Public Works and Government Services Canada

Requisition No. EZ899-221452/A

DRAWINGS & SPECIFICATIONS
For

Hope Detachment Generator Replacement
690 Old Hope - Princeton Way
Hope, BC

Project No. R.109051.001 September 2021

APPROVED BY:

Digitally signed by: Burger, Mark
DN: CN = Burger, Mark C = CA O = GC OU = PWGSC-TPSGC
Date: 2021.09.28 15:12:20 -07'00'

Regional Manager, A&E Services Date

Chris Patterson
Digitally signed by Chris Patterson
Date: 2021.09.27 08:03:44 -07'00'

Construction Safety Coordinator Date

TENDER:

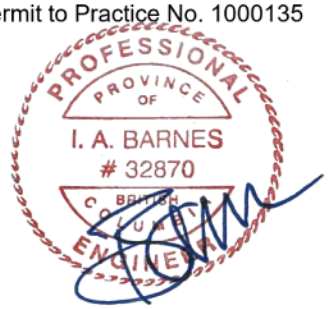
Dezfooli, Masood
Digitally signed by: Dezfooli, Masood
DN: CN = Dezfooli, Masood C = CA O = GC OU = PWGSC-TPSGC
Date: 2021.09.27 11:16:30 -07'00'

Project Manager Date

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

SEAL PAGE

CONSULTANTS – SEAL & SIGNATURE

Discipline	**Seal / Signature / Date**
Electrical (Prime)	Permit to Practice No. 1000135  2021-10-08

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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 back up power generator system, and further identified as:

HOPE DETACHMENT GENERATOR REPLACEMENT
690 OLD HOPE-PRINCETON WAY, HOPE, BC
PROJECT # R.109051.001

.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 generator system complete with double sided automatic transfer switch (ATS), subbase tank for 24 hr, generator pad and associated components.

.2 Existing electrical power service and generator system must remain operational at all times until the transition to the fully commissioned new generator is complete and ready for switch over.

.3 At no time shall the building be without power. All power shutdowns to be arranged and to be performed during non-working hours with the presence of Commissionaires at Contractor’s cost. Temporary generator to be provided if any power shutdown is required during working hours and with prior agreement with departmental representative and RCMP.

.4 Removal and disposal of existing generator system, ATS, and fuel system.

.5 Removal and disposal of redundant feeders and raceways.

.6 Commissioning and testing of all equipment installed as part of this contract.

.7 Demonstration and training of personnel as directed by the Departmental Representative. Refer to Section 01 79 00 Demonstration and Training.

.8 Installation of all necessary wiring and equipment for fire alarm tie-in.

.9 Patch, repair and paint walls and ceiling surfaces and parking lot.

.10 Add supervision generator run/trouble at fire alarm annunciator.

.3 "Green" requirements:

.1 Use only environmentally responsible green materials/ products with no VOC emissions or minimum VOC emissions of indoor off-gassing contaminants for improved indoor air quality - subject of Departmental Representative's approval of submitted MSDS Product Data.

.2 Use materials/products containing highest percentage of recycled and recovered materials practicable - consistent with maintaining cost effective satisfactory levels of competition.

.3 Adhere to waste reduction requirement for reuse or recycling of waste materials, thus diverting materials from landfill.

.4 Perform all work in accordance with National Building Code of Canada (NBC) 2015, 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.

.5 Scope of work:

.1 Sequence demolition and construction sequence of events such that there is minimum downtime to building's electrical service or building is without generator power. All construction activity must take place first and set out work for switching to a new generator minimizing power shut down. All power switch over must take place after hours and on weekends.

.2 Provide constructions schedule for coordination between user group and departmental representative. Construction schedule shall be submitted prior to start of any work and no works is to proceed without prior written approval of departmental representative.

.3 Allow for minimum of 72 hours of notice prior to all electrical shutdowns. All electrical shutdowns to be after 17:00 on weekdays for a maximum of 2 hours. No shutdowns may occur at any other time. A Commissionaires representative must be on site during all electrical shutdowns.

.4 Provide construction and demolition schedule prior to start of work. Schedule shall be accepted by the Departmental Representative before proceeding with the work. Continuously update the construction schedule for coordination between the user group and Departmental Representative.

.5 Provide reinforced concrete foundation pad for new generator and submit B.C. registered P.Eng. stamped shop drawings. Design foundation and equipment anchorage for seismic forces with post-disaster importance factor I=1.5. Also design foundation to resist buoyancy due to flooding combined with empty fuel tank. Provide letters of assurance for structural design and for geotechnical aspects of foundations.

.6 GPR scan the entire excavation area and mark-up the areas that existing services are present. Arrange for hand digging such areas.

.7 Saw cut asphalt pavement for installation of duct bank and generator pad. Make good pavement after duct bank has been installed.

.8 Install the generator to allow for minimum 1000mm minimum clearance around generator. Exact location of the generator to be confirmed with the Departmental Representative and RCMP.

.9 Install new 60kW package unit exterior generator with tightly fitted weatherproof enclosure, generator pad and subbase fuel tank.

.10 Install a new 200A exterior rated double bypass automatic transfer switch (ATS) on wall mounted unistrut.

.11 Remove existing wooden soffit to allow installation of conduit and teck cable above the line of the t-bar ceiling within building interior.

.12 Install generator feeders, block heater, battery charger and controls circuits.

.13 Remove existing panel 'C' installed to the left of the existing ATS.

.14 Relocate lighting control junction boxes to the right of the existing fire alarm panel to allow space for new panel 'H'.

.15 Install new panel 'H' in place of panel 'C'. Temporarily feed with a 200A feeder from the existing splitter box. Relocate all panel 'C' circuits to panel 'H' before dark and energize panel 'H'.

.16 One by one relocate existing feeders, except panel 'AA' from existing splitter box to the new panel 'H' until all have been moved. Coordinate shut down of each load with Departmental Representative.

.17 Existing splitter box to be re-purposed as a junction box between the CT cabinet and the new ATS.

.18 Install new 4c#3/0 Teck from existing splitter box after CT cabinet to the normal power line side of the new ATS.

.19 Install new 4c#3/0 Teck from load side of the new ATS to new panel 'H'.

.20 Install new generator annunciator as indicated.

.21 Install wiring and necessary devices to provide generator trouble and run signals at the fire alarm panel.

.22 Commission new generator, using a temporary feeder from panel 'H' and load bank, program ATS and refuel tank.

.23 Re-install wooden soffit. Replace any damaged pieces.

.24 Once all testing/commissioning is complete, remove panel 'H' connection to existing splitter and connect to new ATS with previously installed 4c#3/0 Teck.

.25 Remove existing ATS and replace with junction box, splicing existing cables for panel 'AA'

.26 Relocate feeder for panel 'AA' to new panel 'H'.

.27 Demolish existing fused disconnects as indicated on drawings.

.28 Install new limacoid label on main disconnect, red colour with white lettering which read "Max Fuse Size 200A".

.29 Remove the existing generator, all associated conduits and cables, control and battery charger wiring and the fuel system.

.30 Dispose or hand over existing equipment as per departmental representative instruction.

.31 Patch, make good and paint all surfaces, including walls and pavement that has been affected by demolition scope. All surface mounted conduits to be painted to match walls.

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 Work in the RCMP must be coordinated with local RCMP and PWGSC representation to allow for access. All work that does not impact building power shall be done during regular hours.

.2 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.

1.7 TIME TO COMPLETION

.1 Completion of this project shall be no later than 26 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 2018, 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 2018.
- .13 Current construction standards of workmanship listed in technical Sections.
- .14 Contractor Safety Plan.

1.11 REGULATORY REQUIREMENTS

.1 Obtain and pay for - Electrical 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 Shared with users 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.

.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 72 hours 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.

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.

.4 Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly. Saw cut parking lot surfaces for new generator duct bank and patch with same type pavement.

.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 2015 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.

.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.

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 ATS and generator.

.2 Inspection and testing of the system software.

.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.

.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.

1.32 FAMILIARIZATION WITH SITE

.1 Before submitting tender, it is strongly suggested contractors visit 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 is fully conversant with all conditions.

1.34 CONSTRUCTION MONITORING

.1 Contractor is to send a brief description of the completed work complete with pictures at regular intervals during the construction to the Departmental Representative. The frequency of sending this information shall be discussed and agreed upon at the pre-construction meeting.

1.35 COVID-19

.1 Contractor shall follow COVID-19 procedures in accordance with Canadian Construction Association COVID-19 Standardized Protocols. Furthermore, Contractor will address PPE and hygiene issues as per WorkSafe BC regulations, and Provincial guidelines. Cost associated with COVID-19 Protocols to be included in the proposed fee.

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 FACILITY POWER AND MECHANICAL SERVICES SHUT-DOWN REQUIREMENTS

.1 All construction staff shall become thoroughly familiar with and abide by all provisions and requirements for the shut-down of power services and/or mechanical services to the facility.

.1 All power services and/or mechanical services (water, gas, drain, heat, ventilation and fire protection) shut-downs (building-wide or partial) shall be confirmed and coordinated with the users (e.g. RCMP detachment commander) at minimum 72 hours prior to the start of work.

.2 All building-wide power shut-downs must occur outside of regular working hours of the facility.

.3 At no time during regular working hours of the facility, the building will be without power. If a building-wide power shut-down needs to occur during regular working hours of the facility, the contractor shall provide a temporary generator to accommodate the entire facility for the duration of the work.

.4 If a building-wide mechanical services shut-down needs to occur during regular working hours of the facility, the contractor shall provide temporary heat and services to accommodate the entire facility for the duration of the work.

.5 Partial building shutdowns may occur during regular hours of the facility if the duration of the shutdown is less than 90 minutes. If the duration of the shutdown is more than 90 minutes, it shall be done as per item 2 above.

.6 RCMP at any time may cancel a pre-scheduled power and/or mechanical services shut-down due to operation situations that may arise. The Contractor shall always contact users (e.g. RCMP detachment commander) immediately before any shut-down and confirm if a pre-scheduled shut-down may proceed as planned.

1.3 SITE ACCESS REQUIREMENTS

.1 General

.1 To ensure that the security of the project construction and RCMP operation is maintained at all times.

.2 All personnel engaged in the execution of the work on the interior or exterior of an RCMP occupied building shall have at a minimum, the requisite RCMP Facility Access Level 3 (FA3) clearance in order to be allowed access to the site. Individuals who do not have RCMP FA3 clearance will not be allowed on site.

.3 Immediately upon contract award, Contractor shall prepare and submit all the requisite forms and documents for all the personnel engaged in the project and submit to RCMP to obtain RCMP FA3 clearance. Ensure all necessary forms and documents are completed as required by RCMP to prevent any delays in the review process.

.4 Once the required RCMP clearances are obtained, Contractor and his employees will have as much freedom of action and movement as is possible and as determined by RCMP to perform the Work

.5 It is the responsibility of the general contractor to ensure that the RCMP security requirements are met throughout the performance of the work.

.2 Restrictions

.1 A 72-hour notice is required for any access to security and high security zones within the premises to allow RCMP to arrange for a staff member to accompany the Contractor. Security and high security areas include Cell Block, Record Rooms, Exhibit Rooms, Special Project Rooms, IT Room, Comm. Room and Security Room.

.2 Entry to the RCMP Property will be refused to any person there may be reason to believe to be a security risk.

.3 Construction activities and all related movement of personnel and vehicles will be subject to surveillance and inspection by RCMP staff members to ensure that established security requirements are met.

.4 RCMP site staff may request at any time that the contractor, his employees, sub-contractors and their employees not enter the site or leave the work site immediately due to a security situation occurring within the RCMP property. The contractor's site supervisor will note the name of the staff member giving the instruction, the time of the request and obey the order as quickly as possible.

1.4 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.

1.5 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.

1.6 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.

1.7 EXISTING SERVICES

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

.2 Where Work involves breaking into or connecting to existing services, give 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 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.

1.8 BUILDING SMOKING ENVIRONMENT

.1 Comply with smoking restrictions.

1.9 NOISE CONTROL

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

1.10 DUST CONTROL

.1 Comply with applicable government regulations, provincial and or city by-law, WCB, Work Safe BC for dust control in the construction and affected areas.

END OF SECTION

MANAGEMENT AND COORDINATION

Part 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 RELATED WORK

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

1.3 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.

1.4 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.

1.5 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.

1.6 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, RCMP staff and consultants.

.2 Communication protocol for submittals.

.3 Start date on site.

.4 RCMP 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.

1.7 PROJECT PLANNING

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

1.8 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.

1.9 CONSTRUCTION MEETINGS

.1 During course of Work and prior to project completion, Departmental Representative will request Construction meetings as required.

.2 Project Consultant on behalf of 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.

1.10 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.

1.11 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.

1.12 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. Meeting to be held on site or via teleconference.

.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 RCMP, 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 10 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 RCMP 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 Site safety in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

.6 Communication Protocol for proposed changes, change orders, procedures, approvals required.

.7 Owner's Work.

.8 Record drawings in accordance with Section 01 78 00 - Closeout Submittals.

.9 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.

.10 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.

.11 Monthly progress claims, administrative procedures, photographs, hold backs.

.12 Appointment of inspection and testing agencies or firms.

1.3 PROGRESS MEETINGS

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

.2 Attendance to include but is not limited to Departmental Representative, members of the RCMP 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 RCMP.

.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 (GANTT).

.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.

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.

.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.

.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

HEALTH AND SAFETY REQUIREMENTS

Part 1 General

PWGSC Update on Asbestos Use

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

COVID 19

All contractors shall follow Canadian Construction Association COVID-19 - Standardized Protocols for All Canadian Construction Sites, Provincial Regulations and Federal Site Specific Guidelines.

1.1 REFERENCES

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

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

.3 The Canadian Electrical Code (as amended)

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

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

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

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

.8 Hazardous Building Materials Assessment

1.2 RELATED SECTIONS

.1 Refer to the following current NMS sections as required:
- .1 Section 01 11 55 – General Instructions
- .2 Section 01 14 00 – Work Restrictions
- .3 Section 01 31 00 – Management and Coordination
- .4 Section 01 33 00 – Submittal Procedures
- .5 Section 01 51 00 – Temporary Facilities
- .6 Section 01 56 00 – Temporary Barriers and Enclosures
- .7 Section 01 61 00 – Common Product Requirements
- .8 Section 01 71 00 – Examination and Preparations
- .9 Section 02 81 01 – Hazardous Materials Use and Abatement
- .10 Section 26 05 00 – Common Work Results for Electrical

1.3 WORKERS' COMPENSATION BOARD COVERAGE

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

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

1.4 COMPLIANCE WITH REGULATIONS

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

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

1.5 SUBMITTALS

.1 Submit to Departmental Representative submittals listed for review in accordance with Section 01 33 00.

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

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

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

.5 Medical surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of work, and submit additional certifications for any new site personnel to Departmental Representative.

.6 Submission of the Site Specific Safety Plan or Health and Safety Plan, and any revised version, to the Departmental Representative is for information and reference purposes only. It shall not:

.1 Be construed to imply approval by the Departmental Representative.

.2 Be interpreted as a warranty of being complete, accurate and legislatively compliant.

.3 Relieve the Contractor of his legal obligations for the provision of health and safety on the project.

1.6 RESPONSIBILITY

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

.2 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.

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

1.7 HEALTH AND SAFETY COORDINATOR

.1 Assign a competent and qualified Health and Safety Coordinator who shall:

.1 Be responsible for completing all health and safety training, and ensuring that personnel that do not successfully complete the required training are not permitted to enter the site to perform work.

.2 Be responsible for implementing, daily enforcing, and monitoring the Site Specific Safety Plan (SSSP) or Health and Safety Plan (HASP)

.3 Be on site during execution of work.

.4 Have minimum two (2) years' site-related working experience

.5 Have working knowledge of the applicable occupational safety and health regulations.

1.8 GENERAL CONDITIONS

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

.2 Ensure that non-authorized persons are not allowed to circulate in designated construction areas of the work site.

.1 Provide appropriate means by use of barricades, fences, warning signs, traffic control personnel, and temporary lighting as required.

.2 Secure site at nighttime or provide security guard as deemed necessary to protect site against entry.

1.9 PROJECT/SITE CONDITIONS

.1 Work at site will involve contact with:

.1 Multi-employer work site.

.2 Federal employees and general public.

.3 Energized electrical services.

.4 Working from heights.

.5 Hazards - PWGSC Preliminary Hazard Assessment included as an Appendix to Specifications

1.10 UTILITY CLEARANCES

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

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

1.11 REGULATORY REQUIREMENTS

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

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

1.12 WORK PERMITS

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

1.13 FILING OF NOTICE

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

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

1.14 SITE SPECIFIC HEALTH AND SAFETY PLAN

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

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

- .1 Primary requirements:
  - .1 Contractor's safety policy.
  - .2 Identification of applicable compliance obligations.
  - .3 Definition of responsibilities for project safety/organization chart for project.
  - .4 General safety rules for project.
  - .5 Job-specific safe work, procedures.
  - .6 Inspection policy and procedures.
  - .7 Incident reporting and investigation policy and procedures.
  - .8 Occupational Health and Safety Committee/Representative procedures.
  - .9 Occupational Health and Safety meetings.
  - .10 Occupational Health and Safety communications and record keeping procedures.
  - .11 COVID 19 Protocols and Procedures
- .2 Summary of health risks and safety hazards resulting from analysis of hazard assessment, with respect to site tasks and operations which must be performed as part of the work.
- .3 List hazardous materials to be brought on site as required by work. SDS required for all products.
- .4 Indicate Engineering and administrative control measures to be implemented at the site for managing identified risks and hazards.
- .5 Identify personal protective equipment (PPE) to be used by workers.
- .6 Identify personnel and alternates responsible for site safety and health.
- .7 Identify personnel training requirements and training plan, including site orientation for new workers.

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

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

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

1.15 EMERGENCY PROCEDURES

.1 List standard operating procedures and measures to be taken in emergency situations. Include an emergency response and emergency evacuation plan and emergency contacts (i.e.names/telephone numbers) of:

- .1 Designated personnel from own company.
- .2 Regulatory agencies applicable to work and as per legislated regulations.
- .3 Local emergency resources.
- .4 Departmental Representative.
- .5 A route map with written directions to the nearest hospital or medical clinic.

.2 Include the following provisions in the emergency procedures:

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

.3 Provide written rescue/evacuation procedures as required for, but not limited to:

- .1 Work at high angles.
- .2 Work in confined spaces or where there is a risk of entrapment.
- .3 Work with hazardous substances.
- .4 Underground work.
- .5 Work on, over, under and adjacent to water.
- .6 Workplaces where there are persons who require physical assistance to be moved.

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

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

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

1.16 HAZARDOUS PRODUCTS

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

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

.1 Advise Departmental Representative beforehand of the product(s) intended for use. Submit applicable SDS and WHMIS 2015 documents as per Section 01 33 00.

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

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

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

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

1.17 ASBESTOS HAZARD

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

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

1.18 PCB REMOVALS

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

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

1.19 REMOVAL OF LEAD-CONTAINING PAINT

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

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

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

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

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

1.20 ELECTRICAL SAFETY REQUIREMENTS

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

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

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

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

1.21 ELECTRICAL LOCKOUT

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

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

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

1.22 OVERLOADING

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

1.23 FALSEWORK

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

1.24 SCAFFOLDING

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

1.25 CONFINED SPACES

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

1.26 POWDER-ACTUATED DEVICES

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

1.27 FIRE SAFETY AND HOT WORK

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

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

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

1.28 FIRE SAFETY REQUIREMENTS

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

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

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

1.29 FIRE PROTECTION AND ALARM SYSTEM

.1 Fire protection and alarm systems shall not be:

- .1 Obstructed.
- .2 Shut off.
- .3 Left inactive at the end of a working day or shift.

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

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

1.30 UNFORESEEN HAZARDS

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

1.31 POSTED DOCUMENTS

.1 Post legible versions of the following documents on site:

- .1 Site Specific Safety Plan (SSSP) or Health and Safety Plan (HASP)
- .2 Sequence of work.
- .3 Emergency procedures.
- .4 Site drawing showing project layout, locations of the first-aid station, evacuation route and marshalling station, and the emergency transportation provisions.
- .5 Notice of Project.
- .6 Floor plans or site plans. Must be posted in a non-inmate access area and locked up when not being used.

.7 Notice as to where a copy of the Workers' Compensation Act and Regulations are available on the work site for review by employees and workers.

.8 Workplace Hazardous Materials Information System (WHMIS 2015) documents.

.9 Material Safety Data Sheets (SDS).

.10 List of names of Joint Health and Safety Committee members, or Health and Safety Representative, as applicable.

.11 All Hazardous Material and Substance Reports including Lab Analysis

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

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

1.32 MEETINGS

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

1.33 CORRECTION OF NON-COMPLIANCE

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

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

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

Part 2 Products

.1 Not used.

Part 3 Execution

.1 Not used.

END OF SECTION

ENVIRONMENTAL PROCEDURES

Part 1 General

1.1 DEFINITIONS

.1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade environment aesthetically, culturally and/or historically.

.2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.2 SUBMITTALS

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

.2 Prior to commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Departmental Representative. Environmental Protection Plan is to present comprehensive overview of known or potential environmental issues which must be addressed during construction.

.3 Address topics at level of detail commensurate with environmental issue and required construction tasks.

.4 Environmental protection plan to include:

- .1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.
- .2 Names and qualifications of persons responsible for manifesting contaminated soils and hazardous waste to be removed from site.
- .3 Names and qualifications of persons responsible for training site personnel.
- .4 Descriptions of environmental protection personnel training program.

.5 Erosion and sediment control plan which identifies type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.

.6 Traffic control plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Plans include measures to minimize amount of mud transported onto paved public roads by vehicles or runoff.

.7 Spill Control Plan: including procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.

.8 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.

.9 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, do not become air borne and travel off project site.

.10 Contaminant prevention plan that: identifies potentially hazardous substances to be used on job site; identifies intended actions to prevent introduction of such materials into air, water, or ground; and details provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.

.11 Waste water management plan that identifies methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.

1.3 FIRES

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

1.4 DISPOSAL OF WASTES

.1 Do not bury rubbish and waste materials on site.

.2 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways.

1.5 DRAINAGE

.1 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.

.2 Do not pump water containing suspended materials into waterways, sewer or drainage systems.

.3 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.6 WORK ADJACENT TO WATERWAY

.1 Do not dump excavated fill, waste material or debris in waterways.

1.7 POLLUTION CONTROL

.1 Maintain temporary erosion and pollution control features installed under this contract.

.2 Control emissions from equipment and plant to local authorities' emission requirements.

.3 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

1.8 HISTORICAL/ARCHAEOLOGICAL CONTROL

.1 Give immediate notice to the Departmental Representative if evidence of archaeological finds are encountered during construction and await written instructions before proceeding with work in the vicinity of any such finds.

.2 Relics, antiquities and items of historical or scientific interest shall remain the property of the Crown. Protect such articles and request directives from the Departmental Representative.

1.9 NOTIFICATION

.1 Departmental Representative will notify Contractor in writing of observed non-compliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.

.2 Contractor: after receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.

.3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.

.4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

1.10 SPILLS OR RELEASE OF DELETERIOUS SUBSTANCES

.1 Measures to be implemented to prevent, control or mitigate spills or release of deleterious substances:

.1 Contractor shall take due care to ensure no deleterious materials enter any surface drainage pathways located in the project area.

.2 Emergency response procedure for spills of deleterious substances must be in place. In the event of a spill, the contractor will immediately implement their Spill Response Protocol.

.3 The Contractor is responsible for all costs associated with a spill or release as a result of their actions. This will include but not limited costs of spill response equipment and materials, associated sampling, analysis and any required restoration of the impacted area.

.4 Response equipment to be on site at all times (i.e. spill kits) and workers trained in their location and use. The resources on hand must be sufficient to respond effectively and expediently to any spill that could occur on site.

.5 All construction equipment brought onto the site will be clean and properly maintained.

.6 Any equipment maintenance must occur in a designated area and must be conducted away from any surface water drains or collection points.

.7 Any equipment remaining on site overnight shall have appropriately placed drip pans.

.8 Waste generated will be prevented from entering the environment.

.9 Prevent discharges containing asphalt, grout, concrete or other waste materials from reaching storm drains or the marine environment. This includes, but is not limited to:

.1 Cleaning equipment off site; and

.2 Protection of any other drainage structures not identified here with filter fences and/or silt socks, if required.

.10 Protection of the roadways from tracking of mud, soil and debris needs to be maintained throughout the work.

.11 Limit of work activities to normal business hours to minimize noise outside of those hours. Ensure that equipment and machinery is properly maintained to minimize unnecessary noise pollution. Consider local municipal noise bylaws when mobilizing equipment.

.12 All utilities must be located prior to excavation.

1.11 IMPORT OF FILL MATERIAL

.1 Prior to import of any material used for surfacing, backfilling or any other use requiring fill material the Contractor will provide sufficient documentation, as agreed on by Departmental Representative, to ensure that the imported material meets the Canadian Council of Ministers of the Environment (CCME) Residential/Parkland (RL/PL) Land Usage Soil Quality Guidelines.

.2 Environmental characterization of fill material must be conducted in accordance with the following: British Columbia, Ministry of Environment, Technical Guidance Document #1 – Site Characterization and Confirmation Testing.

.3 Prior to import of any material the Contractor must inform the Departmental representative of the proposed fill source(s) and identify the nature of current and historic activities conducted at the source.

.4 The Departmental Representative reserves the right to request additional testing of imported material at the source and at the deposit site to satisfy their requirements. All testing will be done at the Contractor's cost.

.5 All material brought to the site that does not meet the CCME RL/PL Guidelines will be removed from the property immediately at the Contractors cost.

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 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 RCMP 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.

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 INSTALLATION AND REMOVAL

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

.2 Remove from site all such work after use.

1.3 GUARD RAILS AND BARRICADES

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

1.4 ACCESS TO SITE

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

1.5 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.

1.6 FIRE ROUTES

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

1.7 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.

1.8 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.

1.9 WASTE MANAGEMENT AND DISPOSAL

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

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.

.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.

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 including but not limited to storm water pipes in the parking lot.

.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.
- .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 in electrical room

.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.

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.

.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.

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.

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.

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 and equipment and systems are fully operational.

.3 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

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 1 New generator.

.2 ATS operation including bypass to utility and generator.

.3 Fuel system including alarm and leak detection.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Refer to the following reports (further referred to herein as the "Assessment Reports"), attached in the Appendix of the Project Specifications, for information pertaining to hazardous building materials that have been identified and may require disturbance (removal and disposal) during the Work:

.1 "Asbestos- Containing Materials Survey, E0691-690 Old Hope Princeton highway, BC RCMP Detachment, prepared by SNC Lavalin, dated March 29, 2019 – Appendix 'A'

.2 "Project-Specific Hazardous Building Materials Assessment, E0691-RCMP Detachment Generator, 690 Hope Princeton Hwy, Hope BC" prepared by Stantec Consulting Ltd., dated February 13, 2020 – Appendix 'B'

.3 "Hazardous Building Materials Survey, E0691 RCMP Detachment, 690 Old Hope Princeton Way, Hope, BC", prepared by Arcadis Canada Inc., dated March 12, 2021 – Appendix 'C'

1.2 DEFINITIONS

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

.2 Hazardous Building Material: component of a building or structure that will cause adverse impact to environment or adversely affect health of persons, animals, or plant life when altered, disturbed or removed during maintenance, renovation or demolition.

.3 Hazardous Material: product, substance, or organism that is used for its original purpose; and that is either dangerous goods or a material that may cause adverse impact to environment or adversely affect health of persons, animals, or plant life when released into the environment.

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

1.3 REFERENCE STANDARDS

.1 Canadian Environmental Protection Act, 1999 (CEPA 1999).

.1 Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations (SOR/2005-149).

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

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

.1 Safety Data Sheets (SDS).

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

.1 National Fire Code of Canada 2015.

.4 Department of Justice Canada

.1 Transportation of Dangerous Goods Act (TDG Act) 1999, (c. 34).

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

.5 Government of Canada

.1 The Canada Labour Code, Part II, Canada Occupational Health and Safety Regulations (COHSR)

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

.3 The Federal Halocarbons Regulation (July 2003).

.6 Public Services and Procurement Canada

.1 Asbestos Management Directive (June 5, 2019)

.2 Asbestos Management Standard (June 5, 2019)

.7 WorkSafe BC

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

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

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

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

.5 “Developing a Silica Exposure Control Plan” (2014)

.8 Government of British Columbia

.1 British Columbia Hazardous Waste Regulation (BC Reg. 63/88)

.9 Canadian Construction Association

.1 Standard Construction Document CCA 82 “Mould Guidelines for the Canadian Construction Industry” (2004 – further referred to herein as “CCA 82”).

1.4 SUBMITTALS

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

.2 Product Data for hazardous materials to be used by the Contractor to complete the Work:

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

.2 Submit two copies of WHMIS SDS to Departmental Representative for each hazardous material required prior to bringing hazardous material on site.

.3 Submit hazardous materials management plan to Departmental Representative that identifies hazardous materials, usage, location, personal protective equipment requirements, and disposal arrangements.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Co-ordinate storage of hazardous materials with Departmental Representative and abide by internal requirements for labelling and storage of materials and wastes.

.2 Store and handle hazardous materials and wastes in accordance with applicable federal and provincial laws, regulations, codes, and guidelines.

.3 Store and handle flammable and combustible materials in accordance with current National Fire Code of Canada 2015 requirements.

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

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

.2 Storage of quantities of flammable and combustible liquids exceeding 45 litres for work purposes requires the written approval of the Departmental Representative.

.5 Transfer of flammable and combustible liquids is prohibited within buildings.

.6 Do not transfer of flammable and combustible liquids in vicinity of open flames or heat-producing devices.

.7 Do not use flammable liquids having flash point below 38 degrees C, such as naphtha or gasoline as solvents or cleaning agents.

.8 Store flammable and combustible waste liquids for disposal in approved containers located in safe, ventilated area. Keep quantities to minimum.

.9 Observe smoking regulations, smoking is prohibited in areas where hazardous materials are stored, used, or handled.

.10 Storage requirements for quantities of hazardous materials and wastes in excess of 5 kg for solids, and 5 litres for liquids:

.1 Store hazardous materials and wastes in closed and sealed containers.

.2 Label containers of hazardous materials and wastes in accordance with WHMIS.

.3 Store hazardous materials and wastes in containers compatible with that material or waste.

.4 Segregate incompatible materials and wastes.

.5 Ensure that different hazardous materials or hazardous wastes are not mixed.

.6 Store hazardous materials and wastes in secure storage area with controlled access.

.7 Maintain clear egress from storage area.

.8 Store hazardous materials and wastes in location that will prevent them from spilling into environment.

.9 Have appropriate emergency spill response equipment available near storage area, including personal protective equipment.

.10 Maintain inventory of hazardous materials and wastes, including product name, quantity, and date when storage began.

.11 Ensure personnel have been trained in accordance with Workplace Hazardous Materials Information System (WHMIS) requirements.

.12 Report spills or accidents immediately to Departmental Representative. Submit a written spill report to Departmental Representative within 24 hours of incident.

1.6 TRANSPORTATION

.1 Transport hazardous materials and wastes in accordance with federal Transportation of Dangerous Goods Act, Transportation of Dangerous Goods Regulations, and applicable provincial regulations.

.2 If hazardous waste is generated on site:

.1 Co-ordinate transportation and disposal with Departmental Representative.

.2 Ensure compliance with applicable federal, provincial and municipal laws and regulations for generators of hazardous waste.

.3 Use licensed carrier authorized by provincial authorities to accept subject material.

.4 Prior to shipping material obtain written notice from intended hazardous waste treatment or disposal facility that it will accept material and that it is licensed to accept this material.

.5 Label containers with legible, visible safety marks as prescribed by federal and provincial regulations.

.6 Ensure that trained personnel handle, offer for transport, or transport dangerous goods.

.7 Provide photocopy of shipping documents and waste manifests to Departmental Representative.

.8 Track receipt of completed manifest from consignee after shipping dangerous goods. Provide a photocopy of completed manifest to Departmental Representative.

.9 Report discharge, emission, or escape of hazardous materials immediately to Departmental Representative and appropriate provincial authority. Take reasonable measures to control release.

1.7 EXISTING CONDITIONS

.1 Reports and information pertaining to hazardous building materials present within the building that may be handled, removed, or otherwise disturbed and disposed of during this Project are included in the Appendix of the Project Specifications.

.2 Notify Departmental Representative of suspected hazardous building material discovered during Work and not apparent from drawings, specifications, or reports pertaining to the Work. Do not disturb such material until such time as instructions are received from Departmental Representative.

Part 2 Products

2.1 MATERIALS

.1 Only bring on site quantity of hazardous materials required to perform work.

.2 Maintain SDS in proximity to where materials are being used. Communicate this location to personnel who may have contact with hazardous materials.

Part 3 Execution

3.1 HAZARDOUS BUILDING MATERIALS ABATEMENT

.1 Abatement shall be conducted to handle, alter, remove and dispose of hazardous building materials as identified in the Assessment Reports in accordance with applicable regulations, guidelines, standards and/or best practices for such work, only to the extent that such identified hazardous building materials will be impacted (handled, altered, damaged, removed) by the Work.

.2 Contractor is responsible for reviewing plans, specifications and reports such that they understand the locations and amounts of hazardous building materials that will be impacted by the Work of this Contract.

.3 Where there is a discrepancy between the information in this specification as compared to the information in the Assessment Reports as it pertains to identities, locations and/or quantities of identified hazardous building materials, the information in the Assessment Reports will prevail.

.1 If discrepancies are present pertaining to identities, locations and/or quantities of identified hazardous building materials, it is the Contractor's responsibility to request information to clarify such discrepancies during the bidding period. No additional costs will be allowed by the Contractor for additional labour or materials required to complete required abatement related to such discrepancies.

.4 The listing below is a summary of the identified hazardous building material categories that are anticipated to require disturbance, along with the associated removal and disposal regulations, guidelines and/or standards.

.1 Asbestos-Containing Materials (ACMs)

.1 As per the Assessment Reports, ACMs were not identified that are anticipated to be impacted by work of the Project.

.1 If encountered during renovation activities, notify Departmental Representative of any additional suspected ACMs not accessible or identified through the Assessment Reports. Do not disturb such material until such time as instructions are received from Departmental Representative.

.2 Lead and Lead-Containing Paints (LCPs)

.1 Refer to the Assessment Reports for identities and locations of identified lead-containing materials (including paints with varying concentrations of lead).

.2 Actions that will disturb lead-containing materials (including paints and materials coated with paints) are to be conducted in accordance with the requirements of the 2017 WorkSafe BC publication "Safe Work Practices for Handling Lead", keeping airborne exposure to lead dust to less than COHSR and BC Reg. 296/97 regulated 8-hour Occupational Exposure Limit (OEL) for lead of 0.05 milligram per cubic metre (mg/m^3).

.1 Actual methods to maintain exposures within applicable limits are to be determined by the contractor through their own risk assessment, which will take into account the lead content of the materials or paints as indicated in the Assessment Reports, along with their planned disturbance methods (and associated dust control), tools, PPE and the overall duration of the work.

.1 Although formal evaluation is ultimately the responsibility of the Contractor, limited hazards are expected associated with the lead content of paints and other items to be disturbed, based on the information in the Assessment Reports.

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

.4 Refer to the provisions of the 2017 WorkSafeBC document "Safe Work Practices for Handling Lead" for removal of LCPs from surfaces before any welding and torch-cutting, should the Contractor plan to use such methods to complete the Work.

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

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

.2 Polychlorinated Biphenyls (PCBs)

.1 As per the Assessment Reports, PCB-containing items are not anticipated to be impacted by work of the Project.

.3 Mould

.1 As per the Assessment Reports, removal, alteration and/or disposal of mould-impacted materials and/or removal of animal waste contamination is not anticipated to be required during the Work.

.1 If project requirements change, and actual or potential mould or animal waste contamination is observed in the Project area, notify Departmental Representative. Do not proceed with activities could impact contaminated items until such time as instructions are received from Departmental Representative.

.4 Mercury

.1 As per the Assessment Reports, mercury-containing items are not anticipated to be impacted by work of the Project.

.1 If project requirements change, and actual or potential mercury-containing items require impacts (e.g. alteration, disturbance, handling, removal and/or disposal), notify Departmental Representative. Do not proceed with activities could impact actual or potential mercury-containing items until such time as instructions are received from Departmental Representative.

.5 Ozone-Depleting Substances (ODSs)

.1 As per the Assessment Reports, ODS-containing items are not anticipated to be impacted by work of the Project.

.6 Silica

.1 According to the Assessment Reports, silica is expected to be present in the following, which may be impacted by work of the Project:

.1 Concrete pad

.2 Concrete block walls

.2 When silica-containing materials are to be disturbed and/or removed (e.g., demolition of concrete slabs), ensure dust control measures are employed such that airborne silica dust concentrations do not exceed the exposure limit as stipulated by the COHSR and BC Reg. 296/97. (Cristobalite and Quartz – each 0.025 mg/m^3). This would include, but not be limited to, the following:

.1 Providing workers with respiratory protection

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

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

3.2 DISPOSAL

.1 Dispose of hazardous waste materials in accordance with applicable federal and provincial acts, regulations, and guidelines.

.2 Recycle hazardous wastes for which there is approved, cost effective recycling process available.

.3 Send hazardous wastes to authorized hazardous waste disposal or treatment facilities.

.4 Burning, diluting, or mixing hazardous wastes for purpose of disposal is prohibited.

.5 Disposal of hazardous materials in waterways, storm or sanitary sewers, or in municipal solid waste landfills is prohibited.

.6 Dispose of hazardous wastes in timely fashion in accordance with applicable provincial regulations.

.7 Minimize generation of hazardous waste to maximum extent practicable. Take necessary precautions to avoid mixing clean and contaminated wastes.

.8 Identify and evaluate recycling and reclamation options as alternatives to land disposal, such as:

.1 Hazardous wastes recycled in manner constituting disposal.

.2 Hazardous waste burned for energy recovery.

.3 Lead-acid battery recycling.

.4 Hazardous wastes with economically recoverable precious metals.

3.3 CLEANING

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

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA C22.1-2018, 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 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.

.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.

.3 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.

.4 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

.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 will 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.

Part 2 Products

2.1 MATERIALS AND EQUIPMENT

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

.2 Material and equipment to be CSA certified. Where CSA certified material and equipment is are 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.

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	

	Prime	Auxiliary
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 CO-ORDINATION OF PROTECTIVE DEVICES

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

3.5 FIELD QUALITY CONTROL

.1 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.

.2 Carry out tests in presence of Departmental Representative.

.3 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

.4 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.

3.6 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 generator and automatic transfer switch installations.

1.2 REGULATORY REQUIREMENTS

.1 Restraints shall meet the requirements of the latest edition of the National building Code of Canada 2015 (NBC) 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 NBC 2015 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 generator subbase fuel tank seismic restraint design and field review and inspection will be by a B.C. registered professional structural and seismic 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.

.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 generator and free standing ATS along with associated equipment and assemblies connected to them at the points of support. The restraint wires shall be oriented at approximately 90^{o} to each other (in plan), and tied back to the structure at approximately 45^{o} 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^{o} 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.

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^{o} 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. generators, motor control centres, free standing automatic transfer switch, control panels, capacitor banks, etc. to the structure. Design anchors and bolts for seismic force applied horizontally 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 The generator and sub-base tank to be seismically restrainted to generator pad such that the packaged generator system remains restrained in the event of flood with an empty fuel tank.

END OF SECTION

FIRESTOPPING

Part 1 General

1.1 SECTION INCLUDES

.1 This section includes materials and installation for tested firestopping systems as follows:

.1 Penetrations for the passage of duct, cable, cable tray, conduit, piping, electrical busways and raceways through fire-rated separations.

1.2 REFERENCES

.1 Test Requirements: CAN/ULC-S115-05, "Fire Tests of Fire Stop Systems"

1.3 QUALITY ASSURANCE

.1 Contractor’s certified installer, or manufacturer’s direct installation trainer to assist with initial installation of firestop systems to ensure appropriate contractor system selection and installation procedures.

.2 Firestop System application, products and installation must meet requirements of a listed system in accordance with CAN/ULC-S115, tested to provide the appropriate fire (and temperature if applicable) rating for the penetrated assembly. Systems may be approved by any Standards Council of Canada approved testing agency.

1.4 SUBMITTALS

.1 Submit Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of ULC or cUL firestop systems to be used and manufacturer's installation instructions to comply with Section 01 33 00.

.2 Submit material safety data sheets provided with product delivered to job-site.

1.5 INSTALLER QUALIFICATIONS

.1 Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having the necessary training to select and install manufacture’s products per applicable requirements. A supplier’s willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer. Qualification should consist of training, successful completion of testing based on the Firestopping Contractors International Association Manual of Practice, and continuing education.

.2 The work is to be installed by a contractor with at least one of the following qualifications:

.1 ULC Qualified Firestop Contractor

.2 Hilti Accredited Fire Stop Specialty Contractor

.3 Nuco Accredited Fire Stop Installer

.4 Other approved manufacturer qualification program

.3 Installer shall have minimum 3 years of experience with fire stop installation. Contractor/installer to submit certificate demonstrating qualification with the

approved products listed above in addition to the list of qualifying projects. Contact the consultant if unclear, prior to tender close.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and ULC or cUL label where applicable.

.2 Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.

.3 Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements.

.4 Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.

.5 Do not use damaged or expired materials.

1.7 PROJECT CONDITIONS

.1 Do not use materials that contain flammable solvents.

.2 Scheduling

.1 Schedule installation of CAST IN PLACE firestop devices after completion of floor formwork, metal form deck, or composite deck but before placement of concrete.

.2 Schedule installation of Drop-In firestop devices after placement of concrete but before installation of the pipe penetration. Diameter of sleeved or cored hole to match the listed system for the device

.3 Schedule installation of other firestopping materials after completion of penetrating item installation but prior to covering or concealing of openings.

.3 Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.

.4 Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.

.5 During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

Part 2 Products

2.1 FIRESTOPPING, GENERAL

.1 Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.

.2 Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.

.3 For penetrations that are anticipated to be re-used (communication cable-trays, riser shaft sleeves, etc.), use a firestopping system that is re-enterable without the use of additional materials or detailed knowledge of the system (EZ-Path, Flamestopper, Speedsleeve or equivalent).

2.2 ACCEPTABLE MANUFACTURERS

.1 Hilti (Canada) Corporation
.2 Nuco
.3 3M
.4 Specified Fire Technologies (STI EZ-Path)
.5 Grace / Flamesafe
.6 Legrand (Flamestopper)
.7 Other manufacturers with fire stopping material equivalent to the above

2.3 MATERIALS

.1 Use only firestop products that have been tested and approved for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.

Part 3 Execution

3.1 PREPARATION

.1 Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
  .1 Verify penetrations are properly sized and in suitable condition for application of materials.
  .2 Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
  .3 Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
  .4 Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.
  .5 Do not proceed until unsatisfactory conditions have been corrected.

3.2 COORDINATION

.1 Coordinate location and proper selection of cast-in-place Firestop Devices with trade responsible for the work. Ensure device is installed before placement of concrete.
.2 Responsible trade is to provide adequate spacing of field run pipes to allow for installation of cast-in-place firestop devices without interference.

3.3 INSTALLATION

.1 Regulatory Requirements: Install firestop materials in accordance with ULC Fire Resistance Directory or equivalent.

.2 Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration and construction joint materials.

.1 Seal all holes or voids made by penetrations to ensure an air and water resistant seal.

.2 Consult with mechanical engineer, project manager, and damper manufacturer prior to installation of ULC firestop systems that might hamper the performance of fire dampers as it pertains to duct work.

.3 Protect materials from damage on surfaces subjected to traffic.

3.4 FIELD QUALITY CONTROL

.1 Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.

.2 Keep areas of work accessible until inspection by authority having jurisdiction.

.3 Inspection of through-penetration firestopping shall be performed in accordance with ASTM E 2174, “Standard Practice for On-Site Inspection of Installed Fire Stops” or other recognized standard.

.4 Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.

3.5 IDENTIFICATION

.1 Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:

.1 The words: "Warning -Through Penetration Firestop System-Do Not Disturb. Notify Building Management of Any Damage."

.2 Contractor's Name, address, and phone number.

.3 Through-Penetration firestop system designation of applicable testing and inspecting agency.

.4 Date of Installation.

.5 Through-Penetration firestop system manufacturer's name.

.6 Installer's Name.

END OF SECTION

WIRE AND BOX CONNECTORS (0-1000V)

Part 1 General

1.1 SECTION INCLUDES

.1 This section specifies the materials and installation for wire and box connectors, rated to 1000V.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA-C22.2No.18 latest edition, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.

.2 CSA C22.2No.65 latest edition, Wire Connectors.

.2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)

.1 EEMAC 1Y-2, latest edition, Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).

.3 National Electrical Manufacturers Association (NEMA)

Part 2 Products

2.1 MATERIALS

.1 Pressure type wire connectors to: CSA C22.2No.65, with current carrying parts of copper alloy sized to fit copper conductors as required.

.2 Fixture type splicing connectors to: CSA C22.2No.65, with current carrying parts of copper alloy sized to fit copper conductors 10 AWG or less.

.3 Bushing stud connectors: to EEMAC 1Y-2 to consist of:

.1 Connector body and stud clamp for stranded copper conductors.

.2 Clamp for stranded copper conductors.

.3 Stud clamp bolts.

.4 Bolts for copper conductors.

.5 Sized for conductors as indicated.

.4 Clamps or connectors for armoured cable, flexible conduit, as required to: CAN/CSA-C22.2No.18.

Part 3 Execution

3.1 INSTALLATION

.1 Remove insulation carefully from ends of conductors and:

.1 Install mechanical pressure type connectors and tighten screws [with appropriate compression tool recommended by manufacturer]. Installation shall meet secureness tests in accordance with CSA C22.2 No.65.

.2 Install fixture type connectors and tighten. Replace insulating cap.

.3 Install bushing stud connectors in accordance with [EEMAC 1Y-2] [NEMA].

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 This section specifies copper, 0-1000 Volts and the most common electrical insulation and covering materials.

1.2 REFERENCES

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

.2 CAN/CSA-C22.2 No. 131 latest edition, Type TECK 90 Cable.

1.3 GENERAL REQUIREMENTS

.1 Typically use insulated 98% conductivity copper conductor wiring enclosed in EMT (steel) conduit for the general wiring systems unless otherwise indicated.

.2 Aluminium conductors not permitted.

.3 Teck cable may only be used where specifically indicated on the drawings or in the specifications. Where permitted, Teck wiring up to 750 system volts to be PVC jacketed armoured cable, multi-copper conductor type Teck90 1000 volt having a PVC jacket with FT-4 flame spread rating.

.4 Flexible AC90 armoured cabling (BX) shall not be used for the general wiring system other than final drops to recessed light fixtures in concealed locations.

.5 Cabling indicated to be 2-Hour Fire-Rated shall be compliant to CAN/ULC-S139 and CSA 38-95 (Draka Lifeline, Raychem RHW, or Shawflex). Cabling shall be low smoke halogen free. Conduit to be sized and installed as per manufacturers' requirements for these specialized cables and assemblies regardless of the size indicated on drawings.

.6 Non-metallic sheathed wiring is not to be used on this project.

Part 2 Products

2.1 WIRE AND CABLE GENERAL

.1 Conductors: stranded for 10 AWG and larger. Minimum size #12 AWG.

.2 Insulation to be 600 volt RW90XLPE (X link) for the general building wiring in conduit.

.3 Use RWU90XLPE for underground installations. Ensure conduits are sized to suit this type of wiring.

.4 Site services sub-circuits, including site lighting, to be minimum #10 AWG for power and #12 for controls. Increase wiring size for lengthy and/or loaded circuits so that system will not exceed the maximum voltage drop as recommended by the Canadian Electrical Code CSA 22.1 [latest edition].

.5 Main feeders to be conduit and copper insulated wiring unless otherwise noted on drawings. Provide ground wiring for all conduits in or below slabs. Increase conduit size as required.

.6 Armoured AC90 (BX) cable may only be utilized where existing is BX.

.7 Conductors to be colour-coded. Conductors No.10 gauge and smaller shall have colour impregnated into insulation at time of manufacture. Conductors size No.8

gauge and larger may be colour-coded with adhesive colour coding tape, but only black insulated conductors shall be employed in this case, except for neutrals which shall be white wherever possible. Where colour-coding tape is utilized, it shall be applied for a minimum of 50 mm at terminations, junctions and pullboxes and conduit fittings. Conductors not to be painted.

2.2 TECK CABLE

.1 Use of Teck cable is only permitted where specifically noted on the drawings.

.2 Cable: to CAN/CSA-C22.2 No. 131 [latest edition].

.3 Conductors:

- .1 Grounding conductor: copper.
- .2 Circuit conductors: copper, size as indicated.

.4 Insulation:

- .1 Type: ethylene propylene rubber.
- .2 Chemically cross-linked thermosetting polyethylene rated type RW90, 600V .

.5 Inner jacket: polyvinyl chloride material.

.6 Armour: interlocking galvanized steel or aluminum.

.7 Overall covering: [thermoplastic [polyvinyl chloride]] material.

.8 Fastenings:

- .1 One hole steel straps to secure surface cables 50 mm and smaller. Two hole steel straps for cables larger than 50 mm.
- .2 Channel type supports for two or more cables at 1000 mm centers.
- .3 Threaded rods: 6 mm dia. to support suspended channels.

.9 Connectors:

- .1 Watertightapproved for TECK cable.

2.3 ARMOURED CABLES

.1 Conductors: insulated, copper, size as indicated.

.2 Type: AC90.

.3 Armour: interlocking type fabricated from galvanized steel or aluminum strip.

2.4 ARMOURED FIRE ALARM CABLE

.1 Use flexible armoured fire alarm cable from junction box to ceiling mounted fire alarm device.

.2 Type: SECUREX® II cable, fire rated to CSA FT4 requirements.

.3 Armour: interlocked aluminum tape armour. Cable armour shall be colour coded “red”.

2.5 CONTROL CABLES

.1 Type LVT: 2 soft annealed copper conductors, sized as indicated, with thermoplastic insulation, outer covering of thermoplastic jacket.

.2 Low energy 300 V control cable: solid annealed copper conductors sized as indicated, with TWH over each conductor and overall covering of PVC jacket.

.3 600 V type: stranded copper conductors, sizes as indicated with R90 (x-link) ethylene-propylene rubber insulation type over each conductor and overall covering of PVC jacket.

Part 3 Execution

3.1 INSTALLATION OF BUILDING WIRES

.1 Install wiring as follows:

.1 In conduit systems in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Fittings.

.2 In underground ducts in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Fittings.

.3 In trenches in accordance with Section 26 05 44 – Installation of Cable in Trenches and Ducts.

.4 In wireways and auxiliary gutters in accordance with Section 26 05 37 - Wireways and Auxiliary Gutters.

.5 All wires are to be pulled in together in a common raceway, using liberal amounts of Compound 77 lubricant.

.6 All power circuits connected to isolated ground type receptacles are to have individual separate neutral c/w insulated bonding conductor.

.7 No combining of circuits onto common neutral will be permitted. Use 2 pole or 3 pole breakers for combined circuits, no connector clips will be allowed.

.8 Ensure that all single phase loadings are reasonably closely balanced over the main feeders.

.9 All dimmer circuits are to have individual neutral conductors for each circuit.

3.2 INSTALLATION OF TECK CABLE 0 -1000 V

.1 Install cables.

.1 Group cables wherever possible on channels or cable tray as noted on the drawings.

.2 Install cable in trenches in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Fittings.

.3 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors - 0 - 1000 V.

3.3 INSTALLATION OF ARMOURED CABLES

.1 Group cables wherever possible.

.2 Install cable in trenches in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Fittings.

.3 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors - 0 - 1000 V.

3.4 INSTALLATION OF CONTROL CABLES

.1 Install control cables in conduit.

.2 Ground control cable shield.

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.

.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 Departmental Representative.

.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

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 or when it is impractical due to existing conditions.

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.

.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.

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.

.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

WIREWAYS AND AUXILIARY GUTTERS

Part 1 General

1.1 SECTION INCLUDES

.1 This section specifies wireways, auxiliary gutters and associated fittings and installation.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSAC22.2No.26-[R1999], Construction and Test of Wireways, Auxiliary Gutters and Associated Fittings.

1.3 PRODUCT DATA

.1 Submit product data in accordance with Section 26 05 00 Common Work Results - Electrical.

Part 2 Products

2.1 WIREWAYS

.1 Wireways and fittings: to CSA C22No.26.

.2 Sheet steel with [hinged] [bolted] cover to give uninterrupted access.

.3 Finish: baked grey enamel.

.4 Elbows, tees, couplings and hanger fittings manufactured as accessories to wireway supplied.

Part 3 Execution

3.1 INSTALLATION

.1 Install wireways and auxiliary gutters.

.2 Keep number of elbows, offsets, connections to minimum.

.3 Install supports, elbows, tees, connectors, fittings.

.4 Install barriers where required.

.5 Install gutter to full length of equipment.

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.

.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

PANELBOARDS BREAKER TYPE

Part 1 General

1.1 SECTION INCLUDES

.1 This Section specifies standard and custom panelboards and their installation.

1.2 SCOPE OF WORK

.1 Provide and install new breakers in existing panelboards as indicated on the drawings, single line diagram, panel schedules and these specifications.

.2 Types of panelboards in this section include the following:

.1 CDP type Power distribution panelboards.

1.3 PRODUCT INFORMATION

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

.2 Shop drawings to include electrical detail of panel, branch breaker type, quantity, ampacity and cover dimensions.

.3 Shop drawings to include custom cover to match new breaker assembly and existing enclosure.

1.4 PLANT ASSEMBLY

.1 In addition to CSA requirements, manufacturer's nameplate must show fault current that panel including breakers has been built to withstand.

.2 All new breakers to be of a common manufacturer.

.3 Panel retrofits shall come complete with CSA (or equivalent accepted mark) to be applied on retrofitted assembly.

1.5 FINISH

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

.2 Panel finish in electrical and equipment rooms and closets to be standard ASA Grey baked enamel. Confirm with Consultant prior to shop finishing panels.

.3 Panels in finished and/or public areas to be either as clause .2 above or prepared to accept painting to closely match surroundings as directed by the Architect. In the later instance, the final paint coat to be done by Division 09 but coordinated by the Electrical Division, in particular for protection and masking of locks and sensitive parts. Confirm with Consultant prior to paint finishing panels.

Part 2 Products

2.1 PANELBOARDS, DOORS AND TRIMS

.1 Panelboards: to CSA C22.2 No. 29 and product of one manufacturer.

.2 Bus and breakers **unless otherwise indicated on the drawings** and in the specifications, shall be rated for:

.1 Minimum 10 kA at 208Y/120V.

.2 Minimum 22 kA at 600Y/347V.

.3 Tin plated copper bus with full size neutral.

.4 Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number.

.5 Mains capacity, number of circuits and number and size of branch circuit breakers as indicated.

.6 Provide all necessary connectors and mounting hardware in every space to facilitate installation of future breakers. Provide blank fillers for all spaces.

.7 Concealed hinges and concealed trim mounting screws, hinged locking door with flush catch.

.8 Panelboards to have flush, locking doors. (Gasketted where required for damp locations).

.9 Provide two keys for each panelboard and key similar voltage and system panelboards alike.

.10 Panel tubs to be typically 450 to 600mm wide but suiting existing panels.

.11 Provide "sprinkler-proof" design in areas where sprinkler fire protection is installed. In any event, all surface mounted enclosures to be complete with sprinkler drip cover.

.12 Provide door within door trims where indicated to facilitate ease of service maintenance Each tub trim cover to be hinged and self supporting and to swing out to expose breaker cable terminations and wireways. Hinged trim shall be secured with cover screws on opening side by concealed machine screws. Hinged breaker cover shall be recessed into the hinged overall tub cover. Breaker cover shall have latch type closures. Submit details on shop drawings prior to manufacturing.

.13 CDP type panels or panels with 100 amp or larger breakers shall be complete with integral locking devices on each circuit breaker.

2.2 BREAKERS

.1 All breakers to be:

.1 For Power Distribution Panelboards: Bolt on type molded case, adjustable and interchangeable trip, single, two and three pole, 120/208V or 347/600V and with trip free position separate from "On" or "Off" positions.

.2 Two and three pole breakers to have common simultaneous trip and able to be located in any circuit position within the panelboard.

.3 Main breaker (where required) to be separately mounted at top or bottom of panel to suit cable entry. When mounted vertically, down position should open breaker.

.4 Provide circuit breakers with indicated trip ratings as shown in the panelboard schedules or the Single Line Diagram.

.5 Provide spare circuit breakers as indicated on panel schedules or single line diagram as applicable.

.6 Provide breaker type Ground Fault Interrupter(s) (GFI) as indicated.

.7 Provide Lock-on devices as indicated and for Fire Alarm circuits, Security Equipment circuits, Exit sign circuits and Emergency Battery Equipment circuits.

2.3 PANELBOARD IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 – Common Work Results - Electrical. Panel identification to match the existing convention on site.

.2 Nameplate for each panelboard size 5 (2 line) engraved as indicated and include panel designation and voltage/phase.

.3 Complete updated circuit directory with typewritten card(s) located in slide-in plastic pocket(s) fixed to the back of the related door. Existing loads on existing panel board schedules shall be transcribed and replicated on new panel schedules. Directory card to indicate the panel designation, mains size, voltage/phase and the location and load controlled of each circuit. Include a “letter sized” paper copy of each directory in the project maintenance manual.

.4 Provide a plasticized typewritten information card fixed to the back of the each panel door. Information card to indicate the panel designation and location, feeder type and size and locations of any controlling contactors and feeder pullboxes. Include a “letter sized” paper copy of each information card in the project maintenance manual.

Part 3 Execution

3.1 INSTALLATION

.1 Replace breakers as indicated and mount securely, plumb true and square, to existing enclosure.

.2 Replace feeder conductors as noted in drawings.

.3 Connect new and existing loads to circuits as indicated. Do not splice conductors in panelboard. Ensure breaker and neutral bus locations suit existing panel and conductor arrangements.

.4 Connect neutral conductors to common neutral bus with respective neutral identified.

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.

2.3 OPTIONAL FEATURES

.1 Provide:

.1 On-off locking device.

.2 Fire alarm breaker to be painted red.

Part 3 Execution

3.1 INSTALLATION

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

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 American National Standards Institute (ANSI)/National Electrical Manufacturers' Association (NEMA)

.1 ANSI/NEMA MG1-1998, Motors and Generators.

.2 Canadian Standards Association (CSA)

.1 CAN/CSA C282-09, Emergency electrical power supply for buildings

.2 CSA B139-04 Installation code for oil-burning equipment

.3 National Electrical Manufacturers Association (NEMA)

.4 Underwriters' Laboratories of Canada (ULC)

.1 ULC-S601-00, Standard for Shop Fabricated Steel Aboveground Horizontal Tanks for Flammable and Combustible Liquids.

.2 CAN/ULC-S603-[92], Standard for Steel Underground Tanks for Flammable and Combustible Liquids.

1.2 SYSTEM DESCRIPTION

.1 Exterior rated with sound proof weather enclosure.

.2 Maximum sound rating of **68dB at 7 metres**.

.3 Generating system consists of:

.1 Diesel engine.

.2 Alternator.

.3 Alternator control panel.

.4 Battery charger and battery.

.5 Automatic engine enclosure ventilation system.

.6 Fuel supply system.

.7 Exhaust system.

.8 Steel mounting base.

.9 Sub-base fuel tank

.10 Synchronizing panel.

.11 Generator annunciator panel.

.12 Double-sided manual by-pass switch.

.4 System designed to operate as an unattended standby unit.

1.3 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 26 05 00 Common Work Results - Electrical.

.2 Include:

- .1 Engine: make and model, with performance curves.
- .2 Alternator: make and model.
- .3 Voltage regulator: make, model and type.
- .4 Manual bypass switch: make and model.
- .5 Battery: make, type and capacity.
- .6 Battery charger: make, type and model.
- .7 Alternator control panel: make and type of meters and controls.
- .8 Governor type and model.
- .9 Automatic engine enclosure ventilation system.
- .10 Cooling air requirements in m^3/s.
- .11 British standard or DIN rating of engine.
- .12 Flow diagrams for:
  - .1 Diesel fuel.
  - .2 Cooling air.
- .13 Dimensioned drawing showing complete generating set mounted on steel base, including vibration isolators, exhaust system, drip trays, sub-hose fuel tank and total weight.
- .14 Continuous full load output of set at 0.8PF lagging.
- .15 Description of set operation including:
  - .1 Automatic starting and transfer to load and back to normal power, including time in seconds from start of cranking until unit reaches rated voltage and frequency.
  - .2 Manual starting.
  - .3 Automatic shut down and alarm on:
    - .1 Overcranking.
    - .2 Overspeed.
    - .3 High engine temp.
    - .4 Low lube oil pressure.
    - .5 Short circuit.
    - .6 Alternator overvoltage.
    - .7 Lube oil high temperature.
    - .8 Over temperature on alternator.
  - .4 Manual remote emergency stop.

1.4 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance data for diesel generator for incorporation into manual specified in Section 26 05 00 – Common Work Results - Electrical.

.2 Include in Operation and Maintenance Manual instructions for particular unit supplied and not general description of units manufactured by supplier and:

- .1 Operation and maintenance instructions for engine, alternator, control panel, automatic transfer switch, manual bypass switch, battery charger, battery, fuel system, engine room ventilation system, exhaust system and accessories, to permit effective operation, maintenance and repair.
- .2 Technical data:
  - .1 Illustrated parts lists with parts catalogue numbers.
  - .2 Schematic diagram of electrical controls.
  - .3 Flow diagrams for:
    - .1 Fuel system.
    - .2 Lubricating oil.
    - .3 Cooling system.
  - .4 Certified copy of factory test results.
  - .5 Maintenance and overhaul instructions and schedules.
  - .6 Precise details for adjustment and setting of time delay relays or sensing controls which require on site adjustment.

1.5 WARRANTY

.1 For Work of this Section, the warranty will be at a minimum 60 months or 1500 operating hours, whichever occurs first. Warranty to be carried by both electrical contractor and manufacturer.

1.6 EXTRA MATERIALS

.1 Provide maintenance materials in accordance with the manufacturer’s recommendations.

.2 Include, at a minimum:

- .1 2 fuel filter replacement elements.
- .2 2 lube oil filter replacement elements.
- .3 2 air cleaner filter elements.
- .4 2 sets of fuses for control panel.
- .5 Special tools for unit servicing.

PART 2 PRODUCTS

2.1 DIESEL ENGINE

.1 Diesel engine: to ISO 3046-1.

.1 Engine: standard product of current manufacture, from company regularly engaged in production of such equipment.

.2 Naturally aspirated, synchronous speed 1800 r/min.

.3 Capacity:

.1 Rated continuous power in kW at rated speed, after adjustment for system losses in auxiliary equipment necessary for engine operation; to be calculated as follows: Rated continuous output = Generator kW divided by Generator efficiency at full load.

.1 Under following site conditions:

.1 Altitude: 130 m.

.2 Ambient temperature: 5-40 degrees C.

.3 Relative humidity: 95 %.

.2 Engine overload capability 110% of continuous output for 1 hour within 12 hours period of continuous operation.

.4 Cooling System:

.1 Liquid cooled: heavy duty industrial radiator mounted on generating set base with engine driven pusher type fan to direct air through radiator from engine side, with ethylene glycol anti-freeze non-sludging above minus 46 degrees C.

.2 Air cooled: air cooling duct enveloping cylinder walls with pressure cooling by engine driven blower.

.3 To maintain manufacturer's recommended engine temperature range at 10% continuous overload in ambient temperature of 40 degrees C.

.4 Block heater: thermostatically controlled lube oil or liquid coolant heater connected to line side of automatic transfer switch to allow engine to start in room ambient minus 10 degrees C.

.1 Switch and fuse in heater circuit, mounted in engine-alternator control cubicle and fed from line side of automatic transfer switch.

.5 Fuel:

.1 Type A fuel oil: to CAN/CGSB-3.6.

.2 Arctic Grade 2 : to CAN/CGSB-3.6.

.6 Fuel system: solid injection, mechanical fuel transfer pump with hand primer, fuel filters and air cleaner, fuel rack solenoid energized when engine running.

.7 Governor:

.1 Mechanical hydraulic with:

.1 Steady state speed band of plus or minus 0.5%.

.2 Speed regulation no load to full load 5% maximum.

.3 Electronic load sharing type, electric actuator, speed droop externally adjustable from isochronous to 5%, temperature compensated with steady state speed maintenance capability of plus or minus 0.25%.

.8 Lubrication system:

.1 Pressure lubricated by engine driven pump.

.2 Lube oil filter: replaceable, full flow type, removable without disconnecting piping.

.3 Lube oil cooler.

.4 Engine sump drain valve.

.5 Oil level dip-stick.

.9 Starting system:

.1 Positive shift, gear engaging starter 12 or 24V dc.

.2 Cranking limiter to provide 3 cranking periods of 10s duration, each separated by 5 s rest.

.3 Lead acid, 12 or 24V storage battery with sufficient capacity to crank engine for 1min at 0 degrees C without using more than 25% of ampere hour capacity.

.4 Battery charger : constant voltage, solid state, two stage from trickle charge at standby to boost charge after use. Regulation: plus or minus 1% output for plus or minus 10% input variation. Automatic boost for 6h every 30 days. Equipped with dc voltmeter, dc ammeter and on-off switch. Minimum charger capacity: 7 A.

.10 Vibration isolated engine instrument panel with:

.1 Lube oil pressure gauge.

.2 Lube oil temperature gauge.

.3 Lube oil level gauge.

.4 Coolant temperature gauge.

.5 Coolant level gauge.

.6 Running time meter: non-tamper type.

.11 Guards to protect personnel from hot and moving parts. Locate guards so that normal daily maintenance inspections can be undertaken without their removal.

.12 Drip tray.

2.2 ALTERNATOR

.1 Alternator: to ANSI/NEMA MG1.

.2 Rating: 208 V, 3 phase 4 wire, 60Hz, at 0.8PF.

.3 Output at 40 degrees C ambient:

- .1 100% full load continuously.
- .2 110% full load for 1h.
- .3 150% full load for 1 min.

.4 Revolving field, brushless, single bearing.

.5 Drip proof.

.6 Amortisseur windings.

.7 Synchronous type.

.8 Dynamically balanced rotor permanently aligned to engine by flexible disc coupling.

.9 Exciter: permanent magnet.

.10 EEMAC class H insulation on windings.

.11 Platinum resistance temperature transducers embedded in stator winding and connected to alternator control circuitry.

.12 Voltage regulator: thyristor controlled rectifiers with phase controlled sensing circuit:

- .1 Stability: 0.25% maximum voltage variation at any constant load from no load to full load.
- .2 Regulation: 1.5% maximum voltage deviation between no-load steady state and full-load steady state.
- .3 Transient: 1.5% maximum voltage dip on one-step application of 0.8PF full load.
- .4 Transient: 25% maximum voltage rise on one-step removal of 0.8PF full load.
- .5 Transient: 12 s maximum voltage recovery time with application or removal of 0.8PF full load.

.13 Alternator: capable of sustaining 300% rated current for period not less than 10s permitting selective tripping of down line protective devices when short circuit occurs.

2.3 CONTROL PANEL

.1 Weatherproof totally enclosed, mounting base isolated from diesel generator.

.2 Instruments:

.1 Digital indicating type 2% accuracy, rectangular face, flush panel mounting:

.1 Voltmeter: ac, scale 0 to 750 V.

.2 Ammeter: ac, scale 0 to 1500 A.

.3 Wattmeter scale 0 to 200 kW.

.4 Frequency meter: scale 55 to 65Hz.

.5 kW.h meter.

.2 Voltmeter selector switch, rotary, panel mounting, round notched handle, four position, labelled "Off-Phase A-Phase B-Phase C".

.3 Ammeter selector switch, rotary, maintained contacts, panel mounting, designed to prevent opening of current circuits, round notched handle, four position labelled "OFF- Phase A-Phase B-Phase C".

.4 Instrument Transformers

.1 Potential-dry type for outdoor use:

.1 Ratio: 120.

.2 Rating: 120 V, 60Hz, BIL 25 kV.

.2 Current-dry type for outdoor use:

.1 Ratio: 600 to 5.

.2 Rating: 120 V, 60Hz.

.3 Positive action automatic short-circuiting device in secondary terminals.

.3 Controls:

.1 Engine start button.

.2 Selector switch: Off-Auto-Manual - Test full load test no load.

.3 Engine emergency stop button and provision for remote emergency stop button.

.1 Alternator output breaker:

.1 Circuit breaker: bolt-on, moulded case, temperature compensated for 40 degrees C ambient, dual thermal-magnetic trip.

.2 Voltage control rheostat: mounted on inside of control panel.

.3 Operating lights, panel mounted:

.1 "Normal power" pilot light.

.2 "Emergency power" pilot light.

.3 Green pilot lights for breaker on and red pilot lights for breaker off.

.4 Solid state indicator lights for alarm with [1set] manually reset NO/NC contacts wired to terminal block for remote annunciation on:

- .1 Low fuel level.
- .2 Low battery voltage.
- .3 Ventilation failure.
- .4 Low coolant temperature.
- .5 Low DC voltage.
- .6 High DC voltage.
- .7 Ground fault.
- .8 Fuel leak.

.5 Solid state controller for automatic shutdown and alarms with 1set manually reset NO/NC contacts wired to terminal block for remote annunciation on:

- .1 Engine overcrank.
- .2 Engine overspeed.
- .3 Engine high temperature.
- .4 Engine low lube oil pressure.
- .5 Short circuit.
- .6 AC over voltage.
- .7 Fail to crank.
- .8 Emergency stop.

.6 Lamp test button.

.7 Provision for remote monitoring.

.8 The alarms and conditions for shut down indicated in items .4 and .5 shall be available on digital display panel on the control panel.

.9 The control system shall include time delay start and time delay stop functions. The time delay start shall be adjustable 0-300 seconds, factory set at 3 seconds. The time delay stop shall be adjustable 0-600 seconds, factory set at the manufacturer's recommended setting.

.10 The control system shall include sender failure monitoring logic for speed sensing, oil pressure and engine temperature and be capable of discriminating between failed sender or wiring components and an actual failure conditions.

.11 The control system shall include an idle mode control which allows the engine to run in the idle mode in the Manual position only. In this mode, the alternator excitation system shall be disabled.

.12 The control system to have data logging and display provision to allow logging of the last 10 warning or shutdown indications on the generator set as well as the total time of operation at various loads as a percent of the standby rating of the generator set.

.13 Three sets of NO/NC relays to be provided, one for common alarm one for the running condition one for low fuel condition.

.14 The controls shall include a load shed control, to operate a set of dry contacts when the generator is overload.

.15 Provide Modbus and other interface required in order to connect the generator control panel to the BMS in the Building. The BMS must be able to read all the monitoring and operation signals from genset. This contractor is responsible for all the conduit and wires to the BMS panel and coordinate with Division 15 for final connection.

2.4 REMOTE ANNUNCIATOR PANEL

.1 Totally enclosed.

.2 Operating lights, panel mounted:

- .1 “Normal power” pilot light
- .2 “Emergency power” pilot light
- .3 Green pilot lights for breaker on and red pilot lights for breaker off.

.3 An LED labeled with proper alarm conditions shall identify each alarm event and a common audible signal shall sound for each alarm condition as follows:

- .1 Low level fuel
- .2 Low battery voltage
- .3 Ventilation failure
- .4 Low coolant temperature
- .5 Low DC voltage
- .6 High DC voltage
- .7 Ground fault
- .8 Fuel leak
- .9 Engine overcrank
- .10 Engine overspeed
- .11 Engine high temperature
- .12 Engine low lube oil pressure
- .13 Short circuit
- .14 AC over voltage
- .15 Fail to crank
- .16 Emergency stop

2.5 DOUBLE SIDED MANUAL BYPASS SWITCH

.1 Load break bypass and isolation switch: manually operated, double throw, to provide bypass around transfer switch to facilitate maintenance on diesel generator control panel and transfer switch or building's electrical service. Switch lockable in bypass position.

2.6 STEEL MOUNTING BASE

.1 Complete generating set mounted on steel base of sufficient strength and rigidity to protect assembly from stress or strain during transportation, installation and under operating conditions on suitable level surface.

.2 Assembly fitted with vibration isolators.

.1 Spring type isolators with adjustable side snubbers and adjustable for levelling.

.3 Sound insulation pads for installation between isolators and concrete base.

.4 The generator set shall be provided with an outdoor weatherproof enclosure. The package shall comply with the requirements of the Canadian Electrical Code for all wiring materials and component spacing. The total assembly of generator set and enclosure shall be designed to be lifted into place using spreader bars. Housing shall provide ample airflow for generator set operation at rated load in an ambient temperature of 40 degrees C. The housing shall have hinged access doors as required to maintain easy access for all operating and service functions. All doors shall be lockable, and include retainers to hold the door open during service. Enclosure roof shall be cambered to prevent rainwater accumulation. Openings shall be screened to limit access of rodents into the enclosure. All electrical power and control interconnections shall be made within the perimeter of the enclosure.

.5 Painting of hoses, clamps, wiring harnesses, and other non-metallic service parts shall not be acceptable. Fasteners used shall be corrosion resistant, and designed to minimize marring of the painted surface when removed for normal installation of service work.

.6 Enclosure shall be constructed of minimum 12 gauge steel for framework and 14 gauge steel for panels. All hardware and hinges shall be stainless steel.

.7 A factory-mounted exhaust silencer shall be installed inside the enclosure. The exhaust shall exit the enclosure through a rain collar and terminate with a rain cap. Exhaust connections to the generator set shall be through seamless flexible connections.

.8 The enclosure shall include the following maintenance provisions:

.1 Flexible coolant and lubricating oil drain lines, that extend to the exterior of the enclosure, with internal drain valves.

.2 External radiator fill provision.

.9 The fueling tank and generator enclosure manufactured and assembled by the same manufacturer and must be available for inspection before delivery to the site.

.10 Provide damp location rated LED strip inside each generator enclosure access door with minimum 500 delivered lumens per 300mm of length. LED lights to be operated with door switches. Power for the LED strip can be combined with generator GFCI receptacle.

2.7 EXHAUST SYSTEM

.1 Heavy duty critical horizontally mounted exhaust silencer with condensate drain, plug and [flanged] [welded] couplings.

.2 Heavy duty flexible exhaust pipe with flanged couplings as required.

.3 Fittings and accessories as required.

.4 Expansion joints: stainless steel, corrugated, of suitable length, to absorb both vertical and horizontal expansion.

2.8 FUEL SYSTEM

.1 Fuel storage tanks: to ANSI/API 650, ULC labelled.

.1 Free standing above ground tank: to ULC-S601.

.2 Day tank integral to generator and capable of supplying generator for 24 hours minimum. The tank to be dual wall sub-base constructed with corrosion resistant steel. The tank shall be completed with drain tap and dip stick (mark in letters and inches) for manually checking the fuel level. The tank shall be completed with a locking (padlock) fuel fill cap and spiral type mechanical fuel gauge next to the fuel cap. The tank also complete with a float type leak detector between the inner and outer wall for detecting any inner wall rupture. The integrated sub base fuel tank to be on painted steel structural steel support base frame complete with flexible supply and return hoses with connection fittings, fuel filter, vent line connection fittings and 110% containment capacity and accessories specified. Submit the size of tank based on calculated recommendation from manufacturer to consultant for approval. The fuel tank and all accessories to be waterproof.

.3 Factory installed leak detection of day tank and leak alarm kit.

.4 Four level float switch kit for connecting to fuel filling station and controls.

.5 Low level alarm kit.

.6 Integral transfer pump.

2.9 COOLING AIR SYSTEM

.1 Engine ventilating system:

.1 Recirculating damper assembly with modulating motor.

.2 Cold air inlet damper assembly with modulating motor.

.3 Air discharge and intake gooseneck weatherhoods.

.4 Modulating thermostat.

.5 Replaceable air intake filters.

2.10 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results - Electrical.

.2 Control panel:

.1 Size 4 nameplates for controls including alternator breakers and program selector switch.

.2 Size 2 nameplates for meters, alarms, indicating lights and minor controls.

2.11 FABRICATION

.1 Shop assemble generating unit including:

.1 Base.

.2 Engine and radiator.

.3 Alternator.

.4 Control panel.

.5 Battery and charger.

.6 Automatic transfer equipment.

2.12 FINISHES

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

.2 Alternator control cubicle: paint inside, exterior to match engine and alternator.

.3 Exhaust and inlet air hoods.

.4 Other ducts and racks grey.

.5 Supply 0.25L of touch-up enamel (appropriate colour).

2.13 SOURCE QUALITY CONTROL

.1 Factory test generator set including engine, alternator, control panels and accessories. All factory test results to be submitted to the Departmental Representative for review prior to shipment of the generator to site.

.2 Test procedure:

.1 Prepare blank forms and check sheet with spaces to record data. At top of first sheet record:

.1 Date.

.2 Generator set serial no.

.3 Engine, make, model, serial no.

.4 Alternator, make, model, serial no.

.5 Voltage regulator, make and model.

.6 Rating of generator set, kW, kV.A, V, A, r/min, Hz.

.2 Mark check sheet and record data on forms in duplicate as test proceeds.

.3 Tests:

.1 With 100% rated load, operate set for 24 h, taking readings at 30 min intervals, and record following:

.1 Time of reading.

.2 Running time.

.3 Ambient temp in degrees C.

.4 Lube oil pressure in kPa.

.5 Lube oil temp in degrees C.

.6 Engine coolant temp in degrees C.

.7 Exhaust stack temp in degrees C.

.8 Alternator voltage: phase 1, 2, 3.

.9 Alternator current: phase 1, 2, 3.

.10 Power in kW.

.11 Frequency in Hz.

.12 Power Factor.

.13 Battery charger current in A.

.14 Battery voltage.

.15 Alternator cooling air outlet temp.

.2 At end of 23 hours run increase load to 110% rated value, and take readings every 15 min for 1 hour.

.3 After completion of 24 hours run, demonstrate following shut down devices and alarms:

.1 Overcranking.

.2 Overspeed.

.3 High engine temp.

.4 Low lube oil pressure.

.5 Short circuit.

.6 Alternator overvoltage.

.7 Low battery voltage, or no battery charge.

.8 Manual remote emergency stop.

.9 High alternator temperature.

.4 Next install continuous strip chart recorders to record frequency and voltage variations during load switching procedures. Each load change delayed until steady state conditions exist. Switching increments to include:

.1 No load to full load to no load.

.2 No load to 70% load to no load.

.3 No load to 20% load to no load.

.4 20% load to 40% load to no load.

.5 40% load to 60% load to no load.

.6 60% load to 80% load to no load.

.4 Demonstrate low oil pressure and high engine temperature shutdown devices operation without subjecting engine to these excesses.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Locate generating unit and install as indicated.

.2 Install fuel supply system as indicated.

.3 Complete wiring and interconnections as indicated.

.4 Start generating set, provide load bank and fuel and test to ensure correct performance of components.

.5 Provide power for charger from an emergency power panel.

.6 Provide connection and monitoring to Fire Alarm Panel and annunciator.

.7 Provide connection and monitoring to BMS.

3.2 FIELD QUALITY CONTROL

.1 Notify Engineer 10 working days in advance of test date.

.2 Provide fuel for testing and leave full tanks on acceptance.

.3 Demonstrate:

.1 Unit start, transfer to load, retransfer to normal power, unit shut down, on "Automatic" control.

.2 Unit start and shut down on "Manual" control

.3 Unit start and transfer on "Test" control.

.4 Unit start on "Engine start" control.

.5 Operation of manual bypass switch.

.6 Operation of automatic alarms and shut down devices.

.4 Perform 6 hours load testing of unit on full load to show load carrying ability, stability of voltage and frequency, and satisfactory performance of dampers in ventilating system to provide adequate engine cooling. Record following at 30 minute intervals during the entire test:

.1 Kilowatts

.2 Amperes

.3 Voltage

.4 Frequency

.5 Oil Pressure

.6 Coolant Temperature

.7 Room Temperature

.8 Noise level at 3m from unit

.5 Record noise level measurements in dB at various locations around the unit and area surrounding the exhaust port.

.6 At end of test run, check battery voltage to demonstrate battery charger has returned battery to full charged state.

.7 After the demonstration, refill fuel tank.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 This section specifies materials and installation for automatic load transfer equipment which can monitor voltage on all phases of normal power supply, initiate cranking of standby generator unit, transfer loads and shut down standby unit when normal power is re-established.

.2 The Contractor shall furnish and install the low voltage automatic transfer switch having the ratings, features/accessories and enclosures as specified herein and as shown on the contract drawings.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA C22.2 No.178- latest edition, Automatic Transfer Switches.

.2 CSA C22.2 No. 5.1 Moulded Case Circuit Breakers

1.3 SCOPE OF WORK

.1 Provide and install a breaker type, open transition automatic transfer switches with bypass isolation, and having the ratings, features/accessories and enclosures as shown on the drawings and as specified herein:

.1 Bus rating: 200 A 208V 3-phase 4-wire c/w double-sided maintenance bypass.

.2 Rated for outdoor use CSA 3R Enclosure

1.4 SYSTEM DESCRIPTION

.1 Automatic load transfer equipment to:

.1 Monitor voltage on phases of normal power supply.

.2 Initiate cranking of standby generator unit on normal power failure or abnormal voltage on any one phase below preset adjustable limits for adjustable period of time.

.3 Transfer load from normal supply to standby unit when standby unit reaches rated frequency and voltage pre-set adjustable limits.

.4 Transfer load from standby unit to normal power supply when normal power restored, confirmed by sensing of voltage on phases above adjustable pre-set limit for adjustable time period.

.5 Shut down standby unit after running unloaded to cool down using adjustable time delay relay.

1.5 SHOP DRAWINGS

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

.2 Include:

.1 Make, model and type.

.2 Load classification.

.3 Single line diagram showing controls and relays.

.4 Description of equipment operation including:

.1 Automatic starting and transfer to standby unit and back to normal power.

.2 Test control.

.3 Manual control.

.4 Automatic shutdown.

1.6 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance data for automatic load transfer equipment for incorporation into manual.

.2 Detailed instructions to permit effective operation, maintenance and repair.

.3 Technical data:

.1 Schematic diagram of components, controls and relays.

.2 Illustrated parts lists with parts catalogue numbers.

.3 Certified copy of factory test results.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Instrument transformers: to CAN3-C13.

.2 Contactors: to ANSI/NEMA ICS2.

2.2 CIRCUIT BREAKER TYPE TRANSFER EQUIPMENT

.1 Circuit Breaker Type Transfer Equipment: to CSA C22.2No.5.

.2 Rated: 208 V, 60Hz, 400 A, 4 wire, solid neutral.

.1 Fault withstand rating: 28 kA symmetrical for 3 cycles.

.2 One normal- three phase molded-case circuit breaker with thermal magnetic trip, mounted on common base, designed for double throw action, motor operated, mechanically held and interlocked, floor mounted CSA enclosure.

.3 One standby- three phase moulded-case circuit breaker with thermal magnetic trip, motor operated, and interlocked.

.4 Circuit breakers:

.1 Trip free in closed position.

.2 Interrupting rating: 28KA A symmetrical.

.5 Dead front construction with access to relays and controls for inspection and maintenance, and manual operating lever for transfer switch.

.6 Main contacts - silver plated, protected by arc disruption means.

.7 Auxiliary contact: silver plated to initiate emergency generator start-up on failure of normal power.

.8 Solid neutral bar, fully rated.

.9 Overlapping neutral contacts on contractor type transfer equipment.

.10 Fault withstand rating: 28kA symmetrical.

2.3 CONTROLS

.1 Selector switch - four position "Test", "Auto", "Manual", "Engine start".

.1 Test position - Normal power failure simulated. Engine starts and transfer takes place. Return switch to "Auto" to stop engine.

.2 Auto position - Normal operation of transfer switch on failure of normal power; retransfers on return of normal voltage and shuts down engine.

.3 Manual position - Transfer switch may be operated by manual handle but transfer switch will not operate automatically and engine will not start.

.4 Engine start position - Engine starts but unit will not transfer unless normal power supply fails. Switch must be returned to "Auto" to stop engine.

.2 Control transformers: dry type with 120V secondary to isolate control circuits from:

.1 Normal power supply.

.2 Emergency power supply.

.3 Relays: continuous duty, industrial control type, with wiping action contacts rated 10 A minimum:

.1 Voltage sensing: 3 phase for normal power and on one phase only for emergency, solid state type, adjustable drop out and pick up, close differential, 2V minimum undervoltage protection.

.2 Time delay: normal power to standby, adjustable solid state, 0 to 60s.

.3 Time delay on engine starting to override momentary power outages or dips, adjustable solid state, 0 to 60s delay.

.4 Time delay on retransfer from standby to normal power, adjustable 0 to 60s.

.5 Time delay for engine cool-off to permit standby set to run unloaded after retransfer to normal power, adjustable solid state, 20s intervals to 10 min.

.6 Time delay during transfer to stop transfer action in neutral position to prevent fast transfer, adjustable, 5s intervals to 180s.

.7 Frequency sensing, to prevent transfer from normal power supply until frequency of standby unit reaches preset adjustable values.

.4 Solid state electronic in-phase monitor.

2.4 ACCESSORIES

.1 Pilot lights to indicate power availability normal and standby, switch position, green for normal, red for standby, mounted in panel.

.2 Plant exerciser: 168h timer to start standby unit once each week for selected interval but does not transfer load from normal supply. Timer adjustable 0-168h in 15 min intervals.

.3 Auxiliary relay to provide 2 N.O. and 2 N.C. contacts for remote alarms.

.4 Instruments:

.1 Digital true rms, indicating type 2 accuracy, flush panel mounting:

.1 Voltmeter: ac, scale 0 to 750V.

.2 Ammeter: ac, scale 0 to 400A.

.3 Frequency meter: scale 55 to 65 Hz.

.5 Voltmeter selector switch: rotary, maintained contacts, panel mounting type, round notched handle, four position, labelled "OFF – Phase A – Phase B – Phase C".

.6 Potential transformers - dry type for indoor use:

.1 Ratio: 600 to 120.

.2 Rating: 200V, 60Hz.

.3 Accuracy rating: 5%.

.7 Ammeter selector switch: rotary, maintained contacts, panel mounting type, designed to prevent opening of current circuits, round notched handle, four position labelled "OFF - Phase A - Phase B - Phase C".

.8 Current transformers - dry type for indoor use:

.1 Ratio: 1000 to 5.

.2 Rating: 600 V, 60Hz.

.3 Accuracy rating: 5%.

.4 Positive action automatic short- circuiting device in secondary terminals.

.9 Manual bypass: YES. Double-sided

2.5 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results - Electrical.

.2 Control panel:

.1 For selector switch and manual switch: size4 nameplates.

.2 For meters, indicating lights, minor controls: size2 nameplates.

2.6 OPERATIONS

.1 The automatic transfer switches are to be continuous rated as per drawings for – 3 phase – 4 wire - 208V operation, and are to be compatible with new standby generator.

.2 The automatic transfer switches shall include standard components and provide control to:

.1 Select through a switch “with load” or “without load” to test as follows:

.1 “Without load” the generator set runs unloaded.

.2 “With load” the automatic transfer switch transfers load to the generator set as if normal source interruption occurred.

.2 Monitor each ungrounded line with a calibrated dial adjustable voltage solid state sensors and sense a decrease of voltage below a set point or loss of voltage on any phase of the normal power supply. Voltage sensors shall be temperature compensated.

.3 Signal the engine generator set to start in the event of power interruption. A solid state time delay shall delay this signal three seconds to avoid nuisance start-ups on momentary voltage dips or power outages. The maximum 15 second reaction time permitted under CSA standard C282 shall include the three second start delay.

.4 Retransfer the load to the line after normal power restoration. A time delay shall delay this retransfer to avoid short term normal power restoration (variable one to five minutes, set at one minute).

.5 Provide an automatic retransfer of the load from generating set to normal source if the generating set output interrupts after normal source restores voltage.

.6 Signal the engine generator to stop after load retransfer to normal source. A solid state time delay on stop shall permit the engine to run unloaded to cool down before shutdown.

.7 Provide a device to electrically disconnect the control sections from the transfer switch for maintenance service during normal operation.

.3 Selected automatic transfer switch shall be included in a factory assembly with bypass-isolation switch equipment. The bypass-isolation switch shall provide a safe means for manually bypassing the transfer switch from either source (Normal or standby) to the load, while under load if necessary, and to isolate the transfer switch from both sources for maintenance or repair Designs that bypass to only one source are not acceptable under this specification.

.1 Ratings:

.1 Bypass-isolation switch equipment shall be ULC Listed and CSA approved, manually operated with continuous current rating, voltage and frequency ratings, and withstand and closing ratings equal to the transfer switch ratings at the specified conditions of ambient temperature, humidity and altitude.

.2 Construction:

.1 The bypass-isolation and transfer switch shall be mechanically held in each position. Switching mechanisms shall be break before make on all poles. The switch mechanism shall be an over centre toggle device which provides stored energy contact operation during both opening and closing. The speed of contact operation shall be independent of the force applied to the operating handles, which permits manual operation under load.

.3 Bypass Switch:

.1 Equipment shall provide manual bypass without load break to the source connected to the load by the transfer switch. Equipment requiring load break before bypass is not acceptable under this specification.

.2 Equipment shall provide for manual bypass operation to the source opposite that to which the transfer switch is connected. This shall cause the transfer switch to go automatically to a position disconnected from both sources.

.4 Interlocks:

.1 Positive mechanical interlocks shall prevent all possible source to source interconnections. Designs which depend on electrical interlocks to prevent source to source interconnections, or which intentionally interconnect the sources, are not acceptable.

.2 The interlock system shall assure a properly sequenced, mechanically guided bypass and isolation action.

.3 The equipment shall utilize automatic mechanical stops.

.4 Contractor is to install automatic transfer switch, and make all necessary connections to facilitate a complete operational system, in conjunction with new standby generator installation. Generator equipment supplier is to provide Consultant with written Verification Report complete with test results.

2.7 SOURCE QUALITY CONTROL

.1 Complete equipment, including transfer mechanism, controls, relays and accessories factory assembled and tested in presence of Consultant.

.2 Notify Consultant 10 days in advance of date of factory test.

.3 Tests:

.1 Operate equipment both mechanically and electrically to ensure proper performance.

.2 Check selector switch, in modes of operation Test, Auto, Manual, Engine Start and record results.

.3 Check voltage sensing and time delay relay settings.

.4 Check:

.1 Automatic starting and transfer of load on failure of normal power.

.2 Retransfer of load when normal power supply resumed.

.3 Automatic shutdown.

.4 In-phase monitor operation.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Locate, install and connect transfer equipment.

.2 Check relays, solid state monitors and adjust as required.

.3 Install and connect remote alarms.

3.2 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 of this specification and as follows:

.1 Energize transfer equipment from normal power supply.

.2 Set selector switch in "Test" position to ensure proper standby start, running, transfer, retransfer. Return selector switch to "Auto" position to ensure standby shuts down.

.3 Set selector switch in "Auto" position and open normal power supply disconnect. Standby should start, come up to rated voltage and frequency, and then load should transfer to standby. Allow to operate for 10min, then close main power supply disconnect. Load should transfer back to normal power supply and standby should shutdown.

.4 Repeat, at 1h intervals, 3 times, complete test with selector switch in each position, for each test.

END OF SECTION

FIRE DETECTION AND ALARM

Part 1 General

1.1 SECTION INCLUDES

.1 This section specifies materials and installation for the 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 The existing system is a Mircom Series 200 conventional fire alarm panel.

.2 System to remain operational for the duration of the project.

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.

1.6 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance data for additional Fire Alarm System devices for incorporation into manual.

.2 Include:

.1 Operation and maintenance instructions for complete fire alarm system to permit effective operation and maintenance.

.2 Technical data - illustrated parts lists with parts catalogue numbers.

.3 Copy of approved shop drawings.

.4 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.

Part 2 Products

2.1 MATERIALS

.1 Equipment and devices: ULC listed and match existing system manufacturer (i.e. Mircom Series 200).

.2 In accordance with applicable CAN/ULC standards.

2.2 SYSTEM OPERATION

.1 New signals from the generator to provide ‘Generator Running’ and ‘Generator Trouble’.

2.3 CONTROL PANEL

.1 Use existing LEDs to indicate the following:

.1 “Generator Running”

.2 “Generator Trouble”

2.4 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.

2.5 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 to be #12 AWG minimum, and in accordance with manufacturer's requirements. 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.

Part 3 Execution

3.1 INSTALLATION

.1 Install systems in accordance with CAN/ULC-S524 and TB OSH Chapter 3-04.

.2 Connect signalling circuits to main control panel.

.3 Install end-of-line devices at end of signalling circuits.

3.2 FIELD QUALITY CONTROL

.1 Perform tests as described herein and in accordance CAN/ULC-S537.

.2 Fire alarm system:

.1 Test each newly installed device to ensure signals transmit signal to control panel and actuate control panel LED indicators and alert signals.

.2 Check annunciator panels to ensure zones are shown correctly.

.3 Simulate grounds and breaks 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.

.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 Class B circuits.

.1 Test each conductor on all circuits for capability of providing alarm signal on line side of single open-circuit fault condition imposed at electrically most remote device on 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 at electrically most remote device on circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.

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.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 32 12 16.01 Asphalt Paving – Short Form.

1.2 MEASUREMENT AND PAYMENT

.1 This item will not be measured separately and will be included in the lump sum price.

1.3 REFERENCE STANDARDS

.1 ASTM International (ASTM)

.1 ASTM C 117, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.

.2 ASTM C 136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.3 ASTM D 422-63, Standard Test Method for Particle-Size Analysis of Soils.

.4 ASTM D 698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ^{3}) (600 kN-m/m ^{3}).

.5 ASTM D 1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ^{3}) (2,700 kN-m/m ^{3}).

.6 ASTM D 4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

.3 CSA Group (CSA)

.1 CAN/CSA-A3000, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.2 CSA-A3001, Cementitious Materials for Use in Concrete.

.3 CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

1.4 DEFINITIONS

.1 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.

.2 Unclassified excavation: excavation of deposits of whatever character encountered in Work.

.3 Topsoil:

.1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.

.2 Material reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 25 millimeters in any dimension.

.4 Waste material: excavated material unsuitable for use in Work or surplus to requirements.

.5 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.

.6 Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.

.7 Unsuitable materials:

.1 Weak, chemically unstable, and compressible materials.

.2 Frost susceptible materials:

.1 Fine grained soils with plasticity index less than 10 when tested to ASTM D 4318, and gradation within limits specified when tested to ASTM D 422 and ASTM C 136: Sieve sizes to CAN/CGSB-8.2.

.2 Table:

Sieve Designation	% Passing
2.00 mm	100
0.10 mm	45 - 100
0.02 mm	10 - 80
0.005 mm	0 – 45

.3 Coarse grained soils containing more than 20 % by mass passing 0.075 mm sieve.

.8 Unshrinkable fill: very weak mixture of cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Quality Control: in accordance with Section 01 45 00 - Quality Control:

.1 Submit condition survey of existing conditions as described in EXISTING CONDITIONS article of this Section.

.2 Submit for review by Departmental Representative proposed dewatering and heave prevention methods as described in PART 3 of this Section.

.3 Submit to Departmental Representative written notice at least 7 days prior to excavation work, to ensure cross sections are taken.

.4 Submit to Departmental Representative written notice when bottom of excavation is reached.

.5 Submit to Departmental Representative testing and inspection results and reports as described in PART 3 of this Section.

.3 Preconstruction Submittals:

.1 Submit construction equipment list for major equipment to be used in this section prior to start of Work.

.2 Submit records of underground utility locates, indicating location plan of existing utilities as found in field and location plan of relocated and abandoned services, as required.

.4 Samples:

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

.2 Inform Departmental Representative at least 2 weeks prior to beginning Work, of proposed source of fill materials and provide access for sampling.

.3 Submit 70 kg samples of type of fill specified including representative samples of excavated material.

.4 Ship samples to Departmental Representative in tightly closed containers to prevent contamination and exposure to elements.

.5 At least 2 weeks prior to beginning Work, inform Departmental Representative of source of fly ash and submit samples to Departmental Representative.

.1 Do not change source of Fly Ash without written approval of Departmental Representative.

1.6 QUALITY ASSURANCE

.1 Qualification Statement: submit proof of insurance coverage for professional liability.

.2 Submit design and supporting data at least 2 weeks prior to beginning Work.

.3 Design and supporting data submitted to bear stamp and signature of qualified professional engineer registered or licensed in British Columbia, Canada.

.4 Keep design and supporting data on site.

.5 Engage services of qualified professional Engineer who is registered or licensed in British Columbia, Canada in which Work is to be carried out to design and inspect cofferdams, shoring, bracing and underpinning required for Work.

.6 Do not use soil material until written report of soil test results are reviewed and approved by Departmental Representative.

.7 Health and Safety Requirements:

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

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 – Construction/Demolition Waste Management

1.8 EXISTING CONDITIONS

.1 Examine soil reports as available.

.2 Buried services:

.1 Before commencing work verify location of buried services on and adjacent to site.

.2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.

.3 Remove obsolete buried services within 2 m of foundations: cap cut-offs.

.4 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.

.5 Prior to beginning excavation Work, notify applicable authorities having jurisdiction to establish location and state of use of buried utilities and structures.

.6 Confirm locations of buried utilities by careful test excavations or soil hydrovac methods.

.7 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered.

.8 Where utility lines or structures exist in area of excavation, obtain direction of Departmental Representative before re-routing.

.9 Record location of maintained, re-routed and abandoned underground lines.

.10 Confirm locations of recent excavations adjacent to area of excavation.

.3 Existing buildings and surface features:

.1 Conduct, with Departmental Representative, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks, pavement, survey bench marks and monuments which may be affected by Work.

.2 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately make repair as directed by Departmental Representative.

.3 Where required for excavation, cut roots or branches as directed by Departmental Representative.

Part 2 Products

2.1 MATERIALS

.1 Type 1 and Type 2 fill: properties to the following requirements:

.1 Crushed, pit run or screened stone, gravel or sand.

.2 Gradations to be within limits specified when tested to ASTM C 136 and ASTM C 117. Sieve sizes to CAN/CGSB-8.2.

.3 Table:

Sieve Designation	% Passing Type 1	Type 2 (Base)	Type 2 (Sub-base)
75 mm	-	100	
50 mm	-	-	
37.5 mm	-	-	
25 mm	100	-	
19 mm	75-100	-	
12.5 mm	-	-	
9.5 mm	50-100	-	
4.75 mm	30-70	22-85	
2.00 mm	20-45	-	
0.425 mm	10-25	5-30	
0.180 mm	-	-	
0.075 mm	3-8	0-10	

.2 Type 3 fill: selected material from excavation or other sources, approved by Departmental Representative] for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials.

Part 3 Execution

3.1 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 sediment and erosion control plan, specific to site, that complies with requirements of authorities having jurisdiction.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 SITE PREPARATION

.1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.

.2 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.

3.3 PREPARATION/ PROTECTION

.1 Protect existing features as required in accordance with applicable local regulations.

.2 Keep excavations clean, free of standing water, and loose soil.

.3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Departmental Representative approval.

.4 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.

.5 Protect buried services that are required to remain undisturbed.

3.4 STRIPPING OF TOPSOIL

.1 Begin topsoil stripping of areas as directed by Departmental Representative after area has been cleared of brush, weeds, and grasses and removed from site.

.2 Strip topsoil to depths as directed by Departmental Representative.

.1 Do not mix topsoil with subsoil.

.3 Stockpile in locations as directed by Departmental Representative.

.1 Stockpile height not to exceed 2 m and should be protected from erosion.

.4 Dispose of unused topsoil as directed by Departmental Representative.

3.5 STOCKPILING

.1 Stockpile fill materials in areas designated by Departmental Representative.

.1 Stockpile granular materials in manner to prevent segregation.

.2 Protect fill materials from contamination.

.3 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

3.6 COFFERDAMS, SHORING, BRACING AND UNDERPINNING

.1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Section 01 35 33 - Health and Safety Requirements

.1 Where conditions are unstable, Departmental Representative to verify and advise methods.

.2 Obtain permit from authority having jurisdiction for temporary diversion of water course.

.3 Construct temporary Works to depths, heights and locations as approved by Departmental Representative.

.4 During backfill operation:

.1 Unless otherwise indicated or directed by Departmental Representative, remove sheeting and shoring from excavations.

.2 Do not remove bracing until backfilling has reached respective levels of such bracing.

.3 Pull sheeting in increments that will ensure compacted backfill is maintained at elevation at least 500 mm above toe of sheeting.

.5 When sheeting is required to remain in place, cut off tops at elevations as indicated.

.6 Upon completion of substructure construction:

.1 Remove cofferdams, shoring and bracing.

.2 Remove excess materials from site and restore watercourses as directed by Departmental Representative.

3.7 DEWATERING AND HEAVE PREVENTION

.1 Keep excavations free of water while Work is in progress.

.2 Provide for Departmental Representative review and approval details of proposed dewatering or heave prevention methods, including dikes, well points, and sheet pile cut-offs.

.3 Avoid excavation below groundwater table if quick condition or heave is likely to occur.

.1 Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.

.4 Protect open excavations against flooding and damage due to surface run-off.

.5 Dispose of water in accordance with Section 01 74 21 Construction/Demolition Waste Management to approved collection areas and in manner not detrimental to public and private property, or portion of Work completed or under construction.

.1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.

.6 Provide flocculation tanks, settling basins, or other treatment facilities to remove suspended solids or other materials before discharging to storm sewers, watercourses or drainage areas.

3.8 EXCAVATION

.1 Advise Departmental Representative at least 7 days in advance of excavation operations for initial cross sections to be taken.

.2 Excavate to lines, grades, elevations and dimensions as indicated by Drawings.

.3 Do not disturb soil within branch spread of trees or shrubs that are to remain.

.1 If excavating through roots, excavate by hand and cut roots with sharp axe or saw.

.4 For trench excavation, unless otherwise authorized by Departmental Representative in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation.

.5 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Departmental Representative.

.6 Restrict vehicle operations directly adjacent to open trenches.

.7 Dispose of surplus and unsuitable excavated material in approved location off site.

.8 Do not obstruct flow of surface drainage or natural watercourses.

.9 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.

.10 Obtain Departmental Representative approval of completed excavation.

.11 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative.

.12 Correct unauthorized over-excavation as follows:

.1 Fill under bearing surfaces and footings with concrete specified for footings Type 2 fill compacted to not less than 100% of corrected Standard Proctor maximum dry density.

.2 Fill under other areas with Type 2 fill compacted to not less than 95 % of corrected Standard Proctor maximum dry density.

.13 Hand trim, make firm and remove loose material and debris from excavations.

.1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.

.2 Clean out rock seams and fill with concrete mortar or grout to approval of Departmental Representative.

3.9 FILL TYPES AND COMPACTION

.1 Use types of fill as indicated or specified below. Compaction densities are percentages of maximum densities obtained from ASTM D 698.

.1 Under concrete slabs: Compact base course to 100 %.

.2 Retaining walls: use Type 2 fill to subgrade level on high side for minimum 500 mm from wall and compact to 95%. For remaining portion, use Type 3 fill compacted to 95%.

.3 Place unshrinkable fill in areas as indicated.

3.10 BEDDING AND SURROUND OF UNDERGROUND SERVICES

.1 Crushed or graded gravels to conform to following gradations:

Sieve Designation (mm dia.)	Percent Passing (%)
25.0	100
19.0	90-100
12.5	65-85
9.5	50-75
4.75	25-50
2.36	10-35
1.18	6-26
0.600	3-17
0.300	
0.075	0-5

.2 Recycled concrete free from contaminated and other extraneous material, conforming to the Type 1 gradations, may be used as pipe bedding and surround material.

.3 Other permissible materials: only where shown on Contract Drawings or directed by Departmental Representative shall other materials be used for bedding and pipe surround.

.4 Place bedding and surround material in unfrozen condition.

3.11 BACKFILLING

.1 Do not proceed with backfilling operations until completion of following:

.1 Departmental Representative has inspected and approved installations.

.2 Departmental Representative has inspected and approved of construction below finish grade.

.3 Inspection, testing, approval, and recording location of underground utilities.

.4 Removal of concrete formwork.

.5 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.

.2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.

.3 Do not use backfill material which is frozen or contains ice, snow or debris.

.4 Place backfill material in uniform layers not exceeding [150] mm compacted thickness up to [grades indicated]. Compact each layer before placing succeeding layer.

.5 Backfilling around installations:

.1 Place bedding and surround material as specified elsewhere.

.2 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.

.3 Place layers simultaneously on both sides of installed Work to equalize loading.

.4 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:

.1 Permit concrete to cure for minimum 14 days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from Departmental Representative or:

.2 If approved by Departmental Representative, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Departmental Representative.

.6 Consolidate and level unshrinkable fill with internal vibrators.

.7 Install drainage system in backfill as directed by Departmental Representative.

3.12 RESTORATION

.1 Upon completion of Work, remove waste materials and debris in accordance to Section 01 74 21 – Construction/Demolition Waste Management, trim slopes, and correct defects as directed by Departmental Representative.

.2 Replace topsoil as directed by Departmental Representative.

.3 Reinstate lawns to elevation which existed before excavation.

.4 Reinstate pavements and sidewalks disturbed by excavation to thickness, structure and elevation which existed before excavation.

.5 Clean and reinstate areas affected by Work as directed by Departmental Representative.

.6 Use temporary plating to support traffic loads over unshrinkable fill for initial 24 hours.

.7 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

END OF SECTION

ASPHALT PAVING – SHORT FORM

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 31 23 33.01 Excavating, Trenching and Backfilling.

1.2 MEASUREMENT AND PAYMENT

.1 This item will not be measured separately and will be included in the lump sum price.

1.3 REFERENCE STANDARDS

.1 For all reference standards listed below, the most recent version should be referred to unless stated otherwise.

.2 American Association of State Highway and Transportation Officials (AASHTO)

.1 AASHTO M320, Standard Specification for Performance Graded Asphalt Binder.

.2 AASHTO R29, Standard Specification for Grading or Verifying the Performance Graded of an Asphalt Binder.

.3 AASHTO T245, Standard Method of Test for Resistance to Plastic Flow of Asphalt Using Marshall Apparatus.

.3 Asphalt Institute (AI)

.1 AI MS-2, Asphalt Mix Design Methods.

.4 ASTM International

.1 ASTM C 88, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.

.2 ASTM D 698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)).

.5 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-8.1, Sieves Testing, Woven Wire, Inch Series.

.2 CAN/CGSB-8.2, Sieves Testing, Woven Wire, Metric.

.6 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.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for asphalt mixes and aggregate and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit viscosity-temperature chart for asphalt cement to be supplied showing either Saybolt Furol viscosity in seconds or kinematic viscosity in centistokes, temperature range 105 to 175 degrees C, four (4) weeks prior to beginning Work.

.3 Samples:

.1 Inform Departmental Representative of proposed source of aggregates four (4) weeks prior to beginning work, with certification that proposed source meetings material specifications of the Contract Documents.

.4 Test and Evaluation Reports:

.1 Submit manufacturer's test data and certification that asphalt cement meets specification requirements.

.2 Submit manufacturer's test data and certification that hydrated lime meets specified requirements.

.3 Submit asphalt concrete mix design and trial mix test results for Departmental Representative's review at least four (4) weeks prior to beginning work.

.4 Submit printed record of mix temperatures at end of each week.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Deliver and stockpile aggregates in accordance with erosion and sedimentation control plan and/or best practices. Stockpile minimum 25% of total amount of aggregate required before beginning asphalt mixing operation.

.3 When necessary to blend aggregates from one or more sources to produce required gradation, do not blend in stockpiles.

.4 Stockpile fine aggregate separately from coarse aggregate, although separate stockpiles for more than two mix components are permitted.

.5 Provide approved storage, heating tanks and pumping facilities for asphalt cement.

.6 Packaging Waste Management: remove for reuse and recycle all packaging materials that can be recycled in the local area.

Part 2 Products

2.1 MATERIALS

.1 Asphalt cement: to CAN/CGSB-16.3-M90, grade: 80-100.

.2 Reclaimed asphalt pavement;

.3 Crushed and screened so that 100% of RAP material passes 37.5mm screen before mixing.

.4 Aggregates: in accordance with Section 31 23 33.01 Excavating, Trenching and Backfilling.

.5 Crushed stone or gravel consisting of hard, durable, angular particles, free from clay lumps, cementation, organic material, frozen material and other deleterious materials.

.6 Gradations: within limits specified when tested to ASTM C 136 and ASTM C 117.

.7

Sieve Designation (mm)	% Passing	
	Lower Course	Upper Course
25	100	--
19	--	--
12.5	70-85	100
9.5	--	--
4.75	40-65	55-75
2.36	32-53	38-58
1.18	26-44	28-47
0.600	18-36	20-36
0.300	10-26	10-26
0.150	4-17	4-17
0.075	3-8	3-8

.8 Coarse aggregate: aggregate retained on 4.75mm sieve and fine aggregate is aggregate passing 4.75mm sieve when tested to ASTM C 136.

.9 When dryer drum plant or plant without hot screening is used, process fine aggregate through 4.75mm sieve and stockpile separately from coarse aggregate.

.10 Do not use aggregates having known polishing characteristics in mixes for surface courses.

.11 Sand equivalent: ASTM D 2419 Min: 40.

.12 Magnesium sulphate soundness: to ASTM C 88 Max % loss by mass after five cycles:

.13 Coarse aggregate: 15%

.14 Fine aggregate: 18%

.15 Los Angeles abrasion: Grading B, to ASTM C 131 Max % loss by mass:

.16 Coarse aggregate, upper course: 25%

.17 Coarse aggregate, lower course: 35%

.18 Absorption: to ASTM C 127 Max % by mass:

.19 Coarse aggregate, upper course: 1.75%.

.20 Coarse aggregate, lower course: 2.00%.

.21 Loss by washing: to ASTM C 117 Max % passing 0.075mm sieve:

.22 Coarse aggregate, upper course: 1.5.

.23 Coarse aggregate, lower course: 2.0.

.24 Flat and elongated particles: to ASTM D 4791, (with length to thickness ratio greater than 3): Max % by mass:

.25 Coarse aggregate, upper course: 10%.

.26 Coarse aggregate, lower course: 10%.

.27 Crushed fragments: at least 60% of particles by mass within each of following sieve designation ranges, to have at least 2 freshly fractured faces. Material to be tested according to ASTM C 136 and ASTM C 117. Determination of amount of fractured material will be in accordance with the British Columbia Ministry of Transportation and Highways' Specification I-11, Fracture Count for Coarse Aggregate, Method "B", which determines fractured faces by mass.

Passing		Retained on
25mm	To	12.5mm
12.5mm	To	4.75mm

.28 Regardless of compliance with specified physical requirements, fine aggregates may be accepted or rejected on the basis of past field performance.

.29 Mineral filler: Ensure finely ground particles of limestone, hydrated lime, Portland cement or non-plastic mineral matter approved by Departmental Representative are thoroughly dry and free from lumps.

.30 Add mineral filler when necessary to meet job mix aggregate gradation or as directed by Departmental Representative to improve mix properties.

.31 Ensure mineral filler is dry and free flowing when added to aggregate.

.32 Anti-stripping agent: hydrated lime to ASTM C 207 type N.

.33 Add lime at rate of approximately 2-3 % of dry weight of aggregate.

.34 Water: to approval of Departmental Representative.

2.2 EQUIPMENT

.1 Pavers: mechanical grade controlled self-powered pavers capable of spreading mix within specified tolerances, true to line, grade and crown indicated.

.2 Rollers: sufficient number of type and weight to obtain specified density of compacted mix.

.3 Vibratory rollers:

.4 Drum diameter: 1200mm minimum.

.5 Amplitude of vibration (machine setting): [0.5] mm maximum for lifts less than 40 mm thick.

.6 Haul trucks: sufficient number and of adequate size, speed and condition to ensure orderly and continuous operation and as follows:

.7 Boxes with tight metal bottoms.

.8 Covers of sufficient size and weight to completely cover and protect asphalt mix when truck fully loaded.

.9 In cool weather or for long hauls, insulate entire contact area of each truck box.

.10 Use only trucks which can be weighed in single operation on scales supplied.

.11 Hand tools:

.12 Lutes or rakes with covered teeth for spreading and finishing operations.

.13 Tamping irons having mass 12 kg minimum and bearing area not exceeding 310 cm² for compacting material along curbs, gutters and other structures inaccessible to roller. Mechanical compaction equipment, when approved by Departmental Representative, may be used instead of tamping irons.

.14 Straight edges, 4.5m in length, to test finished surface.

2.3 MIX DESIGN

.1 Mix design provided by the Contractor (to be developed by testing laboratory) for approval by Departmental Representative.

.2 Mix to contain maximum 20% by mass of RAP. Departmental Representative may approve higher proportion of RAP if Contractor demonstrates ability to produce mix meeting requirements of specification.

.3 Design of mix: by Marshall method to requirements.

.4 Compaction blows on each face of test specimens: 75.

.5 Mix physical requirements:

Property	Roads		
Marshall Stability at 60°C	kN min	5.5	Upper course
		6.4	Lower course
Flow Value	mm	2 – 4	
Air Voids in Mixture	%	3 – 5	Upper course
		3 – 6	Lower course
Voids in Mineral Aggregate	% minimum	15	Upper course 2
		14	Upper course 1
		14	Lower course 2
		13	Lower course 1
Index of Retained Stability	% minimum	75	

.6 Measure physical requirements as follows:

.7 Marshall load and flow value: to ASTM D 1559.

.8 Air voids: to ASTM D 3203.

.9 Index of Retained Stability: measure in accordance with Marshall Immersion Test (ASTM D 1559).

.10 Do not change job-mix without prior approval of Departmental Representative. When change in material source proposed, new job formula to be submitted for review by Departmental Representative.

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 asphalt paving in accordance with manufacturer's written instructions.

.2 Visually inspect substrate in presence of Departmental Representative

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

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

3.2 FOUNDATIONS

.1 Foundations for roadways comprise:

.1 300 mm compacted thickness of granular subbase (Type 2).

.2 150 mm compacted thickness of granular base (Type 1).

.2 Foundations for parking lots to comprise:

.1 300 mm compacted thickness of granular base (Type 1).

.3 Compaction: compact each lift of granular material to 100% Standard

3.3 PAVEMENT THICKNESS

.1 Pavements for roadways:

.1 Base course: 50 mm HL8 or MB2.

.2 Wear course: 40 mm HL3 or MB5.

.2 Pavements for parking lots:

.1 Wear course: 50 mm HL3 or MB5.

3.4 TRAFFIC MARKINGS

.1 Paint parking space divisions and other pavement markings in accordance with manufacturers' recommendations and as indicated.

.2 Use paint thinner in accordance with manufacturer's requirements.

3.5 CLEANING

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

.3 Waste Management: separate waste materials for reuse and recycling as appropriate.

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

END OF SECTION

APPENDIX A

Asbestos-Containing Materials Survey

E0691-690 Old Hope Princeton Highway, BC RCMP-Detachment

March 29, 2019

Internal Ref: 660579

PSPC Ref: R.101470.001

Prepared for:

Public Services and Procurement Canada

Prepared By:

John Baak, B.Sc., R.P.Bio.
Project Scientist
Environment & Geoscience
Infrastructure

Reviewed By:

Tim Drozda, P.Eng.
Project Manager
Environment & Geoscience
Infrastructure

Doug McMillan, M.Sc., P.Ag.
Senior Project Manager
Environment & Geoscience
Infrastructure

BRITISH COLUMBIA 2249 Douglas McMillan Mar 29/19 P.Ag. INSTITUTE OF AGROLOGISTS

SNC·LAVALIN

Executive Summary

At the request of Public Services Procurement Canada (PSPC) on behalf of the Royal Canadian Mounted Police (RCMP), SNC-Lavalin Inc. (SNC-Lavalin) has completed a non-destructive Asbestos-Containing Materials Survey (the "Survey") for the RCMP Detachment (the "Building") located at 690 Old Hope Princeton Highway, BC (the "Site"). SNC-Lavalin understands that the purpose of the work was to complete a Survey of the Building to identify potential Asbestos Containing Materials (ACMs) and the cost of abating those ACMs requiring immediate action based on the ACM Action Matrix detailed in Section 6.2. The scope of work assists the RCMP in complying with federal and provincial requirements and the Asbestos Management Plans (AMPs). An inventory of the location and condition of all ACMs is required for all buildings managed by the RCMP.

Between January 3rd and 4th, 2019, SNC-Lavalin completed a Survey of the detachment Building. The Building was observed for the potential existence of ACMs. Due to confined space restrictions, the crawlspace areas were not assessed; however, visual identification of potential materials was completed from outside the access hatches. Roofing materials were not within the scope of this non-destructive Survey.

Based on the results of the Survey, there are ACMs within the Building requiring specific procedures prior to deconstruction/demolition for handling, abatement, demolition, and disposal.

Summary of Findings and Recommendations:

Identified ACMs and associated actions are summarized below.

ACM	Action Required
Red Mastic – HVAC duct insulation	Routine Surveillance
Grey Mastic – bottom of Telus panel in the electrical room, north wall	Routine Surveillance
Black Mastic – window pane to frame	Routine Surveillance
White Mastic – around windows of building exterior	Routine Surveillance
Black/ Gold Mastic – underside of sink	Routine Surveillance
Suspect ACMs Identified (not confirmed)	
Fire Doors (28) within Building	Routine Surveillance

A detailed summary and recommendations for the management of each hazardous material identified is presented in Table 3 of Section 6.

The following should be noted:

- Any additional materials found in the building similar to those identified above as asbestos-containing that were not identified in the current survey should be considered as asbestos-containing. No other similar materials were observed during the current survey.
- Due to confined space restrictions, and access restriction some attic and crawlspace areas could assessed; however, visual identification of potential materials was completed from points of entry. As such, asbestos and/or lead-containing materials may be present within the attic and crawlspace areas.
- Roofing materials were not assessed as part of this non-destructive survey.

Based on the results of the ACM Action Matrix, none of the identified ACMs are classified as requiring "Immediate Action"; therefore, a Remedial Options Analysis and Class C Estimate are not required.

SNC·LAVALIN

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1 Introduction

At the request of Public Services and Procurement Canada (PSPC) on behalf of the Royal Canadian Mounted Police (RCMP), SNC-Lavalin Inc. (SNC-Lavalin) has completed a non-destructive Asbestos-Containing Materials Survey (the "Survey") for the RCMP Detachment (the "Building") located at 690 Old Hope Princeton Way, BC (the "Site"). Photographs are provided in Appendix I.

SNC-Lavalin understands that the purpose of the work was to complete a Survey of the detachment Building to identify potential Asbestos Containing Materials (ACMs) and provide the estimated costs of abating those ACMs requiring action. The scope of work assists the RCMP in complying with federal and provincial requirements and the Asbestos Management Plans (AMPs). An inventory of the location and condition of all suspected ACMs is required for all buildings managed by the RCMP.

The Building is a 672 m^2 single storey slab on grade structure with attic access above the boiler room. The age of the Building is unknown. The Site currently houses RCMP operations and equipment storage. The main floor consists of offices, locker rooms, interview rooms, exhibits areas, cells, victim's assistance and visitor's room, a cardio/ training room, boiler room, and an electrical room.

The attic space opens into the pitch of the roof with drywall covered walls. The exterior of the Building is constructed of cinder blocks with interior framed drywall walls, and ceilings of mixed drywall and ceiling tile. The roof is torch-on asphalt and resin.

A summary of the Building information provided by PSPC and RCMP is presented below:

Table 1: RCMP Building Description

Building Information	Description
Building Number (RPIS #)	E0691
Building Name/Type	Detachment
Address	690 Old Hope Princeton Highway, BC
Building Size	672 m2
Year Constructed	unknown
Description	Concrete and cinder block construction. Sealed torch-on roofing materials

Refer to appended photographs 1 through 10 and Drawings 660579-E0691-001 and 660579-E0691-002 for an overview of the Site and facilities. No previous Asbestos-Containing Materials Surveys appear to have been completed for the Building.

All work was completed as per SNC-Lavalin's proposal entitled Royal Canadian Mounted Police RCMP 'E' Division- Asbestos Assessments 2018-2019. Project No. R.101470.001, dated November 26, 2018 under the Contract for Task Authorization CTA EZ897-170760/002/PWY with PSPC.

The scope of work for the Survey included review of the documents supplied to SNC-Lavalin with the *Request for Proposal, Royal Canadian Mounted Police RCMP 'E' Division- Asbestos Assessments 2018-2019 (R.101470.001),* hereafter referred to as "the PSPC RFP". All work was completed based on the requirements of the PSPC RFP.

2 Scope of Work

Between January 3rd and 4th 2019, SNC-Lavalin personnel surveyed the Building to identify the potential existence of ACMs. Other hazardous materials and designated substances were outside the scope of work and were not included in the Survey.

Representative samples were collected and laboratory analyses completed for suspected ACMs.

The Survey was completed in general accordance with the following documents:

- *Occupational Health and Safety Regulation B.C. Reg. 296/97;*
- WorkSafeBC publication *Safe Work Practices for Handling Asbestos*. Workers' Compensation Board of British Columbia, 2017 edition;
- *ASTM E2356-14, Standard Practice for Comprehensive Building Asbestos Surveys*, ASTM International, West Conshohocken, PA, 2014;
- *Canadian Occupational Health and Safety Regulations SOR/86-304*;
- *RCMP Asbestos Management Plan*, dated February 2, 2018; and
- *DP 057 – Asbestos Management, National Joint Council (NJC) of the Public Service of Canada, dated 1997-12-03.*

3 Regulatory Framework

Federal and provincial regulations require that regulated building materials including Asbestos be properly identified and managed to prevent potential exposure to workers. In addition, a more intrusive survey is required to identify ACMs prior to renovations, salvage, or demolition of a building or structure. These ACMs 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 ACMs:

Federal

Various Regulations made under the Canadian Environmental Protection Act (CEPA), 1999, S.C. 1999, c. 33, last amended on February 12, 2018, including specialized handling and/or disposal requirements for materials including solid/hazardous wastes. Regulations include the following:

- *Employee and Social Development Canada (ESDC), Canada Labour Code Part II, Canada Occupational Health and Safety Regulations, Section 125.1* states it is the duty of employers that all hazardous substances in the workplace, including asbestos, be identified, controlled, and stored 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.
- *Transportation of Dangerous Goods Act (TDGA), enacted 1992, c. 34*, last amended on January 1, 2017, and Transportation of Dangerous Goods Regulations, including amendments up to SOR/2017-253.

Provincial

- *WorkSafeBC Occupational Health and Safety Regulation (OHSR)*, BC Reg. 296/97, including amendments up to B.C. Reg. 143/2017, January 1, 2018, requires that ACMs 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)*, SBC 2003, Chapter 53, assented to October 23, 2003, as amended.
- *Hazardous Waste Regulation (HWR),* B.C. Reg. 63/88, including amendments up to B.C. Reg. 243/2016, November 1, 2017, requires all Hazardous Wastes (HW) must be properly managed and disposed of.

Asbestos

We note that at the time of this report, the provincial OHSR defines an 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.

The federal OHSR defines an ACM as any article that is manufactured and contains 1% of more asbestos by weight at the time of manufacture or that contains a concentration of 1% or more asbestos as determined in accordance with Method 9002 set out in the document entitled NIOSH Manual of Analytical Methods.

The federal government has in place an asbestos standard (DP-057) that states the federal government defer to provincial legislation for the definition of ACM. Therefore, for the purposes of this report the WorkSafeBC criterion of 0.5% by weight has been used to identify ACM.

4 Methodology

4.1 Asbestos-Containing Materials Survey

The methodology for completing the Asbestos-Containing Materials Survey included the identification of suspect materials and collection of an adequate number of representative samples of these materials. All accessible areas of the Building were observed for possible ACMs, with the exception confined spaces. Wherever possible, wall cavities were inspected for the possible presence of vermiculite insulation via pre-existing perforations. Underground asbestos-containing pipes may be present at the Site; however, identifying potential underground ACM was beyond the scope of this survey.

Samples for laboratory analysis to determine asbestos content were collected in sealable plastic bags, labelled and transported under chain of custody control to International Asbestos Testing Laboratories (iATL), of Mount Laurel, New Jersey. Analysis of bulk samples for determination of asbestos content was performed using polarized light microscopy (PLM) procedures in accordance with the WorkSafeBC OHSR using the US Environmental Protection Agency (US EPA) Test Method EPA/600 R-93/116: Method for the Determination of Asbestos in Bulk Building Materials, July 1993. Note, the NIOSH test method 9002[1] as referenced by the federal OHSR is recognized as being similar to EPA Test method EPA/600 R-93/116. Positive stop testing methodology was employed for all asbestos samples submitted, where if the first sample of a group of similar representative samples is confirmed to be asbestos-containing; the remaining samples in that group will not be analyzed and will also be considered asbestos-containing.

Vinyl flooring was first analysed by PLM procedures described above, and when asbestos was not detected, Transmission Electron Microscopy (TEM) analysis (Method NYSDOH-ELAP 198.4, 2009) was also conducted on one sample per type of vinyl flooring. TEM analysis is able to yield more precise analytical results, especially at low asbestos concentrations, and helps to rule-out false negatives when performing analysis on such material. Vinyl floor tiles may contain fibres too small to be identified by PLM (<0.25 µm in diameter), detection of those fibres by this method may not be possible[2].

Vermiculite, where encountered, was analysed in accordance with the applicable regulations using the US Environmental Protection Agency (US EPA) Test Method EPA/600 R-04/004.

Between January 3rd and 4th, 2019, a total of 170 samples were collected from the detachment building for analysis of asbestos content by PLM.

[1] NIOSH Manual of Analytical Methods, Fourth Edition, Method 9002, Asbestos (bulk), Issue 2, dated 15 August 1994.
[2] EPA, Method for the Determination of Asbestos in Bulk Building Materials, EPA/600 R-93/116, 1993.

4.2 ACM Action Matrix and Action Descriptions

The Action Matrix and Action Descriptions (the "Matrix") criteria rating for asbestos was used to evaluate the hazard of each ACM in the Building. The method followed is outlined in the document entitled *RCMP Asbestos Management Plan,* dated February 2, 2018 (Asbestos Management Plan). The following factors are incorporated into the Matrix:

- Friability of material;
- Condition of material;
- Accessibility of material;
- Potential for disturbance of material; and
- Debris from ACM.

Based on the Matrix action system ACMs are divided into seven categories;

1. Immediate Clean-up of Debris that is Likely to be Disturbed;
2. Entry into Areas with ACM Debris—Moderate Risk Precautions;
3. ACM Removal Required for Compliance;
4. Access into Areas Where ACM is Present and Likely to be Disturbed by Access—Moderate Risk Precautions;
5. Proactive ACM Removal;
6. ACM Repair; and
7. Routine Surveillance.

A summary of the Action Matrix and Action Descriptions used by SNC-Lavalin to evaluate the hazards is provided in Appendix III. For more details refer to the RCMP Asbestos Management Plan.

5 Previous Surveys

No previous surveys were made available to SNC-Lavalin at the time of this report. SNC-Lavalin understands that no prior surveys have been conducted at the Building.

6 Results and Discussion

6.1 Asbestos-Containing Materials Survey

Details of the results are presented for ACM in the tables below. All suspect ACM samples were given the prefix "E0691-"; for conciseness, this prefix has been omitted from the tables and drawings. The sample locations are presented on Drawing 660579-E0691-003. Select photographs of the sample locations or other observations of note are included in Appendix I. Copies of the laboratory analytical reports for the results of the ACM analyses are included in Appendix II.

Between January 3rd and 4th, 2019, a total of 170 representative bulk samples of material were collected from the Building by SNC-Lavalin and submitted for laboratory analysis.

The potential for unidentified ACM within inaccessible portions of the Building (e.g., within wall cavities) and equipment exists. Underground asbestos-containing cement pipes or cast iron piping with ACM-containing bell-end packing may also be present at the Site. Identification of potential ACMs below ground was not within the scope of this report and should be addressed during any excavation at the Site. Where accessible, existing cinder block wall cavities were observed to be empty; however, it is possible that ACMs (e.g., vermiculite) may be encountered in non-accessible areas. The roof of Building was not part of the scope of this report and will require further assessment prior to any future renovations or demolition/deconstruction activities.

No vermiculite was identified during the Survey.

Results of bulk sample analysis for asbestos content are provided in Table 2.

Table 2: Results of Bulk Sample Analysis

Issue / Location	Results
ASBESTOS-CONTAINING MATERIALS (ACMs)	
Asbestos Identified-Current Survey:	Analytical Result
› **A6 – Red Mastic – HVAC ducts** › **A7 and A8 collected from similar material and, therefore, considered to be ACMs.**	› **10% Chrysotile**
› **A29 – Grey Mastic –bottom of Telus panel in the electrical room, north wall (photo 12)** › **A30 and A31 collected from similar material and, therefore, considered to be ACMs.**	› **25% Chrysotile**
› **A123 – Black Mastic – window pane to frame** › **A124 and A125 collected from similar material and, therefore, considered to be ACMs.**	› **4.5% Chrysotile**
› **A128 – White Mastic – around windows of building exterior (photo 14)** › **A129 and A134 collected from similar material and, therefore, considered to be ACMs.**	› **0.75% Chrysotile**
› **A156 – Black/ Gold Mastic – underside of sink in cell block (photo 15)** › **A157 and A158 collected from similar material and, therefore, considered to be ACMs.**	› **1.2% Chrysotile**
Asbestos NOT Identified:	Analytical Result:
› A3, A4, A5 – Grey mastic, window pane to frame	› non-asbestos
› A9, A10, A11 – ceiling tiles Type 2	› non-asbestos

Table 2: Results of Bulk Sample Analysis

Issue / Location	Results
› A12, A13, A14 – ceiling tiles Type 3 – large holes, debris, ceiling space	› non-asbestos
› A16, A17, A18 – grey floor levelling compound	› non-asbestos
› A19, A20, A21 – white mastic beneath carpet	› non-asbestos
› A22, A23, A24 – white DJC (drywall joint compound), wall and ceiling samples	› non-asbestos
› A25 – black vinyl cove base	› non-asbestos
› A26, A27, A28 – grey mortar in the electrical room, northwest wall	› non-asbestos
› A32, A33, A34 – white thin set, tiles	› non-asbestos
› A35, A36, A37 – grey mortar between tiles	› non-asbestos
› A52, A48 – DJC suspect original compound – detachment attic	› non-asbestos
› A49, A50, A51 – grey mastic- new HVAC- in the detachment attic, south	› non-asbestos
› A53, A54, A55 – mastic, DSC –like off-white, HVAC drywall in the detachment attic,	› non-asbestos
› A56, A57, A58 – mastic, yellow, HVAC duct in the detachment attic	› non-asbestos
› A59, A60, A61 – grey mastic on HVAC duct in the detachment attic	› non-asbestos
› A62, A63, A64 – replacement pipe elbows – white mastic over fibreglass mesh– detachment attic	› non-asbestos
› A65, A66, A67 – vinyl sheet flooring grey and white patterned (flecked)	› non-asbestos
› A68, A69 – Black vinyl cove base with mastic	› non-asbestos
› A70, A71, A72 – flooring samples room	› non-asbestos
› A73, A74, A75 – yellow mastic and carpet adhesive	› non-asbestos
› A76, A77, A78 – blue vinyl sheet flooring	› non-asbestos
› A79, A80 – blue VSF	› non-asbestos
› A81, A82, A83 – ceiling tiles Type 3.	› non-asbestos
› A84, A85 – Blue VSF	› non-asbestos
› A86, A87, A88 – 1'x1' ceiling tiles, off white to light grey	› non-asbestos
› A89 – mastic, white, beneath counter tops	› non-asbestos
› A90, A91 – counter top Type 1	› non-asbestos
› A92, A93, A94 – mastic, light grey	› non-asbestos
› A95, A96, A97 – fabric coating over drywall, tan	› non-asbestos
› A98, A99, A100 – grout in the shower enclosure	› non-asbestos
› A101, A102, A103 – tan coloured vinyl sheet flooring and white mastic	› non-asbestos
› A104- black mastic, located between window pane and	› non-asbestos
› A105, A106, A107 – floor leveling compound, light grey	› non-asbestos
› A108, A109, A110 – mastic underlayment beneath rubber mats	› non-asbestos
› A111, A112, A113 – Vinyl sheet flooring, tan with clear mastic, void.	› non-asbestos
› A114, A115, A116 – DJC, white	› non-asbestos

Table 2: Results of Bulk Sample Analysis

Issue / Location	Results
› A117, A118, A119 – white and yellow mastics beneath the carpet	› non-asbestos
› A120, A121, A122 – mortar, light grey collected from the floor	› non-asbestos
› A126, A127, A130 – mortar, north exterior walls, light grey	› non-asbestos
› A131, A132, A133 – mastic, light grey exterior wall filler	› non-asbestos
› A135, A136, A137 – Parging, grey around bolts on exterior wall	› non-asbestos
› A144, A145, A146 – mastic, brown, chimney base on roof	› non-asbestos
› A147, A148, A149 – mastic, grey, located behind the electrical service box of the main building roof.	› non-asbestos
› A150, A151, A152 – black vinyl cove base with white mastic	› non-asbestos
› A153, A154, A155 – DJC, white	› non-asbestos
› A159, A160, A161 – mastic, white, DJC-like, patch around piping	› non-asbestos
› A162, A163, A164 – mastic, yellow, around fluorescent light	› non-asbestos
› A165, A166, A167 – mastic, black, between pane and frame window in door	› non-asbestos
› A168, A169, A170 – grout, white	› non-asbestos
› A171, A172, A173 – grout, white	› non-asbestos
› A174, A175, A176 – mastic, grey, cell door window, pane to frame	› non-asbestos
› A177, A178, A179 – parging, grey water line perforation of exterior cinder block wall	› non-asbestos
Suspect ACMs not sampled: › Inaccessible portions of the Building including ceiling spaces › Approximately 28 fire doors were identified in the Building which may contain ACM packing material. › Underground asbestos-containing cement pipes or cast iron piping with ACM-containing bell-end packing.	Analytical Result: › N/A

Notes:
Bold indicates sample with asbestos content greater than or equal to 0.5%.

ACMs were identified at the Site in the following areas:

- Red mastics on HVAC ducts in the north side of the corporals offices;
- Grey mastic at the bottom of the Telus panel in the electrical room;
- Black mastic on the window pane/ frame in the reception/ public entry;
- White mastic around windows of the Building exterior; and
- Black and gold mastic on the underside of the sink in the cell block.

Identified suspect ACMs (not sampled) include the following:

- Fire doors (28)

The mastics are non-friable. Removal of the mastics can be performed as a moderate risk work activity as specified in B.C. Reg. 296/97 if the work is to be done using non-powered, hand-held tools. If the removal, alteration, and/or disturbance be completed using power tools, the work should be classified as a moderate or high risk activity.

The Survey completed was a non-destructive ACM survey and should only be used to identify accessible existing ACMs and their condition for inclusion in an AMP and potential remediation based on the risk assessments completed below in Section 6.2. Should the RCMP intend to complete renovations or

deconstruction/demolition at the Site, an additional destructive Survey would be required prior to proceeding with the work.

Based on recommendations from the risk assessments completed for identified ACMs, if abatement is required, SNC-Lavalin recommends that the ACMs identified be removed and disposed of by a qualified contractor in accordance with applicable federal and/or provincial regulations. All work should be completed in accordance with the Canada Labour Code [Sections 124(1) and 125(1) Z.14], which is in place to protect any person accessing the work place. Control of exposure to asbestos is governed by the WorkSafeBC Occupational Health and Safety Regulation (OHSR), BC Reg. 296/97 (as amended) and the provincial Hazardous Waste Regulation. Additional guidance is provided in the WorkSafeBC publication *Safe Work Practices for Handling Asbestos.*

If required, the abatement contractor should file a Notice of Project for Asbestos (NOPA) with WorkSafeBC prior to any asbestos abatement work taking place. Documentation should be provided by the abatement contractor and retained by RCMP to verify compliance with the applicable regulations.

All materials found at the Site of similar properties as those identified to be ACMs should be considered to be ACMs.

6.2 ACM Action Matrix

A Matrix was completed for each identified ACM using the Survey methodology outlined in the document, *RCMP Asbestos Management Plan, dated February 2, 2018*. The results of the ACM assessment Matrix is provided in Table 3. A summary of the Action Matrix and Action Descriptions used by SNC-Lavalin to evaluate the hazards is provided in Appendix III. For more details refer to the RCMP Asbestos Management Plan.

Based on the results of the ACM Action Matrix, none of the identified ACMs are classified as requiring “Immediate Action”; therefore, a Remedial Options Analysis and Class C Estimate are not required.

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Table 3: Summary of Asbestos Containing Materials and Hazard Assessment

Sample ID, Material, & Location	Asbestos Content	Estimated Quantity	Friable ACM Condition	Access	Debris	Action
A6 – Red Mastic – HVAC duct insulation north side in Corporal's offices	**10% Chrysotile**	<1kg	**Good** Fair Poor	A,B, C exposed, **C concealed**, D	Yes **No**	**7: Routine Surveillance**
A29 – Grey Mastic –bottom of Telus panel in the electrical room, north wall	**25% Chrysotile**	~250 ml	**Good** Fair Poor	A,**B**, C exposed, C concealed, D	Yes **No**	**7: Routine Surveillance**
A123 – Black Mastic – window pane to frame in reception/ public entry	**4.5% Chrysotile**	two windows	**Good** Fair Poor	**A**,B, C exposed, C concealed, D	Yes **No**	**7: Routine Surveillance**
A128 – White Mastic – around windows of building exterior	**0.75% Chrysotile**	26 windows	**Good** Fair Poor	**A**,B,C, C exposed, C concealed, D	Yes **No**	**7: Routine Surveillance**
A156 – Black/ Gold Mastic – underside of sink in cell block	**1.2% Chrysotile**	<250 ml	**Good** Fair Poor	**A**,B,C, C exposed, C concealed, D	Yes **No**	**7: Routine Surveillance**
Suspect ACM fire doors (28), within Building	**Unknown**	28 doors	**Good** Fair Poor	A,B,C, C exposed, C concealed, **D**	Yes **No**	**7: Routine Surveillance**

Notes: Refer to Appendix III for description of the Matrix assessment methodology action rating criteria.
For non-friable material in GOOD condition, Action 7 – Routine Surveillance is recommended regardless of accessibility.

Action	
1: Immediate Cleanup of Debris that is Likely to be Disturbed	4: Access into Areas Where ACM is Present and Likely to be Disturbed by Access—Moderate Risk Precautions
2: Entry into Areas with ACM Debris—Moderate Risk Precautions	5: Proactive ACM Removal
3: ACM Removal Required for Compliance	6: ACM Repair
	7: Routine Surveillance

7 Recommendations and Conclusions

Based on the results of the Survey, the Building contains ACMs requiring specific procedures prior to renovation, demolition, or deconstruction activities for handling, abatement, demolition, and disposal. SNC-Lavalin recommends the following based on the findings of the Survey outlined in this report:

1: Ensure that all ACM identified at the Site are managed as discussed below. If any renovation, deconstruction, and/or demolition activities are to take place, an additional destructive Survey must be completed prior to initiation of the work. All work must be completed in accordance with the work practices and procedures specified in B.C. Reg. 296/97 and outlined in WorkSafe BC publication *Safe Work Practices for Handling Asbestos*.

If required, the abatement contractor should file a NOPA with WorkSafeBC prior to any asbestos abatement work taking place as a result of the Action Matrix results.

The action rating results for identified ACMs based on the RCMP Asbestos Management Plan discussed in Section 4.1 are as follows:

Table 4: Summary of Action Matrix and Action Descriptions

ACM	Action Required
Red Mastic – HVAC duct insulation	Routine Surveillance
Grey Mastic –bottom of Telus panel in the electrical room, north wall	Routine Surveillance
Black Mastic – window pane	Routine Surveillance
White Mastic – around windows of building exterior	Routine Surveillance
Black/ Gold Mastic	Routine Surveillance
Suspect ACMs Identified (not confirmed)	
Fire Doors (28) within Building	Routine Surveillance

Regulated ACMs are present in the Building at the Site. Qualified personnel should be sought to complete any works disturbing the regulated materials identified within this report. Prior to any work disturbing the ACMs an abatement plan should be prepared including safe handling and disposal procedures, following the applicable laws and regulations. Additionally, implementation of an Asbestos Management Plan and regular condition assessments as described in the RCMP Asbestos Management Plan is recommended.

Additional sampling should be conducted on suspect ACMs to determine if asbestos is present in those materials. All suspect materials should be considered ACMs until further testing can prove otherwise.

8 Notice to Reader

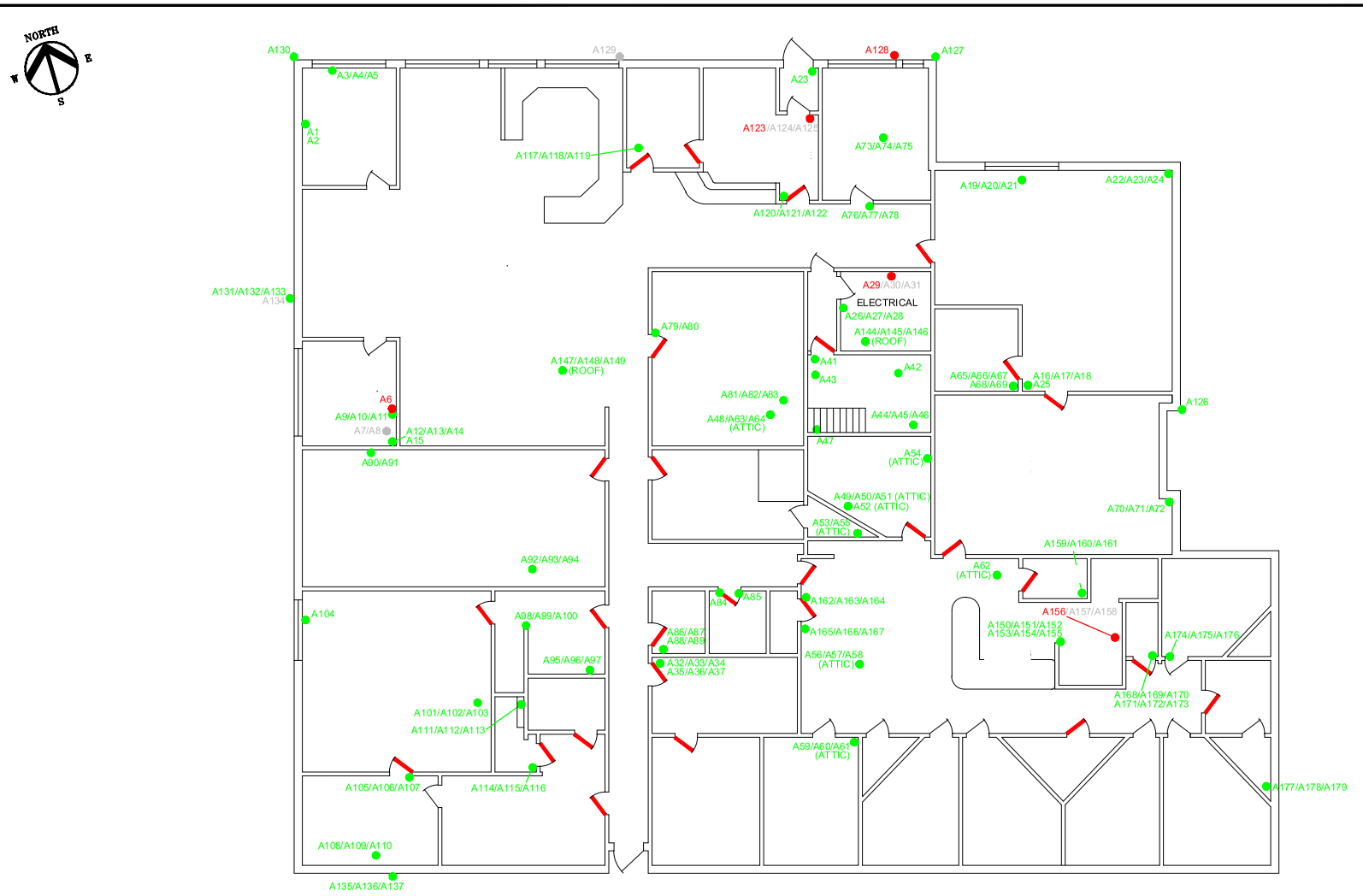
This report has been prepared by SNC-Lavalin Inc. (SNC-Lavalin) for Canada, who has been party to the development of the scope of work for this project and understands its limitations. Copyright of this report vests with Her Majesty the Queen in Right of Canada. This report was prepared in accordance 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. They have been prepared for specific application to this site and are based, in part, upon visual observation of the site and specific analysis of hazardous building material samples as described in 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.



LEGEND

- A1 ASBESTOS SAMPLE WITH CONCENTRATION LESS THAN 0.5%
- A1 ASBESTOS SAMPLE WITH CONCENTRATION GREATER THAN OR EQUAL TO 0.5%
- A1 SAMPLE NOT ANALYZED
- CONFIRMED OR SUSPECT FIRE DOOR

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. ALL LOCATIONS ARE APPROXIMATE.

REFERENCE DRAWINGS

DWG. NO.	DATE	DESCRIPTION
–	–	–

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
1	2019-03-27	ISSUED AS FINAL	DR	DM
0	2019-02-26	ISSUED AS DRAFT	PRT	MAH

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CLIENT NAME: PUBLIC SERVICES AND PROCUREMENT CANADA

PROJECT LOCATION: 690 HOPE PRINCETON HWY HOPE, BC

TITLE: **BUILDING MATERIAL SURVEY SAMPLING PLAN - E0691 - MAIN FLOOR**

DWN BY: PRT | SCALE: N.T.S. | DATE: 2019-01-10 | DWG No: 660579-E0691-003 | REV.: 1

CHK'D: CP | PLOT: 20190329.1138 | CADFILE: 660579-BM2

PATH: D:\PWGSC-660579-RCMP-ISLAND-HAZMAT\CAD\660579-BM2.DWG

APPENDIX B

Stantec

PROJECT-SPECIFIC HAZARDOUS BUILDING MATERIALS ASSESSMENT
SITE REVIEW REPORT

Client:	PSPC on behalf of RCMP	PSPC Contract #	R.109467.001
Stantec Site Assessor:	Kim Wiese	Stantec Project #:	123221493
		Date of Site Visit:	December 17, 2019
Location:	E0691—RCMP Detachment Generator, 690 Hope Princeton Hwy, Hope, BC	Date of Issue:	February 13, 2020

Project Name: **Pre-Renovation Hazardous Building Materials Assessment**
E0691—RCMP Detachment Generator, 690 Hope Princeton Hwy, Hope BC

Stantec was retained by Public Services and Procurement Canada (PSPC) on behalf of the Royal Canadian Mounted Police (RCMP) to provide a pre-renovation hazardous building materials assessment within E0691—RCMP Detachment Generator, 690 Hope Princeton Hwy, Hope BC (subject structure), which is presumed to have been constructed along with the detachment (1977).

Stantec understands that information pertaining to the identity, location and approximate extent of hazardous building materials (if any) within the subject structure is not on-file. Stantec further understands that a renovation project is planned, which may impact various building materials as summarized below (the Project):

- Replacement of current generator, which is not anticipated to impact building materials or finishes associated with the detachment structure, but which will involve disturbance to all aspects of the generator itself, as well as the connection cables to the detachment structure.

PSPC commissioned this assessment on behalf of the RCMP as a measure of diligence in maintaining compliance with the following, as they pertain to identifying hazardous building materials in support of renovation projects:

- Canada Labour Code, Part II Canada Occupational Health and Safety Regulations (COHSR)
- British Columbia's Occupational Health and Safety Regulation (BC Reg. 296/97)
- WorkSafeBC 2017 publication *Safe Work Practices for Handling Asbestos* (BC Asbestos Guide)
- PSPC June 5, 2017 Asbestos Management Standard (AMS) and Asbestos Management Directive (AMD)

The information provided herein is to be considered supplemental to the information regarding hazardous building materials within the subject structure as provided in the following report:

- SNC Report No. 660579 entitled *Asbestos- Containing Materials Survey, E0691-690 Old Hope Princeton highway, BC RCMP Detachment,* dated March 29, 2019, prepared for Public Services and Procurement Canada (Previous Report)

BACKGROUND, STANDARDS, SCOPE AND METHODOLOGY

Site work was conducted in general compliance with the requirements of the COHSR, BC Reg. 296/97, the BC Asbestos Guide, the PSPC AMS and AMD, and Stantec's Safe Work Practices (SWPs).

Mechanical systems, structures and finishes within the subject structure were visually examined to determine the suspected presence of the following potential hazardous building materials, specific to those building materials anticipated to be impacted by the Project:

- Asbestos-containing materials (ACMs)
- Lead, including lead-containing paints (LCPs)
- Other hazardous building materials including electrical equipment containing polychlorinated biphenyls (PCBs); building materials impacted by mould; electrical items containing mercury; equipment that may contain ozone- depleting substances (ODSs); and materials presumed to contain silica.

Applicable standards for each hazardous building material considered during this assessment are summarized below, along with the scope and methodology completed pertaining to those materials, during this assessment.

- Asbestos
  - Asbestos is a naturally occurring form of fibrous silicate that is durable and flexible; has high thermal and tensile strength; is resistant to heat, chemical corrosion and friction; does not conduct electricity; and insulates well against condensation, heat and noise. Due to these properties, asbestos was used in over 3,000 commercial products, and it is estimated that approximately 70% of the asbestos that was used in North America was used in building materials.
  - Undisturbed asbestos within building materials poses no health risks. Asbestos poses a risk when building materials containing asbestos are impacted, or disturbed, thereby releasing the asbestos fibres into the air.
  - Asbestos-related diseases are caused when suspended airborne asbestos fibres are inhaled and the fibres settle into various regions of the lungs and remain for extended periods. Once embedded in the lungs the asbestos fibres cause scarring within the lung tissue, ultimately leading to impaired lung function (asbestosis) and/or various cancers (lung cancer; mesothelioma).
  - The presence of asbestos in federal workplaces and pertaining to federally regulated workers is governed by the COHSR. According to the COHSR, ACM means:
    - Any article that is manufactured and contains 1% or more asbestos (by weight) at the time of manufacture, or any material that contains 1% or more asbestos when tested in accordance with accepted methods.
  - The presence of asbestos in the workplace in British Columbia pertaining to provincially regulated workers is governed by BC Reg. 296/97. According to the current version of BC Reg. 296/97, ACM means:
    - Any material containing at least 0.5% asbestos, or vermiculite insulation with any asbestos
  - As both federally regulated workers and provincially regulated workers (e.g., contractors) are expected to carry out work activities within the subject structure, and as the provincial regulations have a more stringent definition of ACM, and generally include the requirements noted in the COHSR, this assessment was conducted to meet the requirements of BC Reg. 296/97.
  - Where observed, samples were collected from each "homogenous application" of suspected ACMs (materials suspected to contain asbestos that are uniform in material type, colour, texture application and estimated installation date) and submitted to EMSL Canada Inc. (EMSL) in Burnaby, British Columbia for analysis of asbestos content using polarized light microscopy (PLM) with dispersion staining, in accordance with the United States Environmental Protection Agency (EPA) 600/R-93/116 analytical method "Asbestos (bulk) by PLM." EMSL's analytical laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP).

  - The number of samples collected for each homogenous application of a suspected ACM was based on the recommendations provided in the BC Asbestos Guide along with the assessor's experience and understanding of the consistency of the observed building material applications.
    - When asbestos is detected in concentrations greater than 0.5% in one of the samples within a set that was collected to represent a "homogenous application" of a particular material (or detected in any concentration, in a set of samples collected for applications of vermiculite), the entire sample set, and the entire application of that material is then considered to be an ACM.
- Lead
  - Lead is commonly found in buildings in items such as the solder used on copper domestic pipes; the caulking on bell fittings of cast iron drainage pipes; electrical equipment/wiring; batteries (e.g., emergency exit signage batteries); lead sheeting (e.g., x-ray rooms); vent and pipe flashings; and paints and ceramic tile glazes
  - Elemental lead and inorganic lead compounds are absorbed through ingestion or inhalation and can incorporate into the bone marrow, nerve tissue, brain, and kidneys, causing a variety of health effects.
  - Excessive airborne lead and surface contamination can be transferred to employees' hands and may results in lead inhalation or ingestion. Typically, regimented work practices are developed and implemented to minimize airborne and surface lead concentrations during work that may impact lead and lead-containing coatings.
  - Under the COHSR and BC Reg. 296/97, a regulatory limit has been established for occupational exposure to airborne lead that may be present in a workplace. The occupational exposure limit (OEL) for airborne lead dust or fumes per both regulatory instruments should not exceed the time-weighted average value of 0.05 milligram per cubic metre of air (mg/m^3). The OEL represents the time-weighted average concentration for a conventional 8-hour workday and a 40-hour workweek, to which it is believed that nearly all workers may be repeatedly exposed, day after day, without adverse health effects.
  - WorkSafeBC has published the following document, which is intended to provide guidelines for managing lead exposures within applicable limits during renovation or demolition work, and which would meet the requirements of both the COHSR and BC Reg. 296/97:
    - WorkSafeBC 2017 publication entitled Safe Work Practices for Handling Lead (BC Lead Guide)
  - Lead in paint:
    - In Canada, the *Surface Coating Materials Regulations* (SOR/2005-109) under the federal *Hazardous Products Act* provides a concentration of lead that must not be exceeded in surface coatings that are presently sold in this country (90 parts per million, or "ppm"). However, it is important to note that this regulation does not comment on the potential occupational exposure if the material is disturbed
    - With respect to potential lead exposures associated with disturbance to surfaces coated with lead-containing products:
      - The 2011 WorkSafeBC manual titled Lead-Containing Paint and Coatings: Preventing Exposure in the Construction Industry, indicates the following:
        - Improper removal of lead paint containing 600 mg/kg (equivalent to "parts per million" or "ppm") lead results in airborne lead concentrations that exceed half of the exposure limit
          - Potential for exposure exceeding half of the occupational exposure limit would be the trigger for implementation of an exposure control plan
        - Lead concentrations as low as 90 mg/kg may present a risk to pregnant women and children
          - Any risk assessment should include for the presence of high risk individuals within the workplace

- The BC Lead Guide indicates the following:
  - Unlike for asbestos-containing material, WorkSafeBC does not numerically define what would be considered a lead-containing paint or coating. All suspected paints or coatings should be tested for lead because, depending on the nature of the work, even a small amount could pose a risk to workers. In order to determine which controls and personal protective equipment would be required for a particular job, a qualified person must consider this information as part of the risk assessment.
- When reviewing the above, "high risk" individuals are not expected to be present in the workplace associated with this building/structure/site during building material alteration activities (i.e., renovation) that would create significant disturbance to paint with such individuals present. As such, paints containing 600 ppm lead or more will be considered "lead-containing" for the purpose of this report, such that appropriate risk assessments can be completed for demolition planning. However, information regarding the lead content of all paints tested is provided herein, for reference and risk assessment should the consideration of high risk individuals be necessary, based on the requirements of a particular situation

  - Samples of potential lead-containing paints (LCPs) were collected from major paint applications on building materials expected to be disturbed during the Project. The sampling of paint applications involved the collection of paint chip samples of paint layers to the substrate, where possible. Samples collected were submitted to EMSL in Mississauga, Ontario for analysis of total lead content using EPA Method SW 846 3050B*/7000B. EMSL's analytical laboratory is also accredited by the AIHA Environmental Lead Laboratory Approval Program (ELLAP).

- Other hazardous building materials:
  - Various other hazardous building materials may be present that would have special management requirements, and/or requirements for appropriate handling and/or disposal if they were to be impacted by renovation activities.
  - Assessment for the presence of other hazardous building materials, specific to those building materials anticipated to be impacted by the Project, was completed through visual means, as follows:
    - Visual review for the presence of PCBs in electrical equipment was completed. Equipment that is generally suspected of containing PCBs includes lamp ballasts, transformers, hydraulic systems, compressors, switchgear and capacitors. No sampling of dielectric fluids was undertaken as part of this assessment.
    - The presence of suspect visible mould and/or animal waste was assessed through visual observations. Material observed with dark-coloured staining and/or a textured and discoloured appearance is described as "suspected mould". Mould identified visually is defined as "suspected mould" unless it is confirmed as mould by laboratory analysis.
    - Assessment for equipment likely to contain ODSs was completed. Information on the type of equipment, manufacturer and type and quantity of refrigerants was recorded, where available.
    - Assessment for equipment that is likely to contain mercury was completed visually. Information on the type of equipment (i.e., gauges, switches, batteries, thermometers, etc.), model and serial numbers and quantities was recorded, where such information was available.
    - Assessment for the presence of silica was conducted. The presence of silica in building materials such as concrete, masonry, stone, terrazzo, refractory brick, ceramic tile, ceiling tile etc. was noted.

RESULTS

Table 1 below summarizes the findings of the assessment and sampling activities undertaken within the subject structure. A floor plan drawing indicating the locations of samples collected and other pertinent information related to identified hazardous building materials (where practical) is attached to this document, for reference.

Table 1 Assessment Summary

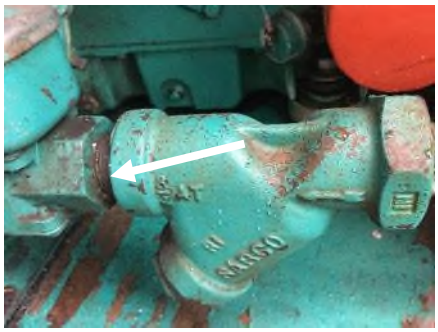
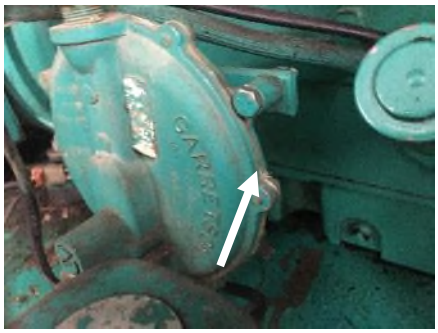
Location	Hazardous Building Material Observations	Photo	Samples collected?	Analytical Results
Exterior generator	No hazardous materials were identified within the generator in the Previous Report.	N/A	None	N/A
Exterior generator	Suspected ACM that is expected to be impacted by the Project: • White pipe sealant applied to the threads of natural gas lines • Observed to be in good condition		G-PS-01A G-PS-01B G-PS-01C	No Asbestos Detected
Exterior generator	Suspected ACM that is expected to be impacted by the Project: • White mechanical gaskets on generator flanges • Observed to be in good condition		G-MG-01A G-MG-01B G-MG-01C	No Asbestos Detected
Exterior generator	Suspected ACM that is expected to be impacted by the Project: • Black mechanical gaskets on generator flanges • Observed to be in good condition		G-MG-02A G-MG-02B G-MG-02C	No Asbestos Detected
Exterior generator	**Suspected lead-containing brown paint on exterior metal generator surfaces.** **Expected to be impacted by the Project**		**G-P-01**	**3,300 ppm lead**

Table 1 Assessment Summary

Location	Hazardous Building Material Observations	Photo	Samples collected?	Analytical Results
Exterior generator	**Suspected lead-containing aqua paint on interior metal generator surfaces.** **Expected to be impacted by the Project**		**G-P-02**	**1,500 ppm lead**
Exterior generator	**Suspected lead-containing brown paint on metal generator cage surfaces.** **Expected to be impacted by the Project**		**G-P-03**	**3,400 ppm lead**
Throughout subject structure	Silica is expected to be present in the concrete pad.	No Photo	N/A	N/A
Throughout Project area	Equipment and/or items expected to contain or be contaminated with the following were NOT observed: • PCBs • Mould/animal waste • Mercury • ODSs	No photo.	N/A	N/A

The certificates of analysis for the samples submitted as part of this assessment, as provided by EMSL, are attached to this document, for reference.

CONCLUSIONS AND RECOMMENDATIONS

In summary, the following limited hazardous building materials that are anticipated to be impacted by the Project were identified through this assessment:

- LCPs
  - Brown paint on exterior metal generator surfaces
  - Aqua paint on interior metal generator surfaces
  - Brown paint on metal generator cage surfaces
- Silica is expected to be present in the concrete pad

Based on the above, the following recommendations are provided as they pertain to the Project:

- Asbestos
  - No ACMs were identified through this assessment or the Previous Report. If encountered during renovation activities, any suspected ACMs not accessible during this assessment should be considered as asbestos-containing and handled as such, unless proven otherwise, through analytical testing.
- Lead
  - When paints or other lead-containing equipment/materials within the subject structure are to be disturbed and/or removed, including in instances where paint chip debris is removed and/or paint debris is created (e.g., preparing surfaces for re-painting), ensure compliance with the following:
    - Exposure protection requirements of the COHSR and BC Reg. 296/97, including the provisions of the Lead Guideline
    - Transportation and disposal requirements of the British Columbia Hazardous Waste Regulation (BC Reg. 63/88) or BC Reg. 63/88
    - Transportation requirements of the Federal Transportation of Dangerous Goods Regulation
  - Corrective action or remedial work on paint applications containing any concentration of lead should be undertaken in a manner so as to avoid generating fine particulate matter or dust (i.e., avoid sanding). Airborne lead dust or fumes should not exceed the COHSR and BC Reg. 296/97 eight-hour occupational exposure limit (OEL) of 0.05 mg/m3 during the removal of paints and products containing any concentration of lead. The use of personal protective equipment is recommended to reduce the potential for over-exposure to lead dust. This can be achieved by:
    - Providing workers with protective clothing and personal protective equipment or devices as necessary to protect them against the hazards to which the worker may be exposed
    - Providing workers with adequate and training in the care and use of clothing, equipment or device before wearing or using such items
    - Wetting the surface of the materials to prevent dust emissions
    - Providing workers with washing facilities with clean water, soap and individual towels to properly wash prior to exiting the work area
  - To avoid the inhalation of lead, it is essential to have the following control methods in place:
    - Engineering controls
    - Work practices and hygiene practices
    - Respirators and personal protective equipment
    - Training
  - Ultimately, the Contractor is responsible to review the work tasks required and the ways in which materials (including those coated with paints that may contain lead in varying concentrations) will be impacted, as well as the individuals that will be present in the immediate vicinity of the work (i.e., potential for high-risk individuals) in order to determine the appropriate personal protective equipment (PPE—including respirators and protective clothing), containment and/or decontamination measures and work procedures that should be followed to protect workers from lead exposure.

  - Using an arc welder or oxyacetylene torch on steel that is coated with lead-containing paint can create hazardous lead fumes and is prohibited by section 12.115 of BC Reg. 296/97. In addition, the following information is provided in the BC Lead Guide:
    - Welding or torch cutting of paints or coatings on metal can create very high concentrations of airborne lead fumes. Torch cutting structural steel, coated with paint containing as little as 130 mg/kg (equivalent to ppm) lead, can release airborne levels of lead as high as 0.8 mg/m^3 (16 times the exposure limit).
    - Given this information and that the analytical detection limit for lead paint analysis is in the order of 90 ppm (not significantly different than 130 ppm, which, per above, may release airborne lead levels 16 times the exposure limit), any paint coating on a metal surface to be welded, burned or torch-cut must be removed prior to that action being undertaken, unless a project-specific or tasks-specific risk assessment and safe work practices are developed by a qualified person.
- Silica
  - When silica-containing materials are to be disturbed during the renovation activities, ensure dust control measures are employed such that airborne silica dust concentrations do not exceed the exposure limit as stipulated by the COHSR and BC Reg. 296/97 (cristobalite and quartz—each 0.025 mg/m^3). This would include, but not be limited to, the following:
    - Providing workers with respiratory protection
    - Wetting the surface of the materials, use of water or dust suppressing agents to prevent dust emissions
    - Providing workers with facilities to properly wash prior to exiting the work area
- Other hazardous building materials
  - Other hazardous building materials as indicated herein were not identified. As such, no additional recommendations have been developed.

LIMITATIONS

This report has been prepared for general information purposes to support the Project. This report does not necessarily constitute an assessment that would be sufficient to support other renovation projects or building demolition, which would typically require destructive removal of building finishes to observed concealed conditions. Prior to any other renovation or demolition work within the subject building, this report should be reviewed by an appropriately qualified professional (with education and experience associated with the management of hazardous building materials) to determine what, if any, additional assessment is necessary.

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

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

This report has been prepared for the exclusive use of PSCP on behalf of the RCMP, for the purpose of assessing general conditions in the subject structure, only as they pertain to the Project. Any use that a third party makes of this report, or reliance on, or decisions to be made on it, are the responsibility of such third parties. Stantec accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

PHYSICAL AND SAMPLING LIMITATIONS

Assessment for hazardous building materials was conducted pertaining to readily visible surfaces within accessible spaces only, and only pertaining to those building materials anticipated to be impacted by the Project. Our understanding of the building materials that would be impacted by the Project was based on the information provided by PSPC and the RCMP only, which was general in nature. Stantec did not design the planned renovations, nor do we have intimate knowledge of the specific tasks that will be required to implement the work tasks.

Due to limitations on the agreed to scope of work for this project as well as physical limitations in accessing concealed areas, there are specific limitations to the information that can be provided regarding the hazardous building materials considered in this assessment, as outlined below.

- Building materials that may contain asbestos and that may be impacted by the Project, but were not accessible for sampling include, but are not limited to the following:
  - Sub-grade materials (e.g., asbestos cement drainage pipe)
- Samples of paint applications suspected to contain lead were collected from surfaces of major paint applications that were anticipated to be impacted by the Project, where visually different paint colours and/or types were identified. Although the surfaces where samples were collected may be covered with more than one coat of paint, the paint samples are described by the surface (visible) colour only. Attempts were made to represent all layers of paint in the samples collected. As analytical results are referenced to the surface paint colour only, the lead content of all painted surfaces similar to that represented by the surface paint colour were presumed to be the same, regardless of differing sub surface paints, if any.
- PCBs may be present in various items in limited amounts (e.g., plastics, molded rubber parts, applied dried paints, coatings or sealants, caulking, adhesives, paper, sound-deadening materials, insulation, or felt and fabric products such as gaskets). PCBs are not expected to be present in these materials in concentrations that would necessitate the requirement for PCB-specific handling procedures, separate removal and/or disposal considerations for demolition. As such, these items were not considered in our assessment.
- Visual assessment for the presence of suspected visible mould and/or suitable conditions for mould growth (e.g., moist and/or water-stained building materials) was conducted only pertaining to areas and materials expected to be impacted by the Project. The conclusions made in this report provide description(s) of the potential source(s) of moisture that may have led to suitable conditions for mould growth, only in those cases where potential source(s) of moisture were identified. The conclusions provided herein will not necessarily identify all sources of moisture leading to suitable conditions for mould growth within the impacted area(s).
  - This assessment does not constitute a building envelope/building systems assessment, which would include an intrusive investigation to assess the internal condition, potential moisture sources, and expected remaining service life of the various components and systems comprising the envelope of a building.
- The potential presence of mercury or mercury-containing equipment in inaccessible areas or other equipment was not assessed.
  - Although limited amounts of mercury may be present in paints and adhesives, mercury is not expected to be present in those materials in concentrations that would necessitate the requirement for mercury-specific handling procedures, separate removal and/or disposal considerations for demolition. As such, these items were not considered in our assessment.
- In general, the assessment for the presence of hazardous building materials was visual in nature and was conducted pertaining to readily visible surfaces within accessible accessed spaces only, and only pertaining to building materials anticipated to be impacted by the Project. Additional hazardous building materials are potentially present in inaccessible areas not assessed including, but not limited to: ceiling spaces, wall cavities and crawlspace areas not accessed, as well as buried materials.

CLOSING

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

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

Regards,

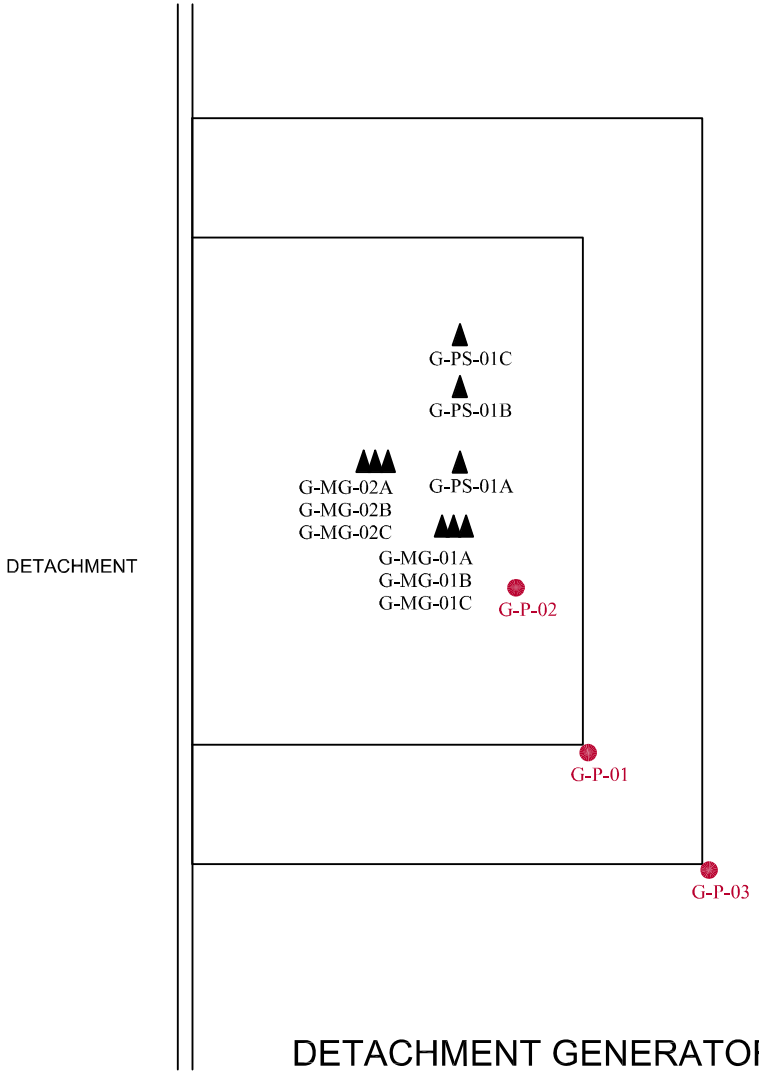
Stantec Consulting Ltd.

Kim Wiese Dipl. Tech.
Report Author
Phone: 604-396-7003
Kim.Wiese@stantec.com

Keith Irwin Dipl. Tech.
Team Lead
Phone: 604-369-0055
Keith.Irwin@stantec.com

Sean Brigden B.Sc., P.B.Dipl., CRSP
Senior Associate
Phone: 250-655-6062
Sean.Brigden@stantec.com

Attachments: Building Floor Plan—1 page
Suspected ACM Bulk Sample Analytical Record (EMSL)—2 pages
Suspected LCP Paint Chip Sample Analytical Record (EMSL)—1 page



DETACHMENT GENERATOR

LEGEND

- BULK SAMPLES FOR ASBESTOS
- PAINT CHIP SAMPLES FOR LEAD

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

FLOOR PLAN SHOWING BULK SAMPLE LOCATIONS

E0691 - HOPE RCMP DETACHMENT GENERATOR, 690 HOPE PRINCETON HWY, HOPE, BC

Project No.:	123221396
Scale:	N.T.S.
Date:	20/02/06
Dwn. By:	CD VM SL2020020052
App'd By:	TW

Dwg. No.: 1

Client: PUBLIC SERVICES AND PROCUREMENT CANADA

Stantec

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: (604) 757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 691903385
Customer ID: 55JACQ30L
Customer PO: 123221493
Project ID:

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

Phone: (604) 412-3004
Fax:
Collected:
Received: 12/18/2019
Analyzed: 12/19/2019

Proj: RCMP/EDIVHAZMAT/123221493

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: G-PS-01A **Lab Sample ID:** 691903385-0001
Sample Description: EXTERIOR, GENERATOR/WHITE PIPE SEALANT APPLIED TO THE THREADS OF NATURAL GAS LINES IN THE EXTERIOR GENERATOR

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/18/2019	White	0.0%	100.0%	None Detected	

Client Sample ID: G-PS-01B **Lab Sample ID:** 691903385-0002
Sample Description: EXTERIOR, GENERATOR/WHITE PIPE SEALANT APPLIED TO THE THREADS OF NATURAL GAS LINES IN THE EXTERIOR GENERATOR

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/18/2019	White	0.0%	100.0%	None Detected	

Client Sample ID: G-PS-01C **Lab Sample ID:** 691903385-0003
Sample Description: EXTERIOR, GENERATOR/WHITE PIPE SEALANT APPLIED TO THE THREADS OF NATURAL GAS LINES IN THE EXTERIOR GENERATOR

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/19/2019	Green	0.0%	100.0%	None Detected	Very little sample

Client Sample ID: G-MG-01A **Lab Sample ID:** 691903385-0004
Sample Description: EXTERIOR, GENERATOR/WHITE MECHANICAL GASKET IN EXTERIOR GENERATOR

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/18/2019	White/Yellow	0.0%	100.0%	None Detected	

Client Sample ID: G-MG-01B **Lab Sample ID:** 691903385-0005
Sample Description: EXTERIOR, GENERATOR/WHITE MECHANICAL GASKET IN EXTERIOR GENERATOR

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/18/2019	White/Yellow	0.0%	100.0%	None Detected	

Client Sample ID: G-MG-01C **Lab Sample ID:** 691903385-0006
Sample Description: EXTERIOR, GENERATOR/WHITE MECHANICAL GASKET IN EXTERIOR GENERATOR

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/19/2019	Green	0.0%	100.0%	None Detected	Very little sample

Client Sample ID: G-MG-02A **Lab Sample ID:** 691903385-0007
Sample Description: EXTERIOR, GENERATOR/BLACK MECHANICAL GASKET IN EXTERIOR GENERATOR

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/18/2019	Black	0.0%	100.0%	None Detected	

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: (604) 757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 691903385
Customer ID: 55JACQ30L
Customer PO: 123221493
Project ID:

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: G-MG-02B ***Lab Sample ID:*** **691903385-0008**

Sample Description: EXTERIOR, GENERATOR/BLACK MECHANICAL GASKET IN EXTERIOR GENERATOR

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/18/2019	Black	0.0%	100.0%	None Detected	

Client Sample ID: G-MG-02C ***Lab Sample ID:*** **691903385-0009**

Sample Description: EXTERIOR, GENERATOR/BLACK MECHANICAL GASKET IN EXTERIOR GENERATOR

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/19/2019	Brown/Green	0.0%	100.0%	None Detected	Very little sample

Analyst(s):

Dane Sorochuk PLM (3)
Margaret Lee PLM (6)

Reviewed and approved by:

Nicole Yeo, Laboratory Manager
or Other Approved Signatory

None Detected = <0.1%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted. This report must not be used to claim product endorsement by NVLAP of any agency or the U.S. Government

Samples analyzed by EMSL Canada Inc. Burnaby, BC

Initial report from: 12/24/201916:54:09

EMSL Canada Inc.
2756 Slough Street, Mississauga, ON L4T 1G3
Phone/Fax: (289) 997-4602 / (289) 997-4607
http://www.EMSL.com torontolab@emsl.com

EMSL Canada Or	551915435
CustomerID:	55JACQ30L
CustomerPO:	123221493
ProjectID:	

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

Phone: (604) 412-3004
Fax:
Received: 12/19/19 12:23 PM
Collected:

Project: **RCMP/EDivHazmat123221493**

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

Client SampleDescription	*Collected*	*Analyzed*	*Weight*	*RDL*	*Lead* ***Concentration***
G-P-01		12/20/2019	0.2460 g	81 ppm	3300 ppm
551915435-0001	Site: Hope Detachment - 690 Hope Princeton Highway (E0691) - Brown on metal generator Desc: Exterior of generator				
G-P-02		12/20/2019	0.2512 g	80 ppm	1500 ppm
551915435-0002	Site: Hope Detachment - 690 Hope Princeton Highway (E0691) - Aqua on metal generator Desc: Interior of generator				
G-P-03		12/20/2019	0.2430 g	82 ppm	3400 ppm
551915435-0003	Site: Hope Detachment - 690 Hope Princeton Highway (E0691) - Brown on metal cage Desc: Exterior generator cage				

Rowena Fanto, Lead Supervisor
or other approved signatory

*Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.008 % wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities. Samples received in good condition unless otherwise noted. "<" (less than) result signifies the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements unless specifically indicated otherwise. Definitions of modifications are available upon request.

Samples analyzed by EMSL Canada Inc. Mississauga, ON A2LA Accredited Cert #2845.08; AIHA-LAP, LLC - ELLAP #196142

Initial report from 12/27/2019 08:54:31

APPENDIX C

Hazardous Building Materials Survey

E0691, RCMP Detachment, 690 Old Hope Princeton Way, Hope, British Columbia

Client Project No.: R.112075.001

March 12, 2021
Arcadis Project No. 30053059

Hazardous Building Materials Survey

E0691, RCMP Detachment, 690 Old Hope Princeton Way, Hope, British Columbia

March 12, 2021

Prepared By:
Arcadis Canada Inc.
1080 Mainland Street
Suite 308
Vancouver, BC, V6B 2T4
Phone: 604 706 4785

Prepared For:
Ashley Rabey
Public Services and Procurement Canada
Environmental Services
1230 Government Street, Suite 401
Victoria, BC V8W 3X4

Our Ref: 30053059

Authored by:

Janine Galandy, AScT, Dipl T (Env)
Field Technologist

Reviewed by:

Jerry Botti, AScT, Dipl T (Env Chem)
Senior Project Manager

Version Control

Issue	Revision No.	Date Issued	Page No.	Description	Reviewed By
01	00	March 12, 2021	All	Final Report	J. Botti

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Acronyms and Abbreviations

ACM	Asbestos-Containing Materials
Arcadis	Arcadis Canada Inc.
CLC	Canada Labour Code
COHSR	Canada Occupational Health and Safety Regulations
LPB	Lead Based Paints
NIOSH	National Institute for Occupational Safety and Health
NJC	National Joint Council
OHS	Occupational Health and Safety
PCBs	Polychlorinated Biphenyls
PLM	Polarized Light Microscopy
DCC	Defence Construction Canada
DND	Department of National Defence
UFFI	Urea Foam Formaldehyde Insulation
ODS	Ozone Depleting Substance
TEM	Transmission Electron Microscopy
USEPA	United States Environmental Protection Agency

Executive Summary

Arcadis Canada Inc. (Arcadis) was retained by Public Services and Procurement Canada (PSPC; Client) on behalf of the Royal Canadian Mounted Police (RCMP) to conduct a hazardous building material assessment (HBMA) of Building E0691, RCMP Detachment, located at 690 Old Hope Princeton Way, Hope, British Columbia (BC).

The project consisted of a limited pre-renovation assessment to identify hazardous building materials in preparation for replacement of the back-up generator.. The assessment scope was limited to areas impacted by the proposed generator replacement project as outlined on the drawings Site Plan and Details – Sheet E1.0, and Main Floor Electrical Layout – Sheet E1.1.

The hazardous building materials considered during this assessment included the following:

- Asbestos-containing materials (ACM)
- Lead Paint and Products
- Silica
- Mercury
- Polychlorinated Biphenyls (PCBs)
- Ozone Depleting Substances (ODS)
- Suspect visible mould

Arcadis performed the assessment on March 4, 2021. The assessment was conducted by Janine Galandy, Field Technologist of Arcadis.

Summary of Findings

Asbestos:

- No asbestos was detected in the samples collected at the time of the assessment.
- Asbestos-containing materials (ACMs) have been previously identified (see SNC-Lavalin Report for more details), however the ACMs are not anticipated to be impacted by the proposed generator replacement project.

Lead Paint: Paint that was identified with levels of lead that exceeded criteria are as follows: Black paint on wood soffits, wood trim, and wood siding throughout exterior.

The Stantec Report identified the following lead paint on the generator:

- Brown paint on exterior metal generator surfaces (3,300 ppm lead)
- Aqua paint on interior generator surfaces (1,500 ppm lead)
- Brown paint on metal generator cage surfaces (3,400 ppm lead)

Lead Products: The following materials are presumed to contain lead in the assessed area:

- Electrical components including wiring connectors, grounding conductors, and solder.

Silica: Crystalline silica is a presumed component of the following materials where present in the assessed area:

- poured or pre-cast concrete
- masonry and mortar
- drywall

- acoustic ceiling tile

Mercury: Mercury vapor is present in fluorescent light tubes observed in the assessed area. Mercury is not expected to be impacted by the proposed renovations.

Polychlorinated Biphenyls (PCBs): Based on the age of the building, fluorescent light ballasts observed in the assessed are presumed to contain PCBs. PCBs are not expected to be impacted by the proposed renovations..

Ozone Depleting Substances: ODS-containing equipment was not observed in the assessed area.

Suspect Visible Mould: Suspect visible mould was not observed in the assessed area.

Recommendations

We recommend the following on the basis of the findings of the HBMA outlined in this report

1. Prepare plans and performance specifications for hazardous material removal required for the planned work. The specifications should include the scope of work, safe work practices, personal protective equipment, respiratory protection, and disposal of waste materials. Provide this report and the detailed plans and specifications to the contractor prior to bidding or commencing work.
2. Ensure that all asbestos-containing materials identified not impacted by the proposed renovations are managed in place. WorkSafeBC publication Safe Work Practices for Handling Asbestos provides guidance in asbestos management programs including risk assessment, development of safe work procedures, worker instructions, development and implementation of Asbestos Management Plans and record keeping.
3. If work activities may cause exposure to lead-containing paint conduct a risk assessment for exposure, develop an exposure control plan, write safe work procedures, and implement controls. The WorkSafeBC publication Safe Work Practices for Handling Lead provides guidance in assessment and control of lead exposure.
4. Lead-containing items should be recycled when taken out of service or prior to building demolition.
5. If silica-containing materials will be affected by sanding, drilling, chipping, grinding, cutting, sawing, sweeping, or blasting, develop a silica exposure control plan to address control methods and personal protective equipment requirements in order to reduce worker exposure to a level as low as reasonably achievable below the occupational exposure limit prescribed in the Canada Occupational Health and Safety Regulation and BC Occupational Health and Safety Regulation. Guidance is provided in the WorkSafeBC publication Developing a Silica Exposure Control Plan. Silica control methods can include construction of barriers or enclosure systems to restrict access to and contain the work area; the use of wet methods; local exhaust ventilation when practical; and the use of personnel protective equipment.
6. Recycle fluorescent lighting when taken out of service. Do not break light tubes.

7. When light fixtures are removed from service, ensure a qualified person examines the light ballasts for PCB content. If ballasts are not clearly labelled as “non-PCB” or are suspected to contain PCBs, package, and ship ballasts for destruction at a federally permitted facility.

Please refer to Section 5.0 of this report for detailed recommendations regarding administrative, renovation or demolition activities.

Findings of this report are subject to our standard Limitations, as outlined in Section 6.0.

This Executive Summary is subject to the same standard limitations as contained in the report and must be read in conjunction with the entire report.

1 Introduction

1.1 Purpose

Arcadis Canada Inc. (Arcadis) was retained by Public Services and Procurement Canada (PSPC; Client) on behalf of the Royal Canadian Mounted Police (RCMP) to conduct a hazardous building material assessment (HBMA) of Building E0691, RCMP Detachment, located at 690 Old Hope Princeton Way, Hope, British Columbia (BC).

The project consisted of a limited pre-renovation assessment to identify hazardous building materials in preparation for replacement of the back-up generator. The assessment scope was limited to areas impacted by the proposed generator replacement project as outlined on drawings Site Plan and Details – Sheet E1.0, and Main Floor Electrical Layout – Sheet E1.1.

Arcadis performed the assessment on March 4, 2021. The assessment was conducted by Janine Galandy, Field Technologist of Arcadis.

1.2 Scope of Work

The scope of work for the project, as referenced in the Arcadis Proposal dated February 26, 2021, identifies the requirement to conduct a HBMA within the Hope RCMP Detachment. Specifically, the scope of work included:

- Review of previous reports, construction specifications and drawings and identify any gaps related to hazardous building materials.
- Development of sampling strategy to address the identified gaps.
- Collect and submit representative suspect asbestos material and lead paint chip samples for analysis.
- Collect and submit representative samples of caulking for PCBs where impacted by the proposed renovations.
- Submit samples to accredited laboratories for analysis.
- Evaluation and interpretation of field findings and sample analytical results to develop conclusions and recommendations pertaining to hazardous building materials identified.

For the purpose of this assessment, hazardous substances are defined as follows:

- Asbestos-containing materials (ACM);
- Lead Paint and Products;
- Silica;
- Mercury;
- Polychlorinated Biphenyls (PCBs);
- Ozone Depleting Substances (ODS);
- Suspect visible mould;

A general description of the building included in this HBMA is provided in Table 1 below:

Table 1: Building Description

Building Number	Building Name	Address	Total Inside Gross m^2	Year Constructed	Building Description
E0691	RCMP Detachment	690 Old Hope Princeton Way, Hope, British Columbia	700 m^2	1977	One storey building with concrete block frame, wood frame, and concrete foundation. Exterior finishes include concrete block, concrete, wood trim, metal trim, torch-on roofing, and metal roofing. Interior finishes include drywall, wood, concrete, concrete block, acoustic ceiling tile, vinyl sheet flooring, and carpet. Heating is supplied by a boiler system.

2 Background Information

Background information for the Site includes the following:

- Project-Specific Hazardous Building Materials Assessment Site Review Report, E0691-RCMP Detachment Generator, 690 Hope Princeton Hwy, Hope BC, February 13, 2020, prepared by Stantec Inc. (Stantec Report)
- Asbestos-Containing Materials Survey, E0691-690 Old Hope Princeton Highway, BC, RCMP Detachment, March 29, 2019, prepared by SNC-Lavalin Group Inc. (SNC-Lavalin Report)
- Site Drawings: Hope Detachment Generator Replacement, 690 Old Hope Princeton Way, Hope, BC, V0X 1L4, Site Plan and Details – Sheet E1.0, and Main Floor Electrical Layout – Sheet E1.1

2.1 Exclusions

The assessment was restricted to accessible locations of the buildings impacted by the proposed renovations. Inaccessible areas, such as behind fixed walls, were not investigated at the time of the assessment unless specifically impacted by the proposed renovations. Roofing or other material that may cause damage to the building envelope were not included unless specifically impacted by the proposed renovations and sampling would not compromise the building envelope integrity.

3 Results

The following section summarizes the findings of the assessment and provides a general description of the designated substances identified and their locations. Site Photographs provided in Appendix A. Laboratory

certificates of analysis have been provided in Appendix B. Floor plans indicating sample locations and room numbers are provided in Appendix C. Refer to Appendix E for the survey methodology.

3.1 Asbestos

During the course of our assessment, representative bulk samples of material were collected by Arcadis staff. The samples were forwarded to EMSL in Burnaby, BC for asbestos analyses. EMSL holds a current Certificate of Accreditation for Bulk Asbestos Fibre Analysis under the Voluntary Accreditation Program (NVLAP). Bulk sampling was performed in general accordance with the requirements specified the WorkSafeBC publication *Safe Work Practices for Handling Asbestos*.

All asbestos samples collected by Arcadis during this assessment are included in the table below. No asbestos was detected in the samples collected.

Table 2: Results of Bulk Asbestos Sample Analysis

Sample Number	Location	Material Description	Estimated Quantity	Content and Type of Asbestos
S-01A	Loc 1	Acoustic ceiling tile 1 (2'x4' small & large pinhole)	-	None Detected
S-01B	Loc 1	Acoustic ceiling tile 1 (2'x4' small & large pinhole)	-	None Detected
S-01C	Loc 1	Acoustic ceiling tile 1 (2'x4' small & large pinhole)	-	None Detected
S-02A	Loc 1	Drywall joint compound	-	None Detected
S-02B	Loc 2	Drywall joint compound	-	None Detected
S-02C	Loc 5	Drywall joint compound	-	None Detected
S-03A	Loc 4	Acoustic ceiling tile 2 (2'x4' pinhole & divot)	-	None Detected
S-03B	Loc 5	Acoustic ceiling tile 2 (2'x4' pinhole & divot)	-	None Detected
S-03C	Loc 4	Acoustic ceiling tile 2 (2'x4' pinhole & divot)	-	None Detected

Masonry block walls were investigated for vermiculite by visual observation of existing penetrations and by destructive testing. No loose fill vermiculite was identified in the locations observed. The locations are indicated on the drawings in Appendix C including:

- Loc 3 (five existing penetrations present)

- Loc 6 – Exterior (two destructive tests performed)

In the Stantec Report, no asbestos was detected in the samples collected. See the Stantec Report for more details.

In the SNC-Lavalin Report, asbestos was detected in the materials listed below, however, these materials are not anticipated to be impacted by the proposed generator replacement project. Refer to the SNC-Lavalin Report for specific details on quantities and locations.

- Red Mastic (10% Chrysotile) – HVAC ducts
- Grey Mastic (25% Chrysotile) – bottom of TELUS panel
- Black Mastic (4.5% Chrysotile) – window pane to frame
- White Mastic (0.75% Chrysotile – around windows of building exterior
- Black/Gold Mastic (1.2% Chrysotile) – underside of sink

Potentially Asbestos-Containing Materials

A number of materials which might contain asbestos were not sampled during this assessment due to limitations in scope or were too destructive to sample effectively. Where present, these materials are considered to be potentially asbestos-containing materials (PACM) until otherwise proven by sampling and analysis.

Materials observed on site and presumed to contain asbestos include the following. These material are not expected to be impacted by the proposed renovations.

- Electrical components or wiring within control centers, breakers, motors or lights, insulation on wiring
- Concealed adhesives and caulking's

3.2 Lead Paint

During the course of our site investigation, representative bulk samples of predominant paint types were collected by Arcadis staff. The samples were forwarded to EMSL for analyses for lead content. Results of bulk sample analysis in paint content are provided in the table below. Samples highlighted yellow exceed the criteria.

Table 3: Results of Analyses of Bulk Samples for Paint for Lead.

Sample ID	Sample Location	Substrate Material	Sample Description	Condition	Lead (90 ppm)
L-01	Loc 1	Drywall	Beige paint on drywall ceiling	-	<82
L-02	Loc 2	Drywall	White paint on drywall	-	<80
L-03	Loc 3	Wood	Yellow paint on wood wall	-	<81
L-04	Loc 6 – Exterior	Wood	Black paint on wood soffit	Good	590

The Stantec Report identified the following lead paint on the generator:

- Brown paint on exterior metal generator surfaces (3,300 ppm lead)
- Aqua paint on interior generator surfaces (1,500 ppm lead)
- Brown paint on metal generator cage surfaces (3,400 ppm lead)

Where one colour of paint is indicated in the sample descriptions in the table above, only one layer of paint was observed. Where multiple colours are indicated in the sample description, multiple layers of paint were observed. Similarly painted areas throughout the building are presumed to contain lead at the same concentrations as noted above.

3.3 Lead Products

The following materials are presumed to contain lead in the assessed area:

- Electrical components including wiring connectors, grounding conductors, and solder.

3.4 Silica

Crystalline silica is a presumed component of the following materials where present in the assessed area:

- poured or pre-cast concrete
- masonry and mortar
- drywall
- acoustic ceiling tile

3.5 Mercury

Mercury vapor is present in fluorescent light tubes observed in the assessed area. Mercury is not expected to be impacted by the proposed renovations.

3.6 Polychlorinated Biphenyls (PCBs)

Liquids

Based on the age of the building, fluorescent light ballasts observed in the assessed are presumed to contain PCBs. PCBs are not expected to be impacted by the proposed renovations..

Solids

PCB may be present in paints in the assessed area.

3.7 Ozone Depleting Substances

ODS-containing equipment was not observed in the assessed area.

3.8 Suspect Visible Mould

Suspect visible mould was not observed in the assessed area.

4 Recommendations

We recommend the following on the basis of the findings of the HBMA outlined in this report.

1. Prepare plans and performance specifications for hazardous material removal required for the planned work. The specifications should include the scope of work, safe work practices, personal protective equipment, respiratory protection, and disposal of waste materials. Provide this report and the detailed plans and specifications to the contractor prior to bidding or commencing work.
1. Ensure that all asbestos-containing materials identified not impacted by the proposed renovations are managed in place. WorkSafeBC publication *Safe Work Practices for Handling Asbestos* provides guidance in asbestos management programs including risk assessment, development of safe work procedures, worker instructions, development and implementation of Asbestos Management Plans and record keeping.
2. If work activities may cause exposure to lead-containing paint conduct a risk assessment for exposure, develop an exposure control plan, write safe work procedures, and implement controls. The WorkSafeBC publication *Safe Work Practices for Handling Lead* provides guidance in assessment and control of lead exposure.
3. Lead-containing items should be recycled when taken out of service or prior to building demolition.
4. If silica-containing materials will be affected by sanding, drilling, chipping, grinding, cutting, sawing, sweeping, or blasting, develop a silica exposure control plan to address control methods and personal protective equipment requirements in order to reduce worker exposure to a level as low as reasonably achievable below the occupational exposure limit prescribed in the *Canada Occupational Health and Safety Regulation* and BC *Occupational Health and Safety Regulation*. Guidance is provided in the WorkSafeBC publication *Developing a Silica Exposure Control Plan*. Silica control methods can include construction of barriers or enclosure systems to restrict access to and contain the work area; the use of wet methods; local exhaust ventilation when practical; and the use of personnel protective equipment.
5. Recycle fluorescent lighting when taken out of service. Do not break light tubes.
6. When light fixtures are removed from service, ensure a qualified person examines the light ballasts for PCB content. If ballasts are not clearly labelled as “non-PCB” or are suspected to contain PCBs, package, and ship ballasts for destruction at a federally permitted facility.

4.1 Planned Work Involving Hazardous Materials

The following recommendations are for planned work involving hazardous materials identified.

Asbestos

Remove all asbestos-containing materials (ACM) prior to renovation, alteration, maintenance or demolition work or if ACM may be disturbed by the work. Disturbance of ACM must follow the appropriate asbestos precautions for the classification of work being performed.

Asbestos-containing materials must be disposed of at a landfill approved to accept asbestos waste.

Lead

Construction disturbance of lead in paint and coatings (or other materials) may result in over-exposure to lead dust or fumes. The need for work procedures, engineering controls and personal protective equipment will need to be assessed on a project-by-project basis and must comply with provincial standards or guidelines. Performing an exposure assessment during work that disturbs lead in paints and coatings may be able to alleviate the use of some of the precautions specified by these standards or guidelines.

Basd on the scope of the propsed renovations, removal of lead paint is not anticpated. If impacted, items painted with paints containing elevated levels of lead may be a hazardous waste. Test lead-painted materials for leachable lead and other metals prior to disposal. Well adhered paints containing elevated levels of lead on metal substrates do not require leachable lead analysis as the materials can be recycled with the paint intact.

Lead-containing items should be recycled when taken out of service or prior to building demolition.

Silica

Construction disturbance of silica-containing products may result in excessive exposures to airborne silica, especially if performed indoors and dry. Cutting, grinding, drilling or demolition of materials containing silica should be completed only with proper respiratory protection and other worker safety precautions that comply with provincial standards or guidelines.

Mercury

Do not break light tubes. Recycle fluorescent llight tubes when taken out of service.

PCBs

When light fixtures are removed, examine light ballasts for PCB content. If ballasts are not clearly labelled as “non-PCB”, or are suspected to contain PCBs, package and ship ballasts for destruction at a federally permitted facility.

5 References

The following legislation and documents were referenced in completing the assessment and this report:

1. Occupational Health and Safety Regulation, B.C. Reg. 296/97, WorkSafe BC.
2. Safe Work Practices for Handling Asbestos, WorkSafe BC, 2017 Edition.
3. Hazardous Waste Regulation, B.C. Reg. 63/88, November 2017, BC Environmental Management Act.
4. Ozone Depleting Substances and Other Halocarbons Regulation, B.C. Reg. 317/2012 Environmental Management Act.
5. PCB Regulations, SOR/2008-273, Canadian Environmental Protection Act.
6. Lead-Containing Paint and Coatings, Preventing Exposure in the Construction Industry, WorkSafe BC, June 2017.

7. Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing, United States Housing and Urban Development (HUD) 2012.
8. Mould Guidelines for the Canadian Construction Industry, Standard Construction Document 2018, Canadian Construction Association.
9. Minister of Justice Canada Labour Code. R.S.C., 1985, c. L-2. March 2020.
10. Minister of Justice. 2018. Canada Occupational Health and Safety Regulations. SOR/86-304, June 2019.
11. Public Services and Procurement Canada Asbestos Management Standard. June 2019.
12. Transport Canada Consolidated Transport of Dangerous Goods Regulations including Amendment SOR/2019-101.
13. ASTM E2356 Standard Practice for Comprehensive Buildings Asbestos Surveys.
14. Royal Canadian Mounted Police, Asbestos Management Plan, Version 2020-01, January 2020.

6 Limitations and Service Constraints

The opinions, conclusions and recommendations presented in this report are limited to the information obtained during the performance of the specific scope of service identified in the report. To the extent that Arcadis relied upon any information prepared by other parties not under direct contract to Arcadis, no representation as to the accuracy or completeness of such information is made. This report is an instrument of professional service and the services described in the report were performed in accordance with generally accepted standards and level of skill and care ordinarily exercised by members of the profession working under similar conditions including comparable budgetary and schedule constraints. No warranty, guarantee or certification express or implied, is intended or given with respect to Arcadis' services, opinions, conclusions or recommendations.

Arcadis' observations, the results of any testing and Arcadis' opinions, conclusions and recommendations apply solely to conditions existing at the specific times when and specific locations where Arcadis' investigative work was performed. Arcadis affirms that data gathered and presented in this report was collected in an appropriate manner in accordance with generally accepted methods and practices. Arcadis cannot be responsible for decisions made by our client solely on the basis of economic factors. Observation and testing activities such as those conducted by Arcadis are inherently limited and do not represent a conclusive or complete characterization. Arcadis analyzed only the substances, conditions and locations described in the report at the time indicated. Conditions in other parts of the project site, building or area may vary from conditions at the specific locations where observations were made and where testing was performed by Arcadis. Additionally, other building material hazards which were not identified by Arcadis, may also be present un-accessed areas and in walls, ceilings, cavities, and floors.

This report is expressly for the sole and exclusive use of the Client for whom this report was originally prepared and for the particular purpose outlined in the report. Reuse of this report or any portion thereof for other than its intended purpose, or if modified, or if used by third parties, shall be at the user's sole risk. This report must be presented in its entirety.

Appendix A

Site Photographs

Photograph Log

PSPC - E0691, RCMP Detachment, 690 Old Hope Princeton Way, Hope, British Columbia

Photograph 1: Building exterior, front (north)

Photograph 2: Building exterior; front (north); location of old generator

Photograph 3: Building exterior (east); location for proposed new generator

Photograph 4: Building exterior (east); wall proposed to be impacted by renovation work

Photograph 5: Building exterior (east); no vermiculite observed in masonry wall after performing destructive test

Photograph 6: Loc 1; Area proposed to be impacted by renovation work

Photograph Log

PSPC - E0691, RCMP Detachment, 690 Old Hope Princeton Way, Hope, British Columbia

Photograph 7: Loc 1; Area proposed to be impacted by renovation work

Photograph 8: Loc 2; Area proposed to be impacted by renovation work

Photograph 9: Loc 3; Area proposed to be impacted by renovation work

Photograph 10: Loc 4; Area proposed to be impacted by renovation work

Photograph 11: Loc 5; Area proposed to be impacted by renovation work

Photograph 12: Loc 1; Ceiling cavity; Area proposed to be impacted by renovation work

Photograph Log

PSPC - E0691, RCMP Detachment, 690 Old Hope Princeton Way, Hope, British Columbia

Photograph 13: Loc 5; Ceiling cavity; Area proposed to be impacted by renovation work; No asbestos detected in drywall joint compound

Photograph 14: Loc 1; No asbestos detected in acoustic ceiling tile 1 (2'x4' small & large pinhole)

Photograph 15: Loc 1; No asbestos detected in drywall joint compound on ceiling

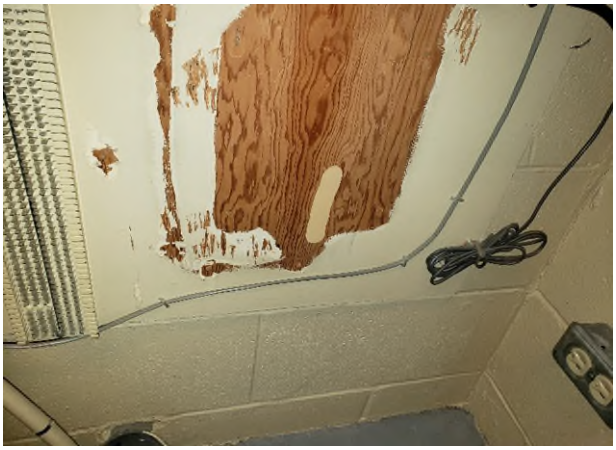
Photograph 16: Loc 4; No asbestos detected in acoustic ceiling tile 2 (2'x4' pinhole & divot)

Photograph 17: Loc 1; Beige paint on ceiling drywall identified with lead levels that do not exceed criteria

Photograph 18: Loc 2; White paint on drywall identified with lead levels that do not exceed criteria

Photograph Log

PSPC - E0691, RCMP Detachment, 690 Old Hope Princeton Way, Hope, British Columbia



Photograph 19: Loc 3; Yellow paint on wood wall identified with lead levels that do not exceed criteria

Photograph 20: Loc 6 - Exterior; Lead-containing black paint on wood soffit (590 ppm lead)

Appendix B

Laboratory Certificates of Analysis

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: (604) 757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 692100622
Customer ID: 55ACAV42
Customer PO: 30053059
Project ID:

Attn: Jerry Botti
ARCADIS Canada Inc.
308-1080 Mainland Street
Vancouver, BC V6B 2T4

Phone: (604) 632-9941
Fax:
Collected: 3/ 4/2021
Received: 3/05/2021
Analyzed: 3/09/2021

Proj: 30053059 / HOPE RCMP

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: S-01A ***Lab Sample ID:*** **692100622-0001**
Sample Description: LOC 1/ACOUSTIC CEILING TILE 1 (2'X4' SMALL & LARGE PINHOLE)

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	3/09/2021	Gray	80.0%	20.0%	None Detected	

Client Sample ID: S-01B ***Lab Sample ID:*** **692100622-0002**
Sample Description: LOC 1/ACOUSTIC CEILING TILE 1 (2'X4' SMALL & LARGE PINHOLE)

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	3/09/2021	Gray	80.0%	20.0%	None Detected	

Client Sample ID: S-01C ***Lab Sample ID:*** **692100622-0003**
Sample Description: LOC 1/ACOUSTIC CEILING TILE 1 (2'X4' SMALL & LARGE PINHOLE)

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	3/09/2021	Gray	80.0%	20.0%	None Detected	

Client Sample ID: S-02A ***Lab Sample ID:*** **692100622-0004**
Sample Description: LOC 1/DRYWALL JOINT COMPOUND

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	3/09/2021	White	0.0%	100.0%	None Detected	

Client Sample ID: S-02B ***Lab Sample ID:*** **692100622-0005**
Sample Description: LOC 2/DRYWALL JOINT COMPOUND

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	3/09/2021	White	0.0%	100.0%	None Detected	

Client Sample ID: S-02C ***Lab Sample ID:*** **692100622-0006**
Sample Description: LOC 5/DRYWALL JOINT COMPOUND

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	3/09/2021	White	0.0%	100.0%	None Detected	

Client Sample ID: S-03A ***Lab Sample ID:*** **692100622-0007**
Sample Description: LOC 4/ACOUSTIC CEILING TILE 2 (2'X4' PINHOLE & DIVOT)

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	3/09/2021	Gray	80.0%	20.0%	None Detected	

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: (604) 757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 692100622
Customer ID: 55ACAV42
Customer PO: 30053059
Project ID:

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: S-03B ***Lab Sample ID:*** **692100622-0008**

Sample Description: LOC 5/ACOUSTIC CEILING TILE 2 (2'X4' PINHOLE & DIVOT)

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	3/09/2021	Gray	80.0%	20.0%	None Detected	

Client Sample ID: S-03C ***Lab Sample ID:*** **692100622-0009**

Sample Description: LOC 4/ACOUSTIC CEILING TILE 2 (2'X4' PINHOLE & DIVOT)

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	3/09/2021	Gray	80.0%	20.0%	None Detected	

Analyst(s):

Nicole Yeo PLM (9)

Reviewed and approved by:

Nicole Yeo, Laboratory Manager
or Other Approved Signatory

None Detected = <0.1%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted. This report must not be used to claim product endorsement by NVLAP of any agency or the U.S. Government

Samples analyzed by EMSL Canada Inc. Burnaby, BC NVLAP Lab Code 201068-0

Initial report from: 03/10/202113:26:40

EMSL Canada Inc.
2756 Slough Street, Mississauga, ON L4T 1G3
Phone/Fax: (289) 997-4602 / (289) 997-4607
http://www.EMSL.com torontolab@emsl.com

EMSL Canada Or	552103414
CustomerID:	55ACAV42
CustomerPO:	30053059
ProjectID:	

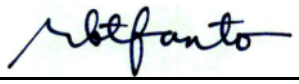
Attn: **Jerry Botti**
ARCADIS Canada Inc.
308-1080 Mainland Street
Vancouver, BC V6B 2T4

Phone: (604) 632-9941
Fax:
Received: 3/8/2021 12:05 PM
Collected: 3/4/2021

Project: **30053059/ Hope RCMP**

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

Client SampleDescription	*Collected*	*Analyzed*	*Weight*	*RDL*	*Lead* ***Concentration***
L-01	3/4/2021	3/9/2021	0.2429 g	82 ppm	<82 ppm
552103414-0001	Site: Biege paint on drywall ceiling- Loc1				
L-02	3/4/2021	3/9/2021	0.2492 g	80 ppm	<80 ppm
552103414-0002	Site: White paint on drywall- Loc2				
L-03	3/4/2021	3/9/2021	0.2454 g	81 ppm	<81 ppm
552103414-0003	Site: Yellow paint on wood wall- Loc 3				
L-04	3/4/2021	3/9/2021	0.2409 g	83 ppm	590 ppm
552103414-0004	Site: Black paint on wood soffit- Loc 6 Exterior				



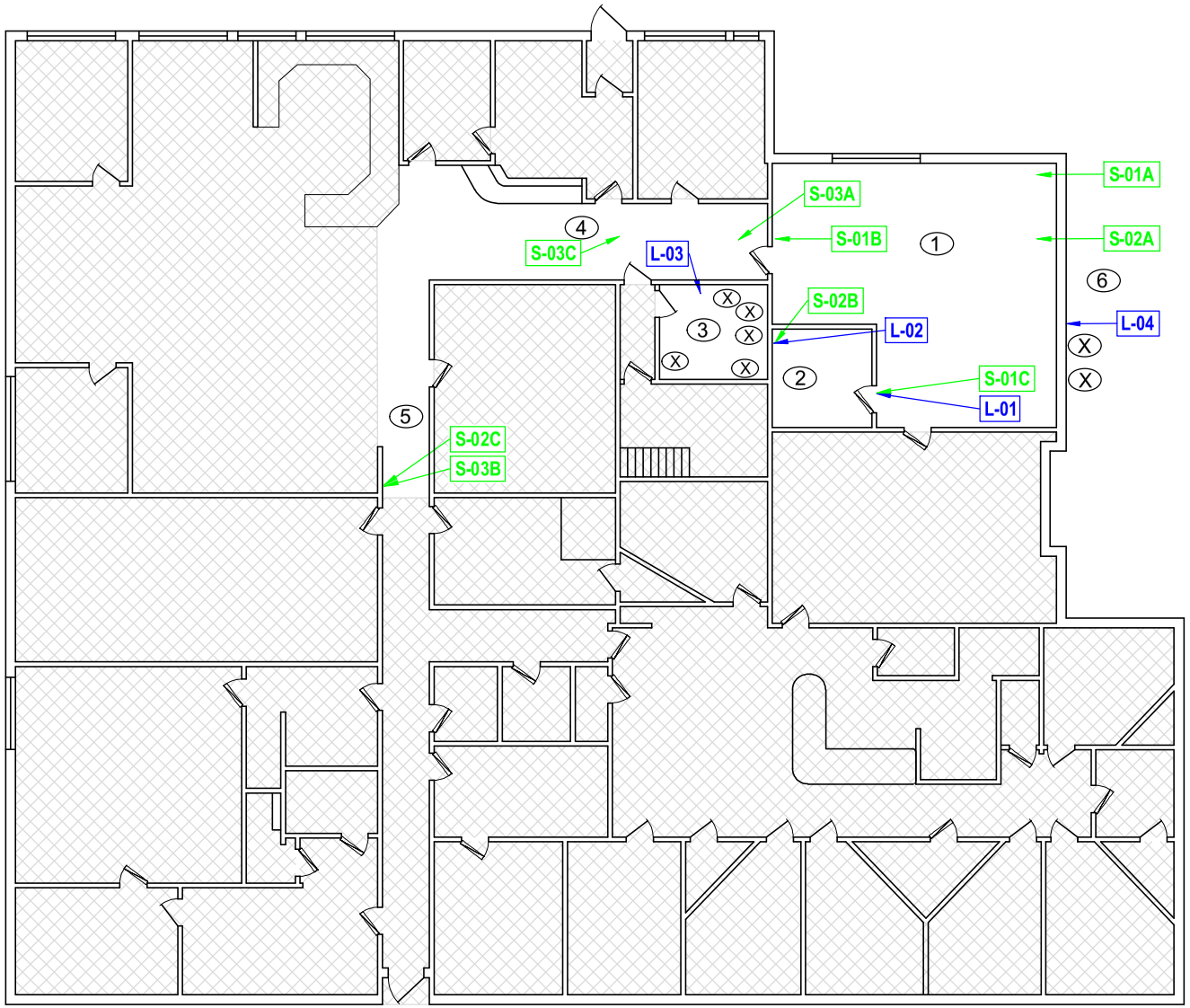
Rowena Fanto, Lead Supervisor
or other approved signatory

Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.008% wt based on the minimum sample weight per our SOP. "<" (less than) result signifies the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. Definitions of modifications are available upon request.
Samples analyzed by EMSL Canada Inc. Mississauga, ON AIHA-LAP, LLC - ELLAP #196142

Initial report from 03/11/2021 09:44:15

Appendix C

Floor Plans



LEGEND

S-XXX	Bulk Asbestos Sample Location Satisfies Applicable
S-XXX	Bulk Asbestos Sample Location Exceeds Applicable Guidelines
L-XXX	Bulk Lead Paint Sample Satisfies Applicable Guidelines
L-XXX	Bulk Lead Paint Sample Exceeds Applicable Guidelines
1	Location Number
X	No Vermiculite Observed in Masonry Wall Penetration
	Area Not Assessed - Not Impacted by Proposed Scope of Work

Notes:
- N.T.S

Title: **HAZARDOUS BUILDING MATERIAL SURVEY**

Project: E0691, RCMP DETACHMENT
690 OLD HOPE PRINCETON WAY
HOPE, BC

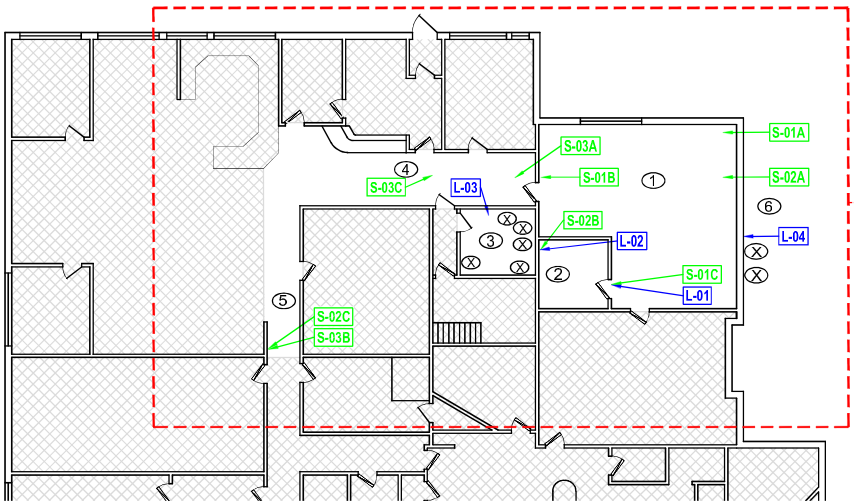
Client: PUBLIC SERVICES AND PROCUREMENT CANADA

Project Number:	Drawn By:	Plot Size:	Date:
30053059	ISZ	11X17"	MARCH 2021

ARCADIS

FIGURE 1

1 C:\Users\iziba\OneDrive - ARCADIS\Documents\Arcadis\PCPC_RCMP\30053059-Hope.dwg



N

LEGEND

- S-XXX — Bulk Asbestos Sample Location Satisfies Applicable
- S-XXX — Bulk Asbestos Sample Location Exceeds Applicable Guidelines
- L-XXX — Bulk Lead Paint Sample Satisfies Applicable Guidelines
- L-XXX — Bulk Lead Paint Sample Exceeds Applicable Guidelines
- (1) — Location Number
- (X) — No Vermiculite Observed in Masonry Wall Penetration
- Area Not Assessed - Not Impacted by Proposed Scope of Work

Notes:
- N.T.S

Title: **HAZARDOUS BUILDING MATERIAL SURVEY**

Project: E0691, RCMP DETACHMENT
690 OLD HOPE PRINCETON WAY
HOPE, BC

Client: PUBLIC SERVICES AND PROCUREMENT CANADA

Project Number: 30053059	Drawn By: ISZ	Plot Size: 11X17"	Date: MARCH 2021

ARCADIS

FIGURE 2

C:\Users\iztbal\OneDrive - ARCADIS\Documents\Arcadis\PCPC_RCMP\30053059-Hope.dwg

Appendix D

Regulations

Canada Labour Code

Requirements related to disclosing the presence of hazardous substances (including designated substances) in federal government buildings are specified in Part II of the Canada Labour Code, sections 125(1)y and 125(1)(z.14), which state that employers shall:

- "*ensure that the activities of every person granted access to the workplace do not endanger the health and safety of employees [Section y]; and*
- *take all reasonable care to ensure that all of the persons granted access to the workplace, other than the employer's employees, are informed of every known or foreseeable health or safety hazard to which they are likely to be exposed in the workplace [Section z.14]*".

Canada Occupational Health and Safety Regulations

The requirement for employees to keep and maintain a record of all hazardous substances that are used, produced, handled or stored for use in the work place and the criteria to employ in carrying out an investigation into potential exposure to a hazardous substance are specified in Part X – Hazardous Substances – of the Canada Occupational Health and Safety Regulations.

Asbestos

Occupational Health and Safety (OHS) for federal employees is regulated by the Canada Labour Code (CLC) Part II. The *Canada Occupational Health and Safety Regulations (COHSR), Part X, Hazardous Substances* covers specific requirements related to the management and control of asbestos-containing materials (ACM). The COHSR, Part X, Hazardous Substances, states an employee shall be kept free from exposure to a concentration of airborne chrysotile asbestos in excess of 0.1 fibre/cm^3 or f/cc. There are also specific requirements for hazard prevention detailed in the Hazard Prevention Program (HPP) in the CLC.

For the purposes of this report, the following federal requirements will be followed, unless provincial requirements are more stringent. Federal legislation and policy referenced in this report includes:

- Canada Labour Code, March 2020;
- Canada Occupational Health and Safety Regulations Part X, Hazardous Substances; SOR/86-304, June 2019;
- Public Services and Procurement Canada Asbestos Management Standard, June 2019;
- Asbestos Management Plan, Royal Canadian Mounted Police, Version 2020-01, January 2020; and,
- Transport Canada, Transport of Dangerous Goods Regulations

The management and requirements for the potential disturbance of asbestos in buildings is also regulated at the provincial level under the *British Columbia Occupational Health and Safety Regulations,296/97, and Safe Work Practices for Handling Asbestos, WorkSafeBC, 2017 Edition*.

The BC Occupational Health and Safety Regulations, 296/97 (BC Reg 296/97), require specific actions when asbestos is a potential health hazard in a workplace. Section 6.1 of the regulation defines an asbestos-containing material as follows:

"asbestos-containing material" means the following:

(a) a manufactured article or other material, other than vermiculite insulation, that would be determined to contain at least 0.5% asbestos if tested in accordance with one of the following methods:

(i) Asbestos, Chrysotile by XRD, Method 9000 (Issue 2, dated August 15, 1994) in the NIOSH Manual of Analytical Methods, published by the United States National Institute for Occupational Safety and Health, Centre for Disease Control;

(ii) Asbestos (bulk) by PLM, Method 9002 (Issue 2, dated August 15, 1994) in the NIOSH Manual of Analytical Methods, published by the United States National Institute for Occupational Safety and Health, Centre for Disease Control;

(iii) Test Method for the Determination of Asbestos in Bulk Building Materials (EPA/600/R-93/116, dated July 1993) published by the United States Environmental Protection Agency;

(b) vermiculite insulation that would be determined to contain any asbestos if tested in accordance with the Research Method for Sampling and Analysis of Fibrous Amphibole in Vermiculite Attic Insulation (EPA/600/R-04/004, dated January 2004) published by the United States Environmental Protection Agency;

The duties of employers, contractors, or owners include:

- identifying and labeling ACM that can potentially release asbestos fibres;
- keeping a current written record of all ACM present in the workplace;
- conducting regular surveillance and maintenance of asbestos materials to prevent fibre release;
- developing a written exposure control plan if workers may be exposed to harmful levels of asbestos;
- conducting work in a way that prevents the release of asbestos fibres as much as possible;
- notifying, informing, and training workers; and,
- notifying Occupational Health and Safety (OHS) at least 48 hours before beginning an asbestos-abatement.

Disturbance of asbestos during construction and demolition is regulated under section 20.112 of BC Reg 296/97.

The 2017 WorkSafeBC publication Safe Work Practices for Handling Asbestos (Asbestos Guide) is used by Occupational Health and Safety officers as a guide when reviewing abatement work practices and employer codes of practice, and generally meets the requirements of the COHSR.

The Asbestos Guide also provides significant additional background information pertaining to asbestos, along with details on health effects and other applicable legislation within the province of British Columbia (e.g., the federal Hazardous Products Act, the BC Building Code and waste disposal regulations).

Disposal of asbestos waste is governed by the British Columbia Hazardous Waste Regulation (BC Reg. 63/88). The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of asbestos waste in British Columbia. In general, and for transportation and disposal, the waste must be placed in a double sealed container, properly labeled, free of cuts, tears or punctures and disposed of at a licensed waste station which has been properly notified of the presence of asbestos waste.

Lead

In Canada, the Surface Coating Materials Regulations (SOR/2005-109) under the federal Hazardous Products Act provides a concentration of lead that must not be exceeded in surface coatings that are presently sold in this country. This value has recently been reduced from 600 ppm (2005) to 90 ppm (2010).

With respect to potential lead exposures associated with disturbance to surfaces coated with lead-containing products, the 2017 WorkSafeBC manual titled Lead-Containing Paint and Coatings: Preventing Exposure in the Construction Industry, indicates the following:

- Improper removal of lead paint containing 600 mg/kg lead results in airborne lead concentrations that exceed half of the exposure limit
    - This potential for exposure exceeding half of the occupational exposure limit would be the trigger for implementation of an exposure control plan.
- Lead concentrations as low as 90 mg/kg may present a risk to pregnant women and children
    - Any risk assessment should include for the presence of high risk individuals within the workplace

Occupational Safety and Health (OSHA) has stated that improper removal (meaning no controls in place) of paint containing 600ppm lead can present an exposure risk to workers.

PCB

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

In British Columbia, PCB equipment becomes PCB wastes as soon as it is removed from service. This is the case even if the intent is to treat, recycle, or reuse the equipment.

When PCB wastes are stored in British Columbia, the full requirements of BC Reg. 63/88 apply to:

- 1.0 kg or more of pure PCB
- 100 L or more of any liquid containing more than 50 ppm of PCB
- 100 kg or more of any material other than a liquid, contaminated with more than 50 ppm of PCB

These amounts are the total of all amounts at a single location owned or controlled by the same person. They include PCB equipment. BC Reg. 63/88 also provides packaging requirements for storage, labeling requirements, waste destruction requirements, and references SOR/2008-273, indicating:

The Federal Transportation of Dangerous Goods Regulation sets out the requirements for the proper transport of PCB waste across provincial boundaries.

In British Columbia, a manifest issued by the Ministry of Environment (or equivalent federal document) must be used for hazardous wastes shipped from sites in British Columbia. A manifest must be used to transport:

- 5 kg or more of PCB solids
- 5 L or more of PCB liquids
- An amount of a PCB solid or PCB liquid containing more than 500 g of PCB within BC

- 500 g or more of solids, liquids, or mixtures of these containing 50 mg/kg of PCB outside of BC

Suspect Visible Mould

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

Although there are currently no regulations in Canada pertaining specifically to mould in buildings, occupational health and safety regulations typically require employers to take every precaution reasonable in the circumstances for the protection of workers.

The WorkSafeBC Guideline for Part 4 of BC Reg. 296/97 discusses the application of the Regulation to workplaces with mould showing on exposed or hidden surfaces, or where mould may be a factor in complaints regarding indoor air quality. The guideline provides information for investigating indoor air quality complaints with respect to mould contamination, including information on sampling for the presence of moulds in buildings. Information is also provided on possible health effects and for cleanup personnel involved in the remediation of buildings damaged by water and mould.

Mercury

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

Mercury disposal should be through a scrap dealer (elemental mercury), recycling firm for mercury vapour and returned to the manufacturer for light tubes and fixtures. Disposal of mercury waste is governed by BC Reg. 63/88.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of mercury waste in British Columbia.

Silica

Regulations pertaining to silica are provided in BC Reg. 296/97. Included are general provisions (minimizing release; keeping worksite clear of unnecessary accumulations; ensuring methods for decontamination prevent generation of airborne silica), provisions for “restricted areas” (where there is a reasonable chance that the airborne concentration of silica exceeds or may exceed the occupational exposure limit), provisions for use in abrasive blasting, and provisions for health assessments for workers exposed to silica.

Ozone Depleting Substances (ODS)

ODSs are regulated in British Columbia by the British Columbia *Waste Management Act*—Ozone Depleting Substances and Other Halocarbons Regulation (BC Reg. 387/99 as amended by BC Reg. 317/2012).

On federal land, aboriginal land and federal works, buildings and undertakings, the Federal Halocarbon Regulation 2003 (SOR/2003-289, including associated amendments) applies. All other buildings and uses of refrigerants and other agents are under the Ozone-Depleting Substances Regulations 1998 (SOR/99-7), under CEPA. The

regulations prohibit the release of halocarbons contained in refrigeration systems, air conditioning systems, fire extinguishers (except to fight a fire that is not a fire caused for training purposes) or containers or equipment used in the re-use, recycling, reclamation or storage of a halocarbon.

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

If ODS-containing materials are to be removed and disposed of, all ODSs must be handled, recycled, stored, and/or disposed of in accordance with the requirements of BC Reg. 63/88.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of ODS waste in British Columbia.

Appendix E

Survey Methodology

Sampling activities were conducted in accordance with Arcadis' Standard Operation Procedures which take into account current federal and provincial regulations pertaining to such work (i.e., sampling procedures, required number of samples and laboratory analytical procedures).

Representative bulk samples were collected of accessible suspect paint, and asbestos-containing materials in sufficient quantities for laboratory analysis. Samples were sealed in polyethylene zip-lock bags labeled with the sample number, suspect material description, and sample location. As part of sampling procedures, sampling tools were cleaned between sample collection events to avoid the potential for cross-contamination of samples.

All sample bags were compiled in order and placed into a single container accompanied with a chain of custody form outlining the project information, date, building location, number of samples, and sample description. Samples were submitted to the analytical laboratory in a sealed container via courier.

Asbestos

A separate set of samples was collected of each type of homogenous material suspected to contain asbestos. A homogenous material is defined by the US EPA as material that is uniform in texture and appearance, was installed at one time, and is unlikely to consist of more than one type or formulation of material. The homogeneous materials are determined by visual examination, available information on the phases of the construction and prior renovations.

Bulk sampling protocols followed the ASTM E2356 Standard, which indicates requirements for the number of samples to collect for each homogeneous material. The table below provides an outline of the minimum number of samples to be collected from the ASTM E2356 Standard.

Table 4: Bulk Material Sample Quantities

Any homogeneous material, including but not limited to fireproofing, drywall joint compound, ceiling tile stucco, acoustical and stipple finishes, and visually similar floor tiles	Less than 90 m^2 (<1,000 ft^2)	3
	90 m^2 or more, but less than 450 m^2 (1,000-5,000 ft^2)	5
	450 m^2 or more (>5,000 ft^2)	7

In some cases, manufactured products such as asbestos cement pipe were visually identified without sample confirmation.

Flooring mastic/adhesive were only sampled and analyzed if present on the underside of flooring samples (vinyl floor tile and vinyl sheet flooring) in sufficient quantity for laboratory analysis.

Attempts to distinguish and delineate asbestos-containing drywall compound from new non-asbestos drywall compound is often unachievable. Arcadis collected drywall joint compound samples from exterior walls, columns or other locations which are unlikely to have been renovated in an attempt to determine the presence of asbestos in the original drywall compound.

Arcadis samples roofing felts only at the Clients request. A temporary repair will be made with asphalt-based mastic and fibreglass mesh. A more permanent repair is required if the roofing or the building is to remain in use for any extended period of time. Arcadis will not be responsible or liable for leaks or water damage caused by sampling and or repair.

Arcadis conducts limited demolition of masonry block walls (core holes) to investigate for loose fill insulation. The core holes are temporarily patched with expanding foam.

Arcadis will submitted the bulk samples to a NVLAP accredited laboratory for analysis. The analysis is performed in accordance with Test Method EPA/600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials, July 1993.

EPA Method 600 states that materials characterized by interfering binder/matrix or low asbestos content may require additional gravimetric reduction sample treatment beyond routine polarized light microscopy (PLM) analysis (e.g. dissolution with hydrochloric acid, treatment with organic solvents or ashing in a muffle furnace or low temperature plasma asher to remove unwanted components). Arcadis will submit one sample of each sample set (3) of vinyl floor tiles to be analyzed by transmission electron microscopy (TEM) if the first two samples are reported negative by PLM.

The asbestos analysis was completed using a stop positive approach. Only one result of greater than the regulated criteria is required to determine that a material is asbestos containing, but all samples must be analyzed to conclusively determine that a material is non-asbestos. The laboratory will stop analyzing samples from a homogeneous material once greater than the criteria was detected in any of the samples of that material. All samples of a homogeneous material will be analyzed if no asbestos is detected.

Bulk samples of materials which could contain asbestos were collected and submitted to EMSL Canada Inc. (EMSL) for analysis of asbestos content. In BC, asbestos-containing materials are defined as 0.5% or greater, or any amount if vermiculite.

Classification, Condition and Accessibility

Spray Applied Fireproofing, Insulation and Texture Finishes

To evaluate the condition of ACM spray applied as fireproofing, thermal insulation, or texture, decorative or acoustic finishes, the following criteria are applied:

GOOD

Surface of material shows no significant signs of damage, deterioration, or delamination. Up to 1 percent visible damage to surface is allowed within range of **GOOD**. Evaluation of sprayed fireproofing requires the surveyor to be familiar with the irregular surface texture typical of sprayed asbestos products. **GOOD** condition includes un-encapsulated or unpainted fireproofing or texture finishes, where no delamination or damage is observed, and encapsulated fireproofing or texture finishes where the encapsulation has been applied after the damage or fallout occurred.

POOR

Sprayed materials show signs of damage, delamination, or deterioration. More than 1 percent damage to surface of ACM spray.

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

NOTE: **FAIR** condition is not utilized in the evaluation of the sprayed fireproofing, sprayed insulation, or texture coat finishes.

The evaluation of ACM spray applied as fireproofing, non-mechanical thermal insulation, or texture, decorative or acoustic finishes which are present above ceilings, may be limited by the number of observations made, and by building components such as ducts or full height walls that obstruct the above ceiling observations. Persons

entering the ceiling are advised to be watchful for ACM **DEBRIS** prior to accessing or working above ceilings in areas of buildings with ACM regardless of the reported condition.

Mechanical Insulation

The evaluation of the condition of mechanical insulation (on boilers, breaching, ductwork, piping, tanks, equipment etc.) utilizes the following criteria:

GOOD

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

FAIR

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

POOR

Original insulation jacket is missing, damaged, deteriorated, or delaminated. Insulation is exposed and significant areas have been dislodged. Damage cannot be readily repaired.

The evaluation of mechanical insulation may be limited by the number of observations made and building components such as ducts or full height walls that obstruct observations. It is not possible to observe the full length of mechanical insulation from all angles.

Non-friable and Potentially Friable Materials

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

Evaluation of Accessibility

The accessibility of building materials known or suspected of being ACM is rated according to the following criteria:

ACCESS (A)

Areas of the building within reach (from floor level) of all building users. Includes areas such as gymnasiums, workshops, and storage areas where activities of the building users may result in disturbance of ACM not normally within reach from floor level.

ACCESS (B)

Frequently entered maintenance areas within reach of maintenance staff, without the need for a ladder. Includes: frequently entered pipe chases, tunnels and service areas or areas within reach from a fixed ladder or catwalk, e.g. tops of equipment, mezzanines.

ACCESS (C) EXPOSED

Areas of the building above 2.4 metres where use of a ladder is required to reach the ACM. Only refers to ACM that is exposed to view, from the floor or ladder, without the removal or opening of other building components such as ceiling tiles, or service access door or hatch. Does not include infrequently accessed service areas of the building.

ACCESS (C) CONCEALED

Areas of the building which require the removal of a building component, including lay-in ceilings and access panels into solid ceiling systems. Includes rarely entered crawl spaces, attic spaces, etc. Observations will be limited to the extent visible from the access points.

ACCESS (D)

Areas of the building behind inaccessible solid ceiling systems, walls, or mechanical equipment, etc. where demolition of the ceiling, wall, or equipment, etc. is required to reach the ACM. Evaluation of condition and extent of ACM is limited or impossible, depending on the surveyor's ability to visually examine materials in ACCESS D.

ACM DEBRIS

DEBRIS from Friable ACM

The presence of fallen ACM is noted separately from the presumed friable ACM source (sprayed fireproofing, thermal insulation, texture, decorative or acoustic finishes or mechanical insulation) and is referred to as **DEBRIS**.

DEBRIS from Damaged Non-Friable ACM

The presence of fallen ACM from damaged non-friable ACM is also reported separately from the non-friable ACM source. Only fallen non-friable ACM that has become friable is reported as **DEBRIS**.

The identification of the exact location or presence of **DEBRIS** on the top of ceiling tiles is limited by the number of observations made and the presence of building components such as ducts or full height walls that obstruct observations. Workers are advised to be watchful for the presence of **DEBRIS** prior to accessing or working in proximity to mechanical insulation or above ceilings in areas of buildings with ACM regardless of the reported presence or absence of **DEBRIS**.

Action Matrix and Action Descriptions

The Asbestos Management Plan requires the following responses:

- Immediately clean-up **DEBRIS** that is likely to be disturbed.
- Remove, repair, or enclose friable ACM in **POOR** or **FAIR** condition whose continued deterioration will result in **DEBRIS** that is likely to be disturbed.

The following factors shall be considered in making site-specific recommendations for compliance with the existing applicable regulations or codes and the practical implementation of the Asbestos Management Plan:

1. ACM in **POOR** condition is not routinely repairable. If an abatement action is necessary, removal is the recommended action (enclosure is a viable option in unusual circumstances, e.g. where removal is difficult or costly and the asbestos-containing material can be thoroughly enclosed).

2. Mechanical insulation in **FAIR** condition will be repaired or removed based on the following general recommendations, applied on a case-by-case basis:
   - ACM insulation found in **FAIR** condition in ACCESS (B) or ACCESS (C) EXPOSED areas is to be repaired.
   - ACM mechanical insulation found in **FAIR** condition in ACCESS (B) and ACCESS (C) EXPOSED areas, where future damage to the ACM is likely to occur, is to be removed.

3. ACM in **GOOD** condition present in ACCESS (A) can be managed by surveillance, as long as it is not disturbed by future renovation, maintenance, or demolition. Proactive removal of the ACM in ACCESS (A) will be considered where damage is possible by on-going occupant activity (accidental or intentional).

4. Non-friable or manufactured products are considered in the action matrix as follows:
   - Non-friable and manufactured products reported in **POOR** condition, or friable **DEBRIS** resulting from the deterioration of non-friable ACM, are treated as friable materials and the appropriate action, and depending on accessibility is determined from the action matrix for friable ACM.
   - For non-friable or manufactured products reported in **GOOD** condition, Action 7 (surveillance) is recommended regardless of accessibility.

5. All asbestos-containing material from a particular area is to be removed where small quantities of asbestos are present, and removal will negate the need for the use of an Asbestos Management Program in that area.

The action matrix provided below establishes the recommended asbestos control action. The ACTIONS themselves are described in full following the table.

Table 5: Action Matrix Tables

FRIABLE ACM				
ACCESS	**CONDITION**			**DEBRIS**
	GOOD	**FAIR**	**POOR**	
(A)	ACTION 5/7[1]	ACTION 5/6[2]	ACTION 3	ACTION 1
(B)	ACTION 7	ACTION 6/5[3]	ACTION 3	ACTION 1
(C) EXPOSED	ACTION 7	ACTION 6	ACTION 4	ACTION 2
(C) CONCEALED	ACTION 7	ACTION 7	ACTION 4	ACTION 2
(D)	ACTION 7	ACTION 7	ACTION 7	ACTION 7

[1] If material in **ACCESS (A)/GOOD** condition is not removed **ACTION 7** is required.

[2] If material in **ACCESS(A)/FAIR** condition is not removed **ACTION 6** is required.

[3] Remove ACM in **ACCESS (B)/FAIR** condition if ACM is likely to be disturbed.

Action Descriptions

ACTION 1 - Immediate Clean-Up of DEBRIS that is Likely to Be Disturbed

Access that is likely to cause a disturbance of the ACM **DEBRIS** is to be restricted and **clean up ACM DEBRIS is to be done immediately**. Use correct asbestos procedures. This action is required for compliance with regulatory requirements and good practice. The assessor should immediately notify the Asset or Property and Facility Manager, or Regional/Area Asbestos Management Coordinator of this condition.

ACTION 2 - Intermediate risk precautions for Entry into Areas with ACM DEBRIS

At locations where ACM **DEBRIS** can be isolated in lieu of removal or cleaned up, use appropriate means to limit entry to the area. Restrict access to the area to persons using intermediate risk asbestos precautions. The precautions will be required until the ACM **DEBRIS** has been cleaned up, and the source of the **DEBRIS** has been stabilized or removed.

ACTION 3 - ACM Removal Required for Compliance

Remove ACM for compliance with regulatory requirements and good practice. Utilize asbestos procedures appropriate to the scope of the removal work.

ACTION 4 - Access into areas where asbestos-containing material is present and likely to be disturbed by access requires intermediate risk precautions.

Intermediate risk asbestos precautions are to be used when entry or access into an area is likely to disturb the ACM. **ACTION 4** must be used until the ACM is re-moved (Use **ACTION 1** or **2** if **DEBRIS** is present). Intermediate risk or high-risk precautions should be used for removal (depending on extent of removal).

ACTION 5 - Proactive ACM Removal

Removal of ACM in lieu of repair may be considered, even if it is in **GOOD** condition at locations, where ACM is easily accessible, limited in quantity, and removal would be cost-effective.

ACTION 6 - ACM Repair

Repair ACM found in **FAIR** condition, and not likely to be damaged again or disturbed by normal use of the area or room. Upon completion of the re-pair work treat ACM as material **in GOOD** condition and implement **ACTION 7**. If ACM is likely to be damaged or disturbed during normal use of the area or room, **ACTION 5** is to be implemented.

ACTION 7 - Routine Surveillance

Institute routine surveillance of the ACM. Trained workers or contractors must use appropriate asbestos precautions (low, intermediate, or high) during disturbance of the remaining ACM.

Lead Paint

Arcadis collects samples of distinctive paint finishes and surface coatings present in more than a limited application, where removal of the paint is possible. Arcadis collects samples by scraping the painted finish to include base and covering applications. Paint and surface coatings are evaluated for condition.

All paints were analyzed for lead.

When evaluating the condition of paints, an attempt is made to determine whether the deterioration is due to a moisture problem or some other existing building deficiency. **"Poor"** surfaces are considered to be a hazard and should be corrected. "**Fair"** surfaces should be repaired but are not yet considered to be a hazard; if not repaired, they should be monitored frequently. "**Good/intact"** surfaces should be monitored to ensure that they remain in a nonhazardous condition.

In addition, the presence of paint debris is considered in evaluating conditions. Given the variety of paint uses, there are many applications that can have a tendency for the paint to "wear" from the surface slowly, over an extended period of time. Conditions where paint has worn from a surface are worth noting for maintenance discussions (i.e., related to re-coating the surface should, for example, the coating provide weather protection), however, in the absence of loose paint chip debris/dust, such conditions would not represent a potential exposure situation related to lead.

The condition evaluation criteria for paints is summarized in the table below.

Table 6: Paint Condition Categories

Type of Building Component[1]	Total Area of Deteriorated Paint on Each Component		
	Good/Intact	Fair[2]	Poor[3]
Exterior components with large surface areas.	Entire surface is intact.	Less than or equal to 10 square feet	More than 10 square feet
Interior components with large surface areas (walls, ceilings, floors, doors.	Entire surface is intact.	Less than or equal to 2 square feet	More than 2 square feet
Interior and exterior components with small surface areas (windowsills,	Entire surface is intact.	Less than or equal to 10% of the total surface area of the	More than 10% of the total surface area of the

NOTES:

1 Building component in this table refers to each individual component or side of building, not the combined surface area of all similar components in a room (e.g., a wall with 1 square foot of deteriorated paint is in "fair" condition, even if the other three walls in a room are intact).

2 Surfaces in "fair" condition should be repaired and/or monitored but are not considered to be "lead-containing paint hazards".

3 Surfaces in "poor" condition are considered to be "lead-containing paint hazards" and should be addressed through abatement or interim controls.

Analysis for lead in paints or surface coatings is performed in accordance with US EPA Method No. 3050B/Method No. 7420; Flame Atomic Absorption (FAA) at an accredited laboratory by the American Industrial Hygiene Association (AIHA). For the purpose of this report a criteria of 90ppm will be used to define lead based paint.

Lead Products

Lead building products (e.g. batteries, lead sheeting, flashing) were identified by visual observation only.

Lead Leachate Testing

Representative samples are collected of materials coated with lead containing paint. The samples are composited into a single sample using a ratio of each material relative to the total painted waste material. Samples are submitted for analysis to EMSL Canada Inc., Burnaby, BC, NVLAP accredited Laboratory in accordance with the Toxicity Characteristic Leaching Procedure (TCLP) outlined in US EPA SW-846 Method 1311 and US EPA 6020.

Results are compared to Schedule 4, Table 1 of the Hazardous Waste Regulation: “leachable toxic waste (5.0 mg/L or greater) means waste when subject to the TCLP leaks or spills which may lead to the escape of hazardous waste from the facility or may pose a threat to human health”.

Silica

Arcadis identified building materials suspected of containing crystalline silica (e.g. concrete, cement, tile, brick, masonry, mortar) by knowledge of current and historic applications and visual inspection only. Arcadis did not perform sampling of these materials for laboratory analysis of crystalline silica content.

Mercury

Building materials/products/equipment (e.g. thermostats, barometers, pressure gauges, light tubes), suspected to contain mercury was identified by visual inspection only. Dismantling of equipment suspected of containing mercury was not performed. Mercury spills or damaged mercury-containing equipment were recorded where observed.

Polychlorinated Biphenyls (PCBs)

Arcadis determined the potential for light ballast and wet transformers to contain PCBs based on the age of the building, a review of maintenance records and examination of labels or nameplates on equipment, where present and accessible. The information was compared to known ban dates of PCBs and Environment Canada publications. Dry type transformers were presumed to be free of dielectric fluids and hence non-PCB. Arcadis recorded spills or leakage of suspect PCB-containing fluids where observed or identified in historical documents. Fluids (mineral oil, hydraulic or Askaral) in transformers or other equipment are not sampled for PCB content.

Window, door, penetration, and expansion caulking were sampled for PCB content in buildings older than 1985. The material was considered a PCB solid if PCB content is 50ppm or greater based on the threshold given in Canadian Environmental Protection Act (1999) SOR/2008-273.

Ozone Depleting Substances (ODS)

Arcadis determined the potential presence of ODS (chlorofluorocarbons, hydrochlorofluorocarbons, hydrofluorocarbons, halons, etc.) in air conditioning units, chillers, commercial coolers, and fire suppression systems by visual inspection of manufactures’ labels or plates, maintenance records, or logbooks, etc.

Suspect Visible Mould

Arcadis identified the presence of any suspect visible mould or water damage observed during the course of our site investigation. Suspect visible mould is typically a coloured, textured substance or discolouration or staining on a building material surface which, based on our experience, may be mould growth. The adjective suspect is used where the presence of mould has not been confirmed by laboratory analysis.

Arcadis Canada Inc.
1080 Mainland Street
Suite 308
Vancouver, BC, V6B 2T4
Phone: 604 706 4785
www.arcadis.com

APPENDIX D

PRELIMINARY HAZARD ASSESSMENT FORM

Project Number:	R.109051.001
Location:	RCMP Detachment Generator Upgrade, Building E0691, 690 Old Hope-Princeton Way, Hope B.C.
Date:	2021-09-13
Name of Departmental Representative:	Masood Dezfooli, PSPC
Name of Client:	R.C.M.P.

Site Specific Orientation Provided at Project Location **Yes** ☐ **No** ☐

Notice of Project Required **Yes** ☐ **No** ☐

NOTE:
PWGSC requires "**A Notice of Project"** for all construction work related activities.

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

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

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

Typical Construction Hazards					Comments
Concealed/Buried Services (electrical, gas, water, sewer, etc)	Yes		Yes		
Slip Hazards or Unsound Footing	Yes		Yes		
Working at Heights **(2.4m)**	Yes		Yes		In a federal institution the fall protection requirement is **2.4m NOT 3m** as per WBC OHSR
Working Over or Around Water		No		No	
Heavy overhead lifting operations, mobile cranes etc.		No		No	

PRELIMINARY HAZARD ASSESSMENT FORM

Marine and/or Vehicular Traffic (site vehicles, public vehicles, etc.	Yes		Yes		
Fire and Explosion Hazards	Yes		Yes		
High Noise Levels	Yes		Yes		
Excavations	TBD		TBD		Contractor to confirm
Blasting		No		No	
Construction Equipment	Yes		Yes		
Pedestrian Traffic (site personnel, tenants, visitors, public)	Yes		Yes		
Multiple Employer Worksite	Yes		Yes		Contractor working in an occupied (workers and general public) federal environment.

Electrical Hazards					**Comments**
Contact With Overhead Wires	Yes		Yes		
Live Electrical Systems or Equipment	Yes		Yes		
Other: Arc Flash	Yes		Yes		

Physical Hazards					**Comments**
Equipment Slippage Due To Slopes/Ground Conditions	Yes		Yes		
Earthquake	Yes		Yes		
Tsunami		No		No	
Avalanche	Yes			Yes	
Forest Fires	Yes			Yes	
Fire and Explosion Hazards	Yes		Yes		
Working in Isolation		No		No	
Working Alone		No		No	
Violence in the Workplace	Yes		Yes		
High Noise Levels	Yes		Yes		
Inclement weather	Yes		Yes		High winds, rain, and snow
High Pressure Systems		No		No	
Other:					

Hazardous Work Environments					**Comments**
Confined Spaces / Enclosed Spaces	Yes		Yes		Follow Worksafe B.C. Confined Space Regulations
Suspended / Mobile Work Platforms		No		No	
Other:					
Biological Hazards					**Comments**
Mould Proliferations		No		No	
Accumulation of Bird or Bat Guano		No		No	

PRELIMINARY HAZARD ASSESSMENT FORM

Bacteria / Legionella in Cooling Towers / Process Water		No		No	
Rodent / Insect Infestation		No		No	
Poisonous Plants		No		No	
Sharp or Potentially Infectious Objects in Wastes	Yes		Yes		
Wildlife	Yes		Yes		Potential of wildlife on roads
Other					
COVID 19	Yes		Yes		Reference: CSA National COVID 19 Standardized Protocol, Province of B.C. Construction - Business PHO,

Chemical Hazards					**Comments**
Asbestos Materials on Site **(See comments)**	See Comments				Reference: Hazardous Building Materials Survey, Arcadis Dated March 12, 2021
Designated Substance Present		No		No	If "yes" a pre-project designated substance survey report is required.
Chemicals Used in work **(see comments)**	Yes		Yes		WHMIS 2015 SDS for all products being used
Lead in paint **(See comments)**	See Comments				Reference: Hazardous Building Materials Survey, Arcadis Dated March 12, 2021
Mercury in Thermostats or Switches **(See comments)**	See Comments				Reference: Hazardous Building Materials Survey, Arcadis Dated March 12, 2021
Application of Chemicals or Pesticides		No		No	
PCB Liquids in Electrical Equipment **(See comments)**	See Comments				Reference: Hazardous Building Materials Survey, Arcadis Dated March 12, 2021
Radioactive Materials in Equipment		No		No	
Other: Silica (See comments)	See Comments				Reference: Hazardous Building Materials Survey, Arcadis Dated March 12, 2021

Contaminated Sites Hazards					**Comments**
Hazardous Waste		No		No	
Hydrocarbons		No		No	
Metals		No		No	
Other:	See Comments				Reference: Hazardous Building Materials Survey, Arcadis Dated March 12, 2021
Security Hazards					**Comments**
Risk of Assault	Yes		Yes		
Other:					

PRELIMINARY HAZARD ASSESSMENT FORM

Other Hazards					Comments

Other Compliance and Permit Requirements[1]	YES	NO	Notes / Comments[2]
Is a Building Permit required?		**n/a**	
Is a Electrical permit required?	Yes		Contractor to secure permits
Is a Plumbing Permit required?		**n/a**	
Is a Sewage Permit required?		**n/a**	
Is a Dumping Permit required?	**Yes**		Contractor shall follow federal/provincial regulations
Is a Hot Work Permit required?	Yes		Mandatory for any hot work process
Is a Permit to Work required?		No	
Is a Confined Space Entry Permit required?	Yes		Mandatory for all Confined Spaces
Is a Confined Space Entry Log required?	Yes		Mandatory for all Confined Spaces
Discharge Approval for treated water required?		No	

Notes:

(1) Does not relieve Contractor from complying with all applicable federal, provincial, and municipal laws and regulations.
(2) TBD means To Be Determined by Contractor.
(3) Contractor and employees (including sub-trades) must attend a CSC/PSPC Security and Safety Orientation prior to gaining any access to institutional property prior to work commencing.

Prime Contractor Acknowledgement: We confirm receipt and review of this Preliminary Project Hazard Assessment and acknowledge our responsibility for conducting our own assessment of project hazards, and taking all necessary protective measures (which may exceed those cited herein) for performance of the work.			
Contractor Name			
Signatory for Contractor		**Date Signed**	
RETURN EXECUTED DOCUMENT TO PWGSC DEPARTMENTAL REPRESENTATIVE. PRIOR TO ANY WORK COMMENCING THE CONTRACTOR AND/OR THEIR SUB-CONTRACTORD MUST ATTEND A CSC/PSPC SECURITY AND SAFETY ORIENTATION			