire stop. Flange hinged for fixing over pipe and then secured tight with self-tapping screw.
- .4 Fire-resistance rating of installed fire stopping assembly not less than the fire- resistance rating of surrounding wall assembly.
- .5 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal; do not use cementitious or rigid seal at such locations.
- .6 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: prefabricated silicone elastomeric seal; do not use a cementitious or rigid seal at such locations.

- .7 Primers: to manufacturer's recommendation for specific material, substrate, and end use.

Part 3 Execution

3.1 PREPARATION

- .1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials. Ensure that substrates and surfaces are clean, dry and frost free.
- .2 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.

3.2 INSTALLATION

- .1 Install fire stopping and smoke seal material and components in accordance with ULC certification and manufacturer's instructions.
- .2 Seal holes or voids made by through penetrations, poke-through termination devices, and openings or joints to ensure continuity and integrity of fire separation are maintained.
- .3 Tighten self-tapping screw on flange unit to ensure adequate tight and permanent seal.

3.3 INSPECTION

- .1 Notify Departmental Representative when ready for inspection and prior to concealing or enclosing fire stopping materials and service penetration assemblies.

3.4 SCHEDULE

- .1 Fire stop and smoke seal at:
 - .1 Penetrations through fire-resistance rated walls, floors and ceilings.
 - .2 Around mechanical and electrical assemblies penetrating fire separations.
- .2 Floor, wall and ceiling assemblies where there is existing fire stopping will deemed to be fire rated. New penetrations through such assemblies shall be fire stopped. Review existing condition on site and keep records. Consult with Departmental Representative as required.

3.5 CLEAN UP

- .1 Remove excess materials and debris and clean adjacent surfaces immediately after application.

END OF SECTION 07 84 00

PART 1 General

1.1 RELATED SECTIONS

- .1 Section 01 33 00 Shop Drawings, Product Data and Samples
- .2 Section 01 35 33 Health and Safety Requirements
- .3 Section 01 74 19 Waste Management And Disposal
- .4 Section 01 78 00 Closeout Submittals
- .5 Section 21 Fire Suppression
- .6 Section 22 Plumbing

1.2 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Shop Drawings, Product Data and Samples.
- .2 Shop Drawings to Show:
 - .1 Mounting arrangements.
 - .2 Operating and maintenance clearances.
- .3 Shop Drawings and Product Data Accompanied By:
 - .1 Detailed drawings of bases, supports, and anchor bolts.
 - .2 Acoustical sound power data, where applicable.
 - .3 Points of operation on performance curves.
 - .4 Manufacturer to certify current model production.
 - .5 Certification of compliance to applicable codes.
- .4 In addition to transmittal letter referred to in Section 01 33 00 - Shop Drawings, Product Data and Samples: use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.
- .5 Closeout Submittals:
 - .1 Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
 - .2 Operation and maintenance manual approved by, and final copies deposited with, Departmental Representative before final inspection.
 - .3 Operation Data to Include:
 - .1 Control schematics for systems including environmental controls.
 - .2 Description of systems and their controls.
 - .3 Description of operation of systems at various loads together with reset schedules and seasonal variances.
 - .4 Operation instruction for systems and component.
 - .5 Description of actions to be taken in event of equipment failure.
 - .6 Valves schedule and flow diagram.
 - .7 Colour coding chart.

- .4 Maintenance Data to Include:
 - .1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
 - .2 Data to include schedules of tasks, frequency, tools required and task time.
- .5 Performance Data to Include:
 - .1 Equipment performance verification test results.
 - .2 Special performance data as specified.
- .6 Approvals:
 - .1 Submit 2 copies of draft Operation and Maintenance Manual to Departmental Representative for approval. Submission of individual data will not be accepted unless directed by Departmental Representative.
 - .2 Make changes as required and re-submit as directed by Departmental Representative.
- .7 Additional Data:
 - .1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.
- .8 Site Records:
 - .1 Departmental Representative will provide 1 set of reproducible mechanical drawings. Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.
 - .2 Transfer information weekly to reproducibles, revising reproducibles to show work as actually installed.
 - .3 Use different colour waterproof ink for each service.
 - .4 Make available for reference purposes and inspection.
- .9 As-Built Drawings:
 - .1 Prior to start of Testing, finalize production of as-built drawings.
 - .2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).
 - .3 Submit to Departmental Representative for approval and make corrections as directed.
 - .4 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.

1.3 QUALITY ASSURANCE

- .1 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

1.4 MAINTENANCE

- .1 Furnish spare parts in accordance with Section 01 78 00 - Closeout Submittals as indicated in the detailed product specification clauses.
- .2 Provide access doors for concealed expansion joints, traps, strainers, cleanouts, balance dampers, fire dampers, other parts requiring accessibility for operating and maintenance.

- .3 In suspended panel ceilings, use panel in place of access door; provide in such panel a button or other means of identification and easy removal when necessary.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Waste Management and Disposal:
 - .1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 ACCESS DOORS

- .1 Access door size shall be as indicated and where not indicated, make 305mm x 406mm [12" x 16"] minimum or 610mm x 457mm [24" x 18"] where persons have to enter. For acoustical ceilings, conform to architectural panel pattern.
- .2 Unless otherwise indicated, access doors shall be hinged, flush type, steel framed panel, 14 gauge minimum, satin finished galvanized steel or type 304 stainless steel, with anchor straps for wet areas, washrooms, and all walls finished in ceramic tile.
- .3 Hinges shall be concealed, spring hinge to allow door to open 175°. Locking devices shall be flush cam type, screwdriver operated, doors and frames shall have prime coated rust inhibiting paint, unless made of stainless steel.
- .4 Where doors are required in fire rated walls, access doors shall be uninsulated and for all fire rated ceilings and walls where maximum temperature rise limitation is applicable, shall be insulated. All fire rated access doors shall have Warnock Hersey or ULC listed 2 hour fire rating and shall be installed in accordance with NFPA 80 and manufacturer's installation instructions.

Part 3 Execution

3.1 CLEANING

- .1 Clean interior and exterior of all systems including strainers.

3.2 FIELD QUALITY CONTROL

- .1 Site Tests: conduct following tests in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 - SUBMITTALS.
- .2 Manufacturer's Field Services:
 - .1 Where specified, obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
 - .2 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, as directed in PART 1 - QUALITY ASSURANCE.

3.3 DEMONSTRATION

- .1 Departmental Representative will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.
- .2 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.
- .3 Use operation and maintenance manual and as-built drawings as part of instruction materials.
- .4 Instruction duration time requirements as specified in appropriate sections.

3.4 PROTECTION

- .1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

END OF SECTION 21 05 01

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 11 55 General Instructions
- .2 Section 01 35 33 Health and Safety Requirements
- .3 Section 21 05 01 Common Work Results – Mechanical

1.2 REFERENCES

- .1 American National Standards Institute/National Fire Prevention Association (ANSI/NFPA)
 - .1 ANSI/NFPA 13-2013, Installation of Sprinkler Systems.
 - .2 NFPA 24-2013, Standard for Installation of Private Fire Service Mains and Their Appurtenances.
 - .3 ANSI/NFPA 25-2014, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .3 Underwriter's Laboratories of Canada (ULC).
- .4 American Society for Testing and Materials (ASTM)
 - .1 ASTM A193 – Alloy-Steel and Stainless Steel Bolting Materials for High Temperature or High Pressure Service and Other Special Purpose Applications
 - .2 ASTM A312 – Seamless and Welded Austenitic Stainless Steel Pipe
 - .3 ASTM A351 – Castings, Austenitic, Austenitic-Ferritic (Duplex), for pressure Containing Parts
 - .4 ASTM A-276 – Stainless Steel Bars and Shapes.
 - .5 ASTM A-312 – Seamless and Welded Austenitic Stainless Steel Pipe.
 - .6 ASTM D-2000 – Standard Classification System for Rubber Products in Automotive Application.

1.3 SAMPLES

- .1 Submit samples of following:
 - .1 Each type of sprinkler head.
 - .2 Signs.

1.4 DESIGN REQUIREMENTS

- .1 Design automatic dry pipe fire suppression sprinkler systems in accordance with required and advisory provisions of NFPA 13-2013, by hydraulic calculations for uniform distribution of water over design area. Automatic sprinkler system shall be hydraulically designed using water supply test data obtain by testing to NFPA 291 Recommended Practice for Fire Flow Testing and Marking of Hydrants. Test shall be conducted by or under the direct supervision of the sprinkler system designer. Flow test is required by the installing contractor for the purposes of detailed design and production of hydraulic calculations.

- .2 Design and provide each system to give full consideration to blind spaces, piping, electrical equipment, ducts, and other construction and equipment in accordance with detailed shop drawings.
- .3 Locate sprinkler heads in consistent pattern with ceiling grid, lights, and air supply diffusers.
- .4 Devices and equipment for fire protection service: ULC approved for use in sprinkler systems.
- .5 Design systems for earthquake protection for buildings in seismic zone applicable.
- .6 Location of Sprinkler Heads:
 - .1 Locate heads in relation to ceiling and spacing of sprinkler heads not to exceed that permitted by NFPA 13.
 - .2 Uniformly space sprinklers on branch.
- .7 Water Distribution:
 - .1 Make distribution uniform throughout the area in which sprinkler heads will open.
- .8 Water Supply:
 - .1 Base hydraulic calculations on static and residual pressures using the water supply test data obtain by testing to NFPA 291 Recommended Practice for Fire Flow Testing and Marking of Hydrants. For design purpose, the available water supply pressures shall be de-rated by a 10% safety factor.
- .9 The “Authority Having Jurisdiction” will be designated by the Departmental Representative.
- .10 Sprinkler drawings and specifications are to give the bidder concept of the work involved. The design intent shall not be changed. Significant design features such as the location of exposed pipes and the method of zoning the sprinkler system may not be changed without prior discussion and approval by the Engineer. Field changes may be required to accommodate lighting, and hidden obstructions. Possible additional sprinkler heads may be required if blind spaces and ceiling drops have not been noted and/or dry type heads may have to be implemented if the area is not frost free.
- .11 The contractor shall make access to blind spaces in a professional manner. Honeycombing required to establish joist locations and/or similar endeavors to establish sound pipe hangers, are acceptable.

1.5 SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 01 50 – General Instructions.
 - .2 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 11 55 - General Instructions.
- .2 Shop Drawings:
 - .1 Submit shop drawings in accordance with Section 01 11 55 - General Instructions.
 - .2 Shop drawings: submit drawings stamped sealed and signed by professional engineer registered or licensed in Province of B.C. Indicate:
 - .1 Materials.
 - .2 Finishes.
 - .3 Method of anchorage

- .4 Number of anchors.
- .5 Supports.
- .6 Reinforcement.
- .7 Assembly details.
- .8 Accessories.
- .3 Drawings: Sprinkler heads and piping system layout.
 - .1 Prepare detail working drawings of system layout in accordance with NFPA 13 using full size contract drawings.
 - .2 Show data essential for proper installation of each system.
 - .3 Show details, plan view, elevations, and sections of systems supply and piping.
 - .4 Show piping schematic of systems supply, devices, valves, pipe, and fittings.
- .4 Design Data:
 - .1 Calculations of sprinkler system design.
 - .2 Indicate type and design density of each system.
- .3 Assurance of Professional Design and Commitment for Field Review.
 - .1 Provide Assurance commitment letters (Schedules B-1 and B-2) at the commencement of the project, in accordance with the building code and for Building Permit application.
 - .2 Provide Assurance of Professional Field Review and Compliance (Schedule C-B) at the completion of the project.
- .4 Closeout Submittals:
 - .1 Submit maintenance and engineering data for incorporation into manual specified in Section 01 11 55 – General Instructions in accordance with ANSI/NFPA 20.
 - .2 Manufacturer's Catalog Data, including specific model, type, and size for:
 - .1 Pipe and fittings.
 - .2 Sprinkler heads.
 - .3 Pipe hangers and supports.
 - .4 Mechanical couplings.
 - .3 Field Test Reports:
 - .1 Preliminary tests on piping system.
 - .2 Formal tests and inspections
 - .4 Records:
 - .1 As-built drawings of each system.
 - .1 After completion, but before final acceptance, submit complete set of as-built drawings (prints) of each system for record purposes.
 - .2 Submit drawings in digital file versions with title block similar to full size contract drawings.
 - .5 Operation and Maintenance Manuals:
 - .1 Provide maintenance data for incorporation into manual specified in Section 01 11 55 - General Instructions.
 - .2 Provide detailed hydraulic calculations including summary sheet, and Contractors Material and Test Certificate for aboveground piping and other documentation for incorporation into manual specified in Section 01 11 55 - General Instructions in accordance with ANSI/NFPA 13.

1.6 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Installer: company or person specializing in sprinkler systems with documented experience.
 - .2 All work shall be carried out by Sprinkler Pipe Fitters who carry a "Certificate of Qualification" for this trade as issued by the B.C. Province Ministry of Labour.
- .2 Health and Safety:
 - .1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.
- .3 Inspections and Tests:
 - .1 All inspections, examinations and tests required by the "Authorities and Agencies having jurisdiction" specified shall be arranged and paid for by the fire protection contractor, as necessary to obtain complete and final acceptance of the fire protection system. All backflow preventers shall be selected, installed, verified and tested in accordance with CAN/CSA-B64.10: Manual for the Selection and Installation of Backflow Prevention Devices.
 - .2 Provide Contractor's Material and Test Certificates and all required test papers as may be requested by all parties having jurisdiction and duly witnessed by Departmental Representative, showing proof of:
 - .1 Underground hydrostatic test of 1400 kPa (200 PSI).
 - .2 Flushing of underground main through 100mm (4") drain pipe.
 - .3 Hydrostatic test of overhead piping @ 1400 kPa (200 PSI).
 - .4 Verification of all alarm and trouble devices installed under this contract.
 - .3 Provide the services of the Professional Engineer who designed the fire protection systems for "Field Review" of the installation. Construction period review reports shall be submitted during the construction period.
 - .4 If welding is required, the Contractor shall submit a copy of the welder's certification to the Engineer for Record purposes prior to starting work. Hot Works, the process as described in Section 5.2. Hot Works of the 2015 NFCC shall be followed. The successful bidder must demonstrate that they have a hot works program in place and it is to be reviewed by the responsible authority or local fire service before starting any work.

1.7 MAINTENANCE

- .1 Extra Materials:
 - .1 Provide maintenance materials in accordance with Section 01 11 55 - General Instructions.
- .2 Provide spare sprinklers and tools as required by ANSI/NFPA 13.

1.8 DELIVERY, STORAGE AND HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle in accordance with Section 01 11 55 – General Instructions.
 - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

- .2 Storage and Protection:
 - .1 Store materials indoors in dry location.
 - .2 Store and protect materials from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.
 - .3 Waste Management and Disposal:
 - .1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 11 55 – General Instructions.

Part 2 Products

2.1 UNDERGROUND PIPE AND FITTINGS

- .1 Underground water pipe shall be PVC pipe conforming to AWWA Standard C900-75 "Poly (Vinyl Chloride) (PVC) Pressure Pipe 4 through 12 inch (100 through 300mm) for water", CSA B137.3 ULC CEx448, and UNI-B-3-80. The pipe is to be Class 150psi (Dimensional Ratio (DR)-18 with cast iron outside diameter) and integral bell gasket joint. Gaskets are to be bonded into the ring groove prior to shipment. Underground fittings shall have joints and pressure rating compatible with pipe used. Roll or Cut grooved as appropriate to the pipe material, wall thickness, pressure, size and method of joining.
- .2 All underground piping for fire mains shall be installed, clamped and anchored and flushed and hydrostatically pressure tested according to requirements of NFPA 13 and NFPA 24 latest Editions. Flushing shall be done through 100mm (4") minimum diameter piping.
- .3 At all changes in direction and at tees, ells, plugs, caps, bends, and hydrants, anchor mains as per NFPA 24 latest Edition. Pipe clamps and tie rods, thrust blocks, or other approved methods or devices may be used. Continuously threaded rod shall not be used for underground applications.
- .4 Piping and fittings must be from a North American manufacturer. Any wall thickness diverging from the North American standards is prohibited for this project.

2.2 PIPE, FITTINGS & VALVES

- .1 Pipe:
 - .1 Ferrous piping to NFPA-13 shall meet or exceed one of the following standards:
 - .1 Black and Hot-Dipped Galvanized Welded and Seamless Steel Pipe – ASTM A795, type E, grade A.
 - .2 Welded and Seamless Steel Pipe – ANSI/ASTM A53
 - .3 Wrought Steel Pipe – ANSI B36.19M
 - .4 Elec.-Resistance Welded Steel Pipe – ASTM A135
 - .2 Piping shall be stainless steel and shall meet or exceed one of the following standards:
 - .1 65mm (2.5") and larger - ASTM A312, Type 316/316L, Schedule 40.
 - .2 50mm (2") and smaller - ASTM A312, Type 316/316L, Sch. 40, pipe, dimensions conforming to ANSI/ASME B36.19M-1985.
 - .3 All thickness for pressures up to 2070 kPa (300 psi) shall be as follows:
 - .1 Joined by shop welding or roll grooving:
 - .1 Up to and incl. 125mm (5") – Schedule 40
 - .2 150mm (6") – 3.40mm (0.134)

- .3 200mm, 250mm (8", 10") – 4.78mm (0.188")
- .2 Joined by threaded fittings or cut grooves:
 - .1 Up to 200mm (8") – Schedule 40
 - .2 200mm (8") and larger – Schedule 40
- .2 Fittings and joints to ANSI/NFPA 13:
 - .1 Ferrous: screwed, welded, flanged or roll grooved.
 - .2 System piping 50mm (2") and smaller shall be Schedule 40 and threaded joints, or with grooved joints, material and IPS dimensions conforming to NFPA 13. Larger sizes shall be joined by welding or groove joining methods in accordance with NFPA 13.
 - .3 All grooved products shall be of one manufacturer. All grooved end fittings shall be of "full flow" design and manufactured from ductile iron conforming to ASTM A-536. Grooved coupling shall be designed with angle bolt pads to provide a rigid joint except where flexibility is required. "Flush cap" or "flush seal" gaskets shall be used with couplings in dry pipe systems.
 - .4 Cast iron floor and ceiling plates with set screws shall be provided whenever pipe passes through walls, floors and partitions. In finished areas, plates shall be chrome plated.
 - .5 CPVC piping is not acceptable for this project.
- .3 Fittings and joints to ANSI/NFPA 13 type 316 stainless steel (65mm and larger):
 - .1 Stainless Steel Mechanical Couplings: Manufactured in two or more segments of cast stainless steel, conforming to ASTM A-351, A-743, and A-744. Gaskets shall be pressure-responsive synthetic rubber, grade to suit the intended service, conforming to ASTM D-2000. Mechanical coupling bolts shall be stainless steel, type 316, meeting the physical properties of ASTM A-193, grade B8M, Class2.
 - .1 Rigid Type: Cast with key designed to clamp the bottom of the groove to provide an essentially rigid joint.
 - .2 Flexible Type: Use in locations where vibration attenuation and stress relief are required.
 - .2 Grooved End Fittings: Fittings shall be manufactured of stainless steel conforming to ASTM A-403, WPW, WPW/S9, or CR/S9, or shall be fabricated from stainless steel pipe conforming to ASTM A312, with factory grooved ends. Fittings shall be type 316/316L stainless steel.
- .4 Fittings and joints to ANSI/NFPA 13 type 316 stainless steel (50mm and smaller):
 - .1 ASTM A-312 stainless steel housings with ASTM A-276 and A-312 outlets and stainless steel plain or grooved ends, type 316, complete with synthetic rubber Grade "H" (HNBR) seals rated for applicable services to +210°F [+98°C]; Grade "E" EPDM for applicable services to +250°F [+120°C]; or Grade "O" Fluoroelastomer for applicable services to +300°F [+149°C]. System shall be rated to 500 psi (3447 kPa) unless noted otherwise.
 - .1 Flange Adapters: ANSI Class 150 flange adapter, Van Stone type with stainless steel back-up flange and Press ends. Rated for services to 275 psi (1876 kPa).
 - .2 Unions: Threaded union, 316/316L stainless steel, with Press ends.
 - .3 Press system shall be FM approved for fire protection services.
- .5 Valves:
 - .1 ULC listed for fire protection service.

- .2 Up to NPS 2: bronze, screwed ends, O. S. & Y. gate.
 - .3 NPS 2 1/2 and over: cast iron, flanged or roll grooved ends, indicating butterfly valve; OS & Y gate.
 - .4 Swing check valves.
 - .5 Ball drip.
 - .6 All water supply and zone isolation valves shall be monitored with tamper switches. Electric wiring for control and alarm components will be provided Under Division 16.
 - .7 Valves controlling water supply and alarm shut-off shall be of O. S. & Y. type with rising stem or approved gear operated butterfly valves with supervisory switch. Where a grooved piping system is installed, grooved end isolation/control valves may be used. Valves shall be supervised by a factory installed double throw/double pole switch.
 - .8 All O. S. & Y. gate vales shall be monitored with tamper switches. Electric wiring for control and alarm components shall be provided under Division 26.
- .6 Valves, type 316 stainless steel:
- .1 ULC listed for fire protection service.
 - .2 Up to NPS 2: type 316 stainless steel, screwed ends, O. S. & Y. gate.
 - .3 NPS 2 1/2 and over, type 316 stainless steel indicating butterfly valve; O.S. & Y gate.
- .7 Grooved End Valves:
- .1 Butterfly Valves: 2" – 8" / 50 – 200 mm: 300 psi (2068 kPa CWP), suitable for bi-directional and dead-end service to full rated pressure. Grooved end stainless steel body and disc, grade CF8M, conforming to ASTM A351, with blow-out proof 17-4PH stainless steel stems to ASTM A564. Disc shall be connected to the stem without the use of fasteners or pins, and be offset from the disc centerline to provide a full 360° continuous contact with the seating surface when closed. Seat shall be pressure responsive, EPDM or lubricated Nitrile. Stem seals shall be of the same material as the seats. Valve shall have standard ISO flange mounting for ease of actuation. Valve provided with lever handle or gear operator as required. The handle shall be zinc-plated carbon steel or fully stainless steel, latch lock type with infinitely variable and memory stop features. Butterfly Valves: Grade CF8M stainless steel body and disc, 316 stainless steel stem, PTFE impregnated glass fabric bearings with 316 stainless steel backing, with synthetic rubber seal. (Grade to suit the intended service.) Valve stem shall be offset from the disc centerline to provide full 360-degree circumferential seating. Bubble-tight, dead-end or bi-directional service to 300 psi (2065 kPa) CWP.
 - .2 Ball Valves: Grade CF8M stainless steel body, 316 stainless steel ball and stem, TFE seats, fluoroelastomer seals, standard port, two-piece valve.
 - .3 Swing check valves, type 316 stainless steel.
 - .4 Ball drip, type 316 stainless steel.
 - .5 All water supply and zone isolation valves shall be monitored with tamper switches. Electric wiring for control and alarm components will be provided Under Division 26.
 - .6 Valves controlling water supply and alarm shut-off shall be of O. S. & Y. type with rising stem or approved gear operated butterfly valves with supervisory switch. Where a grooved piping system is installed, grooved end isolation/control valves may be used. Valves shall be supervised by a factory installed double throw/double pole switch.
 - .7 All O. S. & Y. gate valves, type 316 stainless steel shall be monitored with tamper switches. Electric wiring for control and alarm components shall be provided under Division 26.

- .8 Pipe hangers:
 - .1 ULC listed for fire protection services.
 - .2 Hanger standards shall conform to Section 3-10 of NFPA 13. Use "C" clamps complete with lock nuts and restraining straps. Hangers shall be supplied and installed in accordance with NFPA 13. C-type clamps used to attach hangers to the building structure shall be equipped with lock nuts and retaining straps.
 - .3 Sway bracing shall be installed as per Section 3-5.3.5 of NFPA 13.
- .9 Pipe hangers, type 316 stainless steel:
 - .1 ULC listed for fire protection services, type 316 stainless steel.
 - .2 Hanger standards shall conform to Section 3-10 of NFPA 13. Use "C" clamps complete with lock nuts and restraining straps. Hangers shall be supplied and installed in accordance with NFPA 13. C-type clamps used to attach hangers to the building structure shall be equipped with lock nuts and retaining straps.
 - .3 Sway bracing shall be installed as per Section 3-5.3.5 of NFPA 13, type 316 stainless steel.
- .10 Piping and fittings must be from a North American manufacturer. Any wall thickness diverging from North American standards is prohibited for this project.
- .11 Ensure fittings, mechanical couplings and rubber gaskets are supplied by the same manufacturer from a North American manufacturer. Any wall thickness diverging from the North American manufacturer is prohibited for this project.

2.3 BACKFLOW PREVENTION

- .1 Provide a double check valve assembly as indicated on the Fire Protection Drawings.
- .2 Backflow prevention stations shall be listed by Underwriter's Laboratories Canada (U.L.C.).
- .3 Backflow prevention stations shall be in complete accordance with CAN/CSA-B64.10 "Selection, Installation, Maintenance and Field Testing" and American Water Works Association - Western Canada Section and Pacific Northwest Section - 1990 Fifth Edition.
- .4 Complete testing of all reduced pressure principle backflow prevention devices shall be carried out under this Section prior to final acceptance of fire protection systems. A certificate shall be submitted duly signed and witnessed that testing was satisfactory.

2.4 SPRINKLER HEADS

- .1 General: to ANSI/NFPA 13 and ULC listed for fire services.
- .2 General: to ANSI/NFPA 13 and ULC listed for fire services, PTFE-electroless Nickel coated for sprinkler system with stainless steel piping and fittings.
- .3 Sprinkler shall be protected from mechanical injury by standard guards where necessary. The proximity of sprinklers to heating units shall be taken into consideration in determining the temperature rating.
- .4 Adjacent to each sprinkler alarm valve, provide one (1) 12-sprinkler capacity Underwriters approved cabinet complete with various type and temperatures of sprinklers in ratio to the numbers installed of each type along with a standard sprinkler wrench.

2.5 SUPERVISORY SWITCHES

- .1 General: to ANSI/NFPA 13 and ULC listed for fire service.

- .2 Valves:
 - .1 Mechanically attached to valve body, with normally open and normally closed contacts and supervisory capability.
- .3 Pressure switch type:
 - .1 With normally open and normally closed contacts and supervisory capability.
 - .2 Provide switch with circuit opener or closer for automatic transmittal of alarm over facility fire alarm system.
 - .3 Connect into building fire alarm system.
 - .4 Connection of switch: Section 26 31 02 – Multiplex Fire Alarm System.

2.6 PRESSURE GAUGES

- .1 Provide pressure gauges at the following locations:
 - .1 Dry pipe valve
 - .2 Compressor
- .2 Pressure gauges shall be ULC listed stem mount or wall mount type with Bourdon phosphor bronze tube, brass socket, 6 mm [1/4"] lower connection, aluminum case in black enamel finish, chrome removable slip ring, stainless steel rotary type movement, minimum 90mm [3 1/2"] dial of 1% of full scale range and pressure range to suit application, with lever handle cock and brass 6 mm [1/4"] NPT snubber to suit service.

2.7 FIRE DEPARTMENT CONNECTION

- .1 Provide connections approximately 1.5 m above finish grade, location as indicated.
- .2 To ANSI/NFPA 13 and ULC S543 listed, Siamese type.
- .3 Polished bronze exposed of approved two-way type with 2.5 inch National Standard female hose threads with plug, chain, and identifying fire department connection escutcheon plate.
- .4 Type 316 stainless steel exposed of approved two-way type with 2.5 inch National Standard female hose threads with plug, chain, and identifying fire department connection escutcheon plate for an all stainless steel sprinkler system.
- .5 Thread specifications: compatible with local fire department.

2.8 PIPE SLEEVES

- .1 Provide pipe sleeves where piping passes through walls, floors, and roofs.
- .2 Secure sleeves in position and location during construction.
- .3 Provide sleeves of sufficient length to pass through entire thickness of walls, floors, and roofs.
- .4 Provide 2.5 cm minimum clearance between exterior of piping and interior of sleeve or core-drilled hole.
 - .1 Firmly pack space with mineral wool insulation.
 - .2 Seal space at both ends of sleeve or core-drilled hole with plastic waterproof cement which will dry to firm but pliable mass, provide mechanically adjustable segmented elastomeric seal.

- .3 In fire walls and fire floors, seal both ends of pipe sleeves or core-drilled holes with ULC listed fill, void, or cavity material.
- .5 Sleeves in Masonry and Concrete Walls, Floors, and Roofs:
 - .1 Provide hot-dip galvanized steel, ductile-iron, cast-iron sleeves.
 - .2 Core drilling of masonry and concrete may be provided in lieu of pipe sleeves when cavities in core-drilled hole are completely grouted smooth.
- .6 Sleeves in Other than Masonry and Concrete Walls, Floors, and Roofs:
 - .1 Provide 0.61 mm thick galvanized steel sheet.

2.9 ESCUTCHEON PLATES

- .1 Provide split hinged type metal plates for piping passing through walls, floors, and ceilings in exposed spaces. Provide S.S. for sprinkler system with type 316 pipe and fittings.
- .2 Provide polished chromium-plated finish on copper alloy plates in finished spaces, Type 316 S.S. for stainless steel system.
- .3 Provide paint finish metal plates in unfinished spaces, Type 316 for stainless steel system.

2.10 SPARE PARTS CABINET

- .1 For storage of maintenance materials, spare sprinkler heads and special tools.
- .2 Construct to sprinkler head manufacturer's standard.

2.11 INSPECTOR'S TEST CONNECTION

- .1 Locate inspector's test connection at hydraulically most remote part of each system, provide test connections approximately 3m above floor for each sprinkler system or portion of each sprinkler system equipped with alarm device.
- .2 Provide test connection piping to location where discharged without property damage.
- .3 Provide discharge orifice of same size as corresponding sprinkler orifice.

2.12 SIGNS

- .1 Attach properly lettered and approved metal signs to each valve and alarm device to ANSI/NFPA 13.
- .2 Permanently fix hydraulic design data nameplates to riser of each system.

2.13 DRY PIPE VALVE

- .1 ULC listed.
- .2 Type 316 stainless steel, flanged type, sized to suit water main.
- .3 Components:
 - .1 Accelerator.
 - .2 Air maintenance device with low pressure alarm.
 - .3 Alarm pressure switch with supervisory capability.
 - .4 Pressure gauges.
 - .5 Drain valve.
 - .6 Test valve with associated piping.

- .7 Shut off valve - OS & Y with tamper-proof device wired back to fire alarm panel.

2.14 COMPRESSED AIR SUPPLY

- .1 Automatic Air Compressor.
- .2 ULC listed.
- .3 Capacity:
 - .1 To restore normal air pressure in system within 30 minutes for low differential systems.
 - .2 To provide air pressure of 140 kPa in excess of calculated trip pressure of dry pipe valve in accordance with instruction sheet furnished with dry pipe valve.
- .4 Piping: Type 316 stainless steel, NPS 3/4 screwed joints and fittings, to ANSI/NFPA 13.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTION

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 WATER CONNECTION

- .1 Connect sprinkler system supply line to water main and run service line into the building system.
- .2 Lay underground supply pipe to local authority standards at minimum 1200 mm (48") depth of bury or below frost line, whichever is greater.
- .3 Install frost-proof casing around riser from the underground main to protect against freezing.

3.3 ABOVE GROUND PIPING SYSTEMS

- .1 Provide fittings for changes in direction of piping and for connections.
 - .1 Make changes in piping sizes through tapered reducing pipe fittings, bushings will not be permitted.
 - .2 Perform welding in shop; field welding will not be permitted.
 - .3 Conceal piping in areas with suspended ceiling.

3.4 PIPE INSTALLATION

- .1 Install piping pitched to drain as per NFPA 13. Do not hang piping from plaster ceilings.
- .2 Keep interior and ends of new piping and existing piping thoroughly cleaned of water and foreign matter.
- .3 Keep piping systems clean during installation by means of plugs or other approved methods. When work is not in progress, securely close open ends of piping to prevent entry of water and foreign matter.
- .4 Inspect piping before placing into position.
- .5 Install spare parts cabinet as indicated.
- .6 Valve identification:
 - .1 Identify drain valve and auxiliary valves.

- .7 Provide primed surfaces with following:
 - .1 Piping in Finished Areas:
 - .1 Provide piping with 50 mm wide red enamel bands self-adhering red plastic bands spaced at maximum of 6 m intervals throughout piping systems.
 - .2 Piping in Unfinished Areas:
 - .1 Provide piping with 50 mm wide red enamel bands self-adhering red plastic bands spaced at maximum of 6 m intervals.

3.5 FIELD PAINTING

- .1 Clean, pre-treat, prime, and paint new systems including piping, conduit, hangers, supports, miscellaneous metalwork, and accessories.
- .2 Apply coatings to clean, dry surfaces, using clean brushes.
- .3 Clean surfaces to remove dust, dirt, rust, and loose mill scale.
- .4 Immediately after cleaning, provide metal surfaces with 1 coat of pretreatment primer applied to minimum dry film thickness of 0.3 ml, and one coat of primer suitable for type 316 stainless steel applied to minimum dry film thickness of 1.0 ml.
- .5 Shield sprinkler heads with protective covering while painting is in progress.
- .6 Upon completion of painting, remove protective covering from sprinkler heads.
- .7 Remove sprinkler heads which have been painted and replace with new sprinkler heads.
- .8 Provide primed surfaces with following:
 - .1 Piping in Finished Areas:
 - .1 Provide primed surfaces with 2 coats of re-coatable colour of paint to match adjacent surfaces. Refer to heritage consultant for colour blending and aesthetic compatibility requirements.
 - .2 Provide valves and operating accessories with 1 coat of red alkyd gloss enamel applied to minimum dry film thickness of 1.0 mil.
 - .3 Provide piping with 50 mm wide red enamel bands self-adhering red plastic bands spaced at maximum of 6 m intervals throughout piping systems.
 - .2 Piping in Unfinished Areas:
 - .1 Finish painting not required in spaces above suspended ceilings, crawl spaces, pipe chases, mechanical equipment room, and spaces where walls or ceiling are not painted or not constructed of a pre-finished material.
 - .2 Provide piping with 50 mm wide red enamel bands self-adhering red plastic bands spaced at maximum of 6 m intervals.

3.6 DISINFECTION

- .1 Disinfect new piping.
- .2 Fill piping systems with solution containing minimum of 50 parts per million of chlorine and allow solution to stand for minimum of 24 hours.
- .3 Flush solution from systems with clean water until maximum residual chlorine content is not greater than 0.2 part per million or residual chlorine content of domestic water supply.
- .4 Obtain at least two consecutive satisfactory bacteriological samples from piping, analyzed by certified laboratory, and submit results prior to piping being placed into service.

3.7 FIELD QUALITY CONTROL

- .1 Site Test, Inspection:
 - .1 Perform test to determine compliance with specified requirements in presence of Departmental Representative.
 - .2 Test, inspect, and approve piping before covering or concealing.
 - .3 The coupling manufacturer's representative shall periodically visit the jobsite and review installation. Contractor shall remove and replace any joints deemed improperly installed.
- .2 Preliminary Tests:
 - .1 Hydrostatically test each system at 200 psig for a 2 hour period with no leakage or reduction in pressure.
 - .2 Flush piping with potable water in accordance with NFPA 13.
 - .3 Piping above suspended ceilings: tested, inspected, and approved before installation of ceilings.
 - .4 Test alarms and other devices.
 - .5 Test water flow alarms by flowing water through inspector's test connection. When tests have been completed and corrections made, submit signed and dated certificate in accordance with NFPA 13.
- .3 Formal Tests and Inspections:
 - .1 Do not submit request for formal test and inspection until preliminary test and corrections are completed and approved.
 - .2 Submit written request for formal inspection at least 15 days prior to inspection date.
 - .3 Repeat required tests as directed.
 - .4 Correct defects and make additional tests until systems comply with contract requirements.
 - .5 Furnish appliances, equipment, instruments, connecting devices, and personnel for tests.
 - .6 Authority of Jurisdiction, will witness formal tests and approve systems before they are accepted.
 - .7 Altered and relocated sprinkler system to be inspected and tested in conformance with NFPA 25.

3.8 PLACING IN SERVICE

- .1 When the entire fire protection system has been completed to the satisfaction of the Departmental Representatives and when operating and maintenance instructions have been provided, the Fire Protection Contractor shall, in the presence of the Departmental Representative, demonstrate the complete operation and maintenance required to the operating personnel. A complete operational test conducted on the entire installation for the purpose of verification of compliance with all applicable standards and codes shall be carried out.
- .2 Three copies of a complete operating manual shall be provided, which must include the following:
 - .1 Detailed instructions for the normal maintenance of all installed equipment including operational procedures, frequency of operational checks, service instructions and trouble shooting instructions.
 - .2 Valve schedule for all valves including location, service type and normal position for all systems.

- .3 Schematic showing the location of each excess pressure pump breaker, inspectors test valves, low point drains and flow switches where applicable.
- .4 Warranties and certificates.
- .5 Manufacturer's operating and maintenance manuals.
- .6 Description of the operation of each system and the function of each piece of equipment.
- .7 Lubrication schedule for all lubricated equipment including recommended lubricants.

END OF SECTION 21 13 13

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 Materials and installation for plumbing pumps.

1.2 RELATED SECTION

- .1 Section 01 11 55 General Instructions
- .2 Section 01 35 33 Health and Safety Requirements
- .3 Section 01 91 00 Commissioning
- .4 Section 22 42 01 Plumbing Specialties and Accessories
- .5 Section 21 05 01 Common Work Results for Mechanical

1.3 REFERENCES

- .1 Electrical Equipment Manufacturers Advisory Council (EEMAC).
- .2 National Electrical Manufacturers Association (NEMA).
 - .1 NEMA MG 1-2011, Motors and Generators.
- .3 National Sanitation Foundation (NSF) / American National Standards Institute (ANSI).
 - .1 NSF/ANSI 61, Drinking Water System Components.

1.4 SUBMITTALS

- .1 Submittals in accordance with Section 01 01 50 – General Instructions.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and data sheet for equipment.
- .3 Shop Drawings.
 - .1 Submit shop drawings to indicate:
 - .1 Equipment, including connections, fittings, control assemblies and ancillaries. Identify whether factory or field assembled.
 - .2 Wiring and schematic diagrams.
 - .3 Dimensions and recommended installation.
 - .4 Pump performance and efficiency curves.
- .4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

1.5 CLOSEOUT SUBMITTALS:

- .1 Submit maintenance data in accordance with Section 01 11 55 – General Instructions.

- .2 Include:
 - .1 Shop drawings.
 - .2 Details of operation, servicing, maintenance.
 - .3 List of recommended spare parts.

1.6 HEALTH AND SAFETY

- .1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

1.7 DELIVERY STORAGE AND DISPOSAL

- .1 Waste Management and Disposal:
 - .1 Separate waste materials for recycling in accordance with Section 01 11 55 – General Instructions.
 - .2 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan
 - .3 Fold up metal banding, flatten and place in designated area for recycling.

1.8 QUALITY ASSURANCE

- .1 All potable water system components shall conform to NSF/ANSI Standard 61.

Part 2 Products

2.1 SUMP PUMP SUBMERSIBLE

- .1 Provide as indicated on drawings, sanitary duplex drainage – pump station as specified herein or approved equal.
- .2 The assembly shall be underground, two pumps, automatic sewage pump station. Each pump station shall be furnished with piping, valves, and all necessary automatic controls, two submersible pumps, float type liquid level controls and a duplex pump control panel. Provide 1220 mm diameter precast reinforced concrete sections installed to suit, depth as indicated on drawings. Provide a slide rail assembly with lifting chains, sealing flange, pump carrier and galvanized rails to suit sump depth. Provide 100mm inlet, 50mm inlet, 40mm discharge, 2-50mm electrical and 75mm vent coupling. H2O sealed cover and frame to suit and accept and allow duplex pump removal, non-slippery surface, gas tight; upper rail support.
- .3 Pumps shall be heavy duty cast iron, non-clog type sewage, oil filled, submersible pumps.
Each pump shall have a capacity of 1.9 L/s against a total dynamic head of 162 kPa operating at a maximum speed of 3,450 RPM with a recessed non-clog type impeller which passes 50mm solids. Pump motors to be 1 1/2" HP, 208V, 1PH, 3450 RPM and 60 cycle. Pumps shall be furnished in standard construction c/w 50' of power cable and adaptors for pipe size indicated.
- .4 Each pump shall be provided complete with a lift-out slide rail system. Each rail shall include a 40mm cast iron discharge assembly, upper and lower guide rail support, pump carrier and galvanized pump lifting chains.
- .5 Provide 4 float type, non-mercury, liquid level controls for automatic pump control of the liquid level. A support bracket with strain relief connectors shall be supplied. A CEMA 4 junction box shall be provided for electrical connection.

- FS#4 High water alarm
- FS#3 Lag pump #2 on FS#2 Lead pump #1 on FS#1 Off-alternate pumps
- .6 A duplex automatic 2 pump control panel shall be furnished in a CEMA 1 enclosure with the following equipment.
- .1 Inner door mounted controls.
 - .2 Pump circuit breaker disconnects.
 - .3 Magnetic contactors with 3 leg overloads.
 - .4 H.O.A. selector switches for each pump.
 - .5 Run lights for each pump.
 - .6 Automatic alternator relay.
 - .7 Pump motor overload alarm and automatic interlock to lag pump.
 - .8 Lead-lag pump selector switch.
 - .9 High level alarm with buzzer, light and silencing switch, test switch and automatic reset.
 - .10 Provide also remote alarm panel to repeat light and buzzer signal, silencing switch and lamicoid label reading "High Water in Sewage Sump".
 - .11 Arrange with electrical contractor for wiring in accordance with manufacturer's installation instructions.
- .7 Set inlet invert and provide cover suited for chamber. Provide 40mm cast iron check valve and 40mm ball type isolation valve shall be factory installed on the discharge of each pump. Piping shall be schedule 40 PVC pipe fabricated to suit the installation. A 40mm discharge NPT coupling shall be furnished for connection to forcemain and field piping to complete the installation.

Part 3 Execution

3.1 INSTALLATION

- .1 Install in accordance with National Plumbing Code and local authority having jurisdiction.
- .2 Install in accordance with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.
- .3 Make piping and electrical connections to pump and motor assembly and controls as indicated.
- .4 Ensure pump and motor assembly do not support piping.

3.2 FIELD QUALITY ASSURANCE

- .1 Site Tests/Inspection:
 - .1 Check power supply.
 - .2 Check starter protective devices.
- .2 Start-up, check for proper and safe operation.
- .3 Check settings and operation of hand-off-auto selector switch, operating, safety and limit controls, audible and visual alarms, over-temperature and other protective devices.

3.3 START-UP

- .1 General:
 - .1 In accordance with Section [01 91 13 - General Commissioning (Cx) Requirements]: General Requirements, supplemented as specified herein.
- .2 Procedures:
 - .1 Check power supply.
 - .2 Check starter O/L heater sizes.
 - .3 Start pumps, check impeller rotation.
 - .4 Check for safe and proper operation.
 - .5 Check settings, operation of operating, limit, safety controls, over-temperature, audible/visual alarms, other protective devices.
 - .6 Test operation of hands-on-auto switch.
 - .7 Test operation of alternator.
 - .8 Adjust leakage through water-cooled bearings.
 - .9 Adjust shaft stuffing boxes.
 - .10 Adjust leakage flow rate from pump shaft stuffing boxes to manufacturer's recommendations.
 - .11 Check base for free-floating, no obstructions under base.
 - .12 Run-in pumps for 12 continuous hours.
 - .13 Check installation, operation of mechanical seals, packing gland type seals. Adjust as necessary.
 - .14 Adjust alignment of piping and conduit to ensure full flexibility.
 - .15 Eliminate causes of cavitation, flashing, air entrainment.
 - .16 Measure pressure drop across strainer when clean and with flow rates as finally set.
 - .17 Replace seals if pump used to degrease system or if pump used for temporary heat.
 - .18 Verify lubricating oil levels.

3.4 PERFORMANCE VERIFICATION (PV) – SANITARY PUMPS

- .1 Application tolerances:
 - .1 Flow: plus 10%; minus 0%.
 - .2 Pressure: plus 10%; Minus 5%.
- .2 PV Procedures:
 - .1 Fill sump at rate slower than capacity of pump #1.
 - .2 Record levels at which pump #1 starts and stops. Determine flow rate by observing time taken to down water level.
 - .3 Fill sump at rate faster than capacity of pump #1 but slower than capacities of pumps #1 and #2 operating in parallel.
 - .4 Record levels at which pumps start and stop - water level rising and water level falling.
 - .5 Verify operation of alternator.
 - .6 Adjust water level controls as necessary.
 - .7 Fill sump at rate faster than capacities of pumps #1 and #2 operating in parallel.
 - .8 Record levels at pump starts and stops - water level rising and falling.

- .9 Check operation of alternator.
- .10 Adjust level controls as necessary.
- .11 Check level at which high water level alarm starts and stops. Adjust as necessary.
- .3 Check removability of pumps for servicing without interfering with installation or operation of other equipment.
- .4 Verify non-clog capability and maximum size of solids, using procedures recommended by manufacturer.

3.5 REPORTS

- .1 In accordance with Section 01 91 00 – Commissioning.
- .2 Include:
 - .1 PV results on approved PV Report Forms.
 - .2 Product Information report forms.
 - .3 Pump performance curves (family of curves) with final point of actual performance.

3.6 CLEANING

- .1 Proceed in accordance with Section 01 01 50 – General Instructions.
- .2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION 22 10 10

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 33 00 Submittal Procedures
- .2 Section 01 35 33 Health and Safety Requirements
- .3 Section 01 74 19 Waste Management And Disposal
- .4 Section 01 78 00 Closeout Submittals

1.2 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM).
 - .1 ASTM B 32-03, Specification for Solder Metal.
 - .2 ASTM B 306-02, Specification for Copper Drainage Tube (DWV).
 - .3 ASTM C 564-03a, Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- .2 Canadian Standards Association (CSA International).
 - .1 CAN/CSA-B70-02, Cast Iron Soil Pipe, Fittings and Means of Joining.
 - .2 CAN/CSA-B125-01, Plumbing Fittings.

1.3 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.4 HEALTH AND SAFETY

- .1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Place materials defined as hazardous or toxic in designated containers.
- .4 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional and Municipal regulations.
- .5 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan
- .6 Fold up metal banding, flatten and place in designated area for recycling.

Part 2 Products

2.1 COPPER TUBE AND FITTINGS

- .1 Above ground sanitary storm and vent, Copper Type DWV to: ASTM B 306.
 - .1 Fittings.
 - .1 Cast brass: to CAN/CSA-B125.
 - .2 Wrought copper: to CAN/CSA-B125.
 - .2 Solder: tin-lead, 50:50, type 50A or lead free, tin-copper alloy 95:5, type TA to ASTM B 32.

2.2 CAST IRON PIPING AND FITTINGS

- .1 Buried sanitary storm and vent, cast iron (minimum NPS 2) to: CAN/CSA-B70.
 - .1 Joints.
 - .1 Mechanical joints.
 - .1 Neoprene or butyl rubber compression gaskets: to ASTM C 564 or CAN/CSA-B70.
 - .2 Stainless steel clamps.
 - .2 Above ground sanitary storm and vent: Cast iron to CAN/CSA-B70.
 - .1 Joints.
 - .1 Mechanical joints.
 - .2 Neoprene or butyl rubber compression gaskets with stainless steel clamps.

2.3 ABS PIPING

- .1 Drainage piping under the building, provided that such piping does not pass through any fire separations, may be as follows, at the contractor's option:
 - .1 Underground sanitary drainage piping under building, 150mm in diameter and smaller, certified to the current version of CSA B181.1, ABS Drain, Waste and Vent Pipe and Fittings. Piping shall be solid wall in construction. Cell core piping is not acceptable.
- .2 The use of ABS piping inside building is not permitted.

2.4 PVC PIPING

- .1 Drainage piping under the building may be as follows, at the contractor's option:
 - .1 Underground sanitary drainage piping under building, 100mm in diameter or larger, certified to the current version of CSA B181.2, PVC Drain, Waste and Vent Pipe and Fittings.
- .2 The use of PVC drain pipe inside building is not permitted.

Part 3 Execution

3.1 INSTALLATION

- .1 In accordance with Section 23 05 05 - Installation of Pipework.
- .2 Install in accordance with Canadian Plumbing Code, Provincial Plumbing Code and local authority having jurisdiction.

- .3 Install buried pipe on 150 mm bed of clean washed sand, shaped to accommodate hubs and fittings, to line and grade as indicated. Backfill with 150 mm of clean washed sand.
- .4 Install above ground piping parallel and close to walls and ceilings to conserve headroom and space, and to grade as indicated.

3.2 TESTING

- .1 Pressure test buried systems before backfilling.
- .2 Hydraulically test to verify grades and freedom from obstructions.

3.3 PERFORMANCE VERIFICATION

- .1 Cleanouts:
 - .1 Ensure accessible and that access doors are correctly located.
 - .2 Open, cover with linseed oil and re-seal.
 - .3 Verify that cleanout rods can probe as far as the next cleanout, at least.
- .2 Test to ensure traps are fully and permanently primed.

END OF SECTION 22 13 17

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 The supply and installation of Plumbing Specialties and Accessories.
- .2 Products Installed but not Supplied Under this Section:
 - .1 Install rough-in for equipment supplied by others, complete with valves on hot and cold water supplies, waste and vent.
 - .2 Equipment installed by others.
 - .1 Connect with unions.
 - .3 Equipment not installed.
 - .1 Capped for future connection by others.

1.2 RELATED SECTION

- .1 Section 01 33 00 Submittal Procedures
- .2 Section 01 74 19 Waste Management & Disposal
- .3 Section 01 78 00 Closeout Submittals
- .4 Section 01 35 33 Health and Safety Requirements.

1.3 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM A 126-95(2001), Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
 - .2 ASTM B 62-93, Specification for Composition Bronze or Ounce Metal Castings.
- .2 American Water Works Association (AWWA)
- .3 Canadian Standards Association (CSA)
 - .1 CSA-B64 Series-01, Backflow Preventers and Vacuum Breakers.
 - .2 CSA-B356-00, Water Pressure Reducing Valves for Domestic Water Supply Systems.
- .4 Plumbing and Drainage Institute (PDI)
 - .1 PDI-WH201-92, Water Hammer Arresters Standard.

1.4 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Indicate, for all plumbing specialties and accessories:
 - .1 Dimensions, construction details, roughing-in dimensions.

1.5 CLOSEOUT SUBMITTALS:

- .1 Submit maintenance data in accordance with Section 01 78 00 - Closeout Submittals.

- .2 Include:
 - .1 Description of plumbing specialties and accessories, giving manufacturer's name, type, model, year, capacity.
 - .2 Details of operation, servicing, maintenance.
 - .3 List of recommended spare parts.

1.6 HEALTH AND SAFETY

- .1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

1.7 DELIVERY STORAGE AND DISPOSAL

- .1 Waste Management and Disposal:
 - .1 Separate waste materials for recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .2 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan
 - .3 Fold up metal banding, flatten and place in designated area for recycling.

Part 2 Products

2.1 CLEANOUTS

- .1 Cleanout plugs: heavy cast iron male ferrule with brass screws and threaded brass or bronze plug. Sealing-caulked lead seat or neoprene gasket.
- .2 Access covers:
 - .1 Wall access: face or wall type, polished nickel bronze or stainless steel round cover with flush head securing screws, beveled edge frame complete with anchoring lugs.
 - .1 Floor access: round cast iron body and frame with adjustable secured nickel bronze top cast box with anchor lugs and:
 - .1 Plugs: bolted bronze with neoprene gasket.
 - .2 Cover for unfinished concrete floors: cast iron round gasket, vandal-proof screws.
 - .3 Cover for terrazzo finish: polished brass with recessed cover for filling with terrazzo, vandal-proof locking screws
 - .4 Cover for tile and linoleum floors: polished nickel bronze with recessed cover for linoleum or tile infill, complete with vandal-proof locking screws.
 - .5 Cover for carpeted floors: polished nickel bronze with deep flange cover for carpet infill, complete with carpet retainer vandal-proof locking screws.

2.2 BACK FLOW PREVENTER

- .1 To CSA-B64 Series, Type and size: as indicated
- .2 Application: as indicated.

Part 3 Execution

3.1 INSTALLATION

- .1 Install in accordance with Canadian Plumbing Code provincial codes, and local authority having jurisdiction.
- .2 Install in accordance with manufacturer's instructions and as specified.

3.2 CLEANOUTS

- .1 In addition to those required by code, and as indicated, install at base of soil and waste stacks, and rainwater leaders.
- .2 Bring cleanouts to wall or finished floor unless serviceable from below floor.
- .3 Building drain cleanout and stack base cleanouts: line size to maximum NPS4.

3.3 BACK FLOW PREVENTERS

- .1 Install in accordance with CAN/CSA-B64 Series, where indicated and elsewhere as required by code.
- .2 Pipe discharge to terminate over nearest drain and/ or service sink.

3.4 PERFORMANCE VERIFICATION:

- .1 PV procedures:
 - .1 Vacuum breakers, backflow preventers: operation under all conditions.
 - .2 Thermostatic controls: Verify temperature settings, operation of control, limit and safety controls.

END OF SECTION 22 42 01

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 11 55 General Instructions
- .2 Section 21 05 01 Common Work Results – Mechanical
- .3 This Section applies to all related work under Divisions 22 and 23.

1.2 REFERENCES

- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.181-1999, Ready-Mixed Organic Zinc-Rich Coating.

1.3 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 01 50 – General Instructions.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal packaging material for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.

Part 2 Products

2.1 NOT USED

- .1 Not Used

Part 3 Execution

3.1 CONNECTIONS TO EQUIPMENT

- .1 In accordance with manufacturer's instructions unless otherwise indicated.
- .2 Use valves and either unions or flanges for isolation and ease of maintenance and assembly.

3.2 CLEARANCES

- .1 Provide clearance around systems, equipment and components for observation of operation, inspection, servicing, maintenance and as recommended by manufacturer.
- .2 Provide space for disassembly, removal of equipment and components as recommended by manufacturer or as indicated (whichever is greater) without interrupting operation of other system, equipment, or components.

3.3 PIPEWORK INSTALLATION

- .1 Protect openings against entry of foreign material.
- .2 Install to isolate equipment and allow removal without interrupting operation of other equipment or systems.

- .3 Assemble piping using fittings manufactured to ANSI standards.
- .4 Install exposed piping, equipment, rectangular cleanouts and similar items parallel or perpendicular to building lines.
- .5 Install concealed pipework to minimize furring space, maximize headroom, conserve space.
- .6 Valves:
 - .1 Install in accessible locations.
 - .2 Remove interior parts before soldering.
 - .3 Install with stems above horizontal position unless otherwise indicated.
 - .4 Valves accessible for maintenance without removing adjacent piping.
 - .5 Install globe valves in bypass around control valves.
 - .6 Use chain operators on valves NPS 2-1/2 and larger where installed more than 2,400mm above floor in Mechanical Rooms.
- .7 Install dielectric coupling between dissimilar metals.

3.4 SLEEVES

- .1 General: Install where pipes pass through masonry, concrete structures, fire rated assemblies (where steel sleeves are part of the listed assemblies), and elsewhere as indicated.
- .2 Material: Schedule 40 black steel pipe.
- .3 Construction: Foundation walls and where sleeves extend above finished floors to have annular fins continuously welded on at mid-point.
- .4 Sizes: 6 mm minimum clearance between sleeve and un-insulated pipe or between sleeve and insulation.
- .5 Installation:
 - .1 Concrete, masonry walls, concrete floors on grade: Terminate flush with finished surface.
 - .2 Other floors: Terminate 25mm above finished floor.
- .6 Sealing:
 - .1 Foundation walls and below grade floors: Fire retardant, waterproof non-hardening mastic.
 - .2 Elsewhere: Provide space for firestopping. Maintain fire rating integrity.
 - .3 Sleeves installed for future use: Fill with lime plaster or other easily removable filler.
 - .4 Ensure no contact between copper pipe or tube and sleeve.

3.5 ESCUTCHEONS

- .1 Install on pipes passing through walls, partitions, floors, and ceilings in finished areas.
- .2 Construction: One piece type with set screws. Chrome or nickel plated brass or type 316 stainless steel.
- .3 Sizes: Outside diameter to cover opening or sleeve. Inside diameter to fit around pipe.

3.6 CLEANING OF PIPING SYSTEMS

- .1 Before start-up, clean interior of piping systems.

- .2 Preparatory to acceptance, clean and refurbish equipment and leave in operating condition, including replacement of filters in piping systems.

3.7 PRESSURE TESTING OF EQUIPMENT AND PIPEWORK

- .1 Advise Departmental Representative 48 hours minimum prior to performance of pressure tests.
- .2 Pipework: Test as specified in relevant sections.
- .3 Maintain specified test pressure without loss for 24 hours minimum unless specified for longer period of time.
- .4 Prior to tests, isolate equipment and other parts which are not designed to withstand test pressure or media.
- .5 Pay costs for repairs or replacement, retesting, and making good. Departmental Representative to determine whether repair or replacement is appropriate.
- .6 Conceal work only after approval and certification of tests by Departmental Representative.

END OF SECTION 23 05 05

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 11 55 General Instruction
- .2 Section 23 05 00 Common Work Results – Mechanical

1.2 REFERENCES

- .1 National Building Code of Canada (NBC)
- .2 ANSI/NFPA 13-2013, Installation of Sprinkler Systems.

1.3 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Section 01 11 55 – General Instructions.
- .2 Provide vibration isolation and seismic control systems shop drawings complete with performance and product data. Shop drawings shall demonstrate compliance with the National Building Code and NFPA 13 2013 and shall bear the seal of a Professional Engineer.
- .3 Provide detailed drawings of all seismic restraint systems for piping and equipment.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 11 55 – General Instructions.
- .2 Divert unused metal and wiring materials from landfill to metal recycling facility approved by Departmental Representative.
- .3 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .4 Dispose of packaging material in appropriate on-site bin for recycling in accordance with site waste management program.

Part 2 Products

2.1 VIBRATION ISOLATION SYSTEM – GENERAL

- .1 Performance of vibration isolation systems shall be designed by manufacturer specializing in vibration isolation materials and devices.
- .2 Size and shape of bases type shall be coordinated with submitted equipment.
- .3 Products shall of the same manufacturer unless otherwise noted.

2.2 ELASTOMERIC PADS

- .1 Type EP1 - neoprene waffle or ribbed; 9 mm [3/8"] minimum thick; 50 durometer; maximum loading 350 kPa [50 psi].
- .2 Type EP2 - rubber waffle or ribbed; 9 mm [3/8"] minimum thick; 30 durometer natural rubber; maximum loading 415 kPa [60 psi].
- .3 Type EP3 - neoprene-steel-neoprene; 9 mm [3/8"] minimum thick neoprene bonded to 1.71 mm [16 gauge] steel plate; 50 durometer neoprene, waffle or ribbed; holes sleeved with isolation washers; maximum loading 350 kPa [50 psi].

- .4 Type EP4 - rubber-steel-rubber; 9 mm [3/8"] minimum thick rubber bonded to 1.71 mm [16 gauge] steel plate; 30 durometer natural rubber, waffle or ribbed; holes sleeved with isolation washers; maximum loading 415 kPa [60 psi].

2.3 HANGERS

- .1 Colour coded springs, rust resistant, painted box type hangers. Arrange to permit hanger box or rod to move through a 30° arc without metal to metal contact.
- .2 Type H1 - neoprene - in-shear, molded with rod isolation bushing which passes through hanger box.
- .3 Type H2 - stable spring, elastomeric washer, cup with molded isolation bushing which passes through hanger box.
- .4 Type H3 - stable spring, elastomeric element, cup with molded isolation bushing which passes through hanger box.
- .5 Type H4 - stable spring, elastomeric element with pre-compression washer and nut with deflection indicator.

2.4 ACOUSTIC BARRIERS FOR ANCHORS AND GUIDES

- .1 Acoustic barriers: between pipe and support, consisting of 25 mm [1"] minimum thick neoprene isolation material.

2.5 SEISMIC CONTROL MEASURES

- .1 General:
 - .1 Design anchorage and attachment methods for all systems and/or equipment as specified herein.
 - .2 Seismic control systems to work in all directions.
 - .3 Fasteners and attachment points to resist same maximum load as seismic restraint.
 - .4 Drilled or power driven anchors and fasteners not permitted.
 - .5 No equipment, equipment supports or mounts to fail before failure of structure.
 - .6 Supports of cast iron or threaded pipe not permitted.
 - .7 Seismic control measures not to interfere with integrity of firestopping.
- .2 Static equipment:
 - .1 Anchor equipment to equipment supports. Anchor equipment supports to structure.
 - .2 Seismic restraints:
 - .1 Cushioning action to be gentle and steady.
 - .2 Shall never reach metal-like stiffness.
- .3 Fire protection piping systems:
 - .1 Provide seismic restraints for all piping in accordance to the NFPA 13 2013:
 - .1 Provide coupling requirements as listed in NFPA 13 2013.
 - .2 Provide clearance around all piping extending through walls, floors, platforms and foundations, including drains, fire department connections and other auxiliary piping.
 - .3 Provide sway bracing to withstand forces in tension and compression. Tension only bracing systems are permitted for use where listed for this service and where

installed in accordance with their listing limitations, including installations instructions.

- .4 Provide sway bracing to resist both lateral and longitudinal horizontal seismic load and to prevent vertical motion resulting from seismic loads.
- .6 To be compatible with requirements for anchoring and guiding of piping systems. Verify all seismic restraints method and locations with Departmental Representative and Heritage Consultant prior to installations.

Part 3 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 datasheet.

3.2 INSTALLATION

- .1 Seismic control measures to meet requirements of NBC and NFPA 13 2013.
- .2 Ensure piping and electrical connections to isolated equipment do not reduce system flexibility and that piping and conduit passage through walls and floors do not transmit vibrations.
- .3 Coordinate with Heritage personnel for methods and installations of seismic restraints.

3.3 FIELD QUALITY CONTROL

- .1 Provide the services of the Professional Engineer(s) who designed the restraint systems for "Field Review" of the installed components, and submit the following to the Departmental Representative:
 - .1 Assurance commitment letter, signed and sealed; provided at the commencement of the project.
 - .2 Signed and sealed shop drawings of seismic restraints for equipment and piping provided prior to installation.
 - .3 Typewritten inspection reports provided during the construction period.
 - .4 Schedule C-B, signed and sealed; provided after performing "Field Review".

END OF SECTION 23 05 48

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 11 55 General Instructions
- .2 Section 01 35 33 Health and Safety Requirements
- .3 Section 21 05 01 Common Work Results – Mechanical
- .4 This Section applies to all related work under Divisions 21, 22 and 23.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International):
 - .1 CAN/CSA B149.1, Natural Gas and Propane Installation Code.
- .2 Canadian General Standards Board (CGSB)
 - .1 AN/CGSB-1.60, Interior Alkyd Gloss Enamel.
 - .2 CAN/CGSB-24.3, Identification of Piping Systems.
- .3 National Fire Protection Association (NFPA)
 - .1 NFPA 13, Standard for the Installation of Sprinkler Systems.

1.3 QUALITY ASSURANCE

- .1 Quality assurance submittals: submit following in accordance with Section 01 11 55 – General Instructions.
- .2 Health and Safety:
 - .1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle in accordance with Section 01 11 55 – General Instructions.
 - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Waste Management and Disposal:
 - .1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 11 55 – General Instructions.
 - .2 Dispose of unused paint and coating material at official hazardous material collections site approved by Departmental Representative.
 - .3 Do not dispose of unused paint and coating material into sewer system, into streams, lakes, onto ground or in locations where it will pose health or environmental hazard.

Part 2 Products

2.1 MANUFACTURER'S EQUIPMENT NAMEPLATES

- .1 Metal or plastic laminate nameplate mechanically fastened to each piece of equipment by manufacturer.
- .2 Lettering and numbers raised or recessed.
- .3 Information to include, as appropriate:
 - .1 Equipment: manufacturer's name, model, size, serial number, capacity.
 - .2 Motor: voltage, Hz, phase, power factor, duty, frame size.

2.2 SYSTEM NAMEPLATES

- .1 Colours:
 - .1 Hazardous: red letters, white background.
 - .2 Elsewhere: black letters, white background (except where required otherwise by applicable codes).
- .2 Construction:
 - .1 3 mm thick laminated plastic, matte finish, with square corners, letters accurately aligned and machine engraved into core.
- .3 Sizes:

.1 Conform to following table:

	<u>Sizes (mm)</u>	<u>No. of Lines</u>	<u>Height of Letters (mm)</u>
1	10 x 50	1	3
2	13 x 75	1	5
3	11 x 75	2	3
4	20 x 100	1	8
5	20 x 100	2	5
6	20 x 200	1	8
7	25 x 125	1	12
8	25 x 125	2	8
9	35 x 200	1	20

- .2 Use maximum of 25 letters/numbers per line.
- .4 Identification for PWGSC Preventive Maintenance Support System (PMSS):
 - .1 Use arrangement of Main identifier, Source identifier, Destination identifier.
 - .2 Equipment in Mechanical Room:
 - .1 Main identifier: Size #9.
 - .2 Source and Destination identifiers: Size #6.
 - .3 Terminal cabinets, control panels: Size #5.
 - .3 Equipment elsewhere: Sizes as appropriate.

2.3 PIPING SYSTEMS GOVERNED BY CODES

- .1 Identification:
 - .1 Sprinklers: to NFPA 13.

2.4 IDENTIFICATION OF PIPING SYSTEMS

- .1 Identify contents by background colour marking, pictogram (as necessary), legend; direction of flow by arrows. To CAN/CGSB 24.3 except where specified otherwise.
- .2 Pictograms:
 - .1 Where required: Workplace Hazardous Materials Information System (WHMIS) regulations.
- .3 Legend:
 - .1 Block capitals to sizes and colours listed in CAN/CGSB 24.3.
- .4 Arrows showing direction of flow:
 - .1 Outside diameter of pipe or insulation less than 75 mm: 100 mm long x 50 mm high.
 - .2 Outside diameter of pipe or insulation 75 mm and greater: 150 mm long x 50 mm high.
 - .3 Use double-headed arrows where flow is reversible.
- .5 Extent of background colour marking:
 - .1 To full circumference of pipe or insulation.
 - .2 Length to accommodate pictogram, full length of legend and arrows.
- .6 Materials for background colour marking, legend, arrows:
 - .1 Pipes and tubing 20 mm and smaller: waterproof and heat-resistant pressure sensitive plastic marker tags.
 - .2 Other pipes: pressure sensitive [plastic-coated cloth] [vinyl] with protective overcoating, waterproof contact adhesive undercoating, suitable for ambient of 100% RH and continuous operating temperature of 150 degrees C and intermittent temperature of 200 degrees C.
- .7 Colours and Legends:
 - .1 Where not listed, obtain direction from Departmental Representative.
 - .2 Colours for legends, arrows: to following table:

Background colour: Legend, arrows:

Yellow	BLACK
Green	WHITE
Red	WHITE

- .3 Background colour marking and legends for piping systems:

Contents	Background Colour Marking	Legend
Sanitary	Green	SAN
Plumbing vent	Green	SAN.VENT

Contents	Background Colour Marking	Legend
Fire protection water	Red	FIREPROT.WTR
Sprinklers	Red	SPRINKLERS

2.5 CONTROLS COMPONENTS IDENTIFICATION

- .1 Identify all systems, equipment, components, controls, sensors with system nameplates specified in this section.
- .2 Inscriptions to include function and (where appropriate) fail-safe position.

2.6 LANGUAGE

- .1 Identification in English.

Part 3 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 datasheet.

3.2 TIMING

- .1 Provide identification only after painting specified has been completed.

3.3 INSTALLATION

- .1 Perform work in accordance with CAN/CGSB-24.3 except as specified otherwise.
- .2 Provide CSA registration plates as required by respective agency.
- .3 Identify systems, equipment to conform to PWGSC PMSS.

3.4 NAMEPLATES

- .1 Locations:
 - .1 In conspicuous location to facilitate easy reading and identification from operating floor.
- .2 Standoffs:
 - .1 Provide for nameplates on hot and/or insulated surfaces.
- .3 Protection:
 - .1 Do not paint, insulate or cover.

3.5 LOCATION OF IDENTIFICATION ON PIPING SYSTEMS

- .1 On long straight runs in open areas in boiler rooms, equipment rooms, galleries, tunnels: at not more than 17 m intervals and more frequently if required to ensure that at least one is visible from any one viewpoint in operating areas and walking aisles.
- .2 Adjacent to each change in direction.

- .3 At least once in each small room through which piping or ductwork passes.
- .4 On both sides of visual obstruction or where run is difficult to follow.
- .5 On both sides of separations such as walls, floors, partitions.
- .6 Where system is installed in pipe chases, ceiling spaces, galleries, confined spaces, at entry and exit points, and at access openings.
- .7 At beginning and end points of each run and at each piece of equipment in run.
- .8 At point immediately upstream of major manually operated or automatically controlled valves. Where this is not possible, place identification as close as possible, preferably on upstream side.
- .9 Identification easily and accurately readable from usual operating areas and from access points.
 - .1 Position of identification approximately at right angles to most convenient line of sight, considering operating positions, lighting conditions, risk of physical damage or injury and reduced visibility over time due to dust and dirt.

3.6 CLEANING

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION 23 05 53

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Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 11 55 – General Instructions
- .2 All specification sections prefix-numbered 26

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CSA C22.1-15, Canadian Electrical Code, Part 1 (23rd Edition), Safety Standard for Electrical Installations.
 - .2 Every reference to a CAN/ULC or CSA standard in all sections of the specification shall be a reference to the latest published edition at the time of tender.

1.3 DESIGN REQUIREMENTS

- .1 Operating voltages: to CAN3-C235. Latest published edition.
- .2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.
 - .1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

1.4 SUBMITTALS

- .1 Submittals: in accordance with Section 01 11 55 – General Instructions.
- .2 Submit copy of electrical permit for the project to Departmental Representative prior to commencement of work. Departmental Representative will provide drawings required by Electrical Inspection Department at no cost.
 - .1 Pay associated fees.
 - .2 Notify Departmental Representative of changes required by Electrical Inspection Department prior to making changes.
 - .3 Furnish certificate of acceptance from Electrical Inspection Department upon completion of the work.
- .3 Shop drawings:
 - .1 Submit shop drawings and product data.
 - .2 Indicate details of construction, dimensions, capacities, weights and electrical performance characteristics of equipment or material.
 - .3 Where applicable, include wiring, single line and schematic diagrams.
 - .4 Include wiring drawings or diagrams showing interconnection with work of other Sections.

- .5 Submit 6 copies of shop drawings and product data to the Departmental Representative.
- .4 Provide operation and maintenance data for incorporation into operation and maintenance manual specified in Section 01 11 55 – General Instructions.
Include in operations and maintenance data:
 - .1 Details of design elements, construction features, component function and maintenance requirements, to permit effective start-up, operation, maintenance, repair, modification, extension and expansion of any portion or feature of installation.
 - .2 Technical data, product data, supplemented by bulletins, component illustrations, exploded views, technical descriptions of items, and parts list. Advertising or sales literature not acceptable.
 - .3 Wiring and schematic diagrams.
 - .4 Names and addresses of local suppliers for items included in maintenance manuals.
 - .5 Copy of reviewed shop drawings.
- .5 Quality Control: in accordance with Section 01 11 55 – General Instructions.
 - .1 Provide CSA certified equipment and material.
 - .2 Submit test results of installed electrical systems.
 - .3 Permits and fees: in accordance with General Conditions of contract.
 - .4 Submit to Departmental Representative certificate of acceptance from authority having jurisdiction upon completion of Work.
- .6 Record Drawings
 - .1 Provide record drawings of the installation as specified in Section 01 11 55 – General Instructions.

1.5 QUALITY ASSURANCE

- .1 Quality Assurance: in accordance with Section 01 11 55 – General Instructions.
- .2 Qualifications: electrical Work to be carried out by qualified personnel in accordance with the requirement of authorities having jurisdiction.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Material Delivery Schedule: provide Departmental Representative with schedule within 2 weeks after award of Contract.
- .2 Construction/Demolition Waste Management and Disposal: where applicable separate waste materials for recycling in accordance with Section 01 11 55 – General Instructions.

1.7 SYSTEM STARTUP

- .1 Instruct Departmental Representative and operating personnel in operation, care and maintenance of systems, system equipment and components.

- .2 Where applicable and as further specified, arrange and pay for services of manufacturer's factory service Departmental Representative to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.
- .3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with aspects of its care and operation.

1.8 OPERATING INSTRUCTIONS

- .1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.
- .2 Operating instructions to include following:
 - .1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
 - .2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.
 - .3 Safety precautions.
 - .4 Procedures to be followed in event of equipment failure.
 - .5 Other items of instruction as recommended by manufacturer of each system or item of equipment.

Part 2 Products

2.1 MATERIALS AND EQUIPMENT

- .1 Provide material and equipment in accordance with Section 01 11 55 – General Instructions.
- .2 Material and equipment to be CSA certified.

2.2 WIRING TERMINATIONS

- .1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.

2.3 EQUIPMENT IDENTIFICATION

- .1 Identify electrical equipment with nameplates and labels as follows:
 - .1 Nameplates: lamicoid plastic engraving sheet, black face, white core, lettering accurately aligned and engraved into core attached with Loctite 414 adhesive. No pre-gummed labels are acceptable.

.2 Sizes as follows:

NAMEPLATE SIZES

Size 1	10 x 50 mm	1 line	3 mm high letters
Size 2	12 x 70 mm	1 line	5 mm high letters
Size 3	12 x 70 mm	2 lines	3 mm high letters
Size 4	20 x 90 mm	1 line	8 mm high letters
Size 5	20 x 90 mm	2 lines	5 mm high letters

NAMEPLATE SIZES

Size 6	25 x 100 mm	1 line	12 mm high letters
Size 7	25 x 100 mm	2 lines	6 mm high letters

- .2 Labels: plastic labels with 4mm high letters unless specified otherwise.
- .3 Wording on nameplates and labels to be approved by Departmental Representative prior to manufacture.
- .4 Allow for minimum of twenty-five (25) letters per nameplate and label.
- .5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
- .6 Disconnects, starters and contactors: indicate equipment being controlled and voltage.
- .7 Terminal cabinets and pull boxes: indicate system and voltage.

2.4 WIRING IDENTIFICATION

- .1 Identify wiring with permanent indelible identifying markings, either numbered or coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.
- .2 Maintain phase sequence and colour coding throughout.
- .3 Colour coding: to CSA C22.1-2015.

2.5 FINISHES

- .1 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.
- .2 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.

Part 3 Execution

3.1 INSTALLATION

- .1 Do complete installation in accordance with CSA C22.1-2015, BC Amendments, Directives and Bulletins except where specified otherwise.

3.2 NAMEPLATES AND LABELS

- .1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.

3.3 FIRESTOPPING

- .1 Where cables or conduits pass through floors and fire rated walls, pack space full with a ULC approved firestopping system.

- .2 Fire stopping is specified in Section 01 11 55 – General Instructions.

3.4 LOCATION OF OUTLETS

- .1 Locate outlets in accordance with Section 26 05 32 - Outlet Boxes, Conduit Boxes and Fittings.
- .2 Change location of outlets at no extra cost or credit, providing distance does not exceed 3000mm, and information is given before installation.

3.5 FIELD QUALITY CONTROL

- .1 Carry out tests in presence of Departmental Representative or his representative. Submit written test results for review.
- .2 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

3.6 CLEANING

- .1 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.

END OF SECTION

Part 1 General

Part 2 Products

Part 3 Execution

3.1 FIXING, HANGING

- .1 All wiring shall be fixed to or hung from building structure and shall not be fixed to or hung from building services, i.e., ducts, pipes, electrical conduits, sprinkler pipes, etc.

3.2 CONCEALMENT

- .1 Wiring, in general, shall be concealed where possible. Wiring may be concealed by running on tops of beams to make it invisible from below, in corners of walls/roof joins or joins of structural or architectural components with intent to minimize impact of the visual aesthetic.

3.3 SURFACE WIRING IN FINISHED AREAS

- .1 Finished areas of the building are all areas except the mechanical rooms and similar service rooms.
- .2 Any wiring proposed to be run exposed in finished areas of the buildings shall not be installed until all means of possible concealment have been investigated with the Departmental Representative. Such surface wiring shall be approved by the Departmental Representative as shall the routing.
- .3 Surface wiring in finished areas shall be enclosed in EMT unless otherwise indicated. Junction, pull and outlet boxes for surface wiring shall be concealed from view, where possible.

3.4 USE OF EMT CONDUIT

- .1 For exposed wiring:
 - .1 Exposed wiring installed in electrical and mechanical rooms shall be EMT conduit and wire.

3.5 USE OF FLEXIBLE CONDUIT OR AC (BX) CABLE

- .1 AC (BX) cable or flexible conduit may be used where wiring is concealed or tucked into corners or needs to be installed on the tops of structure to make it unable to be viewed.
- .2 Where flexible conduit is used, provide ground bond wire in conduit.
- .3 Flexible conduit or AC (BX) cable where used shall be installed on the square parallel to building lines and be straight and taut between fixing points.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Materials and installation for wire and box connectors.

1.2 RELATED SECTIONS

- .1 Section 01 11 55 – General Instructions
- .2 Section 26 05 21 – Wires and Cables (0-1000V)
- .3 Section 26 05 00 – Common Work Results – For Electrical

1.3 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CSA C22.2No.65, Wire Connectors. Latest published edition.

Part 2 Products

2.1 MATERIALS

- .1 Pressure type wire connectors to: CSA C22.2No.65, with current carrying parts of copper or copper alloy sized to fit copper conductors as required.
- .2 Fixture type splicing connectors to: CSA C22.2No.65, with current carrying parts of copper or copper alloy sized to fit copper conductors 10 AWG or less.
- .3 Clamps or connectors as required to: CAN/CSA-C22.2No.18.

Part 3 Execution

3.1 INSTALLATION

- .1 Remove insulation carefully from ends of conductors and:
 - .1 Install mechanical pressure type connectors and tighten screws or secure with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CSA C22.2No.65.
 - .2 Install fixture type connectors and tighten. Replace insulating cap.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 11 55 – General Instructions
- .2 Section 26 05 20 - Wire and Box Connectors - 0 - 1000 V.
- .3 Section 26 05 00 – Common Work Results – For Electrical

1.2 REFERENCES

- .1 CSA C22.2 No .0.3, Test Methods for Electrical Wires and Cables. Latest published edition.

1.3 PRODUCT DATA

- .1 Submit product data in accordance with Section 01 11 55 – General Instructions.

Part 2 Products

2.1 BUILDING WIRES

- .1 Conductors: Minimum size: 12 AWG.
- .2 Copper conductors: size as indicated, with 600V insulation of chemically cross-linked thermosetting polyethylene material rated RW90. Note: THHN not acceptable.
- .3 As armoured cable in accordance with Section 26 05 10.

2.2 ARMOURED CABLES

- .1 Conductors: Minimum size: 12 AWG.
- .2 Type: AC 90
- .3 Armour: Interlocking

Part 3 Execution

3.1 INSTALLATION OF BUILDING WIRES

- .1 Install wiring as follows:
 - .1 In conduit systems in accordance with Section 26 05 34.
 - .2 As cable systems in accordance with Section 26 05 10.

END OF SECTION

Part 1 General**1.1 RELATED SECTIONS**

- .1 Section 01 11 55 – General Instructions
- .2 Section 26 05 00 – Common Work Results for Electrical
- .3 Section 26 05 31 –Junction, Pull Boxes and Cabinets
- .4 Section 26 05 32 – Outlet Boxes, Conduit Boxes and Fittings
- .5 Section 26 05 34 – Conduits, Conduit Fastenings and Conduit Fittings
- .6 Section 26 05 37 – Wireways and Auxiliary Gutters
- .7 Section 26 31 02 – Fire Alarm System

Part 2 Products**2.1 SUPPORT CHANNELS**

- .1 U shape, size 41 x 41 mm, 2.5 mm thick, surface mounted or suspended.

Part 3 Execution**3.1 INSTALLATION**

- .1 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.
- .2 Fasten exposed conduit or cables to building construction or support system using straps.
 - .1 One-hole steel straps to secure surface conduits and cables 50 mm and smaller.
- .3 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.
- .4 Do not use wire lashing or perforated strap to support or secure raceways or cables.
- .5 Do not use supports or equipment installed for other trades for conduit or cable support.
- .6 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.
- .7 All hangers, supports and brackets shall be provided and be installed to be consistent with the requirements of Table 4.1.8.18 of Section 4 of the British Columbia Building Code.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 11 55 – General Instructions
- .2 Section 26 05 00 – Common Work Results – For Electrical

Part 2 Products

2.1 JUNCTION AND PULL BOXES

- .1 Welded steel or aluminum construction with screw-on flat covers for surface mounting.

Part 3 Execution

3.1 JUNCTION AND PULL BOXES INSTALLATION

- .1 Install pull boxes in inconspicuous but accessible locations.
- .2 Install pull boxes so as not to exceed 30m of conduit run between pull boxes.

3.2 IDENTIFICATION

- .1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results - Electrical.
- .2 Install size 2 identification labels indicating system name, voltage and phase.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 CSA C22.1-2015, Canadian Electrical Code, Part 1.

Part 2 Products

2.1 OUTLET AND CONDUIT BOXES GENERAL

- .1 Size boxes in accordance with CSA C22.1.
- .2 102 mm square or larger outlet boxes as required for special devices.
- .3 Blank cover plates for boxes without wiring devices.

2.2 SHEET STEEL OUTLET BOXES

- .1 Electro-galvanized steel single and multi gang flush device boxes for flush installation, minimum size 76 x 50 x 38 mm. 102 mm square outlet boxes when more than one conduit enters one side with extension and plaster rings as required.
- .2 Electro-galvanized steel utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102 x 54 x 48 mm.

2.3 CONDUIT BOXES

- .1 Cast FS or FD aluminum or feraloy boxes with factory-threaded hubs and mounting feet for surface wiring of components and devices.
- .2 Surface wiremold boxes. Boxes without knockouts.

2.4 FITTINGS - GENERAL

- .1 Bushing and connectors with nylon insulated throats.
- .2 Knock-out fillers to prevent entry of debris.

Part 3 Execution

3.1 INSTALLATION

- .1 Support boxes independently of connecting conduits.
- .2 Use FS or FD boxes or wiremold boxes for surface mounted outlets and junction boxes.
- .3 Provide correct size of openings in boxes for conduit connections. Reducing washers are not allowed.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 11 55 – General Instructions
- .2 Section 26 05 00 – Common Work Results – For Electrical

1.2 REFERENCES

- .1 Canadian Standards Association
 - .1 CSA C22.2 No. 56, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit. Latest published edition.
 - .2 CSA C22.2 No. 83, Electrical Metallic Tubing. Latest published edition.
 - .3 CSA C22.2 No. 211.2, Rigid PVC (Unplasticized) Conduit. Latest published edition.

1.3 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 11 55 – General Instructions.

Part 2 Products

2.1 CONDUITS

- .1 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with steel fittings.
- .2 Flexible metal conduit: to CSA C22.2 No. 56, steel or aluminum liquid-tight flexible metal.

2.2 CONDUIT FASTENINGS

- .1 One-hole steel straps to secure surface conduits 50 mm and smaller, except as otherwise noted.

2.3 CONDUIT FITTINGS

- .1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified.
 - .1 Coating: same as conduit.
 - .2 Material: Steel (Cast fittings are not acceptable).
- .2 Factory "ells" where 90 degrees bends for 21 mm and larger conduits.

2.4 FISH CORD

- .1 Polypropylene.

Part 3 Execution

3.1 INSTALLATION

- .1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.
- .2 Conceal conduits where possible except in mechanical and electrical service rooms.
- .3 Surface mount conduits in mechanical and electrical rooms, unfinished areas and elsewhere as noted on the drawings.
- .4 Use electrical metallic tubing EMT except as otherwise indicated.
- .5 Use liquid tight flexible metal conduit for connection to motors or vibrating equipment in damp or wet locations.
- .6 Minimum conduit size: 21mm.
- .7 Bend conduit cold:
 - .1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.
- .8 Mechanically bend steel conduit over 19 mm diameter.

3.2 SURFACE CONDUITS

- .1 Run parallel or perpendicular to building lines.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 11 55 – General Instructions
- .2 Section 26 05 00 - Common Work Results - Electrical.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International).
 - .1 Latest published edition of CAN/CSA C22.2 No.4, Enclosed and Dead Front Switches.

1.3 SUBMITTALS

- .1 Submit product data in accordance with Section 01 11 55 – General Instructions.

Part 2 Products

2.1 DISCONNECT SWITCHES

- .1 Fusible or non-fusible, horsepower rated disconnect switch in CSA Enclosure type to suit the application. Enclosure 1 for indoor mounting, weatherproof type for outdoor mounting.
- .2 Provision for padlocking in on-off switch position by three locks.
- .3 Mechanically interlocked door to prevent opening when handle in ON position.
- .4 Fuses: size as indicated, HRC J-type.
- .5 Fuseholders: to CSA C22.2 No.39, relocatable and suitable without adaptors, for type and size of fuse indicated.
- .6 Quick-make, quick-break action.
- .7 ON-OFF switch position indication on switch enclosure cover.

2.2 EQUIPMENT IDENTIFICATION

- .1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results - Electrical.
- .2 Indicate name of load controlled on size 4 nameplate.

Part 3 Execution

3.1 INSTALLATION

- .1 Install disconnect switches complete with fuses as applicable or indicated.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 11 55 – General Instructions
- .2 Section 26 05 00 - Common Work Results - Electrical.

1.2 REFERENCES

- .1 International Electrotechnical Commission (IEC)
 - .1 Latest published edition of IEC60947-4-1, Part 4-1 plus applicable amendments:
 Contactors and motor-starters.

1.3 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings in accordance with Section 01 11 55 – General Instructions.
- .2 Indicate:
 - .1 Mounting method and dimensions.
 - .2 Starter size and type.
 - .3 Layout of identified internal and front panel components.
 - .4 Enclosure types.
 - .5 Wiring diagram for each type of starter.
 - .6 Interconnection diagrams.

1.4 CLOSEOUT SUBMITTALS

- .1 Provide operation and maintenance data for motor starters for incorporation into manual specified in Section 01 11 55 – General Instructions.
- .2 Include operation and maintenance data for each type and style of starter.

Part 2 Products

2.1 MATERIALS

- .1 Starters: to IEC60947-4-1.

2.2 MANUAL MOTOR STARTERS

- .1 Single phase manual motor starters of size, type, rating, and enclosure type as indicated, with components as follows:
 - .1 Switching mechanism, quick make and break.
 - .2 One overload heater for single phase, manual reset, trip indicating handle.
- .2 Accessories:

- .1 Toggle switch: labelled to indicate purpose.
- .2 Indicating light: green LED type.
- .3 Locking tab to permit padlocking in "ON" or "OFF" position.

2.3 FULL VOLTAGE MAGNETIC STARTERS

- .1 Magnetic and combination magnetic starters of size, type, rating and enclosure type as indicated with components as follows:
 - .1 Contactor solenoid operated, rapid action type.
 - .2 Motor overload protective device in each phase, manually reset from outside enclosure.
 - .3 Wiring and schematic diagram inside starter enclosure in visible location.
 - .4 Identify each wire and terminal for external connections, within starter, with permanent number marking identical to diagram.
- .2 Accessories:
 - .1 Pushbuttons and/or Selector switches: standard, heavy duty, oil tight labelled as indicated.
 - .2 Indicating lights: LED type and color as indicated.
 - .3 2-N/O and 2-N/C spare auxiliary contacts unless otherwise indicated.

2.4 CONTROL TRANSFORMER

- .1 Single phase, dry type, control transformer with primary voltage as indicated and 120 V secondary, complete with secondary fuse, installed in with starter as indicated.
- .2 Size control transformer for control circuit load plus 20% spare capacity.

2.5 FINISHES

- .1 Apply finishes to enclosure in accordance with Section 26 05 00 - Common Work Results - Electrical.

2.6 EQUIPMENT IDENTIFICATION

- .1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results - Electrical.
- .2 Manual starter designation label, white plate, black letters, size 1, engraved to indicate purpose.
- .3 Magnetic starter designation label, white plate, black letters, size 1 engraved to indicate purpose.

Part 3 Execution

3.1 INSTALLATION

- .1 Install starters, connect power and control as indicated.

- .2 Ensure correct fuses and overload devices elements installed.

3.2 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results - Electrical and manufacturer's instructions.
- .2 Operate switches, starters to verify correct functioning.
- .3 Perform starting and stopping sequences of starters and control relays.
- .4 Check that sequence controls, interlocking with other separate related starters, equipment, control devices, operate as indicated.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 11 55 – General Instructions
- .2 Section 26 05 00 - Common Work Results - Electrical.
- .3 Section 26 05 21- Wires and Cables (0-1000V)
- .4 Section 26 05 34 – Conduits, Conduit Fastenings and Conduit Fittings.

1.2 REFERENCES

- .1 Government of Canada
 - .1 2015 NBC, National Building Code of Canada - 2015.
- .2 Latest published editions of Underwriter’s Laboratories of Canada (ULC)
 - .1 CAN/ULC-S524, Installation of Fire Alarm Systems.
 - .2 ULC-S525, Audible Signal Appliances for Fire Alarm.
 - .3 CAN/ULC-S527, Control Units.
 - .4 CAN/ULC-S528, Manual Pull Stations.
 - .5 CAN/ULC-S529, Smoke Detectors.
 - .6 CAN/ULC-S536, Inspection and Testing of Fire Alarm Systems.
 - .7 CAN/ULC-S537, Verification of Fire Alarm Systems.

1.3 SYSTEM OVERVIEW

The existing fire alarm system in the building is currently an analogue type panel. The new fire alarm system panel shall also be an analogue system panel. All field components shall be replaced to be of manufacture to match the new fire alarm panel.

1.4 SYSTEM DESCRIPTION

- .1 Fully supervised, microprocessor-based, fire alarm system.
- .2 System to carry out fire alarm and protection functions; including receiving alarm signals; initiating single-stage alarm; supervising components and wiring; actuating annunciator and auxiliary functions; initiating trouble signals and signalling to monitoring agency.
- .3 Zoned, non-coded single stage.
- .4 Modular in design.
- .5 Operation of system shall not require personnel with special computer skills.
- .6 System to include:

- .1 Central Control Unit in separate enclosure with power supply, stand-by batteries, central processor and input-output interfaces for alarm receiving, annunciation/display, and program control/signalling.
- .2 Power supply.
- .3 Initiating/input circuits.
- .4 Output circuits.
- .5 Auxiliary circuits.
- .6 Wiring.
- .7 Manual and automatic initiating devices.
- .8 Audible signalling devices.
- .9 End-of-line resistors.
- .10 Remote annunciator
- .11 Ancillary devices.

1.5 REQUIREMENTS OF REGULATORY AGENCIES

- .1 System components: listed by ULC and comply with applicable provisions of National Building Code 2015, and meet requirements of local authority having jurisdiction.

1.6 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Section 01 11 55 – General Instructions.
- .2 Include:
 - .1 Detail assembly and internal wiring diagrams for control unit.
 - .2 Overall system wiring diagram identifying control equipment initiating zones, signaling circuits; identifying terminations, terminal numbers, conductors and raceways.
 - .3 Details for devices.
 - .4 Details and performance specifications for control, annunciation and peripherals.
 - .5 Step-by-step operating sequence.

1.7 CLOSEOUT SUBMITTALS

- .1 Provide operation and maintenance data for fire alarm system for incorporation into manuals specified in Section 01 11 55 – General Instructions.
- .2 Include:
 - .1 Instructions for complete fire alarm system to permit effective operation and maintenance.
 - .2 Technical data - illustrated parts lists with parts catalogue numbers.
 - .3 Copy of approved shop drawings with corrections completed and marks removed except review stamps.
 - .4 List of recommended spare parts for system.
 - .5 Provide an operators condensed and simplified list of instruction on how to react to the various alarm and trouble conditions to be expected. The list shall be on one 216mm by 279mm sheet only. Departmental Representative shall review the operating instructions prior to distribution.

1.8 EXTRA MATERIALS

- .1 Provide maintenance materials in accordance with Section 01 11 55 - General Instructions.
- .2 Include:
 - .1 3 spare glass rods for manual pull stations.
 - .2 One manual fire alarm station.
 - .3 One smoke detector.

Part 2 Products

2.1 MATERIALS

- .1 Equipment and devices: ULC listed and labelled and supplied by single manufacturer.
- .2 Power supply: to CAN/ULC-S524.
- .3 Audible signal devices: to ULC-S525.
- .4 Control unit: to CAN/ULC-S527.
- .5 Manual alarm stations: to CAN/ULC-S528.
- .6 Smoke detectors: to CAN/ULC-S529.

2.2 SYSTEM OPERATION: SIGNALS ONLY

- .1 Actuation of any alarm initiating device to:
 - .1 Cause electronic latch to lock-in alarm state at central control unit.
 - .2 Indicate zone of alarm at central control unit and at remote annunciator.
 - .3 Cause audible devices throughout building to sound in general alarm mode.
 - .4 Transmit signal to monitoring station via the existing monitoring system that is in place.
- .2 Acknowledging alarm: indicated at central control unit.
- .3 Possible to silence signals by "alarm silence" switch at central control unit, after 60 s period of operation.
- .4 Subsequent alarm, received after previous alarm has been silenced, to re-activate signals.
- .5 Actuation of any supervisory device to:
 - .1 Cause electronic latch to lock-in supervisory state at central control unit.
 - .2 Indicate respective supervisory zone at central control unit and remote annunciator.
 - .3 Cause audible signal at control unit and remote annunciator to sound.
 - .4 Activate common supervisory sequence.

- .6 Resetting alarm or supervisory device not to return system indications/functions back to normal until control unit is reset.
- .7 Trouble on system to:
 - .1 Indicate circuit in trouble at central control unit.
 - .2 Activate "system trouble" indication, buzzer and common trouble sequence. Acknowledging trouble condition at either control unit or remote annunciator to silence audible indication; visual indication to remain until trouble is cleared and system is back to normal.
- .8 Troubles on system: suppressed during course of alarm.
- .9 Trouble condition on any circuit in system not to initiate alarm conditions.

2.3 CONTROL PANEL

- .1 Central control unit (CCU).
 - .1 Minimum two line LCD type display.
 - .2 System to provide for priority reporting levels, with fire alarm points assigned highest priority, supervisory and monitoring lower priority, and third priority for troubles.
 - .3 Integral alarm operated contacts for:
 - .1 Sprinkler flow
 - .2 Fire alarm initiated by detector or by manual station
 - .4 Integral trouble and supervisory conditions for
 - .1 Sprinkler valve tamper or system low pressure
 - .2 Fire alarm panel trouble condition
 - .5 Integral power supply, battery charger and standby batteries.
- .2 Manufacturer: Chubb Edwards, Simplex, Mircom, Notifier, approved other.

2.4 POWER SUPPLIES

- .1 120 V, 60 Hz as primary source of power for system.
- .2 Voltage regulated, current limited system power.
- .3 Primary power failure or power loss (less than 102 V) will activate common trouble sequence.
- .4 Interface with battery charger and battery to provide uninterruptible transfer of power to standby source during primary power failure or loss.
- .5 During normal operating conditions fault in battery charging circuit, short or open in battery leads to activate common trouble sequence and standby power trouble indicator.
- .6 Standby batteries: sealed, maintenance free. Capacity of standby battery system shall be to NBC 2015 requirements for a low-rise building of occupancy type A2.

- .7 Continuous supervision of wiring for external initiating and alarm circuits to be maintained during power failure.

2.5 INITIATING/ INPUT CIRCUITS

- .1 Receiving circuits for alarm initiating devices such as manual pull stations, smoke detectors, and water flow switches, wired to central control unit.
- .2 Alarm receiving circuits (active and spare): compatible with smoke detectors and open contact devices.
- .3 Receiving circuits for supervisory, N/O devices. Devices: wired to central control unit.

2.6 ALARM OUTPUT CIRCUITS

- .1 Alarm output circuit: connected to signals, wired in class B configuration to central control unit.
 - .1 Signal circuits' operation to follow system programming; capable of sounding bells in alarm conditions. Alarm shall be the ISO 8201 temporal pattern. Each signal circuit: rated at 2A, 24 VDC; fuse-protected from overcurrent.
 - .2 One or two audible signal circuits.
 - .3 Manual alarm silence, automatic alarm silence and alarm silence inhibit to be provided by system's common control.

2.7 AUXILIARY CIRCUITS

- .1 Auxiliary contacts for control functions.
- .2 Alarm and or supervisory trouble on system to cause operation of programmed auxiliary output circuits for monitoring: fire alarm, sprinkler alarm, fire alarm trouble, sprinkler supervisory.
- .3 Upon resetting system, auxiliary contacts to return to normal.

2.8 WIRING

- .1 Twisted copper conductors: rated 300 V, listed by CSA as suitable for fire alarm duty.
- .2 To initiating circuits: 18 AWG minimum, and in accordance with manufacturer's requirements.
- .3 To signal circuits: 16 AWG minimum, and in accordance with manufacturer's requirements.
- .4 To control circuits: 14 AWG minimum, and in accordance with manufacturer's requirements.
- .5 All wiring to meet requirements of CEC table 19 and section 32 of the CEC.

2.9 MANUAL ALARM STATIONS

- .1 Manual alarm stations: pull lever, wall mounted semi-flush type, bilingual signage.

2.10 AUTOMATIC ALARM INITIATING DEVICES

- .1 Smoke detector: photo-electric type.

2.11 AUDIBLE SIGNAL DEVICES

- .1 Bells: 250mm diameter, 24 V dc, Minimum 85db @ 3m.

2.12 END-OF-LINE DEVICES

- .1 End-of-line devices to control supervisory current in signalling circuits, sized to ensure correct supervisory current for each circuit. Open, short or ground fault in any circuit will alter supervisory current in that circuit, producing audible and visible alarm at main control panel and remotely at annunciator.

2.13 REMOTE ANNUNCIATOR

- .1 Flush mounted LED type with flat front panel
- .2 Refer to drawing for further details on annunciator requirements.

2.14 HEAT TRACE CONTROL PANEL AND MONITOR

- .1 Suitable for control of heat trace cables.
- .2 Capable of monitoring for loss of power, ground fault.
- .3 Contacts for monitoring by the fire alarm panel.
- .4 Refer to drawing E-1 for added details.

2.15 SPRINKLER ALARM AND SUPERVISORY DEVICES

- .1 The sprinkler sub-contractor will install alarm and supervisory switches on the sprinkler system.

2.16 AS-BUILT RISER DIAGRAM

- .1 Fire alarm system riser diagram: in glazed frame minimum size 600 x 600 mm.

Part 3 Execution

3.1 INSTALLATION

- .1 Install systems in accordance with CAN/ULC-S524.
- .2 Install control unit and connect to ac power supply, dc standby power. Refer to drawing E-1 for further detail of installation.
- .3 Install manual alarm stations and connect to alarm circuit wiring.
- .4 Replace existing detectors and connect to alarm circuit wiring.

- .5 Connect alarm circuits to main control panel.
 - .1 Fire alarm system wiring shall be permanently labeled at each end of every conductor using numbered ferrules. Wiring shall be continuous from panel to device. Where splices are required, they shall be within accessible junction boxes on rail mounted terminal blocks. Wiring labeling schedule shall be typed, laminated in plastic and stuck to inside of junction box.
- .6 Replace existing bell and install new bell and connect to signalling circuits.
- .7 Connect signalling circuits to main control panel.
- .8 Install end-of-line devices at end of alarm initiating and signalling circuits.
- .9 Install remote annunciator panel and connect to annunciator circuit wiring.
- .10 Wiring splices are not permitted except at device locations, unless installed per item .5 above.
- .11 Ensure that wiring is free of opens, shorts or grounds, before system testing and handing over.
- .12 Identify circuits and other related wiring at central control unit, annunciators, and terminal boxes.
- .13 Wire to sprinkler system as follows:
 - .1 To the alarm switch on each zoned area of the sprinkler system to provide separate alarm indication for each area.
 - .2 To the zone valve tamper switches to provide trouble or supervisory indication. Where the tamper switches are located within the same room they may be on the one supervisory zone. Where zone valve tamper switches are in different rooms there shall be a supervisory indication for the valves in each room.
 - .3 System low pressure condition shall be monitored as a separate indication for each wet or dry sprinkler systems.
 - .4 There will be an air compressor for the sprinkler system. Wire to the air compressor starter as necessary via the pressure switch arrangement for automatic maintenance or air pressure of system.
 - .5 To heat trace monitoring and control panel, as indicated on drawing on E-1.

3.2 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results - Electrical and CAN/ULC-S537 and CAN/ULC-S536.
- .2 Tests, inspection and verification shall be performed by a specialist contractor other than the installation contractor. Provide the name of the test, inspection and verification contractor (for example – fire alarm equipment manufacturer) within 5 days after contract award.
- .3 Fire alarm system:
 - .1 Test each device and alarm circuit to ensure manual stations, smoke detectors sprinkler system transmit alarm to control panel.

- .1 Test of smoke detectors shall confirm that each smoke detector sensitivity value is within its rated operating range, using the manufacturer's recommended test equipment or other means. Include initial sensitivity value for each smoke detector in verification report.
- .2 Check annunciator panel to ensure zones are shown correctly.
- .3 Simulate grounds and breaks on alarm and signalling circuits to ensure proper operation of systems.
- .4 Verification Certificate. Provide copies of the completed verification certificate to the Departmental Representative prior to the request for an interim inspection.
 - .1 Verification documentation shall include provision of Appendix C of CAN/ULC S537-14.

3.3 DEMONSTRATION AND TRAINING

- .1 Provide on-site demonstration by fire alarm equipment manufacturer to train operational personnel in use and maintenance of fire alarm system.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 11 55 - General Instructions
- .2 Section 26 05 21 - Wires and Cables (0-1000 V).
- .3 Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

1.2 REFERENCES

- .1 Canadian Standards Association
 - .1 Latest published edition of CSA C22.2 No.141, Unit Equipment for Emergency Lighting.

1.3 SUBMITTALS

- .1 Submit product data in accordance with Section 01 11 55 - General Instructions.
- .2 Data to indicate system components, mounting method, source of power and special attachments.

Part 2 Products

2.1 EQUIPMENT

- .1 Emergency lighting equipment: to CSA C22.2 No.141.
- .2 Supply voltage: 120 V, ac.
- .3 Output voltage: 12 V dc.
- .4 Operating time: **30 min**. Minimum battery pack size 36 watt.
- .5 Battery: sealed, maintenance free, 10 year life expectancy.
- .6 Charger: solid state, multi-rate, voltage/current regulated, inverse temperature compensated, short circuit protected with regulated output of plus or minus 0.01V for plus or minus 10% input variations.
- .7 Solid state transfer circuit.
- .8 Low voltage disconnect: solid state, modular, operates at 80% battery output voltage.
- .9 Signal lights: solid state, for 'AC Power ON' and 'High Charge'.

- .10 Lamp heads: integral on unit and/or remote, 345 degrees horizontal and 180 degrees vertical adjustment. Lamp type:
 - .1 12V, 5 watt LED for all areas.
- .11 Cabinet: suitable for direct mounting to wall and c/w knockouts for conduit. Removable or hinged front panel for easy access to batteries.
- .12 Finish: Factory standard.
- .13 Auxiliary equipment:
 - .1 Lamp disconnect switch.
 - .2 Test switch.
 - .3 AC input and DC output terminal blocks inside cabinet.
 - .4 Seismic fixing accommodation.
 - .5 Cord and plug connection for AC.
 - .6 RFI suppressors.
- .14 Other remote heads: ceiling or wall, surface heads mounted on adjustable swivel.

2.2 RELAY UNITS

- .1 Relay units to activate all emergency heads connected to battery pack, if any of the indicated lighting circuits fail.

2.3 WIRING OF REMOTE HEADS

- .1 Conduit: type EMT, in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings where installed in ceiling spaces or walls.
- .2 Conductors: RW90 type in accordance with Section 26 05 21 - Wires and Cables (0-1000 V), sized as #12 AWG for AC wiring and #10 AWG for DC wiring.

Part 3 Execution

3.1 INSTALLATION

- .1 Install unit equipment for emergency lighting. Fix to wall to suit seismic fixing requirements.
- .2 Install unit equipment and remote mounted fixtures as indicated.
- .3 Wire AC and DC connections to exit signs. Use #12 AWG conductor size for AC and #12 AWG for DC wiring.

- .4 Cut and re-cap cord to remove surplus.
- .5 Direct heads to best light exit paths.

END OF SECTION

Project No.: R.076121.001
Rehabilitation of Fire Suppression System
Historic Site in Fort Langley BC

Appendix A
Pre-construction Hazard Assessment
Form

APPENDIX A



FORT LANGLEY PRELIMINARY HAZARD ASSESSMENT FORM

Project Number:	R076121.001
Location:	HISTORIC SITE FORT LANGLEY, FORT LANGLEY B.C.
Date:	SEPTEMBER 26, 2016
Name of Departmental Representative:	
Name of Client:	PARKS CANADA
Name of Client Project Co-ordinator	PH:

Site Specific Orientation Provided at Project Location Yes

Notice of Project Required Yes

NOTE:

PWGSC REQUIRES A Notice of Project FOR ALL CONSTRUCTION WORK RELATED ACTIVITIES

NOTE:

OHS law is made up of many municipal, provincial, and federal acts, regulations, bylaws and codes. There are also many other pieces of legislation in British Columbia that impose OHS obligations.

Important Notice: This hazard assessment has been prepared by PSPC for its own project planning process, and to inform the service provider of actual and potential hazards that may be encountered in performance of the work. PSPC does not warrant the completeness or adequacy of this hazard assessment for the project and the paramount responsibility for project hazard assessment rests with the service provider.

TYPES OF HAZARDS TO CONSIDER	Potential Risk for:				COMMENTS
Examples: Chemical, Biological, Natural, Physical, and Ergonomic Listed below are common construction related hazards. Your project may include pre-existing hazards that are not listed. Contact the Regional Construction Safety Coordinator for assistance should this issue arise.	PWGSC, OGD's, or tenants		General Public or other contractors		Note: When thinking about this pre-construction hazard assessment, remember a hazard is anything that may cause harm, such as chemicals, electricity, working from heights, etc; the risk is the chance, high or low, that somebody could be harmed by these and other hazards, together with an indication of how serious the harm could be.
	Yes	No	Yes	No	

Typical Construction Hazards					
Concealed/Buried Services (electrical, gas, water, sewer etc)	yes				
Slip Hazards or Unsound Footing	yes				
Working at Heights		no			
Working Over or Around Water		no			
Heavy overhead lifting operations, mobile		no			



cranes etc.					
Marine and/or Vehicular Traffic (site vehicles, public vehicles, etc.)	yes				Low risk
Fire and Explosion Hazards	yes				Low risk
High Noise Levels		no			
Excavations		no			
Blasting		no			
Construction Equipment	yes				
Pedestrian Traffic (site personnel, tenants, visitors, public)	yes				Low risk
Multiple Employer Worksite	yes				Example: Contractor working in an occupied Federal Employee space.

Electrical Hazards					Comments
Contact With Overhead Wires		no			
Live Electrical Systems or Equipment	yes				Low risk
Other:					
Physical Hazards					
Equipment Slippage Due To Slopes/Ground Conditions	yes				Severe slope of ground near the sump pump location.
Earthquake	yes				Low risk
Tsunami	yes				Low risk
Avalanche		no			
Forest Fires	yes				
Fire and Explosion Hazards	yes				Low risk
Working in Isolation	yes				
Working Alone	yes				
Violence in the Workplace	yes				Low risk
High Noise Levels	yes				
Inclement weather	yes				
High Pressure Systems		no			
Other:					
Hazardous Work Environments					
Confined Spaces / Restricted Spaces PSPC employees do not enter confined space.	yes				Crawl space and mechanical room in crawl space.
Suspended / Mobile Work Platforms		no			
Other:					
Biological Hazards					
Mould Proliferations		no			
Accumulation of Bird or Bat Guano		no			
Bacteria / Legionella in Cooling Towers / Process Water		no			
Rodent / Insect Infestation		no			
Poisonous Plants		no			
Sharp or Potentially Infectious Objects in Wastes	yes				
Wildlife	yes				Low risk



Chemical Hazards					
Asbestos Materials on Site		no			Refer to Specifications Appendix A
Designated Substance Present		no			
Chemicals Used in work		no			
Lead in paint	yes				Refer to Specifications Appendix A in Hazardous Materials Report.
Mercury in Thermostats or Switches	Yes				Potential lead in paint. Refer to Specifications Appendix A in Hazardous Materials Report.
Application of Chemicals or Pesticides		no			
PCB Liquids in Electrical Equipment		no			
Radioactive Materials in Equipment		no			
Other:					
Contaminated Sites Hazards					
Hazardous Waste		no			
Hydrocarbons		no			
Metals		no			
Other:					

Security Hazards					Comments
Risk of Assault	yes				Low risk
Other:					
Other Hazards					
Silica					Silica, refer to Specifications appendix A in Hazardous Materials Report.

Other Compliance and Permit Requirements¹	YES	NO	Notes / Comments²
Is a Building Permit required?			
Is an Electrical permit required?	yes		
Is a Plumbing Permit required?	yes		
Is a Sewage Permit required?		no	
Is a Dumping Permit required?		no	
Is a Hot Work Permit required?		no	
Is a Permit to Work required?			Mandatory for ALL AFD managed work sites.
Is a Confined Space Entry Permit required?	yes		Mandatory
Is a Confined Space Entry Log required	yes		Mandatory for all Confined Spaces
Discharge Approval for treated water required	yes		

Notes:

- (1) Does not relieve Service Provider from complying with all applicable federal, provincial, and municipal laws and regulations.
- (2) TBD means To Be Determined by Service Provider.

Service Provider Acknowledgement: We confirm receipt and review of this Pre-Project Hazard Assessment and



acknowledge our responsibility for conducting our own assessment of project hazards, and taking all necessary protective measures (which may exceed those cited herein) for performance of the work.

Service Provider Name			
Signatory for Service Provider		Date Signed	
RETURN EXECUTED DOCUMENT TO PSPC DEPARTMENTAL REPRESENTATIVE PRIOR TO ANY WORK COMMENCING			

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Rehabilitation of Fire Suppression System
Historic Site in Fort Langley BC

Appendix B
Hazardous Building
Materials Assessment

APPENDIX B

Hazardous Building Materials Assessment

24 Buildings/Structures at the Fort
Langley National Historic Site, BC



Prepared for:
PWGSC – Public Works and
Government Services Canada
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Project No.: 123220330.200

March 7, 2016

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HAZARDOUS BUILDING MATERIALS ASSESSMENT

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HAZARDOUS BUILDING MATERIALS ASSESSMENT

Executive Summary

Stantec Consulting Ltd. (Stantec) was retained by Public Works and Government Services Canada (PWGSC) to conduct hazardous building materials assessments within 24 buildings/structures (subject buildings) throughout the Fort Langley Historic Site. A list of the buildings assessed is included in Appendix A.

The purpose of the assessment was to check for potential hazardous building materials that may require special attention in accordance with the requirements of the *Canada Labour Code, Part II* (Canada Labour Code), the current version of British Columbia's *Occupational Health and Safety Regulation* (BC Reg. 296/97), as well as the Parks Canada *Asbestos Management Guide* (January 2014) and the Parks Canada *Asbestos Management Standard* (January 2014).

The hazardous building materials considered included asbestos-containing materials (ACMs), lead-containing materials including lead-containing paints (LCPs), polychlorinated biphenyls (PCBs), mercury-containing items, ozone-depleting substances (ODSs), mould or moisture affected building materials, and silica.

Based on Stantec's visual assessment and on the laboratory analyses performed on samples collected, hazardous building materials were identified within many of the subject buildings.

A summary of our findings and recommendations is presented below. It should be noted that this summary is subject to the same restrictions and limitations as presented in Section 3 (Assessment Limitations) and Section 6 (Closure). The information provided is to be read in conjunction with the remainder of this report.

NOTE: Where particular hazardous building materials are not listed in the following table, they were not identified in that particular building.

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Summary of Identified Hazardous Building Materials	
Building Name	Identified Hazardous Building Materials
Artifact Storage Building	<p>Lead</p> <ul style="list-style-type: none"> Lead is expected to be present in solder used on copper domestic pipes, caulking on bell fittings for cast iron drainage pipes and electrical equipment. <p>PCBs</p> <ul style="list-style-type: none"> The 15 fluorescent light fixtures throughout were observed to have high-efficiency light tubes. The ballasts within such fixtures are not suspected to contain PCBs. <p>Mercury</p> <ul style="list-style-type: none"> Mercury vapour is expected to be present in fluorescent light bulbs/tubes observed in 15 fluorescent light fixtures. Mercury may also be present in paints and adhesives. <p>ODSs</p> <ul style="list-style-type: none"> The following equipment was identified by labels to be ODS-containing: <ul style="list-style-type: none"> One York HVAC unit (factory charged R-22, 3 LB 11OZ). <p>Silica</p> <ul style="list-style-type: none"> Silica is presumed to be present in the concrete foundation of the subject building.
North East and North West Bastion	<p>Lead</p> <ul style="list-style-type: none"> Lead is expected to be present in solder used on copper domestic pipes and caulking on bell fittings for cast iron drainage pipes. <p>PCBs</p> <ul style="list-style-type: none"> The four fluorescent light fixtures throughout were observed to have high-efficiency light tubes. The ballasts within such fixtures are not suspected to contain PCBs. <p>Mercury</p> <ul style="list-style-type: none"> Mercury vapour is expected to be present in fluorescent light bulbs/tubes observed in four fluorescent light fixtures. <p>Silica</p> <ul style="list-style-type: none"> Silica is presumed to be present in the concrete foundation of the subject building.
Big House	<p>Lead</p> <ul style="list-style-type: none"> Red coloured paint on the interior trims is lead-containing. Lead is expected to be present in older electrical wiring and sheathing, solder used on copper domestic pipes, caulking on bell fittings for cast iron drainage pipes, electrical equipment and vent and pipe flashing. <p>Mercury</p> <ul style="list-style-type: none"> Mercury may also be present in paints and adhesives. <p>Silica</p> <ul style="list-style-type: none"> Silica is presumed to be present in the concrete foundation of the subject building.
Blacksmith Shop	<p>Silica</p> <ul style="list-style-type: none"> Silica is presumed to be present in the brick mortar of the subject building.
Chicken Shed	No hazardous building materials were identified in the assessment.

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Summary of Identified Hazardous Building Materials	
Building Name	Identified Hazardous Building Materials
Cooperage	<p>Lead</p> <ul style="list-style-type: none"> Lead is expected to be present in solder used caulking on bell fittings for cast iron drainage pipes and vent and pipe flashings. <p>PCBs</p> <ul style="list-style-type: none"> The majority of the approximately eight fluorescent light fixtures throughout were observed to have high-efficiency light tubes. The ballasts within such fixtures are not suspected to contain PCBs. <p>Mercury</p> <ul style="list-style-type: none"> Mercury vapour is expected to be present in fluorescent light bulbs/tubes observed in eight fluorescent light fixtures. Mercury may also be present in paints and adhesives. <p>Silica</p> <ul style="list-style-type: none"> Silica is presumed to be present in the brick mortar and concrete of the subject building.
Exhibits Building	<p>Lead</p> <ul style="list-style-type: none"> Lead is expected to be present in solder used on caulking on bell fittings for cast iron drainage pipes, electrical equipment and vent and pipe flashings. <p>Mercury</p> <ul style="list-style-type: none"> Mercury may also be present in paints and adhesives. <p>Silica</p> <ul style="list-style-type: none"> Silica is presumed to be present in the concrete foundation of the subject building.
Garage	<p>Lead</p> <ul style="list-style-type: none"> Yellow coloured paint on the exterior wood panels is lead-containing. <p>Mercury</p> <ul style="list-style-type: none"> Mercury may also be present in paints and adhesives. <p>Silica</p> <ul style="list-style-type: none"> Silica is presumed to be present in the concrete foundation of the subject building.
Lumber Shed	<p>Moisture/Mould</p> <ul style="list-style-type: none"> Moisture and confirmed mould impacted drywalls were observed in the ceilings and upper west walls of the subject building. <p>Mercury</p> <ul style="list-style-type: none"> Mercury may also be present in paints and adhesives. <p>Silica</p> <ul style="list-style-type: none"> Silica is presumed to be present in the concrete foundation of the subject building.

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Summary of Identified Hazardous Building Materials	
Building Name	Identified Hazardous Building Materials
Maintenance Building	<p>Asbestos</p> <ul style="list-style-type: none"> Black window pane caulking on windows throughout the Maintenance Building is asbestos-containing. <p>Lead</p> <ul style="list-style-type: none"> Yellow coloured paint on exterior siding is lead-containing. Brown coloured paint on interior trim is lead containing. Yellow coloured paint on exterior main gate is lead containing. Yellow coloured paint on the interior walls of the storage rooms is lead-containing. Lead is expected to be present in electrical wiring materials and sheathing, solder used on copper domestic pipes, caulking on bell fittings for cast iron drainage pipes and electrical equipment. <p>PCBs</p> <ul style="list-style-type: none"> The 35 fluorescent light fixtures were observed to have high-efficiency light tubes. The ballasts within such fixtures are not suspected to contain PCBs. <p>Mercury</p> <ul style="list-style-type: none"> Mercury vapour is expected to be present in fluorescent light bulbs/tubes observed in 35 fluorescent light fixtures. Mercury may also be present in paints and adhesives. <p>Silica</p> <ul style="list-style-type: none"> Silica is presumed to be present in the concrete foundation of the subject building.
Operations Building	<p>Lead</p> <ul style="list-style-type: none"> Lead is expected to be present in solder used on copper domestic pipes, caulking on bell fittings for cast iron drainage pipes, electrical equipment and vent and pipe flashings. <p>PCBs</p> <ul style="list-style-type: none"> The 85 fluorescent light fixtures were observed to have high-efficiency light tubes. The ballasts within such fixtures are not suspected to contain PCBs. <p>Mercury</p> <ul style="list-style-type: none"> Mercury vapour is expected to be present in fluorescent light bulbs/tubes observed in 85 fluorescent light fixtures. Mercury may also be present in paints and adhesives. <p>Silica</p> <ul style="list-style-type: none"> Silica is presumed to be present in the concrete foundation of the subject building.
O'Tentiks	<p>Mercury</p> <ul style="list-style-type: none"> Mercury may also be present in paints and adhesives. <p>Silica</p> <ul style="list-style-type: none"> Silica is presumed to be present in the concrete of the subject building.
Photo Kiosk	<p>Silica</p> <ul style="list-style-type: none"> Silica is presumed to be present in the concrete of the subject building.
Picnic Shelter	<p>Silica</p> <ul style="list-style-type: none"> Silica is presumed to be present in the concrete of the subject building.
Play House	<p>Silica</p> <ul style="list-style-type: none"> Silica is presumed to be present in the concrete of the subject building.

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Summary of Identified Hazardous Building Materials	
Building Name	Identified Hazardous Building Materials
Servants Quarter	<p>Lead</p> <ul style="list-style-type: none"> Lead is expected to be present in older electrical wiring materials and sheathing, solder used on copper domestic pipes, caulking on bell fittings for cast iron drainage pipes and electrical equipment. <p>Mercury</p> <ul style="list-style-type: none"> Mercury may also be present in paints and adhesives. <p>Silica</p> <ul style="list-style-type: none"> Silica is presumed to be present in the concrete of the subject building.
Store House	<p>Lead</p> <ul style="list-style-type: none"> Brown coloured paint on the exterior trim is lead-containing. White coloured paint on exterior walls is lead-containing. Lead is expected to be present in older electrical wiring and sheathing, solder used on copper domestic pipes, caulking on bell fittings for cast iron drainage pipes and electrical equipment. <p>Mercury</p> <ul style="list-style-type: none"> Mercury may also be present in paints and adhesives. <p>Silica</p> <ul style="list-style-type: none"> Silica is presumed to be present in the concrete and brick mortar of the subject building.
Storage Shed	<p>Lead</p> <ul style="list-style-type: none"> Brown coloured paint on the downspout is lead-containing. <p>Mercury</p> <ul style="list-style-type: none"> Mercury may also be present in paints and adhesives. <p>Silica</p> <ul style="list-style-type: none"> Silica is presumed to be present in the concrete foundation of the subject building.
Theatre	<p>Lead</p> <ul style="list-style-type: none"> Lead is expected to be present solder used on copper domestic pipes, caulking on bell fittings for cast iron drainage pipes, electrical equipment and vent and pipe flashings. <p>Silica</p> <ul style="list-style-type: none"> Silica is presumed to be present in the concrete foundation of the subject building.
Visitor Centre	<p>Lead</p> <ul style="list-style-type: none"> Lead is expected to be present solder used on copper domestic pipes, caulking on bell fittings for cast iron drainage pipes and electrical equipment. <p>Mercury</p> <ul style="list-style-type: none"> Mercury may also be present in paints and adhesives. <p>Silica</p> <ul style="list-style-type: none"> Silica is presumed to be present in the concrete foundation of the subject building.

Building-by-building summaries of the identified hazardous building materials are provided in Appendix B through Appendix U. General findings and recommendations pertaining to hazardous building materials within the subject buildings are provided in Section 4 and Section 5 of this report.

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Introduction
March 7, 2016

1.0 INTRODUCTION

Stantec Consulting Ltd. (Stantec) was retained by Public Works and Government Services Canada (PWGSC) to conduct hazardous building materials assessments within the buildings associated with the following National Park sites in British Columbia:

- Fort Langley National Historic Site in Langley, BC (24 buildings)
- Gulf of Georgia Cannery in Richmond, BC (5 buildings)
- Fort Rodd Hill National Historic Site in Victoria, BC (31 buildings)
- Gulf Islands National Park on Vancouver, Saturna, Prevost, Pender, Russell, Mayne and Tumbo Island, BC (45 buildings)
- Pacific Rim National Park in and between Tofino, Ucluelet and Port Renfrew, BC (39 buildings).

The general locations of the National Park sites are indicated on Drawing A1 in Appendix A.

This report presents the findings of assessment activities within 24 buildings (subject buildings) throughout Fort Langley National Historic Site in Fort Langley, BC. An overall plan of Fort Langley National Historic Site which shows the locations of the buildings assessed is presented in the drawings in Appendix A. In addition, a list of the buildings included in this assessment is also provided in Appendix A.

The purpose of the assessment was to check for potential hazardous building materials that may require special attention in accordance with the requirements of the *Canada Labour Code, Part II* (Canada Labour Code), the current version of British Columbia's *Occupational Health and Safety Regulation* (BC Reg. 296/97), as well as the Parks Canada *Asbestos Management Guide* (January 2014) and the Parks Canada *Asbestos Management Standard* (January 2014).

The hazardous building materials considered included asbestos-containing materials (ACMs), lead-containing materials including lead-containing paints (LCPs), polychlorinated biphenyls (PCBs), mercury-containing items, ozone-depleting substances (ODSs), mould or moisture affected building materials, and silica.

The site work was conducted by Keith Irwin and Steve Chou of Stantec on June 17 and 18, 2015.

1.1 UNDERSTANDING OF THE PROJECT

Stantec understands that the subject buildings were constructed during time periods when hazardous building materials were commonly used in construction, and that information pertaining to the identity, location and approximate extent of hazardous building materials (if any) within the subject buildings is either not on-file or outdated. As such, and in accordance with the Parks Canada *Asbestos Management Guide* (January 2014), the Parks Canada *Asbestos Management Directive* (January 2014), the Canada Labour Code and BC Reg. 296/97

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Scope and Methodology
March 7, 2016

pertaining to identifying hazards associated with hazardous building materials in the workplace, PWGSC commissioned this assessment on behalf of Parks Canada.

A list of the buildings included in this assessment is included in Appendix A.

2.0 SCOPE AND METHODOLOGY

Keith Irwin and Steve Chou of Stantec conducted visual assessments within the subject buildings from June 17 to 18, 2015. Site work was conducted in general compliance with the requirements of the Canada Labour Code, BC Reg. 296/97 and Stantec's Safe Work Practices (SWPs).

Mechanical systems, structures and finishes of the subject buildings were visually examined to determine the suspected presence of ACMs, lead including LCPs, PCBs, mercury, ODSs, mould, and silica. Where building materials were suspected but not confirmed to contain asbestos or lead (in paint) samples were collected for analysis to confirm or deny the presence of these hazardous materials. Based on analytical results, visually similar materials were referenced to specific analyzed samples to reduce the number of samples collected.

Additional background information and the methodology used for the determination of presence or absence of each specific hazardous material considered in this assessment are outlined in the following sections.

2.1 ASBESTOS

The common use of friable (materials which, when dry, can be easily crumbled or powdered by hand pressure) ACMs in construction generally ceased voluntarily in the mid-1970s but was only banned through legislation by the late 1980s. Friable asbestos was used in many building products, primarily high temperature insulations, spray-applied structural fireproofing, and a material known as vermiculite that was commonly used as block wall insulation and may be contaminated with asbestos fibres. Asbestos was also used in many non-friable manufactured products such as floor tiles, ceiling tiles, Transite cement products, and various other construction materials. Some cement products currently used in the construction of buildings may still contain asbestos.

The presence of asbestos in federal workplaces, and pertaining to federally regulated workers is governed by the Canada Labour Code. The presence of asbestos in the workplace in British Columbia pertaining to provincially regulated workers is governed by BC Reg. 296/97. As both federally regulated workers and provincially regulated workers (e.g., contractors) are expected to carry out work activities within the subject buildings, and as the provincial regulations are generally more prescriptive pertaining to asbestos (and generally include the requirements noted in the Canada Labour Code), this assessment was conducted to meet the requirements of BC Reg. 296/97.

HAZARDOUS BUILDING MATERIALS ASSESSMENT

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According to the current version of BC Reg. 296/97, ACM means any material containing at least 0.5% asbestos, or vermiculite insulation with any asbestos.

Based on these criteria, a visual assessment of accessible areas was undertaken in order to check for the presence of materials suspected of containing asbestos. Locations to collect discrete bulk asbestos samples of suspect building materials were identified. Samples of representative materials were then collected at these locations.

Multiple samples were collected from each "homogenous application" of observed suspected ACMs (materials suspected to contain asbestos that are uniform in material type, colour, texture application and estimated installation date) and submitted to EMSL Canada Inc. (EMSL) in Mississauga, Ontario for analysis of asbestos content using polarized light microscopy (PLM) with dispersion staining, in accordance with the United States Environmental Protection Agency (EPA) 600/R-93/116 method.

The number of samples to be collected for each homogenous application of a suspected ACM was based on accepted occupational hygiene standards and protocols, along with the assessor's experience and understanding of the consistency of that building material's application.

EMSL's analytical laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP).

2.1.1 Sample Results Interpretation

When asbestos is detected in concentrations greater than 0.5% in one of the samples within a set that was collected to represent a "homogenous application" of a particular material (or detected in any concentration, in a set of samples collected for applications of vermiculite), the entire sample set and the entire application of that material was then considered to be an ACM.

In addition to the above, a "positive stop" option was used during the laboratory analysis of the building material samples submitted for asbestos analysis. The "positive stop" option is utilized by the laboratory when asbestos is detected at a concentration of greater than one percent in one of the samples within a set that was collected to represent a "homogenous application" of that material. At this point, further analysis of subsequent samples within the set is deemed to be unnecessary (as the entire set will be considered an ACM, per above), and the remainder of the samples within the set are not analyzed.

HAZARDOUS BUILDING MATERIALS ASSESSMENT

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2.1.2 Potential Asbestos-Containing Vermiculite Insulation

As part of the assessment, Stantec assessed the subject buildings for areas where vermiculite insulation, a potential ACM, would likely be present. This included making note of and assessing attic spaces, floor cavities and masonry or brick walls, which are typical areas where vermiculite is found. Regarding this portion of the assessment, the following should be noted:

- Where masonry or brick walls were observed, destructive assessment (drilling) was not conducted to assess the cavity for the presence of vermiculite.
- Where non-vermiculite attic insulation (e.g., fiberglass) was observed, inspection for the presence of vermiculite under the other insulation was conducted only at the attic access point (not throughout the attic).

2.1.3 Asbestos Sampling Quality Assurance/Quality Control

Sampling activities pertaining to asbestos were conducted in accordance with Stantec's SWPs, which take into account current provincial regulations pertaining to such work (i.e., sampling procedures, required number of samples, and laboratory analytical procedures).

Representative bulk samples were collected of accessible suspect ACMs in sufficient quantities for laboratory analyses. Suspect ACM 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.

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.

2.2 LEAD

Lead may be used in its pure metallic form or combined chemically with other elements to form lead compounds. Metallic lead is used to make products such as electric storage batteries, ammunition, lead solder, radiation shields, pipes, and sheaths for electric cables. Metallic lead is sometimes combined with other metals such as copper, tin, and antimony as lead alloys for use in the manufacture of a variety of metal products. Lead is commonly found in buildings in the solder used on copper domestic pipes, in the caulking on bell fittings of cast iron drainage pipes and in electrical equipment.

The presence of lead-containing materials (other than paint) was assessed through visual means.

With respect to paint, the lead content of interior paint was limited to 0.5% by weight (equivalent to 5,000 mg/kg or ppm) in 1976 under the Federal *Hazardous Products Act*, which governs the

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import, export and distribution of hazardous products in Canada. In 2005, the *Hazardous Products Act* had reduced the criteria for surface coatings (including paint) to 600 mg/kg (600 ppm) to define them as "lead-containing". This criterion has since (2010) been reduced to 90 ppm.

However, with respect to potential lead exposures associated with disturbance to surfaces coated with lead-containing products, WorkSafeBC has compiled a manual titled *Lead-Containing Paint and Coatings: Preventing Exposure in the Construction Industry*, (Lead Guideline) which defines a "lead-containing surface coating material" and indicates that "...the improper removal of lead paint containing 600 mg/kg lead results in airborne lead concentrations that exceed half of the exposure limit". As such, Stantec will reference this value (600 ppm) in defining paints as "lead-containing".

Based on this criterion, samples of suspected LCPs were collected from major paint applications, and were collected to substrate, where possible, in sufficient quantity to conduct analyses for total lead content. Samples collected were placed into separate, sealed, and labeled polyethylene bags, and submitted to EMSL for analyses of total lead content using Flame Atomic Absorption Spectrometry AAS (SW 846 3050B*/7000B).

EMSL's analytical laboratory is also accredited by the American Industrial Hygiene Association (AIHA) Environmental Lead Laboratory Approval Program.

2.3 POLYCHLORINATED BIPHENYLS

PCBs were used widely as coolants and lubricants in transformers, capacitors, and other electrical equipment. In fluorescent fixtures, PCBs were usually found within the small capacitors inside the ballast that controls the lamp. The Federal *Chlorobiphenyls Regulation*, SOR/91-152, prohibited the use of PCBs in electrical equipment manufactured after July 1, 1980.

The presence of PCB-containing equipment was assessed through visual means. With respect to fluorescent lamp ballasts, due to the risk of electrical shock associated with dismantling operating fixtures, fluorescent lamp ballasts were not removed to view identification numbers/information.

The total number of fluorescent lamp fixtures that may have ballasts that contain PCBs was approximated for each building assessed.

Suspected PCB-containing electrical equipment can be visually inspected and compared to the Environment Canada reference guide entitled *Identification of Lamp Ballasts Containing PCBs*, Report EPS 2/CC/2, dated August 1991 (PCB Guide).

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Scope and Methodology
March 7, 2016

2.4 MERCURY

Mercury is commonly found in buildings as mercury vapour lighting, thermostats/thermometers with mercury-containing glass ampoules, electrical switches and can also be found in minor amounts in fluorescent lamp tubes and vapour bulbs and may be present in stable forms in adhesives. Exposure to mercury in federal workplaces is governed by the Canada Labour Code, while provincially it is governed by BC Reg. 296/97.

The presence of mercury and mercury-containing equipment was assessed through visual means.

2.5 MOULD

Moist building materials may provide suitable conditions for mould growth, and the removal of building materials impacted by mould growth may require workers with specific training and experience using work procedures that have been developed to protect workers and work areas from exposure to elevated concentrations of airborne mould.

The presence of suspect visible mould was assessed through visual means and sampling. Material observed with dark-coloured staining and/or a textured and discoloured appearance is described as "suspect mould". Mould identified visually is defined as "suspect mould" unless it is confirmed as mould by laboratory analysis.

2.5.1 Mould Reference Guidelines

With respect to mould and/or moisture, the visual assessment procedures utilized during this project were based on the recommendations provided in the documents listed below:

- Standard Construction Document CCA 82 *Mould Guidelines for the Canadian Construction Industry*, Canadian Construction Association, 2004 (referred to as CCA 82)
- *Guidelines on Assessment and Remediation of Fungi in Indoor Environment*, New York City Department of Health, Bureau of Environmental and Occupational Disease Epidemiology, April 2000 (referred to as the NYC Guidelines)
- *Fungal Contamination in Public Buildings: Health Effects and Investigation Methods*, Federal-Provincial Committee on Environmental and Occupational Health, 2004 (referred to as the Health Canada Guide)
- *Indoor Air Quality in Office Buildings: A Technical Guide*, Report of the Federal-Provincial Advisory Committee on Environmental and Occupational Health, 1995 (referred to as the IAQ Guide)
- *Bioaerosols: Assessment and Control*, American Conference of Governmental Industrial Hygienists (ACGIH), 1999 (referred to as the ACGIH Report).

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Assessment Limitations
March 7, 2016

2.6 OZONE-DEPLETING SUBSTANCES

Chlorofluorocarbons (CFCs) and other ODSs are often found in refrigeration units associated with air-conditioning or other refrigeration equipment. In September 1987, 47 countries agreed to the Montreal Protocol on Substances that Deplete the Ozone Layer. ODSs are regulated in BC 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) and the Federal Halocarbon Regulations, 2003 (FHR 2003).

The presence of ODSs and equipment containing these materials was assessed through visual means.

2.7 SILICA

Silica, also referred to as free crystalline silica, is found in concrete, cement, mortar, ceramic wall and floor tiles, stucco finishes and acoustic ceiling tiles. Prolonged exposure to, and inhalation of free crystalline silica, may result in respiratory disease known as silicosis, which is characterized by progressive fibrosis of the inner lung tissue and marked shortness of breath or impaired lung function.

Exposure to silica dust is governed by BC Reg. 296/97. According to both legislative instruments, the time-weighted average exposure limit for airborne silica dust is 0.025 mg/m³.

The presence of silica was assessed through visual means.

3.0 ASSESSMENT LIMITATIONS

In preparation of this report, Stantec used professional judgment based on experience. The work was conducted in accordance with generally accepted professional standards. Stantec relied on information gathered during the site investigation and laboratory analytical reports.

This report reflects the observations made within accessed areas of the subject buildings and the results of analyses performed on specific materials sampled during the assessment. Analytical results reflect the sampled materials at the specific sample locations.

Sampling was conducted pertaining to suspected ACMs and suspected LCPs only. The assessment for the presence of other hazardous building materials was visual in nature, and was conducted pertaining to readily visible surfaces within accessible spaces only. Concealed spaces were inspected via existing access panels, where present. Interior and exterior finishes, solid ceilings, walls, flooring and structural elements were not removed to access concealed areas.

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Assessment Limitations
March 7, 2016

Due to limitations on the agreed to scope of work for this project as well as physical limitations in accessing concealed areas and limitations associated with working in occupied/operational spaces, there are specific limitations to the information that can be provided to each hazardous building material considered in this assessment, as outlined in the following sub-sections.

3.1 ASBESTOS

Suspected ACMs that were not sampled include, but are not limited to, the following (where present, based on building construction or as otherwise noted):

- Sealants on penetrations through roofing materials on peaked roofs, where not safely accessible for sampling without fall protection equipment
- Sub-grade materials
- Interior components of mechanical equipment (e.g., inner linings or gaskets in boilers)
- Interior components of heating, ventilation and air conditioning (HVAC) units
- Heat protection materials inside mechanical installations (e.g., gaskets) and light fixtures (e.g., paper backing in sealed incandescent fixtures)
- Flooring material concealed beneath ceramic tile, brickwork, hardwood flooring, and/or concealed beneath existing sub-floors
- Drywall and/or wall plaster and associated finish materials concealed behind new and/or additional walls or ceilings
- Woven tape inside duct connection joints or inner ducting insulation
- Materials within wall cavities, hard ceiling cavities or crawlspaces
- Insulation materials inside fire doors.

If encountered during renovation, demolition or other activities, any suspected ACMs not identified within this report should be presumed to contain asbestos and handled as such until otherwise proven, through analytical testing.

3.2 LEAD

Assessment for the presence of lead or lead-containing materials was visual in nature, and was conducted pertaining to readily visible surfaces within accessible spaces of the subject buildings only. The presence of lead or lead-containing materials in inaccessible areas not assessed included, but was not limited to: ceiling spaces, wall cavities, crawlspaces, and buried materials.

With respect to paint, samples of suspected LCPs were collected within the subject buildings only from surfaces of major paint applications where visually different paint colours and/or types were identified. Although the surfaces where samples were collected may be covered with more than one coat of paint, the paint samples are described by the surface (visible) colour only.

Attempts were made to represent all layers of paint in the samples collected. As analytical results are referenced to the surface paint colour only, the lead content of all painted surfaces

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Assessment Limitations
March 7, 2016

similar to that represented by the surface paint colour will be presumed to be the same, regardless of differing sub surface paints, if any.

3.3 POLYCHLORINATED BIPHENYLS

Due to height restrictions and the risk of electrical shock in handling operational light fixtures, the ballasts present in the fixtures observed within the subject buildings were not removed for comparison to the PCB Guide. The visible labels of ballasts in several fixtures were inspected for comparison to the PCB Guide.

Conclusions and recommendations regarding the presence of PCBs within the subject buildings are based on Stantec's limited observations in combination with information provided by staff regarding lighting renovations (where requested by Stantec based on observations) and is presented to provide guidance regarding the likelihood that PCB-containing equipment is or is not present within the subject buildings. The exact extent and/or number of fluorescent lamp ballasts containing PCBs, if any, within the subject buildings will not be commented on.

3.4 MERCURY

Visual assessment for the presence of mercury-containing equipment within the subject buildings was conducted in accessible areas only. The presence of mercury or mercury-containing equipment in inaccessible areas includes, but is not limited to: ceiling spaces, wall cavities, and crawlspaces, or as internal parts of HVAC mechanisms.

3.5 MOULD

Visual assessment for the presence of suspected visible mould and/or suitable conditions for mould growth (e.g., moist and/or water-stained building materials) were conducted in accessed portions of the subject buildings only. The assessment was not intrusive in nature and included visual assessment of exposed surfaces and closer inspection of known problem areas.

The conclusions made in this report provide description(s) of the potential source(s) of moisture within the subject buildings that may have led to suitable conditions for mould growth, only in those cases where potential source(s) of moisture were identified. These conclusions will not necessarily identify all sources of moisture leading to suitable conditions for mould growth within the subject buildings or within the impacted area(s).

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

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Findings
March 7, 2016

3.6 OZONE DEPLETING SUBSTANCES

Visual assessment for the presence of ODSs within the subject buildings was conducted in accessible areas only. The presence of ODS-containing equipment in inaccessible areas including, but not limited to, ceiling spaces, wall cavities and crawlspaces, was not assessed. In addition, portable equipment that may contain ODSs (refrigerators, drink coolers, etc.) was not considered as part of this assessment.

3.7 SILICA

Visual assessment for the presence of silica-containing materials within the subject buildings was conducted in accessible areas only. The presence of potential silica-containing materials in inaccessible areas including, but not limited to, ceiling spaces and wall cavities was not assessed.

4.0 FINDINGS

The results of our assessment are provided on a building-by-building basis in Appendices B through U. Each Appendix contains the following (where applicable):

- Separate sections with written summaries of findings pertaining to each hazardous building material, including the following:
 - Information regarding the building including the reported intent for that particular building (e.g., continued operations and maintenance)
 - A listing of suspect materials observed
 - Tables that provide summaries of the sample types, locations, and analytical results
 - Interpretations of observations and/or sample analytical results.
- Photographs of identified hazardous building materials, where available
- Information pertaining to condition evaluation of identified hazardous building materials
- Recommendations for identified hazardous building materials found to be in "non-compliant" condition (e.g., damaged ACMs, mould-impacted materials, etc.).
- Floor plan drawings for the subject buildings where sampling was conducted or where hazardous building materials were identified are included and include locations of the samples collected during this assessment, and locations of identified hazardous building materials (where practical)
- Copies of the analytical certificates for all suspected ACM samples collected
- Copies of the analytical certificates for all suspected LCP samples collected
- Copies of the analytical certificates for all suspected tape lift/mould samples collected.

It should be noted that evaluation of condition of identified ACMs was conducted using terminology and classifications as outlined in the *Parks Canada Asbestos Management Directive*, and considered the friability of the material (terminology relating to how easily fibres can be released), condition (good, fair and poor) and accessibility of the material.

HAZARDOUS BUILDING MATERIALS ASSESSMENT

General Recommendations

March 7, 2016

5.0 GENERAL RECOMMENDATIONS

Building-specific recommendations pertaining to the identified hazardous building materials that require action are provided in Appendices B through U. General recommendations pertaining to management of identified hazardous building materials in good condition are provided below.

5.1 ASBESTOS

For buildings/structures with identified ACMs, Stantec recommends the following with regards to meeting the requirements of the Canada Labour Code), BC Reg. 296/97, the Parks Canada *Asbestos Management Guide* (January 2014) and the Parks Canada *Asbestos Management Standard* (January 2014) as they pertain to managing asbestos in the workplace and/or managing asbestos during renovation/demolition projects:

- Asbestos-containing materials that may be impacted during renovations and/or demolition activities should be removed prior to the renovation and/or demolition activities.
- Prior to renovation and/or demolition activities that would disturb them, undertake testing of presumed ACMs (materials that were previously un-tested, but are presumed to contain asbestos based on application and vintage) that may be impacted to determine their asbestos content. Confirmed asbestos materials should be handled accordingly.
- Identified ACMs in good condition can be managed in place in accordance with the requirements of the Parks Canada *Asbestos Management Guide* (January 2014) and the Parks Canada *Asbestos Management Standard* (January 2014).
- Should a material suspected to contain asbestos fibres become uncovered during renovation and/or demolition activities, all work in the areas that may disturb the material should be stopped. Samples of the suspect material should be submitted for laboratory analysis to determine if asbestos fibres are present. Confirmed asbestos materials should be handled in accordance with applicable guidelines and regulations.
- Suspected ACMs deemed visually similar to the ACMs identified in this report (on a building-by-building basis) should be considered asbestos-containing and handled as such, unless proven otherwise, through analytical testing.
- Asbestos-containing cement pipe may be present below ground—caution should be used if excavation is required.
- If masonry block walls are to be impacted by renovation and/or demolition work, and these walls have not been checked for the presence of vermiculite insulation, intrusive assessments for vermiculite should be undertaken prior to renovation/or demolition work. If vermiculite insulation is suspected to be present, this material should be treated as an ACM until testing can show otherwise.
- Ensure asbestos containing waste is handled, stored, and disposed of in accordance with the requirements of the Federal *Transportation of Dangerous Goods Regulation* and the British Columbia *Hazardous Waste Regulation* (BC Reg. 63/88).

HAZARDOUS BUILDING MATERIALS ASSESSMENT

General Recommendations
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5.2 LEAD

Lead-containing materials, including paints, can be managed in place, where in good condition.

If LCPs or other lead-containing equipment/materials within the subject buildings are to be disturbed and/or removed, ensure compliance with the following:

- Exposure protection requirements of the BC Reg. 296/97
- Disposal requirements of the British Columbia *Hazardous Waste Regulation* (BC Reg. 63/88)
- Transportation requirements of the Federal *Transportation of Dangerous Goods Regulation*.

Corrective action or remedial work on paint applications containing any concentration of lead should be undertaken in a manner so as to avoid generating fine particulate matter or dust (i.e., avoid sanding). Airborne lead dust or fumes should not exceed the BC Reg. 296/97 8-hour occupational exposure limit (OEL) of 0.05 milligram per cubic metre (mg/m³) during the removal of paints and products containing any concentration of lead. The use of personal protective equipment is recommended to reduce the potential for over-exposure to lead dust. This can be achieved by:

- Providing workers with protective clothing and PPE or devices as necessary to protect the worker against the hazards to which the worker may be exposed
- Providing workers with adequate and training in the care and use of clothing, equipment or device before wearing or using it
- Wetting the surface of the materials to prevent dust emissions
- Providing workers with washing facilities with clean water, soap and individual towels to properly wash prior to exiting the work area.

To avoid the inhalation of lead, it is essential to have the following control methods in place:

- Engineering controls
- Work practices and hygiene practices
- Respirators and personal protective equipment
- Training.

The work tasks required and the ways in which lead-containing materials (including paints) will be impacted will determine the appropriate respirators, measures and procedures that should be followed to protect workers from lead exposure.

HAZARDOUS BUILDING MATERIALS ASSESSMENT

General Recommendations
March 7, 2016

5.3 POLYCHLORINATED BIPHENYLS

Fluorescent lamp ballasts that may contain PCBs can be managed in place, where these items are operating and in good condition. No further action is currently required until such time that renovation or demolition activities are to be conducted, or until 2025, when PCB-containing ballasts will require removal and disposal.

When decommissioned, verify the PCB content of fluorescent lamp ballasts as per the Environment Canada publication *Identification of Lamp Ballasts Containing PCBs*, 1991. PCB-containing items identified for removal and disposal should be handled, transported, stored and disposed of in accordance with the following:

- Disposal requirements of the British Columbia *Hazardous Waste Regulation* (BC Reg. 63/88)
- Transportation requirements of the Federal *Transportation of Dangerous Goods Regulation*
- Federal *PCB Regulations* (SOR/2008-273)

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. Confirmed PCBs should be handled in accordance with Federal *Regulation SOR/2008-273* and BC Reg. 63/88.

5.4 MERCURY

Identified mercury-containing items can be managed in place, therefore no further action is recommended at this time. Mercury vapour within light fixtures and liquid mercury in thermostat switches pose no risk to workers or occupants provided the mercury containers remain intact and undisturbed.

Complete removal of mercury-containing equipment is required prior to renovation or demolition activities that may disturb the equipment. When mercury-containing items (e.g., fluorescent light bulbs/tubes, thermostats) are removed, ensure all mercury waste is handled, stored and disposed of in accordance with the disposal requirements of the following:

- Disposal requirements of the British Columbia *Hazardous Waste Regulation* (BC Reg. 63/88)
- Transportation requirements of the Federal *Transportation of Dangerous Goods Regulation*.

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.

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Closure
March 7, 2016

5.5 MOULD

In general, mould-impacted building materials will require action (e.g., abatement/removal or cleaning). Recommendations pertaining to mould are provided in the building-by-building information included in Appendices B through U.

5.6 OZONE DEPLETING SUBSTANCES

As no suspect ODS-containing materials or equipment were observed within the subject buildings during the assessment, no recommendations have been provided.

5.7 SILICA

When silica-containing materials are to be removed during demolition activities, 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 (0.025 mg/m³). This would include, but not be limited to, the following:

- Providing workers with respiratory protection
- Wetting the surface of the materials to prevent dust emissions
- Providing workers with facilities to properly wash prior to exiting the work area
- Providing dust control to mitigate the potential for demolition dust to escape from the work area into public and/or adjacent areas.

6.0 CLOSURE

This report has been prepared by Stantec Consulting Ltd. for the sole benefit of Public Works and Government Services Canada. Any use that a third party makes of this report, or any reliance on decisions to be made based on it, is the responsibility of such third parties. Stantec Consulting Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

The conclusions presented represent the best judgment of the assessor based on current environmental, health and safety standards and the site conditions observed on the dates cited within this report. This report is based on, and limited by, circumstances and conditions stated herein, and on information available at the time of preparation of the report. Due to the limited nature of the investigation and the limited data available, Stantec Consulting Ltd. cannot warrant against undiscovered environmental, health and/or safety liabilities. It is possible that additional, concealed hazardous materials may become evident during renovation and/or demolition activities within the subject buildings.

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Closure
March 7, 2016

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

We trust that the report meets your current requirements. Should you have any questions or concerns regarding the above, please do not hesitate to contact the undersigned.

Respectfully submitted,

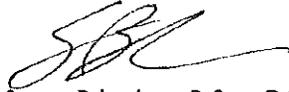
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Sean Brigden, B.Sc., P.B.Dipl., CRSP
Technical Leader, Indoor Environments

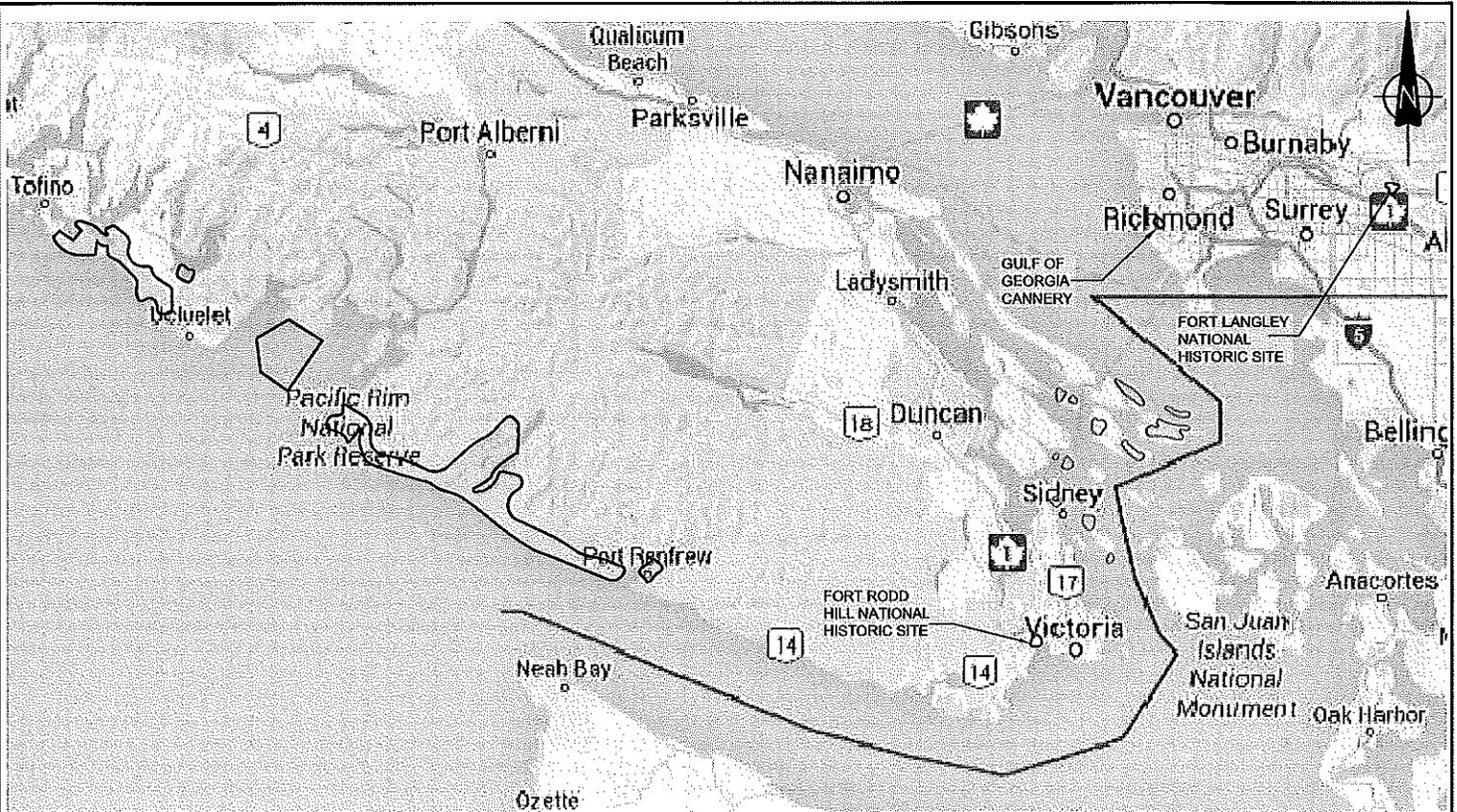
SC/TW/dsc

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**APPENDIX A
BUILDING LIST**

Fort Langley National Historic Site Building/Structure List

Appendix	Building Name	Year of Construction
B	Artifact Storage Building	2000
C	North East and North West Bastion	1957
D	Big House	1959
E	Blacksmith Shop	1976
F	Chicken Shed	2000s
G	Cooperage	1992
H	Exhibits Building	2001
I	Garage	1996
J	Lumber Shed	1987
K	Maintenance Building	1987
L	Operations Building	1998
M	Five O'Tentiks	2014
N	Photo Kiosk	2011
O	Picnic Shelter	1999
P	Play House	2009
Q	Servant's Quarters	1958
R	Store House	1840
S	Storage Shed	Unknown
T	Theatre	1999
U	Visitor Centre	1997

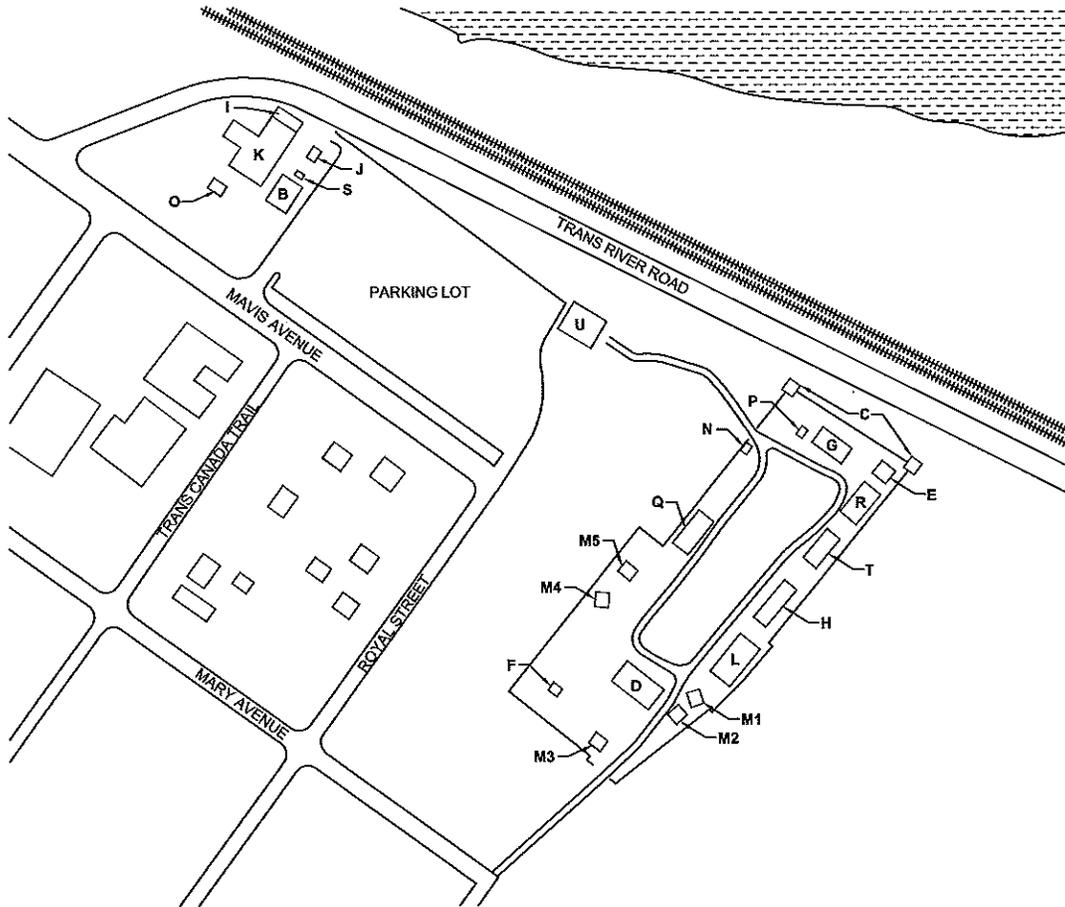


LEGEND

- FORT LANGLEY NATIONAL HISTORIC SITE
- GULF OF GEORGIA CANNERY
- FORT RODD HILL NATIONAL HISTORIC SITE
- GULF ISLANDS NATIONAL PARK
- PACIFIC RIM NATIONAL PARK

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

<p>SITE LOCATIONS</p> <p>SOUTH COAST NATIONAL PARKS OF CANADA</p> <p>SOUTH COAST OF BRITISH COLUMBIA</p>	Project No.: 123220330	Dwg. No.:
	Scale: N.T.S.	A1
Date: 15/10/06		
Dwn. By: CD <small>SL2015100689</small> DMPK		
App'd By: TW		
Client: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA		



FORT LANGLEY NATIONAL HISTORIC SITE

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

<p align="center">SITE PLAN</p> <p align="center">PACIFIC RIM NATIONAL PARK RESERVE, BC FORT LANGLEY NATIONAL HISTORIC SITE, CANADA</p>		Project No.: 123220330.200.100	Dwg. No.:
		Scale: N.T.S.	<p align="center">A2</p>
Date: 15/10/06	SL2015100067		
Dwn. By: CD DMPK	App'd By: TW		
Client: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA			

APPENDIX B
FINDINGS AND RECOMMENDATIONS—
ARTIFACT STORAGE BUILDING

B-4.0 FINDINGS—ARTIFACT STORAGE BUILDING

The Artifact Storage Building was reportedly constructed in 2000 and is a one storey wood frame building used to store artifacts.

The results of the assessment for each of the considered hazardous materials within the building are provided in the following sub-sections.

Floor plan drawings, which include locations of the samples collected during this assessment and locations of identified hazardous building materials (where practical), are attached to this Appendix.

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

- Roof (no safe access to upper portion of peaked roof to assess for or sample suspected asbestos-containing penetration sealants)

As such, limited comments, if any, will be provided regarding the presence, quantity or condition of hazardous building materials within the above-noted areas.

B-4.1 Asbestos

Stantec identified and sampled the following suspected ACMs:

- Roofing shingle
- Drywall joint compound
- Roofing paper
- Electrical penetration putty

Twelve samples of the above-noted suspected ACMs were collected and submitted to EMSL for analysis of asbestos content and nature.

A summary of the sample types, locations and analytical results is presented in Table B-4.1.1, below. A copy of the certificate of analysis provided by EMSL for the suspected ACM samples submitted is attached at the end of this Appendix.

**Table B-4.1.1 Suspected ACM Sample Collection and Analysis Summary
 Artifact Storage Building, Fort Langley National Historic Site, BC**

Sample Number	Material Description	Sample Location	Result (%/type asbestos)
ASB-RS-01A	Black roof shingle	North area of building roof	None Detected
ASB-RS-01B	Black roof shingle	North area of building roof	None Detected
ASB-RS-01C	Black roof shingle	North area of building roof	None Detected
ASB-DJC-01A	Drywall joint compound	North east corner of mechanical room wall	None Detected
ASB-DJC-01B	Drywall joint compound	North entrance on wall	None Detected
ASB-DJC-01C	Drywall joint compound	North of mechanical room wall	None Detected
ASB-ECP-01A	Grey electrical penetration putty	Covering top of electrical conduit in south east corner of the exterior of building	None Detected
ASB-ECP-01B	Grey electrical penetration putty	Covering top of electrical conduit in south east corner of the exterior of building	None Detected
ASB-ECP-01C	Grey electrical penetration putty	Covering top of electrical conduit in south east corner of the exterior of building	None Detected
ASB-RP-01A	Black roof paper	North side of building under roof shingle	None Detected
ASB-RP-01B	Black roof paper	North side of building under roof shingle	None Detected
ASB-RP-01C	Black roof paper	North side of building under roof shingle	None Detected

Based on our observations of building construction (estimated vintage of interior finishes and uniformity of building material use) and on our interpretations of suspected ACM sample analytical results, no ACMs were identified.

B-4.2 Lead

Lead is expected to be present in the following:

- Solder used on domestic water lines
- Solder used in bell fittings for cast iron pipes
- Solder used in electrical equipment

With respect to paint, six paint chip samples were obtained from the predominant suspected LCP applications within the building. A summary of the sample types, locations and analytical results is presented in Table B-4.2.1, below. A copy of the certificate of analysis provided by EMSL for the suspected LCP samples submitted is attached to this Appendix.

Table B-4.2.1 Suspected LCP Sample Collection and Analysis Summary
Artifact Storage Building, Fort Langley National Historic Site, BC

Sample No.	Sample Colour	Sample Location	Lab Result (ppm)	Lead Containing (Yes/No)
ASB-P-01	Yellow	Interior	<96 ppm	No
ASB-P-02	White	Door trim	<90 ppm	No
ASB-P-03	Grey	Floor	<100 ppm	No
ASB-P-04	Yellow	Exterior	<110 ppm	No
ASB-P-05	White	Interior	<150 ppm	No
ASB-P-06	Brown	Exterior trim	<210 ppm	No

Based on our observations and on our interpretations of suspected LCP sample analytical results, no LCPs were identified.

B-4.3 Polychlorinated Biphenyls

The 15 fluorescent light fixtures throughout were observed to have high-efficiency light tubes. The ballasts within such fixtures are not suspected to contain PCBs.

B-4.4 Mercury

Mercury vapour is expected to be present in fluorescent light bulbs/tubes observed in 15 fluorescent light fixtures.

Mercury may also be present in paints and adhesives.

Hazardous Building Materials Assessments

24 Buildings/Structures at the Fort Langley National Historic Site, BC

Appendix B: Findings and Recommendations – Artifact Storage Building

B-4.5 Mould

No mould/moisture damage was observed during the assessment.

B-4.6 Ozone-Depleting Substances

The following equipment was identified by labels to be ODS-containing

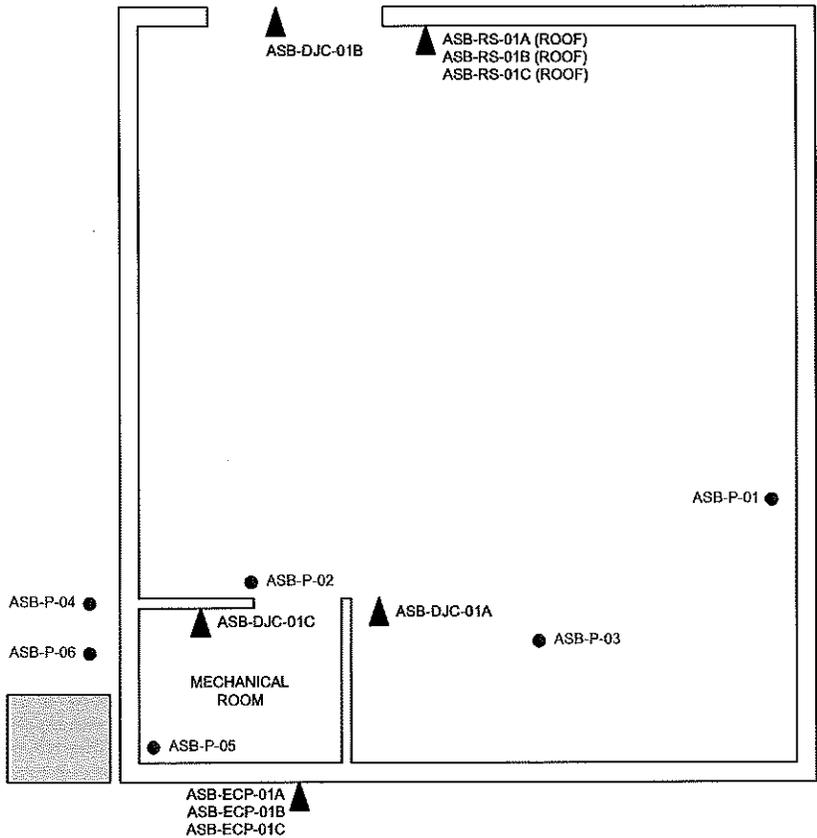
- York pad mounted air conditioning unit at the SW exterior of the building (factory charged R-22, 3 LB 11OZ)

B-4.7 Silica

Silica is presumed to be present in the concrete foundation of the subject building.

B-5.0 RECOMMENDATIONS—ARTIFACT STORAGE BUILDING

In general, identified hazardous building materials were observed to be in good condition and do not appear to require specific action to maintain compliance with applicable regulations for continued operations and maintenance. Refer to Section 5.0 of the main body of this report for applicable material-by-material general recommendations.



ARTIFACT STORAGE BUILDING (ASB)

LEGEND

- ▲ BULK SAMPLE LOCATION
- PAINT CHIP SAMPLE LOCATION
- CONFIRMED ODS CONTAINING EQUIPMENT

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

<p>FLOOR PLAN SHOWING HAZARDOUS BUILDING MATERIALS AND BULK SAMPLE LOCATIONS FORT LANGLEY NATIONAL HISTORIC SITE OF CANADA, FORT LANGLEY 23433 MAVIS AVENUE, FORT LANGLEY, BC</p>	Project No.: 123220330.200	<p>Dwg. No.: 1</p>
	Scale: N.T.S.	
	Date: 15/07/09	
	Dwn. By: CD PK SL2015070054	
Client: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA	App'd By: TW	



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EMSL Canada Order 551507409
Customer ID: 55JACQ30L
Customer PO: 123220330.200
Project ID:

Attn: Steve Chou
Stantec Consulting, Ltd.
500 - 4730 Kingsway
Burnaby, BC V5H 0C6

Phone: (604) 412-3004
Fax:
Collected:
Received: 7/09/2015
Analyzed: 7/16/2015

Proj: Fort Langley/123220330.200

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: ASB-RS-01A **Lab Sample ID:** 551507409-0150

Sample Description: North of Building Roof/Black Roof Shingle

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: ASB-RS-01B **Lab Sample ID:** 551507409-0151

Sample Description: North of Building Roof/Black Roof Shingle

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: ASB-RS-01C **Lab Sample ID:** 551507409-0152

Sample Description: North of Building Roof/Black Roof Shingle

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: ASB-DJC-01A **Lab Sample ID:** 551507409-0153

Sample Description: North East Corner of Mechanical Room Wall/Drywall Joint Compound

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	

Client Sample ID: ASB-DJC-01B **Lab Sample ID:** 551507409-0154

Sample Description: North Entrance on Wall/Drywall Joint Compound

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	

Client Sample ID: ASB-DJC-01C **Lab Sample ID:** 551507409-0155

Sample Description: North of Mechanical Room Wall/Drywall Joint Compound

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	

Client Sample ID: ASB-ECP-01A **Lab Sample ID:** 551507409-0156

Sample Description: Covering Top of Electrical Conduit in SE Corner/Grey Electrical Penetration Putty

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black/Green	0.0%	100%	None Detected	



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EMSL Canada Order 551507409
Customer ID: 55JACQ30L
Customer PO: 123220330.200
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: ASB-ECP-01B **Lab Sample ID:** 551507409-0157
Sample Description: Covering Top of Electrical Conduit in SE Corner/Grey Electrical Penetration Putty

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black/Green	0.0%	100%	None Detected	

Client Sample ID: ASB-ECP-01C **Lab Sample ID:** 551507409-0158
Sample Description: Covering Top of Electrical Conduit in SE Corner/Grey Electrical Penetration Putty

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black/Green	0.0%	100%	None Detected	

Client Sample ID: ASB-RP-01A **Lab Sample ID:** 551507409-0159
Sample Description: North Side of Building Under Roof Shingle/Black Roof Paper

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: ASB-RP-01B **Lab Sample ID:** 551507409-0160
Sample Description: North Side of Building Under Roof Shingle/Black Roof Paper

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: ASB-RP-01C **Lab Sample ID:** 551507409-0161
Sample Description: North Side of Building Under Roof Shingle/Black Roof Paper

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Analyst(s):

- Jon Delos Santos PLM (1)
- Matthew Davis PLM Grav. Reduction (6)
- Nicole Dimou PLM Grav. Reduction (3)
- Romeo Samson PLM (2)

Reviewed and approved by:

Matthew Davis
or Other Approved Signatory

None Detected = <0.5%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted. This report must not be used to claim product endorsement by NVLAP of any agency of the U.S. Government.

Samples analyzed by EMSL Canada Inc. Mississauga, ON NVLAP Lab Code 200877-0

Initial report from: 07/16/2015 21:42:13

**EMSL Canada Inc.**

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EMSL Canada Or 551507426
 CustomerID: 55JACQ30L
 CustomerPO: 123220330
 ProjectID:

Attn: **Steve Chou**
Stantec Consulting, Ltd.
500 - 4730 Kingsway
Burnaby, BC V5H 0C6

Phone: (604) 412-3004
 Fax:
 Received: 07/09/15 11:35 AM
 Collected:

Project: 123220330.200.100

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

<i>Client Sample Description</i>	<i>Lab ID</i>	<i>Collected</i>	<i>Analyzed</i>	<i>Lead Concentration</i>
ASB-P-01	551507426-0020 Site: INTERIOR Desc: YELLOW		7/15/2015	<96 ppm
ASB-P-02	551507426-0021 Site: DOOR TRIM Desc: WHITE		7/15/2015	<90 ppm
ASB-P-03	551507426-0022 Site: FLOOR Desc: GREY		7/15/2015	<100 ppm
ASB-P-04	551507426-0023 Site: EXTERIOR Desc: YELLOW		7/15/2015	<110 ppm
ASB-P-05	551507426-0024 Site: INTERIOR Desc: WHITE		7/15/2015	<150 ppm
ASB-P-06	551507426-0025 Site: EXTERIOR TRIM Desc: BROWN		7/15/2015	<210 ppm

Insufficient sample to reach reporting limit for sample#551507426-0020/-0022/-0023/-0024/-0025.

 Lisa Podzyhun
 or other approved signatory

*Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.010 % wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities. Samples received in good condition unless otherwise noted. "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements established by the AIHA-LAP, unless specifically indicated otherwise.

Samples analyzed by EMSL Canada Inc. Mississauga, ON A2LA Accredited Environmental Testing Cert #2845.08

Initial report from 07/15/2015 17:42:38

APPENDIX C
FINDINGS AND RECOMMENDATIONS—
NORTH EAST AND NORTH WEST BASTION

C-4.0 FINDINGS—NORTH EAST AND NORTH WEST BASTIONS

The North East and North West Bastion were reportedly constructed in 1957 and are two wood tower structures located on the corner of Fort Langley's wood perimeter walls.

The results of the assessment for each of the considered hazardous materials within the buildings are provided in the following sub-sections.

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

- Roof (lack of safe access)

As such, limited comments, if any, will be provided regarding the presence, quantity or condition of hazardous building materials within the above-noted areas.

C-4.1 Asbestos

Suspect ACMs were not observed.

C-4.2 Lead

Lead is expected to be present in the following:

- Solder used on domestic water lines
- Solder used in bell fittings for cast iron pipes

Suspect LCP applications were not observed.

C-4.3 Polychlorinated Biphenyls

The four fluorescent light fixtures throughout the north walkway connecting the two bastions were observed to have high-efficiency light tubes. The ballasts within such fixtures are not suspected to contain PCBs.

C-4.4 Mercury

Mercury vapour is expected to be present in fluorescent light bulbs/tubes observed in four fluorescent light fixtures throughout the north walkway connecting the two bastions.

C-4.5 Mould

Suspect mould or moisture-impacted building materials were not observed at the time of the assessment.

Hazardous Building Materials Assessments

24 Buildings/Structures at the Fort Langley National Historic Site, BC

Appendix C: Findings and Recommendations – North East and North West Bastion

C-4.6 Ozone-Depleting Substances

Building-related cooling and refrigeration equipment suspected to be ODS-containing was not observed.

C-4.7 Silica

Silica is presumed to be present in the concrete foundation of the subject buildings.

C-5.0 RECOMMENDATIONS—NORTH EAST AND NORTH WEST BASTION

In general, identified hazardous building materials were observed to be in good condition and do not appear to require specific action to maintain compliance with applicable regulations for continued operations and maintenance. Refer to Section 5.0 of the main body of this report for applicable material-by-material general recommendations.

APPENDIX D
FINDINGS AND RECOMMENDATIONS—
BIG HOUSE

D-4.0 FINDINGS—BIG HOUSE

The Big House was reportedly constructed in 1959 and is a two storey wood structure building with crawlspace.

The results of the assessment for each of the considered hazardous materials within the building are provided in the following sub-sections.

Floor plan drawings, which include locations of the samples collected during this assessment and locations of identified hazardous building materials (where practical), are attached to this Appendix.

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

- Roof (no safe access to the roof to assess for or sample suspected asbestos-containing penetration sealants)

As such, limited comments, if any, will be provided regarding the presence, quantity or condition of hazardous building materials within the above-noted areas.

D-4.1 Asbestos

Stantec identified and sampled the following suspected ACMs:

- Sealant and caulking
- Drywall joint compound

Nine samples of the above-noted suspected ACMs were collected and submitted to EMSL for analysis of asbestos content and nature.

A summary of the sample types, locations and analytical results is presented in Table D-4.1.1, below. A copy of the certificate of analysis provided by EMSL for the suspected ACM samples submitted is attached at the end of this Appendix.

**Table D-4.1.1 Suspected ACM Sample Collection and Analysis Summary
 Big House, Fort Langley National Historic Site, BC**

Sample Number	Material Description	Sample Location	Result (%/type asbestos)
BH-ES-01A	White sealant	Between exterior wood siding on south side of building	None Detected
BH-ES-01B	White sealant	Between exterior wood siding on east side of wall	None Detected
BH-ES-01C	White sealant	Between exterior wood siding on north side of wall	None Detected
BH-WPC-01A	White window pane caulking	Window east of south entrance on the first floor	None Detected
BH-WPC-01B	White window pane caulking	Window west of north entrance on first floor between glass and frame	None Detected
BH-WPC-01C	White window pane caulking	Window west of south entrance on first floor between glass and frame	None Detected
BH-DJC-01A	Drywall joint compound	Stairwell wall leading to crawlspace on first floor	None Detected
BH-DJC-01B	Drywall joint compound	Mechanical room in crawlspace on south wall	None Detected
BH-DJC-01C	Drywall joint compound	Mechanical room in crawlspace on east wall	None Detected

Based on our observations of building construction (estimated vintage of interior finishes and uniformity of building material use) and on our interpretations of suspected ACM sample analytical results, no ACMs were identified.

D-4.2 Lead

Lead is expected to be present in the following:

- Older electrical wiring materials and sheathing
- Solder used on domestic water lines
- Solder used in bell fittings for cast iron pipes
- Solder used in electrical equipment
- Vent and pipe flashings

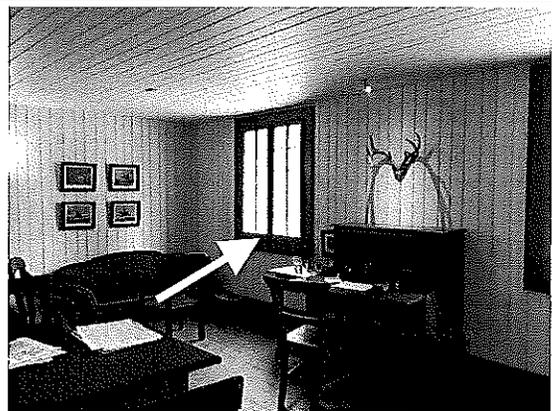
With respect to paint, two paint chip samples were obtained from the predominant suspected LCP applications within the building. A summary of the sample types, locations and analytical results is presented in Table D-4.2.1, below. A copy of the certificate of analysis provided by EMSL for the suspected LCP samples submitted is attached to this Appendix.

**Table D-4.2.1 Suspected LCP Sample Collection and Analysis Summary
 Big House, Fort Langley National Historic Site, BC**

Sample No.	Sample Colour	Sample Location	Lab Result (ppm)	Lead Containing (Yes/No)
BH-P-01	Red	Interior trim	1,600 ppm	Yes
BH-P-02	White	Exterior	<90 ppm	No

Based on our observations and on our interpretations of suspected LCP sample analytical results, the materials presented in Table D-4.2.2, below were identified as LCPs.

**Table D-4.2.2 Summary of Identified LCPs
 Big House, Fort Langley National Historic Site, BC**

Identified LCP Description	Photo
Red colored paint on the interior trims. This paint was observed to be in good condition (not bubbling, flaking or peeling).	

D-4.3 Polychlorinated Biphenyls

No suspected PCB-containing electrical equipment was observed.

D-4.4 Mercury

No suspected mercury-containing equipment and/or items were observed.

Mercury may also be present in paints and adhesives.

Hazardous Building Materials Assessments

24 Buildings/Structures at the Fort Langley National Historic Site, BC

Appendix D: Findings and Recommendations – Big House

D-4.5 Mould

Suspect mould or moisture-impacted building materials were not observed at the time of the assessment.

D-4.6 Ozone-Depleting Substances

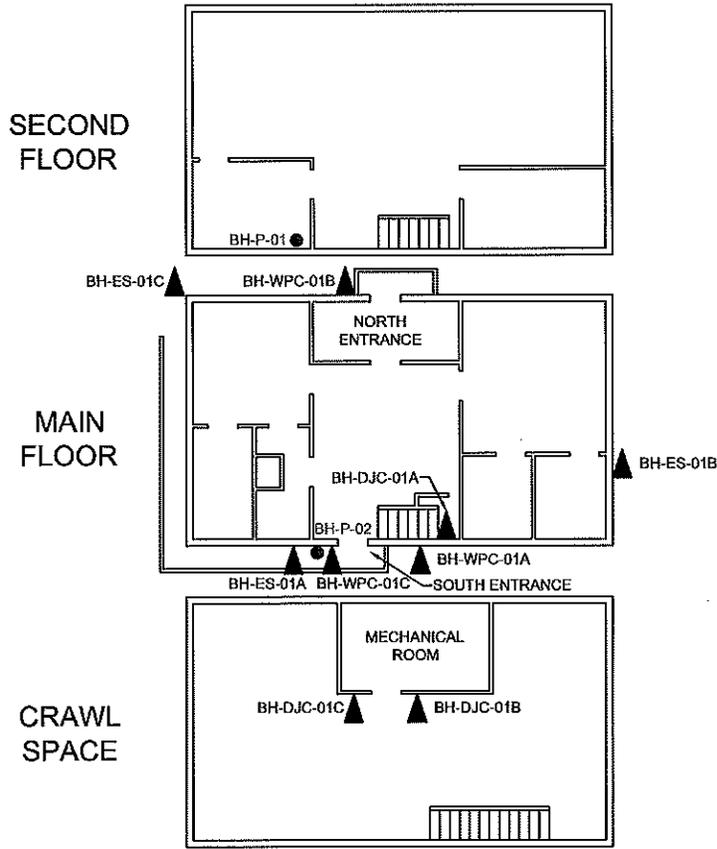
Building related cooling and refrigeration equipment suspected to be ODS-containing was not observed.

D-4.7 Silica

Silica is presumed to be present in the concrete of the subject building.

D-5.0 RECOMMENDATIONS—BIG HOUSE

In general, identified hazardous building materials were observed to be in good condition and do not appear to require specific action to maintain compliance with applicable regulations for continued operations and maintenance. Refer to Section 5.0 of the main body of this report for applicable material-by-material general recommendations.



BIG HOUSE (BH)

LEGEND

- ▲ BULK SAMPLE LOCATION
- PAINT CHIP SAMPLE LOCATION

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

<p>FLOOR PLAN SHOWING HAZARDOUS BUILDING MATERIALS AND BULK SAMPLE LOCATIONS</p> <p>FORT LANGLEY NATIONAL HISTORIC SITE OF CANADA, FORT LANGLEY 23433 MAVIS AVENUE, FORT LANGLEY, BC</p>		Project No.: 123220330.200	Dwg. No.:
		Scale: N.T.S.	3
Date: 15/10/28			
Dwn. By: CD PK/DM			
App'd By: TW	Client: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA		



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EMSL Canada Order 551507409
Customer ID: 55JACQ30L
Customer PO: 123220330.200
Project ID:

Attn: Steve Chou
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500 - 4730 Kingsway
Burnaby, BC V5H 0C6

Phone: (604) 412-3004
Fax:
Collected:
Received: 7/09/2015
Analyzed: 7/16/2015

Proj: Fort Langley/123220330.200

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: BH-ES-01A **Lab Sample ID:** 551507409-0141

Sample Description: Between Exterior Wood Siding on S Side of Building/White Sealant

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	White	0.0%	100%	None Detected	

Client Sample ID: BH-ES-01B **Lab Sample ID:** 551507409-0142

Sample Description: Between Exterior Wood Siding on East Side of Wall/White Sealant

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	White	0.0%	100%	None Detected	

Client Sample ID: BH-ES-01C **Lab Sample ID:** 551507409-0143

Sample Description: Between Exterior Wood Siding on North Side of Wall/White Sealant

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	White	0.0%	100%	None Detected	

Client Sample ID: BH-WPC-01A **Lab Sample ID:** 551507409-0144

Sample Description: Window East of South Entrance on First Floor/White Window Pane Caulking

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	White/Red	0.86%	99.1%	None Detected	

Client Sample ID: BH-WPC-01B **Lab Sample ID:** 551507409-0145

Sample Description: Window West of North Entrance on First Floor/White Window Pane Caulking

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	White/Red	0.96%	99.0%	None Detected	

Client Sample ID: BH-WPC-01C **Lab Sample ID:** 551507409-0146

Sample Description: Window West of South Entrance on First Floor/White Window Pane Caulking

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	White/Red	0.0%	100%	None Detected	

Client Sample ID: BH-DJC-01A **Lab Sample ID:** 551507409-0147

Sample Description: Stairwell Wall Leading to Crawlspace on First Floor/Drywall Joint Compound

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	



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EMSL Canada Order 551507409
Customer ID: 55JACQ30L
Customer PO: 123220330.200
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: BH-DJC-01B **Lab Sample ID:** 551507409-0148
Sample Description: Mechanical Room in Crawlspace on South Wall/Drywall Joint Compound

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	

Client Sample ID: BH-DJC-01C **Lab Sample ID:** 551507409-0149
Sample Description: Mechanical Room in Crawlspace on East Wall/Drywall Joint Compound

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	

Analyst(s):

- Jon Delos Santos PLM (1)
- Matthew Davis PLM Grav. Reduction (4)
- Nicole Dimou PLM Grav. Reduction (1)
- Romeo Samson PLM (2)
PLM Grav. Reduction (1)

Reviewed and approved by:

Matthew Davis
or Other Approved Signatory

None Detected = <0.5%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted. This report must not be used to claim product endorsement by NVLAP of any agency of the U.S. Government.

Samples analyzed by EMSL Canada Inc. Mississauga, ON NVLAP Lab Code 200877-0

Initial report from: 07/16/2015 21:42:13



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CustomerID:	55JACQ30L
CustomerPO:	123220330
ProjectID:	

Attn: **Steve Chou**
Stantec Consulting, Ltd.
500 - 4730 Kingsway
Burnaby, BC V5H 0C6

Phone: (604) 412-3004
 Fax:
 Received: 07/09/15 11:35 AM
 Collected:

Project: 123220330.200.100

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

<i>Client Sample Description</i>	<i>Lab ID</i>	<i>Collected</i>	<i>Analyzed</i>	<i>Lead Concentration</i>
BH-P-01	551507426-0032 Site: INTERIOR TRIM Desc: RED		7/15/2015	1600 ppm
BH-P-02	551507426-0033 Site: EXTERIOR Desc: WHITE		7/15/2015	<90 ppm

Lisa Podzyhun
or other approved signatory

*Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.010 % wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities. Samples received in good condition unless otherwise noted. "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements established by the AIHA-LAP, unless specifically indicated otherwise.

Samples analyzed by EMSL Canada Inc. Mississauga, ON A2LA Accredited Environmental Testing Cert #2845.08

Initial report from 07/15/2015 17:48:24

APPENDIX E
FINDINGS AND RECOMMENDATIONS—
BLACKSMITH SHOP

E-4.0 FINDINGS—BLACKSMITH SHOP

The Blacksmith Shop was reportedly constructed in 1976 and is a small outdoor wood structure. The results of the assessment for each of the considered hazardous materials within the building are provided in the following sub-sections.

Floor plan drawings, which include locations of the samples collected during this assessment and locations of identified hazardous building materials (where practical), are attached to this Appendix.

E-4.1 Asbestos

Stantec identified and sampled the following suspected ACMs:

- Brick mortar
- Fire blanket

Six samples of the above-noted suspected ACMs were collected and submitted to EMSL for analysis of asbestos content and nature.

A summary of the sample types, locations and analytical results is presented in Table E-4.1.1, below. A copy of the certificate of analysis provided by EMSL for the suspected ACM samples submitted is attached at the end of this Appendix.

**Table E-4.1.1 Suspected ACM Sample Collection and Analysis Summary
Blacksmith Shop, Fort Langley National Historic Site, BC**

Sample Number	Material Description	Sample Location	Result (%/type asbestos)
BS-BM-01A	Brick mortar	Between red bricks of chimney	None Detected
BS-BM-01B	Brick mortar	Between red bricks of chimney	None Detected
BS-BM-01C	Brick mortar	Between red bricks of chimney	None Detected
BS-FB-01A	White fire blanket	North side of interior wall	None Detected
BS-FB-01B	White fire blanket	North side of interior wall	None Detected
BS-FB-01C	White fire blanket	North side of interior wall	None Detected

Based on our observations of building construction (estimated vintage of interior finishes and uniformity of building material use) and on our interpretations of suspected ACM sample analytical results, no ACMs were identified.

E-4.2 Lead

Suspect lead and LCP applications were not observed.

E-4.3 Polychlorinated Biphenyls

No suspected PCB-containing electrical equipment was observed.

E-4.4 Mercury

No suspected mercury-containing equipment was observed.

E-4.5 Mould

Suspect mould or moisture-impacted building materials were not observed at the time of the assessment.

E-4.6 Ozone-Depleting Substances

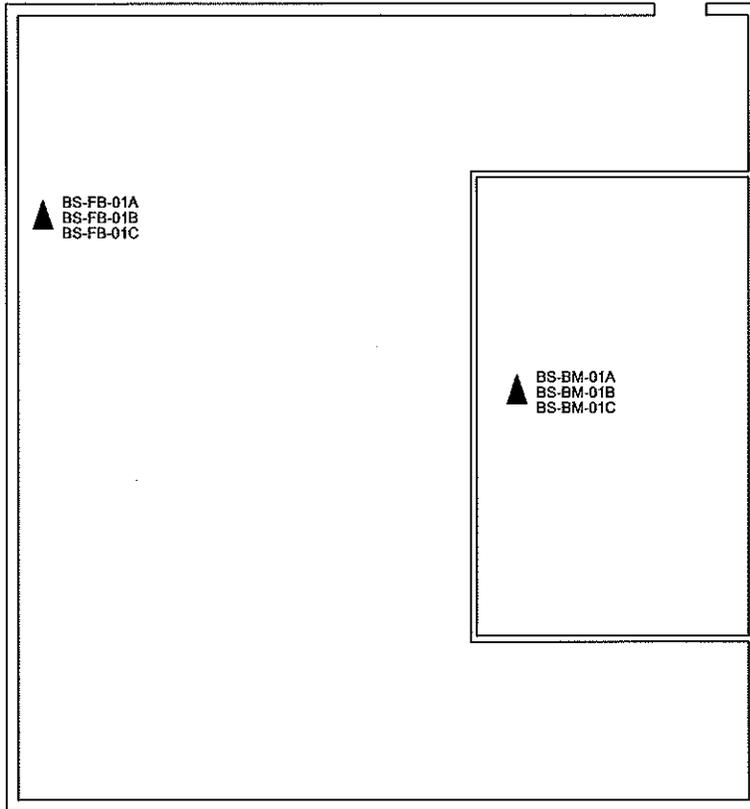
No suspected ODS-containing equipment was observed.

E-4.7 Silica

Silica is presumed to be present in the brick mortar of the subject building.

E-5.0 RECOMMENDATIONS—BLACKSMITH SHOP

In general, identified hazardous building materials were observed to be in good condition and do not appear to require specific action to maintain compliance with applicable regulations for continued operations and maintenance. Refer to Section 5.0 of the main body of this report for applicable material-by-material general recommendations.



BLACK SMITH (BS)

LEGEND

▲ BULK SAMPLE LOCATION

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FLOOR PLAN SHOWING HAZARDOUS BUILDING MATERIALS AND BULK SAMPLE LOCATIONS FORT LANGLEY NATIONAL HISTORIC SITE OF CANADA, FORT LANGLEY 23433 MAVIS AVENUE, FORT LANGLEY, BC	Project No.: 123220330.200	Dwg. No.: 13	
	Scale: N.T.S.		
	Date: 15/07/09		
	Dwn. By: CD VM SL2015070066		
Client: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA	App'd By: TW		



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EMSL Canada Order 551507409
 Customer ID: 55JACQ30L
 Customer PO: 123220330.200
 Project ID:

Attn: Steve Chou
 Stantec Consulting, Ltd.
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Phone: (604) 412-3004
Fax:
Collected:
Received: 7/09/2015
Analyzed: 7/16/2015

Proj: Fort Langley/123220330.200

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: BS-BM-01A **Lab Sample ID:** 551507409-0037

Sample Description: Between Red Bricks of Chimney/Brick Mortar

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	Gray	0%	100%	None Detected	

Client Sample ID: BS-BM-01B **Lab Sample ID:** 551507409-0038

Sample Description: Between Red Bricks of Chimney/Brick Mortar

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	Gray	0%	100%	None Detected	

Client Sample ID: BS-BM-01C **Lab Sample ID:** 551507409-0039

Sample Description: Between Red Bricks of Chimney/Brick Mortar

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	Gray	0%	100%	None Detected	

Client Sample ID: BS-FB-01A **Lab Sample ID:** 551507409-0040

Sample Description: North Side of Interior Wall/White Fire Blanket

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	Gray	90%	10%	None Detected	

Client Sample ID: BS-FB-01B **Lab Sample ID:** 551507409-0041

Sample Description: North Side of Interior Wall/White Fire Blanket

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	Gray	90%	10%	None Detected	

Client Sample ID: BS-FB-01C **Lab Sample ID:** 551507409-0042

Sample Description: North Side of Interior Wall/White Fire Blanket

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	Gray/Red	90%	10%	None Detected	



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Customer PO: 123220330.200
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):

Jon Delos Santos PLM (2)
Romeo Samson PLM (4)

Reviewed and approved by:

Matthew Davis
or Other Approved Signatory

None Detected = <0.5%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted. This report must not be used to claim product endorsement by NVLAP of any agency of the U.S. Government.

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Initial report from: 07/16/2015 21:42:13

APPENDIX F
FINDINGS AND RECOMMENDATIONS—
CHICKEN SHED

F-4.0 FINDINGS—CHICKEN SHED

The Chicken Shed is estimated to be constructed in the 2000s and is an outdoor wood structure.

The results of the assessment for each of the considered hazardous materials within the building are provided in the following sub-sections.

Floor plan drawings, which include locations of the samples collected during this assessment and locations of identified hazardous building materials (where practical), are attached to this Appendix.

F-4.1 Asbestos

Although ACMs are not anticipated to be present based on the estimated construction date, for diligence purposes, Stantec sampled the following building materials, which still contain asbestos:

- Caulking
- Roofing shingle
- Roofing paper

Nine samples of the above-noted suspected ACMs were collected and submitted to EMSL for analysis of asbestos content and nature.

A summary of the sample type, location and analytical result is presented in Table F-4.1.1, below. A copy of the certificate of analysis provided by EMSL for the suspected ACM sample submitted is attached at the end of this Appendix.

**Table F-4.1.1 Suspected ACM Sample Collection and Analysis Summary
 Chicken Shed, Fort Langley National Historic Site, BC**

Sample Number	Material Description	Sample Location	Result (%/type asbestos)
CS-WPC-01A	White window pane caulking	Exterior window of shed	None Detected
CS-WPC-01B	White window pane caulking	Exterior window of shed	None Detected
CS-WPC-01C	White window pane caulking	Exterior window of shed	None Detected
CS-BP-01A	Black building paper	Under roof shingle	None Detected
CS-BP-01B	Black building paper	Under roof shingle	None Detected
CS-BP-01C	Black building paper	Under roof shingle	None Detected
CS-RS-01A	Black roofing shingle	Building roof	None Detected
CS-RS-01B	Black roofing shingle	Building roof	None Detected
CS-RS-01C	Black roofing shingle	Building roof	None Detected

Based on our observations of building construction (estimated vintage of interior finishes and uniformity of building material use) and on our interpretations of suspected ACM sample analytical results, no ACMs were identified.

F-4.2 Lead

Suspect lead-containing materials and suspect LCP applications were not observed.

F-4.3 Polychlorinated Biphenyls

No suspected PCB-containing electrical equipment was observed.

F-4.4 Mercury

No suspected mercury-containing equipment was observed.

F-4.5 Mould

Suspect mould or moisture-impacted building materials were not observed at the time of the assessment.

F-4.6 Ozone-Depleting Substances

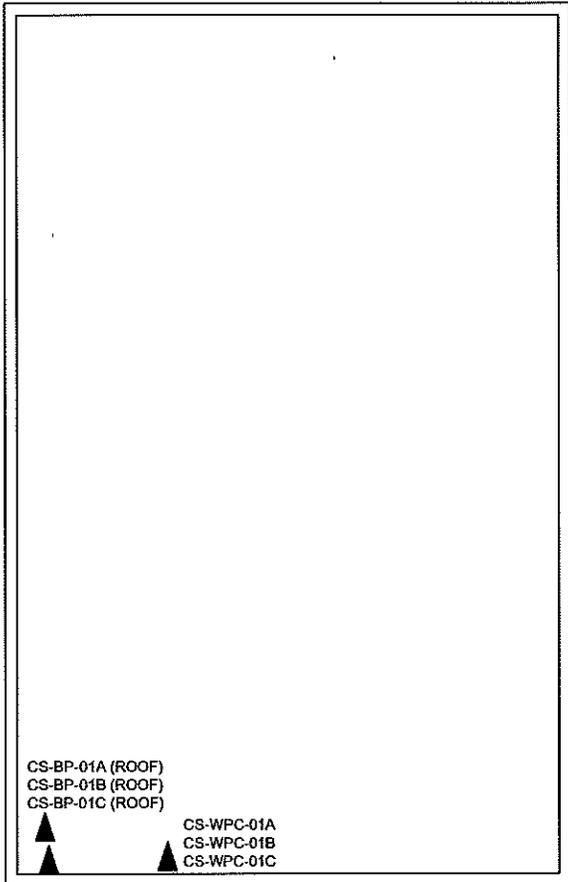
No suspected ODS-containing equipment was observed.

F-4.7 Silica

No suspected silica-containing building materials were observed

F-5.0 RECOMMENDATIONS—CHICKEN SHED

As no hazardous building materials were identified, no recommendations have been provided.



CS-BP-01A (ROOF)
 CS-BP-01B (ROOF)
 CS-BP-01C (ROOF)
 CS-WPC-01A
 CS-WPC-01B
 CS-WPC-01C

CS-RS-01A (ROOF)
 CS-RS-01B (ROOF)
 CS-RS-01C (ROOF)

CHICKEN SHED (CS)

LEGEND

▲ BULK SAMPLE LOCATION

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FLOOR PLAN SHOWING HAZARDOUS BUILDING MATERIALS AND BULK SAMPLE LOCATIONS FORT LANGLEY NATIONAL HISTORIC SITE OF CANADA, FORT LANGLEY 23433 MAVIS AVENUE, FORT LANGLEY, BC	Project No.: 123220330.200	17 Stantec
	Scale: N.T.S.	
	Date: 15/10/28	
	Dwn. By: CD DM SL2015100165	
Client: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA	App'd By: TW	



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 Customer ID: 55JACQ30L
 Customer PO: 123220330.200
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Phone: (604) 412-3004
 Fax:
 Collected:
 Received: 7/09/2015
 Analyzed: 7/16/2015

Proj: Fort Langley/123220330.200

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: CS-WPC-01A Lab Sample ID: 551507409-0028

Sample Description: Exterior Window of Shed/White Window Pane Caulking

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Brown/White	0.0%	100%	None Detected	

Client Sample ID: CS-WPC-01B Lab Sample ID: 551507409-0029

Sample Description: Exterior Window of Shed/White Window Pane Caulking

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Brown/White	0.0%	100%	None Detected	

Client Sample ID: CS-WPC-01C Lab Sample ID: 551507409-0030

Sample Description: Exterior Window of Shed/White Window Pane Caulking

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Brown/White	0.0%	100%	None Detected	

Client Sample ID: CS-BP-01A Lab Sample ID: 551507409-0031

Sample Description: Under Roof Shingle/Black Building Paper

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Brown	0.0%	100%	None Detected	

Client Sample ID: CS-BP-01B Lab Sample ID: 551507409-0032

Sample Description: Under Roof Shingle/Black Building Paper

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Brown	0.0%	100%	None Detected	

Client Sample ID: CS-BP-01C Lab Sample ID: 551507409-0033

Sample Description: Under Roof Shingle/Black Building Paper

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Brown	0.0%	100%	None Detected	

Client Sample ID: CS-RS-01A Lab Sample ID: 551507409-0034

Sample Description: Building Roof/Black Roofing Shingle

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	



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Customer PO: 123220330.200
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: CS-RS-01B **Lab Sample ID:** 551507409-0035
Sample Description: Building Roof/Black Roofing Shingle

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: CS-RS-01C **Lab Sample ID:** 551507409-0036
Sample Description: Building Roof/Black Roofing Shingle

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Analyst(s):

Matthew Davis PLM Grav. Reduction (3)
Nicole Dimou PLM Grav. Reduction (6)

Reviewed and approved by:

Matthew Davis
or Other Approved Signatory

None Detected = <0.5%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted. This report must not be used to claim product endorsement by NVLAP of any agency of the U.S. Government.

Samples analyzed by EMSL Canada Inc. Mississauga, ON NVLAP Lab Code 200877-0

Initial report from: 07/16/2015 21:42:13

APPENDIX G
FINDINGS AND RECOMMENDATIONS—
COOPERAGE

G-4.0 FINDINGS—COOPERAGE

The Cooperage was reportedly constructed in 1992 and is a two story wood structure building consisting of a main level and renovated basement.

The results of the assessment for each of the considered hazardous materials within the building are provided in the following sub-sections.

Floor plan drawings, which include locations of the samples collected during this assessment and locations of identified hazardous building materials (where practical), are attached to this Appendix.

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

- Roof (lack of safe access)

As such, limited comments, if any, will be provided regarding the presence, quantity or condition of hazardous building materials within the above-noted areas.

G-4.1 Asbestos

Although ACMs are unlikely to be present based on the reported construction date of the building, as a measure of diligence, Stantec sampled the following materials that have been historically known to contain asbestos:

- Drywall joint compound
- Caulking
- Ceiling tile
- Sheet flooring
- Roofing shingle
- Textured flooring

Fifteen samples of the above-noted suspected ACMs were collected and submitted to EMSL for analysis of asbestos content and nature.

A summary of the sample types, locations and analytical results is presented in Table G-4.1.1, below. A copy of the certificate of analysis provided by EMSL for the suspected ACM samples submitted is attached at the end of this Appendix.

**Table G-4.1.1 Suspected ACM Sample Collection and Analysis Summary
 Cooperage, Fort Langley National Historic Site, BC**

Sample Number	Material Description	Sample Location	Result (%/type asbestos)
C-WFC-01A	White window frame caulking	Window on north side of building	None detected
C-WFC-01B	White window frame caulking	Window on west side of building	None detected
C-WFC-01C	White window frame caulking	Window on south side of building	None detected
C-DJC-01A	Drywall joint compound	Basement hallway wall adjacent to change room	None detected
C-DJC-01B	Drywall joint compound	Basement costume room wall adjacent to change room	None detected
C-DJC-01C	Drywall joint compound	Men's washroom in basement on ceiling	None detected
C-DJC-01D	Drywall joint compound	North wall of north change room	None detected
C-DJC-1E	Drywall joint compound	South interior wall of stairs	None detected
C-CT-01A	Fissure and pinhole ceiling tile	Basement laundry area in ceiling	None detected
C-CT-01B	Fissure and pinhole ceiling tile	Basement laundry area in ceiling	None detected
C-CT-01C	Fissure and pinhole ceiling tile	Basement laundry area in ceiling	None detected
C-SF-01	Brown pebble patterned sheet flooring	Floor in basement laundry area	None detected
C-TF-01A	Black textured flooring (bitumen gravel shingle)	Exterior ramp on east side of building	None detected
C-TF-01B	Black textured flooring (bitumen gravel shingle)	Exterior ramp on east side of building	None detected
C-TF-01C	Black textured flooring (bitumen gravel shingle)	Exterior ramp on east side of building	None detected

Based on our observations of building construction (estimated vintage of interior finishes and uniformity of building material use) and on our interpretations of suspected ACM sample analytical results, no ACMs were identified.

G-4.2 Lead

Lead is expected to be present in the following:

- Solder used in bell fittings for cast iron pipes

- Solder used in electrical equipment
- Vent and pipe flashings

With respect to paint, two paint chip samples were obtained from the predominant suspected LCP applications within the building. A summary of the sample types, locations and analytical results is presented in Table G-4.2.1, below. A copy of the certificate of analysis provided by EMSL for the suspected LCP samples submitted is attached to this Appendix.

**Table G-4.2.1 Suspected LCP Sample Collection and Analysis Summary
Cooperage, Fort Langley National Historic Site, BC**

Sample No.	Sample Colour	Sample Location	Lab Result (ppm)	Lead Containing (Yes/No)
C-P-01	Cream	Basement wall	<90	No
C-P-02	White	Basement trim	<90	No

Based on our observations and on our interpretations of suspected LCP sample analytical results, no LCPs were identified.

G-4.3 Polychlorinated Biphenyls

The eight fluorescent light fixtures throughout were observed to have high-efficiency light tubes. The ballasts within such fixtures are not suspected to contain PCBs.

G-4.4 Mercury

Mercury vapour is expected to be present in fluorescent light bulbs/tubes observed in eight fluorescent light fixtures.

Mercury may also be present in paints and adhesives.

G-4.5 Mould

No mould/moisture damage was observed during the assessment.

G-4.6 Ozone-Depleting Substances

No suspected ODS-containing equipment was observed.

Hazardous Building Materials Assessments

24 Buildings/Structures at the Fort Langley National Historic Site, BC

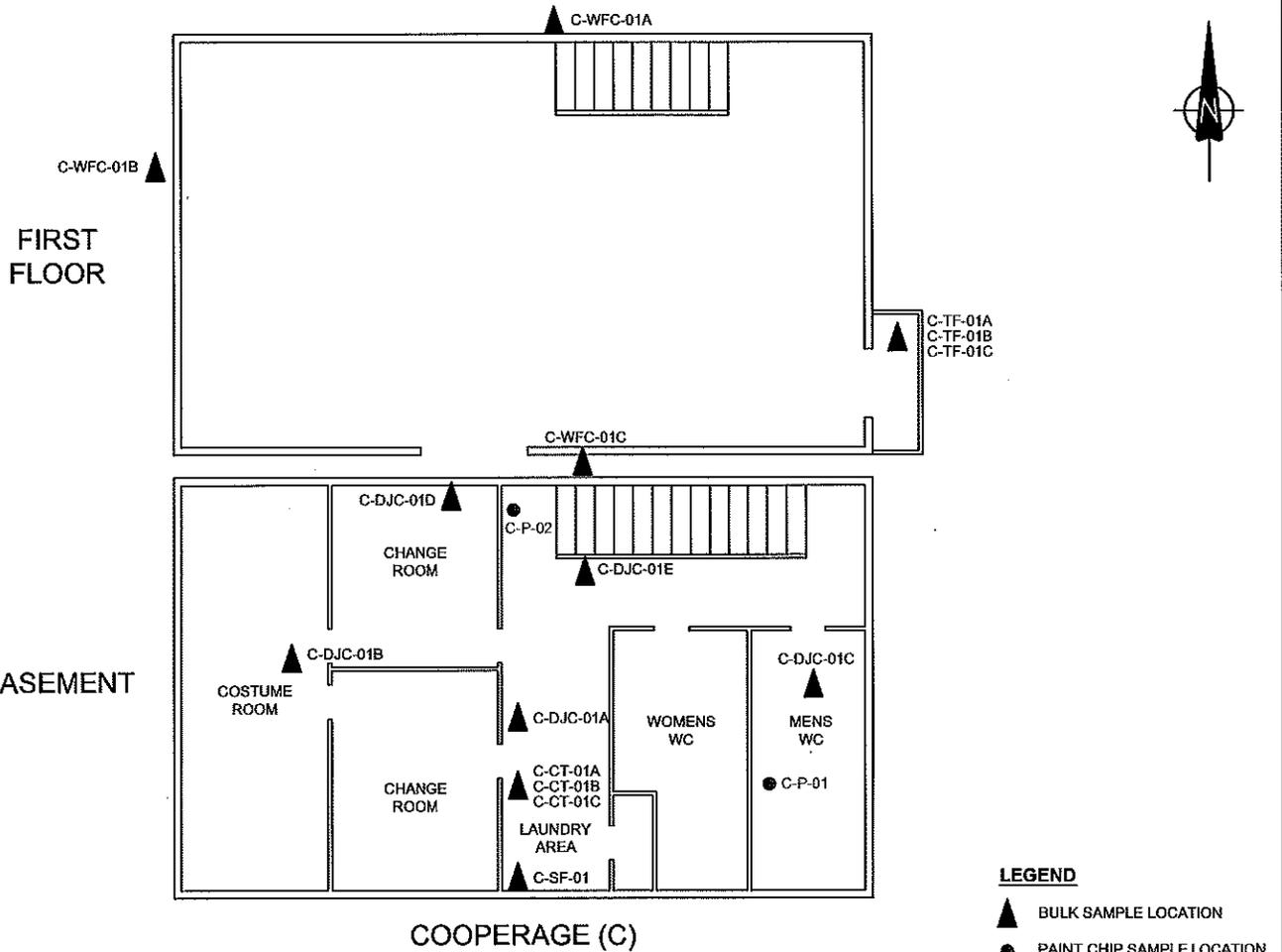
Appendix G: Findings and Recommendations – Cooperage

G-4.7 Silica

Silica is presumed to be present in the brick mortar and the concrete foundation of the subject building.

G-5.0 RECOMMENDATIONS—COOPERAGE

In general, identified hazardous building materials were observed to be in good condition and do not appear to require specific action to maintain compliance with applicable regulations for continued operations and maintenance. Refer to Section 5.0 of the main body of this report for applicable material-by-material general recommendations.



LEGEND
 ▲ BULK SAMPLE LOCATION
 ● PAINT CHIP SAMPLE LOCATION

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FLOOR PLAN SHOWING HAZARDOUS BUILDING MATERIALS AND BULK SAMPLE LOCATIONS FORT LANGLEY NATIONAL HISTORIC SITE OF CANADA, FORT LANGLEY 23433 MAVIS AVENUE, FORT LANGLEY, BC		Project No.: 123220330.200	Dwg. No.:
		Scale: N.T.S.	4
		Date: 15/10/28	
		Dwn. By: CD PK/DM	
Client: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA	App'd By: TW		



EMSL Canada Inc.

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EMSL Canada Order 551507409
Customer ID: 55JACQ30L
Customer PO: 123220330.200
Project ID:

Attn: Steve Chou
Stantec Consulting, Ltd.
500 - 4730 Kingsway
Burnaby, BC V5H 0C6
Phone: (604) 412-3004
Fax:
Collected:
Received: 7/09/2015
Analyzed: 7/16/2015
Proj: Fort Langley/123220330.200

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: C-WFC-01A **Lab Sample ID:** 551507409-0128
Sample Description: Window on North Side of Building/White Window Frame Caulking

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	White	0.0%	100%	None Detected	

Client Sample ID: C-WFC-01B **Lab Sample ID:** 551507409-0129
Sample Description: Window on North Side of Building/White Window Frame Caulking

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	White	0.0%	100%	None Detected	

Client Sample ID: C-WFC-01C **Lab Sample ID:** 551507409-0130
Sample Description: Window on North Side of Building/White Window Frame Caulking

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	White	0.0%	100%	None Detected	

Client Sample ID: C-DJC-01A **Lab Sample ID:** 551507409-0131
Sample Description: Basement Hallway Wall Adjacent to Change Room/Drywall Joint Compound

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	

Client Sample ID: C-DJC-01B **Lab Sample ID:** 551507409-0132
Sample Description: Basement Costume Room Wall Adjacent to Change Room/Drywall Joint Compound

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	

Client Sample ID: C-DJC-01C **Lab Sample ID:** 551507409-0133
Sample Description: Men's Washroom in Basement on Ceiling/Drywall Joint Compound

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	

Client Sample ID: C-CT-01A **Lab Sample ID:** 551507409-0134
Sample Description: Basement Laundry Area in Ceiling/Fissure and Pinhole Ceiling Tile

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	Brown	70%	30%	None Detected	



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EMSL Canada Order 551507409
 Customer ID: 55JACQ30L
 Customer PO: 123220330.200
 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: C-CT-01B **Lab Sample ID:** 551507409-0135

Sample Description: Basement Laundry Area in Ceiling/Fissure and Pinhole Ceiling Tile

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	Brown	75%	25%	None Detected	

Client Sample ID: C-CT-01C **Lab Sample ID:** 551507409-0136

Sample Description: Basement Laundry Area in Ceiling/Fissure and Pinhole Ceiling Tile

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	80%	20%	None Detected	

Client Sample ID: C-SF-01 **Lab Sample ID:** 551507409-0137

Sample Description: Floor in Basement Laundry Area/Brown Pebble Patterned Sheet Flooring

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	White/Yellow	0.0%	100%	None Detected	

Client Sample ID: C-TF-01A **Lab Sample ID:** 551507409-0138

Sample Description: Exterior Ramp on East Side of Building/Black Textured Flooring (Bitumen Gravel Shingle)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: C-TF-01B **Lab Sample ID:** 551507409-0139

Sample Description: Exterior Ramp on East Side of Building/Black Textured Flooring (Bitumen Gravel Shingle)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: C-TF-01C **Lab Sample ID:** 551507409-0140

Sample Description: Exterior Ramp on East Side of Building/Black Textured Flooring (Bitumen Gravel Shingle)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: C-DJC-01D **Lab Sample ID:** 551507409-0182

Sample Description:

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	

Client Sample ID: C-DJC-01E **Lab Sample ID:** 551507409-0183

Sample Description:

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	



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EMSL Canada Order 551507409
Customer ID: 55JACQ30L
Customer PO: 123220330.200
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):

Jon Delos Santos PLM (4)
Nicole Dimou PLM Grav. Reduction (5)
Romeo Samson PLM (4)
PLM Grav. Reduction (2)

Reviewed and approved by:

Matthew Davis
or Other Approved Signatory

None Detected = <0.5%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted. This report must not be used to claim product endorsement by NVLAP of any agency of the U.S. Government.

Samples analyzed by EMSL Canada Inc. Mississauga, ON NVLAP Lab Code 200877-0

Initial report from: 07/16/2015 21:42:13

**EMSL Canada Inc.**

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CustomerID:	55JACQ30L
CustomerPO:	123220330
ProjectID:	

Attn: Steve Chou Stantec Consulting, Ltd. 500 - 4730 Kingsway Burnaby, BC V5H 0C6	Phone: (604) 412-3004 Fax: Received: 07/09/15 11:35 AM Collected:
Project: 123220330.200.100	

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

<i>Client Sample Description</i>	<i>Lab ID</i>	<i>Collected</i>	<i>Analyzed</i>	<i>Lead Concentration</i>
C-P-01	551507426-0034 Site: BASEMENT WALL Desc: CREAM		7/15/2015	<90 ppm
C-P-02	551507426-0035 Site: BASEMENT TRIM Desc: WHITE		7/15/2015	<90 ppm

 Lisa Podzyhun
 or other approved signatory

*Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.010 % wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities. Samples received in good condition unless otherwise noted. "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements established by the AIHA-LAP, unless specifically indicated otherwise.
 Samples analyzed by EMSL Canada Inc. Mississauga, ON A2LA Accredited Environmental Testing Cert #2845.08

Initial report from 07/15/2015 17:49:32

APPENDIX H
FINDINGS AND RECOMMENDATIONS—
EXHIBITS BUILDING

H-4.0 FINDINGS—EXHIBITS BUILDING

The Exhibits Building is reportedly constructed in 2000 and consists of a main level and a partial mezzanine level. It is wood frame construction with varnished wood interior finishes.

The results of the assessment for each of the considered hazardous materials within the building are provided in the following sub-sections.

Floor plan drawings, which include locations of the samples collected during this assessment and locations of identified hazardous building materials (where practical), are attached to this Appendix.

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

- Roof (lack of safe access)

As such, limited comments, if any, will be provided regarding the presence, quantity or condition of hazardous building materials within the above-noted areas.

H-4.1 Asbestos

Although ACMs are unlikely to be present based on the reported construction date of the building, as a measure of diligence, Stantec sampled the following materials that have been historically known to contain asbestos:

- Textured flooring
- Drywall joint compound

Six samples of the above-noted suspected ACMs were collected and submitted to EMSL for analysis of asbestos content and nature.

A summary of the sample types, locations and analytical results is presented in Table H-4.1.1, below. A copy of the certificate of analysis provided by EMSL for the suspected ACM samples submitted is attached at the end of this Appendix.

**Table H-4.1.1 Suspected ACM Sample Collection and Analysis Summary
 Exhibits Building, Langley, BC**

Sample Number	Material Description	Sample Location	Result (%/type asbestos)
EB-TF-01A	Black textured flooring (bitumen gravel shingle)	Exterior ramp on east side of building	None detected
EB-TF-01B	Black textured flooring (bitumen gravel shingle)	Exterior ramp on east side of building	None detected
EB-TF-01C	Black textured flooring (bitumen gravel shingle)	Exterior ramp on east side of building	None detected
EB-DJC-01A	Drywall joint compound	Mechanical closet wall on mezzanine level	None detected
EB-DJC-01B	Drywall joint compound	Mechanical closet wall on mezzanine level	None detected
EB-DJC-01C	Drywall joint compound	Mechanical closet wall on mezzanine level	None detected

Based on our observations of building construction (estimated vintage of interior finishes and uniformity of building material use) and on our interpretations of suspected ACM sample analytical results, no ACMs were identified.

H-4.2 Lead

Lead is expected to be present in the following:

- Solder used in bell fittings for cast iron pipes
- Solder used in electrical equipment
- Vent and pipe flashings

Suspect LCP applications were not observed.

H-4.3 Polychlorinated Biphenyls

No suspected PCB-containing equipment was observed.

H-4.4 Mercury

No suspected mercury-containing equipment was observed.

Mercury may also be present in paints and adhesives.

H-4.5 Mould

Suspect mould or moisture-impacted building materials were not observed at the time of the assessment.

H-4.6 Ozone-Depleting Substances

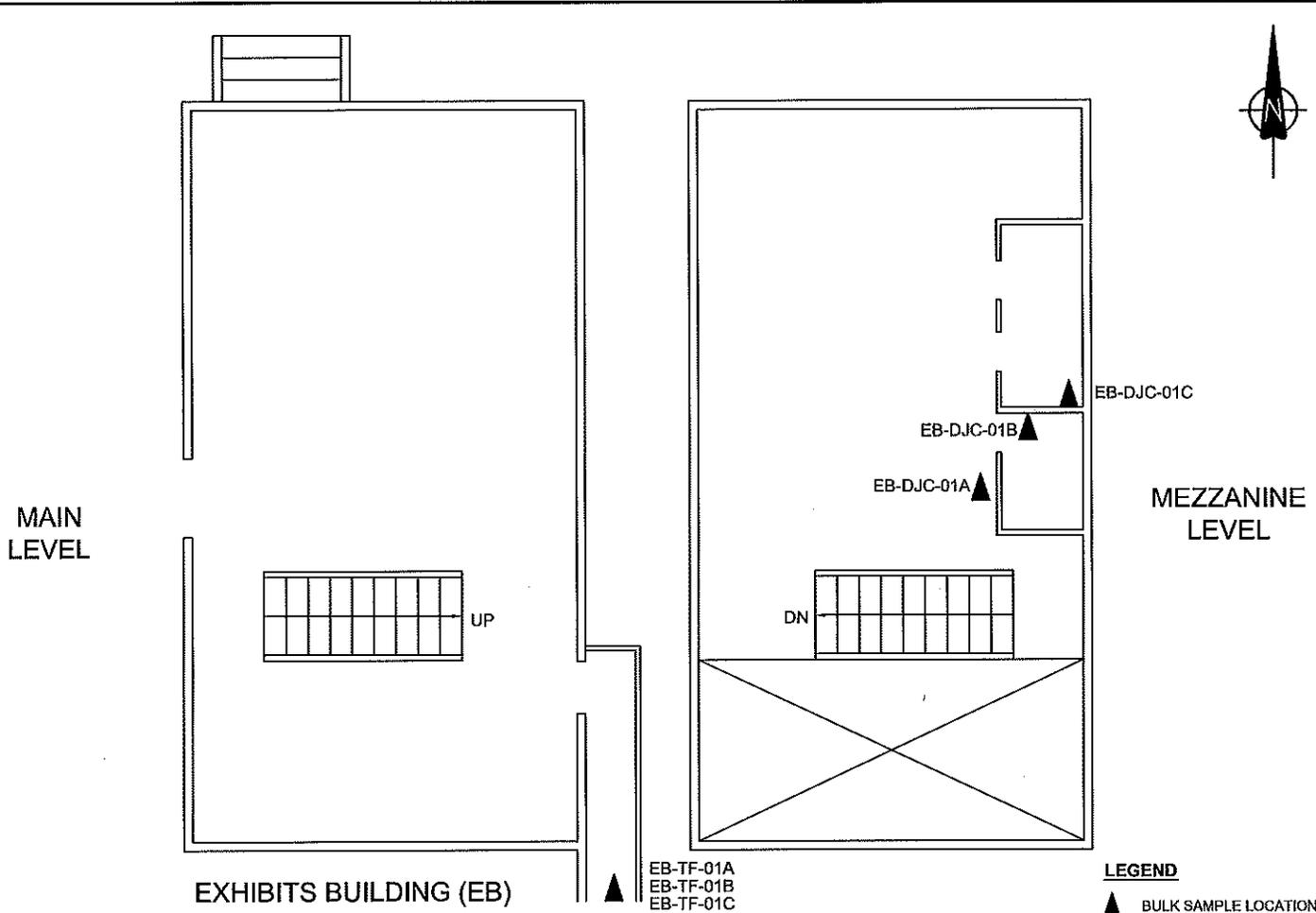
Suspected ODS-containing equipment was not observed.

H-4.7 Silica

Silica is presumed to be present in the concrete foundation of the subject building.

H-5.0 RECOMMENDATIONS—EXHIBITS BUILDING

In general, identified hazardous building materials were observed to be in good condition and do not appear to require specific action to maintain compliance with applicable regulations for continued operations and maintenance. Refer to Section 5.0 of the main body of this report for applicable material-by-material general recommendations.



NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

<p>FLOOR PLAN SHOWING HAZARDOUS BUILDING MATERIALS AND BULK SAMPLE LOCATIONS FORT LANGLEY NATIONAL HISTORIC SITE OF CANADA, FORT LANGLEY 23433 MAVIS AVENUE, FORT LANGLEY, BC</p>		Project No.: 123220330.200	Dwg. No.: 5	
		Scale: N.T.S.		
Client: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA		Date: 15/10/28		
		Dwn. By: CD PK/DM <small>SL2015100167</small>		
		App'd By: TW		



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Customer ID: 55JACQ30L
Customer PO: 123220330.200
Project ID:

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Stantec Consulting, Ltd.
500 - 4730 Kingsway
Burnaby, BC V5H 0C6
Phone: (604) 412-3004
Fax:
Collected:
Received: 7/09/2015
Analyzed: 7/16/2015
Proj: Fort Langley/123220330.200

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: EB-TF-01A **Lab Sample ID:** 551507409-0019

Sample Description: Exterior Ramp on East Side of Building/Black Textured Flooring (Bitumen Gravel Shingle)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: EB-TF-01B **Lab Sample ID:** 551507409-0020

Sample Description: Exterior Ramp on East Side of Building/Black Textured Flooring (Bitumen Gravel Shingle)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: EB-TF-01C **Lab Sample ID:** 551507409-0021

Sample Description: Exterior Ramp on East Side of Building/Black Textured Flooring (Bitumen Gravel Shingle)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: EB-DJC-01A **Lab Sample ID:** 551507409-0022

Sample Description: Mechanical Closet Wall on Mezzanine Level/Drywall Joint Compound

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	

Client Sample ID: EB-DJC-01B **Lab Sample ID:** 551507409-0023

Sample Description: Mechanical Closet Wall on Mezzanine Level/Drywall Joint Compound

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	

Client Sample ID: EB-DJC-01C **Lab Sample ID:** 551507409-0024

Sample Description: Mechanical Closet Wall on Mezzanine Level/Drywall Joint Compound

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	



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EMSL Canada Order 551507409
Customer ID: 55JACQ30L
Customer PO: 123220330.200
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):

- Jon Delos Santos PLM (1)
- Matthew Davis PLM Grav. Reduction (1)
- Nicole Dimou PLM Grav. Reduction (2)
- Romeo Samson PLM (2)

Reviewed and approved by:

Matthew Davis
or Other Approved Signatory

None Detected = <0.5%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted. This report must not be used to claim product endorsement by NVLAP of any agency of the U.S. Government.

Samples analyzed by EMSL Canada Inc. Mississauga, ON NVLAP Lab Code 200877-0

Initial report from: 07/16/2015 21:42:13

APPENDIX I
FINDINGS AND RECOMMENDATIONS—
GARAGE

I-4.0 FINDINGS—GARAGE

The Garage is reportedly constructed in 1996 and is a one story wood frame building.

The results of the assessment for each of the considered hazardous materials within the building are provided in the following sub-sections.

Floor plan drawings, which include locations of the samples collected during this assessment and locations of identified hazardous building materials (where practical), are attached to this Appendix.

I-4.1 Asbestos

Although ACMs are unlikely to be present based on the reported construction date of the building, as a measure of diligence, Stantec sampled the following materials that have been historically known to contain asbestos:

- Roofing shingle
- Drywall joint compound

Six samples of the above-noted suspected ACMs were collected and submitted to EMSL for analysis of asbestos content and nature.

A summary of the sample types, locations and analytical results is presented in Table I-4.1.1, below. A copy of the certificate of analysis provided by EMSL for the suspected ACM samples submitted is attached at the end of this Appendix.

**Table I-4.1.1 Suspected ACM Sample Collection and Analysis Summary
Garage, Fort Langley National Historic Site, BC**

Sample Number	Material Description	Sample Location	Result (%/type asbestos)
G-RS-01A	Black roofing shingle	East side of building roof	None detected
G-RS-01B	Black roofing shingle	East side of building roof	None detected
G-RS-01C	Black roofing shingle	East side of building roof	None detected
G-DJC-01A	Drywall joint compound	North east wall	None detected
G-DJC-01B	Drywall joint compound	South east corner wall	None detected
G-DJC-01C	Drywall joint compound	Central ceiling	None detected

Based on our observations of building construction (estimated vintage of interior finishes and uniformity of building material use) and on our interpretations of suspected ACM sample analytical results, no ACMs were identified.

I-4.2 Lead

With respect to paint, three paint chip samples were obtained from the predominant suspected LCP applications within the building. A summary of the sample types, locations and analytical results is presented in Table I-4.2.1, below. A copy of the certificate of analysis provided by EMSL for the suspected LCP samples submitted is attached to this Appendix.

**Table I-4.2.1 Suspected LCP Sample Collection and Analysis Summary
 Garage, Fort Langley National Historic Site, BC**

Sample No.	Sample Colour	Sample Location	Lab Result (ppm)	Lead Containing (Yes/No)
G-P-01	White	Interior	<120	No
G-P-02	Yellow	Exterior	1,100	Yes
G-P-03	White	Exterior trim	<90	No

Based on our observations and on our interpretations of suspected LCP sample analytical results, the material presented in Table I-4.2.2, below was identified as an LCP.

**Table I-4.2.2 Summary of Identified LCPs
 Garage, Fort Langley National Historic Site, BC**

Identified LCP Description	Photo
Yellow colored paint on wood panels. This paint was observed to be in good condition (not bubbling, flaking or peeling).	

I-4.3 Polychlorinated Biphenyls

No suspected PCB-containing equipment was observed.

I-4.4 Mercury

No suspected mercury-containing equipment was observed.

Mercury may also be present in paints and adhesives.

I-4.5 Mould

Suspect mould or moisture-impacted building materials were not observed at the time of the assessment.

I-4.6 Ozone-Depleting Substances

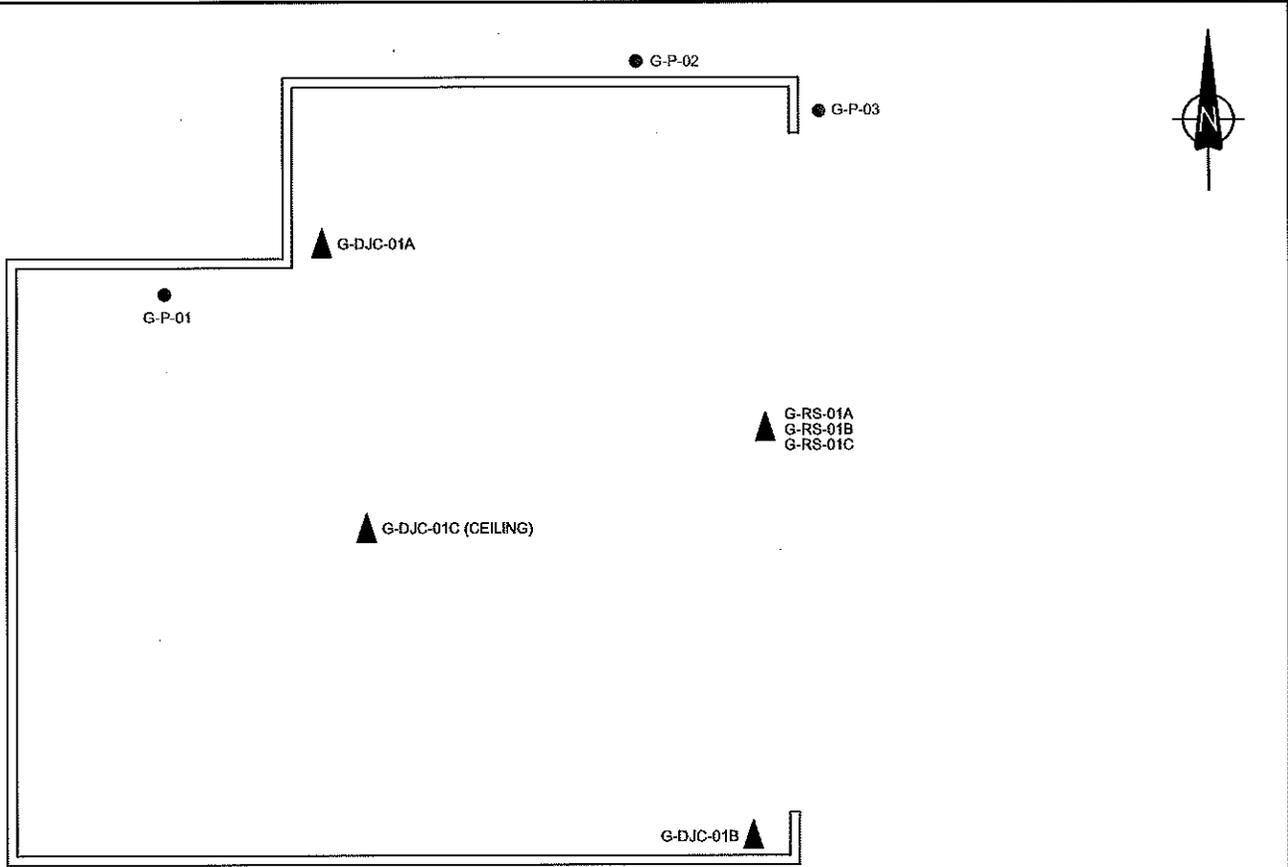
No suspected ODS-containing equipment was observed.

I-4.7 Silica

Silica is presumed to be present in the concrete foundation of the subject building.

I-5.0 RECOMMENDATIONS—GARAGE

In general, identified hazardous building materials were observed to be in good condition and do not appear to require specific action to maintain compliance with applicable regulations for continued operations and maintenance. Refer to Section 5.0 of the main body of this report for applicable material-by-material general recommendations.



GARAGE (G)

LEGEND

- ▲ BULK SAMPLE LOCATION
- PAINT CHIP SAMPLE LOCATION

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<p>FLOOR PLAN SHOWING HAZARDOUS BUILDING MATERIALS AND BULK SAMPLE LOCATIONS FORT LANGLEY NATIONAL HISTORIC SITE OF CANADA, FORT LANGLEY 23433 MAVIS AVENUE, FORT LANGLEY, BC</p>	Project No.: 123220330.200	<p>Dwg. No.: 11</p>
	Scale: N.T.S.	
	Date: 15/07/09	
	Dwn. By: CD VM SL2015070064	
Client: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA	App'd By: TW	



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Proj: Fort Langley/123220330.200

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: G-RS-01A **Lab Sample ID:** 551507409-0013
Sample Description: East Side of Building Roof/Black Roofing Shingle

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: G-RS-01B **Lab Sample ID:** 551507409-0014
Sample Description: East Side of Building Roof/Black Roofing Shingle

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: G-RS-01C **Lab Sample ID:** 551507409-0015
Sample Description: East Side of Building Roof/Black Roofing Shingle

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: G-DJC-01A **Lab Sample ID:** 551507409-0016
Sample Description: North East Wall/Drywall Joint Compound

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	

Client Sample ID: G-DJC-01B **Lab Sample ID:** 551507409-0017
Sample Description: South East Corner Wall/Drywall Joint Compound

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	

Client Sample ID: G-DJC-01C **Lab Sample ID:** 551507409-0018
Sample Description: Central Ceiling/Drywall Joint Compound

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	



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EMSL Canada Order 551507409
Customer ID: 55JACQ30L
Customer PO: 123220330.200
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):

Jon Delos Santos PLM (1)
Matthew Davis PLM Grav. Reduction (1)
Nicole Dimou PLM Grav. Reduction (2)
Romeo Samson PLM (2)

Reviewed and approved by:

Matthew Davis
or Other Approved Signatory

None Detected = <0.5%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted. This report must not be used to claim product endorsement by NVLAP of any agency of the U.S. Government.

Samples analyzed by EMSL Canada Inc. Mississauga, ON NVLAP Lab Code 200877-0

Initial report from: 07/16/2015 21:42:13



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CustomerID:	55JACQ30L
CustomerPO:	123220330
ProjectID:	

Attn: Steve Chou Stantec Consulting, Ltd. 500 - 4730 Kingsway Burnaby, BC V5H 0C6	Phone: (604) 412-3004 Fax: Received: 07/09/15 11:35 AM Collected:
Project: 123220330.200.100	

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

<i>Client Sample Description</i>	<i>Lab ID</i>	<i>Collected</i>	<i>Analyzed</i>	<i>Lead Concentration</i>
G-P-01	551507426-0004		7/15/2015	<120 ppm
	Site: INTERIOR Desc: WHITE Insufficient sample to reach reporting limit.			
G-P-02	551507426-0005		7/15/2015	1100 ppm
	Site: EXTERIOR Desc: YELLOW			
G-P-03	551507426-0006		7/15/2015	<90 ppm
	Site: EXTERIOR TRIM Desc: WHITE			

Lisa Podzyhun
or other approved signatory

*Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.010 % wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities. Samples received in good condition unless otherwise noted. "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements established by the AIHA-LAP, unless specifically indicated otherwise.

Samples analyzed by EMSL Canada Inc. Mississauga, ON A2LA Accredited Environmental Testing Cert #2845.08

Initial report from 07/15/2015 17:29:35

APPENDIX J
FINDINGS AND RECOMMENDATIONS—
LUMBER SHED

J-4.0 FINDINGS—LUMBER SHED

The Lumber Shed was reportedly constructed in 1987. It is a wood frame structure with drywall interior finishes.

The results of the assessment for each of the considered hazardous materials within the building are provided in the following sub-sections.

Floor plan drawings, which include locations of the samples collected during this assessment and locations of identified hazardous building materials (where practical), are attached to this Appendix.

J-4.1 Asbestos

Stantec identified and sampled the following suspected ACMs:

- Roofing shingle
- Drywall joint compound
- Roofing paper
- Putty

Twelve samples of the above-noted suspected ACMs were collected and submitted to EMSL for analysis of asbestos content and nature.

A summary of the sample types, locations and analytical results is presented in Table J-4.1.1, below. A copy of the certificate of analysis provided by EMSL for the suspected ACM samples submitted is attached at the end of this Appendix.

**Table J-4.1.1 Suspected ACM Sample Collection and Analysis Summary
 Lumber Shed, Fort Langley National Historic, BC**

Sample Number	Material Description	Sample Location	Result (%/type asbestos)
LS-RS-01A	Black roofing shingle	South side of building roof	None detected
LS-RS-01B	Black roofing shingle	South side of building roof	None detected
LS-RS-01C	Black roofing shingle	South side of building roof	None detected
LS-DJC-01A	Drywall joint compound	West wall	None detected
LS-DJC-01B	Drywall joint compound	South wall	None detected
LS-DJC-01C	Drywall joint compound	East wall	None detected
LS-RP-01A	Black roofing paper	South side of building under roof shingle	None detected
LS-RP-01B	Black roofing paper	South side of building under roof shingle	None detected
LS-RP-01C	Black roofing paper	South side of building under roof shingle	None detected
LS-ECP-01A	Cream electrical conduit putty	South west exterior wall	None detected
LS-ECP-01B	Cream electrical conduit putty	South west exterior wall	None detected
LS-ECP-01C	Cream electrical conduit putty	South west exterior wall	None detected

Based on our observations of building construction (estimated vintage of interior finishes and uniformity of building material use) and on our interpretations of suspected ACM sample analytical results, no ACMs were identified.

J-4.2 Lead

Suspected lead-containing items (other than paint) were not observed.

With respect to paint, three paint chip samples were obtained from the predominant suspected LCP applications within the building. A summary of the sample types, locations and analytical results is presented in Table J-4.2.1, below. A copy of the certificate of analysis provided by EMSL for the suspected LCP samples submitted is attached to this Appendix.

**Table J-4.2.1 Suspected LCP Sample Collection and Analysis Summary
Lumber Shed, Fort Langley National Historic Site, BC**

Sample No.	Sample Colour	Sample Location	Lab Result (ppm)	Lead Containing (Yes/No)
LS-P-01	White	Interior	<90	No
LS-P-02	White	Exterior	<90	No
LS-P-03	Yellow	Siding	<90	No

Based on our observations and on our interpretations of suspected LCP sample analytical results, no LCPs were identified.

J-4.3 Polychlorinated Biphenyls

No suspected PCB-containing electrical equipment was observed.

J-4.4 Mercury

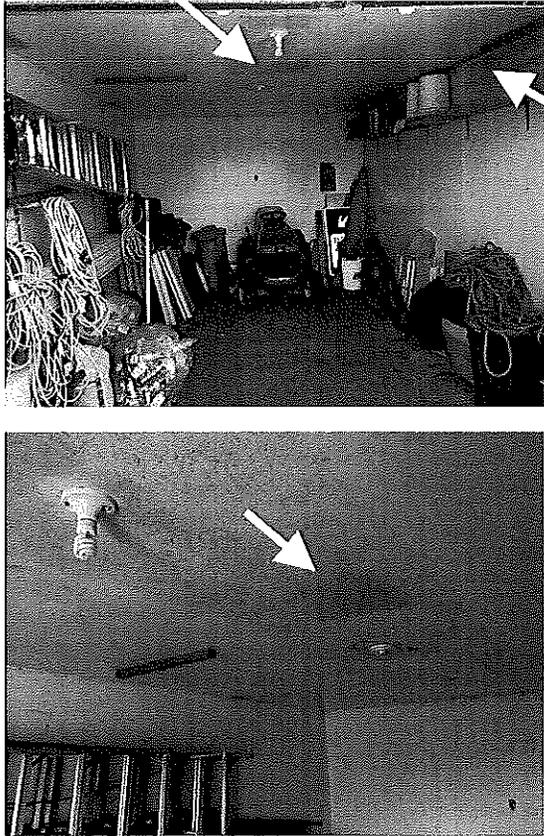
No mercury-containing equipment was observed.

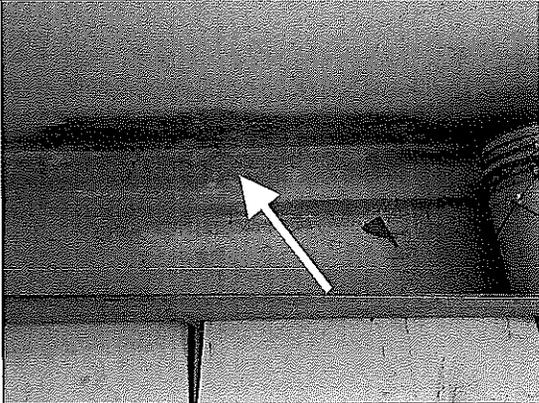
Mercury may also be present in paints and adhesives.

J-4.5 Mould

Mould/moisture damage was observed as summarized in Table J-4.5.1, below.

Table J-4.5.1 Summary of Identified Mould and/or Moisture-Impacted Materials Lumber Shed, Fort Langley National Historic Site, BC

Identified Mould and/or Moisture Impacted Materials Description	Photo
<p>Moisture and mould impacted drywall materials were observed in various locations throughout the Garage - mainly in the ceiling and upper west wall. The suspected source of moisture is roof leaks or condensation.</p>	

Identified Mould and/or Moisture Impacted Materials Description	Photo
	

J.4.5.1 Surface Sampling

Table J-4.5.2, below, summarizes the location and analytical results of the tape-lift/bulk surface sample collected during this assessment. A copy of the sample analytical report provided by Sporometrics is attached in this Appendix

**Table J-4.5.2 Surface Sample Collection and Analysis Summary – June 18, 2015
Lumber Shed, Fort Langley National Historic Site, BC**

Sample No.	Sample Location	Microscopic Observation	Mould Growth Indicated?
LS-M-01	Central drywall on ceiling	Cladosporium, mycelia and spores present	Yes

As indicated above, the dark textured staining on the ceiling and upper west wall was confirmed to be mould growth.

J-4.6 Ozone-Depleting Substances

No suspected ODS-containing equipment was observed.

J-4.7 Silica

Silica is presumed to be present in the concrete foundation of the subject building.

J-5.0 RECOMMENDATIONS—LUMBER SHED

In general, identified hazardous building materials were observed to be in good condition and do not appear to require specific action to maintain compliance with applicable regulations for continued operations and maintenance. Refer to Section 5.0 of the main body of this report for applicable material-by-material general recommendations.

Additional building-specific recommendations to be considered are provided below.

J-5.5 Mould

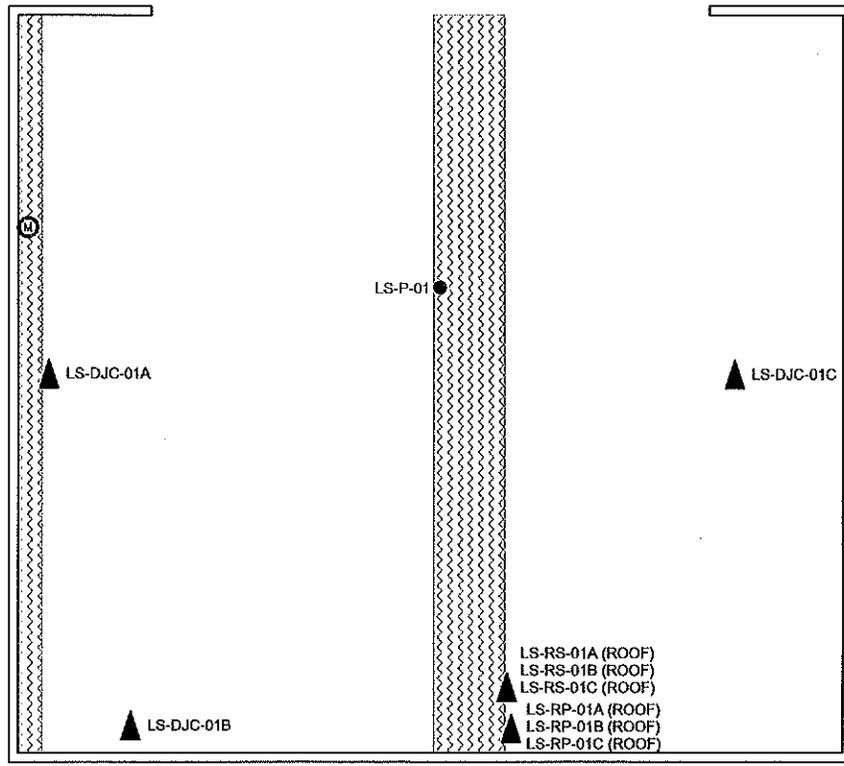
Documents published by Health Canada, Ontario Ministry of Health, American Industrial Hygiene Association (AIHA), American Conference of Governmental Industrial Hygienists (ACGIH) and others, provide guidance for interpreting the results of mold investigations. The Health Canada Guide states that:

"Identifiable promoters of fungal growth require correction, and any visible fungi require removal."

To this end, due to the confirmed presence of mould growth, and although the building is not typically occupied for extended periods of time, as a measure of diligence Stantec recommends the following course of action:

- Remove and dispose of mould-impacted drywall materials from the ceiling and upper west wall (approximately 75 square feet).
- Identified mould should be remediated in accordance with the Mould Guidelines for the Canadian Construction Industry (CAA 2004), by a competent person, who is knowledgeable of potential hazards of mould exposure, following remediation precautions.

An assessment to determine the likely source(s) of moisture intrusion should be undertaken. Issues leading to moisture impacts and/or mould growth should be identified and addressed prior to reinstating building materials to areas where mould abatement is conducted, to avoid the potential for re-wetting of new materials, and repeated mould growth.



LEGEND

- ▲ BULK SAMPLE LOCATION
- PAINT CHIP SAMPLE LOCATION
- Ⓜ MOULD BULK SAMPLE LOCATION
- ▨ MOISTURE AND MOULD IMPACTED DRYWALL MATERIALS

LUMBER SHED (LS)

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

<p>FLOOR PLAN SHOWING HAZARDOUS BUILDING MATERIALS AND BULK SAMPLE LOCATIONS</p> <p>FORT LANGLEY NATIONAL HISTORIC SITE OF CANADA, FORT LANGLEY 23433 MAVIS AVENUE, FORT LANGLEY, BC</p>	Project No.: 123220330.200	<p>Dwg. No.:</p> <p>10</p>
	Scale: N.T.S.	
	Date: 15/10/28	
	Dwn. By: CD VM/DM <small>SL2015100168</small>	
Client: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA	App'd By: TW	



EMSL Canada Inc.

2756 Slough Street Mississauga, ON L4T 1G3
Phone/Fax: 289-997-4602 / (289) 997-4607
<http://www.EMSL.com> / torontolab@emsl.com

EMSL Canada Order 551507409
Customer ID: 55JACQ30L
Customer PO: 123220330.200
Project ID:

Attn: Steve Chou
Stantec Consulting, Ltd.
500 - 4730 Kingsway
Burnaby, BC V5H 0C6

Phone: (604) 412-3004
Fax:
Collected:
Received: 7/09/2015
Analyzed: 7/16/2015

Proj: Fort Langley/123220330.200

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: LS-RS-01A **Lab Sample ID:** 551507409-0001
Sample Description: South Side of Building Roof/Black Roofing Shingle

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	4.6%	95.4%	None Detected	

Client Sample ID: LS-RS-01B **Lab Sample ID:** 551507409-0002
Sample Description: South Side of Building Roof/Black Roofing Shingle

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: LS-RS-01C **Lab Sample ID:** 551507409-0003
Sample Description: South Side of Building Roof/Black Roofing Shingle

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: LS-DJC-01A **Lab Sample ID:** 551507409-0004
Sample Description: West Wall/Drywall Joint Compound

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	

Client Sample ID: LS-DJC-01B **Lab Sample ID:** 551507409-0005
Sample Description: South Wall/Drywall Joint Compound

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	

Client Sample ID: LS-DJC-01C **Lab Sample ID:** 551507409-0006
Sample Description: East Wall/Drywall Joint Compound

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	

Client Sample ID: LS-RP-01A **Lab Sample ID:** 551507409-0007
Sample Description: South Side of Building Under Roof Shingle/Black Roofing Paper

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	



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<http://www.EMSL.com> / torontolab@emsl.com

EMSL Canada Order 551507409
Customer ID: 55JACQ30L
Customer PO: 123220330.200
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: LS-RP-01B **Lab Sample ID:** 551507409-0008
Sample Description: South Side of Building Under Roof Shingle/Black Roofing Paper

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: LS-RP-01C **Lab Sample ID:** 551507409-0009
Sample Description: South Side of Building Under Roof Shingle/Black Roofing Paper

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: LS-ECP-01A **Lab Sample ID:** 551507409-0010
Sample Description: South West Exterior Wall/Cream Electrical Conduit Putty

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Green	0.0%	100%	None Detected	

Client Sample ID: LS-ECP-01B **Lab Sample ID:** 551507409-0011
Sample Description: South West Exterior Wall/Cream Electrical Conduit Putty

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Green	0.0%	100%	None Detected	

Client Sample ID: LS-ECP-01C **Lab Sample ID:** 551507409-0012
Sample Description: South West Exterior Wall/Cream Electrical Conduit Putty

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Green	0.0%	100%	None Detected	

Analyst(s):

- Jon Delos Santos PLM (1)
- Matthew Davis PLM Grav. Reduction (3)
- Nicole Dimou PLM Grav. Reduction (6)
- Romeo Samson PLM (2)

Reviewed and approved by:

Matthew Davis
or Other Approved Signatory

None Detected = <0.5%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted. This report must not be used to claim product endorsement by NVLAP of any agency of the U.S. Government.

Samples analyzed by EMSL Canada Inc. Mississauga, ON NVLAP Lab Code 200877-0

Initial report from: 07/16/2015 21:42:13

**EMSL Canada Inc.**

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<http://www.EMSL.com>tontofab@emsl.com

EMSL Canada Or	551507426
CustomerID:	55JACQ30L
CustomerPO:	123220330
ProjectID:	

Attn: Steve Chou Stantec Consulting, Ltd. 500 - 4730 Kingsway Burnaby, BC V5H 0C6	Phone: (604) 412-3004 Fax: Received: 07/09/15 11:35 AM Collected:
Project: 123220330.200.100	

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

<i>Client Sample Description</i>	<i>Lab ID</i>	<i>Collected</i>	<i>Analyzed</i>	<i>Lead Concentration</i>
LS-P-01	551507426-0001 Site: INTERIOR Desc: WHITE	7/15/2015		<90 ppm
LS-P-02	551507426-0002 Site: EXTERIOR Desc: WHITE	7/15/2015		<90 ppm
LS-P-03	551507426-0003 Site: SIDING Desc: YELLOW	7/15/2015		<90 ppm

 Lisa Podzyhun
 or other approved signatory

*Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.010 % wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities. Samples received in good condition unless otherwise noted. "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements established by the AIHA-LAP, unless specifically indicated otherwise.

Samples analyzed by EMSL Canada Inc. Mississauga, ON A2LA Accredited Environmental Testing Cert #2845.08

Initial report from 07/15/2015 17:21:43



Sporometrics Inc.

219 Dufferin Street, Suite 20C, Toronto, ON M6K 1Y9 - t.416-516-1660 - f.416-516-1670 - www.sporometrics.com

RESULTS OF LABORATORY ANALYSES: JOB NO. 24952.00

To:	Keith Irwin	Date of report:	2015/06/24
Company:	Stantec Consulting Ltd. - Burnaby, BC	Date of sampling:	2015/06/18
Client Project:	123220330	Analyst:	Yordanka Gonzalez Guardiola
Client Address:	500-4730 Kingsway, Burnaby, BC V5H 0C6	Date Received:	2015/06/22

BULK / TAPELIFT / BIOTAPE SAMPLE NO.:	LS-M-01	-	-	-	-	-
Location:	Lumber shed					
Serial #:	N/A					
Expiry date:	N/A					
FUNGAL IDENTIFICATION:^a	ELEMENTS:	MICROSCOPIC OBSERVATIONS^b (RATING^c):				
<i>Cladosporium</i> NOS	mycelia	2+				
	spores	2+				
OTHER OBSERVATIONS:						
background rating		3+				
FUNGAL GROWTH INDICATED?^d:		Y				

AIHA LAP, LLC LAB NO: 171117

Samples were received in satisfactory condition and tested in accordance with SOP 5.4.1.1.3. These results relate only to the samples tested.

^a NOS = not otherwise specified.

^b Mounted in lactofuchsin / lactic acid, or other medium as required, with 50-100 fields examined in bright field microscopy at 400x magnification.

^c - = not detected; tr = 10⁰ - 10¹ elements in total; 1+ = 10⁰ - 10¹ elements in each of ~25% fields; 2+ = 10¹ - 10² elements in each of ~50% fields; 3+ = 10² - 10³ elements in each of ~75% fields obscured.

^d Possibility of fungal growth *in situ* based on microscopic observations; Y = yes; N = no; ? = ambiguous. For explanation please refer to the final page of this report.

END OF REPORT

Examined By

Released By



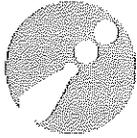
Yordanka Gonzalez Guardiola, MSc

Mike Saleh, MHSc

Analyst

Analyst





RESULTS OF LABORATORY ANALYSES:		JOB NO. 24952.00	
To:	Keith Irwin	Date of report:	2015/06/24
Company:	Stantec Consulting Ltd. - Burnaby, BC	Date of sampling:	2015/06/18
Client Project:	123220330	Analyst:	Yordanka Gonzalez Guardiola
Client Address:	500-4730 Kingsway, Burnaby, BC V5H 0C6	Date Received:	2015/06/22

Guidance on the interpretation of microscopic findings Samples of bulk materials as well as tape lift samples from potentially contaminated surfaces may be examined microscopically to assess the potential of these materials to be supporting fungal growth and serving as indoor fungal amplification sites. Guidelines on indoor microbial contamination proposed by Health Canada (HC. 1995. *Indoor air quality in office buildings: A technical guide*. Federal-Provincial Advisory Committee on Environmental and Occupational Health. Ottawa: Environmental Health Directorate 93-EHD-166 rev.) state unambiguously that indoor, active fungal growth sites are unacceptable regardless of the extent to which these amplifiers impact on the indoor airborne spore-load. Fungal spores are commonly borne on air currents and settle on flat surfaces as a matter of course. Thus, the observation of fungal spores alone is insufficient to characterize a specimen as a growth site. This judgment primarily requires the microscopic visualization of fungal filaments ("hyphae", or *en masse*, "mycelia"). Additionally, the identification of different kinds of fungi usually requires the observation of spores (e.g. conidia, ascospores, etc.) along with the organs responsible for their production (e.g. conidiophores, ascomata, etc.). However, the latter rarely persist long after the spores have been produced, making definitive identification difficult or impossible in aged specimens. The rating system used by Sporometrics to score the frequency of structures observed microscopically is based on a 5-point assessment of 50-100 microscopic fields, usually taken at 400 x magnification. This system uses the following rating criteria:

Descriptor	Criteria (based on 50-100 fields)	Interpretation of growth <i>in situ</i> according to observations:	
		Spores alone	Spores and spore-bearing structures or mycelia
tr	10 ⁰ -10 ¹ elements in total	growth not indicated	growth not indicated
1+	10 ⁰ -10 ¹ elements per ~25% fields	unclear	growth indicated
2+	10 ¹ -10 ² elements per ~50% fields	growth indicated	growth indicated
3+	10 ² -10 ³ elements per ~75% fields	growth indicated	growth indicated
4+	> 75% fields obscured by elements	growth indicated	growth indicated

APPENDIX K
FINDINGS AND RECOMMENDATIONS—
MAINTENANCE BUILDING

K-4.0 FINDINGS—MAINTENANCE BUILDING

The Maintenance Building was reportedly constructed in 1984. It is a wood frame structure with drywall and sheet flooring interior finishes.

The results of the assessment for each of the considered hazardous materials within the building are provided in the following sub-sections.

Floor plan drawings, which include locations of the samples collected during this assessment and locations of identified hazardous building materials (where practical), are attached to this Appendix.

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

- Roof (no safe access to upper portion of peaked roof to assess for or sample suspected asbestos-containing penetration sealants)

As such, limited comments, if any, will be provided regarding the presence, quantity or condition of hazardous building materials within the above-noted areas.

K-4.1 Asbestos

Stantec identified and sampled the following suspected ACMs:

- Caulking and sealant
- Roofing shingle
- Roofing paper
- Drywall joint compound

Seventeen samples of the above-noted suspected ACMs were collected and submitted to EMSL for analysis of asbestos content and nature.

A summary of the sample types, locations and analytical result is presented in Table K-4.1.1, below. A copy of the certificate of analysis provided by EMSL for the suspected ACM samples submitted is attached at the end of this Appendix.

**Table K-4.1.1 Suspected ACM Sample Collection and Analysis Summary
 Maintenance Building, Fort Langley National Historic Site, BC**

Sample Number	Material Description	Sample Location	Result (%/type asbestos)
MB-PS-01A	Yellow pipe sealant	Sprinkler system fitting in east work area	None detected
MB-PS-01B	Yellow pipe sealant	Sprinkler system fitting in west work area	None detected
MB-PS-01C	Yellow pipe sealant	Sprinkler system fitting in sprinkler room	None detected
MB-RS-01A	Black roof shingle	East side of building roof	None detected
MB-RS-01B	Black roof shingle	East side of building roof	None detected
MB-RS-01C	Black roof shingle	East side of building roof	None detected
MB-FT-01	Yellow and brown floor tile	2 nd layer under sheet flooring (MB-SF-01)	None detected
MB-SF-01	Beige and grey pebble sheet flooring	Floor in hallway	None detected
MB-WFC-01A	White exterior window frame caulking	Window in west side of garage	None detected
MB-WFC-01B	White exterior window frame caulking	Window in west side of garage	None detected
MB-WFC-01C	White exterior window frame caulking	Window in west side of garage	None detected
MB-WPC-01A	Black window pane caulking	Window in south east office between glass and frame	7.0% Chrysotile
MB-WPC-01B	Black window pane caulking	Window in lunch room between glass and frame	Stop Positive (Not Analyzed)
MB-WPC-01C	Black window pane caulking	Window in lunch room between glass and frame	Stop Positive (Not Analyzed)
MB-DJC-01A	Drywall joint compound	Washroom on east wall	None detected
MB-DJC-01B	Drywall joint compound	Storage room on east wall	None detected
MB-DJC-01C	Drywall joint compound	West work area on east wall	None detected
MB-DJC-01D	Drywall joint compound	West work area on south wall	None detected
MB-DJC-01E	Drywall joint compound	South storage room wall	None detected

Based on our observations of building construction (estimated vintage of interior finishes and uniformity of building material use) and on our interpretations of suspected ACM sample analytical results, the material presented in Table K-4.1.2, below was identified as an ACM.

**Table K-4.1.2 Summary of Identified ACMs
Maintenance Building, Fort Langley National Historic Site, BC**

Identified ACM Description and Condition Information		Photo
Black window pane caulking between glass and frames throughout.		
Friability	Non-friable	
Condition	Good	
Content	7.0% Chrysotile	

K-4.2 Lead

Lead is expected to be present in the following:

- Older electrical wiring materials and sheathing
- Solder used on domestic water lines
- Solder used in bell fittings for cast iron pipes
- Solder used in electrical equipment

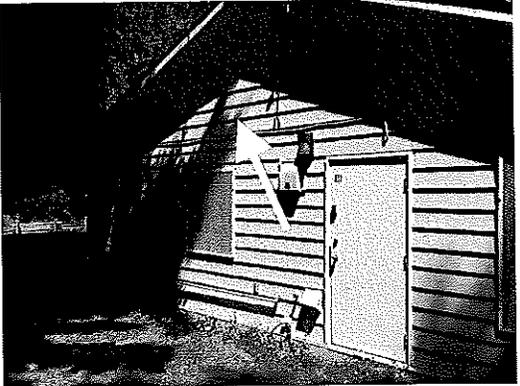
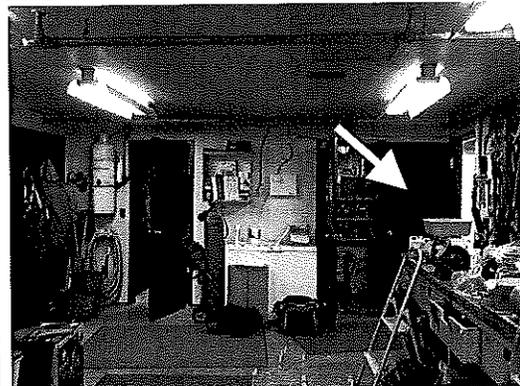
With respect to paint, eight paint chip samples were obtained from the predominant suspected LCP applications within the building. A summary of the sample types, locations and analytical results is presented in Table K-4.2.1, below. A copy of the certificate of analysis provided by EMSL for the suspected LCP samples submitted is attached to this Appendix.

**Table K-4.2.1 Suspected LCP Sample Collection and Analysis Summary
 Maintenance Building, Langley, BC**

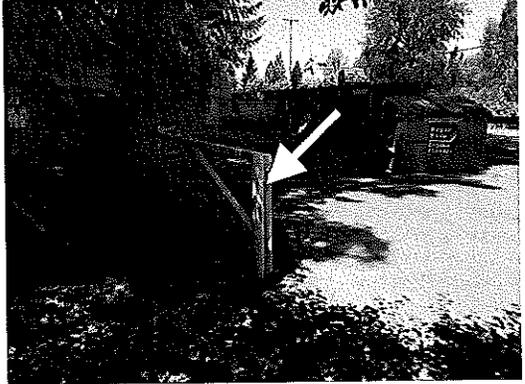
Sample No.	Sample Colour	Sample Location	Lab Result (ppm)	Lead Containing (Yes/No)
MB-P-01	Yellow	Exterior siding	1,100	Yes
MB-P-02	White	Exterior trim	480	No
MB-P-03	Brown	Downspouts	<220	No
MB-P-04	Yellow	Interior wall	880	Yes
MB-P-05	Brown	Interior trim	1,300	Yes
MB-P-06	Pink	Interior wall	590	No
MB-P-07	White	Interior trim	<90	No
MB-P-08	Yellow	Exterior main gate	170,000	Yes

Based on our observations and on our interpretations of suspected LCP sample analytical results, the materials presented in Table K-4.2.2, below were identified as LCPs.

**Table K-4.2.2 Summary of Identified LCPs
Maintenance Building, Langley, BC**

Identified LCP Description	Photo
<p>Yellow colored paint on the exterior siding. This paint was observed to be in good condition (not bubbling, flaking or peeling).</p>	
<p>Yellow colored paint on the interior walls of the storage rooms. This paint was observed to be in good condition (not bubbling, flaking or peeling).</p>	
<p>Brown coloured paint on the interior trim. This paint was observed to be in good condition (not bubbling, flaking or peeling).</p>	

**Table K-4.2.2 Summary of Identified LCPs
 Maintenance Building, Langley, BC**

Identified LCP Description	Photo
<p>Yellow coloured paint on the exterior main gate. This paint was observed to be in good condition (not bubbling, flaking or peeling).</p>	

K-4.3 Polychlorinated Biphenyls

Thirty-five fluorescent light fixtures throughout were observed to have high-efficiency light tubes. The ballasts within such fixtures are not suspected to contain PCBs.

K-4.4 Mercury

Mercury vapour is expected to be present in fluorescent light bulbs/tubes observed in 35 fluorescent light fixtures.

Mercury may also be present in paints and adhesives.

K-4.5 Mould

No mould or moisture damage was observed during the assessment.

K-4.6 Ozone-Depleting Substances

No suspected ODS-containing equipment was observed.

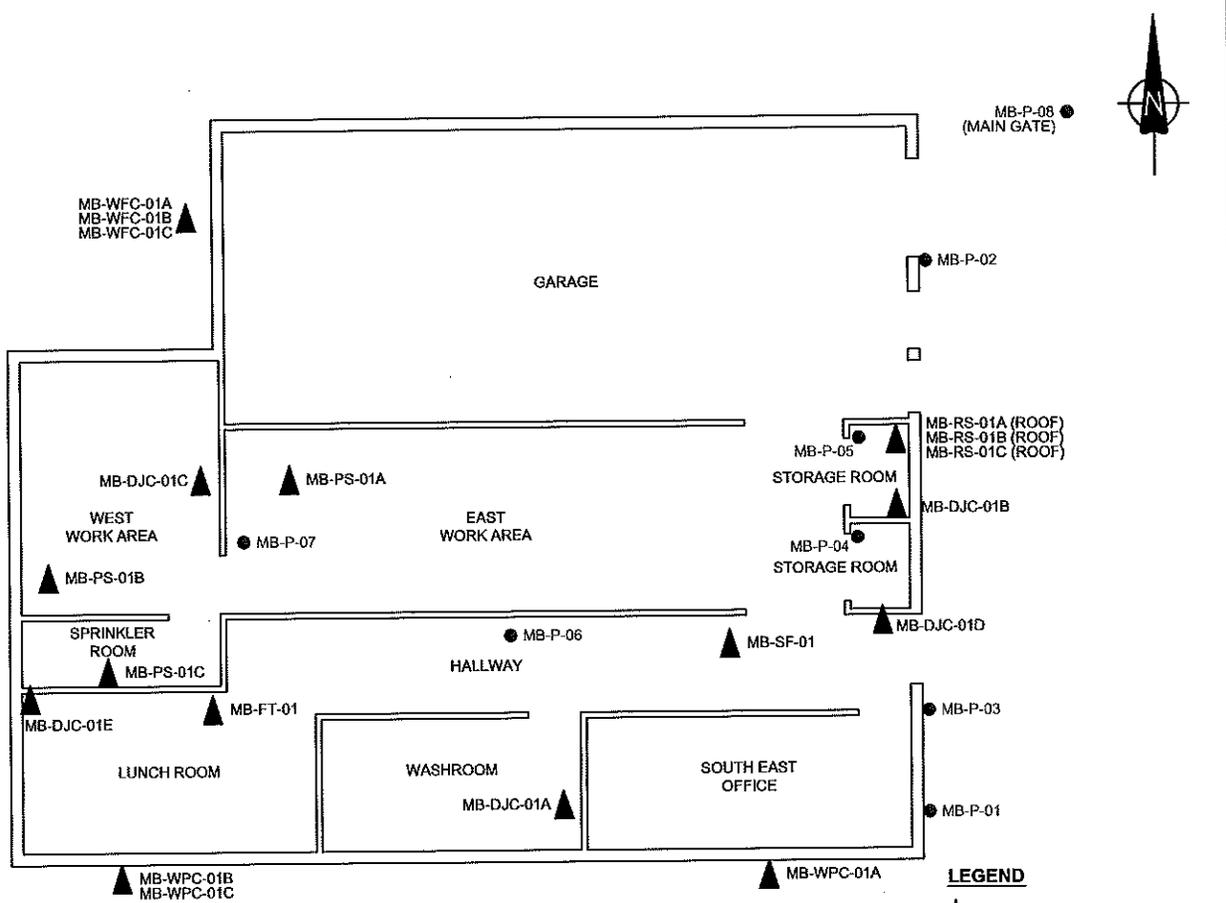
K-4.7 Silica

Silica is presumed to be present in the concrete foundation of the subject building.

K-5.0 RECOMMENDATIONS—MAINTENANCE BUILDING

In general, identified hazardous building materials were observed to be in good condition and do not appear to require specific action to maintain compliance with applicable regulations for continued operations and maintenance. Refer to Section 5.0 of the main body of this report for applicable material-by-material general recommendations.

Stantec Consulting Ltd. 2014



NOTES: 1. BLACK WINDOW PANE CAULKING THROUGHOUT IS ASBESTOS-CONTAINING.
 2. THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

FLOOR PLAN SHOWING HAZARDOUS BUILDING MATERIALS AND BULK SAMPLE LOCATIONS
 FORT LANGLEY NATIONAL HISTORIC SITE OF CANADA, FORT LANGLEY
 23433 MAVIS AVENUE, FORT LANGLEY, BC

Client: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

Project No.:	123220330.200
Scale:	N.T.S.
Date:	15/10/28
Dwn. By:	CD PKJDM SL2015100169
App'd By:	TW

Dwg. No.: **2**



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EMSL Canada Order 551507409
Customer ID: 55JACQ30L
Customer PO: 123220330.200
Project ID:

Attn: Steve Chou
Stantec Consulting, Ltd.
500 - 4730 Kingsway
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Phone: (604) 412-3004
Fax:
Collected:
Received: 7/09/2015
Analyzed: 7/16/2015
Proj: Fort Langley/123220330.200

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: MB-PS-01A **Lab Sample ID:** 551507409-0165
Sample Description: Sprinkler System Fitting in East Work Area/Yellow Pipe Sealant

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Yellow	0.0%	100%	None Detected	

Client Sample ID: MB-PS-01B **Lab Sample ID:** 551507409-0166
Sample Description: Sprinkler System Fitting in East Work Area/Yellow Pipe Sealant

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Yellow	0.0%	100%	None Detected	

Client Sample ID: MB-PS-01C **Lab Sample ID:** 551507409-0167
Sample Description: Sprinkler System Fitting in East Work Area/Yellow Pipe Sealant

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Yellow	0.0%	100%	None Detected	

Client Sample ID: MB-RS-01A **Lab Sample ID:** 551507409-0168
Sample Description: East Side of Building Roof/Black Roof Shingle

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: MB-RS-01B **Lab Sample ID:** 551507409-0169
Sample Description: East Side of Building Roof/Black Roof Shingle

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: MB-RS-01C **Lab Sample ID:** 551507409-0170
Sample Description: East Side of Building Roof/Black Roof Shingle

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: MB-FT-01 **Lab Sample ID:** 551507409-0171
Sample Description: 2nd Layer Under Sheet Flooring (MB-SF-01)/Yellow and Brown Floor Tile

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Beige	0.0%	100%	None Detected	



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 Customer ID: 55JACQ30L
 Customer PO: 123220330.200
 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: MB-SF-01 **Lab Sample ID:** 551507409-0172
Sample Description: Floor in Hallway/Beige and Grey Pebble Sheet Flooring

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Brown/Various	0.0%	100%	None Detected	

Client Sample ID: MB-WFC-01A **Lab Sample ID:** 551507409-0173
Sample Description: Window in West Side of Garage/White Exterior Window Frame Caulking

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Yellow	0.0%	100%	None Detected	

Client Sample ID: MB-WFC-01B **Lab Sample ID:** 551507409-0174
Sample Description: Window in West Side of Garage/White Exterior Window Frame Caulking

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Yellow	0.0%	100%	None Detected	

Client Sample ID: MB-WFC-01C **Lab Sample ID:** 551507409-0175
Sample Description: Window in West Side of Garage/White Exterior Window Frame Caulking

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Yellow	0.0%	100%	None Detected	

Client Sample ID: MB_WPC-01A **Lab Sample ID:** 551507409-0176
Sample Description: Window in South East Office Between Glass and Fram/Black Window Pane Caulking

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	93.0%	7.0% Chrysotile	

Client Sample ID: MB_WPC-01B **Lab Sample ID:** 551507409-0177
Sample Description: Window in Lunch Room Between Glass and Frame/Black Window Pane Caulking

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015					Positive Stop (Not Analyzed)

Client Sample ID: MB_WPC-01C **Lab Sample ID:** 551507409-0178
Sample Description: Window in Lunch Room Between Glass and Frame/Black Window Pane Caulking

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015					Positive Stop (Not Analyzed)

Client Sample ID: MB-DJC-01A **Lab Sample ID:** 551507409-0179
Sample Description: Washroom on East Wall/Drywall Joint Compound

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	



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Customer ID: 55JACQ30L
Customer PO: 123220330.200
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: MB-DJC-01B **Lab Sample ID:** 551507409-0180
Sample Description: Storage Room on East Wall/Drywall Joint Compound

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	

Client Sample ID: MB-DJC-01C **Lab Sample ID:** 551507409-0181
Sample Description: West Work Area on East Wall/Drywall Joint Compound

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	

Client Sample ID: MB-DJC-01D **Lab Sample ID:** 551507409-0184
Sample Description:

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	

Client Sample ID: MB-DJC-01E **Lab Sample ID:** 551507409-0185
Sample Description:

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	

Analyst(s):

Jon Delos Santos PLM (3)
Nicole Dimou PLM Grav. Reduction (9)
Romeo Samson PLM (2)
PLM Grav. Reduction (3)

Reviewed and approved by:

Matthew Davis
or Other Approved Signatory

None Detected = <0.5%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted. This report must not be used to claim product endorsement by NVLAP of any agency of the U.S. Government.

Samples analyzed by EMSL Canada Inc. Mississauga, ON NVLAP Lab Code 200877-0

Initial report from: 07/16/2015 21:42:13



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Phone: (604) 412-3004
Fax:
Received: 07/09/15 11:35 AM
Collected:

Project: 123220330.200.100

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client Sample Description	Lab ID	Collected	Analyzed	Lead Concentration
MB-P-01	551507426-0036 Site: EXTERIOR SIDING Desc: YELLOW		7/15/2015	1100 ppm
MB-P-02	551507426-0037 Site: EXTERIOR TRIM Desc: WHITE		7/15/2015	480 ppm
MB-P-03	551507426-0038 Site: DOWNSPOUTS Desc: BROWN Insufficient sample to reach reporting limit.		7/15/2015	<220 ppm
MB-P-04	551507426-0039 Site: INTERIOR WALL Desc: YELLOW		7/15/2015	880 ppm
MB-P-05	551507426-0040 Site: INTERIOR TRIM Desc: BROWN		7/15/2015	1300 ppm
MB-P-06	551507426-0041 Site: INTERIOR WALL Desc: PINK		7/15/2015	590 ppm
MB-P-07	551507426-0042 Site: INTERIOR TRIM Desc: WHITE		7/15/2015	<90 ppm
MB-P-08	551507426-0043 Site: EXTERIOR MAIN GATES Desc: YELLOW		7/15/2015	170000 ppm

Lisa Podzyhun
or other approved signatory

*Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.010 % wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities. Samples received in good condition unless otherwise noted. "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements established by the AIHA-LAP, unless specifically indicated otherwise.

Samples analyzed by EMSL Canada Inc. Mississauga, ON A2LA Accredited Environmental Testing Cert #2845.08

Initial report from 07/15/2015 17:50:45

APPENDIX L
FINDINGS AND RECOMMENDATIONS—
OPERATIONS BUILDING

L-4.0 FINDINGS—OPERATIONS BUILDING

The Operations Building was reportedly constructed in 1998. It is a two storey plus full basement wood frame structure with drywall, sheet flooring, and carpet interior finishes.

The results of the assessment for each of the considered hazardous materials within the building are provided in the following sub-sections.

Floor plan drawings, which include locations of the samples collected during this assessment and locations of identified hazardous building materials (where practical), are attached to this Appendix.

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

- Roof (no safe access to the roof to assess for or sample suspected asbestos-containing penetration sealants)

As such, limited comments, if any, will be provided regarding the presence, quantity or condition of hazardous building materials within the above-noted areas.

L-4.1 Asbestos

Although ACMs are unlikely to be present based on the reported construction date of the building, as a measure of diligence, Stantec sampled the following materials that have been historically known to contain asbestos:

- Sheet flooring
- Textured flooring
- Mastic
- Drywall joint compound

Thirteen samples of the above-noted suspected ACMs were collected and submitted to EMSL for analysis of asbestos content and nature.

A summary of the sample type, location and analytical result is presented in Table L-4.1.1, below. A copy of the certificate of analysis provided by EMSL for the suspected ACM sample submitted is attached at the end of this Appendix.

**Table L-4.1.1 Suspected ACM Sample Collection and Analysis Summary
 Operations Building, Fort Langley National Historic Site, BC**

Sample Number	Material Description	Sample Location	Result (%/type asbestos)
OB-SF-01	Black sheet flooring	Main floor in south hallway	None detected
OB-SF-02	Blue smeared sheet flooring	Basement in south hallway	None detected
OB-TF-01A	Black textured flooring (bitumen gravel shingle)	Exterior ramp on west side of building	None detected
OB-TF-01B	Black textured flooring (bitumen gravel shingle)	Exterior ramp on west side of building	None detected
OB-TF-01C	Black textured flooring (bitumen gravel shingle)	Exterior ramp on west side of building	None detected
OB-DM-01A	Grey duct mastic	HVAC ducting in basement mechanical room	None detected
OB-DM-01B	Grey duct mastic	HVAC ducting in basement mechanical room	None detected
OB-DM-01C	Grey duct mastic	HVAC ducting in basement mechanical room	None detected
OB-DJC-01A	Drywall joint compound	Storage room in basement on south east wall	None detected
OB-DJC-01B	Drywall joint compound	Mechanical room in basement on south east wall	None detected
OB-DJC-01C	Drywall joint compound	Janitor room in basement on south east wall	None detected
OB-DJC-01D	Drywall joint compound	Kitchen in first floor on west wall	None detected
OB-DJC-01E	Drywall joint compound	2nd floor, office south of boardroom on west wall	None detected

Based on our observations of building construction (estimated vintage of interior finishes and uniformity of building material use) and on our interpretations of suspected ACM sample analytical results, no ACMs were identified.

L-4.2 Lead

Lead is expected to be present in the following:

- Solder used in bell fittings for cast iron pipes
- Solder used in electrical equipment
- Vent and pipe flashings

With respect to paint, four paint chip sample was obtained from the predominant suspected LCP applications within the building. A summary of the sample types, locations and analytical results is presented in Table L-4.2.1, below. A copy of the certificate of analysis provided by EMSL for the suspected LCP samples submitted is attached to this Appendix.

**Table L-4.2.1 Suspected LCP Sample Collection and Analysis Summary
Operations Building, Fort Langley National Historic Site, BC**

Sample No.	Sample Colour	Sample Location	Lab Result (ppm)	Lead Containing (Yes/No)
OB-P-01	Beige	Basement walls	<90	No
OB-P-02	Blue	Stairwell	<91	No
OB-P-03	Green	Kitchen	<99	No
OB-P-04	Grey	Interior second floor	<160	No

Based on our observations and on our interpretations of suspected LCP sample analytical results, no LCPs were identified.

L-4.3 Polychlorinated Biphenyls

The 85 fluorescent light fixture was observed to have high-efficiency light tubes. The ballasts within such fixtures are not suspected to contain PCBs.

L-4.4 Mercury

Mercury vapour is expected to be present in fluorescent light bulbs/tubes observed in 85 fluorescent light fixture.

Mercury may also be present in paints and adhesives.

L-4.5 Mould

No mould or moisture damage was observed during the assessment.

L-4.6 Ozone-Depleting Substances

No suspected ODS-containing equipment was observed.

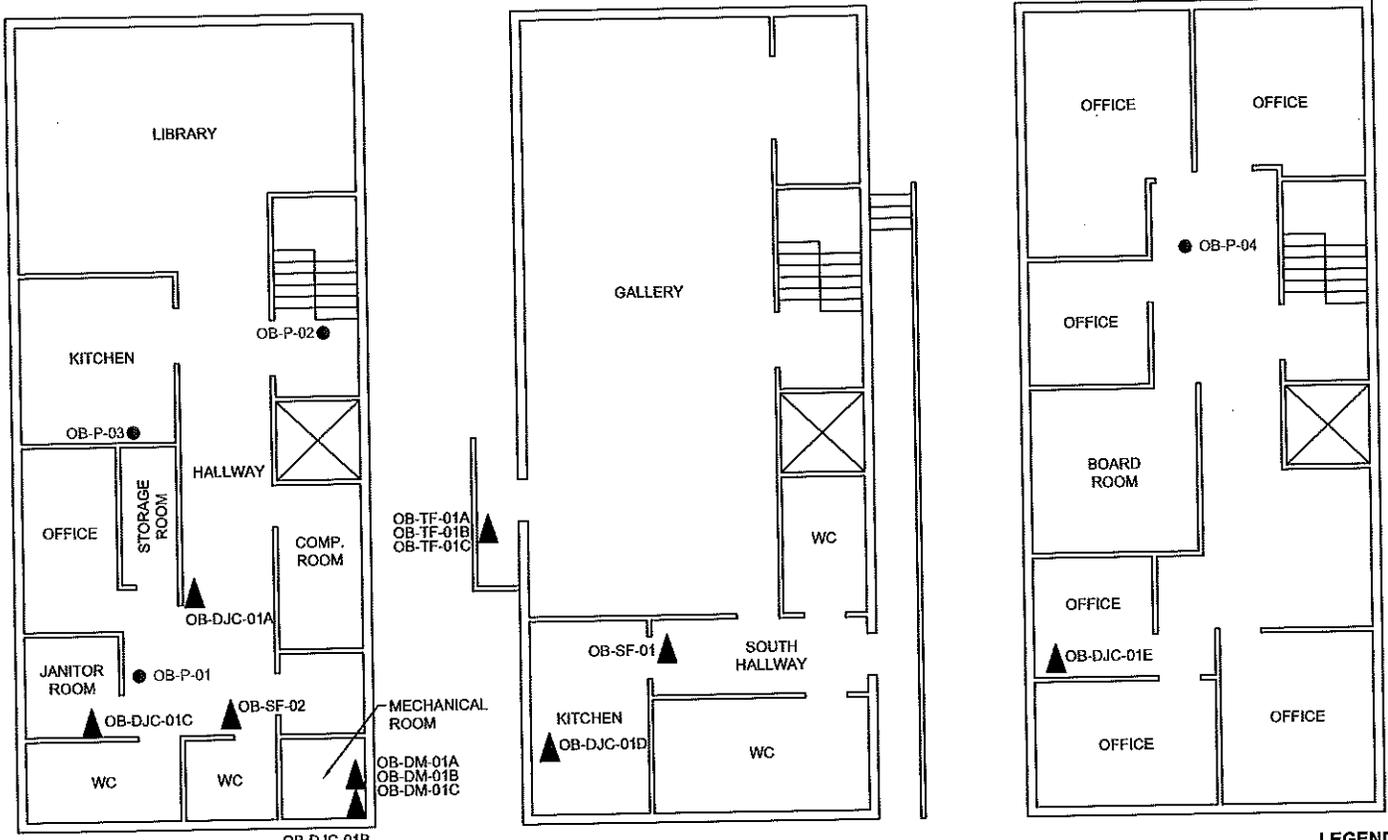
L-4.7 Silica

Silica is presumed to be present in the concrete foundation of the subject building.

L-5.0 RECOMMENDATIONS—OPERATIONS BUILDING

In general, identified hazardous building materials were observed to be in good condition and do not appear to require specific action to maintain compliance with applicable regulations for continued operations and maintenance. Refer to Section 5.0 of the main body of this report for applicable material-by-material general recommendations.

Stantec Consulting Ltd. 2009



BASEMENT

MAIN FLOOR

SECOND FLOOR

OPERATIONS BUILDING (OP)

LEGEND
 ▲ BULK SAMPLE LOCATION
 ● PAINT CHIP SAMPLE LOCATION

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

FLOOR PLAN SHOWING HAZARDOUS BUILDING MATERIALS AND BULK SAMPLE LOCATIONS
 FORT LANGLEY NATIONAL HISTORIC SITE OF CANADA, FORT LANGLEY
 23433 MAVIS AVENUE, FORT LANGLEY, BC

Client: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

Project No.: 123220330.200
Scale: N.T.S.
Date: 15/07/09
Dwn. By: CD PK SL2015070060
App'd By: TW

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7





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Phone: (604) 412-3004
 Fax:
 Collected:
 Received: 7/09/2015
 Analyzed: 7/16/2015

Proj: Fort Langley/123220330.200

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: OB-SF-01 *Lab Sample ID:* 551507409-0043

Sample Description: Main Floor in South Hallway/Black Sheet Flooring

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: OB-SF-02 *Lab Sample ID:* 551507409-0044

Sample Description: Basement in South Hallway/Blue Smearred Shet Flooring

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Yellow	0.0%	100%	None Detected	

Client Sample ID: OB-TF-01A *Lab Sample ID:* 551507409-0045

Sample Description: Exterior Ramp on West Side of Building/Black Textured Flooring (Bitument Gravel Shingle)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: OB-TF-01B *Lab Sample ID:* 551507409-0046

Sample Description: Exterior Ramp on West Side of Building/Black Textured Flooring (Bitument Gravel Shingle)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: OB-TF-01C *Lab Sample ID:* 551507409-0047

Sample Description: Exterior Ramp on West Side of Building/Black Textured Flooring (Bitument Gravel Shingle)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: OB-DM-01A *Lab Sample ID:* 551507409-0048

Sample Description: HVAC Ducting in Basement Mechanical Room/Grey Duct Mastic

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Gray	0.0%	100%	None Detected	

Client Sample ID: OB-DM-01B *Lab Sample ID:* 551507409-0049

Sample Description: HVAC Ducting in Basement Mechanical Room/Grey Duct Mastic

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	Gray	0%	100%	None Detected	



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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: OB-DM-01C **Lab Sample ID:** 551507409-0050
Sample Description: HVAC Ducting in Basement Mechanical Room/Grey Duct Mastic

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Gray	0.0%	100%	None Detected	

Client Sample ID: OB-DJC-01A **Lab Sample ID:** 551507409-0051
Sample Description: Storage Room in Basement on South East Wall/Drywall Joint Compound

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	

Client Sample ID: OB-DJC-01B **Lab Sample ID:** 551507409-0052
Sample Description: Mechanical Room in Basement on South East Wall/Drywall Joint Compound

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	

Client Sample ID: OB-DJC-01C **Lab Sample ID:** 551507409-0053
Sample Description: Janitor Room in Basement on South East Wall/Drywall Joint Compound

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	

Client Sample ID: OB-DJC-01D **Lab Sample ID:** 551507409-0054
Sample Description: Kitchen in First Floor on West Wall/Drywall Joint Compound

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	

Client Sample ID: OB-DJC-01E **Lab Sample ID:** 551507409-0055
Sample Description: 2nd Floor, Office South of Boardroom on West Wall/Drywall Joint Compound

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	



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Customer ID: 55JACQ30L
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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):

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Matthew Davis PLM Grav. Reduction (2)
Nicole Dimou PLM (1)
PLM Grav. Reduction (5)
Romeo Samson PLM (3)

Reviewed and approved by:

Matthew Davis
or Other Approved Signatory

None Detected = <0.5%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted. This report must not be used to claim product endorsement by NVLAP of any agency of the U.S. Government.

Samples analyzed by EMSL Canada Inc. Mississauga, ON NVLAP Lab Code 200877-0

Initial report from: 07/16/2015 21:42:13



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CustomerPO: 123220330
ProjectID:

Attn: **Steve Chou**
Stantec Consulting, Ltd.
500 - 4730 Kingsway
Burnaby, BC V5H 0C6

Phone: (604) 412-3004
Fax:
Received: 07/09/15 11:35 AM
Collected:

Project: 123220330.200.100

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

<i>Client Sample Description</i>	<i>Lab ID</i>	<i>Collected</i>	<i>Analyzed</i>	<i>Lead Concentration</i>
OB-P-01 Site: BASE WALLS Desc: BEIGE	551507426-0007		7/15/2015	<90 ppm
OB-P-02 Site: STAIRWELL Desc: BLUE	551507426-0008		7/15/2015	<91 ppm
OB-P-03 Site: KITCHEN Desc: GREEN	551507426-0009		7/15/2015	<99 ppm
OB-P-04 Site: INTERIOR SECOND FLOOR Desc: GREY	551507426-0010		7/15/2015	<160 ppm

Insufficient sample to reach reporting limit for sample#551507426-0008/-0009/-0010.

Lisa Podzyhun
or other approved signatory

*Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.010 % wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities. Samples received in good condition unless otherwise noted. "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements established by the AIHA-LAP, unless specifically indicated otherwise.

Samples analyzed by EMSL Canada Inc. Mississauga, ON A2LA Accredited Environmental Testing Cert #2845.08

Initial report from 07/15/2015 17:34:01

APPENDIX M
FINDINGS AND RECOMMENDATIONS—
FIVE O'TENTIKS

M-4.0 FINDINGS—FIVE O'TENTIKS

The following O'Tentiks were reportedly constructed in 2014. Each consists of a wood frame and suspended vinyl structure named and number as follows:

- O'Tentik #1—First Nation
- O'Tentik #2—Aloha
- O'Tentik #3—Chez Louis
- O'Tentik #4—What Cheer House
- O'Tentik #5—Stromness

The results of the assessment for each of the considered hazardous materials within the building are provided in the following sub-sections.

M-4.1 Asbestos

Suspect ACMs were not observed.

M-4.2 Lead

Suspect lead and LCP applications were not observed.

M-4.3 Polychlorinated Biphenyls

No suspected PCB-containing electrical equipment was observed.

M-4.4 Mercury

Mercury-containing equipment and/or items were not observed.

M-4.5 Mould

Suspect mould or moisture-impacted building materials were not observed at the time of the assessment.

M-4.6 Ozone-Depleting Substances

No suspected ODS-containing equipment was observed.

M-4.7 Silica

No silica-containing materials were observed.

M-5.0 RECOMMENDATIONS—FIVE O'TENTIKS

As no hazardous materials were identified no recommendations have been developed.

APPENDIX N
FINDINGS AND RECOMMENDATIONS—
PHOTO KIOSK

N-4.0 FINDINGS—PHOTO KIOSK

The Photo Kiosk was reportedly constructed in 2011. It is an open air wood frame structure.

The results of the assessment for each of the considered hazardous materials within the building are provided in the following sub-sections.

Floor plan drawings, which include locations of the samples collected during this assessment and locations of identified hazardous building materials (where practical), are attached to this Appendix.

N-4.1 Asbestos

Although ACMs are unlikely to be present based on the reported construction date of the building, as a measure of diligence, Stantec sampled the following materials that have been historically known to contain asbestos:

- Roofing paper

Three samples of the above-noted suspected ACMs were collected and submitted to EMSL for analysis of asbestos content and nature.

A summary of the sample types, locations and analytical results is presented in Table N-4.1.1, below. A copy of the certificate of analysis provided by EMSL for the suspected ACM samples submitted is attached at the end of this Appendix.

Table N-4.1.1 Suspected ACM Sample Collection and Analysis Summary
Photo Kiosk, Fort Langley National Historic Site, BC

Sample Number	Material Description	Sample Location	Result (%/type asbestos)
PK-RP-01A	Black roofing paper	Roof paper under wood shingle	None detected
PK-RP-01B	Black roofing paper	Roof paper under wood shingle	None detected
PK-RP-01C	Black roofing paper	Roof paper under wood shingle	None detected

Based on our observations of building construction (estimated vintage of interior finishes and uniformity of building material use) and on our interpretations of suspected ACM sample analytical results, no ACMs were identified.

N-4.2 Lead

No suspected lead-containing items or suspected LCP applications were observed.

N-4.3 Polychlorinated Biphenyls

No suspected PCB-containing electrical equipment was observed.

N-4.4 Mercury

No suspected mercury-containing equipment and/or items were observed.

N-4.5 Mould

No mould or moisture damage was observed during the assessment.

N-4.6 Ozone-Depleting Substances

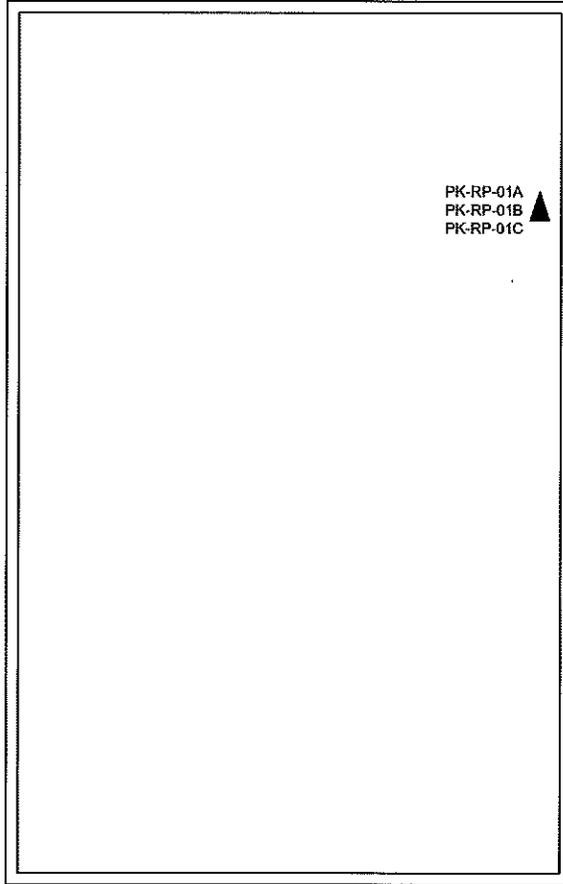
No suspected ODS-containing equipment was observed.

N-4.7 Silica

Silica is presumed to be present in the concrete foundation of the subject building.

N-5.0 RECOMMENDATIONS—PHOTO KIOSK

In general, identified hazardous building materials were observed to be in good condition and do not appear to require specific action to maintain compliance with applicable regulations for continued operations and maintenance. Refer to Section 5.0 of the main body of this report for applicable material-by-material general recommendations.



PK-RP-01A ▲
PK-RP-01B ▲
PK-RP-01C ▲

PHOTO KIOSK (PK)

LEGEND

▲ BULK SAMPLE LOCATION

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

**FLOOR PLAN SHOWING HAZARDOUS BUILDING MATERIALS
AND BULK SAMPLE LOCATIONS**

FORT LANGLEY NATIONAL HISTORIC SITE OF CANADA, FORT LANGLEY
23433 MAVIS AVENUE, FORT LANGLEY, BC

Client: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

Project No.: 123220330.200

Scale: N.T.S.

Date: 15/07/09

Dwn. By: CD DM SL2015070073

App'd By: TW

Dwg. No.:

20





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EMSL Canada Order 551507409
Customer ID: 55JACQ30L
Customer PO: 123220330.200
Project ID:

Attn: Steve Chou
Stantec Consulting, Ltd.
500 - 4730 Kingsway
Burnaby, BC V5H 0C6
Phone: (604) 412-3004
Fax:
Collected:
Received: 7/09/2015
Analyzed: 7/16/2015
Proj: Fort Langley/123220330.200

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: PK-RP-01A **Lab Sample ID:** 551507409-0095
Sample Description: Roof Paper Under Wood Shingle/Black Roofing Paper

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: PK-RP-01B **Lab Sample ID:** 551507409-0096
Sample Description: Roof Paper Under Wood Shingle/Black Roofing Paper

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: PK-RP-01C **Lab Sample ID:** 551507409-0097
Sample Description: Roof Paper Under Wood Shingle/Black Roofing Paper

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Analyst(s):

Matthew Davis PLM Grav. Reduction (1)
Nicole Dimou PLM Grav. Reduction (2)

Reviewed and approved by:

Matthew Davis
or Other Approved Signatory

None Detected = <0.5%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted. This report must not be used to claim product endorsement by NVLAP of any agency of the U.S. Government.

Samples analyzed by EMSL Canada Inc. Mississauga, ON NVLAP Lab Code 200877-0

Initial report from: 07/16/2015 21:42:13

APPENDIX O
FINDINGS AND RECOMMENDATIONS—
PICNIC SHELTER

O-4.0 FINDINGS—PICNIC SHELTER

The Picnic Shelter was reportedly constructed in 1999. It is an open air wood frame structure.

The results of the assessment for each of the considered hazardous materials within the building are provided in the following sub-sections.

Floor plan drawings, which include locations of the samples collected during this assessment and locations of identified hazardous building materials (where practical), are attached to this Appendix.

O-4.1 Asbestos

Although ACMs are unlikely to be present based on the reported construction date of the building, as a measure of diligence, Stantec sampled the following materials that have been historically known to contain asbestos:

- Putty
- Roofing shingle

Six samples of the above-noted suspected ACMs were collected and submitted to EMSL for analysis of asbestos content and nature.

A summary of the sample types, locations and analytical results is presented in Table O-4.1.1, below. A copy of the certificate of analysis provided by EMSL for the suspected ACM samples submitted is attached at the end of this Appendix.

**Table O-4.1.1 Suspected ACM Sample Collection and Analysis Summary
Picnic Shelter, Fort Langley National Historic Site , BC**

Sample Number	Material Description	Sample Location	Result (%/type asbestos)
PS-ECP-01A	Black electrical conduit putty	Covering electrical conduit on north east wood post	None detected
PS-ECP-01B	Black electrical conduit putty	Covering electrical conduit on north east wood post	None detected
PS-ECP-01C	Black electrical conduit putty	Covering electrical conduit on north east wood post	None detected
PS-RS-01A	Black roof shingle	South west side of building roof	None detected
PS-RS-01B	Black roof shingle	South west side of building roof	None detected
PS-RS-01C	Black roof shingle	South west side of building roof	None detected

Based on our observations of building construction (estimated vintage of interior finishes and uniformity of building material use) and on our interpretations of suspected ACM sample analytical results, no ACMs were identified.

O-4.2 Lead

Suspected lead-containing items (other than paint) were not observed.

With respect to paint, one paint chip sample was obtained from the predominant suspected LCP application within the building. A summary of the sample type, location and analytical result is presented in Table O-4.2.1, below. A copy of the certificate of analysis provided by EMSL for the suspected LCP sample submitted is attached to this Appendix.

**Table O-4.2.1 Suspected LCP Sample Collection and Analysis Summary
Picnic Shelter, Fort Langley National Historic Site , BC**

Sample No.	Sample Colour	Sample Location	Lab Result (ppm)	Lead Containing (Yes/No)
PS-P-01	Brown	Downspout	<300	No

Based on our observations and on our interpretations of suspected LCP sample analytical results, no LCPs were identified.

O-4.3 Polychlorinated Biphenyls

No suspected PCB-containing equipment was observed.

O-4.4 Mercury

No suspected mercury-containing equipment and/or items were observed.

Mercury may also be present in paints and adhesives.

O-4.5 Mould

No mould or moisture damage was observed during the assessment.

O-4.6 Ozone-Depleting Substances

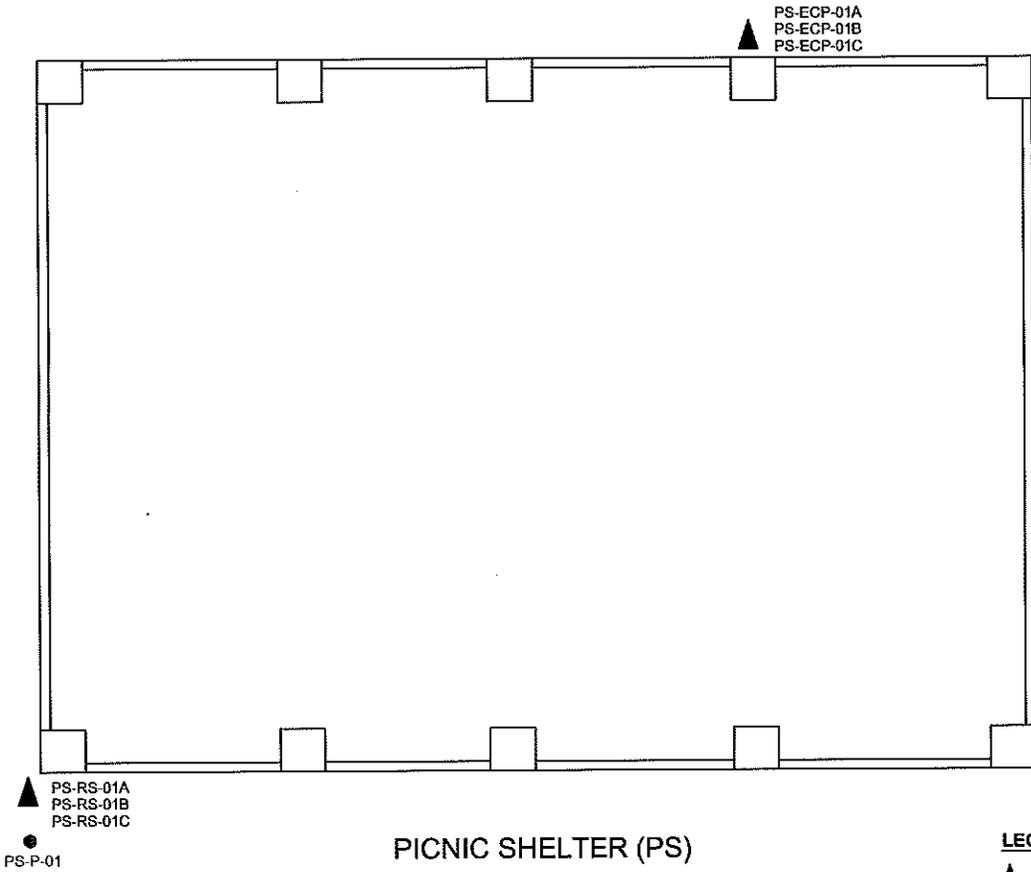
No suspected ODS-containing equipment was observed.

O-4.7 Silica

Silica is presumed to be present in the concrete foundation of the subject building.

O-5.0 RECOMMENDATIONS—PICNIC SHELTER

In general, identified hazardous building materials were observed to be in good condition and do not appear to require specific action to maintain compliance with applicable regulations for continued operations and maintenance. Refer to Section 5.0 of the main body of this report for applicable material-by-material general recommendations.



LEGEND

- ▲ BULK SAMPLE LOCATION
- PAINT CHIP SAMPLE LOCATION

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

FLOOR PLAN SHOWING HAZARDOUS BUILDING MATERIALS AND BULK SAMPLE LOCATIONS FORT LANGLEY NATIONAL HISTORIC SITE OF CANADA, FORT LANGLEY 23433 MAVIS AVENUE, FORT LANGLEY, BC	Project No.: 123220330.200	Dwg. No.:	8
	Scale: N.T.S.		
	Date: 15/07/09		
	Dwn. By: CD VM SL2015070061		
Client: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA	App'd By: TW		



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EMSL Canada Order 551507409
Customer ID: 55JACQ30L
Customer PO: 123220330.200
Project ID:

Attn: Steve Chou
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Phone: (604) 412-3004
Fax:
Collected:
Received: 7/09/2015
Analyzed: 7/16/2015

Proj: Fort Langley/123220330.200

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: PS-ECP-01A **Lab Sample ID:** 551507409-0122
Sample Description: Covering Electrical Conduit on Northeast Wood Post/Black Electrical Conduit Putty

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: PS-ECP-01B **Lab Sample ID:** 551507409-0123
Sample Description: Covering Electrical Conduit on Northeast Wood Post/Black Electrical Conduit Putty

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: PS-ECP-01C **Lab Sample ID:** 551507409-0124
Sample Description: Covering Electrical Conduit on Northeast Wood Post/Black Electrical Conduit Putty

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: PS-RS-01A **Lab Sample ID:** 551507409-0125
Sample Description: South West Side of Building Roof/Black Roof Shingle

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: PS-RS-01B **Lab Sample ID:** 551507409-0126
Sample Description: South West Side of Building Roof/Black Roof Shingle

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: PS-RS-01C **Lab Sample ID:** 551507409-0127
Sample Description: South West Side of Building Roof/Black Roof Shingle

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	



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EMSL Canada Order 551507409
Customer ID: 55JACQ30L
Customer PO: 123220330.200
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):

Nicole Dimou PLM Grav. Reduction (4)
Romeo Samson PLM Grav. Reduction (2)

Reviewed and approved by:

Matthew Davis
or Other Approved Signatory

None Detected = <0.5%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted. This report must not be used to claim product endorsement by NVLAP of any agency of the U.S. Government.

Samples analyzed by EMSL Canada Inc. Mississauga, ON NVLAP Lab Code 200877-0

Initial report from: 07/16/2015 21:42:13



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EMSL Canada Or 551507426
CustomerID: 55JACQ30L
CustomerPO: 123220330
ProjectID:

Attn: **Steve Chou**
Stantec Consulting, Ltd.
500 - 4730 Kingsway
Burnaby, BC V5H 0C6

Phone: (604) 412-3004
Fax:
Received: 07/09/15 11:35 AM
Collected:

Project: 123220330.200.100

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

<i>Client Sample Description</i>	<i>Lab ID</i>	<i>Collected</i>	<i>Analyzed</i>	<i>Lead Concentration</i>
PS-P-01	551507426-0019		7/15/2015	<300 ppm
	Site: DOWNSPOUT Desc: BROWN Insufficient sample to reach reporting limit.			

Lisa Podzyhun
or other approved signatory

*Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.010 % wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities. Samples received in good condition unless otherwise noted. "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements established by the AIHA-LAP, unless specifically indicated otherwise.

Samples analyzed by EMSL Canada Inc. Mississauga, ON A2LA Accredited Environmental Testing Cert #2845.08

Initial report from 07/15/2015 17:40:19

APPENDIX P
FINDINGS AND RECOMMENDATIONS—
PLAY HOUSE

P-4.0 FINDINGS—PLAY HOUSE

The Play House was reportedly constructed in 2009. It is an open air wood frame structure.

The results of the assessment for each of the considered hazardous materials within the building are provided in the following sub-sections.

P-4.1 Asbestos

Suspect ACMs were not observed.

P-4.2 Lead

Suspect lead and LCP applications were not observed.

P-4.3 Polychlorinated Biphenyls

No PCB-containing electrical equipment was observed.

P-4.4 Mercury

No suspected mercury-containing equipment was observed.

P-4.5 Mould

No mould or moisture damage was observed during the assessment.

P-4.6 Ozone-Depleting Substances

No suspected ODS-containing equipment was observed.

P-4.7 Silica

Silica is presumed to be present in the concrete foundation of the subject building.

P-5.0 RECOMMENDATIONS—PLAY HOUSE

In general, identified hazardous building materials were observed to be in good condition and do not appear to require specific action to maintain compliance with applicable regulations for continued operations and maintenance. Refer to Section 5.0 of the main body of this report for applicable material-by-material general recommendations.

APPENDIX Q
FINDINGS AND RECOMMENDATIONS—
SERVANT'S QUARTERS

Q-4.0 FINDINGS—SERVANT'S QUARTERS

The Servant's Quarter was reportedly constructed in 1958. It is a single storey plus loft wood frame structure with varnished wood interior finishes.

The results of the assessment for each of the considered hazardous materials within the building are provided in the following sub-sections.

Floor plan drawings, which include locations of the samples collected during this assessment and locations of identified hazardous building materials (where practical), are attached to this Appendix.

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

- Roof (no safe access to upper portion of peaked roof to assess for or sample suspected asbestos-containing penetration sealants)

As such, limited comments, if any, will be provided regarding the presence, quantity or condition of hazardous building materials within the above-noted areas.

Q-4.1 Asbestos

Stantec identified and sampled the following suspected ACMs:

- Caulking
- Plaster
- Textured flooring

Nine samples of the above-noted suspected ACMs were collected and submitted to EMSL for analysis of asbestos content and nature.

A summary of the sample types, locations and analytical results is presented in Table Q-4.1.1, below. A copy of the certificate of analysis provided by EMSL for the suspected ACM samples submitted is attached at the end of this Appendix.

Hazardous Building Materials Assessments

24 Buildings/Structures at the Fort Langley National Historic Site, BC

Appendix Q: Findings and Recommendations – Servant's Quarters

**Table Q-4.1.1 Suspected ACM Sample Collection and Analysis Summary
Servant's Quarter, Fort Langley National Historic Site, BC**

Sample Number	Material Description	Sample Location	Result (%/type asbestos)
SQ-WPC-01A	Grey window pane caulking	Central east exterior window	None detected
SQ-WPC-01B	Grey window pane caulking	North east exterior window	None detected
SQ-WPC-01C	Grey window pane caulking	South west exterior window	None detected
SQ-TF-01A	Black textured flooring (bitumen gravel shingle)	Exterior ramp on south side of building	None detected
SQ-TF-01B	Black textured flooring (bitumen gravel shingle)	Exterior ramp on south side of building	None detected
SQ-TF-01C	Black textured flooring (bitumen gravel shingle)	Exterior ramp on south side of building	None detected
SQ-CP-01A	White chimney plaster	Exterior coating on fireplace	None detected
SQ-CP-01B	White chimney plaster	Exterior coating on fireplace	None detected
SQ-CP-01C	White chimney plaster	Exterior coating on fireplace	None detected

Based on our observations of building construction (estimated vintage of interior finishes and uniformity of building material use) and on our interpretations of suspected ACM sample analytical results, no ACMs were identified.

Q-4.2 Lead

Lead is expected to be present in the following:

- Older electrical wiring materials and sheathing
- Solder used on domestic water lines
- Solder used in bell fittings for cast iron pipes
- Solder used in electrical equipment

With respect to paint, two paint chip samples were obtained from the predominant suspected LCP applications within the building. A summary of the sample types, locations and analytical results is presented in Table Q-4.2.1, below. A copy of the certificate of analysis provided by EMSL for the suspected LCP samples submitted is attached to this Appendix.

**Table Q-4.2.1 Suspected LCP Sample Collection and Analysis Summary
 Servant's Quarter, Fort Langley National Historic Site, BC**

Sample No.	Sample Colour	Sample Location	Lab Result (ppm)	Lead Containing (Yes/No)
SQ-P-01	White	Interior	<90	No
SQ-P-02	Black	Interior	<120	No

Based on our observations and on our interpretations of suspected LCP sample analytical results, no LCPs were identified.

Q-4.3 Polychlorinated Biphenyls

No suspected PCB-containing equipment was observed.

Q-4.4 Mercury

Suspected mercury-containing equipment and/or items were not observed.

Mercury may also be present in paints and adhesives.

Q-4.5 Mould

No mould or moisture damage was observed during the assessment.

Q-4.6 Ozone-Depleting Substances

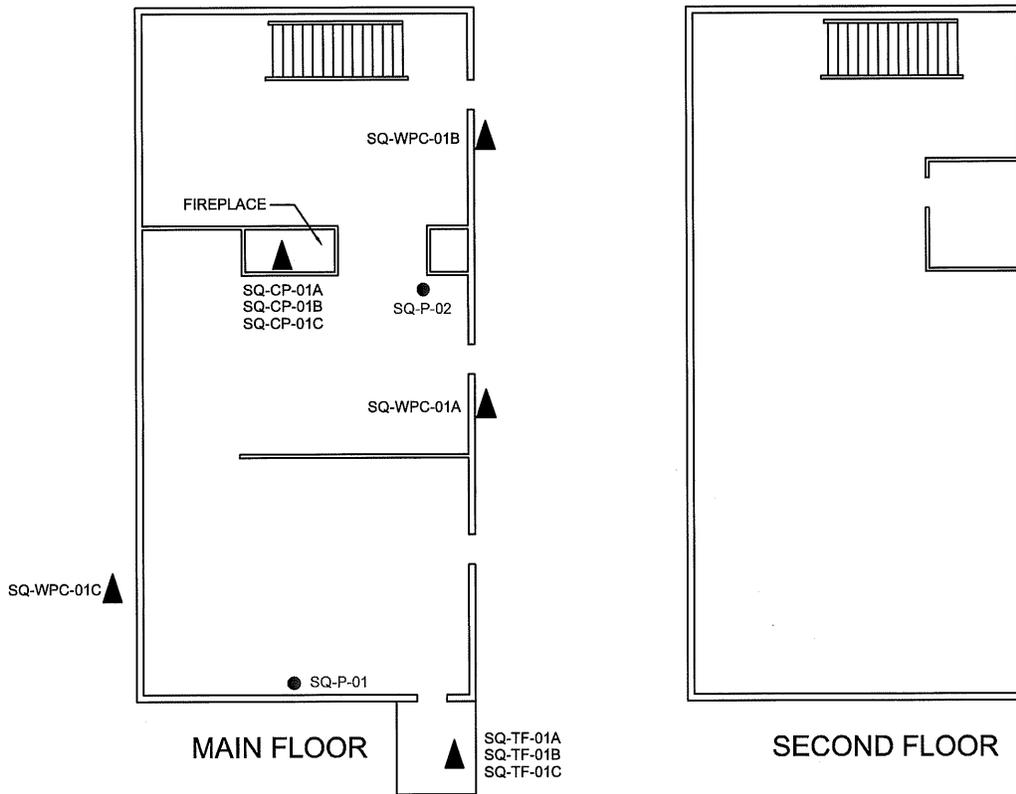
No suspected ODS-containing equipment was observed.

Q-4.7 Silica

Silica is presumed to be present in the concrete foundation and brick mortar of the subject building.

Q-5.0 RECOMMENDATIONS—SERVANT'S QUARTERS

In general, identified hazardous building materials were observed to be in good condition and do not appear to require specific action to maintain compliance with applicable regulations for continued operations and maintenance. Refer to Section 5.0 of the main body of this report for applicable material-by-material general recommendations.



SERVANT QUARTERS (SQ)

LEGEND

- ▲ BULK SAMPLE LOCATION
- PAINT CHIP SAMPLE LOCATION

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

<p>FLOOR PLAN SHOWING HAZARDOUS BUILDING MATERIALS AND BULK SAMPLE LOCATIONS</p> <p>FORT LANGLEY NATIONAL HISTORIC SITE OF CANADA, FORT LANGLEY 23433 MAVIS AVENUE, FORT LANGLEY, BC</p>	Project No.: 123220330.200	Dwg. No.:	<p style="font-size: 2em; font-weight: bold;">9</p>
	Scale: N.T.S.	Date: 15/07/09	
Client: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA	Dwn. By: CD VM SL2015070062	App'd By: TW	



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EMSL Canada Order 551507409
Customer ID: 55JACQ30L
Customer PO: 123220330.200
Project ID:

Attn: Steve Chou
Stantec Consulting, Ltd.
500 - 4730 Kingsway
Burnaby, BC V5H 0C6
Phone: (604) 412-3004
Fax:
Collected:
Received: 7/09/2015
Analyzed: 7/16/2015
Proj: Fort Langley/123220330.200

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: SQ-WPC-01A **Lab Sample ID:** 551507409-0083

Sample Description: Central East Exterior Window/Grey Window Pane Caulking

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Brown/Gray	0.0%	100%	None Detected	

Client Sample ID: SQ-WPC-01B **Lab Sample ID:** 551507409-0084

Sample Description: North East Exterior Window/Grey Window Pane Caulking

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Brown/Gray	0.0%	100%	None Detected	

Client Sample ID: SQ-WPC-01C **Lab Sample ID:** 551507409-0085

Sample Description: South West Exterior Window/Grey Window Pane Caulking

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Gray	0.0%	100%	None Detected	

Client Sample ID: SQ-TF-01A **Lab Sample ID:** 551507409-0086

Sample Description: Exterior Ramp on South Side of Building/Black Textured Flooring (Bitumen Gravel Shingle)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: SQ-TF-01B **Lab Sample ID:** 551507409-0087

Sample Description: Exterior Ramp on South Side of Building/Black Textured Flooring (Bitumen Gravel Shingle)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: SQ-TF-01C **Lab Sample ID:** 551507409-0088

Sample Description: Exterior Ramp on South Side of Building/Black Textured Flooring (Bitumen Gravel Shingle)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: SQ-CP-01A **Lab Sample ID:** 551507409-0089

Sample Description: Exterior Coating on Fireplace/White Chimney Plaster

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	



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EMSL Canada Order 551507409
Customer ID: 55JACQ30L
Customer PO: 123220330.200
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: SQ-CP-01B **Lab Sample ID:** 551507409-0090

Sample Description: Exterior Coating on Fireplace/White Chimney Plaster

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	

Client Sample ID: SQ-CP-01C **Lab Sample ID:** 551507409-0091

Sample Description: Exterior Coating on Fireplace/White Chimney Plaster

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	Gray/White	0%	100%	None Detected	

Analyst(s):

- Jon Delos Santos PLM (1)
- Matthew Davis PLM Grav. Reduction (2)
- Nicole Dimou PLM Grav. Reduction (4)
- Romeo Samson PLM (2)

Reviewed and approved by:

Matthew Davis
or Other Approved Signatory

None Detected = <0.5%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted. This report must not be used to claim product endorsement by NVLAP of any agency of the U.S. Government.

Samples analyzed by EMSL Canada Inc. Mississauga, ON NVLAP Lab Code 200877-0

Initial report from: 07/16/2015 21:42:13



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500 - 4730 Kingsway
Burnaby, BC V5H 0C6

Phone: (604) 412-3004
 Fax:
 Received: 07/09/15 11:35 AM
 Collected:

Project: 123220330.200.100

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

<i>Client Sample Description</i>	<i>Lab ID</i>	<i>Collected</i>	<i>Analyzed</i>	<i>Lead Concentration</i>
SQ-P-01	551507426-0017		7/15/2015	<90 ppm
	Site: INTERIOR Desc: WHITE			
SQ-P-02	551507426-0018		7/15/2015	<120 ppm
	Site: INTERIOR Desc: BLACK Insufficient sample to reach reporting limit.			

Lisa Podzyhun
or other approved signatory

*Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.010 % wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities. Samples received in good condition unless otherwise noted. "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements established by the AIHA-LAP, unless specifically indicated otherwise.

Samples analyzed by EMSL Canada Inc. Mississauga, ON A2LA Accredited Environmental Testing Cert #2845.08

Initial report from 07/15/2015 17:38:20

APPENDIX R
FINDINGS AND RECOMMENDATIONS—
STORE HOUSE

R-4.0 FINDINGS—STORE HOUSE

The Store House was reportedly constructed in 1840. It is a single storey plus loft wood frame structure with painted wood interior finishes.

The results of the assessment for each of the considered hazardous materials within the building are provided in the following sub-sections.

Floor plan drawings, which include locations of the samples collected during this assessment and locations of identified hazardous building materials (where practical), are attached to this Appendix.

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

- Roof (lack of safe access)

As such, limited comments, if any, will be provided regarding the presence, quantity or condition of hazardous building materials within the above-noted areas.

R-4.1 Asbestos

Stantec identified and sampled the following suspected ACMs:

- Assorted caulking and sealant materials
- Fire stop
- Brick mortar
- Textured flooring

Twenty-one samples of the above-noted suspected ACMs were collected and submitted to EMSL for analysis of asbestos content and nature.

A summary of the sample types, locations and analytical results is presented in Table R-4.1.1, below. A copy of the certificate of analysis provided by EMSL for the suspected ACM samples submitted is attached at the end of this Appendix.

Hazardous Building Materials Assessments

24 Buildings/Structures at the Fort Langley National Historic Site, BC

Appendix R: Findings and Recommendations – Store House

**Table R-4.1.1 Suspected ACM Sample Collection and Analysis Summary
Store House, Fort Langley National Historic Site, BC**

Sample Number	Material Description	Sample Location	Result (%/type asbestos)
SH-WPC-01A	White window pane caulking (rubbery)	Exterior on north and south windows at the front of building	None detected
SH-WPC-01B	White window pane caulking (rubbery)	Exterior on north and south windows at the front of building	None detected
SH-WPC-01C	White window pane caulking (rubbery)	Exterior on north and south windows at the front of building	None detected
SH-WPC-02A	White window pane caulking (hard)	Exterior on central window at the front of building	None detected
SH-WPC-02B	White window pane caulking (hard)	Exterior on central window at the front of building	None detected
SH-WPC-02C	White window pane caulking (hard)	Exterior on central window at the front of building	None detected
SH-FS-01A	Brown textured fire stop	Second floor on chimney between red bricks	None detected
SH-FS-01B	Brown textured fire stop	Second floor on chimney between red bricks	None detected
SH-FS-01C	Brown textured fire stop	Second floor on chimney between red bricks	None detected
SH-FS-02A	White fire stop	Second floor on side of chimney inside duct	None detected
SH-FS-02B	White fire stop	Second floor on side of chimney inside duct	None detected
SH-FS-02C	White fire stop	Second floor on side of chimney inside duct	None detected
SH-BM-01A	Brick mortar	Second floor on chimney between red bricks	None detected
SH-BM-01B	Brick mortar	Second floor on chimney between red bricks	None detected
SH-BM-01C	Brick mortar	Second floor on chimney between red bricks	None detected
SH-ES-01A	White sealant	Applied between exterior wood siding on north side of building	None detected
SH-ES-01B	White sealant	Applied between exterior wood siding on west side of building	None detected
SH-ES-01C	White sealant	Applied between exterior wood siding on south side of building	None detected
SH-TF-01A	Black textured flooring (bitumen gravel shingle)	Exterior ramp on west side of building	None detected

**Table R-4.1.1 Suspected ACM Sample Collection and Analysis Summary
 Store House, Fort Langley National Historic Site, BC**

Sample Number	Material Description	Sample Location	Result (%/type asbestos)
SH-TF-01B	Black textured flooring (bitumen gravel shingle)	Exterior ramp on west side of building	None detected
SH-TF-01C	Black textured flooring (bitumen gravel shingle)	Exterior ramp on west side of building	None detected

Based on our observations of building construction (estimated vintage of interior finishes and uniformity of building material use) and on our interpretations of suspected ACM sample analytical results, no ACMs were identified.

R-4.2 Lead

Lead is expected to be present in the following:

- Older electrical wiring materials and sheathing
- Solder used on domestic water lines
- Solder used in bell fittings for cast iron pipes
- Solder used in electrical equipment

With respect to paint, three paint chip samples were obtained from the predominant suspected LCP applications within the building. A summary of the sample types, locations and analytical results is presented in Table R-4.2.1, below. A copy of the certificate of analysis provided by EMSL for the suspected LCP samples submitted is attached to this Appendix.

**Table R-4.2.1 Suspected LCP Sample Collection and Analysis Summary
 Store House, Fort Langley National Historic Site, BC**

Sample No.	Sample Colour	Sample Location	Lab Result (ppm)	Lead Containing (Yes/No)
SH-P-01	White	Interior	90	No
SH-P-02	Brown	Exterior trim	2,400	Yes
SH-P-03	White	Exterior	1,900	Yes

Based on our observations and on our interpretations of suspected LCP sample analytical results, the materials presented in Table R-4.2.2, below were identified as LCPs.

**Table R-4.2.2 Summary of Identified LCPs
 Store House, Fort Langley National Historic Site, BC**

Identified LCP Description	Photo
<p>Brown colored paint on the exterior trim. This paint was observed to be in good condition (not bubbling, flaking or peeling).</p>	
<p>White colored paint on the exterior. This paint was observed to be in good condition (not bubbling, flaking or peeling).</p>	

R-4.3 Polychlorinated Biphenyls

No suspected PCB-containing electrical equipment was observed.

R-4.4 Mercury

No suspected mercury-containing equipment and/or items were observed.

Mercury may also be present in paints and adhesives.

R-4.5 Mould

No mould or moisture damage was observed during the assessment.

R-4.6 Ozone-Depleting Substances

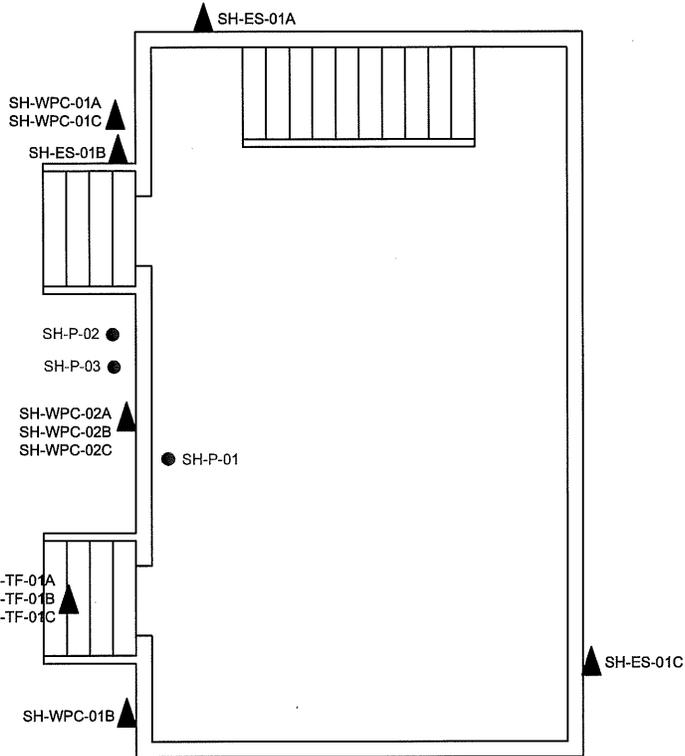
No suspected ODS-containing equipment was observed.

R-4.7 Silica

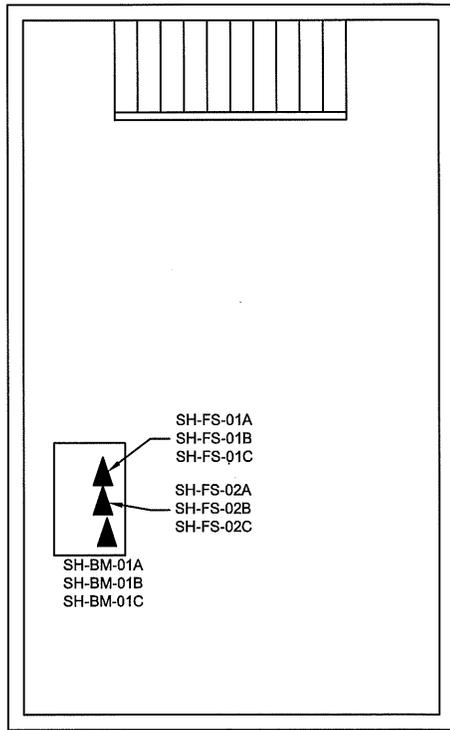
Silica is presumed to be present in the concrete foundation and brick mortar of the subject building.

R-5.0 RECOMMENDATIONS—STORE HOUSE

In general, identified hazardous building materials were observed to be in good condition and do not appear to require specific action to maintain compliance with applicable regulations for continued operations and maintenance. Refer to Section 5.0 of the main body of this report for applicable material-by-material general recommendations.



MAIN FLOOR



SECOND FLOOR

STORE HOUSE (H)

LEGEND

- ▲ BULK SAMPLE LOCATION
- PAINT CHIP SAMPLE LOCATION

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

FLOOR PLAN SHOWING HAZARDOUS BUILDING MATERIALS AND BULK SAMPLE LOCATIONS FORT LANGLEY NATIONAL HISTORIC SITE OF CANADA, FORT LANGLEY 23433 MAVIS AVENUE, FORT LANGLEY, BC	Project No.: 123220330.200	Dwg. No.:	14
	Scale: N.T.S.	Date: 15/07/09	
Client: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA	Dwn. By: CD DM SL2015070067	App'd By: TW	



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Customer ID: 55JACQ30L
Customer PO: 123220330.200
Project ID:

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Fax:
Collected:
Received: 7/09/2015
Analyzed: 7/16/2015
Proj: Fort Langley/123220330.200

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: SH-WPC-01A **Lab Sample ID:** 551507409-0098
Sample Description: Exterior North + South Window at Front of Building/White Window Pane Caulking (Rubbery)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Brown/White	0.0%	100%	None Detected	

Client Sample ID: SH-WPC-01B **Lab Sample ID:** 551507409-0099
Sample Description: Exterior North + South Window at Front of Building/White Window Pane Caulking (Rubbery)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Brown/White	0.0%	100%	None Detected	

Client Sample ID: SH-WPC-01C **Lab Sample ID:** 551507409-0100
Sample Description: Exterior North + South Window at Front of Building/White Window Pane Caulking (Rubbery)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	Brown/White	0%	100%	None Detected	

Client Sample ID: SH-WPC-02A **Lab Sample ID:** 551507409-0101
Sample Description: Exterior Central Window at Front of Building/White Window Pane Caulking (Rubbery)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	

Client Sample ID: SH-WPC-02B **Lab Sample ID:** 551507409-0102
Sample Description: Exterior Central Window at Front of Building/White Window Pane Caulking (Hard)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	White	0.0%	100%	None Detected	

Client Sample ID: SH-WPC-02C **Lab Sample ID:** 551507409-0103
Sample Description: Exterior Central Window at Front of Building/White Window Pane Caulking (Hard)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	

Client Sample ID: SH-FS-01A **Lab Sample ID:** 551507409-0104
Sample Description: Second Floor on Chimney Between Red Bricks/Brown Textured Fire Stop

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	Brown	0%	100%	None Detected	



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Customer PO: 123220330.200
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: SH-FS-01B **Lab Sample ID:** 551507409-0105

Sample Description: Second Floor on Chimney Between Red Bricks/Brown Textured Fire Stop

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	Brown	0%	100%	None Detected	

Client Sample ID: SH-FS-01C **Lab Sample ID:** 551507409-0106

Sample Description: Second Floor on Chimney Between Red Bricks/Brown Textured Fire Stop

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	Brown/Black	0%	100%	None Detected	

Client Sample ID: SH-FS-02A **Lab Sample ID:** 551507409-0107

Sample Description: Second Floor on Side of Chimney Inside Duct/White Fire Stop

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	Brown	0%	100%	None Detected	

Client Sample ID: SH-FS-02B **Lab Sample ID:** 551507409-0108

Sample Description: Second Floor on Side of Chimney Inside Duct/White Fire Stop

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	Brown	0%	100%	None Detected	

Client Sample ID: SH-FS-02C **Lab Sample ID:** 551507409-0109

Sample Description: Second Floor on Side of Chimney Inside Duct/White Fire Stop

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	Gray	0%	100%	None Detected	

Client Sample ID: SH-BM-01A **Lab Sample ID:** 551507409-0110

Sample Description: Second Floor on Chimney Between Red Bricks/Brick Mortar

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	Gray	0%	100%	None Detected	

Client Sample ID: SH-BM-01B **Lab Sample ID:** 551507409-0111

Sample Description: Second Floor on Chimney Between Red Bricks/Brick Mortar

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	Gray	0%	100%	None Detected	

Client Sample ID: SH-BM-01C **Lab Sample ID:** 551507409-0112

Sample Description: Second Floor on Chimney Between Red Bricks/Brick Mortar

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	Brown	0%	100%	None Detected	



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Customer PO: 123220330.200
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: SH-ES-01A **Lab Sample ID:** 551507409-0113

Sample Description: Applied Between Ext. Wood Siding on N Side of Bldg/White Sealant

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	White	0.0%	100%	None Detected	

Client Sample ID: SH-ES-01B **Lab Sample ID:** 551507409-0114

Sample Description: Applied Between Ext. Wood Siding on N Side of Bldg/White Sealant

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Brown	0.0%	100%	None Detected	

Client Sample ID: SH-ES-01C **Lab Sample ID:** 551507409-0115

Sample Description: Applied Between Ext. Wood Siding on N Side of Bldg/White Sealant

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Brown	0.0%	100%	None Detected	

Client Sample ID: SH-TF-01A **Lab Sample ID:** 551507409-0116

Sample Description: Exterior Ramp on West Side of Building/Black Textured Flooring (Bitumen Gravel Shingle)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: SH-TF-01B **Lab Sample ID:** 551507409-0117

Sample Description: Exterior Ramp on West Side of Building/Black Textured Flooring (Bitumen Gravel Shingle)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: SH-TF-01C **Lab Sample ID:** 551507409-0118

Sample Description: Exterior Ramp on West Side of Building/Black Textured Flooring (Bitumen Gravel Shingle)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	



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Customer ID: 55JACQ30L
Customer PO: 123220330.200
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):

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Romeo Samson PLM (8)
PLM Grav. Reduction (2)

Reviewed and approved by:

Matthew Davis
or Other Approved Signatory

None Detected = <0.5%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted. This report must not be used to claim product endorsement by NVLAP of any agency of the U.S. Government.

Samples analyzed by EMSL Canada Inc. Mississauga, ON NVLAP Lab Code 200877-0

Initial report from: 07/16/2015 21:42:13



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ProjectID:	

Attn: Steve Chou Stantec Consulting, Ltd. 500 - 4730 Kingsway Burnaby, BC V5H 0C6	Phone: (604) 412-3004 Fax: Received: 07/09/15 11:35 AM Collected:
Project: 123220330.200.100	

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

<i>Client Sample Description</i>	<i>Lab ID</i>	<i>Collected</i>	<i>Analyzed</i>	<i>Lead Concentration</i>
SH-P-01	551507426-0029 Site: INTERIOR Desc: WHITE		7/15/2015	90 ppm
SH-P-02	551507426-0030 Site: EXTERIOR TRIM Desc: EXTERIOR TRIM		7/15/2015	2400 ppm
SH-P-03	551507426-0031 Site: EXTERIOR Desc: WHITE		7/15/2015	1900 ppm

Lisa Podzyhun
or other approved signatory

*Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.010 % wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities. Samples received in good condition unless otherwise noted. "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements established by the AIHA-LAP, unless specifically indicated otherwise.

Samples analyzed by EMSL Canada Inc. Mississauga, ON A2LA Accredited Environmental Testing Cert #2845.08

Initial report from 07/15/2015 17:46:56

APPENDIX S
FINDINGS AND RECOMMENDATIONS—
STORAGE SHED

S-4.0 FINDINGS—STORAGE SHED

The Storage Shed construction date is unknown. It is a wood frame structure with no interior finishes.

The results of the assessment for each of the considered hazardous materials within the building are provided in the following sub-sections.

Floor plan drawings, which include locations of the samples collected during this assessment and locations of identified hazardous building materials (where practical), are attached to this Appendix.

S-4.1 Asbestos

Stantec identified and sampled the following suspected ACM:

- Roofing shingle

Three samples of the above-noted suspected ACMs were collected and submitted to EMSL for analysis of asbestos content and nature.

A summary of the sample types, locations and analytical results is presented in Table S-4.1.1, below. A copy of the certificate of analysis provided by EMSL for the suspected ACM samples submitted is attached at the end of this Appendix.

**Table S-4.1.1 Suspected ACM Sample Collection and Analysis Summary
 Storage Shed, Fort Langley National Historic Site, BC**

Sample Number	Material Description	Sample Location	Result (%/type asbestos)
SS-RS-01A	Black roof shingle	North west corner of building roof	None Detected
SS-RS-01B	Black roof shingle	North west corner of building roof	None Detected
SS-RS-01C	Black roof shingle	North west corner of building roof	None Detected

Based on our observations of building construction (estimated vintage of interior finishes and uniformity of building material use) and on our interpretations of suspected ACM sample analytical results, no ACMs were identified.

S-4.2 Lead

With respect to paint, three paint chip samples were obtained from the predominant suspected LCP applications within the building. A summary of the sample types, locations and analytical results is presented in Table S-4.2.1, below. A copy of the certificate of

Hazardous Building Materials Assessments

24 Buildings/Structures at the Fort Langley National Historic Site, BC

Appendix S: Findings and Recommendations – Storage Shed

analysis provided by EMSL for the suspected LCP samples submitted is attached to this Appendix.

**Table S-4.2.1 Suspected LCP Sample Collection and Analysis Summary
Storage Shed, Fort Langley National Historic Site, BC**

Sample No.	Sample Colour	Sample Location	Lab Result (ppm)	Lead Containing (Yes/No)
SS-P-01	White	Exterior trim	<130 ppm	No
SS-P-02	Brown	Downspout	4,100 ppm	Yes
SS-P-03	Yellow	Yellow siding	<190 ppm	No

Based on our observations and on our interpretations of suspected LCP sample analytical results, the material presented in Table S-4.2.2, below was identified as an LCP.

**Table S-4.2.2 Summary of Identified LCPs
Storage Shed, Fort Langley National Historic Site, BC**

Identified LCP Description	Photo
Brown colored paint on the downspout. This paint was observed to be in good condition (not bubbling, flaking or peeling).	

S-4.3 Polychlorinated Biphenyls

No suspected PCB-containing equipment was observed.

S-4.4 Mercury

No suspected mercury-containing equipment and/or items were observed.

Mercury may also be present in paints and adhesives.

S-4.5 Mould

No mould or moisture damage was observed during the assessment.

S-4.6 Ozone-Depleting Substances

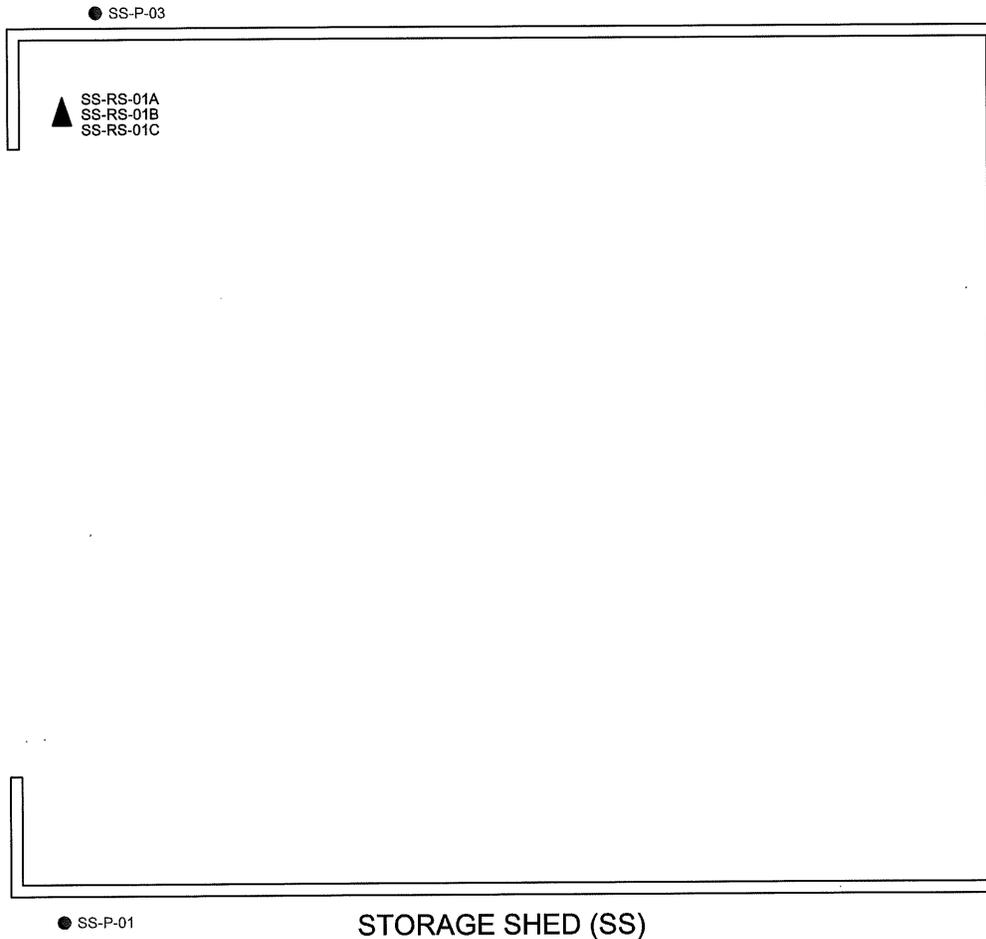
No suspected ODS-containing equipment was observed.

S-4.7 Silica

Silica is presumed to be present in the concrete foundation of the subject building.

S-5.0 RECOMMENDATIONS—STORAGE SHED

In general, identified hazardous building materials were observed to be in good condition and do not appear to require specific action to maintain compliance with applicable regulations for continued operations and maintenance. Refer to Section 5.0 of the main body of this report for applicable material-by-material general recommendations.



LEGEND

- ▲ BULK SAMPLE LOCATION
- PAINT CHIP SAMPLE LOCATION

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

FLOOR PLAN SHOWING HAZARDOUS BUILDING MATERIALS AND BULK SAMPLE LOCATIONS FORT LANGLEY NATIONAL HISTORIC SITE OF CANADA, FORT LANGLEY 23433 MAVIS AVENUE, FORT LANGLEY, BC	Project No.: 123220330.200	Dwg. No.: 12
	Scale: N.T.S.	
	Date: 15/07/09	
	Dwn. By: CD VM SL2015070065	
Client: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA	App'd By: TW	



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EMSL Canada Order 551507409
Customer ID: 55JACQ30L
Customer PO: 123220330.200
Project ID:

Attn: Steve Chou
Stantec Consulting, Ltd.
500 - 4730 Kingsway
Burnaby, BC V5H 0C6
Phone: (604) 412-3004
Fax:
Collected:
Received: 7/09/2015
Analyzed: 7/16/2015
Proj: Fort Langley/123220330.200

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: SS-RS-01A **Lab Sample ID:** 551507409-0162
Sample Description: North West Corner of Building Roof/Black Roof Shingle

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: SS-RS-01B **Lab Sample ID:** 551507409-0163
Sample Description: North West Corner of Building Roof/Black Roof Shingle

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: SS-RS-01C **Lab Sample ID:** 551507409-0164
Sample Description: North West Corner of Building Roof/Black Roof Shingle

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Analyst(s):
Matthew Davis PLM Grav. Reduction (2)
Nicole Dimou PLM Grav. Reduction (1)

Reviewed and approved by:

Matthew Davis
or Other Approved Signatory

None Detected = <0.5%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted. This report must not be used to claim product endorsement by NVLAP of any agency of the U.S. Government.

Samples analyzed by EMSL Canada Inc. Mississauga, ON NVLAP Lab Code 200877-0

Initial report from: 07/16/2015 21:42:13



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torontolab@emsl.com

EMSL Canada Or	551507426
CustomerID:	55JACQ30L
CustomerPO:	123220330
ProjectID:	

Attn: Steve Chou Stantec Consulting, Ltd. 500 - 4730 Kingsway Burnaby, BC V5H 0C6	Phone: (604) 412-3004 Fax: Received: 07/09/15 11:35 AM Collected:
Project: 123220330.200.100	

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

<i>Client Sample Description</i>	<i>Lab ID</i>	<i>Collected</i>	<i>Analyzed</i>	<i>Lead Concentration</i>
SS-P-01 Site: EXTERIOR TRIM Desc: WHITE Insufficient sample to reach reporting limit.	551507426-0026		7/15/2015	<130 ppm
SS-P-02 Site: DOWNSPOUT Desc: BROWN	551507426-0027		7/15/2015	4100 ppm
SS-P-03 Site: YELLOW SIDING Desc: YELLOW Insufficient sample to reach reporting limit.	551507426-0028		7/15/2015	<190 ppm

Lisa Podzyhun
or other approved signatory

*Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.010 % wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities. Samples received in good condition unless otherwise noted. "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements established by the AIHA-LAP, unless specifically indicated otherwise.

Samples analyzed by EMSL Canada Inc. Mississauga, ON A2LA Accredited Environmental Testing Cert #2845.08

Initial report from 07/15/2015 17:45:33

APPENDIX T
FINDINGS AND RECOMMENDATIONS—
THEATRE

T-4.0 FINDINGS—THEATRE

The Theatre was reportedly constructed in 1999. It is a single storey plus partial mezzanine wood frame structure with varnished wood interior finishes.

The results of the assessment for each of the considered hazardous materials within the building are provided in the following sub-sections.

Floor plan drawings, which include locations of the samples collected during this assessment and locations of identified hazardous building materials (where practical), are attached to this Appendix.

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

- Roof (no safe access to upper portion of peaked roof to assess for or sample suspected asbestos-containing penetration sealants)

As such, limited comments, if any, will be provided regarding the presence, quantity or condition of hazardous building materials within the above-noted areas.

T-4.1 Asbestos

Although ACMs are unlikely to be present based on the reported construction date of the building, as a measure of diligence, Stantec sampled the following materials that have been historically known to contain asbestos:

- Textured flooring

Three samples of the above-noted suspected ACMs were collected and submitted to EMSL for analysis of asbestos content and nature.

A summary of the sample types, locations and analytical results is presented in Table T-4.1.1, below. A copy of the certificate of analysis provided by EMSL for the suspected ACM samples submitted is attached at the end of this Appendix.

**Table T-4.1.1 Suspected ACM Sample Collection and Analysis Summary
 Theatre, Fort Langley National Historic Site , BC**

Sample Number	Material Description	Sample Location	Result (%/type asbestos)
T-TF-01A	Black textured flooring (bitumen gravel shingle)	Exterior ramp on north side of building	None detected
T-TF-01B	Black textured flooring (bitumen gravel shingle)	Exterior ramp on north side of building	None detected
T-TF-01C	Black textured flooring (bitumen gravel shingle)	Exterior ramp on north side of building	None detected

Based on our observations of building construction (estimated vintage of interior finishes and uniformity of building material use) and on our interpretations of suspected ACM sample analytical results, no ACMs were identified.

T-4.2 Lead

Lead is expected to be present in the following:

- Solder used in bell fittings for cast iron pipes
- Solder used in electrical equipment
- Vent and pipe flashings

Suspect LCP applications were not observed.

T-4.3 Polychlorinated Biphenyls

No suspected PCB-containing electrical equipment was observed.

T-4.4 Mercury

No suspected mercury-containing equipment and/or items were observed.

T-4.5 Mould

No mould or moisture damage was observed during the assessment.

T-4.6 Ozone-Depleting Substances

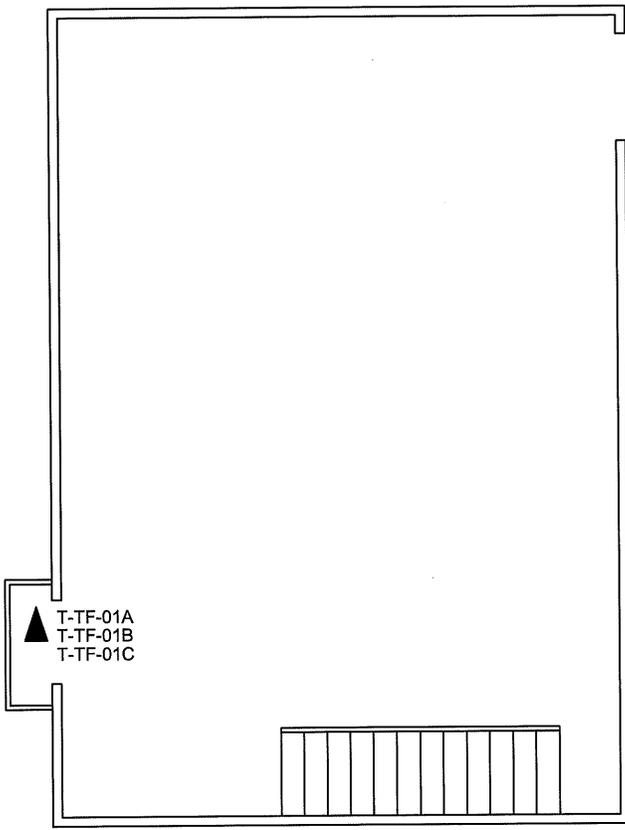
No suspected ODS-containing equipment was observed.

T-4.7 Silica

Silica is presumed to be present in the concrete foundation of the subject building.

T-5.0 RECOMMENDATIONS—THEATRE

In general, identified hazardous building materials were observed to be in good condition and do not appear to require specific action to maintain compliance with applicable regulations for continued operations and maintenance. Refer to Section 5.0 of the main body of this report for applicable material-by-material general recommendations.



THEATRE (T)

LEGEND

▲ BULK SAMPLE LOCATION

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

**FLOOR PLAN SHOWING HAZARDOUS BUILDING MATERIALS
AND BULK SAMPLE LOCATIONS**
FORT LANGLEY NATIONAL HISTORIC SITE OF CANADA, FORT LANGLEY
23433 MAVIS AVENUE, FORT LANGLEY, BC

Project No.:	123220330.200
Scale:	N.T.S.
Date:	15/07/09
Dwn. By:	CD PK SL2015070059
App'd By:	TW

Dwg. No.:	6	
Client:		



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EMSL Canada Order 551507409
Customer ID: 55JACQ30L
Customer PO: 123220330.200
Project ID:

Attn: Steve Chou
Stantec Consulting, Ltd.
500 - 4730 Kingsway
Burnaby, BC V5H 0C6
Phone: (604) 412-3004
Fax:
Collected:
Received: 7/09/2015
Analyzed: 7/16/2015
Proj: Fort Langley/123220330.200

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: T-TF-01A **Lab Sample ID:** 551507409-0025

Sample Description: Exterior Ramp on West Side of Building/Black Textured Flooring (Bitument Gravel Shingle)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: T-TF-01B **Lab Sample ID:** 551507409-0026

Sample Description: Exterior Ramp on West Side of Building/Black Textured Flooring (Bitument Gravel Shingle)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: T-TF-01C **Lab Sample ID:** 551507409-0027

Sample Description: Exterior Ramp on West Side of Building/Black Textured Flooring (Bitument Gravel Shingle)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Analyst(s):

Matthew Davis PLM Grav. Reduction (1)
Nicole Dimou PLM Grav. Reduction (2)

Reviewed and approved by:

Matthew Davis
or Other Approved Signatory

None Detected = <0.5%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted. This report must not be used to claim product endorsement by NVLAP of any agency of the U.S. Government.

Samples analyzed by EMSL Canada Inc. Mississauga, ON NVLAP Lab Code 200877-0

Initial report from: 07/16/2015 21:42:13

APPENDIX U
FINDINGS AND RECOMMENDATIONS—
VISITOR CENTRE

U-4.0 FINDINGS—VISITOR CENTRE

The Visitor Centre was reportedly constructed in 1997. It is a single story wood frame structure with drywall and sheet flooring interior finishes.

The results of the assessment for each of the considered hazardous materials within the building are provided in the following sub-sections.

Floor plan drawings, which include locations of the samples collected during this assessment and locations of identified hazardous building materials (where practical), are attached to this Appendix.

U-4.1 Asbestos

Although ACMs are unlikely to be present based on the reported construction date of the building, as a measure of diligence, Stantec sampled the following materials that have been historically known to contain asbestos:

- Caulkings and mastics
- Textured flooring
- Sheet flooring
- Roofing shingle
- Drywall joint compound

Twenty-four samples of the above-noted suspected ACMs were collected and submitted to EMSL for analysis of asbestos content and nature.

A summary of the sample types, locations and analytical results is presented in Table Q-4.1.1, below. A copy of the certificate of analysis provided by EMSL for the suspected ACM samples submitted is attached at the end of this Appendix.

Hazardous Building Materials Assessments**24 Buildings/Structures at the Fort Langley National Historic Site, BC**

Appendix U: Findings and Recommendations – Visitor Centre

**Table U-4.1.1 Suspected ACM Sample Collection and Analysis Summary
Visitor Centre, Fort Langley National Historic Site, BC**

Sample Number	Material Description	Sample Location	Result (%/type asbestos)
VC-SF-01	Grey sheet flooring	Storage room floor adjacent to men's washroom	None Detected
VC-DM-01A	Green duct mastic	HVAC ducting in mechanical room	None Detected
VC-DM-01B	Green duct mastic	HVAC ducting in mechanical room	None Detected
VC-DM-01C	Green duct mastic	HVAC ducting in mechanical room	None Detected
VC-FM-01A	Red flooring material	Men's washroom floor	None Detected
VC-FM-01B	Red flooring material	Men's washroom floor	None Detected
VC-FM-01C	Red flooring material	Men's washroom floor	None Detected
VC-EPM-01A	Exterior penetration mastic	South side of building on pipe fitting	None Detected
VC-EPM-01B	Exterior penetration mastic	South side of building on pipe fitting	None Detected
VC-EPM-01C	Exterior penetration mastic	South side of building on pipe fitting	None Detected
VC-RS-01A	Black roofing shingle	South side of the lower roof	None Detected
VC-RS-01B	Black roofing shingle	South side of the lower roof	None Detected
VC-RS-01C	Black roofing shingle	South side of the lower roof	None Detected
VC-RS-02A	Black roofing shingle	South side of the upper roof	None Detected
VC-RS-02B	Black roofing shingle	South side of the upper roof	None Detected
VC-RS-02C	Black roofing shingle	South side of the upper roof	None Detected
VC-RM-01A	Clear roofing mastic	Lower roof on PVC ventilation pipe	None Detected
VC-RM-01B	Clear roofing mastic	Lower roof on PVC ventilation pipe	None Detected
VC-RM-01C	Clear roofing mastic	Lower roof on PVC ventilation pipe	None Detected
VC-DJC-01A	Drywall joint compound	East wall of mechanical room	None Detected
VC-DJC-01B	Drywall joint compound	East wall of men's washroom	None Detected
VC-DJC-01C	Drywall joint compound	Storage room wall outside men's washroom	None Detected
VC-DJC-01D	Drywall joint compound	East wall of main gallery	None Detected
VC-DJC-01E	Drywall joint compound	Void space wall inside north of mechanical room	None Detected

Based on our observations of building construction (estimated vintage of interior finishes and uniformity of building material use) and on our interpretations of suspected ACM sample analytical results, no ACMs were identified.

U-4.2 Lead

Lead is expected to be present in the following:

- Solder used in bell fittings for cast iron pipes
- Solder used in electrical equipment

With respect to paint, six paint chip samples were obtained from the predominant suspected LCP applications within the building. A summary of the sample types, locations and analytical results is presented in Table U-4.2.1, below. A copy of the certificate of analysis provided by EMSL for the suspected LCP samples submitted is attached to this Appendix.

Table U-4.2.1 Suspected LCP Sample Collection and Analysis Summary
Visitor Centre, Fort Langley National Historic Site, BC

Sample No.	Sample Colour	Sample Location	Lab Result (ppm)	Lead Containing (Yes/No)
VC-P-01	White	Interior	<110	No
VC-P-02	Maroon	Interior	<140	No
VC-P-03	Olive green	Interior	<120	No
VC-P-04	Black	Interior	<200	No
VC-P-05	Light blue	Interior	<90	No
VC-P-06	Red	Exterior trim	<210	No

Based on our observations and on our interpretations of suspected LCP sample analytical results, no LCPs were identified.

U-4.3 Polychlorinated Biphenyls

No suspected PCB-containing electrical equipment was observed.

U-4.4 Mercury

No suspected mercury-containing equipment and/or items were observed.

Mercury may also be present in paints and adhesives.

Hazardous Building Materials Assessments

24 Buildings/Structures at the Fort Langley National Historic Site, BC

Appendix U: Findings and Recommendations – Visitor Centre

U-4.5 Mould

No mould or moisture damage was observed during the assessment.

U-4.6 Ozone-Depleting Substances

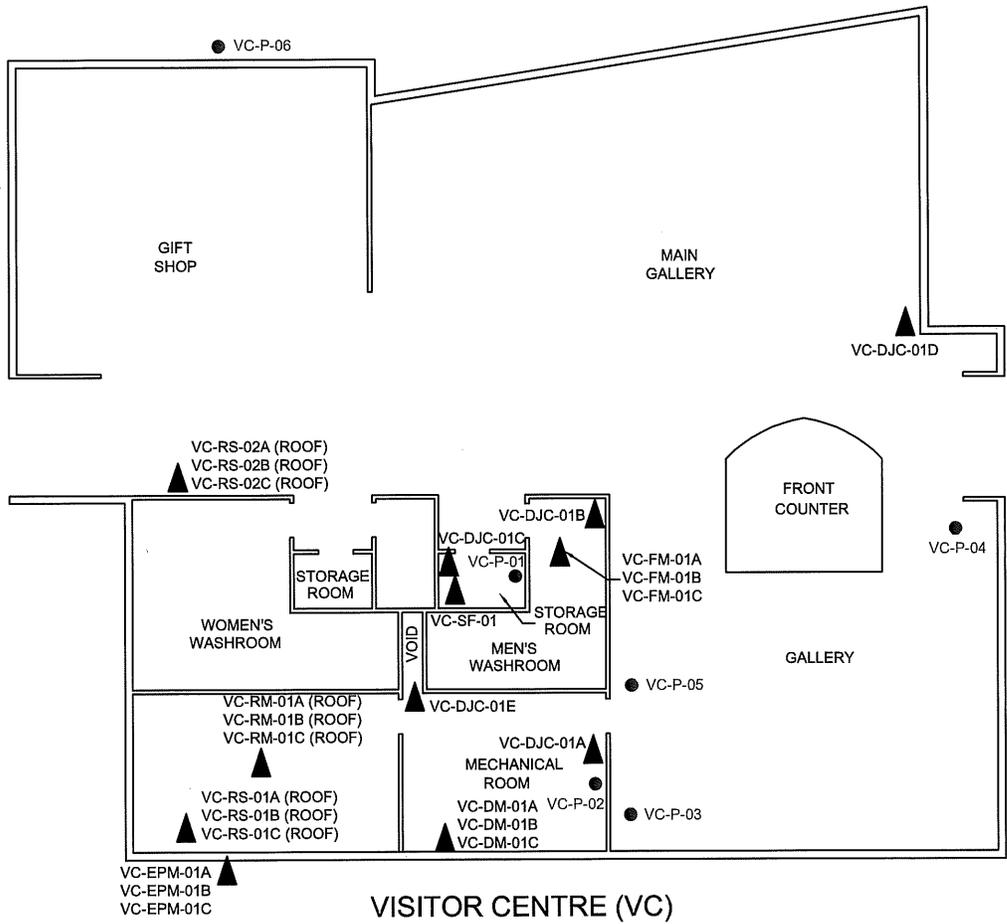
No suspected ODS-containing equipment was observed.

U-4.7 Silica

Silica is presumed to be present in the concrete foundation of the subject building.

U-5.0 RECOMMENDATIONS—VISITOR CENTRE

In general, identified hazardous building materials were observed to be in good condition and do not appear to require specific action to maintain compliance with applicable regulations for continued operations and maintenance. Refer to Section 5.0 of the main body of this report for applicable material-by-material general recommendations.



LEGEND
 ▲ BULK SAMPLE LOCATION
 ● PAINT CHIP SAMPLE LOCATION

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

<p align="center">FLOOR PLAN SHOWING HAZARDOUS BUILDING MATERIALS AND BULK SAMPLE LOCATIONS</p> <p align="center">FORT LANGLEY NATIONAL HISTORIC SITE OF CANADA, FORT LANGLEY 23433 MAVIS AVENUE, FORT LANGLEY, BC</p>		Project No.: 123220330.200	Dwg. No.: 15	
		Scale: N.T.S.		
Client: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA		Date: 15/10/28		
		Dwn. By: CD DM SL2015100170		
		App'd By: TW		



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EMSL Canada Order 551507409
Customer ID: 55JACQ30L
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Project ID:

Attn: Steve Chou
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500 - 4730 Kingsway
Burnaby, BC V5H 0C6

Phone: (604) 412-3004
Fax:
Collected:
Received: 7/09/2015
Analyzed: 7/16/2015

Proj: Fort Langley/123220330.200

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: VC-SF-01 **Lab Sample ID:** 551507409-0056

Sample Description: Storage Room Floor Adjacent to Men's Washroom/Grey Sheet Flooring

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Brown	0.0%	100%	None Detected	

Client Sample ID: VC-DM-01A **Lab Sample ID:** 551507409-0057

Sample Description: HVAC Ducting in Mechanical Room/Green Duct Mastic

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Green	0.0%	100%	None Detected	

Client Sample ID: VC-DM-01B **Lab Sample ID:** 551507409-0058

Sample Description: HVAC Ducting in Mechanical Room/Green Duct Mastic

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Green	0.0%	100%	None Detected	

Client Sample ID: VC-DM-01C **Lab Sample ID:** 551507409-0059

Sample Description: HVAC Ducting in Mechanical Room/Green Duct Mastic

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Green	0.0%	100%	None Detected	

Client Sample ID: VC-FM-01A **Lab Sample ID:** 551507409-0060

Sample Description: Men's Washroom Floor/Red Flooring Material

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Gray/Red	0.0%	100%	None Detected	

Client Sample ID: VC-FM-01B **Lab Sample ID:** 551507409-0061

Sample Description: Men's Washroom Floor/Red Flooring Material

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Gray/Red	0.0%	100%	None Detected	

Client Sample ID: VC-FM-01C **Lab Sample ID:** 551507409-0062

Sample Description: Men's Washroom Floor/Red Flooring Material

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Gray/Red	0.0%	100%	None Detected	



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EMSL Canada Order 551507409
Customer ID: 55JACQ30L
Customer PO: 123220330.200
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: VC-EPM-01A **Lab Sample ID:** 551507409-0063

Sample Description: South Side of Building on Pipe Fitting/Exterior Penetration Mastic

TEST	Analysed	Color	Non-Asbestos		Asbestos	Comment
	Date		Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Gray	0.0%	100%	None Detected	

Client Sample ID: VC-EPM-01B **Lab Sample ID:** 551507409-0064

Sample Description: South Side of Building on Pipe Fitting/Exterior Penetration Mastic

TEST	Analysed	Color	Non-Asbestos		Asbestos	Comment
	Date		Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Gray	0.0%	100%	None Detected	

Client Sample ID: VC-EPM-01C **Lab Sample ID:** 551507409-0065

Sample Description: South Side of Building on Pipe Fitting/Exterior Penetration Mastic

TEST	Analysed	Color	Non-Asbestos		Asbestos	Comment
	Date		Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Gray	0.0%	100%	None Detected	

Client Sample ID: VC-RS-01A **Lab Sample ID:** 551507409-0066

Sample Description: South Side of the Lower Roof/Black Roofing Shingle

TEST	Analysed	Color	Non-Asbestos		Asbestos	Comment
	Date		Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: VC-RS-01B **Lab Sample ID:** 551507409-0067

Sample Description: South Side of the Lower Roof/Black Roofing Shingle

TEST	Analysed	Color	Non-Asbestos		Asbestos	Comment
	Date		Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: VC-RS-01C **Lab Sample ID:** 551507409-0068

Sample Description: South Side of the Lower Roof/Black Roofing Shingle

TEST	Analysed	Color	Non-Asbestos		Asbestos	Comment
	Date		Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: VC-RS-02A **Lab Sample ID:** 551507409-0069

Sample Description: South Side of the Upper Roof/Black Roofing Shingle

TEST	Analysed	Color	Non-Asbestos		Asbestos	Comment
	Date		Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: VC-RS-02B **Lab Sample ID:** 551507409-0070

Sample Description: South Side of the Upper Roof/Black Roofing Shingle

TEST	Analysed	Color	Non-Asbestos		Asbestos	Comment
	Date		Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	



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<http://www.EMSL.com> / torontolab@emsl.com

EMSL Canada Order 551507409
Customer ID: 55JACQ30L
Customer PO: 123220330.200
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: VC-RS-02C **Lab Sample ID:** 551507409-0071

Sample Description: South Side of the Upper Roof/Black Roofing Shingle

TEST	Analyzed		Non-Asbestos		Asbestos	Comment
	Date	Color	Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Black	0.0%	100%	None Detected	

Client Sample ID: VC-RM-01A **Lab Sample ID:** 551507409-0072

Sample Description: Lower Roof on PVC Ventilation Pipe/Clear Roofing Mastic

TEST	Analyzed		Non-Asbestos		Asbestos	Comment
	Date	Color	Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Clear	0.0%	100%	None Detected	

Client Sample ID: VC-RM-01B **Lab Sample ID:** 551507409-0073

Sample Description: Lower Roof on PVC Ventilation Pipe/Clear Roofing Mastic

TEST	Analyzed		Non-Asbestos		Asbestos	Comment
	Date	Color	Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Clear	0.0%	100%	None Detected	

Client Sample ID: VC-RM-01C **Lab Sample ID:** 551507409-0074

Sample Description: Lower Roof on PVC Ventilation Pipe/Clear Roofing Mastic

TEST	Analyzed		Non-Asbestos		Asbestos	Comment
	Date	Color	Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/16/2015	Clear	0.0%	100%	None Detected	

Client Sample ID: VC-DJC-01A **Lab Sample ID:** 551507409-0075

Sample Description: East Wall of Mechanical Room/Drywall Joint Compound

TEST	Analyzed		Non-Asbestos		Asbestos	Comment
	Date	Color	Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	

Client Sample ID: VC-DJC-01B **Lab Sample ID:** 551507409-0076

Sample Description: East Wall of Men's Washroom/Drywall Joint Compound

TEST	Analyzed		Non-Asbestos		Asbestos	Comment
	Date	Color	Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	

Client Sample ID: VC-DJC-01C **Lab Sample ID:** 551507409-0077

Sample Description: Storage Room Wall Outside Men's Washroom/Drywall Joint Compound

TEST	Analyzed		Non-Asbestos		Asbestos	Comment
	Date	Color	Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	

Client Sample ID: VC-DJC-01D **Lab Sample ID:** 551507409-0078

Sample Description: East Wall of Main Gallery/Drywall Joint Compound

TEST	Analyzed		Non-Asbestos		Asbestos	Comment
	Date	Color	Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	



EMSL Canada Inc.

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EMSL Canada Order 551507409
Customer ID: 55JACQ30L
Customer PO: 123220330.200
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: VC-DJC-01E

Lab Sample ID: 551507409-0079

Sample Description: Void Space Wall Inside North of Mechanical Room/Drywall Joint Compound

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/16/2015	White	0%	100%	None Detected	

Analyst(s):

- Jon Delos Santos PLM (2)
- Matthew Davis PLM Grav. Reduction (6)
- Nicole Dimou PLM Grav. Reduction (13)
- Romeo Samson PLM (3)

Reviewed and approved by:

Matthew Davis
or Other Approved Signatory

None Detected = <0.5%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted. This report must not be used to claim product endorsement by NVLAP of any agency of the U.S. Government.

Samples analyzed by EMSL Canada Inc. Mississauga, ON NVLAP Lab Code 200877-0

Initial report from: 07/16/2015 21:42:13

**EMSL Canada Inc.**

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EMSL Canada Or 551507426
 CustomerID: 55JACQ30L
 CustomerPO: 123220330
 ProjectID:

Attn: **Steve Chou**
Stantec Consulting, Ltd.
500 - 4730 Kingsway
Burnaby, BC V5H 0C6

Phone: (604) 412-3004
 Fax:
 Received: 07/09/15 11:35 AM
 Collected:

Project: 123220330.200.100

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

<i>Client Sample Description</i>	<i>Lab ID</i>	<i>Collected</i>	<i>Analyzed</i>	<i>Lead Concentration</i>
VC-P-01	551507426-0011 Site: INTERIOR Desc: WHITE		7/15/2015	<110 ppm
VC-P-02	551507426-0012 Site: INTERIOR Desc: MAROON		7/15/2015	<140 ppm
VC-P-03	551507426-0013 Site: INTERIOR Desc: OLIVE GREEN		7/15/2015	<120 ppm
VC-P-04	551507426-0014 Site: INTERIOR Desc: BLACK		7/15/2015	<200 ppm
VC-P-05	551507426-0015 Site: INTERIOR Desc: LIGHT BLUE		7/15/2015	<90 ppm
VC-P-06	551507426-0016 Site: EXTERIOR TRIM Desc: RED		7/15/2015	<210 ppm

Insufficient sample to reach reporting limit for sample#551507426-0011/-0012/-0013/-0014/-0016.

Lisa Podzyhun
 or other approved signatory

*Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.010 % wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities. Samples received in good condition unless otherwise noted. "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements established by the AIHA-LAP, unless specifically indicated otherwise.

Samples analyzed by EMSL Canada Inc. Mississauga, ON A2LA Accredited Environmental Testing Cert #2845.08

Initial report from 07/15/2015 17:36:14