



Public Works and
Government Services Canada

Requisition No. EZ899-170812

MERX I.D. No. _____

SPECIFICATIONS

For

PENTICTON AIRPORT FIRE ALARM UPGRADE

109 - 3000 Airport Road

Penticton, BC

Project No R. 077021.001

Tender June 14, 2016

APPROVED BY:

[Signature]
Regional Manager, A&E Services

Date

2016-06-16

[Signature]
Construction Safety Coordinator

Date

2016-06-16

TENDER:

[Signature]
Project Manager

Date

2016-06-26

ISSUED FOR TENDER

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DRAWINGS

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ZONES AND SCHEDULES
- E300 SITE PLAN WITH REVISED FIRE ALARM ZONES AND SYSTEM RISER

END OF SECTION 00 00 10

GENERAL INSTRUCTIONS

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 Work of this Contract comprises replacement and upgrade of an existing fire alarm system, and further identified as:
 - Penticton Airport Fire Alarm Upgrade**
 - #109 3000 AIRPORT ROAD, PENTICTON**
 - PROJECT # R.077021.001**
- .2 Work to be performed under this Contract includes, but is not limited to, the following items covered further in the Contract documents:
 - .1 Installation of new addressable fire alarm system and associated components in the ATB and FSS Tower buildings.
 - .2 Modifications and additions to the existing fire alarm system in the Fire Hall.
 - .3 Existing system must remain operational at all times until the transition to the fully verified replacement system is complete.
 - .4 At no time shall the building be without a fire alarm system. If interruption of the existing system operation is required, contractor shall hire, at their cost, the services of Commissionaire(s) to provide fire watch.
 - .5 Connection of new fire alarm system to existing panels.
 - .6 Removal and disposal of existing fire alarm system.
 - .7 Removal and disposal of redundant fire alarm devices.
 - .8 Commissioning and testing of all equipment installed as part of this contract.
 - .9 Demonstration and training of personnel as directed by the Departmental Representative. Refer to Section 01 79 00 Demonstration and Training.
 - .10 Engage building system control contractor for DDC tie-in.
 - .11 Engage fire sprinkler contractor for modifications, connection and verification to existing flow and tamper stations and include associated cost.
 - .12 New fire alarm system to include coordination with sprinkler, building management system, access control and security door release/interface, remote signal transmission and full integration to other existing fire alarm system at airport site.
 - .13 Patch, repair and paint walls and ceiling surfaces.
- .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.

GENERAL INSTRUCTIONS

- .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.
- .4 Perform all work in accordance with National Building Code of Canada (NBC) 2012, WorkSafeBC/Workers' Compensation Board (WCB) Regulations and these Contract Documents. Where there is a conflict between Contract Documents and referenced standards, the most stringent will be applied.

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 HOURS OF WORK

- .1 Restrictive as follows:
 - .1 All work in the ATB must be completed after hours when the public is not in the building.
 - .2 Work in the FSS must be coordinated with local FSS and NAV Canada staff to allow for access, but may be completed during regular hours with prior approval.
 - .3 All work impacting provision of power to the building and its users must be fully coordinated to the benefit of the building occupants. Contractor shall assume that all outages will be during weekends or evenings.

1.6 WORK SCHEDULE

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

GENERAL INSTRUCTIONS

1.7 TIME TO COMPLETION

- .1 Completion of this project shall be no later than 24 weeks from award of contract.

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.
- .2 Provide a projection of project billing as proposed on a month by month basis accounting for expected delivery of equipment, project phasing and mobilisation.

1.9 CODES, BYLAWS, STANDARDS

- .1 Perform work in accordance with the Canadian Electrical Code 2012, 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 Canadian Electrical Code 2012.
 - .13 Current construction standards of workmanship listed in technical Sections.
 - .14 Contractor Safety Plan.

GENERAL INSTRUCTIONS

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 Exclusive and complete for execution of work.
 - .2 Assume responsibility for assigned premises for performance of this work.
 - .3 Be responsible for coordination of all work activities on site, including the work of other contractors engaged by the Departmental Representative such as moving contractors and furniture installers.
- .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 A 1-hour site safety orientation to be completed by all workers. Personnel that do not successfully complete the required training are not permitted to enter the site to perform work.
- .5 Limit use of premises for Work, for storage and for access to allow for continuous occupancy of building.
- .6 Co-ordinate use of premises under direction of the Departmental Representative.
- .7 Assume full responsibility for protection and safekeeping of Products under this Contract.
- .8 Do not use any other part of property unless approved in writing by the Departmental Representative.
- .9 Store materials and equipment only where directed by the Departmental Representative. Obtain and pay for use of additional storage and work areas if required.
- .10 Ensure access to assigned lay down or construction areas is maintained for fire and emergency access at all times.
- .11 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.
- .12 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work.
- .13 Condition of existing work at completion of operations to be equal to or better than that which existed before new work started.

GENERAL INSTRUCTIONS

- .14 Provide necessary protection and hoarding to prevent unauthorized entry into areas of work at all times by staff and public.
 - .15 Inform the Departmental Representative 3 working days prior to performing work inside the building. Entry into areas of work will be by authorized personnel only and must be delineated during execution of work.
 - .16 Adjacent portions of building and property will remain in use during Work.
 - .17 Co-operate with the Departmental Representative by scheduling operations to minimize conflict and to facilitate continuous use of building. Do not impede, restrict or obstruct use of building or adjacent portions of property.
 - .18 Do work in a manner that will minimize creation of noise that would disturb day-to-day operation of building and adjacent property.
 - .19 Locate stationary noise generating equipment as far away as practical from occupied parts of building, or where directed by the Departmental Representative.
 - .20 Co-ordinate with the Departmental Representative for necessary shutdown of services affecting occupied parts of building and adjacent property where serviced from building. Provide 14 days of notice prior to shutdown. Minimize occurrences and durations of shutdowns.
 - .21 Co-ordinate with the Departmental Representative to ensure that construction activities do not compromise security of building and site.
 - .22 Ensure that construction activities do not compromise other active systems within the building and site.
- 1.13 EXAMINATION**
- .1 Examine site and be familiar and conversant with existing conditions likely to affect work.
 - .2 Provide photographs of surrounding properties, objects and structures liable to be damaged or be the subject of subsequent claims.
- 1.14 LOCATION OF EQUIPMENT AND FIXTURES**
- .1 Location of equipment and devices indicated or specified are to be considered as approximate.
 - .2 Locate equipment, devices 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.
- 1.15 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.

GENERAL INSTRUCTIONS

- .4 Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly.
- .5 Patch and make good surfaces cut, damaged or disturbed, to Departmental Representative's approval. Match existing material, colour, finish and texture.
- .6 Making good is defined as matching construction and finishing materials and the adjacent surfaces such that there is no visible difference between existing and new surfaces when viewed from 1.5 metres in ambient light, and includes painting the whole surface to the next change in plane.
- .7 Provide temporary dust screens, barriers, warning signs in locations where renovation and alteration work is adjacent to areas used by public or government staff.
- .8 Protect adjacent surfaces. Make good or replace damaged surfaces and equipment to satisfaction of the Departmental Representative, at no cost to Contract.
- .9 Provide barricade warning tape to mark perimeter of work area, as directed by the Departmental Representative.

1.16 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.

1.17 ACCEPTANCE OF SUBSTRATES

- .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.

1.18 QUALITY OF WORK

- .1 Ensure that quality workmanship is performed through use of skilled tradesmen, under supervision of qualified journeyman.
- .2 The workmanship, erection methods and procedures to meet minimum standards set out in the National Building Code of Canada 2010 and local Construction Standards.
- .3 In cases of dispute, decisions as to standard or quality of work rest solely with the Departmental Representative, whose decision is final.

1.19 WORKS COORDINATION

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

GENERAL INSTRUCTIONS

- .2 Convene meetings between subcontractors whose work interfaces and ensure awareness of areas and extent of interface required.
 - .1 Provide each subcontractor with complete plans and specifications for Contract, to assist them in planning and carrying out their respective work.
 - .2 Develop coordination drawings when required, illustrating potential interference between work of various trades and distribute to affected parties.
 - .1 Pay particularly close attention to overhead work above ceilings and within or near to building structural elements.
 - .2 Identify on coordination drawings, building elements, services lines, rough-in points and indicate location services entrance to site.
 - .3 Facilitate meeting and review coordination drawings. Ensure subcontractors agree and sign off on drawings.
 - .4 Publish minutes of each meeting.
 - .5 Plan and coordinate work in such a way to minimize quantity of service line offsets.
 - .6 Submit copy of coordination drawings and meeting minutes to Departmental Representative for information purposes.
- .3 Submit shop drawings and order of prefabricated equipment or rebuilt components only after coordination meeting for such items has taken place.
- .4 Work cooperation:
 - .1 Ensure cooperation between trades in order to facilitate general progress of Work and avoid situations of spatial interference.
 - .2 Ensure that each trade provides all other trades reasonable opportunity for completion of Work and in such a way as to prevent unnecessary delays, cutting, patching and removal or replacement of completed work.
 - .3 Ensure disputes between subcontractors are resolved.
- .5 Departmental Representative is not responsible for, or accountable for extra costs incurred as a result of Contractor's failure to coordinate Work.
- .6 Maintain efficient and continuous supervision.

1.20 APPROVAL OF SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

- .1 In accordance with Section 01 33 00, submit the requested shop drawings, product data, MSDS sheets and samples indicated in each of the technical Sections.
- .2 Allow sufficient time for the following:
 - .1 Review of product data.
 - .2 Approval of shop drawings.
 - .3 Review of re-submission.
 - .4 Ordering of approved material and/or products - refer to Sections of Divisions 2 to 48.

GENERAL INSTRUCTIONS

1.21 SECURITY CLEARANCES

- .1 Personnel employed on this project will be subject to security check. Obtain requisite clearances, as instructed, for each individual required to enter the premises.
- .2 Personnel will be checked at start of work shift and provided with pass which must be worn at all times. Pass must be returned at end of work shift and personnel checked out.
- .3 Contractor shall be fully responsible for securing the premises and its contents throughout the construction period.

1.22 PROJECT MEETINGS

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

1.23 TESTING AND INSPECTIONS

- .1 The Contractor will appoint and pay for the services of the factory technical representative for the following:
 - .1 Inspection and testing required of individual door controllers.
 - .2 Inspection and testing of the system software.
 - .3 Testing, adjustment and balancing of overhead door/gate and associated electrical equipment and systems.
 - .1 Tests specified to be carried out by Contractor under the Departmental Representative's supervision.
- .2 Contractor shall furnish labour and facilities to:
 - .1 Notify Departmental Representative in advance of planned testing.
- .3 Pay costs for uncovering and making good work that is covered before required inspection or testing is completed and approved by Departmental Representative.
- .4 Provide Departmental Representative with 2 copies of testing and commissioning reports as soon as they are available.

1.24 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.

1.25 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 Clean interior building areas when ready to receive finish painting and continue cleaning on an as-needed basis until building is sufficiently completed or ready for occupancy.

GENERAL INSTRUCTIONS

- .4 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.
 - .5 Use cleaning materials and methods in accordance with instructions of the manufacturer of the surface to be cleaned.
- 1.26 DUST CONTROL**
- .1 Provide temporary dust tight screens or partitions to localize dust generating activities, and for protection of workers, finished areas of work and public.
 - .2 Protect furnishings within work area with polyethylene film during construction. Remove film during non- construction hours and leave premises in clean, unencumbered and safe manner for normal daytime function.
 - .3 Maintain and relocate protection until such work is complete.
- 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 of Divisions 02 to 48, where required.
- 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 on the site is not permitted.
- 1.31 SYSTEM OF MEASUREMENT**
- .1 The metric system of measurement (SI) will be employed on this Contract.

GENERAL INSTRUCTIONS

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.

END OF SECTION

WORK RESTRICTIONS

Part 1 General

1.1 FACILITY OPERATIONS AND SECURITY PROCEDURES

- .1 All construction staff shall become thoroughly familiar with and abide by all provisions and requirements of the facility, Safety and Security Procedures and Restrictions.
 - .1 The parking area(s) to be used by construction employees will be designated by the Departmental Representative. Parking in other locations will be prohibited and vehicles may be subject to removal.
 - .2 Speed limits are posted on site. Failure to abide by site speed limits may result in removal of employee and vehicle from site.

1.2 ACCESS AND EGRESS

- .1 Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders and scaffolding, independent of finished surfaces and in accordance with relevant Federal, municipal, provincial and other regulations.
- .2 Provide hoarding, and scaffolding plan for Departmental Representative to review 5 business days prior to installation.

1.3 USE OF SITE AND FACILITIES

- .1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated.
- .2 Maintain existing services to building and provide for personnel and vehicle access.
- .3 Where security is reduced by work, provide temporary means to maintain security as per Departmental Representatives direction.
- .4 Closures: protect work temporarily until permanent enclosures are completed.
- .5 Coordinate with Departmental Representative in scheduling operations to minimize conflict and to facilitate use of space.

1.4 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

- .1 Execute work with least possible interference or disturbance to Facility operations, occupants, and normal use. Arrange with Departmental Representative to facilitate execution of work.

1.5 EXISTING SERVICES

- .1 Notify Departmental Representative and utility companies of intended interruption of services and obtain required permission.

WORK RESTRICTIONS

- .2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 3 working days of notice for necessary interruption of civil, mechanical or electrical service throughout course of work. Keep duration of interruptions minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends.
 - .1 Optimize and plan shut-downs so that services are restored in time for normal facility operation hours. Coordinate all shut-downs with utility providers and facility users.
 - .2 Contractor shall be held responsible for damages to facility equipment as the result of service shut-downs.
 - .3 Contractor shall be held responsible for any and all unscheduled shut-downs of building utilities and services.
 - .4 Contractor will not be allowed to connect to Departmental Representative's existing data and communication services.
 - .5 Submit a "Fire Alarm Bypass" request to Departmental Representative 3 working days in advance for approval.
 - .6 Obtain permission from Departmental Representative for access to restricted areas outside the construction zones 3 working days in advance.
 - .3 Provide for personnel and vehicular traffic.
 - .4 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.
- 1.6 BUILDING SMOKING ENVIRONMENT**
- .1 Comply with smoking restrictions. Smoking is not permitted within Penticton Airport.
- 1.7 NOISE CONTROL**
- .1 Comply with applicable provincial by-law for noise control.

END OF SECTION

MANAGEMENT AND COORDINATION

Part 1 General

- .1 This section includes the following:
 - .1 Coordination of Work under administration of Departmental Representative.
 - .2 Scheduled Pre-construction and Site meetings.
 - .3 Project planning and construction schedule.
 - .4 Site progress monitoring and control.

1.1 DESCRIPTION

- .1 Coordinate and manage construction schedule, submittals, use of site, temporary utilities, construction facilities, quality control program, and construction Work, with progress of Work of subcontractors, other contractors and Departmental Representative.

1.2 PRE-CONSTRUCTION MEETING

- .1 Pre-construction Meeting:
 - .1 Within 10 days after award of Contract, Departmental Representative will arrange pre-construction meeting.
 - .2 Departmental Representative, Contractor and operations staff will be in attendance.
 - .3 Departmental Representative will establish time and location of meeting and notify parties concerned.
 - .4 The Departmental Representative will chair the meeting, record minutes and issue minutes to all attendees.
 - .1 Agenda of meeting is generally as follows:
 - .1 Project team introductions including main construction personnel, PWGSC personnel, ATB staff and consultants.
 - .2 Communication protocol for submittals.
 - .3 Start date on site.
 - .4 PFC security requirements.
 - .5 Construction Organization and Start-up:
 - .1 Comply with Departmental Representative's allocation of mobilization areas of site; for access, traffic, and parking facilities.
 - .2 During construction coordinate use of site and facilities through Departmental Representative's procedures for intra-project communications: Submittals, reports and records, schedules, coordination of drawings, recommendations, and resolution of ambiguities and conflicts.
 - .3 Comply with instructions of Departmental Representative for use of temporary utilities and construction facilities.
 - .4 Coordinate layout of construction barrier with Departmental Representative.

MANAGEMENT AND COORDINATION

1.3 PROJECT PLANNING

- .1 Plan construction activities, submittals and field reviews ahead of time for efficient and effective management to ensure timely completion of project.

1.4 SCHEDULES

- .1 Submit preliminary construction schedule to Departmental Representative during Pre-Construction meeting.
- .2 After review, revise and resubmit schedule. Submit final full schedule within 2 weeks after Pre-Construction meeting.
- .3 During progress of Work revise and resubmit as directed by Departmental Representative.

1.5 CONSTRUCTION SITE MEETINGS

- .1 During course of Work and prior to project completion, Departmental Representative will request Construction Site Meetings as required.
- .2 Departmental Representative will record minutes of meetings and circulate to attending parties and affected parties not in attendance.
- .3 Agenda to include following:
 - .1 Review, approval of minutes of previous meeting.
 - .2 Review of Work progress since previous meeting.
 - .3 Field observations, problems, conflicts.
 - .4 Review of Health and Safety including any incidents, near misses, and WorkSafe BC visits.
 - .5 Problems which impede construction schedule.
 - .6 Review of off-site fabrication delivery schedules.
 - .7 Corrective measures and procedures to regain projected schedule.
 - .8 Revision to construction schedule.
 - .9 Progress schedule, during succeeding work period.
 - .10 Review submittal schedules: expedite as required.
 - .11 Update of Red Line As-Built Drawings.
 - .12 Maintenance of quality standards.
 - .13 Review proposed changes for effect on construction schedule and on completion date.
 - .14 Other business.

1.6 WALK THROUGH FIELD REVIEW BY DEPARTMENTAL REPRESENTATIVE

- .1 Departmental Representative will carry out the following:
 - .1 Walk-through field review of the work with contractor's representatives.
 - .2 Preparation and distribution of the Walk-through field review Reports. Reports will be distributed within 5 days of field review.

MANAGEMENT AND COORDINATION

1.7 SUBMITTALS

- .1 Submit requests for interpretation of Contract Documents, and obtain instructions through Departmental Representative.
- .2 Process substitutions through Departmental Representative.
- .3 Deliver closeout submittals for review and inspections, for transmittal to Departmental Representative.

1.8 CLOSEOUT PROCEDURES

- .1 Notify Departmental Representative when Work is considered Substantially Complete. Contractor to prepare list of defects, deficiencies and incomplete work prior to inspection by Departmental Representative. Follow procedures as outlined in Section 01 78 00 – Closeout Submittals.
- .2 Accompany Departmental Representative on preliminary inspection to determine items listed for completion or correction.
- .3 Comply with Departmental Representative's instructions for correction of items of Work listed in deficiency list. completion or correction.
- .4 Notify Departmental Representative of instructions for completion of items of Work determined in Departmental Representative's final inspection.

END OF SECTION

PROJECT MEETINGS

Part 1 General

1.1 ADMINISTRATIVE

- .1 Schedule and administer site meetings throughout the progress of the work on a regular basis or at the call of Departmental Representative.
- .2 Prepare and distribute agenda at least three (3) days prior to the meetings.
- .3 Distribute written notice of each meeting seven (7) days in advance of meeting date to Departmental Representative.
- .4 Meeting space can be held in the meeting room in the ATB, location to be determined. Book meeting or room in advance through Departmental Representative.
- .5 Preside at meetings.
- .6 Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.
- .7 Reproduce and distribute copies of minutes within five (5) days after meetings and transmit to meeting participants and affected parties not in attendance, Departmental Representative and Consultants.
- .8 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

1.2 PRE- CONSTRUCTION MEETING

- .1 Within 15 days after award of Contract: Departmental Representative will request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
- .2 Attendance will include, but is not limited to, the Departmental Representative, members of the ATB and Contractor.
- .3 Departmental Representative to establish time and location of preconstruction meeting, Contractor to notify parties concerned a minimum of 4 working days before meeting.
- .4 Departmental Representative will chair the meeting, record minutes and issue minutes.
- .5 Agenda to include:
 - .1 Introduction of official representative of participants in the Work.
 - .2 Start date on site.
 - .3 Communication Protocol for submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
 - .4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 51 00 - Temporary Facilities.
 - .5 Penticton Airport Security requirements.
 - .6 Site safety in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

PROJECT MEETINGS

- .7 Communication Protocol for proposed changes, change orders, procedures, approvals required.
- .8 Owner's Work.
- .9 Record drawings in accordance with Section 01 78 00 - Closeout Submittals.
- .10 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.
- .11 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.
- .12 Monthly progress claims, administrative procedures, photographs, hold backs.
- .13 Appointment of inspection and testing agencies or firms.

1.3

PROGRESS MEETINGS

- .1 During course of Work and two weeks prior to Project Completion, schedule progress meetings bi-weekly.
- .2 Attendance to include but is not limited to Departmental Representative, members of the Penticton Airport and Contractor.
- .3 Contractor responsible to record minutes of meetings and circulate to attending parties and affected parties not in attendance within five (5) days after meeting.
- .4 Record next meeting dates in the meeting minutes or notify parties minimum of seven (7) days in advance for other ad-hoc meetings.
- .5 Agenda to include, at a minimum, the following:
 - .1 Review, approval of minutes of previous meeting.
 - .2 Review of Health and Safety including any incidents, near misses, and WorkSafe BC visits.
 - .3 Review of Work progress since previous meeting.
 - .4 Coordination discussions with Penticton Airport.
 - .5 Construction schedule review.
 - .6 Review of off-site fabrication delivery schedules.
 - .7 Corrective measures and procedures to regain projected schedule.
 - .8 Request for Information (RFI) log review.
 - .9 Engineering Disciplines Reviews.
 - .1 Electrical
 - .10 Change order log review.
 - .11 Review submittal schedule.
 - .12 Review updated as built.
 - .13 Review and resolve site issues.
 - .14 New business.

END OF SECTION

CONSTRUCTION PROGRESS SCHEDULE

1.1 SCHEDULES REQUIRED

- .1 Submit schedules as follows.
 - .1 Construction progress schedule.
 - .2 Submittal schedule for shop drawings and product data.
 - .3 Product delivery schedule.

1.2 FORMAT

- .1 Prepare schedule in form of horizontal bar chart (GANNTT).
- .2 Provide a separate bar for each major item of work, trade or operation.
- .3 Provide horizontal time scale identifying first work day of each week.
- .4 Format for listings: chronological order of start of each item of work.
- .5 Identification of listings: by Specification subjects or system descriptions.

1.3 SUBMISSION

- .1 Submit initial schedule within 7 working days after award of Contract.
- .2 Submit minimum of 3 copies to be retained by the Departmental Representative.
- .3 The Departmental Representative will review schedule and return review copy within 7 working days after receipt.
- .4 Re-submit finalized schedule within 3 working days after return of review copy.
- .5 Submit revised progress schedule with each application for payment.
- .6 Distribute copies of revised schedule to:
 - .1 Subcontractors.
 - .2 Other concerned parties.
- .7 Instruct recipients to report to Contractor within 5 working days, any problems anticipated by timetable shown in schedule.

1.4 SCHEDULING

- .1 Include complete sequence of construction activities.
- .2 Include dates for commencement and completion of each major element of construction as follows.
- .3 Show projected percentage of completion of each item as of first day of week.
- .4 Indicate progress of each activity to date of submission schedule.
- .5 Show changes occurring since previous submission of schedule:
 - .1 Major changes in scope.
 - .2 Activities modified since previous submission.
 - .3 Revised projections of progress and completion.
 - .4 Other identifiable changes.
- .6 Provide a narrative report to define:
 - .1 Problem areas, anticipated delays and impact on schedule.
 - .2 Corrective action recommended and its effect.

CONSTRUCTION PROGRESS SCHEDULE

1.5 PROGRESS REPORTS

- .1 Maintain accurate record of the progress of the Work. Submit progress reports at times requested by the Departmental Representative.
- .2 Include in reports dates of commencement and percentage of work completed for different parts of the Work.

1.6 STAFFING AND OVERTIME

- .1 Cease work at any particular point and transfer workers to other designated points, when so directed, should the Departmental Representative judge it necessary to expedite the Work.
- .2 Should the Work fail to progress according to the approved progress schedule, work such additional time (including weekends and holidays), employ additional workers, or both, as may be required to bring the Work back on schedule, at no additional cost to Contract.

1.7 SUBMITTALS SCHEDULE

- .1 Include schedule for submitting shop drawings, product data and samples.
- .2 Indicate dates for submitting, review time, re-submission time, last date for meeting fabrication schedule.
- .3 Include dates when reviewed submittals will be required from the Departmental Representative.

END OF SECTION

SUBMITTAL PROCEDURES

1.1 APPROVALS

- .1 Approval of shop drawings and samples: Refer to Section 01 11 55 - General Instructions.

1.2 GENERAL

- .1 This Section specifies general requirements and procedures for 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 Departmental Representative.

1.3 SUBMISSION REQUIREMENTS

- .1 Co-ordinate each submission with requirements of work and Contract documents. Individual submissions will not be reviewed until all related information is available.
- .2 Allow 10 working 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.

SUBMITTAL PROCEDURES

- .4 Submissions to 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.
- .6 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 portion 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 specification sections and/or as requested by Departmental Representative.
- .4 Cross-reference shop drawing information to applicable portions of Contract documents.

1.5 SHOP DRAWINGS REVIEW

- .1 Review of shop drawings by Department Representative is for the sole purpose of ascertaining conformance with the general concept.
- .2 This review will not mean the Department Representative approves detail design inherent in shop drawings, responsibility for which remains with Contractor submitting same.

SUBMITTAL PROCEDURES

- .3 This review will not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting all requirements of construction and Contract documents.
- .4 Without restricting the generality of the foregoing, Contractor is responsible for:
 - .1 Dimensions to be confirmed and correlated at job site.
 - .2 Information that pertains solely to fabrication processes or to techniques of construction and installation.
 - .3 Co-ordination of 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 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 01 11 55 - General Instructions.

END OF SECTION

SPECIAL PROCEDURES FOR AIRPORT FACILITIES

Part 1 General

1.1 GENERAL PROTECTION

- .1 Do not disrupt airport business except as permitted by Airport Manager.
- .2 Provide temporary protection for safe movement and handling of public, personnel, pedestrians, cargo, and vehicular traffic.
- .3 Provide barricades and lights where directed by Airport Manager or Departmental Representative.

1.2 FLIGHT SAFETY

- .1 All Contractor's vehicles used on the airfield must be equipped with an orange rotary beacon or must be escorted by Airport Manager or Designate.
- .2 Foreign Object Damage (FOD) control procedures will be enforced by the Airport Manager or Designate at all times in the construction and operational area.
- .3 Site FOD clean-up shall be conducted at the end of each working day and when directed by the Airport Manager or Designate.

1.3 CONSTRUCTION EQUIPMENT

- .1 It is essential that all power tools, internal combustion engines, and equipment used for work in this project, be equipped with suppressors to eliminate interference with airfield radio, and telecommunications equipment.

1.4 RESTRICTED OR SECURE AREA

- .1 Any area on airport property to which access is restricted by sign and/or monitored is a secure or restricted area.
- .2 Coordinate use of premises under direction of Airport Manager or Designate.

1.5 CONTRACTOR PERSONNEL

- .1 Provide Airport Manager or Designate and site personnel with list of responsible personnel complete with phone numbers, and those of sub-contractors, who may be contracted after working hours in case of an emergency.
- .2 The Contractor will be responsible for personnel and vehicles employed by the Contractor as well as personnel and vehicles of a sub-contractor and suppliers of materials or services requiring access to restricted areas.

1.6 MOVEMENT OF EQUIPMENT AND PERSONNEL

- .1 For all airside work:
 - .1 Obtain Airport Manager or Designate approval on scheduling of Work.
 - .2 Control movements of equipment and personnel as directed by Airport Manager or Designate.

SPECIAL PROCEDURES FOR AIRPORT FACILITIES

1.7 EVACUATION

- .1 The Contractor shall be required to abandon and evacuate the work sites as directed, should an emergency situation be declared by Airport Authorities.
- .2 Stoppage of work
 - .1 No claim will be entertained where such stoppage does not exceed one hour in aggregate each day.

1.8 VEHICLES

- .1 Company vehicles will be removed from the restricted construction site when not actually in use. If company vehicles are left at the airport they are to be stored in the staging/storage area or a location directed by Airport Manager or Designate.

1.9 STAGING AND STORAGE AREAS

- .1 Use of site for work and storage limited to the areas indicated on the drawings or as directed by Airport Manager or Designate.
- .2 Security of any and all materials in storage or staging areas will be the sole responsibility of the Contractor. The contractor will be responsible for moving stored products or equipment that interfere with operations, occupants or other contractors.
- .3 Do not unreasonably encumber the site with materials and equipment.
- .4 Any storage or staging area that may be established by the Contractor shall be fully enclosed and lockable.
- .5 A fenced, gated storage will be provided for the contractors use for the duration of the project. Refer to the Site Plan for location.

1.10 DELIVERIES

- .1 All delivery vehicle comply to requirements of this Section.

1.11 DAILY SECURITY

- .1 Ensure that access to restricted area is arranged and secured at the beginning and end of each work day with the Airport Manager or Designate.
- .2 When work is to be done within restricted area after normal working hours, provide Airport Manager or Designate with minimum 48 hours normal business working hours notice of area, times and equipment.

1.12 UNSERVICEABLE AREAS

- .1 Mark off areas made unserviceable for aircraft by Work of this Contract by providing highly visible danger markings by day and red lights by night in Accordance with TP312, Aerodrome Standards and Recommended Practices as directed by the Airport Manager or Designate.
- .2 Open flames and flammable fuels are not permitted without permission from the Airport Manager or Designate.

SPECIAL PROCEDURES FOR AIRPORT FACILITIES

1.13 PASSES AND KEYS

- .1 A picture Identification e.g. Valid Driver's License will be required to enter airside. Temporary passes maybe issued to contractor for their employees after verification of above picture.
- .2 Keys necessary for access to restricted areas will be issued by the Airport Manager. The keys will be returned at the end of the project work or according to arrangements laid down by the Airport Manager. Keys lost or not returned shall be subject to a charge of \$200.00.

1.14 Products

NOT USED

1.15 Execution

NOT USED

END OF SECTION

HEALTH AND SAFETY REQUIREMENTS

1.1 References

- .1 Government of Canada.
 - .1 Canada Labour Code - Part II
 - .2 Canada Occupational Health and Safety Regulations.
- .2 National Building Code of Canada (NBC):
 - .1 Part 8, Safety Measures at Construction and Demolition Sites.
- .3 Canadian Standards Association (CSA) as amended:
 - .1 CSA Z797-2009 Code of Practice for Access Scaffold
 - .2 CSA S269.1-1975 (R2003) Falsework for Construction Purposes
 - .3 CSA S350-M1980 (R2003) Code of Practice for Safety in Demolition of Structure
 - .4 CSA Z1006-10 – Management of Work In Confined Space
- .4 National Fire Code of Canada 2010 (as amended)
 - .1 Part 5 – Hazardous Processes and Operations and Division B as applicable and required.
- .5 American National Standards Institute (ANSI):
 - .1 ANSI A10.3, Operations – Safety Requirements for Powder-Actuated Fastening Systems.
- .6 Province of British Columbia:
 - .1 Workers Compensation Act Part 3-Occupational Health and Safety.
 - .2 Occupational Health and Safety Regulation.
- .7 NMS Section 00 10 10 Specification Index (Appendix A thru Appendix E).

1.2 Related Sections

- .1 Refer to the current NMS Sections as indicated in Section 000110 Specification Index.

1.3 Workers' Compensation Board Coverage

- .1 Comply fully with the Workers' Compensation Act, regulations and orders made pursuant thereto, and any amendments up to the completion of the work.
- .2 Maintain Workers' Compensation Board coverage during the term of the Contract, until and including the date that the Certificate of Final Completion is issued.

1.4 Compliance with Regulations

- .1 PWGSC may terminate the Contract without liability to PWGSC where the Contractor, in the opinion of PWGSC, refuses to comply with a requirement of the Workers' Compensation Act or the Occupational Health and Safety Regulations.
- .2 It is the Contractor's responsibility to ensure that all workers are qualified, competent and certified to perform the work as required by the Workers' Compensation Act or the Occupational Health and Safety Regulations.

HEALTH AND SAFETY REQUIREMENTS

1.5 Submittals

- .1 Submit to Departmental Representative submittals listed for review in accordance with Section 013300.
- .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 Material Safety Data Sheets (MSDS), and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.
 - .5 Copy of Contractors' Construction Safety Manual Emergency Procedures.
- .4 The Departmental Representative will review the Contractor's Site Specific Project Health and Safety Plan and Emergency Procedures, and provide comments to the Contractor within 5 (five) 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
- .4 requirements of Contract documents, applicable Federal, Provincial, Territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

HEALTH AND SAFETY REQUIREMENTS

1.7 Health and Safety Coordinator

- .1 The contractor shall appoint a Health and Safety Coordinator who is a Registered Occupational Hygienist and shall:
 - .1 Be responsible for completing all health and safety training, and ensuring that personnel that do not successfully complete the required training are not permitted to enter the site to perform work
 - .2 Be responsible for implementing, daily enforcing, and monitoring the site-specific Health and Safety Plan.
 - .3 Be on site during execution of work.

1.8 General Conditions

- .1 Ensure that non-authorized persons are not allowed to circulate in designated construction areas of the work sites.
 - .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 work sites against entry.

1.9 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.

1.10 Project/Site Conditions

- .1 Work at site will involve contact with:
 - .1 PWGSC and other Federal employees,
 - .2 Penticton Airport operational staff,
 - .3 Other contractors,
 - .4 Unpredictable weather conditions,
 - .5 Threat of earthquake,
 - .6 Restricted access space,
 - .7 Concealed and buried electrical services,
 - .8 Excavating and trenching,
 - .9 Noise levels Issue's.
 - .10 Hazardous Building Materials Assessment - Appendix A.

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.

HEALTH AND SAFETY REQUIREMENTS

1.12 Work Permits

- .1 Obtain specialty permits related to project before start of work.

1.13 Filing of Notice

- .1 The Prime 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 Develop, implement, and enforce 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 communication 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.
- .2 Develop the Site Specific project health and Safety Plan in collaboration with all subcontractors. Ensure that work/activities of subcontractors are included in the hazard assessment and are reflected in the plan.
- .3 Revise and update Site Specific Project Health and Safety Plan as required, and re-submit to the Departmental Representative.

HEALTH AND SAFETY REQUIREMENTS

- .4 Departmental Representative's review: the review of the contractors' Site Specific Safety Project Health and Safety Plan by Public Works and Government Services Canada(PWGSC) shall not relieve the Contractor of responsibility for errors or omissions in final Site Specific Project 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 and other PWGSC staff as required.
- .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 and PWGSC 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.
- .5 At least once each year, emergency drills must be held to ensure awareness and effectiveness of emergency exit routes and procedures, and a record of the drills must be kept.
- .6 Revise and update emergency procedures as required, and re-submit to the Departmental Representative.

HEALTH AND SAFETY REQUIREMENTS

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 labeling 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 product(s) intended for use. Submit applicable MSDS and WHMIS documents as per Section 013300.
 - .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 NMS Sections as indicated in Section 000110 Specification Index.

1.17 Off Site Contingency and Emergency Response Plan

- .1 Prior to commencing Work involving handling of hazardous materials, develop off site Contingency and Emergency Response Plan.
- .2 Plan must provide immediate response to serious site occurrence such as explosion, fire, or migration of significant quantities of toxic or hazardous material from Site.

1.18 Personnel Health, Safety, and Hygiene

- .1 Training: ensure personnel entering Site are trained in accordance with specified personnel training requirements. Training session must be completed by Health and Safety Officer.
- .2 Levels of Protection: establish levels of protection for each Work area based on planned activity and location of activity.
- .3 Personal Protective Equipment
- .4 Furnish site personnel with appropriate PPE as specified above. Ensure that safety equipment and protective clothing is kept clean and maintained.
- .5 Develop protective equipment usage procedures and ensure that procedures are strictly followed by site personnel; include following procedures as minimum:
- .6 Ensure prescription eyeglasses worn are safety glasses and do not permit contact lenses on site within work zones.
- .7 Ensure footwear is steel-toed safety shoes or boots and is covered by rubber overshoes when entering or working in potentially contaminated work areas.
- .8 Dispose of or decontaminate PPE worn on site at end of each workday.
- .9 Decontaminate reusable PPE before reissuing.
- .10 Ensure site personnel have passed respirator fit test prior to entering potentially contaminated work areas.

HEALTH AND SAFETY REQUIREMENTS

- .11 Ensure facial hair does not interfere with proper respirator fit.
 - .1 Respiratory Protection:
 - .1 Provide site personnel with extensive training in usage and limitations of, and qualitative fit testing for, air purifying and supplied-air respirators in accordance with specified regulations.
 - .2 Develop, implement, and maintain respirator program.
 - .3 Monitor, evaluate, and provide respiratory protection for site personnel.
 - .4 Ensure levels of protection as listed have been chosen consistent with site-specific potential airborne hazards associated with major contaminants identified on site.
 - .5 In absence of additional air monitoring information or substance identification, retain an industrial hygiene specialist to determine minimum levels of respiratory protection required.
 - .6 Immediately notify Departmental Representative when level of respiratory protection required increases.
 - .7 Ensure appropriate respiratory protection during Work activities. As minimum requirement, ensure that persons entering potentially contaminated work areas are supplied with and use appropriate respiratory protection.
 - .2 Heat Stress/Cold Stress:
 - .1 Implement heat stress or cold stress monitoring program as applicable and include in site-specific Health and Safety Plan.
 - .3 Personnel Hygiene and Personnel Decontamination Procedures. Provide minimum as follows:
 - .1 Suitable containers for storage and disposal of used disposable PPE.
 - .2 Potable water and suitable sanitation facility.
 - .4 Emergency and First-Aid Equipment:
 - .1 Locate and maintain emergency and first-aid equipment in appropriate location on site including first-aid kit to accommodate number of site personnel; portable emergency eye wash; 9 kg ABC type dry chemical fire extinguishers as required.
- 1.19 Asbestos Hazard**
 - .1 Modifications to spray- or trowel-applied asbestos surfaces can be hazardous to health.
 - .2 Removal and handling of asbestos will be performed as per Worksafe B.C. Regulations Part 6 Asbestos.
 - .3 Refer to Hazardous Building Materials Assessment in Appendix A.
- 1.20 Removal of Lead-Containing Paints**
 - .1 All paints containing TCLP lead concentrations above 5 ppm are classified as hazardous.

HEALTH AND SAFETY REQUIREMENTS

- .2 Carry out demolition activities involving lead-containing paints in accordance with applicable Provincial regulations.
- .3 Refer to Hazardous Building Materials Assessment in Appendix A.

1.21 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.
 - .3 Develop, implement and enforce a communication plan with Departmental representative and maintenance staff for all electrical work and lockout procedures.
 - .4 Follow the Isolation procedure forms for high voltage isolation supplied by PWGSC.

1.22 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.

1.23 Overloading

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

1.24 Falsework

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

1.25 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.

1.26 Confined Spaces

- .1 Carry out work in confined spaces in compliance with Worksafe B.C. Part 9 Confined Spaces and CSA Z1006-10 Management of Work in Confined Space.

HEALTH AND SAFETY REQUIREMENTS

1.27 Restricted Access

- .1 Contractor shall perform a hazard assessment and develop an appropriate restricted access entry plan in accordance with Worksafe B.C. regulations.

1.28 Confined Space and Restricted Space Outside of Defined Work Site

- .1 Carry out work in confined spaces in compliance with Worksafe B.C. Part 9 Confined Spaces and CSA Z1006-10 Management of Work in Confined Space. Coordinate all confined space entry work with PWGSC Departmental Representative through the contractor's confined space entry permit system.
- .2 Contractor shall perform a hazard assessment and develop an appropriate restricted access entry plan in accordance with Worksafe B.C. regulations. Coordinate all restricted access space entry work with the PWGSC Departmental Representative prior to entry.
- .3 The Contractor is required to provide a reasonable amount of time to the Departmental Representative for making arrangements for entry and/or access to Confined Space or Restricted Access spaces located outside the designated work site.

1.29 Powder-Actuated Devices

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

1.30 Fire Safety and Hot Work

- .1 Coordinate all hot work with PWGSC Departmental Representative through the contractors' hot work permit system.
- .2 Obtain Departmental Representative's authorization before any welding, cutting or any other hot work operations can be carried out on site.
- .3 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.

1.31 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.

1.32 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.

HEALTH AND SAFETY REQUIREMENTS

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

1.33 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.

1.34 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 Health and Safety Coordinator, 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.

1.35 Meetings

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

1.36 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.

HEALTH AND SAFETY REQUIREMENTS

- .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

QUALITY CONTROL

1.1 INSPECTION

- .1 Be responsible for quality control during execution of Work.
- .2 Allow the 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.
- .3 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by the Departmental Representative's instructions, or law of Place of Work.
- .4 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.
- .5 The Departmental Representative may order any 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, Canada will pay cost of examination and replacement.

1.2 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.

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

1.4 REPORTS

- .1 Submit 3 copies of inspection and test reports to the Departmental Representative and Authority having Jurisdiction.
- .2 Provide copies to Subcontractor of work being inspected or tested, manufacturer or fabricator of material being inspected or tested.

END OF SECTION

TEMPORARY FACILITIES

Part 1 General

1.1 ACCESS AND DELIVERY

- .1 Contractor is required to use only the designated entrance to access the work site, for deliveries to site, and as the exit for offsite disposal.
 - .1 Maintain for duration of contract.
 - .2 Make good damage resulting from Contractor's use.
- .2 Use of the Penticton Airport facility will be granted to the Contractor through the Departmental Representative.
 - .1 The contractor's work site is to be used for loading and unloading purposes.
- .3 Provide and maintain access roads, sidewalk crossing ramps and construction runways as may be required for access to the work. All roadways and walkways outside of the Contractor's work site must be kept clear of materials and equipment at all times.
- .4 Provide and maintain competent flag operators, traffic signals, barricades and flares, lights or lanterns as may be required to perform work and protect other users of the Facility.

1.2 CONSTRUCTION PARKING

- .1 Construction staff shall be responsible for their own parking in nearby private facilities.

1.3 STORAGE FACILITIES

- .1 Confine work and operations of employees to areas indicated on Contract Documents. Do not unreasonably encumber premises with products. Storage space to be limited to the area of construction.
- .2 Do not load or permit to load any part of Work with weight or force that will endanger Work or existing structure or elements.
- .3 Provide and pay for all off-site storage as required. Note that storage space is limited on site. Refer to site plan for location of Contractor's site storage and lay-down area.

1.4 SANITARY FACILITIES

- .1 Contractor will provide their own portable sanitary facilities. Maintain in a safe and sanitary condition. Construction staff will not be allowed to use Airport washrooms.

1.5 SCAFFOLDING

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

TEMPORARY FACILITIES

1.6 HOISTING

- .1 Provide, operate and maintain hoists required for moving of workers, materials and equipment. Make financial arrangements with Sub-contractors for their use of hoists.
- .2 Hoists shall be operated by qualified operator.

1.7 HOARDING

- .1 Prior to all demolition and construction, install plywood hoarding or protective barrier as detailed. Maintain in safe and clean condition throughout duration of project. Submit hoarding plan to Departmental Representative for approval.
- .2 Erect and maintain safety barricades around all openings and other danger areas as required by Building Code and WCB.
- .3 Installation of hoarding must not create permanent damage to existing wall cladding or flooring finish which is of heritage value.

1.8 SITE OFFICE

- .1 Contractor to provide their own trailer as temporary site office in an area to be designated by the Departmental Representative.
- .2 Contractor should clear and demolish site office at end of project according to contract requirement.

1.9 REMOVAL OF TEMPORARY FACILITIES

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

1.10 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 offsite on completion of Project when directed by Departmental Representative.

1.11 CLEAN-UP

- .1 Remove construction debris, waste materials, packaging material from work site daily.
- .2 Clean dirt of mud tracked onto paved or surfaced roadways.
- .3 Store materials resulting from demolition activities that are salvageable.
- .4 Stack stored new or salvaged material not in construction facilities.
- .5 At completion of Project: Remove and dispose of all debris, thoroughly clean and restore site to condition found at commencement of Work. Repair and make good to all damage caused by construction activities.

END OF SECTION

TEMPORARY BARRIERS AND ENCLOSURES

Part 1 General

1.1 RELATED SECTIONS

.1 N/A

1.2 REFERENCES

.1 Public Works Government Services Canada (PWGSC) Standard Acquisition Clauses and Conditions (SACC)-ID: R0202D, Title: General Conditions 'C', In Effect as of: 2012-01-18.

1.3 INSTALLATION AND REMOVAL

.1 Provide temporary controls in order to execute Work expeditiously.
.2 Remove from site all such work after use.

1.4 GUARD RAILS AND BARRICADES

.1 Provide secure, rigid guard rails and barricades around deep excavations.

1.5 ACCESS TO SITE

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

1.6 PUBLIC TRAFFIC FLOW

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

1.7 FIRE ROUTES

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

1.8 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

.1 Protect surrounding private and public property from damage during performance of Work.
.2 Be responsible for damage incurred.

1.9 PROTECTION OF BUILDING FINISHES

.1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.
.2 Provide necessary screens, covers, and hoardings.
.3 Confirm with Departmental Representative locations and installation schedule 3 days prior to installation.
.4 Be responsible for damage incurred due to lack of or improper protection.

1.10 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

TEMPORARY BARRIERS AND ENCLOSURES

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

COMMON PRODUCT REQUIREMENTS

1.1 PRODUCTS/MATERIAL AND EQUIPMENT

- .1 Use NEW products/material and equipment unless otherwise specified. Term "products" is referred to throughout specifications.
- .2 Use products of one (1) manufacturer for material and equipment of 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 instructions. Departmental Representative will designate which document is to be followed.
- .5 Provide metal fastenings and accessories in 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 items and fasteners.
 - .4 FRP fibre reinforced plastic washers: use with FRP items and fabrications.
- .11 Deliver, store and maintain packaged material and equipment with manufacturer 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 supplier 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 to be new, not damaged or defective and of best quality (compatible with specifications) for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.

COMMON PRODUCT REQUIREMENTS

- .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 requirements of specifications. Produce documents when requested by Departmental Representative.
- .4 Should any dispute arise as to quality or fitness of products, the decision rests strictly with Departmental Representative based upon requirements of Contract Documents.
- .5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout 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 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 work.
- .3 In event of failure to notify Departmental Representative at start of work and should it subsequently appear that work may be delayed for such reason, Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in either Contract price or Contract time.

1.4 MANUFACTURER INSTRUCTIONS

- .1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer instructions.
 - .1 Do not rely on labels or enclosures provided with products.
 - .2 Obtain written instructions directly from manufacturer.
- .2 Notify Departmental Representative in writing of conflicts between specifications and manufacturer instructions so that Departmental Representative may establish course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in either Contract price or Contract time.

COMMON PRODUCT REQUIREMENTS

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 manufacturers, or any other manufacturer meeting or exceeding Prescriptive specifications and indicated Products.
- .3 Products specified by performance and referenced standard: select any product meeting or exceeding 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 referenced standard or by Performance specifications, upon request of Departmental Representative obtain from manufacturer and independent laboratory report showing that product meets or exceeds specified requirements.

1.6 SUBSTITUTION AFTER CONTRACT AWARD

- .1 No substitutions are permitted without prior written approval of 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 proposed substitution.
- .3 Proposals will be considered by 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 attention of Departmental Representative is considered by Departmental Representative as equivalent to product specified and will result in a credit to 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 project. Pay for design or drawing changes required as result of substitution.
- .5 Amounts of all credits arising from approval of substitutions will be determined by Departmental Representative and Contract price will be reduced accordingly.

END OF SECTION

EXAMINATION AND PREPARATION

Part 1 General

1.1 EXISTING SERVICES

- .1 Before commencing work, establish location and extent of service lines in area of Work and notify Departmental Representative of findings.
- .2 Remove abandoned service lines within 2 m of structures. Cap or otherwise seal lines at cut-off points as directed by Departmental Representative.

1.2 LAYOUT

- .1 Confirm all project requirements prior to starting work.
- .2 Make no changes or relocations without prior written notice to Departmental Representative.
- .3 Confirm all structural, electrical, civil and mechanical work prior to starting construction.

1.3 LOCATION OF EQUIPMENT AND FIXTURES

- .1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.
- .2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.
- .3 Inform Departmental Representative of impending installation and obtain approval for actual location.
- .4 Submit field drawings to indicate relative position of various services and equipment when required by Departmental Representative.

1.4 RECORDS

- .1 Maintain a complete, accurate log of work as it progresses.
- .2 Record locations of maintained, re-routed and abandoned service lines.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

EXECUTION REQUIREMENTS

1.1 SUBMITTALS

- .1 Submit written request in advance of cutting or alteration which affects any of following.
 - .1 Structural integrity of any part of Project.
 - .2 Efficiency, maintenance or safety of any operational element.
 - .3 Visual qualities of sight-exposed elements.
 - .4 Interior and exterior building finishes.

1.2 INCLUDE IN REQUEST

- .1 Identification of Project.
- .2 Location and description of affected Work.
- .3 Statement on necessity for cutting or alteration.
- .4 Description of proposed Work and products to be used.
- .5 Alternatives to cutting and patching.
- .6 Effect on work of Other Contractor.
- .7 Written permission of affected Other Contractor.
- .8 Date and time work will be executed.

1.3 MATERIALS

- .1 Required for original installation.

1.4 PREPARATION

- .1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.
- .2 After uncovering, inspect conditions affecting performance of Work.
- .3 Beginning of cutting or patching means acceptance of existing conditions.
- .4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.
- .5 Cover adjacent surfaces and finishes with clean and dry drop sheets, kraft paper, cardboard or other suitable coverings during minor demolition.

1.5 EXECUTION

- .1 Execute cutting, fitting and patching required to perform work. Perform minor demolition required for alterations with care not to damage adjacent construction, fittings, fixtures, surfaces and finishes scheduled to remain.
- .2 Obtain Departmental Representative's approval before cutting, boring or sleeving load-bearing members
- .3 Fit several parts together, to integrate with other work.
- .4 Uncover work to install ill-timed work, at no cost to Contract.
- .5 Remove and replace defective and non-conforming work, at no cost to Contract.
- .6 Execute work by methods to avoid damage to other work, and which will provide proper surfaces to receive patching and finishing. Make cuts with clean, true, smooth edges.

EXECUTION REQUIREMENTS

- .7 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.
- .8 Restore work with new products in accordance with requirements of Contract Documents.
- .9 Include cost of making good all surfaces, substrates and work disturbed by removal of existing work and by installation of new work.

1.6 MATCHING TO EXISTING WORK

- .1 Make new work in existing areas and all alteration/renovation work match in every respect similar items in existing areas.
- .2 Use new materials to match existing items. Where perfect matches cannot be made as to quality, texture, colour and pattern remove existing materials and replace with new materials of comparable quality selected by the Departmental Representative, to extent directed by the Departmental Representative.
- .3 Execute Work carefully wherever existing work is being re-used. Make repairs to such reused items after re-installation to properly restore them. Where proper restoration is impractical, such items will be rejected and replaced to the Departmental Representative's approval.
- .4 After removal of reusable items, carefully patch and repair original location.
- .5 Wherever existing work is being altered to make way for new work, perform such cutting and patching neatly and make finished installations equal to quality and appearance.
- .6 Where new work is a continuation or an extension of existing work take care to blend both together with complete regard to appearance. Obvious joints and visible patches not acceptable.

1.7 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 straight edges and templates required to facilitate the Departmental Representative's inspection of work.
- .4 Review layouts with the Departmental Representative prior to commencement of work.

1.8 LOCATION OF EQUIPMENT AND FIXTURES

- .1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.
- .2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.
- .3 Inform the Departmental Representative of impending installation and obtain his approval for actual location.
- .4 Submit field drawings to indicate relative position of various services and equipment when required by the Departmental Representative.

END OF SECTION

CLEANING

1.1 PROJECT CLEANLINESS

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris.
- .2 Remove waste materials from site at regularly scheduled times or dispose of as directed by the Departmental Representative. Refer to Section 01 35 43 - Environmental Procedures for additional requirements.
- .3 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .4 Provide on-site containers for collection of waste materials and debris. Locate where directed by the Departmental Representative.
- .5 Provide and use clearly marked separate bins for recycling wherever facilities are available. Refer to Section 01 74 21 - Waste Management and Disposal for additional requirements.
- .6 Remove waste material and debris from site and deposit in waste containers at end of each working day.
- .7 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .8 Use only cleaning materials recommended by manufacturer of surface to be cleaned and as recommended by cleaning material manufacturer.
- .9 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.2 FINAL CLEANING

- .1 When Work is substantially completed, remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2 Remove waste products and debris.
- .3 Prior to final review, remove surplus products, tools, construction machinery and equipment.
- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 Remove stains, spots, marks and dirt from decorative work, electrical/mechanical fixtures, furniture fitments; walls, floors and ceilings.
- .6 Clean lighting reflectors, lenses and other lighting surfaces.
- .7 Vacuum clean and dust room interiors.
- .8 Sweep and power wash pavement around building and all pavement parking/storage areas used by Contractor to remove all traces of construction spillage, stains and residue. Do not blast dirty water onto adjacent buildings and site features.

END OF SECTION

CONSTRUCTION/DEMOLITION WASTE MANAGEMENT

1.1 RELATED WORK

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

1.2 DEFINITIONS

- .1 Waste Reduction Workplan: written report which addresses opportunities for reduction, re-use or recycling of materials.
- .2 Materials Source Separation Program: consists of 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. Provide separate containers for re-usable and/or recyclable materials of following:
 - .1 Construction waste: including but not limited to following types.
 - .1 Uncontaminated packaging (wood, metal banding, cardboard, paper, plastic wrappings, polystyrene).
 - .2 Wood pallets (recycle or return to shipper).
 - .3 Metals (pipe, conduit, ducting, wiring, miscellaneous cuttings)
 - .4 Wood (uncontaminated).
 - .5 Paint, solvent, oil.
 - .6 Other materials as indicated in technical sections.
 - .2 Administration/worker waste (uncontaminated): including but not limited to following types.
 - .1 Paper, cardboard.
 - .2 Plastic containers and lids marked types 1 through 6.
 - .3 Glass and aluminum drink containers (recycle or return to vendor).
- .2 Implement Materials Source Separation Program for waste generated on project in compliance with approved methods and as approved by Departmental Representative.
- .3 Locate containers in locations, to facilitate deposit of materials without hindering daily operations.
- .4 Locate separated materials in areas which minimize material damage.

1.4 DIVERSION OF MATERIALS

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

CONSTRUCTION/DEMOLITION WASTE MANAGEMENT

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

END OF SECTION

CLOSEOUT PROCEDURES

1.1 INSPECTION AND DECLARATION

- .1 Contractor's inspection: Contractor and all Subcontractors will conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
 - .1 Notify the Departmental Representative in writing of satisfactory completion of Contractor's inspection and that corrections have been made.
 - .2 Request the Departmental Representative's inspection.
- .2 The Departmental Representative's inspection: the Departmental Representative and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor will correct Work accordingly.
- .3 Completion: submit written certificate that following have been performed:
 - .1 Work has been completed and inspected for compliance with Contract Documents.
 - .2 Defects have been corrected and deficiencies have been completed.
 - .3 Certificates required by authorities having jurisdiction have been submitted.
 - .4 Work is complete and ready for Final Inspection.
- .4 Final inspection: when items noted above are completed, request final inspection of Work by the Departmental Representative and Contractor. If Work is deemed incomplete by the Departmental Representative, complete outstanding items and request re-inspection.

END OF SECTION

CLOSEOUT SUBMITTALS

1.1 SUBMISSION

- .1 Prepare instructions and data by personnel experienced in maintenance and operation of described products.
- .2 Revise content of documents as required before final submittal.
- .3 Phasing of submission:
 - .1 5 working days before substantial performance of work submit to Departmental Representative 4 final copies of operation and maintenance manuals.
 - .2 5 working days before substantial performance of work submit to Departmental Representative 4 final copies of supplements to operation and maintenance manuals for each subsequent phase.
- .4 Ensure that spare parts, maintenance materials and special tools provided are new, neither damaged nor defective and of same quality and manufacture as products provided in work.
- .5 If requested, furnish evidence as to type, source and quality of products provided.
- .6 Defective products will be rejected, regardless of previous inspections. Replace defective products at no cost to Contract.

1.2 FORMAT

- .1 Organize data in the form of an instructional manual.
- .2 Binders: vinyl, hard covered, 3 D-ring, loose leaf 219 x 279 mm size with spine and face pockets.
- .3 Cover: identify each binder with typed or printed title "Project Record Documents"; list title of project and identify subject matter of contents.
- .4 Arrange content by systems under section numbers and sequence of Specifications Index.
- .5 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .6 Text: manufacturer's printed data, or typewritten data.
- .7 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

1.3 CONTENTS, EACH VOLUME

- .1 Table of contents - provide the following:
 - .1 Title of project.
 - .2 Date of submission.
 - .3 Names, addresses, and telephone numbers of Consultant and Contractor with name of responsible parties.
 - .4 Schedule of products and systems, indexed to content of volume.
- .2 For each product or system, list names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

CLOSEOUT SUBMITTALS

- .3 Product data: mark each sheet to clearly identify 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.

1.4 RECORD DOCUMENTS

- .1 Contract drawings and shop drawings: legibly mark each item to record actual construction, including:
 - .1 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
 - .2 Field changes of dimension and detail.
 - .3 Changes made by change orders.
 - .4 Details not on original Contract drawings.
 - .5 References to related shop drawings and modifications.
- .2 Contract specifications: legibly mark each item to record actual "Workmanship of Construction", including:
 - .1 Manufacturer, trade name and catalogue number of each "Product/Material" actually installed, particularly optional items and substitute items.
 - .2 Changes made by addenda and change orders.
- .3 Recording information:
 - .1 Record changes in red ink.
 - .2 Mark on one (1) set of drawings, specifications and shop drawings with changes during progress of work.
 - .3 Provide one (1) set of CDs in AutoCAD dwg. file format with all as-built information on the CDs.
 - .4 Submit all sets for the Departmental Representative.

1.5 EQUIPMENT AND SYSTEMS

- .1 Operating procedures - include the following:
 - .1 Start-up, break-in, and routine normal operating instructions and sequences.
 - .2 Regulation, control, stopping, shutdown, and emergency instructions.
 - .3 Summer, winter and any special operating instructions.
- .2 Provide servicing schedule required.
- .3 Include manufacturer printed operation and maintenance instructions.
- .4 Include sequence of operation by controls manufacturer.
- .5 Provide original manufacturer parts list, illustrations, assembly drawings and diagrams required for maintenance.
- .6 Provide installed control diagrams by controls manufacturer.
- .7 Additional requirements: as specified in individual specification Sections.

CLOSEOUT SUBMITTALS

1.6 MANUFACTURER DOCUMENTATION REPORTS

- .1 When specified in individual Sections, require manufacturer to provide authorized representative to demonstrate operation of equipment and system, instruct Departmental Representative's indicated facility personnel and provide detailed written report that demonstration and instructions have been completed.
- .2 Departmental Representative will provide list of personnel to receive instructions, and will co-ordinate their attendance at agreed upon times.

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 on-site location as directed; place and store.
- .4 Receive and catalogue all items. Submit inventory listing to the Departmental Representative. Include approved listings in maintenance manual.
- .5 Obtain receipt for delivered products and submit to Departmental Representative.

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 Provide all software, licenses, interface and cabling devices required to setup or maintain all equipment as installed in this project, whether specifically requested or not. Software shall be fully operational and not time-limited or demonstration versions. All passwords, keys or hardware locks will be provided to the Owner.
- .4 Deliver to on-site location as directed; place and store.
- .5 Receive and catalogue all items. Submit inventory listing to Departmental Representative. Include approved listings in maintenance manual.
- .6 Obtain receipt for delivered products and submit to Departmental Representative.

1.9 WARRANTIES, BONDS, TEST REPORTS, INSPECTION REPORTS

- .1 Obtain Warranties, Bonds, Test Results, Inspection Reports executed in duplicate by subcontractors, suppliers, manufacturers and inspection agencies within 10 working days after completion of applicable item of work.
- .2 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.
- .3 Verify that documents are in proper form, contain full information and are notarized.
- .4 Co-execute submittals when required.
- .5 Retain warranties and bonds until time specified for submittal.

CLOSEOUT SUBMITTALS

1.10 COMPLETION

- .1 Submit written certificate that following have been performed:
 - .1 Work has been completed and inspected for compliance with Contract documents.
 - .2 Defects have been corrected and deficiencies have been completed.
 - .3 Equipment and systems have been tested and adjusted and are fully operational.
 - .4 Certificates required by BC Electrical Safety Authority has been submitted.
 - .5 Work is complete and ready for final inspection.

END OF SECTION

DEMONSTRATION AND TRAINING

Part 1 General

1.1 SECTION INCLUDES

- .1 Procedures for demonstration and instruction of equipment and systems to Owner's personnel.

1.2 RELATED SECTIONS

- .1 Section 01 78 00 - Closeout Submittals.
- .2 Section 01 91 13 – General Commissioning (Cx) Requirements.
- .3 Section 01 91 31 –Commissioning (Cx) Plan.
- .4 Section 01 91 33 – Commissioning: Forms.
- .5 Section 01 91 41 – Commissioning: Training.

1.3 DESCRIPTION

- .1 Demonstrate operation and maintenance of equipment and systems to Departmental Representative two weeks prior to date of final inspection.
- .2 Owner will provide list of personnel to receive instructions, and will coordinate their attendance at agreed-upon times.

1.4 QUALITY CONTROL

- .1 When specified in individual Sections, require manufacturer to provide authorized representative to demonstrate operation of equipment and systems, instruct Owner's personnel, and provide written report that demonstration and instructions have been completed.

1.5 SUBMITTALS

- .1 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.
- .2 Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.
- .3 Give time and date of each demonstration, with list of persons present.

1.6 CONDITIONS FOR DEMONSTRATIONS

- .1 Equipment has been inspected and put into operation in accordance with Manufacturer's recommendations.
- .2 Testing, adjusting, and balancing has been performed in accordance with Section 01 91 13 - General Commissioning (Cx) Requirements and equipment and systems are fully operational.
- .3 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

DEMONSTRATION AND TRAINING

1.7 PREPARATION

- .1 Verify that conditions for demonstration and instructions comply with requirements.
- .2 Verify that designated personnel are present.

1.8 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 all phases of operation and maintenance using operation and maintenance manuals as the basis of instruction.
- .3 Review contents of manual in detail to explain all aspects of operation and maintenance.
- .4 Prepare and insert additional data in operations and maintenance manuals when the need for additional data becomes apparent during instructions.
- .5 Training and demonstration will be performed by manufacturers representative and will include actual interaction with all systems requiring software or computer interface.

1.9 TIME ALLOCATED FOR INSTRUCTIONS

- .1 Contractor shall provide for a total of 1 working day of demonstration and training for all systems in the project, including but not limited to:
 - .1 Fire Alarm system and devices.
- .2 Allow for separate training sessions for NAV Canada (FSS) and PWGSC (ATB).

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

GENERAL COMMISSIONING (Cx) REQUIREMENTS

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
General requirements relating to commissioning of project's components and systems, specifying general requirements to Performance Verification of components, equipment, sub-systems, systems, and integrated systems.
- .2 Related Sections:
 - .1 Section 01 33 00 - Submittal Procedures
 - .2 Section 01 45 00 - Quality Control.
 - .3 Section 01 91 31- Commissioning (Cx) Plan
 - .4 Section 26 05 00 - Common Work Results - Electrical.
 - .5 Section 28 31 00 – Lighting Control Devices
 - .6 Section 26 28 21 – Moulded Case Circuit Breakers
- .3 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.

1.2 REFERENCE

- .1 Public Works and Government Services Canada (PWGSC)
 - .1 CSA Z320.11
 - .2 ANSI/NETA Standard for Maintenance Testing Specifications for Electrical Power Distribution Equipment and Systems.

1.3 GENERAL

- .1 Cx is a planned 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. Objectives:
 - .1 Verify installed equipment, systems and integrated systems operate in accordance with contract documents and design criteria and intent.
 - .2 Ensure appropriate documentation is compiled into the BMM.
 - .3 Effectively train O&M staff.

GENERAL COMMISSIONING (Cx) REQUIREMENTS

- .2 Cx is to be performed by an independent third party after work is completed and prior to energizing any equipment. The General Contractor is to engage and hire the services of the independent third party Commissioning Authority and commissioning Provider. The independent third party must have performed similar work for a minimum of 5 years. Contractor shall provide documentation attesting to the qualifications and experience of the proposed Testing Agency(ies) performing all commissioning work and preparing commissioning documents. These references shall be reviewed by the Consultant and Departmental Representative confirming the suitability of the Testing Agencies. The Testing Agency may only be engaged after review and approval of these documents by the Consultant and Departmental Representative.
- .3 Furnish Independent Testing agency professional engineer's letter confirming that entire installation as it pertains to each system has been installed to manufacturer's instructions. The letter is to be submitted stamped by a Professional Engineer, registered in BC, and provided to the Departmental Representative
- .4 Employ only personnel who are qualified and experienced in required field of work. Personnel must be familiar with the equipment and procedures necessary to complete the work as specified herein.
- .5 Contractor assists in Cx process, operating equipment and systems, troubleshooting and making adjustments as required.
 - .1 Systems to be operated at full capacity under various modes to determine if they function correctly and consistently at peak efficiency. Systems to be interactively with each other as intended in accordance with Contract Documents and design criteria.
 - .2 During these checks, adjustments to be made to enhance performance to meet environmental or user requirements.
- .6 Design Criteria: as per client's requirements or determined by designer to meet Project functional and operational requirements.

1.4 COMMISSIONING OVERVIEW

- .1 Cx to be a line item of General Contractor's cost breakdown.
- .2 Cx activities supplement field quality and testing procedures described in relevant technical sections.
- .3 Cx is to ensure the built facility is constructed and proven to operate satisfactorily under weather, environmental and occupancy conditions to meet functional and operational requirements. Cx activities includes transfer of critical knowledge to facility operational personnel.
- .4 Complete all start-up and verification of systems prior to review by Commissioning Agent.
 - .1 To bring mechanical, electrical and building architectural systems and components from a state of static completion to a state of dynamic operation.
 - .2 To verify conformance to contract requirements.
 - .3 To confirm installations meet requirements of Contract Documents.

GENERAL COMMISSIONING (Cx) REQUIREMENTS

- .4 To provide all testing documents and records.
- .5 To ensure completed facility meets contract requirements.
- .6 To provide a documented operator training program.
- .7 To verify accuracy of project record drawings and operating and maintenance manuals.
- .5 Departmental Representative will issue Interim Acceptance Certificate of Substantial Completion when:
 - .1 Completed Cx documentation has been received, reviewed for suitability and approved by Departmental Representative.
 - .2 Equipment, components and systems have been commissioned.
 - .3 O&M training has been completed.
- 1.5 NON-CONFORMANCE TO PERFORMANCE VERIFICATION REQUIREMENTS**
 - .1 Should equipment, system components, and associated controls be incorrectly installed or malfunction during Cx, correct deficiencies, re-verify equipment and components within the unfunctional system, including related systems as deemed required by Cx Authority and Departmental Representative, Cx Authority to ensure effective performance.
 - .2 Costs for corrective work, additional tests, inspections, to determine acceptability and proper performance of such items to be borne by General Contractor. Above costs to be in form of progress payment reductions or hold-back assessments.
- 1.6 PRE-CX REVIEW**
 - .1 Before Construction:
 - .1 Review contract documents, confirm by writing to Departmental Representative.
 - .1 Adequacy of provisions for Cx.
 - .2 Aspects of design and installation pertinent to success of Cx.
 - .2 During Construction:
 - .1 Co-ordinate provision, location and installation of provisions for Cx.
 - .3 Before start of Cx:
 - .1 Have completed Cx Plan up-to-date.
 - .2 Ensure installation of related components, equipment, sub-systems, systems is complete.
 - .3 Fully understand Cx requirements and procedures.
 - .4 Have Cx documentation shelf-ready.
 - .5 Understand completely design criteria and intent and special features.
 - .6 Submit complete start-up documentation to Departmental Representative.
 - .7 Have Cx schedules up-to-date.
 - .8 Ensure systems have been cleaned thoroughly.

GENERAL COMMISSIONING (Cx) REQUIREMENTS

- .9 Complete TAB procedures on systems, submit TAB reports to Departmental Representative for review and approval.
- .10 Submit factory testing report of Electrical Equipment to Departmental Representative for review and approval.
- .11 Ensure "As-Built" system schematics are available.
- .4 Inform Departmental Representative in writing of discrepancies and deficiencies on finished works.

1.7 CONFLICTS

- .1 Report conflicts between requirements of this section and other sections to Departmental Representative before start-up and obtain clarification.
- .2 Failure to report conflict and obtain clarification will result in application of most stringent requirement.

1.8 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Submit no later than 4 weeks after award of Contract:
 - .1 Name of Cx Authority and General Contractor's Cx Provider.
 - .2 Draft Cx documentation.
 - .3 Preliminary Cx schedule.
 - .2 Request in writing to Departmental Representative for changes to submittals and obtain written approval at least 8 weeks prior to start of Cx.
 - .3 Submit proposed Cx procedures to Departmental Representative where not specified and obtain written approval at least 8 weeks prior to start of Cx.
 - .4 Provide additional documentation relating to Cx process required by Departmental Representative, specifically;
 - .1 Cx Plan and Schedule
 - .2 Accepted Shop drawings
 - .3 Completed PI forms
 - .4 Approved TAB report
 - .5 Approved PV forms
 - .6 Approved O&M manuals
 - .7 Approved System and Integrated System Test Report
 - .8 Approved Factory testing reports
 - .9 Approved Training and Attendance forms
 - .10 Accepted "As-built" Plans and Specifications
 - .11 Final Cx Report

1.9 COMMISSIONING DOCUMENTATION

- .1 Refer to Section 01 91 33 - Commissioning (Cx) Forms: Installation Check Lists and Product Information (PI) / Performance Verification (PV) Forms for requirements and instructions for use.

GENERAL COMMISSIONING (Cx) REQUIREMENTS

- .2 General Contractor to review and approve Cx documentation submitted by Cx Provider prior to submission to Departmental Representative for review.
- .3 Provide completed and approved Cx documentation to Departmental Representative.

1.10 COMMISSIONING SCHEDULE

- .1 Provide detailed Cx schedule as part of construction schedule in accordance with Section 01 32 17 Construction Progress Schedule Bar (GANTT Chart).
- .2 Provide adequate time for Cx activities prescribed in technical sections and commissioning sections including:
 - .1 Approval of Cx reports.
 - .2 Verification of reported results.
 - .3 Repairs, retesting, re-commissioning, re-verification.
 - .4 Training.

1.11 COMMISSIONING MEETINGS

- .1 Convene Cx meetings following project meetings: Section 01 32 17 Construction Progress Schedule Bar (GANTT Chart) and as specified herein.
- .2 Purpose: to resolve issues, monitor progress, identify deficiencies, relating to Cx.
- .3 Continue Cx meetings on regular basis until commissioning deliverables have been addressed.
- .4 At 60% construction completion stage. Section 01 32 17 Construction Progress Schedule Bar (GANTT Chart). General Contractor to call a separate Cx scope meeting to review progress, discuss schedule of equipment start-up activities and prepare for Cx. Issues at meeting to include:
 - .1 Review duties and responsibilities of General Contractor and subcontractors, addressing delays and potential problems.
 - .2 Determine the degree of involvement of trades and manufacturer's representatives in the commissioning process.
- .5 Thereafter Cx meetings to be held until project completion and as required during equipment start-up and functional testing period.
- .6 Meeting will be chaired by General Contractor with their Commissioning Provider, who will record and distribute minutes.
- .7 Ensure subcontractors and relevant manufacturer representatives are present at 60% and subsequent Cx meetings and as required.

1.12 STARTING AND TESTING

- .1 General Contractor assumes liabilities and costs for inspections. Including disassembly and re-assembly after approval, starting, testing and adjusting, including supply of testing equipment.

1.13 WITNESSING OF STARTING AND TESTING

- .1 Provide 14 days' notice prior to commencement.

GENERAL COMMISSIONING (Cx) REQUIREMENTS

- .2 Cx Authority and Departmental Representative to witness of start-up and testing.
- .3 Cx Authority and Departmental Representative shall be advised of and shall be in attendance during energization of any and all equipment as part of this project.
- .4 General Contractor's Cx Provider to be present at tests performed and documented by sub-trades, suppliers and equipment manufacturers.
 - .1 Minimum of 5 years experience in design, installation and operation of equipment and systems.
 - .2 Ability to interpret test results accurately.
 - .3 To report results in clear, concise, logical manner.

1.14 PROCEDURES

- .1 Verify that equipment and systems are complete, clean, and operating in normal and safe manner prior to conducting start-up, testing and Cx.
- .2 Conduct start-up and general testing in following distinct phases:
 - .1 Included in delivery and installation
 - .1 Verification of conformity to specification, approved shop drawings and completion of report forms.
 - .2 Visual inspection of quality of installation.
 - .2 Prior to startup:
 - .1 Startup: follow accepted start-up procedures.
 - .2 Operational testing: document equipment performance.
 - .3 System PV: include repetition of tests after correcting deficiencies.
 - .4 Post-substantial performance verification: to include fine-tuning.
- .3 Conduct following tests in accordance with Section 01 45 00 - Quality Control.
 - .1 Power distribution system including phasing, voltage, grounding and load balancing.
 - .2 Circuits originating from branch distribution panels.
 - .3 Lighting and its control.
 - .4 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.
 - .5 Systems: fire alarm system communications.
 - .6 Insulation resistance testing:
 - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
 - .2 Check resistance to ground before energizing.
- .4 Correct deficiencies and obtain approval from Cx Authority and Departmental Representative after distinct phases have been completed and before commencing next phase.
- .5 Document requires tests on approved PV forms.

GENERAL COMMISSIONING (Cx) REQUIREMENTS

- .6 Failure to follow accepted start-up procedures will result in re-evaluation of equipment by an independent testing agency selected by Departmental Representative. If results reveal that equipment start-up was not in accordance with requirements, and resulted in damage to equipment, implement following
 - .1 Minor equipment/systems: implement corrective measures approved by Departmental Representative.
 - .2 Major equipment/systems: if evaluation report concludes that damage is minor, implement corrective measures approved by Departmental Representative.
 - .3 If evaluation report concludes that major damage has occurred, Departmental Representative shall reject equipment.
 - .1 Rejected equipment to be removed from site and replace with new.
 - .2 Subject new equipment/systems to specified start-up procedures.

- 1.15 START-UP DOCUMENTATION**
 - .1 Assemble start-up documentation and submit to Cx Authority and Departmental Representative for approval before commencement of commissioning.
 - .2 Start-up documentation to include:
 - .1 Factory and on-site test certificates for specified equipment.
 - .2 Pre-start-up inspection reports.
 - .3 Signed installation/start-up check lists.
 - .4 Start-up reports,
 - .5 Step-by-step description of complete start-up procedures, to permit Cx Authority and Departmental Representative to repeat start-up at any time.

- 1.16 OPERATION AND MAINTENANCE OF EQUIPMENT AND SYSTEMS**
 - .1 After start-up, operate and maintain equipment and systems as directed by equipment/system manufacturer.
 - .2 With assistance of manufacturer develop written maintenance program and submit to Cx Authority for review and Departmental Representative for approval before implementation.
 - .3 Operate and maintain systems for length of time required for commissioning to be completed.
 - .4 After completion of commissioning, operate and maintain systems until issuance of Certificate of Substantial Performance.

- 1.17 TEST RESULTS**
 - .1 If start-up, testing and/or PV produce unacceptable results, repair, replace or repeat specified starting and/or PV procedures until acceptable results are achieved.
 - .2 Provide manpower and materials, assume costs for re-commissioning.

GENERAL COMMISSIONING (Cx) REQUIREMENTS

1.18 START OF COMMISSIONING

- .1 Notify Cx Authority and Departmental Representative at least 4 weeks prior to start of Cx.
- .2 Start Cx after elements of building affecting start-up and performance verification of systems have been completed.

1.19 INSTRUMENTS / EQUIPMENT

- .1 Submit to Departmental Representative for review and approval:
 - .1 Complete list of instruments proposed to be used.
 - .2 Listed data including, serial number, current calibration certificate, calibration date, calibration expiry date and calibration accuracy.
- .2 Provide the following equipment as required:
 - .1 2-way radios.
 - .2 Ladders.
 - .3 Heat source
 - .4 Sound level meter
 - .5 Equipment as required to complete work.

1.20 COMMISSIONING PERFORMANCE VERIFICATION

- .1 Carry out Cx:
 - .1 Under accepted simulated operating conditions, over entire operating range, in all modes.
 - .2 On independent systems and interacting systems.
- .2 Cx procedures to be repeatable and reported results are to be verifiable.
- .3 Follow equipment manufacturer's operating instructions.
- .4 EMCS trending to be available as supporting documentation for performance verification.

1.21 WITNESSING COMMISSIONING

- .1 Cx Authority to witness activities and verify results. Departmental Representative to witness activities and verify results as required.

1.22 AUTHORITIES HAVING JURISDICTION

- .1 Where start-up, testing or commissioning procedures duplicate verification requirements of authority having jurisdiction, arrange for authority to witness procedures so as to avoid duplication of tests and to facilitate expedient acceptance of facility.
- .2 Obtain certificates of approval, acceptance and compliance with rules and regulation of authority having jurisdiction.
- .3 Provide copies to Departmental Representative within 5 days of test and with Cx report.
- .4 Authorities having jurisdiction in this project include City of Penticton and BC Safety Authority.

GENERAL COMMISSIONING (Cx) REQUIREMENTS

1.23 EXTRAPOLATION OF RESULTS

- .1 Where Cx of weather, occupancy, or seasonal-sensitive equipment or systems cannot be conducted under near-rated or near-design conditions, extrapolate part-load results to design conditions when approved by Departmental Representative in accordance with equipment manufacturer's instructions, using manufacturer's data, with manufacturer's assistance and using approved formulae.

1.24 SUNDRY CHECKS AND ADJUSTMENTS

- .1 Make adjustments and changes which become apparent as Cx proceeds.
- .2 Perform static and operational checks as applicable and as required.

1.25 DEFICIENCIES, FAULTS, DEFECTS

- .1 Correct deficiencies found during start-up and Cx to satisfaction of Cx Authority and Departmental Representative.
- .2 Report problems, faults or defects affecting Cx to Cx Authority and Departmental Representative in writing. Stop Cx until problems are rectified. Proceed with written approval from Departmental Representative.

1.26 COMPLETION OF COMMISSIONING

- .1 Upon completion of Cx, leave systems in normal operating mode.
- .2 Except for warranty and seasonal verification activities, complete Cx prior to issuance of Certificate of Substantial Performance.
- .3 Cx to be considered complete when contract Cx deliverables have been submitted and accepted by Departmental Representative.

1.27 ACTIVITIES UPON COMPLETION OF COMMISSIONING

- .1 When changes are made to baseline components or system settings established during Cx process, provide updated Cx form for affected item.

1.28 MAINTENANCE MATERIALS, SPARE PARTS, SPECIAL TOOLS

- .1 Supply, deliver, and document maintenance materials, spare parts, and special tools as specified in contract.

1.29 OCCUPANCY

- .1 Cooperate fully with Departmental Representative during stages of acceptance and occupancy of facility.

1.30 INSTALLED INSTRUMENTATION

- .1 Use instruments installed under Contract for TAB and PV if:
 - .1 Accuracy complies with these specifications.
 - .2 Calibration certificates have been deposited with Departmental Representative.

GENERAL COMMISSIONING (Cx) REQUIREMENTS

1.31 PERFORMANCE VERIFICATION TOLERANCES

- .1 Application tolerances:
 - .1 Specified range of acceptable deviations of measured values from specified values or specified design criteria. Except for special areas, to be within +/- 10% of specified values.
- .2 Instrument accuracy tolerances:
 - .1 To be of higher order of magnitude than equipment or system being tested.
- .3 Measurement tolerances during verification:
 - .1 Unless otherwise specified actual values to be within +/- 2% of recorded values.

1.32 OWNER'S PERFORMANCE TESTING

- .1 Performance testing of equipment or system by Cx Authority and Departmental Representative will not relieve Contractor from compliance with specified start-up and testing procedures.

END OF SECTION

COMMISSIONING (Cx) PLAN

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 Description of overall structure of Cx Plan and roles and responsibilities of Cx team.

1.2 REFERENCES

- .1 PWGSC Cx manual CP-1 with CSA Z320-11.
- .2 Public Works and Government Services Canada (PWGSC)
 - .1 PWGSC - Commissioning Guidelines CP.3 -3rd edition-03.
- .3 Underwriters' Laboratories of Canada (ULC)
- .4 ANSI/NETA Standard for Maintenance Testing Specifications for Electrical Power Distribution Equipment and Systems.

1.3 GENERAL

- .1 Provide fully functional facilities:
 - .1 Systems, equipment and components meet user's functional requirements before date of acceptance, and operate consistently at peak efficiencies and within specified energy budgets under normal loads.
 - .2 Facility user and O&M personnel have been fully trained in aspects of installed systems.
 - .3 Optimized life cycle costs.
 - .4 Complete documentation relating to installed equipment and systems.
- .2 Term "Cx" in this section means "Commissioning".
- .3 Use this Cx Plan as master planning document for Cx:
 - .1 Outlines organization, scheduling, allocation of resources, documentation, pertaining to implementation of Cx.
 - .2 Communicates responsibilities of team members involved in Cx Scheduling, documentation requirements, and verification procedures.
 - .3 Sets out deliverables relating to O&M, process and administration of Cx.
 - .4 Describes process of verification of how built works meet design requirements.
 - .5 Produces a complete functional system prior to issuance of Certificate of Substantial Performance.
 - .6 Management tool that sets out scope, standards, roles and responsibilities, expectations, deliverables, and provides:
 - .1 Overview of Cx.
 - .2 General description of elements that make up Cx Plan.
 - .3 Process and methodology for successful Cx.

COMMISSIONING (Cx) PLAN

- .4 Acronyms:
 - .1 Cx - Commissioning.
 - .2 BMM - Building Management Manual.
 - .3 EMCS - Energy Monitoring and Control Systems.
 - .4 MSDS - Material Safety Data Sheets.
 - .5 PI - Product Information.
 - .6 PV - Performance Verification.
 - .7 TAB - Testing, Adjusting and Balancing.
 - .8 WHMIS - Workplace Hazardous Materials Information System.
- .5 Commissioning terms used in this Section:
 - .1 Bumping: short term start-up to prove ability to start and prove correct rotation.
 - .2 Deferred Cx - Cx activities delayed for reasons beyond Contractor's control due to lack of occupancy, weather conditions, need for heating/cooling loads.

1.4 DEVELOPMENT OF 100% CX PLAN

- .1 Cx Plan to be 100% completed within 12 weeks of award of contract to take into account:
 - .1 Approved shop drawings and product data.
 - .2 Approved changes to contract.
 - .3 Contractor's project schedule.
 - .4 Cx schedule.
 - .5 Contractor's, sub-contractor's, suppliers' requirements.
 - .6 Project construction team's and Cx team's requirements.
- .2 Submit completed Cx Plan to Cx Authority for review and obtain written approval from and Departmental Representative.

1.5 REFINEMENT OF CX PLAN

- .1 During construction phase, revise, refine and update Cx Plan to include:
 - .1 Changes resulting from Client program modifications.
 - .2 Approved design and construction changes.
- .2 Revise, refine and update every 3 months during construction phase. At each revision, indicate revision number and date.
- .3 Submit completed Cx Plan to Cx Authority for review and obtain written approval from and Departmental Representative.
- .4 Include testing parameters at full range of operating conditions and check responses of equipment and systems.

1.6 COMPOSITION, ROLES AND RESPONSIBILITIES OF CX TEAM

- .1 General Contractor to maintain overall responsibility for project and is sole point of contact between members of commissioning team.

COMMISSIONING (Cx) PLAN

- .2 General Contractor is to engage and hire the services of an independent third party Commissioning Authority to ensure Cx activities are carried out to ensure delivery of a fully operational project including:
 - .1 Organizing Cx.
 - .2 Monitoring operations Cx activities.
 - .3 Review of Cx documentation from operational perspective.
 - .4 Review for performance, reliability, durability of operation, accessibility, maintainability, operational efficiency under conditions of operation.
 - .5 Protection of health, safety and comfort of occupants and O&M personnel.
 - .6 Monitoring of Cx activities, training, development of Cx documentation.
 - .7 Work closely with members of Cx Team.
 - .8 Certifying accuracy of reported results
 - .9 Certifying tabs and other results
 - .10 Developing BMM.
 - .11 Ensuring implementation of final Cx Plan.
 - .12 Implementation of Training Plan
- .3 Departmental Representative is responsible for:
 - .1 Witnessing reported results.
 - .2 Witnessing TAB and other tests.
 - .3 Provides basis of design data not included in the Contract Documents.
 - .4 Reviews commissioning checklists and test forms to ensure applicability to the project and provide comments to the Commissioning Agent.
 - .5 Attends commissioning activities as required to certify the site adaptation and related work meet the design intent and the project requirements.
- .4 Construction Team: contractor, sub-contractors, suppliers and support disciplines, is responsible for construction/installation in accordance with contract documents, including:
 - .1 Testing.
 - .2 TAB.
 - .3 Performance of Cx activities.
 - .4 Delivery of training and Cx documentation.
 - .5 Assigning one person as point of contact Departmental Representative for administrative and coordination purposes.
- .5 General Contractor it to engage and hire the services of an independent third party Commissioning Provider to implement specified Cx activities including:
 - .1 Demonstrations.
 - .2 Training.
 - .3 Testing.
 - .4 Preparation, submission of test reports.
 - .5 Performing verification of performance of installed systems and equipment.

COMMISSIONING (Cx) PLAN

- .6 PFC Facility Manager: represents lead role in Operation Phase and onwards and is responsible for:
 - .1 Receiving facility.
 - .2 Day-To-Day operation and maintenance of facility.

1.7 EXTENT OF CX

- .1 The General Contractor shall provide commissioning services for the following items .
 - .1 List of Electrical Equipment and Acceptance Tests:
 - .1 Preventable Inspections - Box, Conduit & Cable Installations
 - .2 Fire Alarm System, wiring and devices.
 - .3 Certificates and/or Equipment Test Report
 - .4 Equipment Spare Parts Report
 - .5 Generic Acceptance Report
 - .6 Twelve Step Final Acceptance Report

1.8 DELIVERABLES RELATING TO O&M PERSPECTIVES

- .1 General requirements:
 - .1 Compile English documentation.
 - .2 Documentation to be computer-compatible format ready for inputting for data management.
- .2 Provide deliverables:
 - .1 Warranties.
 - .2 Project record documentation.
 - .3 Inventory of spare parts, special tools and maintenance materials.
 - .4 Maintenance Management System (MMS) identification system used.
 - .5 WHMIS information.
 - .6 MSDS data sheets.
 - .7 Electrical Panel inventory containing detailed inventory of electrical circuitry for each panel board. Duplicate of inventory inside each panel.

1.9 DELIVERABLES RELATING TO THE CX PROCESS

- .1 General:
 - .1 Start-up, testing and Cx requirements, conditions for acceptance and specifications form part of relevant technical sections of these specifications.
- .2 Definitions:
 - .1 Cx as used in this section includes:
 - .1 Cx of components, equipment, systems, subsystems, and integrated systems.
 - .2 Factory inspections and performance verification tests.

COMMISSIONING (Cx) PLAN

- .3 Deliverables: provide:
 - .1 Cx Specifications.
 - .2 Startup, pre-Cx activities and documentation for systems, and equipment.
 - .3 Completed installation checklists (ICL).
 - .4 Completed product information (PI) report forms.
 - .5 Completed performance verification (PV) report forms.
 - .6 Results of Performance Verification Tests and Inspections.
 - .7 Description of Cx activities and documentation.
 - .8 Description of Cx of integrated systems and documentation.
 - .9 Tests witnessed by Departmental Representative.
 - .10 Training Plans.
 - .11 Cx Reports.
 - .12 Prescribed activities during warranty period.
- .4 Cx Authority to witness and certify tests and reports of results provided to Departmental Representative.

1.10 PRE-CX ACTIVITIES AND RELATED DOCUMENTATION

- .1 Items listed in this Cx Plan include the following:
 - .1 Pre-Start-Up inspections: by Cx Authority prior to permission to start up and rectification of deficiencies to Departmental Representative's satisfaction.
 - .2 Cx Authority to use approved check lists.
 - .3 Cx Authority will monitor some of these pre-start-up inspections.
 - .4 Include completed documentation with Cx report.
 - .5 Conduct pre-start-up tests: conduct pressure, static, flushing, cleaning, and "bumping" during construction as specified in technical sections. To be witnessed and certified by Cx Authority and does not form part of Cx specifications.
 - .6 Cx Authority will monitor some of these inspections and tests.
 - .7 Include completed documentation in Cx report.
- .2 Pre-Cx Activities - ELECTRICAL:
 - .1 Low voltage, medium voltage and high voltage distribution systems require independent testing agency to perform pre-energization and post-energization tests.

1.11 START-UP

- .1 Start up components, equipment and systems.
- .2 Cx Authority to monitor some of these start-up activities.
 - .1 Rectify start-up deficiencies to satisfaction of Cx Authority Departmental Representative.

COMMISSIONING (Cx) PLAN

- .3 Performance Verification (PV):
 - .1 Approved Cx Provider to perform.
 - .1 Repeat when necessary until results are acceptable to Departmental Representative.
 - .2 Use procedures modified generic procedures to suit project requirements.
 - .3 Cx Authority to witness and certify reported results using approved PI and PV forms.
 - .4 Cx Authority to approve completed PV reports and provide to Departmental Representative.
 - .5 Cx Authority and Departmental Representative reserves the right to verify up to 30% of reported results at random.
 - .6 Failure of randomly selected item shall result in rejection of PV report or report of system startup and testing.

1.12 CX ACTIVITIES AND RELATED DOCUMENTATION

- .1 Perform Commissioning by specified Cx Provider using procedures developed by Cx Authority.
- .2 Cx Authority to monitor Cx activities.
- .3 Upon satisfactory completion, Cx Provider performing tests to prepare Cx Report using approved PV forms.
- .4 Cx Authority to witness, certify reported results of, Cx activities and forward to Cx Authority.
- .5 Departmental Representative reserves right to verify a percentage of reported results at no cost to contract.

1.13 ELECTRICAL TESTING, ADJUSTING AND BALANCING

- .1 Conduct and pay for tests of the following:
 - .1 Fire Alarm testing, verification and integration.
- .2 Furnish manufacturers certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturer' s instructions .
- .3 Carry out tests in presence of the Cx Authority and Departmental Representative.
- .4 Give advance notice of proposed time of tests so that the Cx Authority and Departmental Representative can be represented at the tests.
- .5 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
- .6 Submit test results for review by the Cx Authority and Departmental Representative.
- .7 Test all systems in accordance with details in appropriate sections.
- .8 Testing methods and test results: in accordance with CSA, CEC, NETA MTS, and regulations of the supply authority and other authorities having jurisdiction.

COMMISSIONING (Cx) PLAN

- .9 Liability: During tests, assume responsibility for damages in the event of injury to personnel, building or equipment and bear costs for liability, repairs and restoration .
 - .10 Remove and replace with new materials all conductors that are found to be shorted or grounded.
 - .11 Conduct dielectric tests, hi-pot tests, insulation resistance tests and ground continuity tests as required by the nature of the various systems and equipment.
 - .1 General Operations: energize and put into operation each and every electrical circuit and item. Make repairs, alterations, replacements, tests and adjustments necessary for a complete and satisfactory operating electrical system.
 - .12 Carry out tests covering "General Operation" at the time of acceptance of the work.
 - .13 Test all systems and obtain written confirmation from the manufacturer of each system that all components have been installed correctly and that the system is functioning as intended. Present separate certification for all systems including: fire alarm, power distribution, to the Cx Authority and Departmental Representative.
 - .14 Provide labour, instruments, apparatus and pay all expenses required for the tests. The Cx Authority and Departmental Representative reserves the right to demand proof of the accuracy of all instruments used.
 - .15 When tests are performed, the Cx Authority and Departmental Representative may require that equipment be opened and removed from their housings to examine interior of equipment, terminations and connections. Provide all required labour and tools.
 - .16 Co-ordinate the testing of motors with the trades providing the equipment driven by the motors so that they are carried out at the time the driven equipment is put on test. In addition to the motor loading tests, provide labour and instruments to take and record all motor load readings required to supplement the tests on the driven equipment through various load sequences, as required by the trades involved.
 - .17 Insulation Resistance Testing:
 - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
- 1.14 INSTALLATION CHECK LISTS (ICL)**
- .1 Refer to Section 01 91 33 - Commissioning (Cx) Forms: Installation Check Lists and Product Information (PI) / Performance Verification (PV) Forms.
- 1.15 PRODUCT INFORMATION (PI) REPORT FORMS**
- .1 Refer to Section 01 91 33 - Commissioning (Cx) Forms: Installation Check Lists and Product Information (PI) / Performance Verification (PV) Forms.

COMMISSIONING (Cx) PLAN

1.16 PERFORMANCE VERIFICATION (PV) REPORT

- .1 Refer to Section 01 91 33 - Commissioning (Cx) Forms: Installation Check Lists and Product Information (PI) / Performance Verification (PV) Forms.

1.17 DELIVERABLES RELATING TO ADMINISTRATION OF CX

- .1 General:
 - .1 Because of risk assessment, complete Cx of occupancy, weather and seasonal-sensitive equipment and systems in these areas before building is occupied.

1.18 CX SCHEDULES

- .1 Prepare detailed Cx Schedule and submit to Departmental Representative for review and approval same time as project Construction Schedule. Include:
 - .1 Milestones, testing, documentation, training and Cx activities of components, equipment, subsystems, systems and integrated systems, including:
 - .1 Design criteria, design intents.
 - .2 Pre-TAB review: 28 days after contract award, and before construction starts.
 - .3 Cx agents' credentials: 60 days before start of Cx.
 - .4 Cx procedures: 3 months after award of contract.
 - .5 Cx Report format: 3 months after contract award.
 - .6 Discussion of heating/cooling loads for Cx: 3 months before start-up.
 - .7 Submission of list of instrumentation with relevant certificates: 21 days before start of Cx.
 - .8 Notification of intention to start TAB: 21 days before start of TAB.
 - .9 TAB: after successful start-up, correction of deficiencies and verification of normal and safe operation.
 - .10 Notification of intention to start Cx: 14 days before start of Cx.
 - .11 Notification of intention to start Cx of integrated systems: after Cx of related systems is completed 14 days before start of integrated system Cx.
 - .12 Identification of deferred Cx.
 - .13 Implementation of training plans.
 - .14 Cx reports: immediately upon successful completion of Cx.
 - .2 Detailed training schedule to demonstrate no conflicts with testing, completion of project and hand-over to Property Manager.
 - .3 Six (6) months in Cx schedule for verification of performance in all seasons and wear conditions.
- .2 After approval, incorporate Cx Schedule into Construction Schedule.

COMMISSIONING (Cx) PLAN

- .3 Consultant, Contractor, Contractor's Cx Provider, Cx Authority, and Departmental Representative will monitor progress of Cx against this schedule.

1.19 CX REPORTS

- .1 Submit reports of tests, witnessed and certified by Cx Authority and Departmental Representative to Departmental Representative who will verify reported results.
- .2 Include completed and certified PV reports in properly formatted Cx Reports.
- .3 Before reports are accepted, reported results to be subject to verification by Cx Authority.

1.20 TESTS TO BE PERFORMED BY OWNER/USER

- .1 None is anticipated on this project.

1.21 TRAINING PLANS

- .1 Refer to Section 01 91 41 - Commissioning (Cx) - Training.

1.22 FINAL SETTINGS

- .1 Upon completion of Cx to satisfaction of Cx Authority and Departmental Representative lock control devices in their final positions, indelibly mark settings marked and include in Cx Reports.

END OF SECTION

COMMISSIONING FORMS

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Commissioning forms to be completed for equipment, system and integrated system.

1.2 INSTALLATION/START-UP CHECK LISTS

.1 Include the following data:

.1 Product manufacturer's installation instructions and recommended checks.

.2 Special procedures as specified in relevant technical sections.

.3 Items considered good installation and engineering industry practices deemed appropriate for proper and efficient operation.

.2 Equipment manufacturer's installation/start-up check lists are acceptable for use. As deemed necessary by Cx Authority and Departmental Representative supplemental additional data lists will be required for specific project conditions.

.3 Use check lists for equipment installation. Document check list verifying checks have been made, indicate deficiencies and corrective action taken.

.4 Installer to sign check lists upon completion, certifying stated checks and inspections have been performed. Return completed check lists to Cx Authority and Departmental Representative. Check lists will be required during Commissioning and will be included in Building Maintenance Manual (BMM) at completion of project.

.5 Use of check lists will not be considered part of commissioning process but will be stringently used for equipment pre-start and start-up procedures.

1.3 PRODUCT INFORMATION (PI) REPORT FORMS

.1 Product Information (PI) forms compiles gathered data on items of equipment produced by equipment manufacturer, includes nameplate information, parts list, operating instructions, maintenance guidelines and pertinent technical data and recommended checks that is necessary to prepare for start-up and functional testing and used during operation and maintenance of equipment. This documentation is included in the BMM at completion of work.

.2 Prior to Performance Verification (PV) of systems complete items on PI forms related to systems and obtain Cx Authority and Departmental Representative's approval.

1.4 PERFORMANCE VERIFICATION (PV) FORMS

.1 PV forms to be used for checks, running dynamic tests and adjustments carried out on equipment and systems to ensure correct operation, efficiently and function independently and interactively with other systems as intended with project requirements.

COMMISSIONING FORMS

- .2 PV report forms include those developed by Contractor records measured data and readings taken during functional testing and Performance Verification procedures.
- .3 Prior to PV of integrated system, complete PV forms of related systems and obtain Cx Authority and Departmental Representative approval.

1.5 COMMISSIONING FORMS

- .1 Use Commissioning forms to verify installation and record performance when starting equipment and systems.
- .2 Strategy for Use:
 - .1 Contractor provides project-specific Commissioning forms with Specification data included.
 - .2 Contractor will provide required shop drawings information and verify correct installation and operation of items indicated on these forms.
 - .3 Confirm operation as per design criteria and intent.
 - .4 Identify variances between design and operation and reasons for variances.
 - .5 Verify operation in specified normal and emergency modes and under specified load conditions.
 - .6 Record analytical and substantiating data.
 - .7 Verify reported results.
 - .8 Form to bear signatures of recording technician.
 - .9 Submit immediately after tests are performed.
 - .10 Reported results in true measured SI unit values.
 - .11 Provide Cx Authority and Departmental Representative with originals of completed forms.
 - .12 Maintain copy on site during start-up, testing and commissioning period.

1.6 LANGUAGE

- .1 To suit the language profile of the awarded contract.

END OF SECTION

COMMISSIONING: TRAINING

1.1 SUMMARY

- .1 Section Includes:
 - .1 This Section specifies roles and responsibilities of Commissioning Training.
- .2 Related Sections:
 - .1 General Commissioning (Cx) Requirements Section 01 91 13
 - .2 Commissioning (Cx) Plan Section 01 91 31

1.2 TRAINEES

- .1 Trainees: personnel selected for operating and maintaining this facility. Includes Facility Manager, building operators, maintenance staff, security staff, and technical specialists as required.
- .2 Trainees will be available for training during later stages of construction for purposes of familiarization with systems.

1.3 INSTRUCTORS

- .1 Engineer will provide:
 - .1 Descriptions of systems.
 - .2 Instruction on design philosophy, design criteria, and design intent.
- .2 Contractor and certified factory-trained manufacturers' personnel: to provide instruction on the following:
 - .1 Start-Up, operation, shut-down of equipment, components and systems.
 - .2 Control features, reasons for, results of, implications on associated systems of, adjustment of set points of control and safety devices.
 - .3 Instructions on servicing, maintenance and adjustment of systems, equipment and components.
- .3 Contractor and equipment manufacturer to provide instruction on:
 - .1 Start-up, operation, maintenance and shut-down of equipment they have certified installation, started up and carried out PV tests.

1.4 TRAINING OBJECTIVES

- .1 Training to be detailed and duration to ensure:
 - .1 Safe, reliable, cost-effective, energy-efficient operation of systems in normal and emergency modes under all conditions.
 - .2 Effective on-going inspection, measurements of system performance.
 - .3 Proper preventive maintenance, diagnosis and trouble-shooting.
 - .4 Ability to update documentation.
 - .5 Ability to operate equipment and systems under emergency conditions until appropriate qualified assistance arrives.

COMMISSIONING: TRAINING

1.5 TRAINING MATERIALS

- .1 Instructors to be responsible for content and quality.
- .2 Training materials to include:
 - .1 "As-Built" Contract Documents.
 - .2 Operating Manual.
 - .3 Maintenance Manual.
 - .4 Management Manual.
 - .5 TAB and PV Reports.
- .3 Project Manager, Cx Authority and Facility Manager will review training manuals.
- .4 Training materials to be in a format that permits future training procedures to same degree of
- .5 detail.
- .6 Supplement training materials:
 - .1 Transparencies for overhead projectors.
 - .2 Multimedia presentations.
 - .3 Manufacturer's training videos.
 - .4 Equipment models.

1.6 SCHEDULING

- .1 Include in Commissioning Schedule time for training.
- .2 Deliver training during regular working hours, training sessions to be 8 hours in length.
- .3 Training to be completed prior to acceptance of facility.

1.7 RESPONSIBILITIES

- .1 Be responsible for:
 - .1 Implementation of training activities,
 - .2 Coordination among instructors,
 - .3 Quality of training, training materials.
- .2 Commissioning Authority will evaluate training and materials.
- .3 Upon completion of training, provide written report, signed by Instructors, witnessed by Commissioning Authority.

1.8 ELECTRICAL SYSTEM TRAINING

- .1 Organize and conduct training courses to instruct the Departmental Representative in the operation and preventative maintenance of equipment and systems provided at the completion of the project.
- .2 Provide services of qualified personnel, including each sub-trade, each major equipment supplier and design engineer to and instruct on their equipment or systems.

COMMISSIONING: TRAINING

- .3 One-person day shall be eight hours including one half hour for breaks, and one person week shall be five person days.
- .4 Submit sessions schedule and list of representatives to the Departmental Representative for approval 30 days prior to course starting date. Confirm attendance of course by written notification to all participants, followed by verbal confirmation just prior to course starting date.
- .5 Submit final copies of record drawings and operating and maintenance manuals to Departmental Representative. Submit a written follow-up of all courses, complete with an attendants list to the Departmental Representative.

END OF SECTION

DEMOLITION FOR MINOR WORKS

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 31 19 – Project Meetings.
- .2 Section 01 33 00 – Submittal Procedures.
- .3 Section 01 35 43 – Environmental Procedures.
- .4 Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- .5 Section 01 74 11 – Cleaning.

1.2 REFERENCES

- .1 CSA International
 - .1 CSA S350-M1980 (R2003), Code of Practice for Safety in Demolition of Structures.
- .2 U.S. Environmental Protection Agency (EPA)/Office of Water
 - .1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.
- .3 Canadian Environmental Protection Act (CEPA), 1999, C.33.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section:
 - .1 01 33 00 - Submittal Procedures.
 - .2 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .3 01 35 43 - Environmental Procedures.

1.4 SITE CONDITIONS

- .1 Review "Designated Substance Report" and take precautions to protect environment.
- .2 If material resembling spray or trowel-applied asbestos or other designated substance listed as hazardous is encountered, stop work, take preventative measures, and notify Departmental Representative immediately.
 - .1 Proceed only after receipt of written instructions have been received from Departmental Representative.
- .3 Notify Departmental Representative before disrupting building access or services.

Part 2 Products

2.1 NOT USED

- .1 Not used.

DEMOLITION FOR MINOR WORKS

Part 3 Execution

3.1 EXAMINATION

- .1 Inspect site with Departmental Representative and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.
- .2 Locate and protect utilities. Preserve active utilities traversing site in operating condition.
- .3 Notify and obtain approval of utility companies before starting demolition.
- .4 Disconnect, cap, plug or divert, as required, existing public utilities within the property where they interfere with the execution of the work, in conformity with the requirements of the authorities having jurisdiction. Mark the location of these and previously capped or plugged services on the site and indicate location (horizontal and vertical) on the record drawings. Support, shore up and maintain pipes and conduits encountered.
 - .1 Immediately notify Departmental Representative and utility company concerned in case of damage to any utility or service, designated to remain in place.
 - .2 Immediately notify the Departmental Representative should uncharted utility or service be encountered, and await instruction in writing regarding remedial action.

3.2 PREPARATION

- .1 Temporary Erosion and Sedimentation Control:
 - .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to: requirements of authorities having jurisdiction.
 - .2 Inspect, repair, and maintain erosion and sedimentation control measures during demolition.
 - .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal after completion of demolition work.
- .2 Protection of In-Place Conditions:
 - .1 Prevent movement, settlement, or damage to adjacent structures, utilities, and landscaping features and parts of building to remain in place. Provide bracing and shoring required.
 - .2 Keep noise, dust, and inconvenience to occupants to minimum. Dust control in laboratories to be reviewed with departmental representative prior to starting work to ensure sensitive specimens are not damaged.
 - .3 Protect building systems, services and equipment.
 - .4 Provide temporary dust screens, covers, railings, supports and other protection as required.

DEMOLITION FOR MINOR WORKS

- .5 Do Work in accordance with Section 01 35 33 - Health and Safety Requirements.
- .3 Demolition/Removal:
 - .1 Remove items as indicated.
 - .2 Removal of Pavements, Curbs and Gutters:
 - .1 Square up adjacent surfaces to remain in place by saw cutting or other method approved by Departmental Representative.
 - .2 Protect adjacent joints and load transfer devices.
 - .3 Protect underlying and adjacent granular materials.
 - .3 Trim edges of partially demolished building elements to tolerances as defined by Departmental Representative to suit future use.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Refer to demolition drawings and specifications for items to be salvaged for reuse.
- .4 Waste Management: separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

COMMON WORK RESULTS FOR ELECTRICAL

Part 1 General

1.1 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CSA C22.1-2012, Canadian Electrical Code, Part 1 (21st Edition), Safety Standard for Electrical Installations.
 - .2 CAN3-C235-83(R2000), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.
- .2 Electrical and Electronic Manufacturer's Association of Canada (EEMAC)
 - .1 EEMAC 2Y-1-1958, Light Gray Colour for Indoor Switch Gear.
- .3 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)
 - .1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

1.2 DEFINITIONS

- .1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.

1.3 DESIGN REQUIREMENTS

- .1 Operating voltages: to CAN3-C235.
- .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.
- .3 Language operating requirements: provide identification nameplates and labels for control items in English

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit for review fire alarm riser diagrams under plexiglass and locate as indicated.
 - .1 Main Electrical Room.
- .3 Shop drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of BC, Canada.
 - .2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure coordinated installation.
 - .3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.

COMMON WORK RESULTS FOR ELECTRICAL

- .4 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.
- .5 Submit copies of 600 x 600 mm minimum size drawings and product data to authority having jurisdiction.
- .6 If changes are required, notify Departmental Representative of these changes before they are made.
- .4 Quality Control: in accordance with Section 01 45 00 - Quality Control. Provide CSA certified equipment and material.
 - .1 Where CSA certified material is not available, submit such material to authority having jurisdiction for special approval before delivery to site.
 - .2 Submit test results of installed electrical systems and instrumentation.
 - .3 Permits and fees: in accordance with General Conditions of contract.
 - .4 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Departmental Representative.
- .5 Manufacturer's Field Reports: submit to Departmental Representative manufacturer's written report, within 3 days of review, verifying compliance of Work and electrical system and instrumentation testing, as described in PART 3 - FIELD QUALITY CONTROL.

1.5 QUALITY ASSURANCE

- .1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.
- .2 Qualifications: electrical Work to be carried out by qualified, licensed electricians who hold valid Contractor license or apprentices in accordance per the conditions of Provincial Act respecting manpower vocational training and qualification.
- .3 Site Meetings:
 - .1 In accordance with Section 01 32 17 - Construction Progress Schedule - Bar (GANTT) Charts.
 - .2 Site Meetings: as part of Manufacturer's Field Services described in Part 3 - FIELD QUALITY CONTROL, schedule site visits, to review Work, at stages listed.
 - .1 After delivery and storage of products, and when preparatory Work is complete but before installation begins.
 - .2 Twice during progress of Work at 25% and 60% complete.
 - .3 Upon completion of Work, after cleaning is carried out.
- .4 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

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: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.7 SYSTEM STARTUP

COMMON WORK RESULTS FOR ELECTRICAL

- .1 Instruct Departmental Representative in operation, care and maintenance of systems, system equipment and components.
- .2 Arrange and pay for services of manufacturer's factory service engineer 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.
- .3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.
- .4 Post instructions where directed.
- .5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.
- .6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

1.9 RECORD DRAWINGS

- .1 In addition to requirements for record drawings noted in Section 01 78 00 - Closeout Submittal, the following shall also be completed as per 01 78 00 - 1.4.3:
 - .1 Complete, detailed riser diagram for all fire alarm equipment and devices as installed as part of this contract.

Part 2 Products

2.1 MATERIALS AND EQUIPMENT

- .1 Provide material and equipment in accordance with Section 01 61 00 - Common Product Requirements.

COMMON WORK RESULTS FOR ELECTRICAL

- .2 Material and equipment to be CSA certified. Where CSA certified material and equipment is not available, obtain special approval from authority having jurisdiction before delivery to site and submit such approval as described in PART 1 - SUBMITTALS.
- .3 Factory assemble control panels and component assemblies.

2.2 WARNING SIGNS

- .1 Warning Signs: in accordance with requirements of inspection authorities.
- .2 Decal signs, minimum size 175 x 250 mm.

2.3 WIRING TERMINATIONS

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

2.4 EQUIPMENT IDENTIFICATION

- .1 Identify electrical equipment with nameplates and labels as follows:
 - .1 Nameplates: lamicoid 3 mm thick plastic engraving sheet, black face, white core, lettering accurately aligned and engraved into core.
 - .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
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: embossed plastic labels with 6mm 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.
- .8 Transformers: indicate capacity, primary and secondary voltages.

2.5 WIRING IDENTIFICATION

- .1 Identify wiring with permanent indelible identifying markings, numbered, 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.
- .4 Use colour coded wires in communication cables, matched throughout system.

COMMON WORK RESULTS FOR ELECTRICAL

2.6 CONDUIT AND CABLE IDENTIFICATION

- .1 Colour code conduits, boxes and metallic sheathed cables.
- .2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m intervals.
- .3 Colours: 25 mm wide prime colour and 20 mm wide auxiliary colour.

	Prime	Auxiliary
up to 250 V	Yellow	
up to 600 V	Yellow	Green
up to 5 kV	Yellow	Blue
up to 15 kV	Yellow	Red
Telephone	Green	
Other Communication Systems	Green	Blue
Fire Alarm	Red	
Emergency Voice	Red	Blue
Other Security Systems	Red	Yellow

2.7 FINISHES

- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
 - .1 Paint outdoor electrical equipment light gray to EEMAC 2Y-1.
 - .2 Paint indoor switchgear and distribution enclosures light gray to EEMAC 2Y-1.

Part 3 Execution

3.1 INSTALLATION

- .1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.
- .2 Do overhead and underground systems in accordance with CSA C22.3 No.1 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 CONDUIT AND CABLE INSTALLATION

- .1 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.
- .2 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.

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 3000 mm, and information is given before installation.

COMMON WORK RESULTS FOR ELECTRICAL

3.5 CO-ORDINATION OF PROTECTIVE DEVICES

- .1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

3.6 FIELD QUALITY CONTROL

- .1 Load Balance:
 - .1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.
 - .2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.
 - .3 Provide upon completion of work, load balance report as directed in PART 1 - SUBMITTALS: phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load, as well as hour and date on which each load was measured, and voltage at time of test.
- .2 Conduct following tests in accordance with Section 01 45 00 - Quality Control.
 - .1 Circuits originating from branch distribution panels.
 - .2 Insulation resistance testing:
 - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
 - .2 Check resistance to ground before energizing.
- .3 Carry out tests in presence of Departmental Representative.
- .4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
- .5 Manufacturer's Field Services:
 - .1 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.

3.7 CLEANING

- .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.

END OF SECTION

SEISMIC RESTRAINTS - ELECTRICAL

Part 1 General

1.1 SECTION INCLUDES

- .1 This section specifies materials and installation for seismic restraint systems for electrical installations.

1.2 REGULATORY REQUIREMENTS

- .1 Restraints shall meet the requirements of the latest edition of the British Columbia Building Code and amendments.
- .2 The Seismic Engineer shall be able to provide a proof of professional insurance and the related practice credentials, upon request. The Seismic Engineer shall be familiar with SMACNA, ECABC & NFPA guidelines as well as the BC Building Code requirements.
- .3 The Contractor's Seismic Engineer shall submit original signed BC Building Code "Letters of Assurance" "Model Schedules S-B and S-C" to the Prime Consultant or Electrical Consultant.
- .4 The above requirements shall not restrict or supplant the requirements of any local bylaws, codes, or other certified agencies which may have jurisdiction over all or part of the installation.

1.3 SCOPE

- .1 It is the responsibility of equipment manufacturers to design their equipment so that the strength and anchorage of internal components of the equipment exceeds the force level used to restrain and anchor the unit itself to the supporting structure.
- .2 Manufacturer's shop drawings to be submitted with seismic information on equipment structure, bracing and internal components and as required by Division 01.
- .3 Provide restraint on all equipment and machinery, which is part of the building electrical services and systems, to prevent injury or hazard to persons and equipment in and around the structure. Restrain all such equipment in its normal position in the event of an earthquake.
- .4 The total electrical seismic restraint design and field review and inspection will be by a B.C. registered professional structural engineer who specializes in the restraint of building elements. Contractor to allow for coordination, provision of seismic restraints, as well as all costs for the services of the Seismic Restraint Engineer. This Engineer, herein referred to as the Seismic Engineer, will provide normal engineering functions as they pertain to seismic restraint of electrical installations.
- .5 The Contractor shall be aware of, and comply with, all current seismic restraining requirements and make provision for those that may come into effect during construction of the project. Make proper allowance for such conditions in the tender.

SEISMIC RESTRAINTS - ELECTRICAL

- .6 The Seismic Engineer shall provide detailed seismic restraint installation shop drawings to the Contractor. Copies of the shop drawings to be included in the final project manual.
- .7 Provide seismic restraints on all equipment, and/or installations or assemblies, which are suspended, pendant, shelf mounted, freestanding and/or bolted to the building structure or support slabs.
- .8 The Seismic Engineer shall provide inspections during and after installation. The Contractor shall correct any deficiencies noted without additional cost to the contract.
- .9 Include all costs associated with the Seismic installation and certification in the base tender.

1.4 SHOP DRAWINGS & SUBMITTALS

- .1 Submit shop drawings of all seismic restraint systems including details of attachment to the structure, either tested in an independent testing laboratory or approved by the seismic Engineer.
- .2 Submit all the proposed types and locations of inserts or connection points to the building structure or support slabs. Follow the directions and recommendations of the Seismic Engineer.

Part 2 Products

2.1 SLACK CABLE SYSTEMS.

- .1 Slack cable restraints shall be provided on suspended and shelf mounted transformers along with associated equipment and assemblies connected to them at the points of vertical support (4 points). The restraint wires shall be oriented at approximately 90° to each other (in plan), and tied back to the ceiling slab or its structure at approximately 45° to the slab or basic structure. The restraints shall be selected for a 1 g earthquake loading, i.e. each wire shall have a working load capacity equal to the weight of the transformer. The anchors in the structure shall be selected for a load equal to the weight of the transformers at a 45° pull.
- .2 Slack cable systems to allow normal maintenance of equipment and shall not create additional hazard by their location or configurations. Contractor shall rectify any such installations at no additional cost, all to the satisfaction of the engineer and inspection authority having jurisdiction.
- .3 Coordinate requirements of slack cables with suppliers prior to installation.

Part 3 Execution

3.1 GENERAL

- .1 All seismic restraints systems shall conform to local authority having jurisdiction and all applicable code requirements.

SEISMIC RESTRAINTS - ELECTRICAL

3.2

CONDUITS

- .1 Provide restraint installation information and details on conduit and equipment as indicated below:
- .2 Vertical Conduit:
 - .1 Attachment - Secure vertical conduit at sufficiently close intervals to keep the conduit in alignment and carry the weight of the conduits and wiring. Stacks shall be supported at their bases and, if over 2 stories in height, at each floor by approved metal floor clamps.
 - .2 At vertical conduit risers, wherever possible, support the weight of the riser, at a point or points above the center of gravity of the riser. Provide lateral guides at the top and bottom of the riser, and at intermediate points not to exceed 9.2 m o.c.
 - .3 Riser joints shall be braced or stabilized between floors.
- .3 Horizontal Conduits:
 - .1 Supports - Horizontal conduit shall be supported at sufficiently close intervals to keep it in alignment and prevent sagging.
 - .2 EMT tubing - tubing shall be supported at approximately 1.2 m intervals for tubing.
- .4 Provide transverse bracing at 12.2 m intervals maximum unless otherwise noted. Provide bracing at all 90° bend assemblies, and pull box locations.
- .5 Provide longitudinal bracing at 24.4 m intervals maximum unless otherwise noted.
- .6 Do not brace conduit runs against each other. Use separate support and restraint system.
- .7 Support all conduits in accordance with the capability of the pipe to resist seismic load requirements indicated.
- .8 Trapeze hangers may be used. Provide flexible conduit connections where conduits pass through building seismic or expansion joints, or where rigidly supported conduits connect to equipment with vibration or seismic isolators.
- .9 A conduit system shall not be braced to dissimilar parts of a building or two dissimilar building systems that may respond in a different mode during an earthquake. Examples: wall and a roof; solid concrete wall and a metal deck with lightweight concrete fill.
- .10 Provide large enough conduit sleeves through walls or floors to allow for anticipated differential movements with firestopping where required.
- .11 It is the responsibility of the contractor to ascertain that an appropriate size restraint device be selected for each individual piece of equipment. Submit details on shop drawings. Review with seismic Engineer and submit shop drawings to consultants for their reference.

3.3

FLOOR MOUNTED EQUIPMENT

- .1 Bolt all equipment, e.g. transformers, switchgear, generators, motor control centres, free standing panelboards, control panels, capacitor banks, etc. to the structure. Design anchors and bolts for seismic force applied horizontally

SEISMIC RESTRAINTS - ELECTRICAL

through the center of gravity to a seismic force of 0.5g. For equipment which may be subject to resonances, use a nominal 1.0 g seismic force.

- .2 Provide flexible conduit connections between floor mounted equipment to be restrained and its adjacent associated electrical equipment.

3.4 LIGHT FIXTURES

- .1 Fluorescent fixtures in suspended ceilings shall be hung independently of the ceiling system. Fixtures shall be secured to concrete or structural deck above by at least two seismic cables which are connected to the fixture at diagonal points.
- .2 Surface and recessed style fixtures shall be hung independently of the ceiling system. Fixtures shall be secured to concrete or structural deck above by seismic cables.
- .3 Fixtures which are hung independently of ceiling systems shall have minimum of one seismic cable in addition to the chain or cable used to support the fixture. Seismic restraint cables shall be secured into the concrete or structural deck above.
- .4 Cables shall be corrosion resistant and approved for the application.
- .5 Fixtures which are rod hung shall have seismic ball alignment fittings at the ceiling and fixture.

END OF SECTION

GROUNDING - SECONDARY

Part 1 General

1.1 REFERENCES

- .1 American National Standards Institute /Institute of Electrical and Electronics Engineers (ANSI/IEEE)
 - .1 ANSI/IEEE 837-02, IEEE Standard for Qualifying Permanent Connections Used in Substation Grounding.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for grounding equipment and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for grounding equipment for incorporation into manual.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect grounding equipment from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 EQUIPMENT

- .1 Grounding conductors: bare stranded copper, soft annealed, size as indicated.
- .2 Insulated grounding conductors: green, copper conductors, size as indicated.
- .3 Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:
 - .1 Grounding and bonding bushings.
 - .2 Bolted type conductor connectors.
 - .3 Bonding jumpers, straps.
 - .4 Pressure wire connectors.

GROUNDING - SECONDARY

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for grounding equipment installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION GENERAL

- .1 Install complete permanent, continuous grounding system including conductors, connectors, accessories. Where EMT is used, run ground wire in conduit.
- .2 Install connectors in accordance with manufacturer's instructions.
- .3 Protect exposed grounding conductors from mechanical injury.
- .4 Use mechanical connectors for grounding connections to equipment provided with lugs.
- .5 Soldered joints not permitted.
- .6 Make grounding connections in radial configuration only, with connections terminating at single grounding point. Avoid loop connections.

3.3 SYSTEM AND CIRCUIT GROUNDING

- .1 Install system and circuit grounding connections to neutral.

3.4 EQUIPMENT GROUNDING

- .1 Install grounding connections to typical equipment included in, but not necessarily limited to following list. Service equipment, transformers, fire alarm, starters, control panels, , distribution panels, , cable trays.

3.5 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results - Electrical.
- .2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation.
- .3 Perform tests before energizing electrical system.
- .4 Disconnect ground fault indicator during tests.

GROUNDING - SECONDARY

3.6

CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

END OF SECTION

HANGERS & SUPPORTS FOR ELECTRICAL SYSTEMS

Part 1 General

1.1 SECTION INCLUDES

- .1 This section specifies U shape support channels either surface mounted. Suspended or set in poured concrete walls or ceilings.

Part 2 Products

2.1 SUPPORT CHANNELS

- .1 U shape, size 41 x 41mm, 2.5mm thick, surface mounted, suspended, or set in poured concrete walls and ceilings.

Part 3 Execution

3.1 INSTALLATION

- .1 Secure equipment to surfaces with lead anchors or nylon shields as required.
- .2 Secure equipment to poured concrete with expandable inserts.
- .3 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.
- .4 Secure surface mounted equipment with twist clip fasteners to inverted T bar ceilings. Ensure that T bars are adequately supported to carry weight of equipment specified before installation.
- .5 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.
- .6 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.
 - .2 Two-hole steel straps for conduits and cables larger than 50 mm.
 - .3 Beam clamps to secure conduit to exposed steel work.
- .7 Suspended support systems.
 - .1 Support individual cable or conduit runs with 6 mm dia threaded rods and spring clips.
 - .2 Support 2 or more cables or conduits on channels supported by 6 mm dia threaded rod hangers where direct fastening to building construction is impractical.
- .8 For surface mounting of two or more conduits use channels at 1.5m on centre spacing.
- .9 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.
- .10 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.
- .11 Do not use wire lashing or perforated strap to support or secure raceways or cables.

HANGERS & SUPPORTS FOR ELECTRICAL SYSTEMS

- .12 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Consultant.
- .13 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

END OF SECTION

CONDUITS, CONDUIT FASTENINGS AND FITTINGS

Part 1 General

1.1 SECTION INCLUDES

- .1 This section specifies rigid and flexible conduits, raceways,, fasteners, fittings and installation.

1.2 REFERENCES

- .1 Outlet Boxes, Conduit Boxes, and Fittings and Associated Hardware: to CSA C22.2 No. 18.
- .2 Rigid metal conduit (RMC): to CSA C22.2 No. 45.
- .3 Electrical metallic tubing (EMT): to CSA C22.2 No. 83.
- .4 Flexible metal conduit (FMC): to CSA C22.2 No. 56.

1.3 BASIC WIRING METHODS

- .1 Partition walls and ceilings:
 - .1 All wiring to be run in EMT conduit for:
 - .1 Branch circuits.
 - .2 Low voltage systems.
 - .3 Surface wiring in electrical and mechanical rooms.
- .2 Motors, transformers and all vibrating equipment:
 - .1 Short (600mm to 1200mm) PVC jacketed flexible conduit with liquid tight connectors shall be used. Allow sufficient slack to avoid strain on connectors at extreme extension of equipment movement.
- .3 Surface raceways - interior:
 - .1 All surface raceways shall be EMT, except if located without protection in areas susceptible to damage, which shall be rigid steel conduit.
 - .2 Where surface wiring is required in a finished, interior space, and approved by the Departmental Representative, a steel surface 'wiremold' raceway shall be used. Surface wiring in mechanical and electrical rooms shall be EMT conduit.
 - .3 Surface wiring in finished areas will only be allowed for block or poured concrete type construction.

1.4 LOCATION

- .1 Electrical drawings are diagrammatic and do not show all conduits, wire, cable, etc. Electrical contractor to provide conduit, wire cable, etc., for a complete operating job to meet in all respects the intent of the drawings and specifications.
- .2 Outlet positions shown on architectural drawings (plans and elevations) to take precedence over locations and mounting heights indicated on electrical plans or in specifications.
- .3 Locate electrical devices on walls with regard given for convenience of operation and conservation of wall space. Switches, receptacles, fire alarm pull stations, etc. generally to be vertically lined up where items are in the same general location. Adjacent common devices to be installed in common outlet box.

CONDUITS, CONDUIT FASTENINGS AND FITTINGS

- .4 Review the exact location criteria of each electrical outlet and device with the Departmental Representative prior to rough-in. Relocate any item installed without architectural confirmation as required by the Departmental Representative at no cost to the owner as long as the relocation is within 3m of the location originally shown on the electrical drawings.
- .5 Locate light switches on latch side of doors. Locate disconnect devices in mechanical rooms on latch side of door.
- .6 All outlets located on exterior walls to be complete with moulded plastic vapour barriers to maintain integrity of wall vapour barrier system.
- .7 All raceways and wiring shall be installed concealed in building fabric, except for mechanical and electrical rooms where they shall be installed on the surface.
- .8 All outlet boxes, junction boxes, and cabinets to hold electrical devices shall be mounted so the equipment can be flush mounted unless indicated otherwise.
- .9 All junction boxes and other raceway access devices shall be mounted to avoid being visible from public areas. Obtain approval from Departmental Representative for any and all junction boxes that, due to the building design, cannot be concealed.
- .10 All junction boxes mounted, out of necessity, on surface of solid walls shall be painted to match adjacent surface, with junction boxes painted to match designated systems.

Part 2 Products

2.1 EMT RACEWAY

- .1 Electrical Metallic Tubing (EMT) shall be galvanized steel of sufficient quality and thickness to allow smooth field formed bends.
- .2 EMT couplings, connectors and fittings shall be steel. Cast type units shall not be used on this installation.

2.2 OUTLET BOXES AND JUNCTION BOXES

- .1 Except as noted for rigid PVC raceways, all outlet boxes and junction boxes shall be one piece formed or welded.
- .2 Outlet boxes to be galvanized steel.
- .3 Junction boxes to be galvanized steel or aluminum.

2.3 CONDUIT FASTENINGS

- .1 One hole steel straps to secure surface conduits 50 mm and smaller. Two hole steel straps for conduits larger than 50 mm.
- .2 Beam clamps to secure conduits to exposed steel work.
- .3 Channel type supports for two or more conduits at 1500mm oc.
- .4 Threaded rods, 6 mm dia., to support suspended channels.

2.4 CONDUIT FITTINGS

- .1 Fittings: manufactured for use with conduit specified. Coating: same as conduit.
- .2 Factory "ells" where 90° bends are required for 25 mm and larger conduits.
- .3 Watertight connectors and couplings for EMT. Set-screws are not acceptable.

CONDUITS, CONDUIT FASTENINGS AND FITTINGS

2.5 FISH CORD

- .1 Polypropylene.

2.6 SURFACE RACEWAY

- .1 Surface mounted electrical raceway shall be steel, architecturally styled with clip on covers, associated bends, 90s, offsets and boxes fully coordinated with this raceway system.
- .2 Finish shall be epoxy type powder paint or similar quality wet process; color to be beige/off white.
- .3 Surface wire way boxes shall be sized appropriately for the devices to be used and for wire fill calculations. Boxes used for fire alarm pull stations shall be red in color.
- .4 Mounting clips shall utilise concealed fasteners.

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 except in mechanical and electrical service rooms and in unfinished areas.
- .3 Use electrical metallic tubing (EMT) except in cast concrete and above 2.4 m not subject to mechanical injury.
- .4 Use flexible metal conduit for connection to motors in dry areas, connection to recessed incandescent fixtures without a prewired outlet box, connection to surface or recessed fluorescent fixtures and work in movable metal partitions.
- .5 Use liquid tight flexible metal conduit for connection to motors or vibrating equipment in damp, wet or corrosive locations.
- .6 Minimum conduit size for lighting and power circuits: 19mm. Fire Alarm: 16mm.
- .7 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.
- .8 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.
- .9 Install fish cord in empty conduits.
- .10 Remove and replace blocked conduit sections. Do not use liquids to clean out conduits.
- .11 Dry conduits out before installing wire.
- .12 Conduits shall be installed mechanically continuous from outlet to outlet and without pockets. All the necessary standard bushings, elbows and bends shall be provided. All conduit bends shall have a radius of not less than six (6) times the internal diameter of the conduit and in no case shall the equivalent of more than four quarter bends from outlet to outlet be made. For all conduit sizes to be used for low voltage raceway, the conduits shall have a minimum bending radius of 230mm.
- .13 Conduit bends shall be made with no more than 10% flattening of the conduit. Bends shall be smooth throughout deformations.

CONDUITS, CONDUIT FASTENINGS AND FITTINGS

- .14 On surface wall runs, all conduit shall be installed in true vertical or horizontal direction and on ceilings in true 90 degree angles or parallel to the walls. Crossings of conduits shall also be made at 90 degree angles. Parallel running conduit shall be kept on equal spacing on the entire length of run including bends.
- .15 All conduits shall be fastened to structure with steel straps (no cast type straps allowed).
- .16 Where more than three conduits are run parallel in ceiling cavity, they shall be installed on cantruss type channel, complete with all Manufacturer's fittings to secure channel to structure and to conduit.
- .17 Raceways extending out concrete slabs shall be securely protected using rebar stubs or similar material. All duct stubs are to be kept sealed during construction

3.2 SURFACE CONDUITS

- .1 Run parallel or perpendicular to building lines.
- .2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.
- .3 Run conduits in flanged portion of structural steel.
- .4 Group conduits wherever possible on suspended or surface channels.
- .5 Do not pass conduits through structural members except as indicated.
- .6 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

3.3 CONCEALED CONDUITS

- .1 Run parallel or perpendicular to building lines.

END OF SECTION

INSTALLATION OF CABLES IN TRENCHES & IN DUCTS

Part 1 General

1.1 SECTION INCLUDES

- .1 This section specifies the installation of cables in ducts including testing.

1.2 REFERENCES

- .1 Canadian Standards Association, (CSA International)
- .2 Insulated Cable Engineers Association, Inc. (ICEA)

Part 2 Products

- .1 Not applicable.

Part 3 Execution

3.1 CABLE INSTALLATION IN DUCTS

- .1 Install cables as indicated in ducts.
 - .1 Do not pull spliced cables inside ducts.
- .2 Install multiple cables in duct simultaneously.
- .3 Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.
- .4 To facilitate matching of colour coded multiconductor control cables reel off in same direction during installation.
- .5 Before pulling cable into ducts and until cables are properly terminated, seal ends of lead covered cables with wiping solder; seal ends of non-leaded cables with moisture seal tape.
- .6 After installation of cables, seal duct ends with duct sealing compound.

3.2 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results - Electrical.
- .2 Perform tests using qualified personnel. Provide necessary instruments and equipment.
- .3 Check phase rotation and identify each phase conductor of each feeder.
- .4 Check each feeder for continuity, short circuits and grounds. Ensure resistance to ground of circuits is not less than 50 megohms.
- .5 Pre-acceptance tests.
 - .1 After installing cable but before splicing and terminating, perform insulation resistance test with 1000 V megger on each phase conductor.
 - .2 Check insulation resistance after each splice and/or termination to ensure that cable system is ready for acceptance testing.
- .6 Acceptance Tests
 - .1 Ensure that terminations and accessory equipment are disconnected.
 - .1 Megger test all cables to ensure integrity of the insulation system.

INSTALLATION OF CABLES IN TRENCHES & IN DUCTS

- .7 Provide Departmental Representative with list of test results showing location at which each test was made, circuit tested and result of each test.
- .8 Remove and replace entire length of cable if cable fails to meet any of test criteria.

END OF SECTION

MOULDED CASE CIRCUIT BREAKERS

Part 1 General

1.1 SECTION INCLUDES

1.2 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 19 - Construction/Demolition Waste Management and Disposal.

1.3 REFERENCES

- .1 Canadian Standards Association (CSA International).
 - .1 CSA-C22.2 No. 5-02, Moulded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, tenth edition, and the second edition of NMX-J-266-ANCE).

1.4 SUBMITTALS

- .1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Include time-current characteristic curves for breakers with ampacity of 100A and over.

Part 2 Products

2.1 BREAKERS GENERAL

- .1 Moulded-case circuit breakers, to CSA C22.2 No. 5
- .2 Bolt-on moulded case circuit breaker: quick- make, quick-break type, for manual and automatic operation with temperature compensation for 40 degrees C ambient.
- .3 Common-trip breakers: with single handle for multi-pole applications.
- .4 Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting.
 - .1 Trip settings on breakers with adjustable trips to range from 3-8 times current rating.
- .5 Circuit breakers with interchangeable trips as indicated.
- .6 Circuit breakers to have minimum 10kA symmetrical rms interrupting capacity rating.

2.2 THERMAL MAGNETIC BREAKERS

- .1 Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.
- .2 Existing Panel ES is FPE type NBDP.

2.3 OPTIONAL FEATURES

- .1 Provide:
 - .1 On-off locking device.
 - .2 Fire alarm breaker to be painted red.

MOULDED CASE CIRCUIT BREAKERS

Part 3 Execution

3.1 INSTALLATION

- .1 Install circuit breakers in new, existing or retrofit distribution assemblies as noted in drawings.

END OF SECTION

FIRE DETECTION AND ALARM

Part 1 General

1.1 SECTION INCLUDES

- .1 This section specifies materials and installation for fire detection and fire alarm systems.

1.2 REFERENCES

- .1 NBC-latest edition, National Building Code of Canada.
- .2 Government of Canada
 - .1 TB OSH Chapter 3-03, latest edition, Treasury Board of Canada, Occupational Safety and Health, Chapter 3-03, Standard for Fire Protection Electronic Data Processing Equipment.
 - .2 TB OSH Chapter 3-04, latest edition, Treasury Board of Canada, Occupational Safety and Health, Chapter 3-04, Standard for Fire Alarm Systems.
- .3 Underwriters Laboratories of Canada (ULC)
 - .1 CAN/ULC-S524-latest edition, Installation of Fire Alarm Systems.
 - .2 ULC-S525- latest edition, Audible Signal Appliances.
 - .3 CAN/ULC-S526- latest edition, Visual Signal Appliances, Fire Alarm.
 - .4 CAN/ULC-S527- latest edition, Control Units.
 - .5 CAN/ULC-S528- latest edition, Manual Pull Stations.
 - .6 CAN/ULC-S529- latest edition, Smoke Detectors.
 - .7 CAN/ULC-S530- latest edition, Heat Actuated Fire Detectors.
 - .8 CAN/ULC-S531- latest edition, Smoke Alarms.
 - .9 CAN/ULC-S536- latest edition, Inspection and Testing of Fire Alarm Systems.
 - .10 CAN/ULC-S537- latest edition, Verification of Fire Alarm Systems.

1.3 DESCRIPTION OF SYSTEM

- .1 System shall be fully supervised, microprocessor-based, fire alarm system, utilizing digital techniques for data control and digital and multiplexing techniques for data transmission.
- .2 System to carry out fire alarm and protection functions; including receiving alarm signals; initiating general alarm; supervising components and wiring; actuating annunciators and auxiliary functions; initiating trouble signals and signalling to fire department.
- .3 The system shall be fully addressable, zoned, **non-coded two stage**.
- .4 System to be modular in design to allow for future expansion.
- .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 with microprocessor and logic interface, main system memory, input-output interfaces for alarm receiving, annunciation/display, and program control/signalling.

FIRE DETECTION AND ALARM

- .2 Power supplies.
 - .3 Initiating/input circuits.
 - .4 Output circuits.
 - .5 Auxiliary circuits.
 - .6 Wiring.
 - .7 Manual and automatic initiating devices.
 - .8 Audible and visual signalling devices.
 - .9 End-of-line resistors.
 - .10 Local and Remote annunciators and displays.
 - .11 Data riser network to connect between several fire panels, including associated hardware for existing panel.
- .7 New fire alarm system to include coordination with sprinkler, building management system, access control and security door release/interface, remote signal transmission and full integration to other existing fire alarm system at the airport site.

1.4 REQUIREMENTS OF REGULATORY AGENCIES

- .1 System:
- .1 To TB OSH Chapter 3-04.
 - .2 Subject to Fire Commissioner of Canada (FC) approval.
 - .3 Subject to FC inspection for final acceptance.
 - .4 To Canadian Forces Fire Marshal approval.

1.5 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Include:
- .1 Layout of equipment.
 - .2 Zoning.
 - .3 Complete wiring diagram, including schematics of modules.
 - .4 Full size color fire alarm zone building map. Obtain approval of fire alarm passive graphic zone map from AHJ and City fire department,
 - .5 Battery load calculations.
 - .6 Wiring and riser diagrams showing fire alarm modifications and wiring to existing fire alarm panels in other buildings.

1.6 CLOSEOUT SUBMITTALS

- .1 Provide operation and maintenance data for Fire Alarm System for incorporation into manual.
- .2 Include:
- .1 Operation and maintenance instructions for complete fire alarm system to permit effective operation and maintenance.
 - .2 Copy of sound pressure levels for each space.

FIRE DETECTION AND ALARM

- .3 Technical data - illustrated parts lists with parts catalogue numbers.
- .4 Copy of approved shop drawings.
- .5 List of recommended spare parts for system.

1.7 EXTRA MATERIALS

- .1 Provide maintenance materials as recommended by the system manufacturer. Submit recommended spare parts list to Consultant for review in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Include four (4) spare glass rods for manual pull box stations if applicable.
- .3 Include for three (3) additional spare audible devices, wired and installed within 30m of the nearest audible device. Devices will be utilised where sound level readings during verification are below Building Code requirements. Unused devices are to be turned over to the owner or credited to the contract.
- .4 Provide six spare heat detectors; two spare strobes; two spare fire gongs and two spare pull stations.

1.8 MAINTENANCE

- .1 Provide one year's free maintenance with two inspections by manufacturer during warranty period. Inspection tests to conform to CAN/ULC-S536. Submit inspection report to Departmental Representative.

Part 2 Products

2.1 MATERIALS

- .1 Equipment and devices: ULC listed and labelled and supplied by single manufacturer.
- .2 In accordance with applicable CAN/ULC standards.
- .3 Two stage operation: operation to actuation following:
 - .1 Manual station.
 - .2 Heat detector.
 - .3 Smoke detector.
 - .4 Automatic fire sprinkler system.
 - .5 Hood Suppression system.
 - .6 Fire standpipe system.
- .4 Actuation of two stage operation device to initiate following:
 - .1 Audible signal devices in zone of alarm to sound continuously while other audible signal devices throughout building sound at 20 strokes per minute.
 - .2 An audible alarm in the ATB will not ring in the FSS.
 - .3 Zone of alarm to be indicated on control panel and remote annunciators.
 - .4 Transmit signal to fire department via monitoring station.
 - .5 Air conditioning and ventilating fans to shut down or to function so as to provide required control of smoke movement.
 - .6 Electro-magnetic door holders to de-energize.

FIRE DETECTION AND ALARM

- .7 Operations to remain in alarm mode (except alarm notification appliances if manually silenced) until system is manually restored to normal.
- .5 Operation of alarm initiating device on second stage to:
 - .1 Cause audible signal devices throughout building to sound continuously.
- .6 Capability to program smoke detector status change confirmation on any or zones in accordance with CAN/ULC-S527, Appendix C.

2.2 CONTROL PANEL

- .1 Two stage operation.
- .2 Zoned.
- .3 Non-coded.
- .4 Enclosure: CSA Enclosure 1, c/w lockable concealed hinged door, full viewing window, flush lock and 2 keys.
- .5 Provide 120-volt circuit and ceramic heater for all exterior mounted annunciator panels, whether indicated or not.
- .6 Supervised, modular design with plug-in modules:
 - .1 Alarm receiver with [trouble and alarm indications] [provision for remote supervised annunciation], for class A and B initiating circuits.
 - .2 Spare zones: compatible with smoke detectors and open circuit devices.
 - .3 Space for future modules with a minimum of 30% additional zones over that currently installed.
 - .4 Latching type supervisory receiver circuits. Discrete indication for both off-normal and trouble.
- .7 Components:
 - .1 Coded alarm receiver panel with trouble and alarm indications for class A and B initiating circuits.
 - .2 Single stage alarm pulse rate panels:
 - .1 Single stroke control type for output to signal control panel continuously.
 - .3 Common control and power units:
 - .1 Control panel containing following indications and controls:
 - .1 "Power on" LED (green) to monitor primary source of power to system.
 - .2 "Power trouble" indication.
 - .3 "Ground trouble" indication.
 - .4 "Remote annunciator trouble" indication.
 - .5 "System trouble" indication.
 - .6 "System trouble" buzzer and silence switch c/w trouble resound feature.
 - .7 System reset switch.
 - .8 "LED test" switch if applicable.

FIRE DETECTION AND ALARM

- .9 "Alarm silence" switch to silence signals manually. If new alarm occurs after signals have been silenced, signals to resound.
- .10 "Signals silenced" indication.
- .2 Master power supply panel to provide 24Vdc to system from 120Vac, 60Hz input.
- .3 Fire department connections:
 - .1 Plug-in module for shunt type municipal box.
 - .2 Fire department bypass switch c/w indicator for trouble at panel.
- .4 Auxiliary relays: plug-in type, dust cover, supervised against unauthorized removal by common trouble circuit.
 - .1 Contacts: 2.0A, 120Vac, for functions such as release of door holders or initiation of fan shut down.
 - .2 Contact terminal size: capable of accepting 22-12AWG wire.
- .5 Manufacturer: Edwards EST3 to coordinate and integrate with existing system in Fire Hall building. Local installer/integrator shall provide emergency service to the Airport site within 2 hours or be located within 50km of the site.

2.3 POWER SUPPLY

- .1 120V, ac, 60Hz input, 24Vdc output from rectifier to operate alarm and signal circuits, with standby power of gell cell batteries minimum expected life of 4 years, sized in accordance with BC Building Code.

2.4 MANUAL ALARM STATIONS

- .1 Manual alarm pull stations: addressable, pull lever, wall mounted surface type, with English and French signage.
- .2 General alarm key switch for two stage system.
- .3 Manufacturer - Addressable two stage manual pull station: Edwards.

2.5 AUTOMATIC ALARM INITIATING DEVICES

- .1 Thermal detectors, addressable, fixed temperature: 57°C.
- .2 Smoke detector: addressable ionization type.
 - .1 Dual chamber, ionization, twistlock, plug-in type with fixed wire-in base assembly with integral red alarm LED. Detector to be addressable type c/w electronics to communicate detector's status and field adjustable address setting.
- .3 Duct Smoke Detector
 - .1 Dual chamber, multisensor, twistlock, plug-in type with fixed wire-in base assembly with integral red alarm LED. Detector to be addressable type c/w electronics to communicate detector's status and field adjustable address setting. If shaft mounted or obstructed, provide remote indicating LED and access hatch in accordance with Section 26 05 00. See drawings for sizing of existing duct(s).

FIRE DETECTION AND ALARM

- .4 Remote LED alarm indicator for concealed thermal and smoke detectors.
- 2.6 AUDIBLE SIGNAL DEVICES**
 - .1 Bells: vibrating type, gongs of special alloy steel, 24Vdc, 150mm, 95dB.
 - .2 All audible devices must be programmed to a temporal pattern 3, as required by the BC Building Code.
- 2.7 END-OF-LINE DEVICES**
 - .1 End-of-line devices to control supervisory current in alarm circuits and 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 as indicated.
- 2.8 REMOTE ANNUNCIATOR PANELS**
 - .1 Alphanumeric LCD type with designation cards to indicate zone.
 - .2 LED's to annunciate alarm and trouble.
 - .3 Wired in multiple with main control panel.
 - .4 Supervised, including trouble signal for open circuit.
 - .5 LED test button.
 - .6 General alarm key switch.
 - .7 Reset/silence switch.
- 2.9 GRAPHIC DISPLAY**
 - .1 Provide and install flush mounted remote graphic annunciator complete with driver, LCD display, scroll, acknowledge button, system re-set system trouble, power on, and signal silence, where indicated on plans.
 - .2 Ensure all annunciator locations are approved by local fire department.
 - .3 Display:
 - .1 Alarms and troubles for alarm initiating circuits.
 - .2 Supervisory alarms and troubles common supervisory alarm for supervisory initiating circuits.
 - .3 Common system trouble.
 - .4 Alarms for standby emergency generator. (run / fault)
 - .5 Trouble buzzer
 - .1 Acknowledging trouble at main panel to silence trouble buzzers in system.
 - .6 Supervised, with LED test button and alarm trouble acknowledge button.
 - .7 Minimum wiring configuration with main panel and other remote annunciators.
 - .8 Annunciator to be complete with brushed aluminum trim and hinged lockable cover.

FIRE DETECTION AND ALARM

2.10 VISUAL ALARM SIGNAL DEVICES

- .1 Strobe type: flashing, 24Vdc.
- .2 Designed for surface mounting on ceiling or walls as indicated.

2.11 ISOLATION MODULES

- .1 Addressable zone isolation modules.

2.12 MAGNETIC DOOR HOLD OPEN DEVICES

- .1 Magnetic two-piece device. One piece flush mounted on wall and the other piece on door, 120V AC.
- .2 Wire through Low Voltage Relay, to de-energize door holder, upon signal from fire alarm system.

2.13 ANCILLARY DEVICES

- .1 Remote, addressable relay unit to initiate fan shutdown.
- .2 Provide addressable relay contact to DDC system to signal the status of the fire alarm system.
- .3 Provide addressable relay contacts to DDC system to signal the status of the smoke removal switches

2.14 WIRE AND CABLE

- .1 Conductor Insulation: Minimum rating 300 volts. Single conductor RW90XLPE (X-link).
- .2 Multi-conductor cables 105°C with outer PVC jacket, colour coded, FAS rated.
- .3 Conductor sizes as follows:
 - .1 To initiating circuits: #18 AWG minimum, and in accordance with manufacturer's requirements.
 - .2 To signal circuits: #16 AWG minimum, and in accordance with manufacturer's requirements.
 - .3 To control circuits: #12 AWG minimum, and in accordance with manufacturer's requirements.
 - .4 Size all fire alarm wiring for maximum 3% voltage drop at maximum load at last device in run.
- .4 All wiring to be copper.
- .5 All wiring to be tag identified at the points of connection.
- .6 Provide a ground conductor with all system wiring and bond all metal parts including device boxes.
- .7 All fire alarm system wiring to be in conduit except short drops from ceiling junction box to detectors mounted in T-Bar ceiling may be rated fire alarm system cable.

2.15 AS-BUILT RISER DIAGRAM

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

FIRE DETECTION AND ALARM

2.16 LOW VOLTAGE SURGE SUPPRESSOR

- .1 Provide surge suppression for circuits which leave building shell.
- .2 When circuits interconnect 2 or more buildings, provide arrestor at circuit entrance to each building.
- .3 Suppressor: UL 497B listed with maximum 30 volt clamping level and maximum response time of 5 nanoseconds. Suppressor: multi-stage construction and both differential and common mode protection.

Part 3 Execution

3.1 INSTALLATION

- .1 Install systems in accordance with CAN/ULC-S524 and TB OSH Chapter 3-04.
- .2 Install main control panel and connect to ac power supply.
- .3 Locate and install manual alarm stations and connect to alarm circuit wiring.
- .4 Locate and install detectors and connect to alarm circuit wiring. Do not mount detectors within 1 m of air outlets. Maintain at least 600 mm radius clear space on ceiling, below and around detectors. Locate duct type detectors in straight portions of ducts.
- .5 Connect alarm circuits to main control panel.
- .6 Locate and install signal devices, bells, chimes, horns and visual signal devices and connect to signalling circuits.
- .7 Connect signalling circuits to main control panel.
- .8 Install end-of-line devices at end of alarm and signalling circuits.
- .9 Install remote annunciator panels and connect to annunciator circuit wiring.
- .10 Locate and install door releasing devices.
- .11 Locate and install remote relay units to control fan shut down, door release and other remote contact operations.
- .12 Sprinkler system: wire alarm and supervisory switches and connect to control panel.
- .13 All dataloop wiring shall be installed in Class A configuration.

3.2 FIELD QUALITY CONTROL

- .1 Perform tests as described herein and in accordance CAN/ULC-S537.
- .2 Fire alarm system:
 - .1 Test each device and alarm circuit to ensure manual stations, thermal and smoke detectors, and sprinkler system transmit alarm to control panel and actuate general alarm ancillary devices.
 - .2 Check annunciator panels to ensure zones are shown correctly.
 - .3 Simulate grounds and breaks on alarm and signalling circuits to ensure proper operation of system.
 - .4 Manufacturer's technician to verify all new devices and reconnected existing fire alarm system equipment and components in accordance with ULC Standard S537.

FIRE DETECTION AND ALARM

- .5 Provide a Certification of Verification.
- .6 After verification, demonstrate and spot test system as required by Consultant and Fire Commissioner.
- .7 Provide Engineer with written verification report for review and include copies in maintenance manuals
- .8 Class A circuits.
 - .1 Test each conductor on all circuits for capability of providing alarm signal on each side of single open-circuit fault condition imposed near midmost point of circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.
 - .2 Test each conductor on all circuits for capability of providing alarm signal during ground-fault condition imposed near midmost point of circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.
- .9 Confirm connection to and correct operation of the existing off site central monitoring equipment using both main and backup communications methods.

3.3

TRAINING

- .1 Arrange and pay for on-site lectures and demonstrations by fire alarm equipment manufacturer to train operational personnel in use and maintenance of fire alarm system.
- .2 Provide two training sessions, one for ATB staff; one for FSS staff.

END OF SECTION

HAZARDOUS BUILDING MATERIALS ASSESSMENT
Penticton Airport Terminal Building,
3000 Airport Road, Penticton, BC

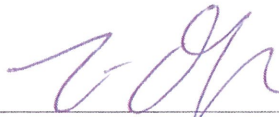
March 31, 2016
Project 636476

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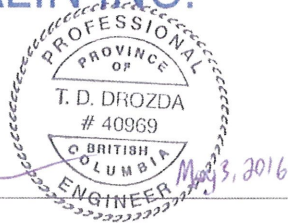
Public Works and Government Services Canada

SNC-LAVALIN INC.

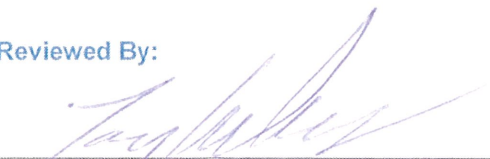
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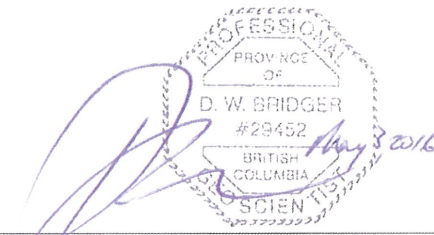
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EXECUTIVE SUMMARY

On behalf of Public Works and Government Services Canada (PWGSC), SNC-Lavalin Inc. (SNC-Lavalin) has completed a pre-renovation non-destructive hazardous building materials survey (HBMS) of the airport terminal building located at 3000 Airport Road, Penticton, BC. PWGSC requested the HBMS in preparation for renovations which are planned in the near future.

Between March 28 and 30, 2016, SNC-Lavalin completed a room-by-room survey of the accessible areas of the airport terminal building to quantify suspected designated substances and hazardous materials, and collect representative samples for laboratory analysis of select materials for asbestos and lead content.

The survey and sampling program identified asbestos in the following building materials: drywall joint compound, vinyl floor tiles, concrete pipes, bell and spigot cast iron pipe joint packing, gaskets, pipe thread sealant, window putty, HVAC ducting mastic, tar and exterior ceiling and wall texture coat.

Potential asbestos-containing materials may be present in the following building materials: vermiculite insulation, fire doors, electrical wiring, gaskets and underground piping.

Analytical results confirmed the presence of lead-based paints in 31 of the 49 paint samples collected throughout the interior and exterior of the building. As per PWGSC direction, no leachate analyses were carried out.

The survey and sampling program also identified the following other designated substances or hazardous materials of potential concern:

- Potentially polychlorinated biphenyls (PCB)-containing fluorescent and high intensity discharge (HID) light ballasts throughout the interior and exterior of the building.
- Ozone depleting substances (ODS)-containing air conditioning units, water cooling units, refrigerator/freezer units and other refrigeration equipment.
- Confirmed/potential lead-containing materials (lead-acid batteries, lead solder, lead roof vent pipes, and lead packing in bell and spigot piping).
- Fire extinguishers (compressed gas) mounted on the interior walls and stored in rooms throughout the building.
- Miscellaneous potentially hazardous consumer products including paint, oil, propane and various chemicals and cleaning products.
- Liquid mercury in thermostats located in select rooms of the building.

- Silica potentially in concrete, ceramic tiles, ceiling tiles, mortar, and drywall, where present in the building.

While effort was made to identify all hazardous building materials, a number are suspected to be hidden/inaccessible in the building. Surveys in conjunction with renovation activities are recommended to identify such materials.

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In-Text Tables

1: Detailed Inventory of Regulated Materials – 3000 Airport Road (Airport Terminal Building), Penticton, BC19

Appendices

- I Drawings:
 - 636476-BM1 – Sample Location Plan – First Floor
 - 636476-BM2 – Sample Location Plan – Roof
- II Photographs
- III Laboratory Analytical Report (IATL)
- IV Laboratory Analytical Report (Maxxam)

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1 INTRODUCTION

On behalf of Public Works and Government Services Canada (PWGSC), SNC-Lavalin Inc. (SNC-Lavalin) has completed a pre-renovation non-destructive hazardous building materials survey (HBMS) of the airport terminal building located at 3000 Airport Road, Penticton, BC (the "Site"). SNC-Lavalin understands that the purpose of the work was to complete a non-destructive HBMS of the building (with exception to the Hold Room and Air Control Building) to identify potential materials of concern. At the time of the survey, the terminal was active; however, the areas of the building were unoccupied during the assessment.

All work was completed as per the *Hazardous Materials Assessment Consulting Services Task Authorization – EZ113-150642/003/PWY* under Task Authorization No. 70034882 (Amend 1).

2 SCOPE OF WORK

Between March 28 and 30, 2016, SNC-Lavalin personnel observed the interior and exterior of the Site to identify the potential existence of the following regulated materials:

- asbestos;
- lead paint;
- polychlorinated biphenyls (PCB);
- ozone depleting substances (ODS);
- miscellaneous solid and liquid wastes;
- liquid mercury;
- radiological sources and/or substances;
- silica; and
- mould and/or moisture.

The scope of work for the HBMS excluded the following materials: formaldehyde; carbon monoxide; radon; volatile organic compounds; biological hazards (e.g., rodent droppings); very short-lived low-level radioactive waste; and, indoor air quality pollutants.

Representative samples were collected and laboratory analysis completed for suspected asbestos-containing materials (ACMs) and lead-containing paint. The survey was completed based on the expectation that portions of the building would be renovated in the future. As such, non-destructive sampling methods were utilized to inspect and where appropriate, collect samples of materials of interest. Effort was made to identify materials of potential concern within hidden or concealed spaces; however, due to the non-destructive nature of the survey, inspection and sampling was limited to the extent that was possible without causing obvious and/or irreparable damage to building materials in active areas of the building that could not be feasibly repaired within the scope of this work program. For samples that were collected, effort was made to obtain the samples from discrete locations or locations where the building materials were already in poor condition.

The following sections provide a summary of the results, SNC-Lavalin's recommendations with regard to the Site, details of the regulatory framework related to regulated building materials, and the methodology used to complete the survey. Limitations and/or exclusions are also discussed in the following sections as they relate to the work program results.

3 SUMMARY

Based on the results of the survey, there are regulated building materials located on the Site requiring specific procedures prior to renovation activities for: handling; abatement; demolition; and disposal, as outlined in Table 1. The sample locations are presented on Drawings 636476-BM1 and 636476-BM2, included as Appendix I. Select photographs of the sample locations are included in Appendix II. Copies of the laboratory analytical reports for the results of the asbestos and lead analyses are included in Appendices III and IV, respectively.

A summary of the regulated building materials identified on the Site is as follows:

Asbestos-Containing Materials:

- **Asbestos-containing drywall joint compound** was identified in Rooms 106A, 120, 124, 125, and 130. Due to the variability in drywall joint compound results, all drywall joint compound in the building should be treated as ACM.
- **Asbestos-containing light grey vinyl floor tiles** were identified in Rooms 106B (within the small wall compartment on the west wall, north of the building entrance), 109, 112, 114, 125, and 129. Similar coloured asbestos-containing vinyl floor tile debris was identified in the northeast flooring vent in Room 120. All similar coloured vinyl floor tiles should be considered ACM.
- **Asbestos-containing green vinyl floor tiles (and associated black mastic adhesive)** were identified in Rooms 127, 128A, 128B, 132, 133, 134, 135, 136. All similar coloured vinyl floor tiles should be considered ACM.
- **Asbestos-containing grey vinyl floor tiles (and associated black mastic adhesive)** were identified in Rooms 123 and 124. All similar coloured vinyl floor tiles should be considered ACM.
- **Asbestos-containing light brown vinyl floor tiles** were identified in Room 129 beneath the lockers on the north and south walls. All similar coloured vinyl floor tiles should be considered ACM.
- **Asbestos-containing tan vinyl floor tiles** were identified in Rooms 115, 116A, 117, and 119. All similar coloured vinyl floor tiles should be considered ACM.
- **Asbestos-containing grey concrete pipe** was identified in the crawlspace of Room 127. The same pipe was observed sticking out of the ground (vertical) and capped on the exterior of the west side of the building adjacent Room 133. Similar piping may be present in other areas of the crawlspace, walls spaces and/or ceiling spaces, or buried beneath the ground.

- **Asbestos-containing bell and spigot cast iron pipe joint packing** was identified in one joint attached to the asbestos-containing concrete pipe in the crawlspace of Room 127. Similar inaccessible piping joints may be present in other areas of the crawlspace, walls spaces and/or ceiling spaces.
- **Asbestos-containing gaskets** were identified in the crawlspace of Room 127 and in the mechanical room (Room 137), both of which were grey gaskets. All similar gaskets should be treated as ACM. Due to the limited access to working pipe joints, limited sampling could be completed.
- **Asbestos-containing pipe thread sealant** was identified in Rooms 124 and 143 on the fire sprinkler lines. All fire sprinkler line pipe thread sealant should be considered ACM.
- **Asbestos-containing white floor leveling compound** was identified beneath the vinyl floor tiles in Room 123. The extent of the floor leveling compound could not be determined based on the non-destructive nature of the survey. If any similar compound is identified in the building, it should be treated as ACM.
- **Asbestos-containing grey window putty** was identified in Rooms 120 (northeast corner) and 117 (east side of room), of which the windows are adjoining. All similar window putty should be considered ACM.
- **Asbestos-containing grey window putty** was identified on the upper windows in Room 106A above Room 143. All similar putty on the upper windows in the building should be treated as ACM.
- **Asbestos-containing red mastic** was identified on HVAC ducting in the crawlspace of Room 136. There may be similar mastic that was inaccessible during the survey in other areas of the crawlspace and ceiling spaces; if similar mastic is identified, it should be treated as ACM.
- **Asbestos-containing tar** was identified by the base of the doorframe of the southeast door of Room 110. All similar tar should be considered ACM.
- **Asbestos-containing exterior ceiling and wall texture** was identified on the south and west exterior walls and ceiling (carport area on the south end of the building). All similar exterior texture coat should be considered ACM.

Suspect Asbestos-Containing Materials:

- Vermiculite contaminated with asbestos may also be present in wall cavities and ceiling spaces within the building. No vermiculite was encountered during the survey; however, the absence of vermiculite insulation could not be confirmed in all areas during the survey. If encountered during renovations, vermiculite insulation must be handled as ACMs unless testing confirms otherwise.

- Fire doors to the entrances of Rooms 137 and 138 may contain asbestos-containing filler material. No other fire doors were identified at the Site; however, if any similar fire doors are identified, they should be treated as ACM.
- Electrical wiring insulation throughout the building may contain ACMs; however, this material was not sampled due to safety concerns with live electrical wiring.
- ACMs within equipment; no dismantling of equipment was completed and therefore, inspection and sampling of gaskets in operating equipment/piping was limited. Similarly, only the exterior of electrical equipment in the building, including switch boxes, was visually inspected for potential asbestos containing insulating panels (i.e., no opening of electrical boxes and no sampling), due to possible related safety concerns.
- Asbestos-containing cement pipes could be present at the Site as one ACM pipe was observed in the crawlspace. The identification of potential ACMs below ground was not within the scope of this report, and should be addressed during any excavation at the Site.

Lead-Based Paint:

- **Lead-containing light brown and blue paint** was identified on the door of Rooms 125 and 130.
- **Lead-containing brown and blue paint** was identified on the door and window frames of Room 125.
- **Lead-containing white paint** was identified on the walls of Room 125.
- **Lead-containing green paint** was identified on the door frame of Rooms 127 and 135.
- **Lead-containing grey paint** was identified on the wall panels in Room 127.
- **Lead-containing beige paint** was identified on the wall trim in Room 120.
- **Lead-containing white and off-white paint** was identified on the walls of Room 106A (collected above Room 143). Similar paint colours were identified in Rooms 102, 105A, and 106B.
- **Lead-containing light blue and white paint** was identified on the door frame of Room 109.
- **Lead-containing exterior yellow paint** was identified on a steel pipe on the roof.
- **Lead-containing exterior grey paint** was identified on the wall of the raised portion of the roof.
- **Lead-containing exterior white paint** was identified on the soffit of the raised portion of the roof.
- **Lead-containing exterior black paint** was identified on the ladder to the raised portion of the roof located on the south west side.
- **Lead-containing exterior dark brown paint** was identified on the window trim on the east side of the raised portion of the roof.

- **Lead-containing exterior white, tan and light grey paint** was identified on the concrete foundation (above ground portion).
- **Lead-containing exterior blue paint** was identified on the exterior walls of the building.
- **Lead-containing exterior dark brown paint** was identified on the door frame to Room 125.
- **Lead-containing pink paint** was identified on the walls and ceiling of Room 128B.
- **Lead-containing grey floor paint** was identified in Room 138.
- **Lead-containing beige paint** was identified on the walls of Room 137 and 138.
- **Lead-containing grey primer paint** was identified on the wall in the ceiling space of Room 142.
- **Lead-containing light brown paint** was identified on the door frame of Room 132.
- **Lead-containing red paint** was identified on the window frames on the west wall of Room 106B.
- **Lead-containing brown paint** was identified on the door to the wall cabinet in Room 106B (north of the main entrance, Room 101).
- **Lead-containing yellow paint** was identified in the wall cabinet in Room 106B.
- **Lead-containing yellow paint** was identified on the door frame of Room 112.
- **Lead-containing beige paint** was identified on the walls and pipes in Room 110B.

Based on these results, all materials found at the Site of similar colours as identified above should be considered as lead-containing.

PCB Materials:

- **Potentially PCB-containing light ballasts (fluorescent and high intensity discharge [HID])** were identified throughout the interior and exterior of the building.

Ozone Depleting Substances (ODS):

R404a Refrigerant (Non-ODS)

- Room 162 – One (1) ice maker and one (1) freezer.

R134a Refrigerant (Non-ODS)

- Room 162 – One (1) refrigerator;
- Room 161 – One (1) cooler;

- Room 151B – One (1) water cooler;
- Room 110A – One (1) refrigerator;
- Room 113 – One (1) water cooler;
- Room 116A – One (1) refrigerator;
- Room 116B – One (1) freezer; and
- Room 140 – One (1) water cooler (black) and one (1) refrigerator.

R410a Refrigerant (Non-ODS)

- Room 136 – One (1) wall mounted air conditioning unit; and
- Room 162 – One (1) air conditioning unit.

R22 Refrigerant (ODS)

- Room 161 – One (1) upright cooler; and
- Room Roof – Six (6) air conditioner units (2, 4, 5, 6, 7, and 8).

Unknown Refrigerant (Suspect ODS [no ID tag accessible])

- Room 113 – One (1) refrigerator;
- Room 134 – One (1) refrigerator; and
- Room 140 – One (1) water cooler (white).

Miscellaneous Solid and Liquid Wastes:

- **Lead-based batteries** were identified in Room 127:
 - Two (2) batteries (one in each fire control box) on the west wall;
 - Eight (8) car sized batteries on the south wall; and
 - One (1) battery in the control box on the east wall.
- **Potential lead-based batteries** were identified in the following locations:
 - Room 125 – Fire control box;
 - Room 138 – Electrical equipment and/or control boxes that were inaccessible during the survey; and

- Rooms 102, 109, 106B, 112, and 127 – Emergency lighting boxes.
- **Potential lead-containing soldering equipment and supplies** was identified in Room 133.
- **Potential lead-containing copper pipe solder joints** were identified throughout the building. Copper pipe joints may be hidden in the crawlspace, wall and ceiling spaces and could not be identified due to the non-destructive nature of the survey.
- **Potential lead-containing bell and spigot cast iron pipe joint packing** was identified in the crawlspace of Room 127.
- **Potential lead-containing roof vent pipes** were identified on the exterior roof.
- **Approximately twelve (12) fire extinguishers** were identified in Rooms 105B, 107, 110, 114, 116A, 124, 127, 135, 136, 138 and 162.
- **Various cleaning supplies** were identified in Room 128A (janitor's storage room).
- **Flammable storage box** was identified containing small quantities of various paints, oils, propane, etc.
- **Nine (9) Sinclair canisters** were identified in Room 135. The canisters appeared empty and contents unknown (no additional labels).

Liquid Mercury:

- **Four (4) mercury-containing thermostats** were identified in Rooms 110 (two thermostats), 140 and 142.

Silica:

- Silica may be present throughout the building in the following materials:
 - Concrete floors;
 - Ceramic tiles;
 - Ceiling tiles;
 - Mortar; and
 - Drywall.

4 RECOMMENDATIONS

SNC-Lavalin understands that PWGSC intends to renovate and/or deconstruct various portions of the building that was surveyed.

When PWGSC undertakes demolition or deconstruction activities, then known and suspect ACMs that were identified must be removed by a qualified contractor in accordance with applicable federal and provincial regulations.

WorkSafeBC suggests that improper removal of paint with a lead concentration of 600 mg/kg or more can result in airborne lead concentrations that exceed 50% of the airborne lead exposure limit of 0.05 mg/m³; this would trigger the requirement for an employer to file a Notice of Project Lead (NOPL) and the development and implementation of an exposure control plan and safe work procedures prior to any work being completed.

There is the potential for lead exposure for high risk individuals in the event that lead-based paint with lead concentrations >90 mg/kg is burned and/or becomes airborne during renovation, deconstruction/demolition activities such as cutting, grinding, etc. Therefore, these individuals should be excluded from the work area whenever lead-based paint is being disturbed by work activities to minimize potential lead exposure to these individuals.

The waste generated from removal of paint and surface coatings may be hazardous. Given the possible need for off-site disposal of waste material during renovations, laboratory analysis for preliminary waste characterization of select samples (concentrations of metals in the leachate) may be required. Based on discussions with PWGSC, this sampling was specifically excluded from the assessment. If leachate analysis (Toxicity Characteristic Leaching Procedure [TCLP]) is required for disposal of materials containing hazardous lead concentrations, SNC-Lavalin will be available to collect and submit additional samples, as required.

Suspected silica-containing material, such as the buildings concrete floors, ceramic tiles, ceiling tiles, mortar and drywall, must be managed appropriately. Parts 5, 6 and 20 of the *Occupational Health and Safety Regulation* (OHSR) set out occupational exposure guidelines and controls for silica dust to eliminate, reduce, or manage workers' exposure risk. WorkSafeBC identifies the requirement to develop an exposure control plan to protect workers from overexposure to airborne silica dust in excess of 50% of the exposure limit (i.e., crystalline silica has an OHSR occupational exposure limit of 0.025 mg/m³).

If PWGSC undertakes renovations or deconstruction activities at the Site, PWGSC should require that the qualified contractors (i.e., abatement, demolition and/or disposal contractors) submit the following documentation to PWGSC to verify that the qualified contractors have acted in a responsible manner in accordance with the existing applicable regulations:

- Notice of project for work involving asbestos (NOPA) to be filed with WSBC prior to asbestos abatement;
- NOPL to be filed with WSBC prior to lead abatement;
- Site-specific work procedures for materials of concern (asbestos and lead procedures are included with NOPA and NOPL);
- Letter stating that the ODS recovery, liquid mercury and PCB disposal work, if required, was completed; and
- Relevant Waste Disposal Manifests.

The above documentation should be retained by PWGSC to verify compliance with the applicable regulations. The information supplied by the contractor(s) should include, but not be limited to the above list.

5 REGULATORY FRAMEWORK

Federal and provincial regulations require that regulated building materials be properly identified and managed to prevent potential exposure to workers. In addition, a more intrusive survey is required to identify materials of concern prior to renovations, salvage, or demolition of a building or structure. These materials must be properly controlled, removed, and/or disposed of at a suitably permitted facility in accordance with the applicable federal and provincial regulations. The following federal and provincial regulations relate to these materials:

Federal

- Various Regulations made under the *Canadian Environmental Protection Act (CEPA)*, 1999, S.C. 1999, c. 33, as amended up to February 26, 2015 and current to October 15, 2015, including specialized handling and/or disposal requirements for materials including lead, PCBs, mercury, halocarbons (ODSs and Non-ODSs), radiological sources and/or substances and solid/hazardous wastes. Regulations include the following:
 - Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations (SOR/2005-149).
 - Federal Halocarbon Regulations, 2003 (SOR/2003-289) and Regulations Amending the Federal Halocarbon Regulations, 2003 (SOR/2009-221).
 - Interprovincial Movement of Hazardous Waste Regulations (SOR/2002-301).
 - Ozone-Depleting Substances Regulations, 1998 (SOR/99-7).
 - PCB Regulations (SOR/2008-273).
 - PCB Waste Export Regulations, 1996 (SOR/97-109).
 - Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations, 2008 (SOR/2008-197).
- *Transportation of Dangerous Goods (TDG) Act*, 1992, S.C. 1992, c. 34, as amended up to February 26, 2015, Transportation of Dangerous Goods Regulations (SOR/2001-286) requires that dangerous goods including radioactive materials must be transported in accordance with the provisions of the Act and regulations.
- *Hazardous Products Act* (R.S.C., 198, c. H-3), as amended up to February 11, 2015, prohibits the sale or importation of UFFI into Canada.
- *Surface Coating Materials Regulations*, SOR/2005-109, as amended up to June 20, 2011, issued under the Canada Consumer Product Safety Act (S.C. 2010, c. 21), requires the concentration of total lead present in a surface coating material to be not more than 90 mg/kg.

- *Human Resources Social Development Canada (HRSDC), Canada Labour Code Part II, Canada Occupational Health and Safety Regulations, Part X, Hazardous Substances, as amended, requires that all hazardous substances in the workplace, including asbestos, be identified and controlled to minimize potential exposure to workers. Under the Canada Labour Code Part II definitions, a “hazardous substance” includes a controlled product and a chemical, biological, or physical agent that, by reason of a property that the agent possess, is hazardous to the safety or health of a person exposed to it.*
- *Mould Guidelines for Canadian Construction Industry - CCA82, Canadian Construction Association, 2004, provides guidance on minimizing and abating mould growth.*
- *The Nuclear Safety and Control Act (1997, c.9), Nuclear Substances and Radiation Devices Regulations (SOR/2000-207) applies to nuclear substances and sealed sources, including devices such as smoke detectors.*

Provincial

- *WorkSafeBC Occupational Health and Safety Regulation (OHSR), BC Reg. 296/97, includes amendments up to B.C. Reg. 30/2015, August 4, 2015, requires that materials including any asbestos, lead, or other heavy metal or toxic substance, and flammable or explosive materials that may be handled, disturbed or removed during demolition must be identified and removed or safely contained prior to demolition. In addition, a copy of the observation report identifying these materials must be available at the work site.*
- *Environmental Management Act (EMA), B.C. Reg. 54/2016 / March 2, 2016, Ozone Depleting Substances (ODS) and Other Halocarbons Regulation, BC Reg. 387/99, including amendments up to BC Reg. 317/2012, requires ODS to be recovered from equipment prior to disposal.*
- *Hazardous Waste Regulation (HWR), B.C. Reg. 63/88, including amendments up to B.C. Reg. 63/2009, requires all Hazardous Wastes (HW) must be properly managed and disposed of.*

We note that at the time of this report, the provincial OHSR defines ACM as any manufactured article or other material which contains 0.5% or more asbestos by weight and vermiculite insulation containing any amount of asbestos. Other federal and provincial legislation defines ACM as containing 1% or more asbestos by weight. Therefore, for the purposes of this report the more stringent criterion of 0.5% has been used to identify ACM.

Federal and provincial guidelines limit lead concentrations in paint to 90 mg/kg for high risk individuals (i.e., pregnant women and children), and any concentrations that exceed this limit would be considered a lead based paint. WorkSafeBC suggests that improper removal of paint with a lead concentration of 600 mg/kg or more can result in airborne lead concentrations that exceed 50% of the airborne lead exposure limit of 0.05 mg/m³; this would trigger the requirement for an employer to file a NOPL and the development and implementation of an exposure control plan and safe work procedures prior to any work being completed. Therefore, for the purposes of this report, paint is

identified as lead based if the total lead concentration is >90 mg/kg as per the federal regulations, and if the paint contains lead concentrations >600 mg/kg, an exposure control plan may be required if the paint is disturbed in such a manner that workers could be exposed to lead at >50% of the exposure limit.

There are no special disposal requirements for materials coated with lead paint unless the lead is found to be leachable in excess of the regulated standard of 5 mg/L in the HW regulations while considering the entire mass of the object the paint is coating.

Radioactive materials are listed under the current Federal TDG Act and Regulations. Substances with a specific radioactivity greater than 70 kBq/kg are considered Class 7 (Radioactive Materials) within the TDG Act and Regulations and must be transported in accordance with the provisions of the TDG Act and Regulations. The Nuclear Safety and Control Act (1997, c.9), Nuclear Substances and Radiation Devices Regulations (SOR/2000-207), advises that radioactive substances that do not contain more than 185 kBq of americium 241 or, where it is in a commercial or industrial facility, more than 740 kBq of americium 241 is considered as a radioactive source under the TDG Act and Regulations.

According to the Canadian Nuclear Society, approximately 30 kBq of radioactive material is contained within a typical smoke detector. Therefore, for a commercial facility, the 740 kBq level may be reached if 25 or more radioactive smoke detection devices are collected and stored together.

WorkSafeBC indicates that employers are required under Section 5.54 of the OHSR to develop an exposure control plan when workers are or may be exposed to airborne silica dust in excess of 50% of the exposure limit. Exposure limits vary depending on the type of silica identified.

6 METHODOLOGY

The following sections outline the specific protocols followed when completing the survey. In general, fieldwork included the following tasks:

- A room-by-room visual survey of the accessible portions of the Site to identify, document and quantify suspected designated substances and hazardous materials; and
- Representative sampling and laboratory analysis of select materials for asbestos and lead content.

The following sections outline the specific protocols followed when completing the survey.

6.1 *Asbestos*

The methodology for completing the asbestos assessment was in accordance with WorkSafeBC guidelines and included the identification of suspect materials and collection of an adequate number of representative samples of these materials. All accessible areas of the Site were observed for possible ACM. Accessible wall cavities and roof spaces were also inspected for the possible presence of vermiculite insulation.

Samples were collected with minimum disturbance and sampling locations repaired, where applicable. Sample locations were marked on the building material in discrete locations; where non-discrete locations were sampled, temporary markings were used to identify the sample locations (i.e., tape and sample bags with IDs). Temporary markings were subsequently removed following sample location photographs.

Samples for laboratory analysis to determine asbestos content were collected in sealable plastic bags, labelled and shipped by courier to International Asbestos Testing Laboratories (IATL) in Mt. Laurel, NJ, USA under Chain of Custody protocols. Analysis of bulk samples for determination of asbestos content was performed using polarized light microscopy (PLM) procedures in accordance with the applicable regulations using EPA 600 R-93/116, 1993 Method.

During the survey, a total of 210 samples were collected for analysis of asbestos content.

6.2 *Lead Paint*

Lead-based paint or surface coatings may be present on structures that need to be cut or ground during renovations. The presence of lead-based paint or surface coatings is not an environmental concern but could pose a potential exposure risk to workers in the event that lead-based paint or surface coatings is burned and/or becomes airborne during renovation activities. As such, sampling

of paint or surface coatings was generally limited to most widely applied, suspected lead-based paint colours on building materials and on larger metal building components that might reasonably require torch cutting during building renovation.

Different paint colours may contain different concentrations of lead; therefore, SNC-Lavalin personnel inspected the Site to determine major paint colour(s) that have been applied to surfaces throughout. The approach was to try to obtain samples from structures that may need to be cut, ground, or sanded during renovation or demolition/deconstruction. Factory painted surfaces were not sampled as the paint is applied in thin layers, making it difficult to obtain a sufficient amount of paint to analyse.

Samples were collected in sealable plastic bags, labelled and submitted to Maxxam Analytics in Burnaby, BC (Maxxam) for analysis of lead in paint. Analysis of bulk samples for determination of metals content was performed using Inductively Coupled Plasma, Mass Spectrometry (ICP-MS) procedures

During the survey, 49 samples were collected and submitted to Maxxam for analysis of total lead in accordance with the applicable regulations.

6.3 *Polychlorinated Biphenyls (PCBs)*

Historical use of PCBs in electrical equipment manufactured in Canada, such as transformers, fluorescent lamp ballasts and capacitors, was common prior to approximately 1977. The use of PCBs was prohibited by the Canadian Environmental Protection Act in heat transfer and electrical equipment installed after August 1977, and in transformers and capacitors installed after June 1980. However, experience has shown that electrical equipment manufactured previously and held in inventory may still be in use.

The survey included observation of accessible areas of the armoury for items or equipment that could possibly contain PCBs, such as fluorescent light fixtures, HID lamps, and oil-filled electrical equipment.

SNC-Lavalin personnel identified and recorded suspect fluorescent light ballasts and electrical equipment potentially containing PCBs.

6.4 *Ozone Depleting Substances*

SNC-Lavalin personnel observed the interior and exterior spaces of the Site to identify if air conditioning units, refrigerators, freezers, or other sources of ODS exist. If a unit was identified, the

manufacturer's nameplate (if accessible) was observed to determine the type and amount of refrigerant used.

6.5 *Miscellaneous Solid and Liquid Wastes*

The interior and exterior spaces of the armoury were visually observed to identify the presence of other designated substances and hazardous materials, including miscellaneous solid and liquid wastes. Miscellaneous materials of concern include, but are not limited to, materials in larger means of containment, such as oils or fuels in storage tanks or drums, or chemicals that may be present in smaller household containers, such as paints, solvents, cleaners, etc. Materials of concern were identified, photographed and documented.

6.6 *Liquid Mercury*

Mercury has widespread use in commercial/residential products including electrical switches, barometers and thermometers. It also has many commercial, medical and industrial applications. A potential concern of mercury is its persistence in the environment when released at a landfill following disposal. Special considerations must be taken during the disposal of items containing mercury.

The interior of the building was observed for thermostats that may contain small amounts of liquid mercury. The covers of thermostats found were opened to assess the presence of mercury ampoules.

6.7 *Radiological Sources and/or Substances*

Radioactive sources and/or substances may be present in smoke detection devices.

The accessible areas of the Site were observed for potential radiological sources and/or substances and, if found, SNC-Lavalin compiled an inventory. Any remaining radiological sources and/or substances should be properly disposed of by a qualified contractor prior to renovations or demolition/deconstruction.

6.8 *Silica*

Silica occurs naturally as a crystalline material in rock, sand, concrete and cement, and therefore, is likely present in poured concrete slabs/floors, concrete blocks, mortar, plaster, drywall, acoustic ceiling tiles and ceramic tiles. Crystalline silica is significantly more toxic than amorphous silica; however, both are regulated. Crystalline silica dust can be generated through such processes such as breaking, drilling, hammering, blasting, grinding, crushing or sandblasting silica-containing materials. When breathed in, the crystalline silica dust can cause permanent damage to the lungs.

SNC-Lavalin personnel noted materials at the Site that are suspected of containing silica.

6.9 *Mould and/or Moisture*

SNC-Lavalin personnel observed interior and exterior areas of the Site for the presence of mould and/or moisture. Any suspect areas identified (e.g., beneath sinks or adjacent hot water tanks) were noted and photographed.

7 RESULTS

Details of the results are presented for each regulated material of concern in the following Table 1, below. This information includes recommendations for removal/handling during renovation or demolition/deconstruction activities, where required.

Table 1: Detailed Inventory of Regulated Materials – 3000 Airport Road (Airport Terminal Building), Penticton, BC

Issue / Location	Results	Renovation/Pre-Demolition Requirement
<p>ASBESTOS-CONTAINING MATERIALS (ACM)</p> <p>Suspect ACM Sampled – Asbestos Identified:</p> <ul style="list-style-type: none"> • A3 (Layer 1) – Drywall joint compound – Room 125. • A4 (Layer 1) – Vinyl floor tiles – off-white with grey streaks – Room 125. • A5 – Drywall joint compound – Room 125. • A15 (Layer 1) – Green vinyl floor tile – Room 127. • A15 (Layer 2) – Black mastic (adhered to Layer 1) – Room 127. • A20 – Grey concrete pipe – Room 127 (crawl space). • A21 – Oakum bell end cast iron pipe fitting filler attached to asbestos-concrete pipe – Room 127 (crawl space). • A23 – Grey gasket – Crawl space Room 127. • A28 (Layer 2) – Drywall joint compound – Room 124. • A29 – Pipe thread sealant on fire line – Room 124. • A34 (Layer 1) – Grey vinyl floor tile – Room 123. • A34 (Layer 2) – Black mastic (adhered to Layer 1) – Room 123. • A35 (Layer 1) – Black mastic (similar to A34) – Room 123. • A35 (Layer 2) – White floor levelling compound – Room 123. • A38 – Grey vinyl floor tile – Room 129. • A40 – Drywall joint compound under vinyl wall covering – Room 130. • A41 – Drywall joint compound in ceiling space – Room 120. • A43 – Grey window putty – Room 120. • A45 (Layer 1) – Grey vinyl floor tile debris located in floor vent – Room 120. • A47 – Drywall joint compound – Room 120. • A49 – Grey window putty – Room 106A above Room 143. 	<p>Analytical Result:</p> <ul style="list-style-type: none"> • 1.1% Chrysotile • 0.75% Chrysotile • 1.3% Chrysotile • 10% Chrysotile • 2.5% Chrysotile • 15% Chrysotile, 10% Crocidolite • 5.1% Amosite • 40% Chrysotile • 1.1% Chrysotile • 0.5% Chrysotile • 8.7% Chrysotile • 0.5% Chrysotile • 0.5% Chrysotile • 1.3% Chrysotile • 6% Chrysotile • 1.2% Chrysotile • 1.2% Chrysotile • 3.5% Chrysotile • 7.2% Chrysotile • 0.75% Chrysotile • 4.1% Chrysotile 	<p>Prior to renovation/demolition, the ACM must be removed by a qualified asbestos removal contractor. Work should be performed in accordance with the OHSR and BC HWR.</p> <p>Note: At the time of this report, ACM means any manufactured article or other material, which contains 0.5% or more asbestos by weight as defined in the regulations.</p>

Table 1: Detailed Inventory of Regulated Materials – 3000 Airport Road (Airport Terminal Building), Penticton, BC

Issue / Location	Results	Renovation/Pre-Demolition Requirement
ASBESTOS-CONTAINING MATERIALS (ACM) (Cont'd)		
Suspect ACM Sampled – Asbestos Identified (Cont'd) :	Analytical Result:	Prior to renovation/demolition, the ACM must be removed by a qualified asbestos removal contractor. Work should be performed in accordance with the OHSR and BC HWR.
<ul style="list-style-type: none"> • A52 – Drywall joint compound – Room 106A above Room 143. 	<ul style="list-style-type: none"> • 2.4% Chrysotile 	Note: At the time of this report, ACM means any manufactured article or other material, which contains 0.5% or more asbestos by weight as defined in the regulations.
<ul style="list-style-type: none"> • A108 – White ceiling texture – Exterior. 	<ul style="list-style-type: none"> • 4.1% Chrysotile 	
<ul style="list-style-type: none"> • A110 – White wall texture (same as ceiling texture) – Exterior. 	<ul style="list-style-type: none"> • 4.7% Chrysotile 	
<ul style="list-style-type: none"> • A114 – White wall texture (same as ceiling texture) – Exterior. 	<ul style="list-style-type: none"> • 5.0% Chrysotile 	
<ul style="list-style-type: none"> • A116 – White wall texture (same as ceiling texture) – Exterior. 	<ul style="list-style-type: none"> • 4.8% Chrysotile 	
<ul style="list-style-type: none"> • A130 – Grey gasket – Room 137. 	<ul style="list-style-type: none"> • 15% Chrysotile 	
<ul style="list-style-type: none"> • A135 (Layer 1) – Off-white vinyl floor tile – Room 132. 	<ul style="list-style-type: none"> • 4.8% Chrysotile 	
<ul style="list-style-type: none"> • A146 – Red mastic on HVAC ducting – Room 136 (crawl space). 	<ul style="list-style-type: none"> • 1.2% Chrysotile 	
<ul style="list-style-type: none"> • A165 – Off-white vinyl floor tile – Room 117. 	<ul style="list-style-type: none"> • 1.5% Chrysotile 	
<ul style="list-style-type: none"> • A168 – Grey window putty – Room 117. 	<ul style="list-style-type: none"> • 10% Chrysotile 	
<ul style="list-style-type: none"> • A170 (Layer 1) – Tan vinyl floor tile – Room 119. 	<ul style="list-style-type: none"> • 1.4% Chrysotile 	
<ul style="list-style-type: none"> • A173 – Pipe thread sealant on fire line – Room 143. 	<ul style="list-style-type: none"> • 1.4% Chrysotile 	
<ul style="list-style-type: none"> • A180 (Layer 1) – Grey vinyl floor tile (inside wall compartment) – Room 106B. 	<ul style="list-style-type: none"> • 1.2% Chrysotile 	
<ul style="list-style-type: none"> • A196 (Layer 1) – White vinyl floor tile – Room 112. 	<ul style="list-style-type: none"> • 3.6% Chrysotile 	
<ul style="list-style-type: none"> • A202 (Layer 2) – tar on floor adjacent door step – Room 110. 	<ul style="list-style-type: none"> • 2.4% Chrysotile 	

Table 1 (Cont'd): Detailed Inventory of Regulated Materials – 3000 Airport Road (Airport Terminal Building), Penticton, BC

Issue / Location	Results	Renovation/Pre-Demolition Requirement
ASBESTOS-CONTAINING MATERIALS (ACM) (Cont'd)		
Suspect ACM Sampled – Asbestos NOT Identified :	Analytical Result:	No renovation/pre-demolition requirements necessary.
• A1 – Grey cementitious material beneath baseboard – Room 125.	• non-asbestos	Note:
• A2 – Black baseboard – Room 125.	• non-asbestos	At the time of this report, ACM means any
• A3 (Layer 2) – Tan mastic (A2 adhesive) – Room 125.	• non-asbestos	manufactured article or other material, which
• A4 (Layer 2) – Black mastic (Layer 1 adhesive) – Room 125.	• non-asbestos	contains 0.5% or more asbestos by weight as
• A4 (Layer 3) – Tan mastic (A2 adhesive) – Room 125.	• non-asbestos	defined in the regulations.
• A6 – Grey window putty – Room 125.	• non-asbestos	
• A7 – Ceiling tile – Room 125.	• non-asbestos	
• A8 (Layer 1) – Paper insulation backing – Room 125 (ceiling space).	• non-asbestos	
• A8 (Layer 2) – Tan wall insulation – Room 125 (ceiling space).	• non-asbestos	
• A9 (Layer 1) – Silver pipe insulation – Room 125 (ceiling space).	• non-asbestos	
• A9 (Layer 2) – Black tar on pipe insulation – Room 125 (ceiling space).	• non-asbestos	
• A10 – White cementitious hole filler in west door – Room 125.	• non-asbestos	
• A11 (Layer 1) – Silver pipe insulation – Room 125 (ceiling space).	• non-asbestos	
• A11 (Layer 2) – Black tar on pipe insulation – Room 125 (ceiling space).	• non-asbestos	
• A12 – Grey wall mortar patch for piping/wiring – Room 125 (ceiling space).	• non-asbestos	
• A13 – Ceiling tile – Room 125.	• non-asbestos	
• A14 – Grey putty (loose piece) – Room 125 (ceiling space)	• non-asbestos	
• A16 (Layer 1) – Black baseboard – Room 127.	• non-asbestos	
• A16 (Layer 2) – Brown mastic (Layer 1 adhesive) – Room 127.	• non-asbestos	
• A17 (Layer 1) – Black baseboard – Room 127.	• non-asbestos	
• A17 (Layer 2) – White mastic (Layer 1 adhesive) – Room 127.	• non-asbestos	

Table 1 (Cont'd): Detailed Inventory of Regulated Materials – 3000 Airport Road (Airport Terminal Building), Penticton, BC

Issue / Location	Results	Renovation/Pre-Demolition Requirement
<p>ASBESTOS-CONTAINING MATERIALS (ACM) (Cont'd)</p> <p>Suspect ACM Sampled – Asbestos NOT Identified (Cont'd):</p> <ul style="list-style-type: none"> • A18 – Red mastic over doorway – Room 127. • A19 – Pipe thread sealant – Room 127 (crawl space). • A22 – Pipe thread sealant – Room 127 (crawl space). • A24 – Grey sill gasket – Room 127 (crawl space). • A25 – Drywall joint compound between plywood joints – Room 127. • A26 – Drywall joint compound on ceiling patch – Room 124. • A27 – Ceiling tile – Room 124. • A28 (Layer 1) – Black baseboard – Room 124. • A28 (Layer 3) – White mastic on baseboard (Layer 1 adhesive) – Room 124. • A30 – Drywall joint compound in skylight – Room 124. • A31 – Ceiling tile (suspended) – Room 123. • A32 – Ceiling tile (at top of ceiling space) – Room 123. • A33 – Yellow glue under carpet – Room 123 • A36 – White mastic between wall panels (north wall) – Room 123. • A37 – Ceiling tile – Room 129. • A39 – Vinyl wall covering – Room 129. • A42 – Drywall joint compound – Room 128. • A44 – Drywall joint compound – Room 120. • A46 – Grey cementitious on base of east door – Room 120. • A48 – Grey grout – Room 130. • A50 – White pipe insulation wrap (ceiling space) – Room 106A above Room 143. • A51 – Ceiling tile – Room 106A above Room 143. 	<p>Analytical Result:</p> <ul style="list-style-type: none"> • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos 	<p>No renovation/pre-demolition requirements necessary.</p> <p>Note: At the time of this report, ACM means any manufactured article or other material, which contains 0.5% or more asbestos by weight as defined in the regulations.</p>

Table 1 (Cont'd): Detailed Inventory of Regulated Materials – 3000 Airport Road (Airport Terminal Building), Penticton, BC

Issue / Location	Results	Renovation/Pre-Demolition Requirement
<p>ASBESTOS-CONTAINING MATERIALS (ACM) (Cont'd)</p> <p>Suspect ACM Sampled – Asbestos NOT Identified (Cont'd):</p> <ul style="list-style-type: none"> • A53 – Drywall joint compound – Room 106A. • A54 – Grey grout – Room 106A. • A55 – Brown baseboard – Room 109. • A56 (Layer 1) – Brown mastic (A55 adhesive) – Room 109 • A56 (Layer 2) – Drywall joint compound – Room 109. • A57 – Transition strip glue – Room 109. • A58 – Tan glue under carpet – Room 109. • A59 – Drywall joint compound – Room 151A. • A60 – Brown vinyl wall covering – Room 106A • A61 – Baseboard – Room 151A. • A62 – Yellow glue on baseboard – Room 151A. • A63 – Dark grey grout for floor tiles – Room 105A. • A64 – Beige grout – Room 105A. • A65 – Drywall joint compound – Room 105A. • A66 – Tan HVAC duct mastic – above Room 162. • A67 – Pipe thread sealant – above Room 162. • A68 – Ceiling tile – northeast corner of Room 105A. • A69 – Drywall joint compound (drop ceiling) – above Room 162. • A70 – Drywall joint compound (demising wall) – above Room 162. • A71 – Ceiling stipple – Room 106B (sampled above Room 162). • A72 – Ceiling tile around heat detector – above Room 162. • A73 – Ceiling tile (very large holes) – above Room 162. • A74 – Ceiling tile (random holes) – above Room 162. • A75 – Orange HVAC vent mastic – above Room 162. 	<p>Analytical Result:</p> <ul style="list-style-type: none"> • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos 	<p>No renovation/pre-demolition requirements necessary.</p> <p>Note: At the time of this report, ACM means any manufactured article or other material, which contains 0.5% or more asbestos by weight as defined in the regulations.</p>

Table 1 (Cont'd): Detailed Inventory of Regulated Materials – 3000 Airport Road (Airport Terminal Building), Penticton, BC

Issue / Location	Results	Renovation/Pre-Demolition Requirement
ASBESTOS-CONTAINING MATERIALS (ACM) (Cont'd)		
Suspect ACM Sampled – Asbestos NOT Identified (Cont'd):	Analytical Result:	No renovation/pre-demolition requirements necessary.
<ul style="list-style-type: none"> • A76 – Plywood knot hole filler (northwest corner) – above Room 162. 	<ul style="list-style-type: none"> • non-asbestos 	Note: At the time of this report, ACM means any manufactured article or other material, which contains 0.5% or more asbestos by weight as defined in the regulations.
<ul style="list-style-type: none"> • A77 – Ceiling stipple – Room 106B outside north side of Room 110A. 	<ul style="list-style-type: none"> • non-asbestos 	
<ul style="list-style-type: none"> • A78 – Ceiling stipple – Room 106B near Room 146. 	<ul style="list-style-type: none"> • non-asbestos 	
<ul style="list-style-type: none"> • A79 (Layer 1) – Ceiling stipple – Room 106B near Room 146. 	<ul style="list-style-type: none"> • non-asbestos 	
<ul style="list-style-type: none"> • A79 (Layer 2) – Drywall joint compound on ceiling – Room 106B near Room 146. 	<ul style="list-style-type: none"> • non-asbestos 	
<ul style="list-style-type: none"> • A80 – Ceiling stipple – Room 106B near Room 146. 	<ul style="list-style-type: none"> • non-asbestos 	
<ul style="list-style-type: none"> • A81 – Ceiling stipple – Room 106B near Room 146. 	<ul style="list-style-type: none"> • non-asbestos 	
<ul style="list-style-type: none"> • A82 – Ceiling stipple – Room 106B near Room 146. 	<ul style="list-style-type: none"> • non-asbestos 	
<ul style="list-style-type: none"> • A83 – Asphalt roof around vent – south section of Roof. 	<ul style="list-style-type: none"> • non-asbestos 	
<ul style="list-style-type: none"> • A84 – Asphalt roof patch – southwest section of Roof. 	<ul style="list-style-type: none"> • non-asbestos 	
<ul style="list-style-type: none"> • A85 – Black mastic around vent – south section of Roof. 	<ul style="list-style-type: none"> • non-asbestos 	
<ul style="list-style-type: none"> • A86 – Black mastic on base of lead pipe – south section of Roof. 	<ul style="list-style-type: none"> • non-asbestos 	
<ul style="list-style-type: none"> • A87 – Black mastic on lead pipe – south section of Roof. 	<ul style="list-style-type: none"> • non-asbestos 	
<ul style="list-style-type: none"> • A88 (Layer 1) – Black shingle – southwest section of Roof. 	<ul style="list-style-type: none"> • non-asbestos 	
<ul style="list-style-type: none"> • A88 (Layer 2) – Black roof material – southwest section of Roof. 	<ul style="list-style-type: none"> • non-asbestos 	
<ul style="list-style-type: none"> • A89 – Grey sealant around concrete light stand base – southeast corner of Roof. 	<ul style="list-style-type: none"> • non-asbestos 	
<ul style="list-style-type: none"> • A90 – Black shingle beneath concrete light stand – southeast corner of Roof. 	<ul style="list-style-type: none"> • non-asbestos 	
<ul style="list-style-type: none"> • A91 – Mastic around lead pipe opening for ACU2 wiring – Roof. 	<ul style="list-style-type: none"> • non-asbestos 	
<ul style="list-style-type: none"> • A92 – Mastic around lead pipe opening for ACU4 wiring – Roof. 	<ul style="list-style-type: none"> • non-asbestos 	
<ul style="list-style-type: none"> • A93 – Texture coat on south wall of raised portion of Roof. 	<ul style="list-style-type: none"> • non-asbestos 	
<ul style="list-style-type: none"> • A94 – Black mastic around roof vent – northeast of ACU5. 	<ul style="list-style-type: none"> • non-asbestos 	

Table 1 (Cont'd): Detailed Inventory of Regulated Materials – 3000 Airport Road (Airport Terminal Building), Penticton, BC

Issue / Location	Results	Renovation/Pre-Demolition Requirement
ASBESTOS-CONTAINING MATERIALS (ACM) (Cont'd)		
Suspect ACM Sampled – Asbestos NOT Identified (Cont'd):	Analytical Result:	No renovation/pre-demolition requirements necessary.
<ul style="list-style-type: none"> A95 (Layer 1) – Grey mastic adjacent window on west side of raised portion of Roof. 	<ul style="list-style-type: none"> non-asbestos 	<p>Note: At the time of this report, ACM means any manufactured article or other material, which contains 0.5% or more asbestos by weight as defined in the regulations.</p>
<ul style="list-style-type: none"> A95 (Layer 2) – Clear mastic adjacent window on west side of raised portion of Roof. 	<ul style="list-style-type: none"> non-asbestos 	
<ul style="list-style-type: none"> A96 – Black mastic around electrical conduit entering building on west side of raised portion of Roof. 	<ul style="list-style-type: none"> non-asbestos 	
<ul style="list-style-type: none"> A97 – Dark brown mastic on south end of sloped metal roofing west of raised portion of Roof. 	<ul style="list-style-type: none"> non-asbestos 	
<ul style="list-style-type: none"> A98 – White mastic on security camera mount – Roof over Room 101. 	<ul style="list-style-type: none"> non-asbestos 	
<ul style="list-style-type: none"> A99 – Black mastic on sloped metal roof west of raised portion of Roof. 	<ul style="list-style-type: none"> non-asbestos 	
<ul style="list-style-type: none"> A100 – Tar paper beneath sloped metal roof west of raised portion of Roof. 	<ul style="list-style-type: none"> non-asbestos 	
<ul style="list-style-type: none"> A101 – Tan mastic between foam and wood supports for metal conduit – east portion of raised section of Roof. 	<ul style="list-style-type: none"> non-asbestos 	
<ul style="list-style-type: none"> A102 – Mastic around lead pipe opening for ACU6 wiring – Roof. 	<ul style="list-style-type: none"> non-asbestos 	
<ul style="list-style-type: none"> A103 – Tar paper (bottom of roof profile) – east of ACU7. 	<ul style="list-style-type: none"> non-asbestos 	
<ul style="list-style-type: none"> A104 (Layer 1) – Black/grey shingle – east of ACU7 (roof profile). 	<ul style="list-style-type: none"> non-asbestos 	
<ul style="list-style-type: none"> A104 (Layer 2) – Black roof material (roof profile). 	<ul style="list-style-type: none"> non-asbestos 	
<ul style="list-style-type: none"> A104 (Layer 3) – Black tar (roof profile). 	<ul style="list-style-type: none"> non-asbestos 	
<ul style="list-style-type: none"> A104 (Layer 4) – Brown fibrous roof material (roof profile). 	<ul style="list-style-type: none"> non-asbestos 	
<ul style="list-style-type: none"> A105 – Grey mastic around steel pipe opening for ACU8 wiring – Roof. 	<ul style="list-style-type: none"> non-asbestos 	
<ul style="list-style-type: none"> A106 – Brown tar paper beneath metal roof siding – east side of building outside Room 107 (exterior). 	<ul style="list-style-type: none"> non-asbestos 	

Table 1 (Cont'd): Detailed Inventory of Regulated Materials – 3000 Airport Road (Airport Terminal Building), Penticton, BC

Issue / Location	Results	Renovation/Pre-Demolition Requirement
ASBESTOS-CONTAINING MATERIALS (ACM) (Cont'd)		
Suspect ACM Sampled – Asbestos NOT Identified (Cont'd):		
<ul style="list-style-type: none"> A107 – Black tar on foundation – southwest corner of building (exterior). 	Analytical Result:	No renovation/pre-demolition requirements necessary.
<ul style="list-style-type: none"> A109 (Layer 1) – White texture waterproof membrane on building foundation – west side outside Room 133 (exterior). 	<ul style="list-style-type: none"> non-asbestos 	Note:
<ul style="list-style-type: none"> A109 (Layer 2) – Black tar waterproof membrane. 	<ul style="list-style-type: none"> non-asbestos 	At the time of this report, ACM means any manufactured article or other material, which contains 0.5% or more asbestos by weight as defined in the regulations.
<ul style="list-style-type: none"> A111 – White mastic on metal conduit entering Room 127 (exterior). 	<ul style="list-style-type: none"> non-asbestos 	
<ul style="list-style-type: none"> A112 – tar paper under textured wood siding – southwest corner of building (exterior). 	<ul style="list-style-type: none"> non-asbestos 	
<ul style="list-style-type: none"> A113 – White window mastic – southwest corner of building outside Room 125 (exterior). 	<ul style="list-style-type: none"> non-asbestos 	
<ul style="list-style-type: none"> A115 – Wall texture coat – west side of building (exterior). 	<ul style="list-style-type: none"> non-asbestos 	
<ul style="list-style-type: none"> A117 – Grey baseboard – Room 138. 	<ul style="list-style-type: none"> non-asbestos 	
<ul style="list-style-type: none"> A118 – Yellow mastic (A117 adhesive) – Room 138. 	<ul style="list-style-type: none"> non-asbestos 	
<ul style="list-style-type: none"> A119 – Brown mastic (A117 adhesive) – Room 138. 	<ul style="list-style-type: none"> non-asbestos 	
<ul style="list-style-type: none"> A120 (Layer 1) – Grey transition strip – Room 138. 	<ul style="list-style-type: none"> non-asbestos 	
<ul style="list-style-type: none"> A120 (Layer 2) – Tan mastic (Layer 1 adhesive) – Room 138. 	<ul style="list-style-type: none"> non-asbestos 	
<ul style="list-style-type: none"> A121 – Tan mastic plywood knot hole filler – Room 138 	<ul style="list-style-type: none"> non-asbestos 	
<ul style="list-style-type: none"> A122 – Red mastic around conduit over door – Room 138. 	<ul style="list-style-type: none"> non-asbestos 	
<ul style="list-style-type: none"> A123 (Layer 1) – Red mastic around conduit in northeast corner – Room 138. 	<ul style="list-style-type: none"> non-asbestos 	
<ul style="list-style-type: none"> A123 (Layer 2) – Off-White foam hole filler around conduit in northeast corner – Room 138. 	<ul style="list-style-type: none"> non-asbestos 	
<ul style="list-style-type: none"> A124 – Pipe thread sealant on fire line – Room 138. 	<ul style="list-style-type: none"> non-asbestos 	
<ul style="list-style-type: none"> A125 – Drywall joint compound – Room 138. 	<ul style="list-style-type: none"> non-asbestos 	

Table 1 (Cont'd): Detailed Inventory of Regulated Materials – 3000 Airport Road (Airport Terminal Building), Penticton, BC

Issue / Location	Results	Renovation/Pre-Demolition Requirement
<p>ASBESTOS-CONTAINING MATERIALS (ACM) (Cont'd)</p> <p>Suspect ACM Sampled – Asbestos NOT Identified (Cont'd):</p> <ul style="list-style-type: none"> • A126 – Grey cementitious board along east wall behind transformer – Room 138. • A127 – Pipe thread sealant – Room 137. • A128 – Red gasket – Room 137. • A129 – Tan/silver pipe wrap – Room 137. • A131 – White/silver/tan pipe wrap – Room 137. • A132 – Pipe thread sealant – Room 137. • A133 – Black gasket – Room 137. • A134 – Off-white pipe wrap – Room 137. • A135 (Layer 2) – Black mastic (Layer 1 adhesive) – Room 132. • A136 – Pipe thread sealant on fire line – Room 135. • A137 (Layer 1) – Brown transition strip – Room 133. • A137 (Layer 2) – Clear mastic (Layer 1 adhesive) – Room 133. • A138 – Ceiling tile – Room 133.A139 – Ceiling tile – Room 133. • A140 – Grey cementitious wall board behind transformer on south wall – Room 136. • A141 (Layer 1) – Black vinyl floor tile – Room 136. • A141 (Layer 2) – Black mastic (Layer 1 adhesive) – Room 136. • A142 (Layer 1) – Blue vinyl floor tile – Room 136. • A142 (Layer 2) – Black mastic (Layer 1 adhesive) – Room 136. • A143 – Tan paper insulation backing – Room 135. • A144 – Black pipe wrap – Room 136. • A145 (Layer 1) – Black mastic on pipe wrap – Room 136 (crawl space). 	<p>Analytical Result:</p> <ul style="list-style-type: none"> • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos 	<p>No renovation/pre-demolition requirements necessary.</p> <p>Note: At the time of this report, ACM means any manufactured article or other material, which contains 0.5% or more asbestos by weight as defined in the regulations.</p>

Table 1 (Cont'd): Detailed Inventory of Regulated Materials – 3000 Airport Road (Airport Terminal Building), Penticton, BC

Issue / Location	Results	Renovation/Pre-Demolition Requirement
ASBESTOS-CONTAINING MATERIALS (ACM) (Cont'd)		
Suspect ACM Sampled – Asbestos NOT Identified (Cont'd):		
<ul style="list-style-type: none"> • A145 (Layer 2) – Tan insulation on pipe – Room 136 (crawl space). • A147 – Grey baseboard – Room 139. • A148 – Tan mastic (A147 adhesive) – Room 139. • A149 – Drywall joint compound – Room 139. • A150 – Ceiling tile (hallway) – Room 139. • A151 – Ceiling tile (closet) – Room 139. • A152 (Layer 1) – Green vinyl floor tile – Room 140. • A152 (Layer 2) – Tan mastic (Layer 1 adhesive) – Room 140. • A153 (Layer 1) – White vinyl floor tile – Room 140. • A153 (Layer 2) – Tan mastic (Layer 1 adhesive) – Room 140. • A154 – Drywall joint compound – Room 142. • A155 (Layer 1) – Light grey vinyl floor tile – Room 141. • A155 (Layer 2) – Tan mastic (Layer 1 adhesive) – Room 141. • A156 – Drywall joint compound – Room 142. • A157 (Layer 1) – Light grey vinyl floor tile (west of Room 125) – Room 114. • A157 (Layer 2) – Black mastic (Layer 1 adhesive) – Room 114. • A158 (Layer 1) – Light grey vinyl floor tile (outside doorway to Room 115) – Room 114. • A158 (Layer 2) – Grey mastic (Layer 1 adhesive) – Room 114. • A159 – Green baseboard – Room 115. • A160 – Yellow mastic (A159 adhesive) – Room 115. • A161 – Black mastic on joist in ceiling space – Room 115. • A162 – Drywall joint compound patch in ceiling – Room 115. 	Analytical Result: <ul style="list-style-type: none"> • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos 	No renovation/pre-demolition requirements necessary. Note: At the time of this report, ACM means any manufactured article or other material, which contains 0.5% or more asbestos by weight as defined in the regulations.

Table 1 (Cont'd): Detailed Inventory of Regulated Materials – 3000 Airport Road (Airport Terminal Building), Penticton, BC

Issue / Location	Results	Renovation/Pre-Demolition Requirement
ASBESTOS-CONTAINING MATERIALS (ACM) (Cont'd) Suspect ACM Sampled – Asbestos NOT Identified (Cont'd) : <ul style="list-style-type: none"> • A163 – Drywall joint compound – Room 117. • A164 (Layer 1) – Grey vinyl sheet flooring – Room 116B. • A164 (Layer 2) – Tan mastic (Layer 1 adhesive) – Room 116B. • A165 (Layer 2) – Black mastic (Layer 1 adhesive) – Room 117. • A165 (Layer 3) – Grey cementitious leveling compound – Room 117. • A166 (Layer 1) – Solid grey vinyl floor tile – Room 116A. • A166 (Layer 2) – Black mastic (Layer 1 adhesive) – Room 116A. • A166 (Layer 3) – Clear mastic (Layer 1 adhesive) – Room 116A. • A167 – Cloth pipe wrap – Room 116A. • A169 – Drywall joint compound adjacent window on frame – Room 117. • A170 (Layer 2) – Black mastic (Layer 1 adhesive) – Room 119. • A170 (Layer 3) – Tan mastic (Layer 1 adhesive) – Room 119. • A171 – Drywall joint compound patch on ceiling – Room 143. • A172 – Ceiling tile – Room 143. • A174 – Grey grout on floor – Room 143. • A175 – Under sink coating – Room 143. • A176 – Tan insulation pipe coating (ceiling space) – Room 143. • A177 – Corner protector on post inside entrance – Room 106B. • A178 – Tan mastic (A177 adhesive) – Room 106B. • A179 – Grey floor grout – Room 106B. • A180 (Layer 2) – Black mastic (Layer 1 adhesive) inside wall cabinet – Room 106B. • A181 – Drywall joint compound (on post) – Room 106B. 	Analytical Result: <ul style="list-style-type: none"> • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos 	No renovation/pre-demolition requirements necessary. Note: At the time of this report, ACM means any manufactured article or other material, which contains 0.5% or more asbestos by weight as defined in the regulations.

Table 1 (Cont'd): Detailed Inventory of Regulated Materials – 3000 Airport Road (Airport Terminal Building), Penticton, BC

Issue / Location	Results	Renovation/Pre-Demolition Requirement
ASBESTOS-CONTAINING MATERIALS (ACM) (Cont'd)		
<p>Suspect ACM Sampled – Asbestos NOT Identified (Cont'd):</p> <ul style="list-style-type: none"> • A182 – White mortar (on post baseboard) – Room 106B. • A183 – Tile grout – Room 106B. • A184 – Pipe thread sealant (inside wall cabinet) – Room 106B. • A185 – Drywall joint compound – Room 160. • A186 – Drywall joint compound – Room 160. • A187 – Drywall joint compound – Room 160. • A188 – Drywall joint compound – Room 105B. • A189 (Layer 1) – Tan baseboard – Room 163. • A189 (Layer 2) – White mastic (Layer 1 adhesive) – Room 163. • A190 – Grey vinyl sheet flooring – Room 163. • A191 – Grey grout – Room 163. • A192 – White grout above fridge on west side – Room 162. • A193 – Grey vinyl sheet flooring – Room 105C. • A194 – Drywall joint compound – Room 105C. • A195 – Grey mastic on transition strip – Room 112. • A196 (Layer 1) – Grey vinyl floor tile – Room 112. • A196 (Layer 2) – Yellow mastic (Layer 1 adhesive) – Room 112. • A196 (Layer 4) – Black mastic (Layer 3 adhesive) – Room 112. • A196 (Layer 5) – White leveling compound – Room 112. • A197 – Joint compound on floor at vinyl sheet flooring joint – Room 113. • A198 (Layer 1) – Grey vinyl sheet flooring – Room 113. • A198 (Layer 2) – Grey vinyl floor tile – Room 113. • A198 (Layer 3) – Black mastic (Layer 2 adhesive) – Room 113. • A199 – Ceiling tile – Room 113. 	<p>Analytical Result:</p> <ul style="list-style-type: none"> • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos • non-asbestos 	<p>No renovation/pre-demolition requirements necessary.</p> <p>Note: At the time of this report, ACM means any manufactured article or other material, which contains 0.5% or more asbestos by weight as defined in the regulations.</p>

Table 1 (Cont'd): Detailed Inventory of Regulated Materials – 3000 Airport Road (Airport Terminal Building), Penticton, BC

Issue / Location	Results	Renovation/Pre-Demolition Requirement
ASBESTOS-CONTAINING MATERIALS (ACM) (Cont'd)		
Suspect ACM Sampled – Asbestos NOT Identified (Cont'd) :	Analytical Result:	No renovation/pre-demolition requirements necessary.
<ul style="list-style-type: none"> • A200 (Layer 1) – Tan mastic (carpet adhesive above vinyl floor tile) – Room 111. 	<ul style="list-style-type: none"> • non-asbestos 	Note:
<ul style="list-style-type: none"> • A200 (Layer 2) – Grey vinyl floor tile – Room 111. 	<ul style="list-style-type: none"> • non-asbestos 	At the time of this report, ACM means any
<ul style="list-style-type: none"> • A200 (Layer 3) – Black mastic (Layer 2 adhesive) – Room 111. 	<ul style="list-style-type: none"> • non-asbestos 	manufactured article or other material, which
<ul style="list-style-type: none"> • A201 – Fiberboard wall covering (similar to ceiling tile) – Room 110B. 	<ul style="list-style-type: none"> • non-asbestos 	contains 0.5% or more asbestos by weight as
<ul style="list-style-type: none"> • A202 (Layer 1) – Black floor tar – Room 110B. 	<ul style="list-style-type: none"> • non-asbestos 	defined in the regulations.
<ul style="list-style-type: none"> • A203 – White floor leveling compound – Room 110B. 	<ul style="list-style-type: none"> • non-asbestos 	
<ul style="list-style-type: none"> • A204 – Tan putty around door – Room 110B. 	<ul style="list-style-type: none"> • non-asbestos 	
<ul style="list-style-type: none"> • A205 – Grey leveling compound under carpet – Room 151B. 	<ul style="list-style-type: none"> • non-asbestos 	
<ul style="list-style-type: none"> • A206 – Grey baseboard – Room 151B. 	<ul style="list-style-type: none"> • non-asbestos 	
<ul style="list-style-type: none"> • A207 – Tan mastic (A206 adhesive) – Room 151B. 	<ul style="list-style-type: none"> • non-asbestos 	
<ul style="list-style-type: none"> • A208 – Drywall joint compound between sheets of plywood – Room 107. 	<ul style="list-style-type: none"> • non-asbestos 	
<ul style="list-style-type: none"> • A209 – Red mastic on north wall (east corner) – Room 107. 	<ul style="list-style-type: none"> • non-asbestos 	
<ul style="list-style-type: none"> • A210 – Drywall joint compound – Room 110A. 	<ul style="list-style-type: none"> • non-asbestos 	
Suspect ACMs not sampled:	Analytical Result:	Inaccessible areas suspect of containing ACMs
<ul style="list-style-type: none"> • Not all wall cavities could be inspected; therefore, there is the potential for vermiculite insulation to be present within wall cavities. 	<ul style="list-style-type: none"> • N/A 	should be inspected prior to renovation/deconstruction activities. All suspect ACMs not sampled should be sampled for asbestos content and managed accordingly.
<ul style="list-style-type: none"> • Fire doors to the entrances of Rooms 137 and 138 may contain asbestos-containing filler material. 	<ul style="list-style-type: none"> • N/A 	
<ul style="list-style-type: none"> • Electrical wiring insulation, gaskets and insulating panels throughout the building. 	<ul style="list-style-type: none"> • N/A 	
<ul style="list-style-type: none"> • Suspect asbestos-concrete pipes below ground. 	<ul style="list-style-type: none"> • N/A 	

Table 1 (Cont'd): Detailed Inventory of Regulated Materials – 3000 Airport Road (Airport Terminal Building), Penticton, BC

Issue / Location	Results	Renovation/Pre-Demolition Requirement
LEAD PAINT (mg/kg) Suspect lead-based paint sampled: <ul style="list-style-type: none"> • P1 – Light brown / blue door – Room 125. • P2 – Brown / blue door / window frames – Room 125. • P3 – White wall – Room 125. • P4 – Green door frame – Room 127. • P5 – Grey wall panel – Room 127. • P6 – White door frame – Room 123. • P7 – Blue wall – Room 123. • P8 – Light brown door – Room 129. • P9 – Light brown / blue door – Room 130. • P10 – Beige trim – Room 120. • P11 – Light brown wall – Room 120. • P12 – Off-white – Room 106A (above 143). • P13 – White – Room 106A (above 143). • P14 – Light blue / white door frame – Room 109. • P15 – Light blue walls – Room 151A. • P16 – Beige wall – Room 105A. • P17 – Yellow paint on steel pipe – Roof. • P18 – Grey paint on wall of raised portion – Roof. • P19 – White paint on soffit of raised portion – Roof. • P20 – Black paint on ladder to raised portion – Roof. • P21 – Dark brown window trim on East side of raised portion – Roof. • P22 – White on tar on foundation – Exterior. • P23 – Brown – Exterior. • P24 – Blue – Exterior. 	Analytical Result: <ul style="list-style-type: none"> • <u>5.700 mg/kg</u> • <u>8.350 mg/kg</u> • <u>788 mg/kg</u> • <u>8.480 mg/kg</u> • <u>990 mg/kg</u> • < 3 mg/kg • < 15 mg/kg • < 3 mg/kg • <u>1.780 mg/kg</u> • <u>187 mg/kg</u> • < 3 mg/kg • <u>1.570 mg/kg</u> • <u>1.350 mg/kg</u> • <u>461 mg/kg</u> • < 3 mg/kg • 50.4 mg/kg • <u>18.800 mg/kg</u> • <u>732 mg/kg</u> • <u>34.500 mg/kg</u> • <u>337 mg/kg</u> • <u>3.430 mg/kg</u> • <u>4.220 mg/kg</u> • < 15 mg/kg • <u>173 mg/kg</u> 	Lead paint was identified containing >90 mg/kg in the majority of samples. If cutting torch, grinding equipment or other work methods are used on the painted areas of the structures that could mobilize lead dust or fumes then high risk individuals such as pregnant women or children should be kept out of the work area. Most of the paint samples were also found to be containing lead concentrations >600 mg/kg. Therefore, an exposure control plan must be implemented if work activities could generate lead dust or fumes. A fog nozzle to wet the area should be used to reduce particles during the demolition process.

Table 1 (Cont'd): Detailed Inventory of Regulated Materials – 3000 Airport Road (Airport Terminal Building), Penticton, BC

Issue / Location	Results	Renovation/Pre-Demolition Requirement
<p>LEAD PAINT (mg/kg) (Cont'd)</p> <p>Suspect lead-based paint sampled:</p> <ul style="list-style-type: none"> • P25 – Dark brown door frame – Exterior. • P26 – Light grey / white on concrete foundation – Exterior. • P27 – Pink wall and ceiling – Room 128B. • P28 – Grey floor – Room 138. • P29 – Beige wall – Room 138. • P30 – Dark grey plywood wall – Room 138. • P31 – Light grey plywood wall – Room 138. • P32 – Grey plywood wall – Room 138. • P33 – Beige wall – Room 137. • P34 – Grey primer on wall in ceiling space – Room 142. • P35 – Green door frame – Room 135. • P36 – Light brown door frame – Room 132. • P37 – Red / brown door paint – Room 143. • P38 – Beige wall – Room 143. • P39 – Brown door frame paint – Room 143. • P40 – Red window frame (west wall) – Room 106B. • P41 – Brown door to wall cabinet – Room 106B. • P42 – Yellow paint in wall cabinet – Room 106B. • P43 – Beige wall paint – Room 106B. • P44 – Yellow door frame paint – Room 112. • P45 – White trim paint in ceiling space – Room 113. • P46 – Beige – collected from steel pipe – Room 110B. • P47 – Light brown wall – Room 151B. • P48 – Beige – collected from steel pipe – Room 107. 	<p>Analytical Result:</p> <ul style="list-style-type: none"> • <u>4.080 mg/kg</u> • <u>2.500 mg/kg</u> • <u>370 mg/kg</u> • <u>2.110 mg/kg</u> • <u>745 mg/kg</u> • 19.5 mg/kg • < 3 mg/kg • < 24 mg/kg • <u>524 mg/kg</u> • <u>130 mg/kg</u> • <u>1.170 mg/kg</u> • < 3 mg/kg • < 3 mg/kg • < 3 mg/kg • <u>705 mg/kg</u> • <u>952 mg/kg</u> • <u>5.780 mg/kg</u> • 21.5 mg/kg • <u>396 mg/kg</u> • 40.1 mg/kg • <u>667 mg/kg</u> • < 3 mg/kg • < 9 mg/kg 	<p>Lead paint was identified containing >90 mg/kg in the majority of samples. If cutting torch, grinding equipment or other work methods are used on the painted areas of the structures that could mobilize lead dust or fumes then high risk individuals such as pregnant women or children should be kept out of the work area. Most of the paint samples were also found to be containing lead concentrations >600 mg/kg. Therefore, an exposure control plan must be implemented if work activities could generate lead dust or fumes. A fog nozzle to wet the area should be used to reduce particles during the demolition process.</p>

Table 1 (Cont'd): Detailed Inventory of Regulated Materials – 3000 Airport Road (Airport Terminal Building), Penticton, BC

Issue / Location	Results	Renovation/Pre-Demolition Requirement
LEAD PAINT (mg/kg) (Cont'd) Suspect lead-based paint sampled: <ul style="list-style-type: none"> • P49 – Light grey door frame – Room 115. 	Analytical Result: <ul style="list-style-type: none"> • < 18 mg/kg 	No renovation/pre-demolition requirements necessary.
POLYCHLORINATED BIPHENYLS Fluorescent and HID light ballasts were identified/suspected in the following areas: <ul style="list-style-type: none"> • Throughout the interior and exterior of the building. 	<ul style="list-style-type: none"> • Approximately 250 fluorescent lights ballasts were identified (throughout the building). • Approximately 15 HID light ballasts were identified (Rooms 106A, 106B and 102). • Approximately 6 HID light ballasts were identified on the roof facing air side. 	Prior to renovation/demolition remove all light ballasts and/or capacitors. Inspect for PCB-containing and/or suspect PCB-containing ballasts as per Environment Canada publication, <i>Identification of Lamp Ballasts Containing PCBs, Report EPS 2/CC/2, August 1991.</i> Place known or suspect PCB-containing ballasts in an 18-gauge steel painted drum with a close fitting removable steel lid on top of a gasket of PCB-resistant material. The drum is to be supplied by the demolition contractor. Drums should be disposed of in Canada in accordance with HWR.

Table 1 (Cont'd): Detailed Inventory of Regulated Materials – 3000 Airport Road (Airport Terminal Building), Penticton, BC

Issue / Location	Results	Renovation/Pre-Demolition Requirement
OZONE DEPLETING SUBSTANCES		
<p>A total of 23 air conditioning units, water cooling units and refrigerators/freezers were identified on the Site and include the following:</p>		
<p>Room 162</p> <ul style="list-style-type: none"> • Ice Maker. • Refrigerator (left unit on west wall). • Freezer (right unit on west wall). • Air conditioning unit (ceiling space). 	<ul style="list-style-type: none"> • 9 oz of R404a refrigerant • 21 oz of R134a refrigerant • 27 oz of R404a refrigerant • 13.1 oz of R410a refrigerant 	<p>ODS refrigerants (i.e., R22) should be recovered by qualified personnel and disposed of in accordance with Regulations made under CEPA.</p> <p>Non-ODS refrigerants (R134a and R404a) were identified on the site which contains hydrofluorocarbons (HFC) that are regulated in the Federal Halocarbon Regulations as per item 11 (HFC) of Schedule 1 – List of Halocarbons. As a result, halocarbon-containing Non-ODS refrigerants should be recovered by qualified personnel and disposed of in accordance with Federal Regulations.</p>
<p>Room 161</p> <ul style="list-style-type: none"> • Cooler (small on south wall, west side). • Drink cooler (north wall, east side). • Freezer (east wall). 	<ul style="list-style-type: none"> • 9 oz of R134a refrigerant • 17 oz of R22 refrigerant (ODS) • No identification tag 	
<p>Room 151B</p> <ul style="list-style-type: none"> • Water cooler. 	<ul style="list-style-type: none"> • 1.23 oz of R134a refrigerant 	
<p>Room 110A</p> <ul style="list-style-type: none"> • Refrigerator. 	<ul style="list-style-type: none"> • 1.76 oz of R134a refrigerant 	
<p>Room 113</p> <ul style="list-style-type: none"> • Water cooler. • Refrigerator. 	<ul style="list-style-type: none"> • 1.66 oz of R134a refrigerant • Tag inaccessible 	
<p>Room 116A</p> <ul style="list-style-type: none"> • Refrigerator. 	<ul style="list-style-type: none"> • 1.59 oz of R134a refrigerant 	

Table 1 (Cont'd): Detailed Inventory of Regulated Materials – 3000 Airport Road (Airport Terminal Building), Penticton, BC

Issue / Location	Results	Renovation/Pre-Demolition Requirement
<p>ODZONE DEPLETING SUBSTANCES (Cont'd)</p> <p><u>Room 116B</u> Freezer.</p> <p><u>Room 134</u></p> <ul style="list-style-type: none"> Refrigerator. <p><u>Room 136</u></p> <ul style="list-style-type: none"> Wall mounted air conditioning unit. <p><u>Room 140</u></p> <ul style="list-style-type: none"> Water cooler (white). Water cooler (black). Refrigerator. <p><u>Roof</u></p> <ul style="list-style-type: none"> Air Conditioning Unit 2 Air Conditioning Unit 4 Air Conditioning Unit 5 Air Conditioning Unit 6 Air Conditioning Unit 7 Air Conditioning Unit 8 	<ul style="list-style-type: none"> 4.2 oz of R134a refrigerant No identification tag 22.9 oz of R410a refrigerant No refrigerant listed on ID tag 32 g of R134a refrigerant 75 g of R134a refrigerant 7 lbs 0 oz of R22 refrigerant 4 lbs 12 oz of R22 refrigerant 7 lbs 0 oz of R22 refrigerant 8 lbs 6 oz of R22 refrigerant 7 lbs 9 oz of R22 refrigerant 3 lbs 3 oz of R22 refrigerant 	<p>ODS refrigerants (i.e., R22) should be recovered by qualified personnel and disposed of in accordance with Regulations made under CEPA. Non-ODS refrigerants (R134a and R404a) were identified on the site which contains hydrofluorocarbons (HFC) that are regulated in the Federal Halocarbon Regulations as per item 11 (HFC) of Schedule 1 – List of Halocarbons. As a result, halocarbon-containing Non-ODS refrigerants should be recovered by qualified personnel and disposed of in accordance with Federal Regulations.</p>

Table 1 (Cont'd): Detailed Inventory of Regulated Materials – 3000 Airport Road (Airport Terminal Building), Penticton, BC

Issue / Location	Results	Renovation/Pre-Demolition Requirement
<p>MISCELLANEOUS SOLID AND LIQUID WASTES</p> <ul style="list-style-type: none"> Lead-based batteries were identified in the following Rooms: <ul style="list-style-type: none"> ➤ 125 – Potential lead-based batteries in the fire control box on the north wall. ➤ 127 – Two (2) lead-based batteries (one in each fire control box on the west wall); eight (8) lead-containing batteries (car sized) on the south wall; one (1) lead-based battery in the control box on the east wall. ➤ 138 – Additional lead-based batteries may be present in other electrical equipment and/or control boxes that were not accessible during the survey. Approximately five (5) potential lead-based batteries may be present in the emergency lighting boxes located in the following Rooms: <ul style="list-style-type: none"> ➤ 102 – North wall. ➤ 109 – South wall. ➤ 106B – West wall, north of the front entrance. ➤ 112 – East wall over the south doorway. ➤ 127 – East wall, southeast corner. Soldering equipment located in Room 133. Potential lead-containing bell and spigot cast iron pipe joint packing was identified in the crawlspace of Room 127. 	<ul style="list-style-type: none"> Potential for lead containing material. Lead containing material. Potential for lead containing material. Potential for lead containing material. Potential for lead containing material. Potential for lead containing material. Potential for lead containing material. 	<p>These materials must be removed prior to demolition. However, if these materials are to be disposed of or recycled, it is the responsibility of the qualified contractor to correctly identify and characterize the wastes observed and dispose of or recycle appropriately.</p>

Table 1 (Cont'd): Detailed Inventory of Regulated Materials – 3000 Airport Road (Airport Terminal Building), Pentiction, BC

Issue / Location	Results	Renovation/Pre-Demolition Requirement
SOLID AND LIQUID WASTES (Cont'd)		
<ul style="list-style-type: none"> Copper piping solder joints located throughout the building. 	<ul style="list-style-type: none"> Potential for lead containing material. 	<p>These materials must be removed prior to demolition. However, if these materials are to be disposed of or recycled, it is the responsibility of the qualified contractor to correctly identify and characterize the wastes observed and dispose of or recycle appropriately.</p>
<ul style="list-style-type: none"> Potential lead-containing roof vent pipes located on the exterior roof. 	<ul style="list-style-type: none"> Potential for lead containing material. 	
<ul style="list-style-type: none"> Approximately 12 fire extinguishers were identified in Rooms 105B, 107, 110, 114, 116A, 124, 127, 135, 136, 138, and 162. 		
<ul style="list-style-type: none"> Various cleaning supplies located in Room 128A (janitor's storage room). 		
<ul style="list-style-type: none"> Flammable storage box in Room 135 containing various paints, oils, propane, etc. 		
<ul style="list-style-type: none"> Nine (9) Sinclair canisters (appeared empty – unknown contents [no additional labels]) in Room 135. 		
LIQUID MERCURY		
<ul style="list-style-type: none"> Four (4) mercury-containing thermostats were observed in the building at the following locations: <ul style="list-style-type: none"> ➤ Room 110 – Two (2) thermostats on the north wall (northeast corner). ➤ Room 140 – East wall. ➤ Room 142 – South wall. 	<ul style="list-style-type: none"> Two (2) ampoules of mercury; one ampoule in each thermostat. One (1) ampoule of mercury. One (1) ampoule of mercury. 	<p>The mercury containing ampoules must be removed prior to renovation/demolition and reused, recycled or disposed of in accordance with the BC HWR and applicable Regulations made under CEPA.</p>
RADIOLOGICAL SOURCES AND SUBSTANCES		
<ul style="list-style-type: none"> No suspect radiological sources or substances were observed. 	<ul style="list-style-type: none"> None identified. 	<p>No renovation/pre-demolition requirements necessary.</p>

Table 1 (Cont'd): Detailed Inventory of Regulated Materials – 3000 Airport Road (Airport Terminal Building), Penticton, BC

Issue / Location	Results	Renovation/Pre-Demolition Requirement
SILICA Silica may be present throughout the building in the following materials: <ul style="list-style-type: none"> • Concrete floors • Ceramic tiles • Ceiling tiles • Mortar • Drywall 	<ul style="list-style-type: none"> • N/A 	If the material is to be cut, ground, drilled or broken up during renovation/demolition, then airborne silica particles may be released. Therefore, an exposure control plan must be implemented if work activities could generate silica dust.
MOULD AND/OR MOISTURE None was identified.	<ul style="list-style-type: none"> • N/A 	No renovation/pre-demolition requirements necessary.

8 NOTICE TO READER

This report has been prepared by SNC-Lavalin Inc. (SNC-Lavalin) for Canada, who has been party to the development of the scope of work for this project and understands its limitations¹. Copyright of this report vests with Her Majesty the Queen in Right of Canada. This report was prepared in accordance with a services contract between SNC-Lavalin and Canada, including General Conditions 2035 of the Standard Acquisition Clauses and Conditions (SACC) Manual.

This report is intended to provide information to Canada to assist it in making business decisions. SNC-Lavalin is not a party to the various considerations underlying the business decisions, and does not make recommendations regarding such business decisions.

The findings, conclusions and recommendations in this report have been developed in a manner consistent with the level of skill normally exercised by environmental professionals currently practising under similar conditions in the area. The findings contained in this report are based, in part, upon information provided by others. If any of the information is inaccurate, modifications to the findings, conclusions and recommendations may be necessary.

The findings, conclusions and recommendations presented by SNC-Lavalin in this report reflect SNC-Lavalin's best judgement based on the site conditions at the time of the site inspection on the date(s) set out in this report and on information available at the time of preparation of this report. Substances other than those described may exist within the site, reported substance parameters may exist in areas of the site not investigated, and concentrations of substances greater or less than those reported may exist between sample locations.

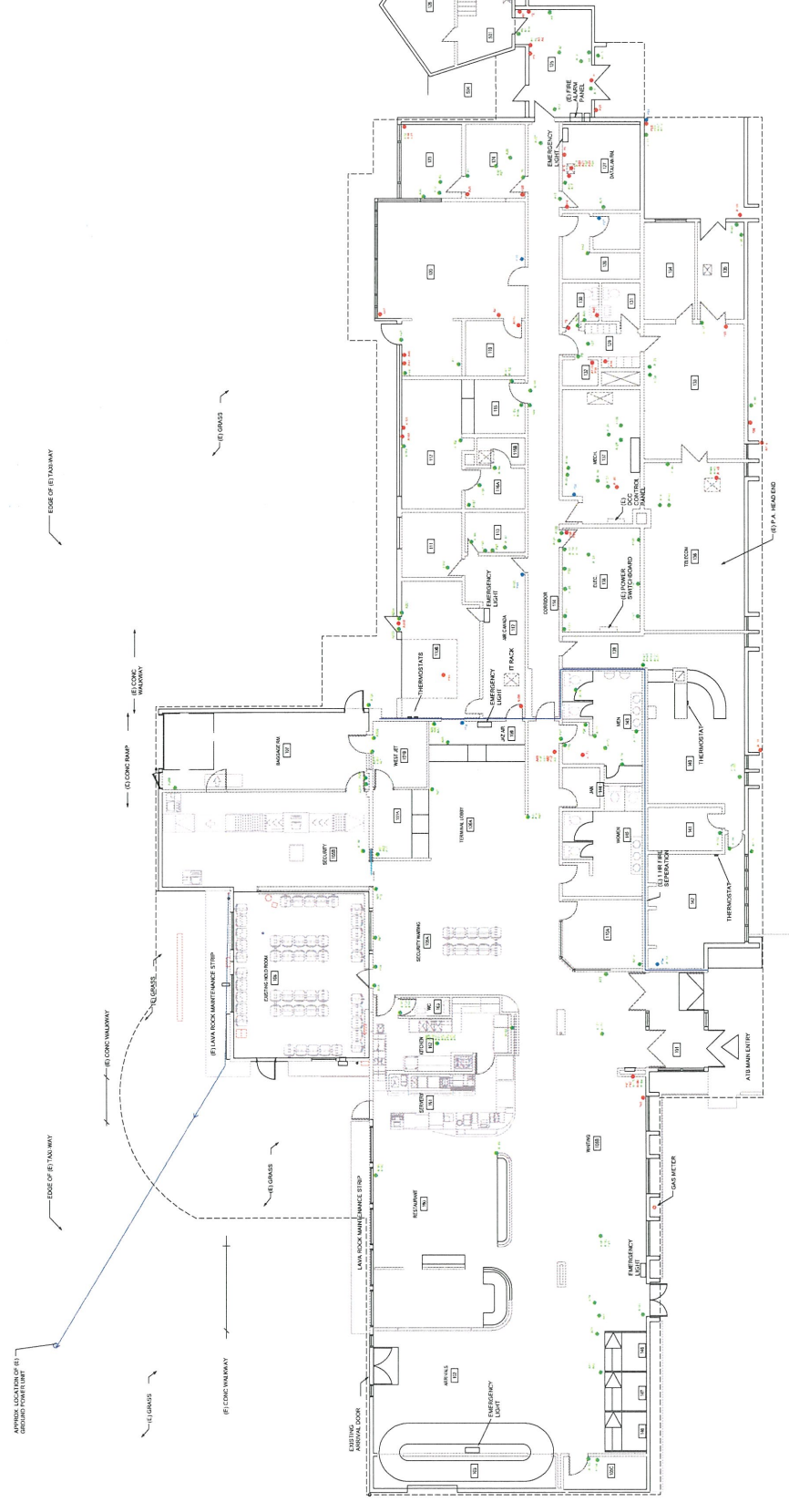
The findings and conclusions of this report are valid only as of the date of this report. If site conditions change, new information is discovered, or unexpected site conditions are encountered in future work, including excavations, borings, or other studies, the findings, conclusions and/or recommendations of this report should be re-evaluated. It is recommended that users of this report should engage a suitably qualified professional to assist in interpreting the significance, if any, of the findings.

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APPENDIX I

Drawings:

- 636746-BM1 – Sample Location Plan – First Floor
- 636746-BM2 – Sample Location Plan – Roof



CLIENT NAME: PROJECTS AND GOVERNMENT
 PROJECT LOCATION: BUREAU OF INDIAN AFFAIRS
 PROJECT NO: 18-2019-00000-0000
 TITLE: **SAMPLE LOCATION PLAN - FIRST FLOOR**

SCALE: 1:1000
 DRAWN BY: JAC
 CHECKED BY: JAC
 DATE: 2018-03-31
 REVISION NO: 0
 PROJECT NO: 18-2019-00000-0000
 SHEET NO: 836476-BM1

REVISIONS

REFERENCE DRAWINGS

NOTES

- 1. CONSULT OWNER AS TO DATE
- 2. CONSULT OWNER AS TO DATE
- 3. CONSULT OWNER AS TO DATE
- 4. CONSULT OWNER AS TO DATE
- 5. CONSULT OWNER AS TO DATE

LEGEND

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- F1-3 FIRE EXTINGUISHER
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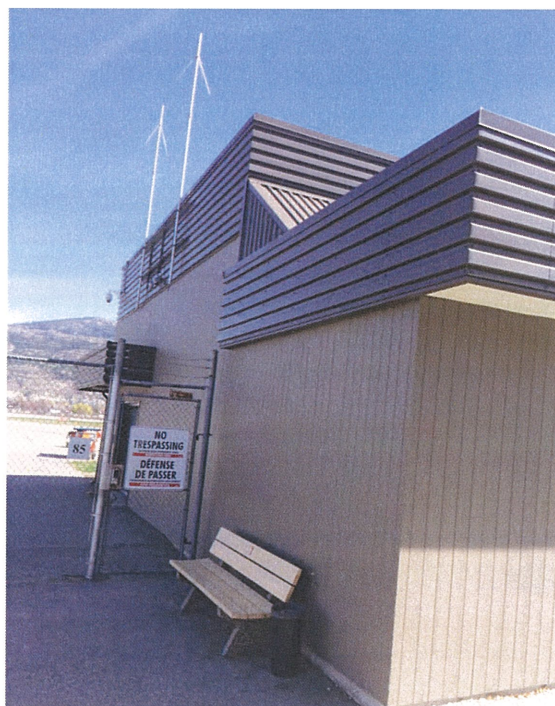
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- F1-49 FIRE EXTINGUISHER
- F1-50 FIRE EXTINGUISHER

APPENDIX II

Photographs



Photograph 1: West side of building (front entrance on right) – Facing southeast.



Photograph 2: North side of building – Facing east.



Photograph 3: Front (west) side of building – Facing north.



Photograph 4: South end of building – Facing north.



Photograph 5: East side of building (Rooms 105B/107 on left, new hold room on right) – Facing northwest.



Photograph 6: Airside (east) arrivals entrance – Facing northwest.



Photograph 7: Roof – Facing north towards raised portion of roof.



Photograph 8: Roof – Facing south (standing west of raised portion of roof).



Photograph 9: Raised portion of roof – Facing north..



Photograph 10: Room 106A – Air Canada and West Jet counters – Facing southeast.



Photograph 11: Room 106B (north of entrance and west of restaurant) – Facing south.



Photograph 12: Wall compartment in Room 106B (south wall), north of entrance – Facing southwest.



Photograph 13: Room 106B – Facing north (arrivals area in right of photo).



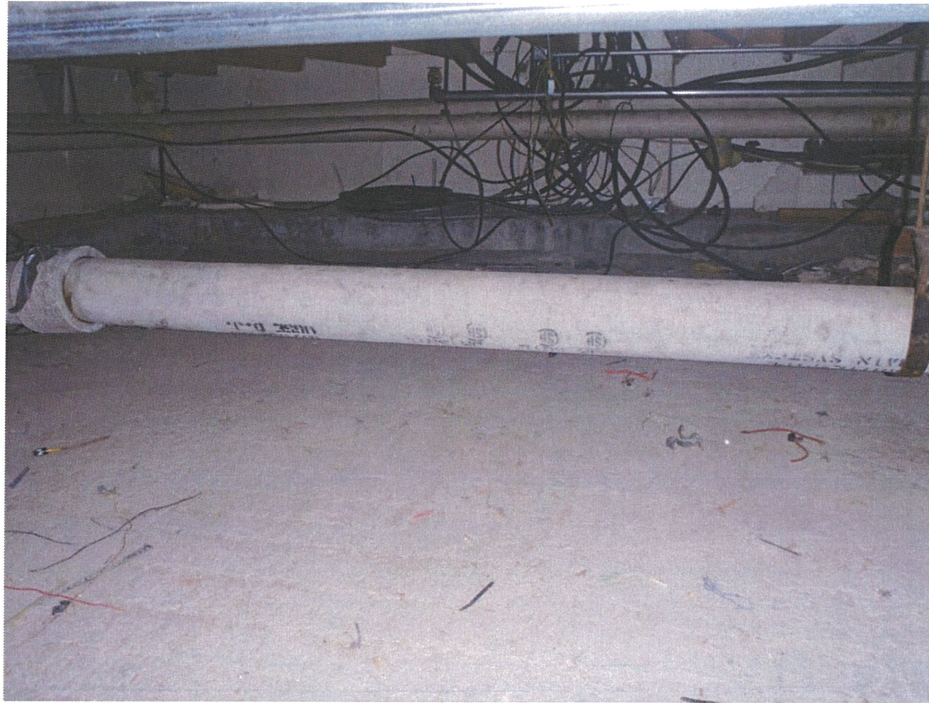
Photograph 14: Room 102 (arrivals) – Facing north towards baggage claim carousel.



Photograph 15: Room 160 (restaurant) – Facing southeast.



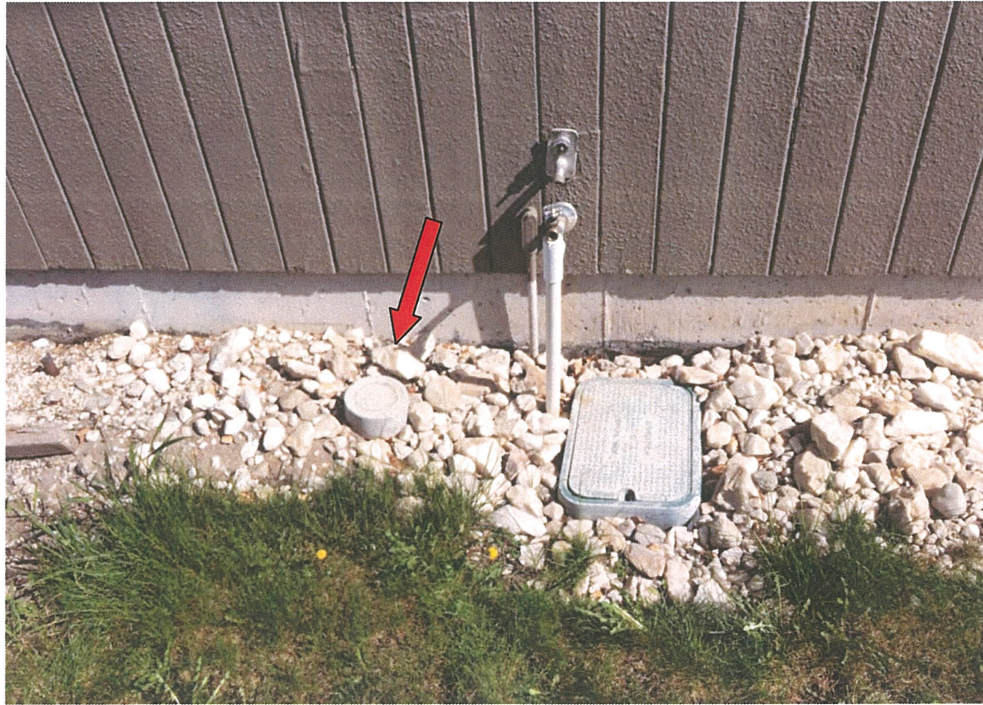
Photograph 16: Room 105A (security waiting area) – Facing east.



Photograph 17: Room 127 crawlspace with asbestos-containing concrete pipe.



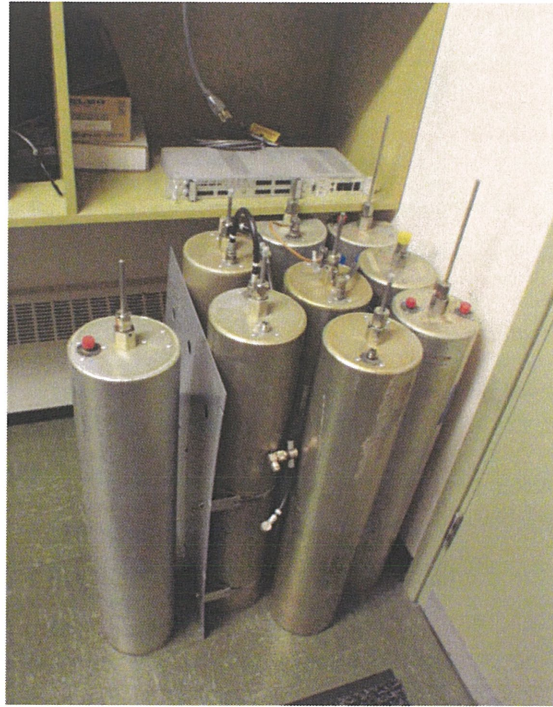
Photograph 18: Room 136 crawlspace.



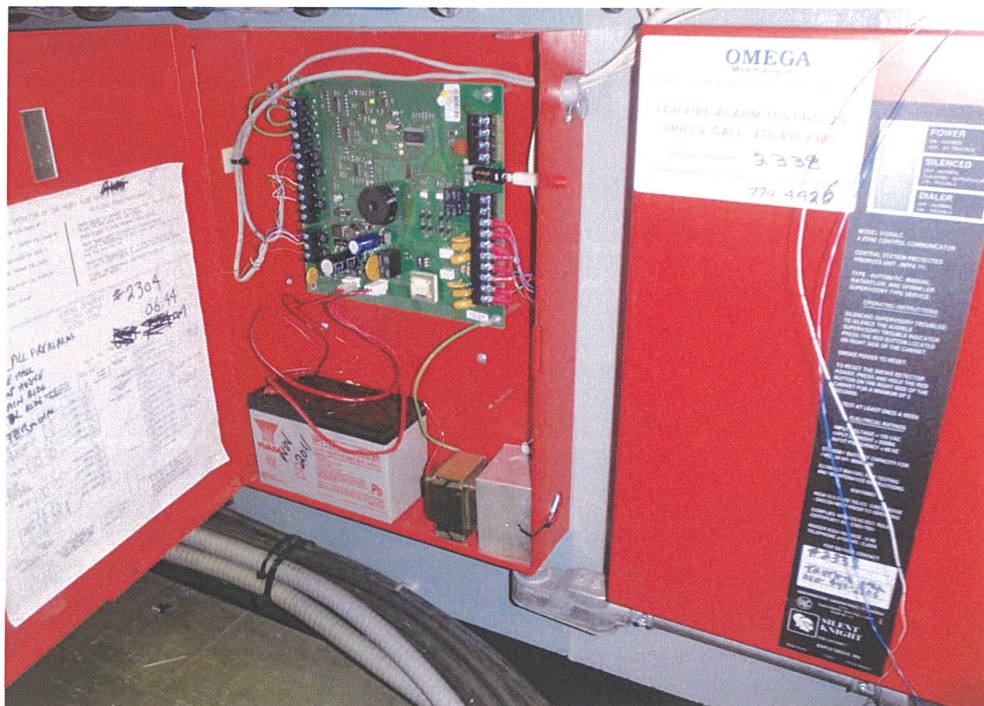
Photograph 19: Asbestos-containing concrete pipe (capped) on west side of building.



Photograph 20: Room 135 – Flammable storage box.



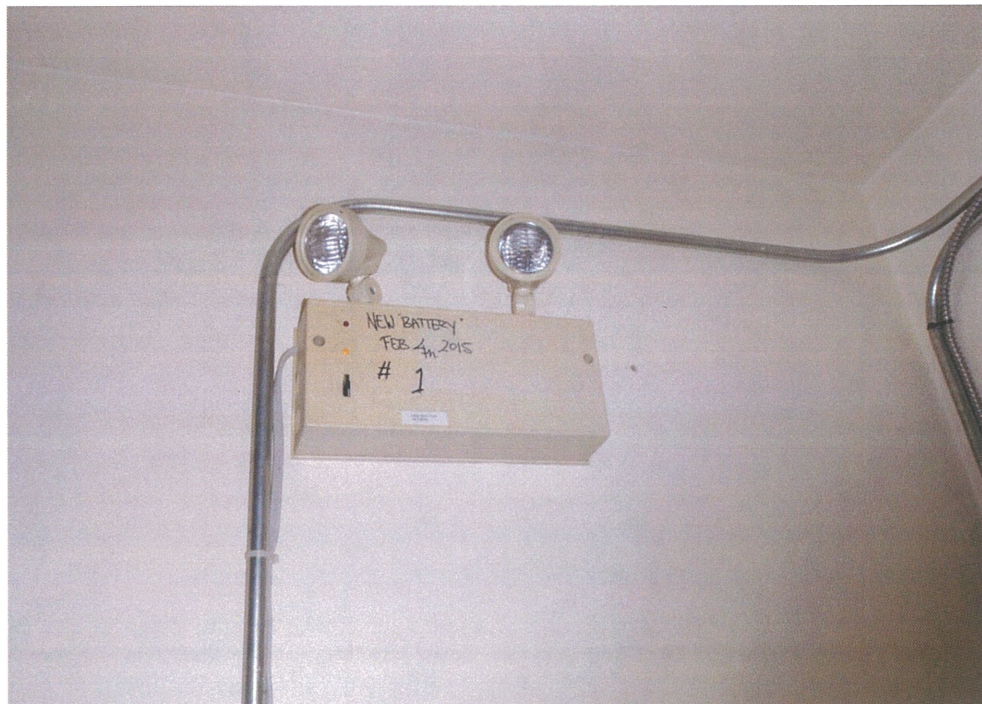
Photograph 21: Room 135 Sinclair canisters – unknown contents.



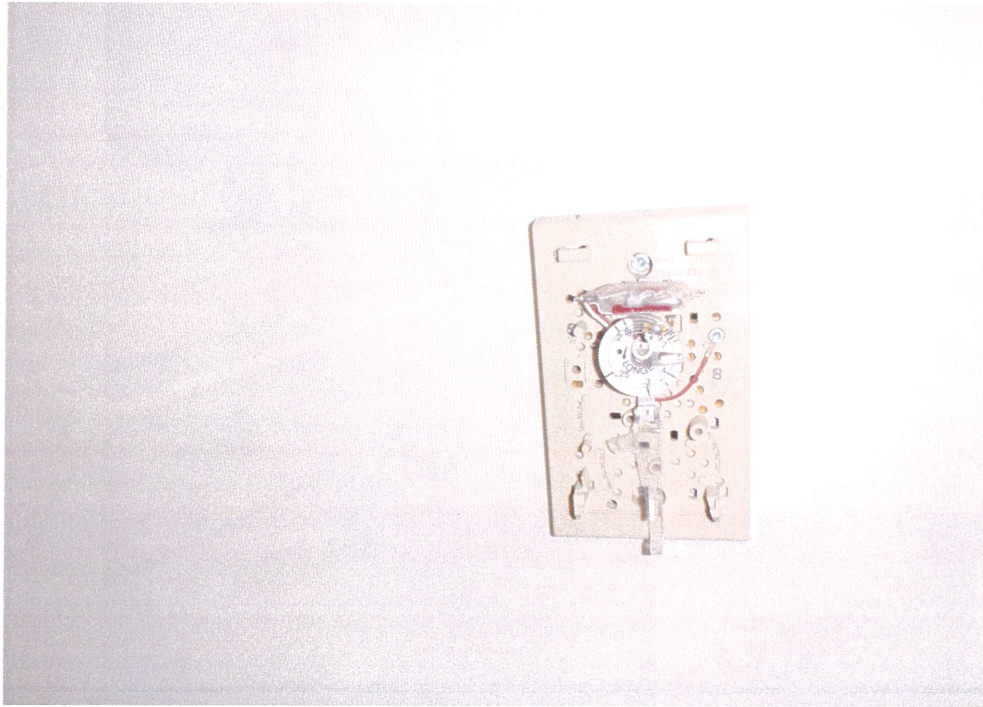
Photograph 22: Typical lead-acid battery in fire control box (Room 127).



Photograph 23: Room 127 lead-containing batteries.



Photograph 24: Typical emergency light with potentially lead-containing battery (Room 127).



Photograph 25: Typical mercury-containing thermostat (Room 142).



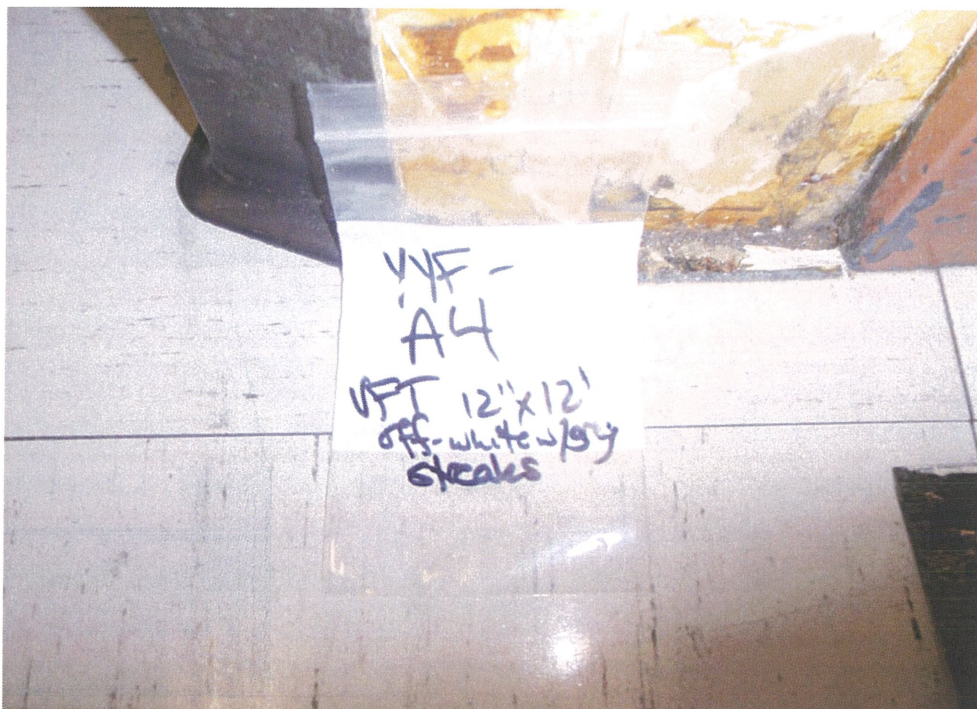
Photograph 26: Typical rooftop air conditioning unit.



Photograph 27: Typical potential lead-containing roof vent pipe.



Photograph 28: Asbestos-containing drywall joint compound in Room 125 (Sample A3).



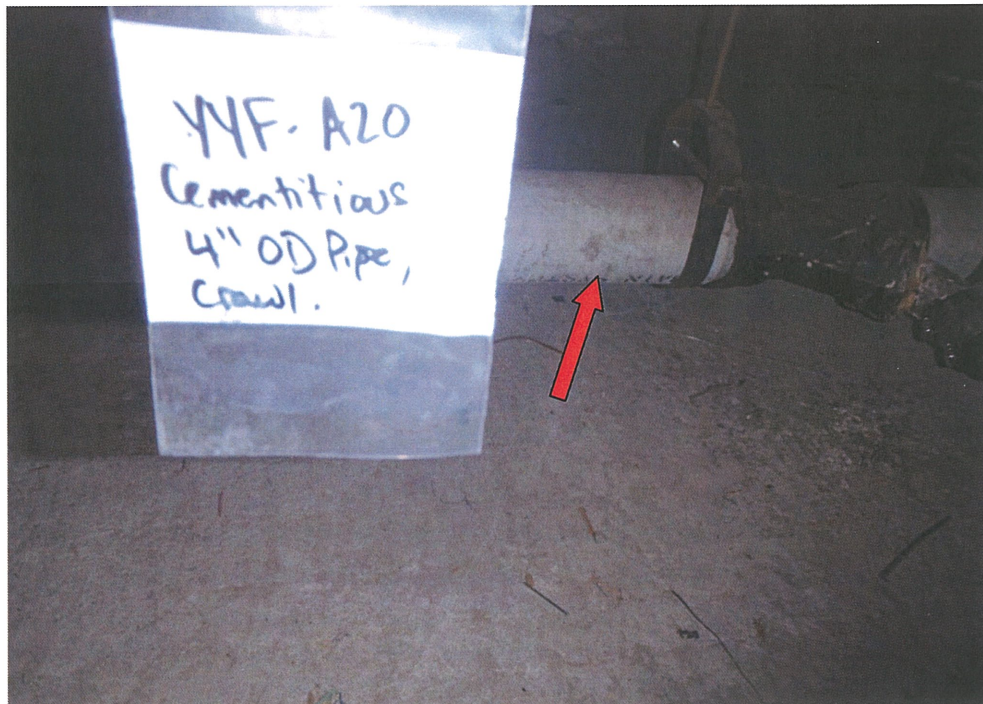
Photograph 29: Asbestos-containing light grey (off-white with grey streaks) vinyl floor tiles in Room 125 (Sample A4).



Photograph 30: Asbestos-containing drywall joint compound in Room 125 (Sample A5).



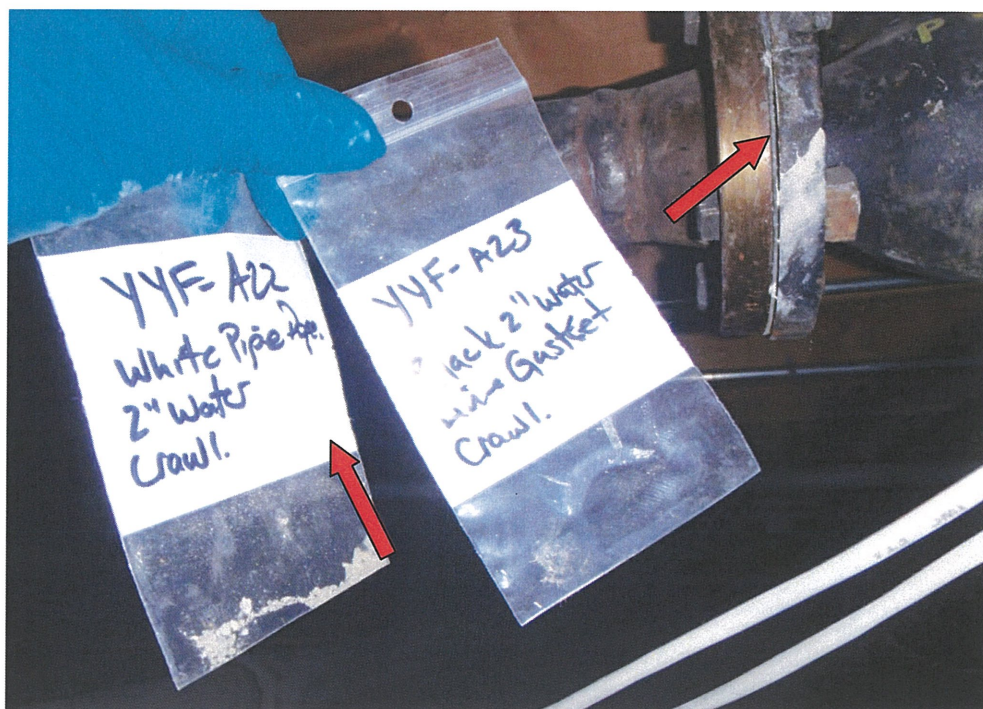
Photograph 31: Asbestos-containing green vinyl floor tiles (**Sample A15**).



Photograph 32: Asbestos-containing concrete pipe in crawlspace beneath Room 127 (**Sample A20**).



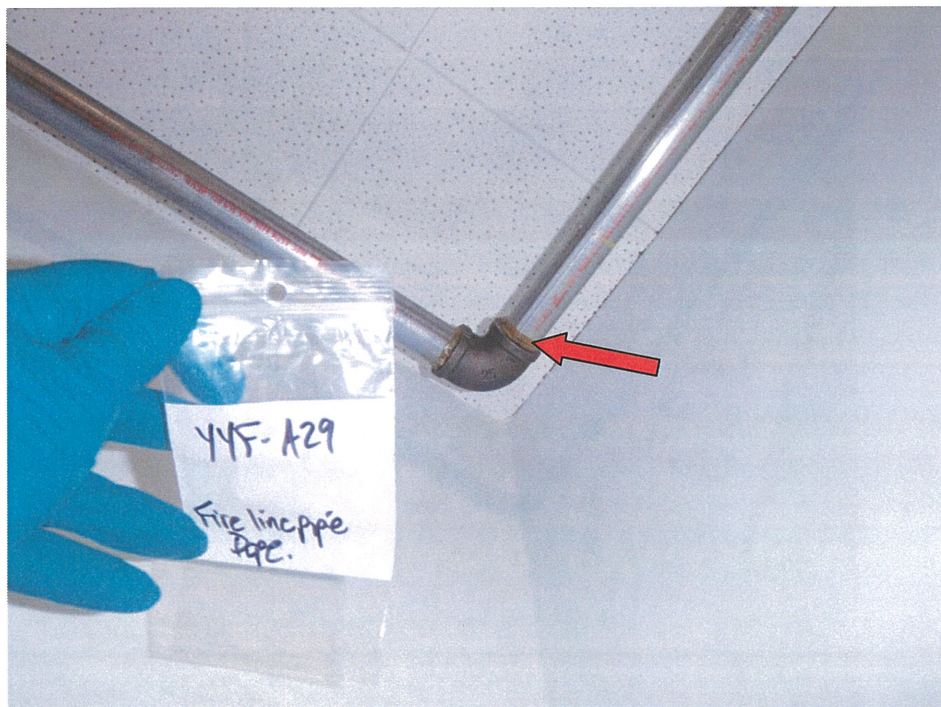
Photograph 33: Asbestos-containing bell and spigot joint filler (**Sample A21**).



Photograph 34: Asbestos-containing grey gasket in crawlspace beneath Room 127 (**Sample A23**) and non-asbestos containing white pipe sealant (**Sample A22**).



Photograph 35: Asbestos-containing drywall joint compound in Room 124 (Sample A28).



Photograph 36: Asbestos-containing pipe thread sealant on fire line in Room 124 (Sample A29).



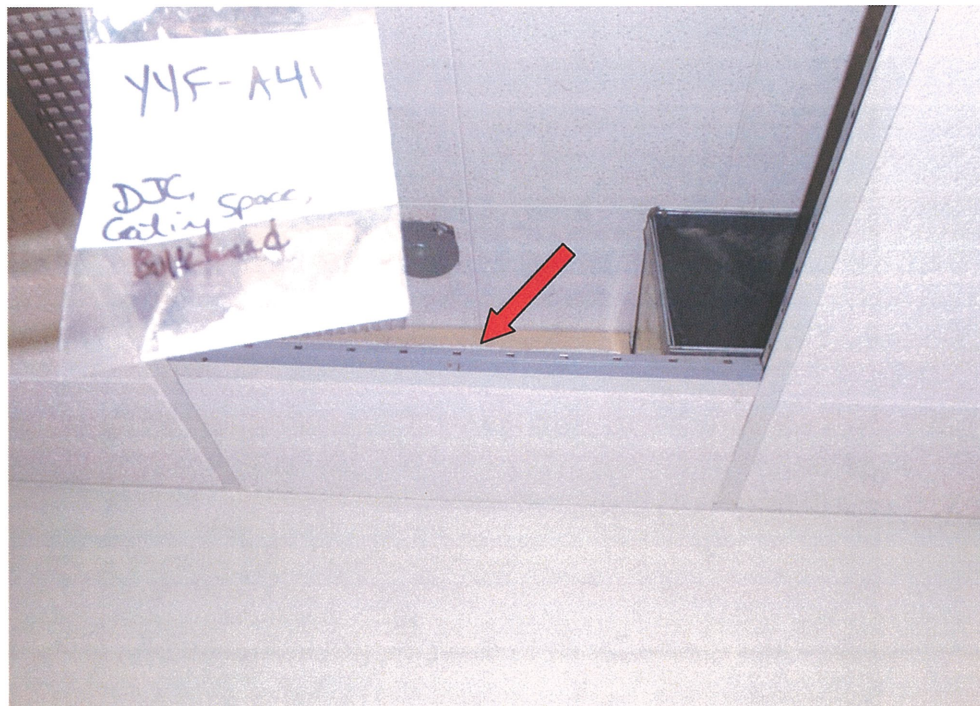
Photograph 37: Asbestos-containing grey vinyl floor tile (**Sample A34**) and associated black mastic (**Sample A35**) over white floor leveling compound (**Sample A35 – Layer 2**) in Room 123.



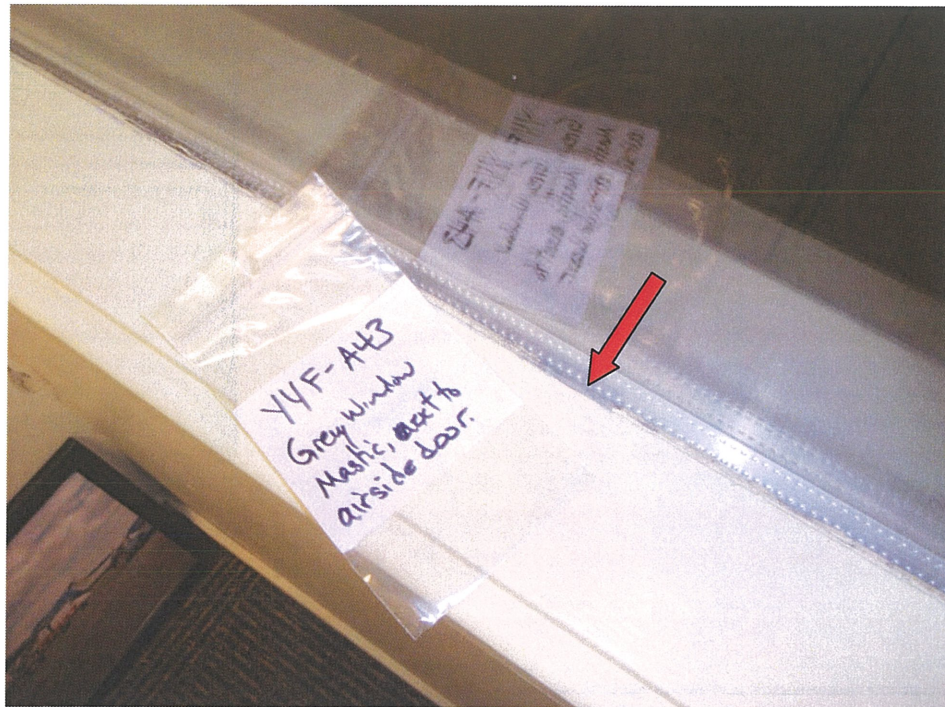
Photograph 38: Asbestos-containing grey vinyl floor tile (**Sample A38**).



Photograph 39: Asbestos-containing drywall joint compound in Room 130 (**Sample A40**).



Photograph 40: Asbestos-containing drywall joint compound in ceiling space of Room 120 (**Sample A41**).



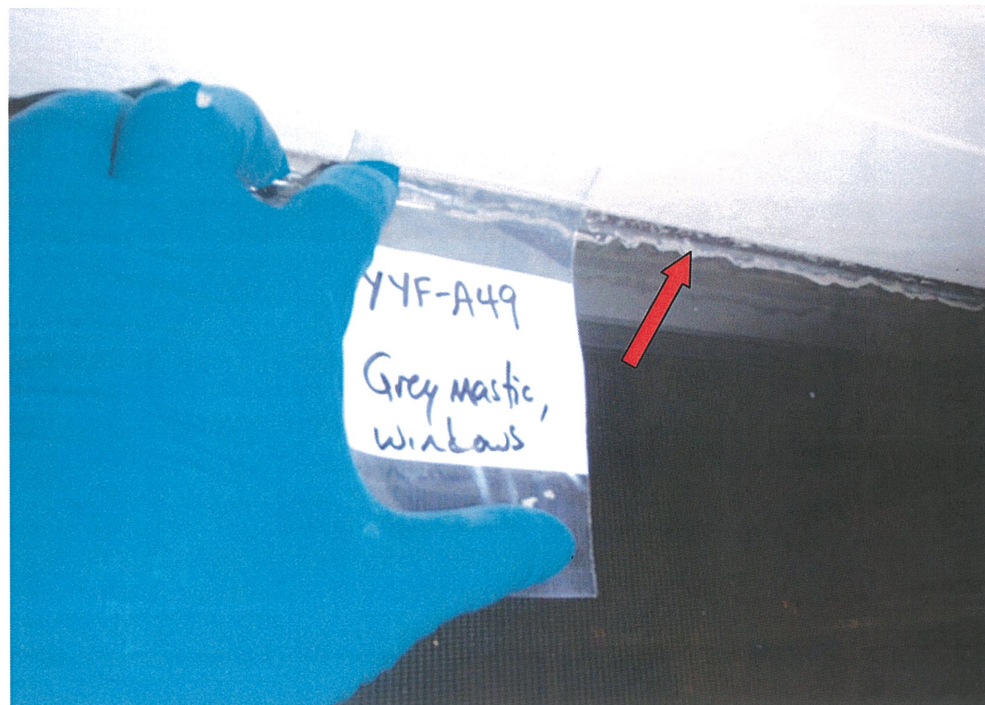
Photograph 41: Asbestos-containing grey window putty in Room 120 (Sample A43).



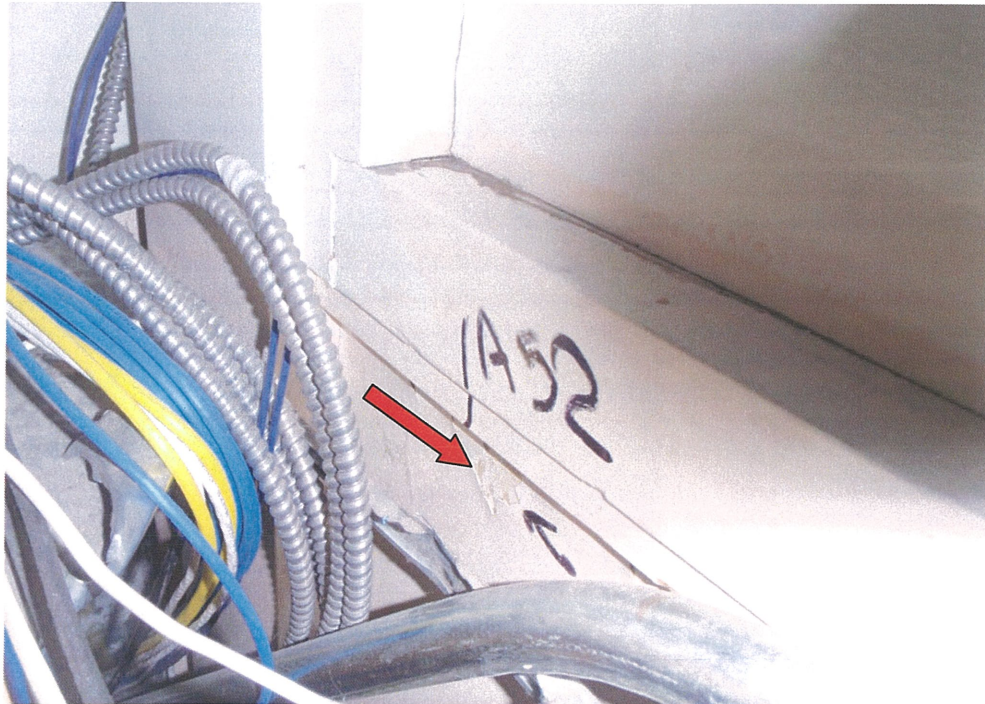
Photograph 42: Asbestos-containing grey vinyl floor tile debris located in the floor vent in Room 120 (Sample A45).



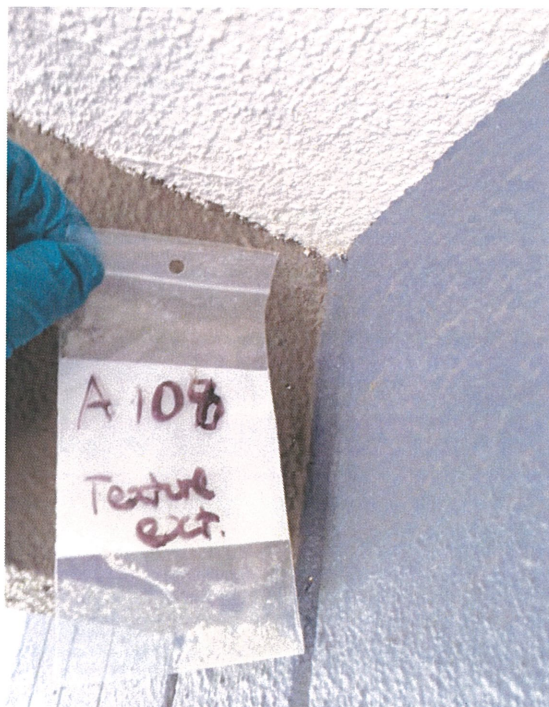
Photograph 43: Asbestos-containing drywall joint compound in Room 120 (**Sample A47**).



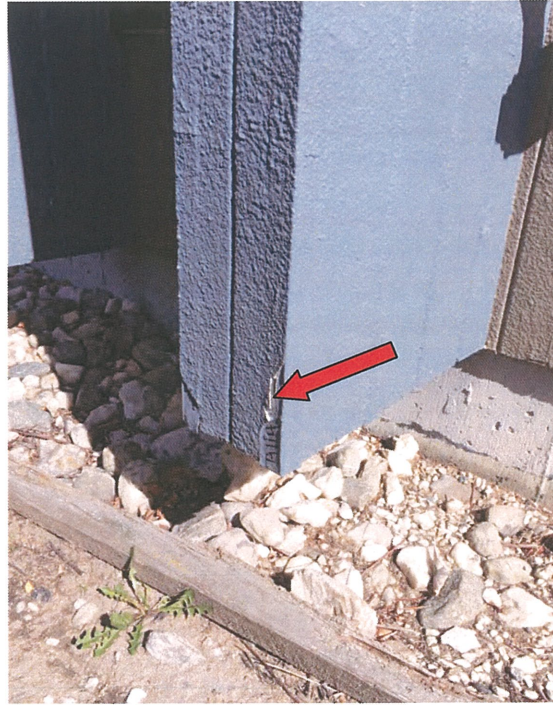
Photograph 44: Asbestos-containing grey window putty on upper window in Room 106A above Room 143. (**Sample 49**).



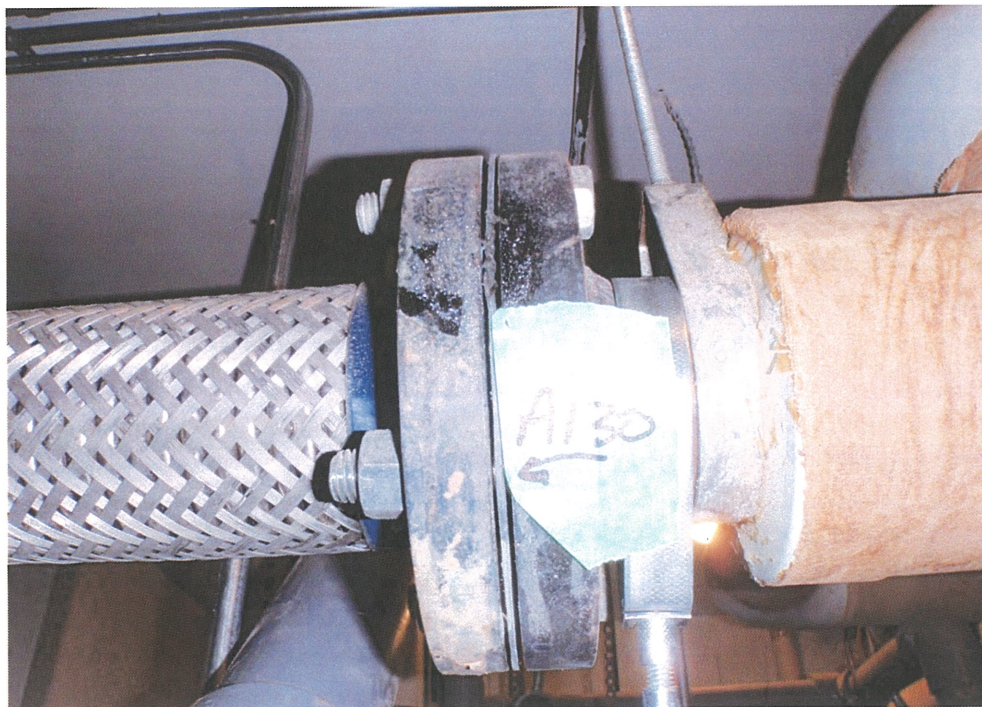
Photograph 45: Asbestos-containing drywall joint compound in Room 106A above Room 143 (**Sample A52**).



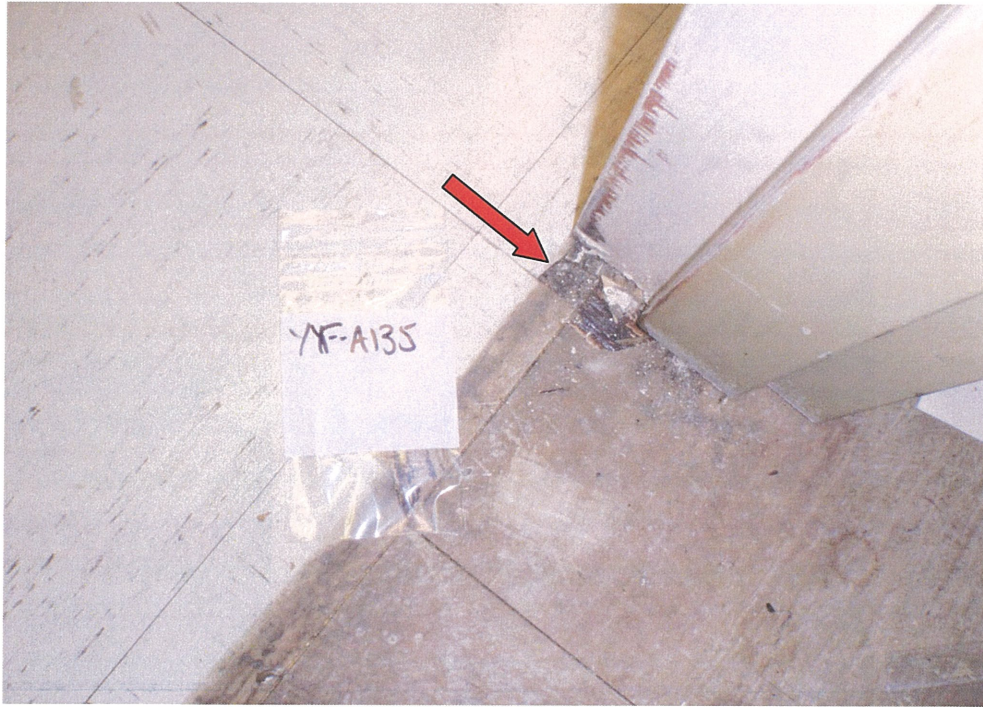
Photograph 46: Asbestos-containing exterior ceiling texture on south end of building (**Sample A108**).



Photograph 47: Asbestos-containing exterior wall texture on west side of building (**Sample A114 and Sample A116**).



Photograph 48: Asbestos-containing grey pipe gasket in Room 137 (**Sample A130**).



Photograph 49: Asbestos-containing off-white vinyl floor tile in Room 117 (Sample A135).



Photograph 50: Asbestos-containing red mastic on HVAC ducting in crawlspace beneath Room 136 (Sample A146).



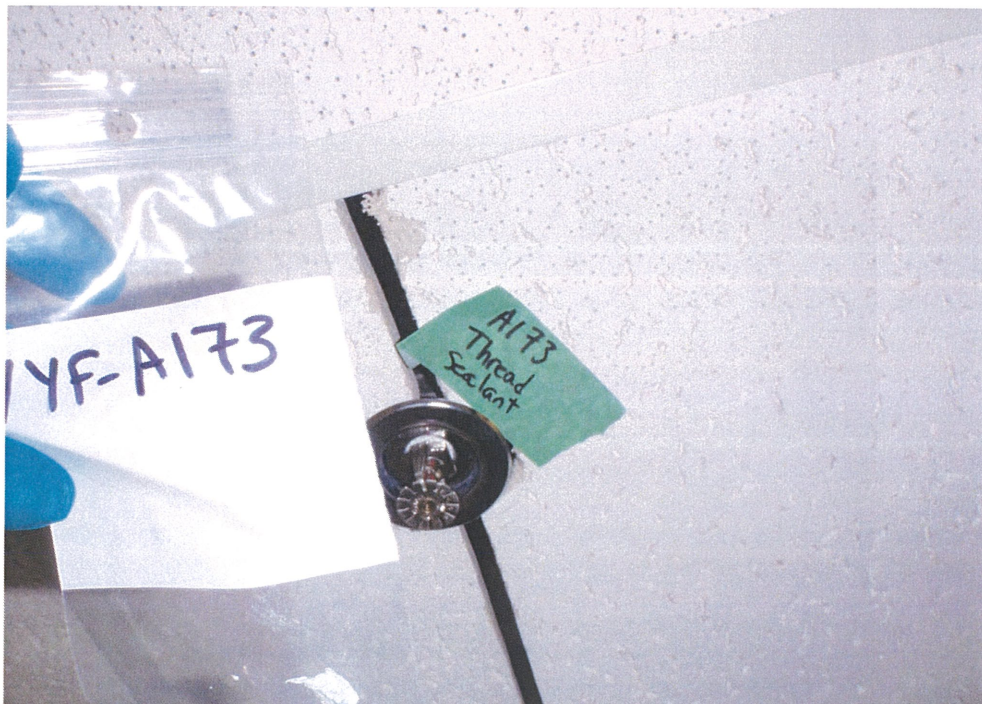
Photograph 51: Asbestos-containing off-white vinyl floor tile in Room 117 (Sample A165).



Photograph 52: Asbestos-containing grey window putty in Room 117 (Sample A168).



Photograph 53: Asbestos-containing tan vinyl floor tile in Room 119 (Sample A170).



Photograph 54: Asbestos-containing pipe thread sealant on fire line in Room 143 (Sample A173).



Photograph 55: Asbestos-containing grey vinyl floor tile located inside wall compartment in Room 106B (Sample A180).



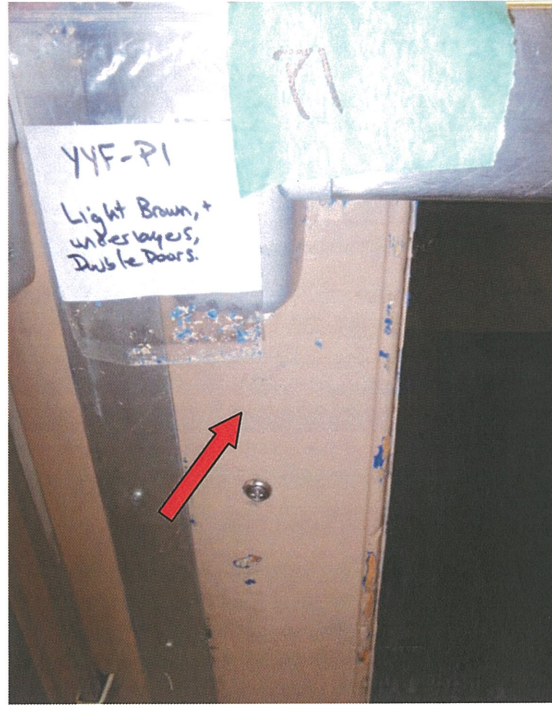
Photograph 56: Asbestos-containing white vinyl floor tile in Room 112 (Sample A196).



Photograph 57: Asbestos-containing tar on floor adjacent door step in Room 110 (Sample A202).



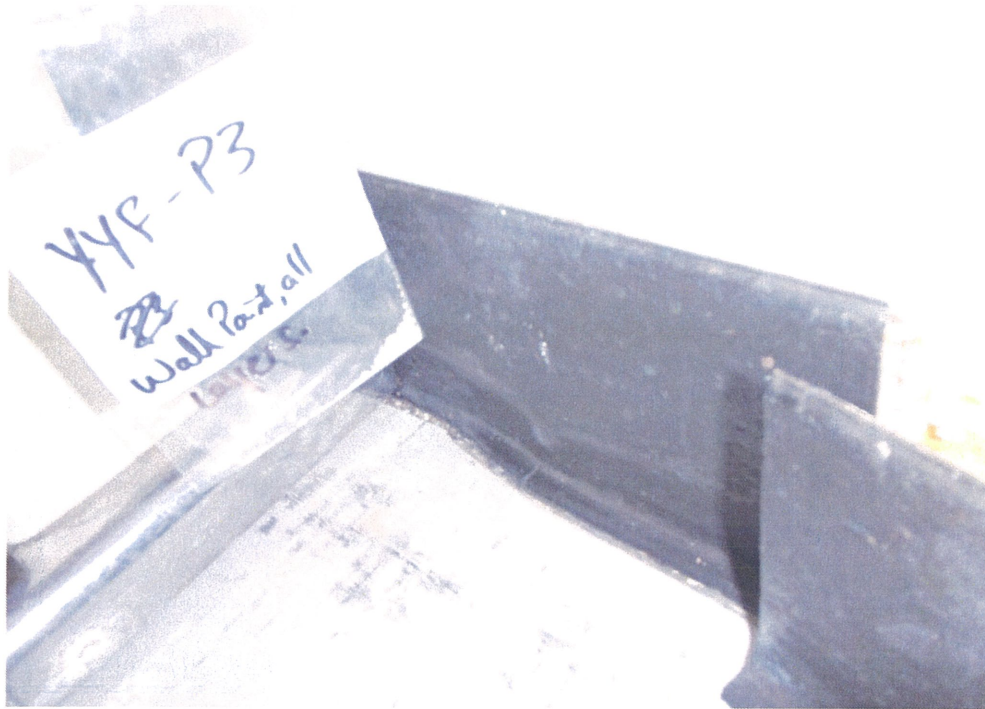
Photograph 58: Typical fire door to Room 137 (not sampled - inaccessible).



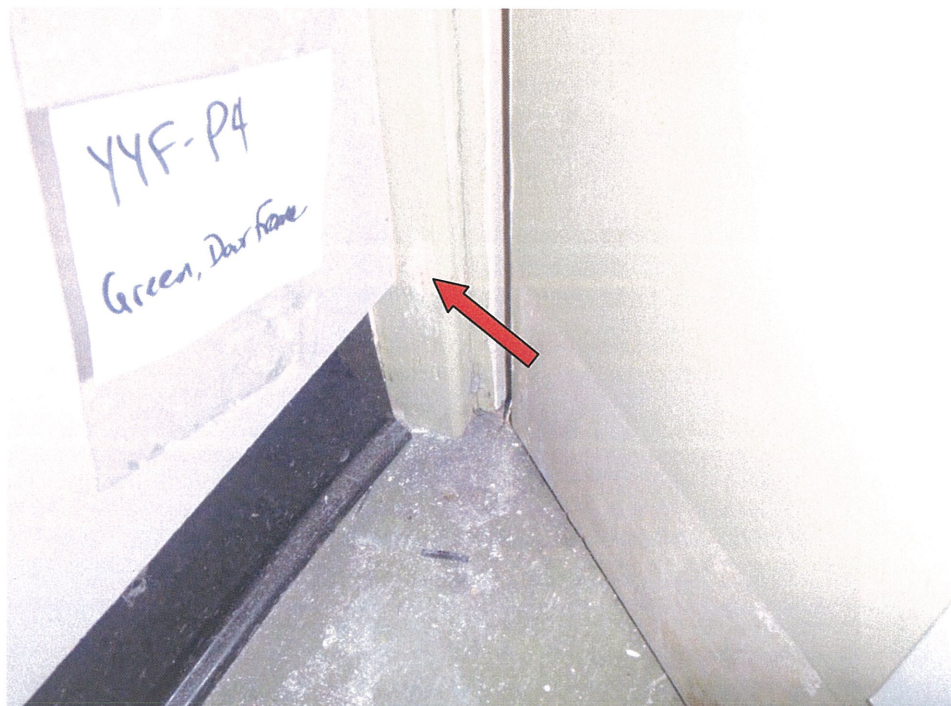
Photograph 59: Lead-based light brown/blue paint on double doors in Room 125 (**Sample P1**).



Photograph 60: Lead-based brown paint on door and window frames in Room 125 (**Sample P2**).



Photograph 61: Lead-based white paint on walls in Room 125 (**Sample P3**).



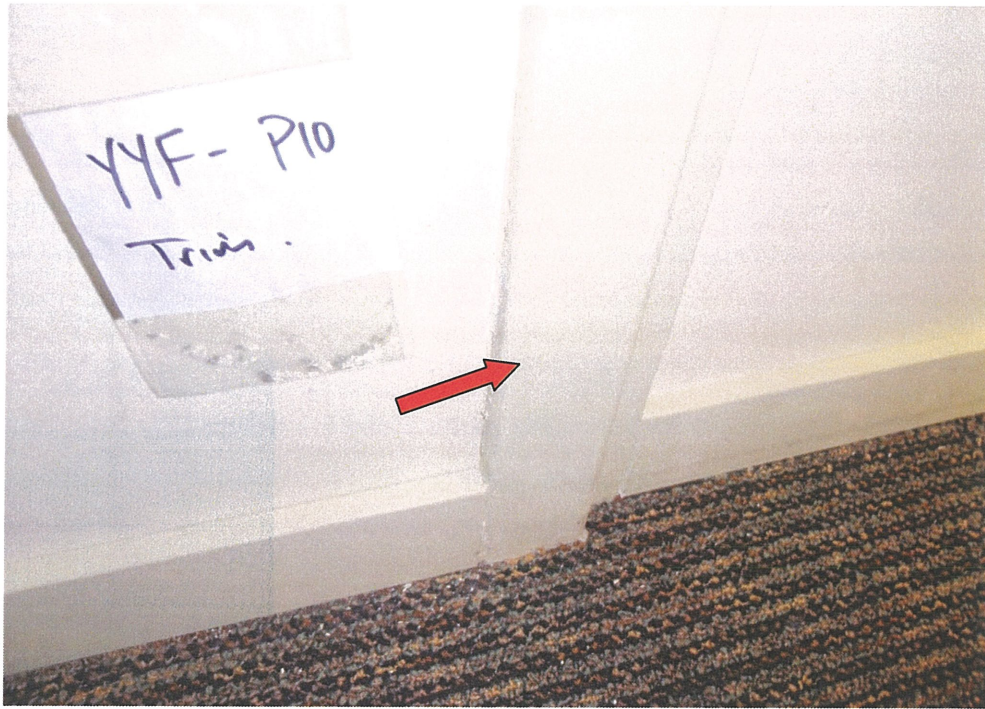
Photograph 62: Lead-based green paint on door frame in Room 127 (**Sample P4**).



Photograph 63: Lead-based grey paint on a wall panel in Room 127 (Sample P5).



Photograph 64: Lead-based light brown / blue paint on door to Room 130 (Sample P9).



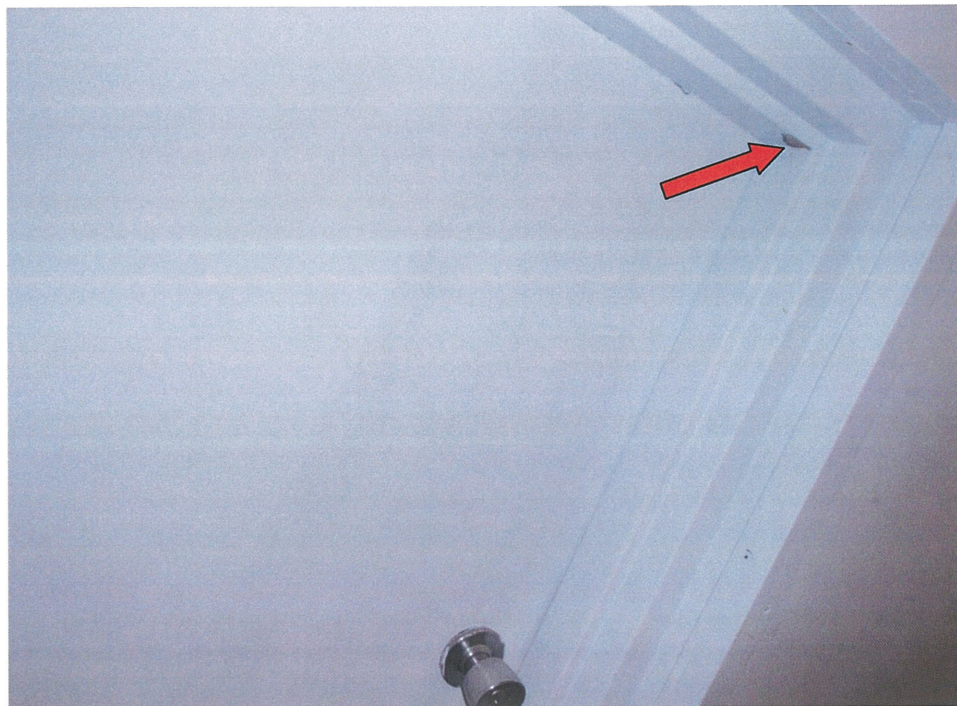
Photograph 65: Lead-based beige wall trim in Room 120 (**Sample P10**).



Photograph 66: Lead-based off-white trim paint in Room 106A above Room 143 (**Sample P12**).



Photograph 67: Lead-based white paint in Room 106A above Room 143 (**Sample P13**).



Photograph 68: Lead-based light blue/white paint on small door frame in Room 109 (**Sample P14**).



Photograph 69: Lead-based yellow paint on steel pipe on roof (**Sample P17**).



Photograph 70: Lead-based grey paint on wall of raised portion of roof (**Sample P18**) and lead-based white paint on soffit of raised portion of roof (**Sample P19**).



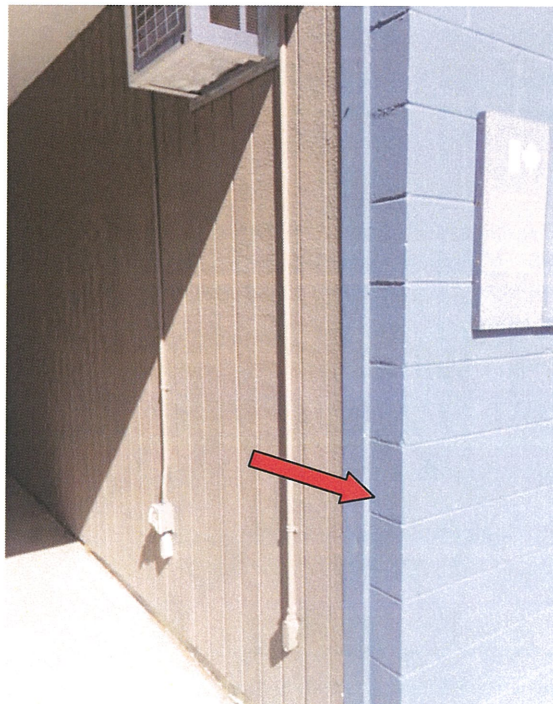
Photograph 71: Lead-based black paint on ladder to raised portion of roof (Sample P20).



Photograph 72: Lead-based dark brown paint on window trim on east side of raised portion of roof (Sample P21).



Photograph 73: Lead-based white paint on tar of foundation exterior (**Sample P22**).



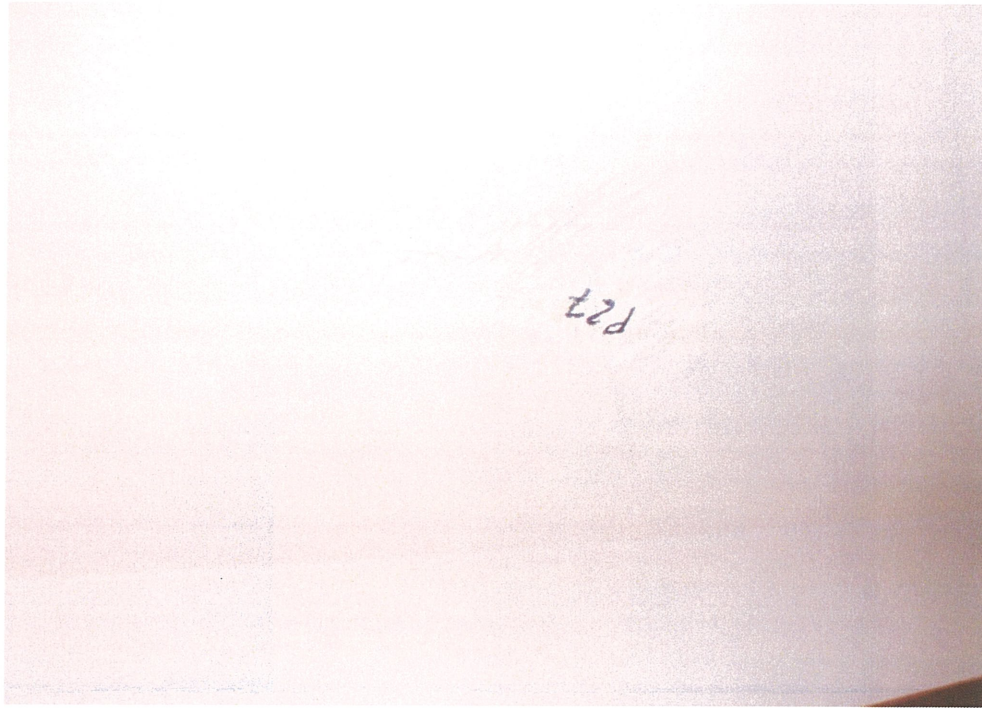
Photograph 74: Lead-based blue paint on exterior of building (**Sample P24**).



Photograph 75: Lead-based dark brown paint on exterior door frame to Room 125 (**Sample P25**).



Photograph 76: Lead-based exterior light grey / white paint on concrete foundation (**Sample P26**).



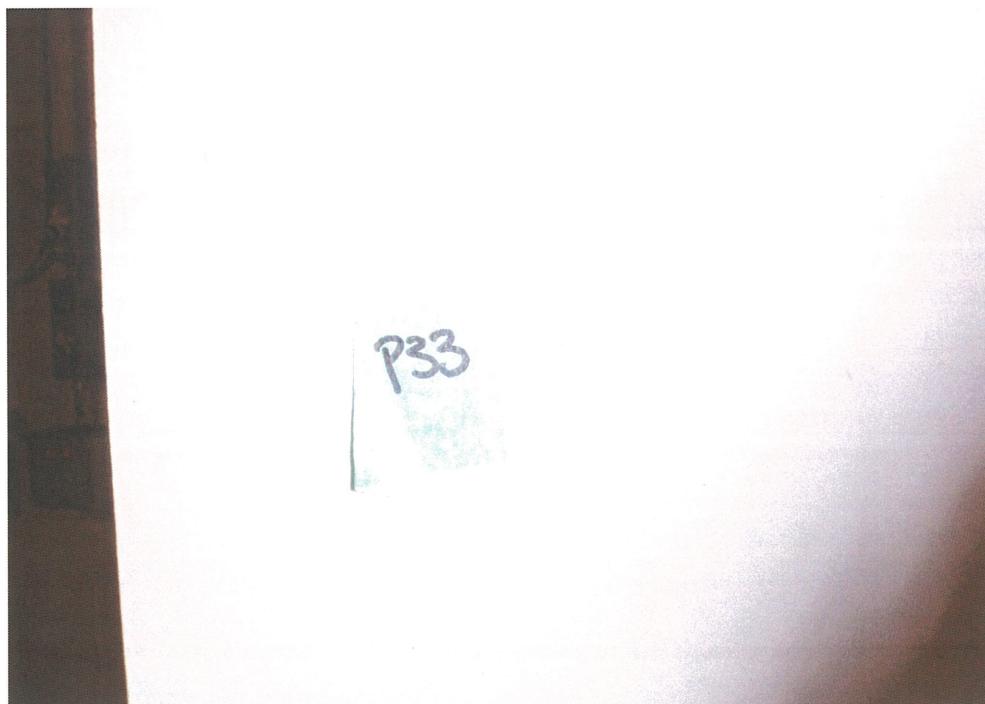
Photograph 77: Lead-based pink wall and ceiling paint in Room 128B (Sample P27).



Photograph 78: Lead-based grey floor paint on concrete in Room 138 (Sample P28).



Photograph 79: Lead-based beige paint on walls of Room 138 (**Sample P29**).



Photograph 80: Lead-based beige paint on walls of Room 137 (**Sample P33**).



Photograph 81: Lead-based grey primer paint on wall in ceiling space of Room 142 (**Sample P34**).



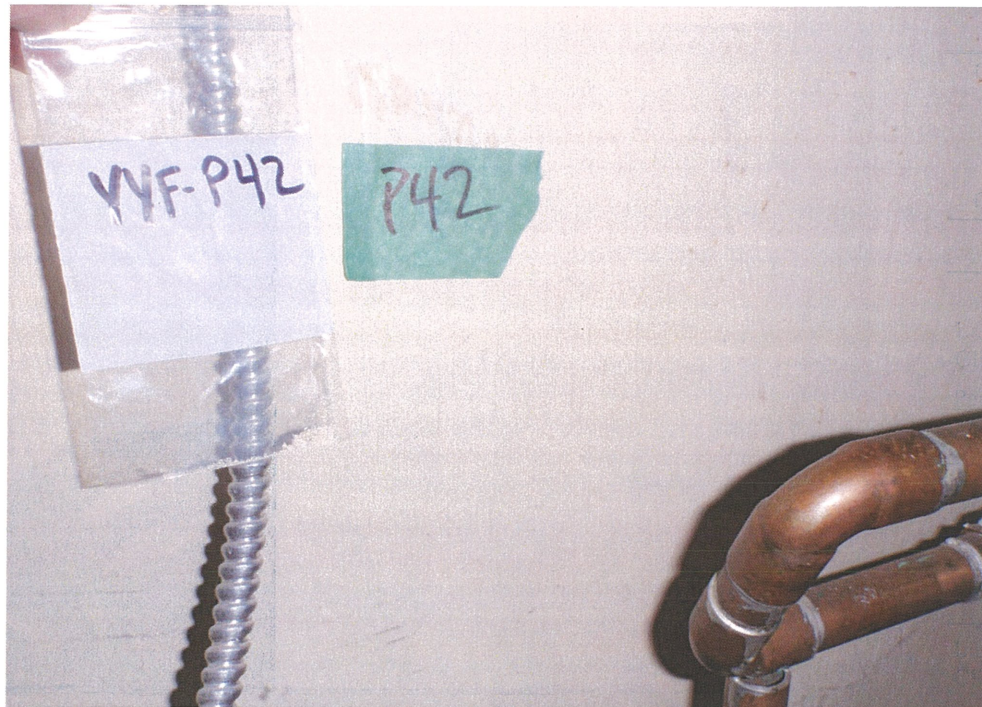
Photograph 82: Lead-based green paint on door frame of Room 135 (**Sample P35**).



Photograph 83: Lead-based red paint on window trim along the west wall of Room 106B (Sample P40).



Photograph 84: Lead-based brown paint on door to Room 143 (Sample P41).



Photograph 85: Lead-based yellow paint in wall cabinet on south end of Room 106B (Sample P42).



Photograph 86: Lead-based yellow paint on door frame of Room 112 (Sample P44).



Photograph 87: Lead-based beige paint on steel pipe near ceiling of Room 107 (**Sample P46**).

APPENDIX III

Laboratory Analytical Report (IATL)

Cover Letter

Apr 07, 2016

SNC - Lavalin, Inc.

Thank you for choosing iATL for your analytical needs. The Report herein along with the chain of custody contains details of (1) the transmittal of the samples from you to our laboratory, (2) the acceptance and analysis of the samples, (3) the supporting documentation tied to this project, (4) any QA notifications or communications, and (5) our invoice for this project. In addition:

- Please carefully look over these report deliverables and make sure that it meets your needs. Depending upon regulator and accrediting body limitations, you may have some choices for the formatting and data presentation beyond what follows. Please contact our customer service department for information on any options.
- You may intend for all, or select, samples in this submittal to move forward in the laboratory for other testing procedures. The batch sheet in this Report may list that authorization to proceed. Please login to our secure client portal and check this status or to confirm any additional analyses.
- If there are other offices, individuals, or customers who you think should receive this report – please send us that information and we will happily forward the report.

iATL is always seeking to improve our services and the customer experience. Any feedback that you can supply would benefit our commitment to quality. Please consider emailing any of the contacts on the next page of this report.

Finally, I wanted to take this opportunity to express our appreciation in your choice of iATL. We value our customers and seek to earn your business... one sample at a time.

Regards,



Eric Snyder
President, iATL



Frank Ehrenfeld
Laboratory
Director, iATL

CERTIFICATE OF ANALYSIS

Client: SNC - Lavalin, Inc.
8648 Commerce Court
Burnaby BC V5A 4N6


Client: SNC483


Report Date: 4/7/2016
Report No.: 506746 - PLM
Project: Penticton Airport-PWGSC
Project No.: 636476

PLM BULK SAMPLE ANALYSIS SUMMARY

<p>Lab No.: 5896891 Client No.: YYF-A1 <u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Grey Cementitious Facility: <u>Percent Non-Asbestos Fibrous Material:</u> 5 Cellulose</p>	<p>Location: <u>Percent Non-Fibrous Material:</u> 95</p>
<p>Lab No.: 5896892 Client No.: YYF-A2 <u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Black Cove Base Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location: <u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5896893 Client No.: YYF-A3 <u>Percent Asbestos:</u> <i>PC 1.1 Chrysotile</i></p>	<p>Description: Off-White Joint Compound Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location: <u>Percent Non-Fibrous Material:</u> 98.9</p>
<p>Lab No.: 5896893(L2) Client No.: YYF-A3 <u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Tan Mastic Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location: <u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5896894 Client No.: YYF-A4 <u>Percent Asbestos:</u> <i>PC 0.75 Chrysotile</i></p>	<p>Description: Light Grey Floor Tile Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location: <u>Percent Non-Fibrous Material:</u> 99.25</p>
<p>Lab No.: 5896894(L2) Client No.: YYF-A4 <u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Black Mastic Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location: <u>Percent Non-Fibrous Material:</u> 100</p>

Analytical Method - US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

Date Received: 4/5/2016
Date Analyzed: 4/6/2016 6:14:59 AM
Signature: 
Analyst: Tom Barkley

Approved By: 
Frank E. Ehrenfeld, III
Laboratory Director

CERTIFICATE OF ANALYSIS

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Burnaby BC V5A 4N6


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Project No.: 636476


Client: SNC483

PLM BULK SAMPLE ANALYSIS SUMMARY

<p>Lab No.: 5896894(L3) Client No.: YYF-A4</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Tan Mastic Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5896895 Client No.: YYF-A5</p> <p><u>Percent Asbestos:</u> <i>PC 1.3 Chrysotile</i></p>	<p>Description: Tan Joint Compound Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 98.7</p>
<p>Lab No.: 5896896 Client No.: YYF-A6</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Grey Putty Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5896897 Client No.: YYF-A7</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: White Grey Ceiling Tile Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> 50 Cellulose 10 Fibrous Glass</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 40</p>
<p>Lab No.: 5896898 Client No.: YYF-A8</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Brown Tar Paper Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> 75 Cellulose</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 25</p>
<p>Lab No.: 5896898(L2) Client No.: YYF-A8</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Tan Insulation Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> 100 Fibrous Glass</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> None Detected</p>

Analytical Method - US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

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Client: SNC483

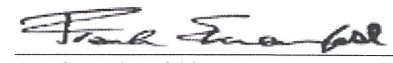
Report Date: 4/7/2016
Report No.: 506746 - PLM
Project: Penticton Airport-PWGSC
Project No.: 636476

PLM BULK SAMPLE ANALYSIS SUMMARY

<p>Lab No.: 5896899 Client No.: YYF-A9 <u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Silver Insulation Facility: <u>Percent Non-Asbestos Fibrous Material:</u> 15 Cellulose 15 Fibrous Glass</p>	<p>Location: <u>Percent Non-Fibrous Material:</u> 70</p>
<p>Lab No.: 5896899(L2) Client No.: YYF-A9 <u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Black Tar Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location: <u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5896900 Client No.: YYF-A10 <u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: White Cementitious Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location: <u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5896901 Client No.: YYF-A11 <u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Silver Insulation Facility: <u>Percent Non-Asbestos Fibrous Material:</u> 15 Cellulose 15 Fibrous Glass</p>	<p>Location: <u>Percent Non-Fibrous Material:</u> 70</p>
<p>Lab No.: 5896901(L2) Client No.: YYF-A11 <u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Black Tar Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location: <u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5896902 Client No.: YYF-A12 <u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Grey Mortar Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location: <u>Percent Non-Fibrous Material:</u> 100</p>

Analytical Method - US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

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Analyst: Tom Barkley

Approved By: 
Frank E. Ehrenfeld, III
Laboratory Director


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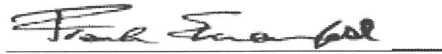
Client: SNC - Lavalin, Inc. 8648 Commerce Court Burnaby BC V5A 4N6 Client: SNC483	Report Date: 4/7/2016 Report No.: 506746 - PLM Project: Penticton Airport-PWGSC Project No.: 636476
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PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5896903 Client No.: YYF-A13 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: White Grey Ceiling Tile Facility: <u>Percent Non-Asbestos Fibrous Material:</u> 50 Cellulose 20 Fibrous Glass	Location: <u>Percent Non-Fibrous Material:</u> 30
Lab No.: 5896904 Client No.: YYF-A14 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Grey Putty Facility: <u>Percent Non-Asbestos Fibrous Material:</u> 2 Fibrous Glass	Location: <u>Percent Non-Fibrous Material:</u> 98
Lab No.: 5896905 Client No.: YYF-A15 <u>Percent Asbestos:</u> <i>10 Chrysotile</i>	Description: Green Floor Tile Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 90
Lab No.: 5896905(L2) Client No.: YYF-A15 <u>Percent Asbestos:</u> <i>PC 2.5 Chrysotile</i>	Description: Black Mastic Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 97.5
Lab No.: 5896906 Client No.: YYF-A16 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Black Cove Base Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896906(L2) Client No.: YYF-A16 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Brown Mastic Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100

Analytical Method -US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

Date Received: 4/5/2016
Date Analyzed: 4/6/2016 6:14:59 AM
Signature: 
Analyst: Tom Barkley

Approved By: 
 Frank E. Ehrenfeld, III
 Laboratory Director

CERTIFICATE OF ANALYSIS

Client: SNC - Lavalin, Inc.
8648 Commerce Court
Burnaby BC V5A 4N6


Report Date: 4/7/2016
Report No.: 506746 - PLM
Project: Penticton Airport-PWGSC
Project No.: 636476

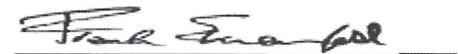
Client: SNC483

PLM BULK SAMPLE ANALYSIS SUMMARY

<p>Lab No.: 5896907 Client No.: YYF-A17</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Black Cove Base Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5896907(L2) Client No.: YYF-A17</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: White Mastic Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5896908 Client No.: YYF-A18</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Red Caulk Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5896909 Client No.: YYF-A19</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: White Caulk Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5896910 Client No.: YYF-A20</p> <p><u>Percent Asbestos:</u> <i>15 Chrysotile</i> <i>10 Crocidolite</i></p>	<p>Description: Grey Transite Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 75</p>
<p>Lab No.: 5896911 Client No.: YYF-A21</p> <p><u>Percent Asbestos:</u> <i>PC 5.1 Amosite</i></p>	<p>Description: Tan Insulation Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 94.9</p>

Analytical Method - US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

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Analyst: Tom Barkley

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Frank E. Ehrenfeld, III
Laboratory Director

CERTIFICATE OF ANALYSIS

Client: SNC - Lavalin, Inc.
8648 Commerce Court
Burnaby BC V5A 4N6


Client: SNC483

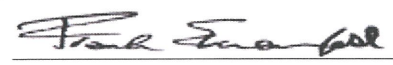
Report Date: 4/7/2016
Report No.: 506746 - PLM
Project: Penticton Airport-PWGSC
Project No.: 636476

PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5896912 Client No.: YYF-A22	Description: Grey Cementitious Facility:	Location:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896913 Client No.: YYF-A23	Description: Grey Gasket Facility:	Location:
<u>Percent Asbestos:</u> <i>40 Chrysotile</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 60
Lab No.: 5896914 Client No.: YYF-A24	Description: Black Tar Paper Facility:	Location:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> 75 Cellulose	<u>Percent Non-Fibrous Material:</u> 25
Lab No.: 5896915 Client No.: YYF-A25	Description: White Joint Compound Facility:	Location:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896916 Client No.: YYF-A26	Description: White Joint Compound Facility:	Location:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896917 Client No.: YYF-A27	Description: White Tan Ceiling Tile Facility:	Location:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> 95 Cellulose	<u>Percent Non-Fibrous Material:</u> 5

Analytical Method - US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

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Client: SNC483

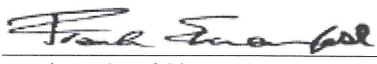
Report Date: 4/7/2016
Report No.: 506746 - PLM
Project: Penticton Airport-PWGSC
Project No.: 636476

PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5896918 Client No.: YYF-A28 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Black Cove Base Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896918(L2) Client No.: YYF-A28 <u>Percent Asbestos:</u> <i>PC 1.1 Chrysotile</i>	Description: Off-White Joint Compound Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 98.9
Lab No.: 5896918(L3) Client No.: YYF-A28 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: White Mastic Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896919 Client No.: YYF-A29 <u>Percent Asbestos:</u> <i>PC 0.5 Chrysotile</i>	Description: Grey Sealant Facility: <u>Percent Non-Asbestos Fibrous Material:</u> 5 Synthetic	Location: <u>Percent Non-Fibrous Material:</u> 94.5
Lab No.: 5896920 Client No.: YYF-A30 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: White Joint Compound Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896921 Client No.: YYF-A31 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: White Grey Ceiling Tile Facility: <u>Percent Non-Asbestos Fibrous Material:</u> 25 Cellulose 25 Fibrous Glass	Location: <u>Percent Non-Fibrous Material:</u> 50

Analytical Method -US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

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Report Date: 4/7/2016
Report No.: 506746 - PLM
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Project No.: 636476

Client: SNC483

PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5896922	Description: White Brown Ceiling Tile	Location:
Client No.: YYF-A32	Facility:	
<u>Percent Asbestos:</u>	<u>Percent Non-Asbestos Fibrous Material:</u>	<u>Percent Non-Fibrous Material:</u>
<i>None Detected</i>	90 Cellulose	10

Lab No.: 5896923	Description: Tan Mastic	Location:
Client No.: YYF-A33	Facility:	
<u>Percent Asbestos:</u>	<u>Percent Non-Asbestos Fibrous Material:</u>	<u>Percent Non-Fibrous Material:</u>
<i>None Detected</i>	None Detected	100


Lab No.: 5896924	Description: Grey Floor Tile	Location:
Client No.: YYF-A34	Facility:	
<u>Percent Asbestos:</u>	<u>Percent Non-Asbestos Fibrous Material:</u>	<u>Percent Non-Fibrous Material:</u>
<i>PC 8.7 Chrysotile</i>	None Detected	91.3

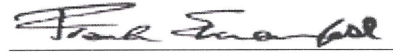
Lab No.: 5896924(L2)	Description: Black Mastic	Location:
Client No.: YYF-A34	Facility:	
<u>Percent Asbestos:</u>	<u>Percent Non-Asbestos Fibrous Material:</u>	<u>Percent Non-Fibrous Material:</u>
<i>PC 0.5 Chrysotile</i>	None Detected	99.5

Lab No.: 5896925	Description: Black Mastic	Location:
Client No.: YYF-A35	Facility:	
<u>Percent Asbestos:</u>	<u>Percent Non-Asbestos Fibrous Material:</u>	<u>Percent Non-Fibrous Material:</u>
<i>PC 0.5 Chrysotile</i>	None Detected	99.5

Lab No.: 5896925(L2)	Description: White Leveling Compound	Location:
Client No.: YYF-A35	Facility:	
<u>Percent Asbestos:</u>	<u>Percent Non-Asbestos Fibrous Material:</u>	<u>Percent Non-Fibrous Material:</u>
<i>PC 1.3 Chrysotile</i>	None Detected	98.7

Analytical Method -US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

Date Received: 4/5/2016
Date Analyzed: 4/6/2016 6:14:59 AM
Signature: 
Analyst: Tom Barkley

Approved By: 
Frank E. Ehrenfeld, III
Laboratory Director

CERTIFICATE OF ANALYSIS

Client: SNC - Lavalin, Inc.
8648 Commerce Court
Burnaby BC V5A 4N6


Client: SNC483

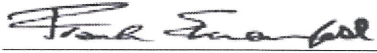
Report Date: 4/7/2016
Report No.: 506746 - PLM
Project: Penticton Airport-PWGSC
Project No.: 636476

PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5896926 Client No.: YYF-A36 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: White Caulk Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896927 Client No.: YYF-A37 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: White Brown Ceiling Tile Facility: <u>Percent Non-Asbestos Fibrous Material:</u> 50 Fibrous Glass 20 Cellulose	Location: <u>Percent Non-Fibrous Material:</u> 30
Lab No.: 5896928 Client No.: YYF-A38 <u>Percent Asbestos:</u> <i>PC 6.0 Chrysotile</i>	Description: Brown Floor Tile Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 94
Lab No.: 5896929 Client No.: YYF-A39 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Grey Woven Material Facility: <u>Percent Non-Asbestos Fibrous Material:</u> 40 Cellulose	Location: <u>Percent Non-Fibrous Material:</u> 60
Lab No.: 5896930 Client No.: YYF-A40 <u>Percent Asbestos:</u> <i>PC 1.2 Chrysotile</i>	Description: Off-White Joint Compound Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 98.8
Lab No.: 5896931 Client No.: YYF-A41 <u>Percent Asbestos:</u> <i>PC 1.2 Chrysotile</i>	Description: Off-White Joint Compound Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 98.8

Analytical Method - US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

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Signature: 
Analyst: Tom Barkley

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Report Date: 4/7/2016
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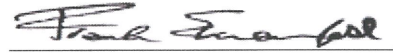
Client: SNC483

PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5896932 Client No.: YYF-A42 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: White Joint Compound Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896933 Client No.: YYF-A43 <u>Percent Asbestos:</u> <i>PC 3.5 Chrysotile</i>	Description: Grey Putty Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 96.5
Lab No.: 5896934 Client No.: YYF-A44 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: White Joint Compound Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896935 Client No.: YYF-A45 <u>Percent Asbestos:</u> <i>PC 7.2 Chrysotile</i>	Description: Grey Floor Tile Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 92.8
Lab No.: 5896935(L2) Client No.: YYF-A45 <u>Percent Asbestos:</u> <i>PC Trace Chrysotile</i>	Description: Black Mastic Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896936 Client No.: YYF-A46 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Grey Cementitious Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100

Analytical Method -US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

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Signature: 
Analyst: Tom Barkley

Approved By: 
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 Laboratory Director

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Report Date: 4/7/2016
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Project No.: 636476

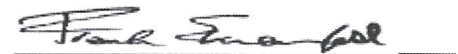
Client: SNC483

PLM BULK SAMPLE ANALYSIS SUMMARY

<p>Lab No.: 5896937 Client No.: YYF-A47</p> <p><u>Percent Asbestos:</u> PC 0.75 Chrysotile</p>	<p>Description: Off-White Joint Compound Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 99.25</p>
<p>Lab No.: 5896938 Client No.: YYF-A48</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Grey Grout Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 100</p>

Analytical Method - US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

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Date Analyzed: 4/6/2016 6:14:59 AM
Signature: 
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Laboratory Director

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Report Date: 4/7/2016
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Project No.: 636476

Client: SNC483

PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5896939	Description: Grey Putty	Location:
Client No.: YYF-A49	Facility:	
<u>Percent Asbestos:</u> <i>PC 4.1 Chrysotile</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 95.9

Lab No.: 5896940	Description: White Wrap	Location:
Client No.: YYF-A50	Facility:	
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> 60 Cellulose 30 Mineral Wool	<u>Percent Non-Fibrous Material:</u> 10

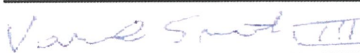
Lab No.: 5896941	Description: White/Grey Ceiling Tile	Location:
Client No.: YYF-A51	Facility:	
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> 40 Cellulose 30 Mineral Wool	<u>Percent Non-Fibrous Material:</u> 30

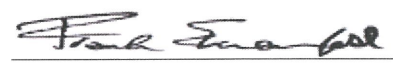
Lab No.: 5896942	Description: Grey Joint Compound	Location:
Client No.: YYF-A52	Facility:	
<u>Percent Asbestos:</u> <i>PC 2.4 Chrysotile</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 97.6

Lab No.: 5896943	Description: White Joint Compound	Location:
Client No.: YYF-A53	Facility:	
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100

Lab No.: 5896944	Description: Grey Grout	Location:
Client No.: YYF-A54	Facility:	
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100

Analytical Method - US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

Date Received: 4/5/2016
Date Analyzed: 4/6/2016 12:00:00 AM
Signature: 
Analyst: Vane Smith

Approved By: 
Frank E. Ehrenfeld, III
Laboratory Director

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Client: SNC483


Report Date: 4/7/2016
Report No.: 506746 - PLM
Project: Penticton Airport-PWGSC
Project No.: 636476

PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5896945 Client No.: YYF-A55	Description: Brown Rubber Facility:	Location:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896946 Client No.: YYF-A56	Description: Brown Mastic Facility:	Location:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896946(L2) Client No.: YYF-A56	Description: White Joint Compound Facility:	Location:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896947 Client No.: YYF-A57	Description: Off-White Mastic Facility:	Location:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896948 Client No.: YYF-A58	Description: Tan Mastic Facility:	Location:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896949 Client No.: YYF-A59	Description: White Joint Compound Facility:	Location:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100

Analytical Method - US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

Date Received: 4/5/2016
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Signature: 
Analyst: Vane Smith

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Frank E. Ehrenfeld, III
Laboratory Director

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Client: SNC - Lavalin, Inc.
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Report Date: 4/7/2016
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Project No.: 636476


Client: SNC483

PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5896950 Client No.: YYF-A60	Description: Brown Wallpaper Facility:	Location:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> 30 Cellulose	<u>Percent Non-Fibrous Material:</u> 70
Lab No.: 5896951 Client No.: YYF-A61	Description: Grey Rubber Facility:	Location:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896952 Client No.: YYF-A62	Description: Yellow Mastic Facility:	Location:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896953 Client No.: YYF-A63	Description: Black Grout Facility:	Location:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896954 Client No.: YYF-A64	Description: Off-White Mastic Facility:	Location:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896955 Client No.: YYF-A65	Description: White Non-Fibrous Facility:	Location:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100

Analytical Method -US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

Date Received: 4/5/2016
Date Analyzed: 4/6/2016 12:00:00 AM
Signature: 
Analyst: Vane Smith

Approved By: 
Frank E. Ehrenfeld, III
Laboratory Director

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Client: SNC - Lavalin, Inc.
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Burnaby BC V5A 4N6

Report Date: 4/7/2016
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Project No.: 636476


Client: SNC483


PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5896956 Client No.: YYF-A66 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Grey Mastic Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896957 Client No.: YYF-A67 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Grey Caulk Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896958 Client No.: YYF-A68 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Brown Ceiling Tile Facility: <u>Percent Non-Asbestos Fibrous Material:</u> 98 Cellulose	Location: <u>Percent Non-Fibrous Material:</u> 2
Lab No.: 5896959 Client No.: YYF-A69 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: White Joint Compound Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896960 Client No.: YYF-A70 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: White Joint Compound Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896961 Client No.: YYF-A71 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: White Texture/Plaster Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100

Analytical Method -US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

Date Received: 4/5/2016
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Signature: 
Analyst: Vane Smith

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 Laboratory Director

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8648 Commerce Court
Burnaby BC V5A 4N6

Report Date: 4/7/2016
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Project No.: 636476

Client: SNC483

PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5896962 Client No.: YYF-A72	Description: White/Grey Ceiling Tile Facility:	Location:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> 60 Cellulose 10 Mineral Wool	<u>Percent Non-Fibrous Material:</u> 30

Lab No.: 5896963 Client No.: YYF-A73	Description: White/Grey Ceiling Tile Facility:	Location:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> 40 Cellulose 30 Mineral Wool	<u>Percent Non-Fibrous Material:</u> 30

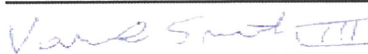
Lab No.: 5896964 Client No.: YYF-A74	Description: White/Grey Ceiling Tile Facility:	Location:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> 40 Cellulose 20 Mineral Wool	<u>Percent Non-Fibrous Material:</u> 40


Lab No.: 5896965 Client No.: YYF-A75	Description: Orange Mastic Facility:	Location:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100

Lab No.: 5896966 Client No.: YYF-A76	Description: Tan Rubber Facility:	Location:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100

Lab No.: 5896967 Client No.: YYF-A77	Description: White Texture Facility:	Location:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100

Analytical Method - US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

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Analyst: Vane Smith

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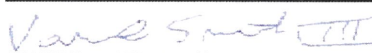
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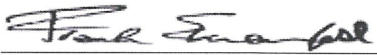
Client: SNC483

PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5896968 Client No.: YYF-A78 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: White Texture Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896969 Client No.: YYF-A79 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: White Texture Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896969(L2) Client No.: YYF-A79 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: White Joint Compound Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896970 Client No.: YYF-A80 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: White Texture Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896971 Client No.: YYF-A81 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: White Texture Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896972 Client No.: YYF-A82 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: White Joint Compound Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100

Analytical Method - US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

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Report Date: 4/7/2016
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Project No.: 636476


Client: SNC483


PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5896973 Client No.: YYF-A83	Description: White/Black Shingle Facility:	Location:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> 15 Synthetic	<u>Percent Non-Fibrous Material:</u> 85

Lab No.: 5896974 Client No.: YYF-A84	Description: White/Blace Shingle Facility:	Location:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> 15 Synthetic	<u>Percent Non-Fibrous Material:</u> 85

Analytical Method - US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

Date Received: 4/5/2016
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Signature: 
Analyst: Vane Smith

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Report Date: 4/7/2016
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Project No.: 636476

Client: SNC483

PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5896975	Description: Black Mastic	Location:
Client No.: YYF-A85	Facility:	
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> 5 Cellulose	<u>Percent Non-Fibrous Material:</u> 95

Lab No.: 5896976	Description: Black Mastic	Location:
Client No.: YYF-A86	Facility:	
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> 5 Cellulose	<u>Percent Non-Fibrous Material:</u> 95

Lab No.: 5896977	Description: Black Mastic	Location:
Client No.: YYF-A87	Facility:	
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> 5 Cellulose	<u>Percent Non-Fibrous Material:</u> 95

Lab No.: 5896978	Description: Black/White Shingle	Location:
Client No.: YYF-A88	Facility:	
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> 15 Synthetic	<u>Percent Non-Fibrous Material:</u> 85

Lab No.: 5896978(L2)	Description: Black Roof Material	Location:
Client No.: YYF-A88	Facility:	
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> 25 Cellulose Trace Fibrous Glass	<u>Percent Non-Fibrous Material:</u> 75

Lab No.: 5896979	Description: Grey Caulk	Location:
Client No.: YYF-A89	Facility:	
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100

Analytical Method -US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

Date Received: 4/5/2016

Date Analyzed: 4/6/2016 12:00:00 AM

Signature: 

Analyst: Rachel McQuiggan

Approved By: 

Frank E. Ehrenfeld, III

Laboratory Director

CERTIFICATE OF ANALYSIS

Client: SNC - Lavalin, Inc.
8648 Commerce Court
Burnaby BC V5A 4N6

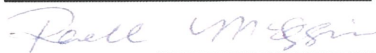
Client: SNC483

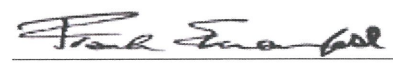
Report Date: 4/7/2016
Report No.: 506746 - PLM
Project: Penticton Airport-PWGSC
Project No.: 636476

PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5896980 Client No.: YYF-A90 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Black Shingle Facility: <u>Percent Non-Asbestos Fibrous Material:</u> 20 Synthetic	Location: <u>Percent Non-Fibrous Material:</u> 80
Lab No.: 5896981 Client No.: YYF-A91 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Black/Grey Caulk Facility: <u>Percent Non-Asbestos Fibrous Material:</u> 5 Cellulose	Location: <u>Percent Non-Fibrous Material:</u> 95
Lab No.: 5896982 Client No.: YYF-A92 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Black Mastic Facility: <u>Percent Non-Asbestos Fibrous Material:</u> Trace Fibrous Glass	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896983 Client No.: YYF-A93 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Grey Cementitious Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896984 Client No.: YYF-A94 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Black Mastic Facility: <u>Percent Non-Asbestos Fibrous Material:</u> Trace Fibrous Glass	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896985 Client No.: YYF-A95 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Grey Caulk Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100

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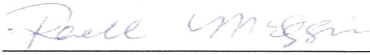
Client: SNC483


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Project No.: 636476

PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5896985(L2) Client No.: YYF-A95 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Clear Caulk Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896986 Client No.: YYF-A96 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Black/Grey Caulk Facility: <u>Percent Non-Asbestos Fibrous Material:</u> 5 Cellulose	Location: <u>Percent Non-Fibrous Material:</u> 95
Lab No.: 5896987 Client No.: YYF-A97 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Dk.Brown Caulk Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896988 Client No.: YYF-A98 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: White Caulk Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896989 Client No.: YYF-A99 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Black Mastic Facility: <u>Percent Non-Asbestos Fibrous Material:</u> 5 Cellulose	Location: <u>Percent Non-Fibrous Material:</u> 95
Lab No.: 5896990 Client No.: YYF-A100 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Brown Paper Facility: <u>Percent Non-Asbestos Fibrous Material:</u> 95 Cellulose	Location: <u>Percent Non-Fibrous Material:</u> 5

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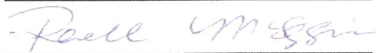
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Client: SNC483

PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5896991 Client No.: YYF-A101 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Tan Mastic Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896992 Client No.: YYF-A102 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Grey Caulk Facility: <u>Percent Non-Asbestos Fibrous Material:</u> 5 Cellulose	Location: <u>Percent Non-Fibrous Material:</u> 95
Lab No.: 5896993 Client No.: YYF-A103 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Black Tar Paper Facility: <u>Percent Non-Asbestos Fibrous Material:</u> 70 Cellulose	Location: <u>Percent Non-Fibrous Material:</u> 30
Lab No.: 5896994 Client No.: YYF-A104 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Black/Grey Shingle Facility: <u>Percent Non-Asbestos Fibrous Material:</u> 15 Synthetic	Location: <u>Percent Non-Fibrous Material:</u> 85
Lab No.: 5896994(L2) Client No.: YYF-A104 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Black Roof Material Facility: <u>Percent Non-Asbestos Fibrous Material:</u> 20 Cellulose 5 Fibrous Glass	Location: <u>Percent Non-Fibrous Material:</u> 75
Lab No.: 5896994(L3) Client No.: YYF-A104 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Black Tar Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100

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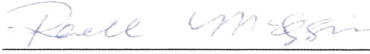
Client: SNC483


Report Date: 4/7/2016
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PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5896994(L4) Client No.: YYF-A104 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Brown Fibrous Facility: <u>Percent Non-Asbestos Fibrous Material:</u> 90 Cellulose	Location: <u>Percent Non-Fibrous Material:</u> 10
Lab No.: 5896995 Client No.: YYF-A105 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Grey Caulk Facility: <u>Percent Non-Asbestos Fibrous Material:</u> 5 Cellulose	Location: <u>Percent Non-Fibrous Material:</u> 95
Lab No.: 5896996 Client No.: YYF-A106 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Brown Tar Paper Facility: <u>Percent Non-Asbestos Fibrous Material:</u> 90 Cellulose	Location: <u>Percent Non-Fibrous Material:</u> 10
Lab No.: 5896997 Client No.: YYF-A107 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Black Tar Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5896998 Client No.: YYF-A108 <u>Percent Asbestos:</u> <i>PC 4.1 Chrysotile</i>	Description: White Texture Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 95.9
Lab No.: 5896999 Client No.: YYF-A109 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: White Texture Facility: <u>Percent Non-Asbestos Fibrous Material:</u> 99 Fibrous Glass	Location: <u>Percent Non-Fibrous Material:</u> 1

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Client: SNC483

PLM BULK SAMPLE ANALYSIS SUMMARY

<p>Lab No.: 5896999(L2) Client No.: YYF-A109</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Black Tar Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5897000 Client No.: YYF-A110</p> <p><u>Percent Asbestos:</u> <i>PC 4.7 Chrysotile</i></p>	<p>Description: White Texture Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 95.3</p>
<p>Lab No.: 5897001 Client No.: YYF-A111</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Grey/White Paint Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5897002 Client No.: YYF-A112</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Grey Paper Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> 90 Cellulose</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 10</p>
<p>Lab No.: 5897003 Client No.: YYF-A113</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: White Putty Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5897004 Client No.: YYF-A114</p> <p><u>Percent Asbestos:</u> <i>PC 5.0 Chrysotile</i></p>	<p>Description: White Texture Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 95</p>

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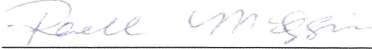
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PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5897005 Client No.: YYF-A115 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: White Texture Facility: <u>Percent Non-Asbestos Fibrous Material:</u> 3 Other	Location: <u>Percent Non-Fibrous Material:</u> 97
Lab No.: 5897006 Client No.: YYF-A116 <u>Percent Asbestos:</u> <i>PC 4.8 Chrysotile</i>	Description: White Texture Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 95.2
Lab No.: 5897007 Client No.: YYF-A117 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Grey Cove Base Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5897008 Client No.: YYF-A118 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Yellow Mastic Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5897009 Client No.: YYF-A119 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Brown Mastic Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5897010 Client No.: YYF-A120 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Grey/Black Cove Base Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100

Analytical Method -US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

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Client: SNC483

PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5897010(L2)
Client No.: YYF-A120

Description: Tan/Grey Mastic
Facility:

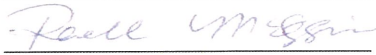
Location:


Percent Asbestos:
None Detected

Percent Non-Asbestos Fibrous Material:
None Detected

Percent Non-Fibrous Material:
100

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PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5897011 Client No.: YYF-A121 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Tan Mastic Facility: <u>Percent Non-Asbestos Fibrous Material:</u> 5 Cellulose	Location: <u>Percent Non-Fibrous Material:</u> 95
Lab No.: 5897012 Client No.: YYF-A122 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Orange Mastic Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5897013 Client No.: YYF-A123 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Orange Mastic Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5897013(L2) Client No.: YYF-A123 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Off-White Foam Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5897014 Client No.: YYF-A124 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Yellow Mastic Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5897015 Client No.: YYF-A125 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: White Joint Compound Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100

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PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5897016	Description: Grey Cementitious	Location:
Client No.: YYF-A126	Facility:	
<u>Percent Asbestos:</u>	<u>Percent Non-Asbestos Fibrous Material:</u>	<u>Percent Non-Fibrous Material:</u>
<i>None Detected</i>	5 Fibrous Glass	95

Lab No.: 5897017	Description: Yellow/Grey Mastic	Location:
Client No.: YYF-A127	Facility:	
<u>Percent Asbestos:</u>	<u>Percent Non-Asbestos Fibrous Material:</u>	<u>Percent Non-Fibrous Material:</u>
<i>None Detected</i>	None Detected	100


Lab No.: 5897018	Description: Orange Non-Fibrous	Location:
Client No.: YYF-A128	Facility:	
<u>Percent Asbestos:</u>	<u>Percent Non-Asbestos Fibrous Material:</u>	<u>Percent Non-Fibrous Material:</u>
<i>None Detected</i>	None Detected	100

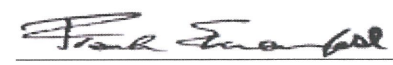
Lab No.: 5897019	Description: Tan/Silver Wrap	Location:
Client No.: YYF-A129	Facility:	
<u>Percent Asbestos:</u>	<u>Percent Non-Asbestos Fibrous Material:</u>	<u>Percent Non-Fibrous Material:</u>
<i>None Detected</i>	10 Fibrous Glass 60 Cellulose	40

Lab No.: 5897020	Description: Grey Gasket	Location:
Client No.: YYF-A130	Facility:	
<u>Percent Asbestos:</u>	<u>Percent Non-Asbestos Fibrous Material:</u>	<u>Percent Non-Fibrous Material:</u>
<i>15 Chrysotile</i>	15 Cellulose	70

Lab No.: 5897021	Description: White/Silver/Tan Wrap	Location:
Client No.: YYF-A131	Facility:	
<u>Percent Asbestos:</u>	<u>Percent Non-Asbestos Fibrous Material:</u>	<u>Percent Non-Fibrous Material:</u>
<i>None Detected</i>	10 Fibrous Glass 60 Cellulose	40

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PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5897022 Client No.: YYF-A132 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Black Non-Fibrous Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5897023 Client No.: YYF-A133 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Black Gasket Facility: <u>Percent Non-Asbestos Fibrous Material:</u> 10 Cellulose	Location: <u>Percent Non-Fibrous Material:</u> 90
Lab No.: 5897024 Client No.: YYF-A134 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Off-White Wrap Facility: <u>Percent Non-Asbestos Fibrous Material:</u> 20 Mineral Wool 60 Cellulose	Location: <u>Percent Non-Fibrous Material:</u> 20
Lab No.: 5897025 Client No.: YYF-A135 <u>Percent Asbestos:</u> <i>PC 4.8 Chrysotile</i>	Description: Off-White Floor Tile Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 95.2
Lab No.: 5897025(L2) Client No.: YYF-A135 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Black Mastic Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5897026 Client No.: YYF-A136 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Grey Caulk Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100

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PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5897027	Description: Brown Rubber	Location:
Client No.: YYF-A137	Facility:	
<u>Percent Asbestos:</u> None Detected	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100

Lab No.: 5897027(L2)	Description: Clear Mastic	Location:
Client No.: YYF-A137	Facility:	
<u>Percent Asbestos:</u> None Detected	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100


Lab No.: 5897028	Description: White/Tan Ceiling Tile	Location:
Client No.: YYF-A138	Facility:	
<u>Percent Asbestos:</u> None Detected	<u>Percent Non-Asbestos Fibrous Material:</u> Cellulose 90	<u>Percent Non-Fibrous Material:</u> 10

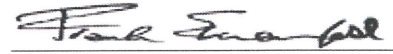
Lab No.: 5897029	Description: White/Tan Ceiling Tile	Location:
Client No.: YYF-A139	Facility:	
<u>Percent Asbestos:</u> None Detected	<u>Percent Non-Asbestos Fibrous Material:</u> Cellulose 90	<u>Percent Non-Fibrous Material:</u> 10

Lab No.: 5897030	Description: Grey Cementitious	Location:
Client No.: YYF-A140	Facility:	
<u>Percent Asbestos:</u> None Detected	<u>Percent Non-Asbestos Fibrous Material:</u> Fibrous Glass 10	<u>Percent Non-Fibrous Material:</u> 90

Lab No.: 5897031	Description: Black Floor Tile	Location:
Client No.: YYF-A141	Facility:	
<u>Percent Asbestos:</u> None Detected	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100

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Date Analyzed: 4/6/2016 12:00:00 AM
Signature: 
Analyst: Rodney Redman

Approved By: 
Frank E. Ehrenfeld, III
Laboratory Director

CERTIFICATE OF ANALYSIS

Client: SNC - Lavalin, Inc.
8648 Commerce Court
Burnaby BC V5A 4N6


Client: SNC483

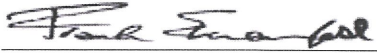
Report Date: 4/7/2016
Report No.: 506746 - PLM
Project: Penticton Airport-PWGSC
Project No.: 636476

PLM BULK SAMPLE ANALYSIS SUMMARY

<p>Lab No.: 5897031(L2) Client No.: YYF-A141</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Black Mastic Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5897032 Client No.: YYF-A142</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Blue Floor Tile Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5897032(L2) Client No.: YYF-A142</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Black Mastic Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> 5 Cellulose</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 95</p>
<p>Lab No.: 5897033 Client No.: YYF-A143</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Tan/Blue/Pink Wrap Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> 10 Mineral Wool 50 Cellulose</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 40</p>
<p>Lab No.: 5897034 Client No.: YYF-A144</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Black Wrap Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> 15 Fibrous Glass</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 85</p>

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PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5897035
Client No.: YYF-A145

Percent Asbestos:
None Detected

Description: Black Mastic
Facility:

Percent Non-Asbestos Fibrous Material:
1 Cellulose

Location:

Percent Non-Fibrous Material:
99

Lab No.: 5897035(L2)
Client No.: YYF-A145

Percent Asbestos:
None Detected

Description: Tan/Yellow Insulation
Facility:

Percent Non-Asbestos Fibrous Material:
10 Fibrous Glass
85 Cellulose

Location:

Percent Non-Fibrous Material:
5

Lab No.: 5897036
Client No.: YYF-A146

Percent Asbestos:
PC 1.2 Chrysotile

Description: Red Mastic
Facility:

Percent Non-Asbestos Fibrous Material:
None Detected

Location:

Percent Non-Fibrous Material:
98.8

Lab No.: 5897037
Client No.: YYF-A147

Percent Asbestos:
None Detected

Description: Grey Cove Base
Facility:

Percent Non-Asbestos Fibrous Material:
None Detected

Location:

Percent Non-Fibrous Material:
100

Lab No.: 5897038
Client No.: YYF-A148

Percent Asbestos:
None Detected

Description: Lt.Tan Mastic
Facility:

Percent Non-Asbestos Fibrous Material:
None Detected

Location:

Percent Non-Fibrous Material:
100

Lab No.: 5897039
Client No.: YYF-A149

Percent Asbestos:
None Detected


Description: White Joint Compound
Facility:

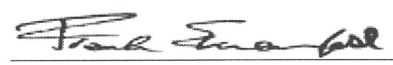
Percent Non-Asbestos Fibrous Material:
None Detected

Location:

Percent Non-Fibrous Material:
100

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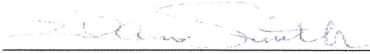
Client: SNC483

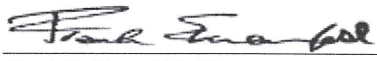
Report Date: 4/7/2016
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Project No.: 636476

PLM BULK SAMPLE ANALYSIS SUMMARY

<p>Lab No.: 5897040 Client No.: YYF-A150 <u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Tan Ceiling Tile Facility: <u>Percent Non-Asbestos Fibrous Material:</u> 35 Cellulose 20 Fibrous Glass</p>	<p>Location: <u>Percent Non-Fibrous Material:</u> 45</p>
<p>Lab No.: 5897041 Client No.: YYF-A151 <u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Tan Ceiling Tile Facility: <u>Percent Non-Asbestos Fibrous Material:</u> 35 Cellulose 20 Fibrous Glass</p>	<p>Location: <u>Percent Non-Fibrous Material:</u> 45</p>
<p>Lab No.: 5897042 Client No.: YYF-A152 <u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Green Floor Tile Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location: <u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5897042(L2) Client No.: YYF-A152 <u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Tan Mastic Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location: <u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5897043 Client No.: YYF-A153 <u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Off-White Floor Tile Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location: <u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5897043(L2) Client No.: YYF-A153 <u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Tan Mastic Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location: <u>Percent Non-Fibrous Material:</u> 100</p>

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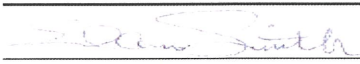
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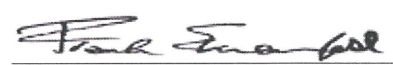
Report Date: 4/7/2016
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Project No.: 636476

PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5897044 Client No.: YYF-A154 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: White Joint Compound Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5897045 Client No.: YYF-A155 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Lt.Blue Floor Tile Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5897045(L2) Client No.: YYF-A155 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Tan Mastic Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5897046 Client No.: YYF-A156 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: White Joint Compound Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100

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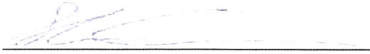
Client: SNC483

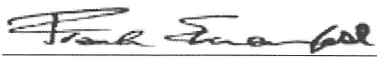
Report Date: 4/7/2016
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Project No.: 636476

PLM BULK SAMPLE ANALYSIS SUMMARY

<p>Lab No.: 5897047 Client No.: YYF-A157 <u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Off-White Floor Tile Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location: <u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5897047(L2) Client No.: YYF-A157 <u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Black/Brown Mastic Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location: <u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5897048 Client No.: YYF-A158 <u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Off-White Floor Tile Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location: <u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5897048(L2) Client No.: YYF-A158 <u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Grey Mastic Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location: <u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5897049 Client No.: YYF-A159 <u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Blue Cove Base Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location: <u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5897050 Client No.: YYF-A160 <u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Yellow Mastic Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location: <u>Percent Non-Fibrous Material:</u> 100</p>

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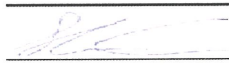
Client: SNC483


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PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5897051 Client No.: YYF-A161 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Black Mastic Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5897052 Client No.: YYF-A162 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: White Joint Compound Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5897053 Client No.: YYF-A163 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: White Joint Compound Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5897054 Client No.: YYF-A164 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Off-White Vinyl Sheet Flooring Facility: <u>Percent Non-Asbestos Fibrous Material:</u> 20 Cellulose 10 Fibrous Glass	Location: <u>Percent Non-Fibrous Material:</u> 70
Lab No.: 5897054(L2) Client No.: YYF-A164 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Tan Mastic Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5897055 Client No.: YYF-A165 <u>Percent Asbestos:</u> <i>PC 1.5 Chrysotile</i>	Description: Off-White Floor Tile Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 98.5

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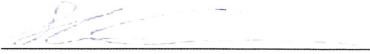
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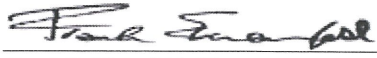
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PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5897055(L2) Client No.: YYF-A165 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Black Mastic Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5897055(L3) Client No.: YYF-A165 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Grey Cementitious Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5897056 Client No.: YYF-A166 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Blue Floor Tile Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5897056(L2) Client No.: YYF-A166 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Black Mastic Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5897056(L3) Client No.: YYF-A166 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Clear Mastic Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5897057 Client No.: YYF-A167 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: White Wrap Facility: <u>Percent Non-Asbestos Fibrous Material:</u> 90 Cellulose	Location: <u>Percent Non-Fibrous Material:</u> 10

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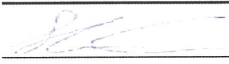
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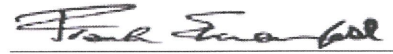
Client: SNC483

PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5897058 Client No.: YYF-A168	Description: Grey Caulk Facility:	Location:
<u>Percent Asbestos:</u> <i>10 Chrysotile</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 90
Lab No.: 5897059 Client No.: YYF-A169	Description: Black/White Non-Fibrous Facility:	Location:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5897060 Client No.: YYF-A170	Description: Tan Floor Tile Facility:	Location:
<u>Percent Asbestos:</u> <i>PC 1.4 Chrysotile</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 98.6
Lab No.: 5897060(L2) Client No.: YYF-A170	Description: Black Mastic Facility:	Location:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5897060(L3) Client No.: YYF-A170	Description: Tan Mastic Facility:	Location:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5897061 Client No.: YYF-A171	Description: White Joint Compound Facility:	Location:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100

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PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5897062 Client No.: YYF-A172	Description: Off-White Ceiling Tile Facility:	Location:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> 50 Cellulose 20 Fibrous Glass	<u>Percent Non-Fibrous Material:</u> 30

Lab No.: 5897063 Client No.: YYF-A173	Description: Off-White Caulk Facility:	Location:
<u>Percent Asbestos:</u> <i>PC 1.4 Chrysotile</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 98.6

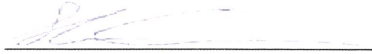
Lab No.: 5897064 Client No.: YYF-A174	Description: Grey Cementitious Facility:	Location:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100


Lab No.: 5897065 Client No.: YYF-A175	Description: White Caulk Facility:	Location:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100

Lab No.: 5897066 Client No.: YYF-A176	Description: Tan Insulation Facility:	Location:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> 90 Fibrous Glass	<u>Percent Non-Fibrous Material:</u> 10

Lab No.: 5897067 Client No.: YYF-A177	Description: Black Rubber Tile Facility:	Location:
<u>Percent Asbestos:</u> <i>None Detected</i>	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100

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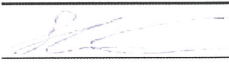
PLM BULK SAMPLE ANALYSIS SUMMARY

<p>Lab No.: 5897068 Client No.: YYF-A178</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Tan Mastic Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5897069 Client No.: YYF-A179</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Grey Cementitious Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5897070 Client No.: YYF-A180</p> <p><u>Percent Asbestos:</u> <i>PC 1.2 Chrysotile</i></p>	<p>Description: Off-White Floor Tile Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 98.8</p>
<p>Lab No.: 5897070(L2) Client No.: YYF-A180</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Black Mastic Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 100</p>

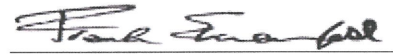
Analytical Method - US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

Date Received: 4/5/2016

Date Analyzed: 4/6/2016 12:00:00 AM

Signature: 

Analyst: Shane Cone

Approved By: 

Frank E. Ehrenfeld, III
Laboratory Director

CERTIFICATE OF ANALYSIS

Client: SNC - Lavalin, Inc.
8648 Commerce Court
Burnaby BC V5A 4N6


Report Date: 4/7/2016
Report No.: 506746 - PLM
Project: Penticton Airport-PWGSC
Project No.: 636476

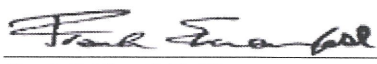
Client: SNC483

PLM BULK SAMPLE ANALYSIS SUMMARY

<p>Lab No.: 5897071 Client No.: YYF-A181</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: White Joint Compound Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5897072 Client No.: YYF-A182</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: White Mortar Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5897073 Client No.: YYF-A183</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Grey Grout Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5897074 Client No.: YYF-A184</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Grey Mastic Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5897075 Client No.: YYF-A185</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: White Joint Compound Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5897076 Client No.: YYF-A186</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: White Joint Compound Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 100</p>

Analytical Method -US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

Date Received: 4/5/2016
Date Analyzed: 4/6/2016 12:00:00 AM
Signature: 
Analyst: Randy Caran

Approved By: 
Frank E. Ehrenfeld, III
Laboratory Director

CERTIFICATE OF ANALYSIS

Client: SNC - Lavalin, Inc.
8648 Commerce Court
Burnaby BC V5A 4N6


Client: SNC483

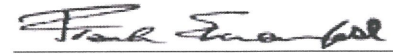
Report Date: 4/7/2016
Report No.: 506746 - PLM
Project: Penticton Airport-PWGSC
Project No.: 636476

PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5897077 Client No.: YYF-A187 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: White Joint Compound Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5897078 Client No.: YYF-A188 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: White Joint Compound Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5897079 Client No.: YYF-A189 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Grey Cove Base Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5897079(L2) Client No.: YYF-A189 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: White Mastic Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5897080 Client No.: YYF-A190 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Grey Vinyl Sheet Flooring Facility: <u>Percent Non-Asbestos Fibrous Material:</u> 10 Synthetic	Location: <u>Percent Non-Fibrous Material:</u> 90
Lab No.: 5897081 Client No.: YYF-A191 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Grey Grout Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100

Analytical Method -US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

Date Received: 4/5/2016
Date Analyzed: 4/6/2016 12:00:00 AM
Signature: 
Analyst: Randy Caran

Approved By: 
 Frank E. Ehrenfeld, III
 Laboratory Director

CERTIFICATE OF ANALYSIS

Client: SNC - Lavalin, Inc.
8648 Commerce Court
Burnaby BC V5A 4N6

Client: SNC483


Report Date: 4/7/2016
Report No.: 506746 - PLM
Project: Penticton Airport-PWGSC
Project No.: 636476

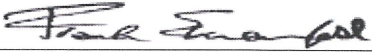
PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5897082 Client No.: YYF-A192 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: White Grout Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5897083 Client No.: YYF-A193 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Grey Vinyl Sheet Flooring Facility: <u>Percent Non-Asbestos Fibrous Material:</u> 10 Cellulose 10 Synthetic	Location: <u>Percent Non-Fibrous Material:</u> 80
Lab No.: 5897084 Client No.: YYF-A194 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: White Joint Compound Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5897085 Client No.: YYF-A195 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Grey Mastic Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5897086 Client No.: YYF-A196 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Grey Floor Tile Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5897086(L2) Client No.: YYF-A196 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Yellow Mastic Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100

Analytical Method -US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

Date Received: 4/5/2016
Date Analyzed: 4/6/2016 12:00:00 AM

Signature: 
Analyst: Randy Caran

Approved By: 
 Frank E. Ehrenfeld, III
 Laboratory Director

CERTIFICATE OF ANALYSIS

Client: SNC - Lavalin, Inc.
8648 Commerce Court
Burnaby BC V5A 4N6


Client: SNC483

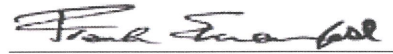
Report Date: 4/7/2016
Report No.: 506746 - PLM
Project: Penticton Airport-PWGSC
Project No.: 636476

PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5897086(L3) Client No.: YYF-A196 <u>Percent Asbestos:</u> <i>PC 3.6 Chrysotile</i>	Description: White Floor Tile Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 96.4
Lab No.: 5897086(L4) Client No.: YYF-A196 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Black Mastic Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5897086(L5) Client No.: YYF-A196 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: White Leveling Compound Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5897087 Client No.: YYF-A197 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Off-White Vinyl Sheet Flooring Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100
Lab No.: 5897088 Client No.: YYF-A198 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Off-White Vinyl Sheet Flooring Facility: <u>Percent Non-Asbestos Fibrous Material:</u> 5 Cellulose	Location: <u>Percent Non-Fibrous Material:</u> 95
Lab No.: 5897088(L2) Client No.: YYF-A198 <u>Percent Asbestos:</u> <i>None Detected</i>	Description: Grey Floor Tile Facility: <u>Percent Non-Asbestos Fibrous Material:</u> None Detected	Location: <u>Percent Non-Fibrous Material:</u> 100

Analytical Method -US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

Date Received: 4/5/2016
Date Analyzed: 4/6/2016 12:00:00 AM
Signature: 
Analyst: Randy Caran

Approved By: 
Frank E. Ehrenfeld, III
Laboratory Director

CERTIFICATE OF ANALYSIS

Client: SNC - Lavalin, Inc.
8648 Commerce Court
Burnaby BC V5A 4N6

Client: SNC483


Report Date: 4/7/2016
Report No.: 506746 - PLM
Project: Penticton Airport-PWGSC
Project No.: 636476

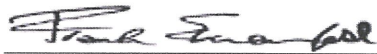
(PLM BULK SAMPLE ANALYSIS SUMMARY

<p>Lab No.: 5897088(L3) Client No.: YYF-A198</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Black Mastic Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5897089 Client No.: YYF-A199</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: White/Brown Ceiling Tile Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> 98 Cellulose</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 2</p>
<p>Lab No.: 5897090 Client No.: YYF-A200</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Tan Mastic Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5897090(L2) Client No.: YYF-A200</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Grey Floor Tile Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5897090(L3) Client No.: YYF-A200</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Black Mastic Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5897091 Client No.: YYF-A201</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: White/Brown Ceiling Tile Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> 100 Cellulose</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> Trace</p>

Analytical Method -US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

Date Received: 4/5/2016
Date Analyzed: 4/6/2016 12:00:00 AM

Signature: 
Analyst: Randy Caran

Approved By: 
Frank E. Ehrenfeld, III
Laboratory Director

CERTIFICATE OF ANALYSIS

Client: SNC - Lavalin, Inc.
8648 Commerce Court
Burnaby BC V5A 4N6

Client: SNC483

Report Date: 4/7/2016
Report No.: 506746 - PLM
Project: Penticton Airport-PWGSC
Project No.: 636476

PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5897092	Description: Black Mastic	Location:
Client No.: YYF-A202	Facility:	
<u>Percent Asbestos:</u> None Detected	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100

Lab No.: 5897092(L2)	Description: Black/Grey Leveling Compound	Location:
Client No.: YYF-A202	Facility:	
<u>Percent Asbestos:</u> PC 2.4 Chrysotile	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 97.6


Lab No.: 5897093	Description: White Leveling Compound	Location:
Client No.: YYF-A203	Facility:	
<u>Percent Asbestos:</u> None Detected	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100

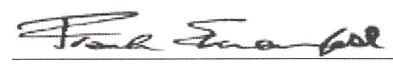
Lab No.: 5897094	Description: Tan Putty	Location:
Client No.: YYF-A204	Facility:	
<u>Percent Asbestos:</u> None Detected	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100

Lab No.: 5897095	Description: Grey Leveling Compound	Location:
Client No.: YYF-A205	Facility:	
<u>Percent Asbestos:</u> None Detected	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100

Lab No.: 5897096	Description: Grey Cove Base	Location:
Client No.: YYF-A206	Facility:	
<u>Percent Asbestos:</u> None Detected	<u>Percent Non-Asbestos Fibrous Material:</u> None Detected	<u>Percent Non-Fibrous Material:</u> 100

Analytical Method -US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

Date Received: 4/5/2016
Date Analyzed: 4/6/2016 12:00:00 AM
Signature: 
Analyst: Randy Caran

Approved By: 
Frank E. Ehrenfeld, III
Laboratory Director

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Client: SNC - Lavalin, Inc.
8648 Commerce Court
Burnaby BC V5A 4N6

Client: SNC483

Report Date: 4/7/2016
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Project: Penticton Airport-PWGSC
Project No.: 636476


PLM BULK SAMPLE ANALYSIS SUMMARY

<p>Lab No.: 5897097 Client No.: YYF-A207</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Tan Mastic Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5897098 Client No.: YYF-A208</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: White Joint Compound Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5897099 Client No.: YYF-A209</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: Red Mastic Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 100</p>
<p>Lab No.: 5897100 Client No.: YYF-A210</p> <p><u>Percent Asbestos:</u> <i>None Detected</i></p>	<p>Description: White Joint Compound Facility:</p> <p><u>Percent Non-Asbestos Fibrous Material:</u> None Detected</p>	<p>Location:</p> <p><u>Percent Non-Fibrous Material:</u> 100</p>

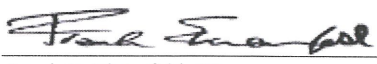
Analytical Method -US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

Date Received: 4/5/2016

Date Analyzed: 4/6/2016 12:00:00 AM

Signature: 

Analyst: Randy Caran

Approved By: 

Frank E. Ehrenfeld, III
Laboratory Director

CERTIFICATE OF ANALYSIS

Client: SNC - Lavalin, Inc.
8648 Commerce Court
Burnaby BC V5A 4N6

Client: SNC483

Report Date: 4/7/2016
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Project No.: 636476

Appendix to Analytical Report

Customer Contact: Tony Kavelares
Analysis: US EPA 600, R93-116

This appendix seeks to promote greater understanding of any observations, exceptions, special instructions, or circumstances that the laboratory needs to communicate to the client concerning the above samples. The information below is used to help promote your ability to make the most informed decisions for you and your customers. Please note the following points of contact for any questions you may have.

iATL Customer Service: customerservice@iatl.com

iATL Office Manager: cdavis@iatl.com

iATL Account Representative: Shirley Clark

Sample Login Notes: See Batch Sheet Attached

Sample Matrix: Bulk Building Materials

Exceptions Noted: See Following Pages

General Terms, Warrants, Limits, Qualifiers:

General information about iATL capabilities and client/laboratory relationships and responsibilities are spelled out in iATL policies that are listed at www.iATL.com and in our Quality Assurance Manual per ISO 17025 standard requirements. The information therein is a representation of iATL definitions and policies for turnaround times, sample submittal, collection media, blank definitions, quantification issues and limit of detection, analytical methods and procedures, sub-contracting policies, results reporting options, fees, terms, and discounts, confidentiality, sample archival and disposal, and data interpretation.

iATL warrants the test results to be of a precision normal for the type and methodology employed for each sample submitted. iATL disclaims any other warrants, expressed or implied, including warranty of fitness for a particular purpose and warranty of merchantability. iATL accepts no legal responsibility for the purpose for which the client uses test results. Any analytical work performed must be governed by our Standard Terms and Conditions. Prices, methods and detection limits may be changed without notification. Please contact your Customer Service Representative for the most current information.

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA LAP LLC, or any agency of local, state or province governments nor of any agency of the U.S. government.

This report shall not be reproduced except in full, without written approval of the laboratory.

Information Pertinent to this Report:

Analysis by US EPA 600 93-116: Determination of Asbestos in Bulk Building Materials by Polarized Light Microscopy (PLM).

Certification:

- NIST-NVLAP No. 101165-0
- NY-DOH No. 11021
- AIHA-LAP, LLC No. 100188

Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analytical Methodology Alternatives: Your initial request for analysis may not have accounted for recent advances in regulatory requirements or advances in technology that are routinely used in similar situations for other qualified projects. You may have the option to explore additional analysis for further information. Below are a few options, listed as the matrix followed by the appropriate methodology. Also included are links to more information on our website.

Bulk Building Materials that are Non-Friable Organically Bound (NOB) by Gravimetric Reduction techniques employing PLM and TEM: ELAP 198.6 (PLM-NOB), ELAP 198.4 (TEM-NOB)

Loose Fill Vermiculite Insulation, Attic Insulation, Zonolite (copyright), etc.: US EPA 600 R-4/004 (multi-tiered analytical process)
Sprayed On Insulation/Fireproofing with Vermiculite (SOF-V): ELAP 198.8 (PLM-SOF-V)

Soil, sludge, sediment, aggregate, and like materials analyzed for asbestos or other elongated mineral particles (ex. erionite, etc.): ASTM D7521, CARB 435, and other options available

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Project No.: 636476

Asbestos in Surface Dust according to one of ASTM's Methods (very dependent on sampling collection technique – by TEM): ASTM D 5755, D5756, or D6480

Various other asbestos matrices (air, water, etc.) and analytical methods are available.

Disclaimers / Qualifiers:

There may be some samples in this project that have a "NOTE:" associated with a sample result. We use added disclaimers or qualifiers to inform the client about something that requires further explanation. Here is a list with highlighted disclaimers that may be pertinent to this project. For a full explanation of these and other disclaimers, please inquire at customerservice@iatl.com.

- 1) Note: No mastic provided for analysis.
- 2) Note: Insufficient mastic provided for analysis.
- 3) Note: Insufficient material provided for analysis.
- 4) Note: Insufficient sample provided for QC reanalysis.
- 5) Note: Different material than indicated on Sample Log / Description.
- 6) Note: Sample not submitted.
- 7) Note: Attached to asbestos containing material.
- 8) Note: Received wet.
- 9) Note: Possible surface contamination.
- 10) Note: Not building material. 1% threshold may not apply.
- 11) Note: Recommend TEM-NOB analysis as per EPA recommendations.
- 12) Note: Asbestos detected but not quantifiable.
- 13) Note: Multiple identical samples submitted, only one analyzed.
- 14) Note: Analyzed by EPA 600/R-93/116. Point Counting detection limit at 0.080%.
- 15) Note: Analyzed by EPA 600/R-93/116. Point Counting detection limit at 0.125%.

Recommendations for Vermiculite Analysis:

Several analytical protocols exist for the analysis of asbestos in vermiculite. These analytical approaches vary depending upon the nature of the vermiculite mineral being tested (e.g. un-processed gänge, homogeneous exfoliated books of mica, or mixed mineral composites). Please contact your client representative for pricing and turnaround time options available.

iATL recommends initial testing using the EPA 600/R-93/116 method. This method is specifically designed for the analysis of asbestos in bulk building materials. It provides an acceptable starting point for primary screening of vermiculite for possible asbestos.

Results from this testing may be inconclusive. EPA suggests proceeding to a multi-tiered analysis involving wet separation techniques in conjunction with PLM and TEM gravimetric analysis (EPA 600/R-04/004).

Further information on this method and other vermiculite and asbestos issues can be found at the following: Agency for Toxic Substances and Disease Registry (ATSDR) www.atsdr.cdc.gov, United States Geological Survey (USGS) www.minerals.usgs.gov/minerals/, US EPA www.epa.gov/asbestos. The USEPA also has an informative brochure "Current Best Practices for Vermiculite Attic Insulation" EPA 747F03001 May 2003, that may assist the health and remediation professional.

The following is a summary of the analytical process outlines in the EPA 600/R-04/004 Method:

- 1) **Analytical Step/Method:** Initial Screening by PLM, EPA 600R-93/116
Requirements/Comments: Minimum of 0.1 g of sample. ~0.25% LOQ for most samples.
- 2) **Analytical Step/Method:** Wet Separation by PLM Gravimetric Technique, EPA R-04/004
Requirements/Comments: Minimum 50g** of dry sample. Analysis of "Sinks" only.
- 3) **Analytical Step/Method:** Wet Separation by PLM Gravimetric Technique, EPA R-04/004
Requirements/Comments: Minimum 50g** of dry sample. Analysis of "Floats" only.
- 4) **Analytical Step/Method:** Wet Separation by TEM Gravimetric Technique, EPA R-04/004
Requirements/Comments: Minimum 50g** of dry sample. Analysis of "Sinks" only.
- 5) **Analytical Step/Method:** Wet Separation by TEM Gravimetric Technique, EPA R-04/004
Requirements/Comments: Minimum 50g** of dry sample. Analysis of "Suspension" only.

LOQ, Limit of Quantitation estimates for mass and volume analyses.

*With advance notice and confirmation by the laboratory.

**Approximately 1 Liter of sample in double-bagged container (~9x6 inch bag of sample).

CERTIFICATE OF ANALYSIS

Client: SNC - Lavalin, Inc.
8648 Commerce Court
Burnaby BC V5A 4N6

Client: SNC483

Report Date: 4/7/2016
Report No.: 506746 - PLM
Project: Penticton Airport-PWGSC
Project No.: 636476

APPENDIX IV

Laboratory Analytical Report (Maxxam)

Your P.O. #: 636476
Your Project #: PENTICTON AIRPORT
Site Location: PENTICTON, BC

Attention: Tim Drozda
SNC-LAVALIN INC.
BURNABY, ENVIRONMENT DIVISION
8648 COMMERCE COURT
BURNABY, BC
CANADA V5A 4N6

Your C.O.C. #: G052566, G052567, G052568, G052569, G052570

Report Date: 2016/04/01
Report #: R2151555
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B623801
Received: 2016/03/31, 16:05
Sample Matrix: Paint
Samples Received: 49

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Elements by ICP-AES (acid extr. solid)	49	2016/04/01	2016/04/01	BBY7SOP-00018	EPA 6010c R3 m

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key



Graham Rudkin
Project Manager, Environmental
01 Apr 2016 17:05:00 -07:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Graham Rudkin, Project Manager, Environmental
Email: GRudkin@maxxam.ca
Phone# (604)638-5926 Ext:5926

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B623801
Report Date: 2016/04/01

SNC-LAVALIN INC.
Client Project #: PENTICTON AIRPORT
Site Location: PENTICTON, BC
Your P.O. #: 636476
Sampler Initials: MAH

LEAD IN PAINT CHIPS (PAINT)

Maxxam ID		OJ3770	OJ3771	OJ3772	OJ3773	OJ3774	OJ3775		OJ3776		
Sampling Date		2016/03/28	2016/03/28	2016/03/28	2016/03/28	2016/03/28	2016/03/28		2016/03/28		
COC Number		G052566	G052566	G052566	G052566	G052566	G052566		G052566		
	UNITS	YYF-P1	YYF-P2	YYF-P3	YYF-P4	YYF-P5	YYF-P6	RDL	YYF-P7	RDL	QC Batch

Total Metals by ICP											
Total Lead (Pb)	mg/kg	5700	8350	788	8480	990	<3.0	3.0	<15 (1)	15	8230578

RDL = Reportable Detection Limit
(1) Detection limits raised due to insufficient sample volume.

Maxxam ID		OJ3777	OJ3778	OJ3779	OJ3780	OJ3781	OJ3784	OJ3785		
Sampling Date		2016/03/28	2016/03/28	2016/03/28	2016/03/28	2016/03/28	2016/03/28	2016/03/28		
COC Number		G052566	G052566	G052566	G052566	G052566	G052567	G052567		
	UNITS	YYF-P8	YYF-P9	YYF-P10	YYF-P11	YYF-P12	YYF-P13	YYF-P14	RDL	QC Batch

Total Metals by ICP											
Total Lead (Pb)	mg/kg	<3.0	1780	187	<3.0	1570	1350	461	3.0	8230578	

RDL = Reportable Detection Limit

Maxxam ID		OJ3786		OJ3787	OJ3788	OJ3789	OJ3790	OJ3791		
Sampling Date		2016/03/28		2016/03/28	2016/03/28	2016/03/28	2016/03/28	2016/03/28		
COC Number		G052567		G052567	G052567	G052567	G052567	G052567		
	UNITS	YYF-P15	QC Batch	YYF-P16	YYF-P17	YYF-P18	YYF-P19	YYF-P20	RDL	QC Batch

Total Metals by ICP											
Total Lead (Pb)	mg/kg	<3.0	8230578	50.4	18800	732	34500	337	3.0	8230676	

RDL = Reportable Detection Limit

Maxxam ID		OJ3792	OJ3793		OJ3794		OJ3795	OJ3796	OJ3797		
Sampling Date		2016/03/28	2016/03/28		2016/03/28		2016/03/28	2016/03/28	2016/03/28		
COC Number		G052567	G052567		G052567		G052567	G052568	G052568		
	UNITS	YYF-P21	YYF-P22	RDL	YYF-P23	RDL	YYF-P24	YYF-P25	YYF-P26	RDL	QC Batch

Total Metals by ICP											
Total Lead (Pb)	mg/kg	3430	4220	3.0	<15 (1)	15	173	4080	2500	3.0	8230676

RDL = Reportable Detection Limit
(1) Detection limits raised due to insufficient sample volume.

Maxxam ID		OJ3798	OJ3799	OJ3800	OJ3801	OJ3802		OJ3803		
Sampling Date		2016/03/28	2016/03/28	2016/03/28	2016/03/28	2016/03/28		2016/03/28		
COC Number		G052568	G052568	G052568	G052568	G052568		G052568		
	UNITS	YYF-P27	YYF-P28	YYF-P29	YYF-P30	YYF-P31	RDL	YYF-P32	RDL	QC Batch

Total Metals by ICP											
Total Lead (Pb)	mg/kg	370	2110	745	19.5	<3.0	3.0	<24 (1)	24	8230676	

RDL = Reportable Detection Limit
(1) Detection limits raised due to insufficient sample volume.

Maxxam Job #: B623801
Report Date: 2016/04/01

SNC-LAVALIN INC.
Client Project #: PENTICTON AIRPORT
Site Location: PENTICTON, BC
Your P.O. #: 636476
Sampler Initials: MAH

LEAD IN PAINT CHIPS (PAINT)

Maxxam ID		OJ3804		OJ3805	OJ3806	OJ3807	OJ3808	OJ3809		
Sampling Date		2016/03/28		2016/03/28	2016/03/28	2016/03/28	2016/03/28	2016/03/28		
COC Number		G052568		G052568	G052568	G052568	G052569	G052569		
	UNITS	YYF-P33	QC Batch	YYF-P34	YYF-P35	YYF-P36	YYF-P37	YYF-P38	RDL	QC Batch

Total Metals by ICP										
Total Lead (Pb)	mg/kg	524	8230676	130	1170	4810	<3.0	<3.0	3.0	8230730
RDL = Reportable Detection Limit										

Maxxam ID		OJ3810	OJ3811	OJ3812	OJ3813	OJ3814	OJ3815	OJ3816		
Sampling Date		2016/03/28	2016/03/28	2016/03/28	2016/03/28	2016/03/28	2016/03/28	2016/03/28		
COC Number		G052569	G052569	G052569	G052569	G052569	G052569	G052569		
	UNITS	YYF-P39	YYF-P40	YYF-P41	YYF-P42	YYF-P43	YYF-P44	YYF-P45	RDL	QC Batch

Total Metals by ICP										
Total Lead (Pb)	mg/kg	<3.0	705	952	5780	21.5	396	40.1	3.0	8230730
RDL = Reportable Detection Limit										

Maxxam ID		OJ3817	OJ3818		OJ3819		OJ3820		
Sampling Date		2016/03/28	2016/03/28		2016/03/28		2016/03/28		
COC Number		G052569	G052569		G052569		G052570		
	UNITS	YYF-P46	YYF-P47	RDL	YYF-P48	RDL	YYF-P49	RDL	QC Batch

Total Metals by ICP										
Total Lead (Pb)	mg/kg	667	<3.0	3.0	<9.0 (1)	9.0	<18 (1)	18	8230730	
RDL = Reportable Detection Limit										
(1) Detection limits raised due to insufficient sample volume.										

Maxxam Job #: B623801
Report Date: 2016/04/01

SNC-LAVALIN INC.
Client Project #: PENTICTON AIRPORT
Site Location: PENTICTON, BC
Your P.O. #: 636476
Sampler Initials: MAH

GENERAL COMMENTS

Results relate only to the items tested.

Maxxam Job #: B623801
Report Date: 2016/04/01

QUALITY ASSURANCE REPORT

SNC-LAVALIN INC.
Client Project #: PENTICTON AIRPORT
Site Location: PENTICTON, BC
Your P.O. #: 636476
Sampler Initials: MAH

QC Batch	Parameter	Date	Method Blank		RPD		QC Standard	
			Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8230578	Total Lead (Pb)	2016/04/01	<3.0	mg/kg	NC	35	95	80 - 120
8230676	Total Lead (Pb)	2016/04/01	<3.0	mg/kg	NC	35	92	80 - 120
8230730	Total Lead (Pb)	2016/04/01	<3.0	mg/kg	16	35	94	80 - 120

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

G052566

31-Mar-16 16:05

Graham Rudkin

Maxxam Job#: B623801

4605 Canada Way, Burnaby, BC Canada V5G 1K5 Ph: 604 734 7270 Toll Fr

Maxxam

Invoice To: Require Report? Yes [X] No []

Company Name: S&S Leavelin Inc. Contact Name: Tim Drozda / Aaron Hall Address: 8010 Commerce Court Burnaby, BC Ph: 604-515-5151 Fax: 604-515-5152 E-mail: tim.drozda@s-and-l.com

Report To: AS AT LEAF KCG SO131

Company Name: SO131

Contact Name:

Address:

Phone / Fax:

E-mail:

PC: FAX:

Address: aaron.hall@scandria.com

Orientation: S&S Leavelin Pricing Project #: 636476 Proj. Name: Penetration Airport Location: Penetration, BC Sampled By: MAH / TBD

REGULATORY REQUIREMENTS SERVICE REQUESTED:

- CSR 90APM Regular Turn Around Time (TAT) 5 days for most tests CCME RUSH (Please contact the lab) 1 Day 2 Day 3 Day BC Water Quality Other DRINKING WATER Date Required:

Special Instructions:

Return Cooler Ship Sample Bottles (please specify)

ANALYSIS REQUESTED

Table with columns for various chemical and physical tests including Metals, Pesticides, PCBs, VOCs, and more. Includes handwritten 'X' marks and a large 'X' in the center.



Form with fields for Date, Time, Received by, and other administrative data. Includes handwritten dates and times.

Vertical text on the right side of the page containing additional information and page number 'Page 6 of 10'.

CHAIN OF CUSTODY RECORD

Page: 2 of 5
G0525567

4506 Canada Way, Burnaby, BC Canada V5G 1K6 Ph: 604 794 7276 Toll Free: 1 800 665 8596 Fax: 604 731 2386



Maxxam Job#:

Invoice To: Require Report? Yes No

Company Name: SNC-Lavalin Inc
 Contact Name: Tim Dreyer / Assistant
 Address: 11110 Connaught Court
Burnaby BC BC V5A 4N6
 Phone / Fax#: 604-515-5151 ext: 604-515-9350
 E-mail: tim.dreyer@snc-lavalin.com

Report To: As At Left
 PC: _____
 Fax: _____
 Email: carol.walton@snc-lavalin.com

PO #: _____
 Quotation #: SNC Lavalin Pricing
 Project #: 636476
 Proj. Name: Water Treatment
 Location: Penticton BC
 Sampled By: MALY / TDD

REGULATORY REQUIREMENTS SERVICES REQUESTED:

CSR Regular Turn Around Time (TAT) (5 days for most tests)
 CCME <90 PPM
 BC Water Quality RUSH (Please contact the lab)
 Other 1 Day 2 Day 3 Day
 Date Required: _____
 DRINKING WATER

Special Instructions:

Return Cooler Ship Sample Bottles (please specify) _____

ANALYSIS REQUESTED

Analysis	Requested	Result	Unit	Notes
MTBE	<input type="checkbox"/>			
BTEX/PH	<input type="checkbox"/>			
VOC/PH	<input type="checkbox"/>			
EPH	<input type="checkbox"/>			
PAH	<input type="checkbox"/>			
CEM-PhC (Fractions 1-4 Plus BTEX)	<input type="checkbox"/>			
CEM-BTEX (Fraction 1 Plus BTEX)	<input type="checkbox"/>			
PCB	<input type="checkbox"/>			
Phenols by AAF	<input type="checkbox"/>			
Phenols by GC/MS	<input type="checkbox"/>			
TOG	<input type="checkbox"/>			
MOG	<input type="checkbox"/>			
SWOG	<input type="checkbox"/>			
Disolved Field Filter?	<input type="checkbox"/>			
Metals Field Filter?	<input type="checkbox"/>			
Toxic Metals Field Filter?	<input type="checkbox"/>			
Nitrate	<input type="checkbox"/>			
Ammonia	<input type="checkbox"/>			
Chloride	<input type="checkbox"/>			
Fluoride	<input type="checkbox"/>			
Sulfate	<input type="checkbox"/>			
Total Suspended Solids-TSS	<input type="checkbox"/>			
TDS	<input type="checkbox"/>			
pH	<input type="checkbox"/>			
Conductivity	<input type="checkbox"/>			
Alkalinity	<input type="checkbox"/>			
BCP	<input type="checkbox"/>			
CCP	<input type="checkbox"/>			
Coliform, Total & col	<input type="checkbox"/>			
Fecal	<input type="checkbox"/>			
Asbestos	<input type="checkbox"/>			
Lead in Paint	<input checked="" type="checkbox"/>			
Does source supply from a Drinking Water Source?	YES			
Does source supply multiple households?	YES			

Received by: [Signature] Date: 16/03/31 Time: 16:05
 Received by: Arlene Date: 2016/03/31 Time: 16:05
 Temperature on Receipt (°C): NA
 Custody Seal Intact on Cooler? Yes No

*It is the responsibility of the Remitter to ensure the accuracy of the Chain of Custody Record. An incomplete Chain of Custody may result in analytical delays.
 Maxxam International Corporation is Maxxam Analytes
 695-024-03/14

CHAIN OF CUSTODY RECORD

Page 3 of 5

G052568

4696 Canada Way, Burnaby, BC Canada V5G 1K5 Ph: 604 734 7278 Toll Free: 1 800 665 0696 Fax: 604 731 2865



Maxxam Job#:

Invoice To: Regular Recurr? No

Company Name: SNE-Lavalin Pricing
 Contact Name: Jim Drexler / Aaron Hall
 Address: 6418 Commerce Court
Burnaby BC
 Phone / Fax#: 604-515-5151 / 604-515-5150
 E-mail: Jim.Drexler@SNE-Lavalin.com

Report To: AS AT LEFT
 PC: 0300.mil@SNE-Lavalin.com
 Fax:

Quotation #: SNE-Lavalin Pricing
 Project #: 636476
 Ref. Name: Restricton Airport
 Location: Restricton BC
 Sampled By: MAT / TDD

REGULATORY REQUIREMENTS SERVICE REQUESTED:

CSR Regular Turn Around Time (TAT) (5 days for most tests)
 CCME <90 ppm
 BC Water Quality RUSH (Please contact the lab)
 Other 1 Day 2 Day 3 Day
 Date Required: _____

Special Instructions:

Return Cooler Ship Sample Bottles (please specify)

ANALYSIS REQUESTED

Analysis	Requested	Result	Unit	Notes
MTBE	<input type="checkbox"/>			
BTEX/VPH	<input type="checkbox"/>			
VOC/VPH	<input type="checkbox"/>			
EPA	<input type="checkbox"/>			
PAH	<input type="checkbox"/>			
CCME-PHC (Fractions 1-4 Plus BTEX)	<input type="checkbox"/>			
CCME-PHC (Fractions 2-4)	<input type="checkbox"/>			
CCME BTEX (Fraction 1 Plus BTEX)	<input type="checkbox"/>			
PCB	<input type="checkbox"/>			
Phenols by 4AP	<input type="checkbox"/>			
Phenols by GC/MS	<input type="checkbox"/>			
SWOC	<input type="checkbox"/>			
TOG	<input type="checkbox"/>			
MOC	<input type="checkbox"/>			
Disolved Total Phos?	<input type="checkbox"/>			
Metals Total Assted?	<input type="checkbox"/>			
Total Metals Field Assted?	<input type="checkbox"/>			
Nitrate	<input type="checkbox"/>			
Ammonia	<input type="checkbox"/>			
Chloride	<input type="checkbox"/>			
Fluoride	<input type="checkbox"/>			
Sulphate	<input type="checkbox"/>			
Total Suspended Solids-TSS	<input type="checkbox"/>			
TDS	<input type="checkbox"/>			
SH	<input type="checkbox"/>			
Conductivity	<input type="checkbox"/>			
Alkalinity	<input type="checkbox"/>			
CO2	<input type="checkbox"/>			
CO	<input type="checkbox"/>			
Colorm, Total & Eco	<input type="checkbox"/>			
Fecal	<input type="checkbox"/>			
Adbestos	<input type="checkbox"/>			

Sample Identification	Lab Identification	Sample Type	Date/Time Sampled	Received by:	Date (YY/MM/DD)	Time	Temperature on Receipt (°C)	Custody Seal Intact on Cooler?
1 YVF-P25		Piston	Mar. 28-30	Asater	28/03/31	11:05	NA	Yes
2 YVF-P26							NA	No
3 YVF-P27								
4 YVF-P28								
5 YVF-P29								
6 YVF-P30								
7 YVF-P31								
8 YVF-P32								
9 YVF-P33								
10 YVF-P34								
11 YVF-P35								
12 YVF-P36								

It is the responsibility of the client to ensure the accuracy of the chain of custody record. An incomplete chain of custody may result in analytical delays. Maxxam International Corporation is a Maxxam Analyte.

CHAIN OF CUSTODY RECORD

Page 5 of 5

G052570

4608 Canada Way, Burnaby, BC Canada V5G 1K5 Ph: 604 734 7276 Toll Free: 1 800 505 8566 Fax: 604 731 2586



Maxxam Job#:

Invoice To: Require Receipt? Yes No

Company Name: ONE Levechin Pkwy
Contact Name: Tim Proctor / Aaron Hall
Address: 6519 Semmeroe Court
Burnaby BC BC V5A 1N6
Phone / Fax#: (604) 515-5151 Fax: (604) 515-5150
E-mail: timproctor@onelevechin.com

Report To: AS AT LEFT

Company Name:
Contact Name:
Address:
PC:
PH: account@onelevechin.com
FAX:

PO #:
Quotation #: 512 Levechin Pkwy
Project #: 636476
Proj. Name: Penitentiary Airport
Location: Penitentiary BC
Sampled By: MATT / JPD

REGULATORY REQUIREMENTS SERVICE REQUESTED:

CSR Regular Turn Around Time (TAT)
CCME (5 days for most tests)
BC Water Quality RUSH (Please contact the lab)
Other 1 Day 2 Day 3 Day
Date Required:

Special Instructions:

Return Cooler Ship Sample Bottles (please specify)

ANALYSIS REQUESTED

Table with columns for various chemical and biological analyses (e.g., TOG, PCB, BTEX, Metals, Pesticides) and checkboxes for 'Samples are from a Drinking Water Source?' and 'Does source supply multiple households?'.

Table with columns: Sample Identification, Lab Identification, Sample Type, Date/Time Sampled. Row 1: YNF-P49, Rainy Mar 28-30.

Administrative fields: Date (YYMMDD), Time, Received by, Date (YYMMDD), Time, Laboratory Use Only, Temperature on Receipt (C), Custody Seal Intact on Cooler?, Time Sensitive.

IT IS THE RESPONSIBILITY OF THE REQUESTER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.
Maxxam: International Corporation c/o Maxxam Analytica
G05-1008 (05/10)



SNC • LAVALIN

8648 Commerce Court
Burnaby, British Columbia
Canada V5A 4N6
Tel.: 604-515-5151
www.snclavalin.com