

CONSULTANTS – SEAL & SIGNATURE

Discipline

Seal/Signature/Date

Electrical (Prime)

Structural

END OF SECTION

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Appendix A

Public Services and Procurement Canada – Hazardous Building Material Assessment, RCMP
Buildings – E Division, E0547 RCMP Hangar, #1 Coast Guard Road, Seal Cove/Prince Rupert
BC 45

Appendix B

PSPC Preliminary Hazard Assessment Form..... 4

Drawings – Electrical

E-001 Electrical Legend, Site Keyplan and General Notes
E-002 Electrical Plan and Single Line Diagram
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Part 1 General

1.1 SUMMARY OF WORK

- .1 Work covered by Contract Documents:
 - .1 This Contract covers the following work at the Prince Rupert RCMP detachment in Prince Rupert BC.
- .2 Work to be performed under this Contract includes, but not limited to, the following items covered further in the Contract Documents:
 - .1 GPR (Ground Penetrating Radar) survey of the proposed feeder route to identify existing underground obstacles prior to trench excavation.
 - .2 Installation of underground ducts and junction boxes
 - .3 Installation of new exterior generator (in sound attenuated enclosure) and ATS, and associated feeders and control.
 - .4 Installation of Generator Annunciator to provide status of generator ‘running’ and generator ‘trouble’.
 - .5 Provide a detailed work plan including a project schedule and phasing. This detailed work plan shall be submitted to the Departmental Representative for review.
 - .6 Do not start work until all essential equipment is delivered to the site and work can proceed without delays.
 - .7 Provide as-built drawings and closeout submittals.

1.2 Work Restrictions

- .1 Notify Departmental Representative of intended interruption of power, communication and water services and provide schedule of interruption times.
- .2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 72 hours of notice for necessary interruption of services throughout course of Work. Keep duration of interruptions to a minimum. Coordinate interruptions with local authority having jurisdiction and local residences and businesses affected by the disruption.
- .3 Provide for access by pedestrian and vehicular traffic on and around site where Work is in progress.
- .4 Construct barriers
- .5 Hours of Work:
 - .1 Perform work during normal working hours.
 - .2 When necessary, arrange in advance with Departmental Representative to work outside of normal working hours.

1.3 ACCESS AND EGRESS

- .1 Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

- .1 Work of this Contract comprises of modifications to the existing electrical distribution system and replacement or additions to the associated electrical equipment. Work of this contract including the general construction of a new exterior rated sound attenuated generator, ATS, primary and secondary feeders, located at Prince Rupert Hangar and further identified as the Prince Rupert Hangar Generator Upgrade.
- .2 Pay all fees and obtain permits required by regulatory authorities to complete the work.
- .3 Provide inspection authorities with plans and information required for the issue of acceptance certificates.
- .4 Furnish inspection certificates in evidence that the work installed conforms with the requirements of the authority having jurisdiction.

1.5 CONTRACT

- .1 This contract shall be executed as a single stipulated price contract

1.6 SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit Project construction progress schedule
- .3 Construction Progress Schedule - Bar (GANNT) Chart.
- .4 Sustainable Design Submittals:
 - .1 Construction Waste Management:
 - .1 Submit project Waste Management Plan highlighting recycling and salvage requirements
- .5 Submit site-specific and Work Plan Health and Safety Plan.

1.7 WORK BY OTHERS

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

1.8 WORK SEQUENCE

- .1 Construct Work in stages to accommodate Owner's continued use of premises during construction.
- .2 Co-ordinate Progress Schedule and co-ordinate with Owner Occupancy during construction.

- .3 Construct Work in stages to provide for continuous public usage. Do not close off public usage of facilities until use of one stage of Work will provide alternate usage.
- .4 Maintain fire access/control.
- .5 Protect workers and public safety.

1.9 CONTRACTOR USE OF PREMISES

- .1 Unrestricted use of site until Substantial Performance.
- .2 Limit use of premises for access ,for storage, for Work, to allow:
 - .1 Owner occupancy.
 - .2 Partial owner occupancy.
 - .3 Work by other contractors.
 - .4 Public usage.
- .3 Co-ordinate use of premises under direction of Departmental Representative.
- .4 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.
- .5 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.
- .6 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by Consultant.
- .7 Ensure that operations conditions of exiting work at completion are still the same, equal to or better than that which existed before new work started.

1.10 OWNER OCCUPANCY

- .1 Owner will occupy premises during entire construction period for execution of normal operations.
- .2 Co-operate with Owner in scheduling operations to minimize conflict and to facilitate Owner usage.

1.11 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

- .1 Execute work with least possible interference or disturbance to building operations, public and normal use of premises. Arrange with Consultant to facilitate execution of work.

1.12 EXISTING SERVICES

- .1 Notify, Consultant and utility companies of intended interruption of services and obtain required permission.
- .2 Where Work involves breaking into or connecting to existing services, give 48 Consultant hours notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to tenant operations.
- .3 Provide alternative routes for personnel and vehicular traffic.

- .4 Establish location and extent of service lines in area of work before starting Work. Notify Consultant of findings.
- .5 Submit schedule for approval by Consultant for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.
- .6 Provide temporary services to maintain critical building and tenant services.
- .7 Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.
- .8 Where unknown services are encountered, immediately advise Consultant and confirm findings in writing.
- .9 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.
- .10 Record locations of maintained, re-routed and abandoned service lines.

1.13 DOCUMENTS REQUIRED

- .1 Maintain at job site, one copy of each document as follows:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Reviewed Shop Drawings.
 - .5 List of Outstanding Shop Drawings.
 - .6 Change Orders.
 - .7 Other Modifications to Contract.
 - .8 Field Test Reports.
 - .9 Copy of Approved Work Schedule.
 - .10 Health and Safety Plan and Other Safety Related Documents.
 - .11 Other documents as specified.

1.14 TIME OF COMPLETION

- .1 Schedule activities to complete project deliverables within 26 weeks after award of contract. Submit Construction Work Schedule according to Part 1.15.

1.15 CONSTRUCTION WORK SCHEDULE

- .1 Commence work immediately upon official notification of acceptance of offer and complete the work in a time period as agreed upon with the Departmental Representative.
- .2 Ensure that it is understood that Award of Contract, or time of beginning, rate of progress, Substantial Certificate and Final Certificate as defined times of completion are of essence of this Contract.
- .3 On award of contract submit Bar (GANTT) Chart construction schedule for work, indicating anticipated progress stages within time of completion. When schedule has been reviewed by Departmental Representative, take necessary measures to complete work within scheduled time.

- .4 Do not change schedule without notifying Departmental Representative.
- .5 Submit schedule updates monthly and, when requested by Departmental Representative, due to changing project conditions. Provide a narrative explanation of necessary changes and schedule revisions at each update.

1.16 FIRE SAFETY REQUIREMENTS

- .1 Comply with the National Building Code of Canada [2005] (NBC) for fire safety in construction and the National Fire Code of Canada [2005] (NFC) for fire prevention, fire fighting and life safety in building in use.
- .2 Comply with Human Resources Development Canada (HRDC), Fire Commissioner of Canada (FCC) standards available from Fire Protection Engineering Services, Labour Program, HRDC or following internet site:
http://info.load-otea.hrdc-drhc.gc.ca/fire_prevention/standards/commissioner.shtml.
 - .1 No. 301: Standard for Construction Operations.
 - .2 No. 302: Standard for Welding and Cutting.
 - .3 No. 374: Fire Protection Standard for General Storage (Indoor and Outdoor).
 - .4 Retain fire safety documents and standards on site.

1.17 SUBMITTALS

- .1 Shop Drawings:
 - .1 Submit for Departmental Representative review each shop drawing.
 - .2 Review is for sole purpose of ascertaining conformance with general design concept and does not mean approval of design details inherent in shop drawings, responsibility for which remains with Contractor.
 - .3 Departmental Representative's review does not relieve Contractor of responsibility for errors or omissions in shop drawings or of Contractor's responsibility for meeting requirements of Contract Documents.
 - .4 Do not commence manufacture or order materials before shop drawings are reviewed.
- .2 Samples:
 - .1 Where colour, pattern or texture is criterion, submit full range of samples.
 - .2 Reviewed and accepted samples will become standard of quality of work and material against which installed work will be verified.
- .3 Product Data:
 - .1 Submit copies of product data.
 - .2 Delete information not applicable to project.
 - .3 Cross-reference product data information by division and section number to applicable portions of Contract Documents.

1.18 SECURITY CLEARANCES

- .1 Personnel employed on this project will be subject to security check. Obtain requisite clearance, as instructed, for each individual required to enter premises.

- .2 Personnel will be checked daily 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.

1.19 CODES AND STANDARDS

- .1 Perform work in accordance with National Building Code of Canada (NBC) and other applicable code of provincial, territorial or local application including amendments up to project tender closing date provided that in case of conflict or discrepancy, more stringent requirements apply.
- .2 Canadian Electrical Code CC22.1-15.
- .3 Quality of materials and work must meet or exceed requirements of specified standards, codes and referenced documents.

1.20 BUILDING SMOKING ENVIRONMENT

- .1 Comply with smoking restrictions.

1.21 FIELD QUALITY CONTROL

- .1 Carry out Work using qualified licenced workers or apprentices in accordance with Provincial Act respecting manpower vocational training and qualification.
- .2 Permit employees registered in Provincial apprenticeship program to perform specific tasks only if under direct supervision of qualified licenced workers.
- .3 Determine permitted activities and tasks by apprentices, based on level of training attended and demonstration of ability to perform specific duties.

1.22 INSPECTION AND TESTING

- .1 Tests on materials and equipment, as specified within trade sections, is responsibility of Contractor except where specified.
- .2 Provide necessary instruments, equipment and qualified personnel to perform tests.
- .3 At completion of tests, turn over two sets of fully documented tests reports to Departmental Representative.
- .4 Where tests or inspections reveal work not in accordance with Contract, bear cost of tests and additional tests as Departmental Representative requires to verify acceptability of corrected work.
- .5 Pay costs for uncovering and making good work that is covered before inspection or testing is completed and approved by Departmental Representative.

1.23 TEMPORARY UTILITIES

- .1 Existing services required for work, may be used by Contractor without charge. Ensure capacity is adequate prior to imposing additional loads. Connect and disconnect at own expense and responsibility.
- .2 Notify Departmental Representative and utility companies of intended interruption of services, obtain requisite permission.

- .3 Give Departmental Representative 72 hours notice related to each necessary interruption of any mechanical or electrical service throughout course of work. Minimize duration and frequency of interruptions. Carry out interruptions after normal working hours of occupants, preferably on weekends.
- .4 Installation and Removal:
 - .1 Provide temporary utilities/controls in order to execute work expeditiously
 - .2 Remove from site all such work after use
- .5 Dewatering:
 - .1 Provide temporary drainage and pumping facilities to keep excavations and site free from standing water

1.24 TEMPORARY BARRIERS AND ENCLOSURES

- .1 Hoarding:
 - .1 Erect temporary site enclosure using new 1.8 m high temporary construction fencing. Provide lockable truck gate. Maintain fence in good repair.
- .2 Enclosure of Structure:
 - .1 Provide temporary weathertight enclosures and protection for exterior openings until permanently enclosed. Design enclosures to withstand wind pressure. Provide lockable entry as required for moving personnel equipment and materials.
 - .2 Provide temporary enclosures to secure building from entry of unauthorized personnel during construction period.
- .3 Guardrails and Excavations:
 - .1 Provide secure, rigid guard rails and barricades around deep excavations, open edges of floors and roofs etc.
 - .2 Provide as required by governing authorities.
- .4 Access to Site:
 - .1 Maintain immediate local access roads in clean condition used during work of this contract.
- .5 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.

1.25 SCAFFOLDS AND WORK PLATFORMS

- .1 Design, install, and inspect scaffolds and work platforms required for work in accordance with relevant municipal, provincial and other regulations.

- .2 Provide design drawings, signed and sealed by qualified Professional Engineer licensed in the Province of BC.
- .3 Additions or modifications to scaffolding must be approved in writing by Professional Engineer licensed in the Province of BC

1.26 SIGNS

- .1 Provide common use signs related to traffic control, information, instruction, use of equipment, public safety devices, and other signs as directed by Departmental Representative in both official languages or by use of commonly understood graphic symbols to approval of Departmental Representative
- .2 No advertising is permitted on this project.
- .3 Departmental Representative will provide a sign describing project for information of building users. Erect/install sign as directed Departmental Representative.

1.27 DUST CONTROL

- .1 Provide temporary dust tight screens or partitions to localize dust generating activities, and for protection of workers, finished areas of work and public.
- .2 Maintain and relocate protection until such work is complete.
- .3 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.

1.28 WORK CO-ORDINATION

- .1 Co-ordinate work of subtrades.
 - .1 Designate one person to be responsible for review of contract documents, shop drawings, and planning and managing co-ordination 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. Ensure subcontractors receive Division 01.
 - .2 Develop co-ordination 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 building structural elements.
 - .2 Identify on co-ordination drawings, building elements, services lines, rough-in points and indicate location of 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 co-ordinate work to minimize number of service line offsets.
- .6 Submit copy of coordination drawings and meeting minutes Departmental Representative for information purposes.

- .3 Submit shop drawings and order prefabricated equipment or prebuilt components only after co-ordination meeting for such items has taken place.
- .4 Work Co-operation:
 - .1 Ensure co-operation between trades in order to facilitate general progress of Work and avoid situations of spatial interference.
 - .2 Ensure that each trade provides other trades reasonable opportunity for completion of Work to prevent unnecessary delays, cutting, patching and removal or replacement of completed work.
- .5 Departmental Representative is not responsible for, or accountable for extra costs incurred as a result of Contractor's failure to co-ordinate Work.
 - .1 Resolve disputes between subcontractors.

1.29 BILINGUAL NOTATIONS

- .1 Any items supplied and installed under this contract which have operating instructions on them and which can be expected to be used by public or building tenants, must have operating instructions in English and French.
- .2 Factory embossed or recessed symbols illustrating equipment operation is an acceptable alternative to lettering.
- .3 Items supplied with factory embossed or recessed lettering in one official language with an applied sticker or decal representing second official language is not acceptable without approval from Departmental Representative before items are ordered.
- .4 Internationally recognized colour coding such as red and blue centre pieces for plumbing brass is acceptable.
- .5 Contractor is responsible for costs incurred for re-stocking or re-ordering as a result of failure to ensure bilingual designation on items.

1.30 SITE STORAGE

- .1 Contractor will equip and maintain storage space assigned Departmental Representative.
- .2 Do not unreasonably encumber site with materials or equipment.
- .3 Move stored products or equipment which interfere with operations of Departmental Representative or other contractors.
- .4 Obtain and pay for use of additional storage or work areas needed for operations.

1.31 CONCEALMENT

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

1.32 PROTECTION

- .1 Protect finished work against damage.
- .2 Protect adjacent work against spread of dust and dirt beyond work areas.
- .3 Protect operatives and other users of site from hazards.

1.33 EXAMINATION

- .1 Examine site and conditions likely to affect work and be familiar and conversant with existing conditions.
- .2 Provide photographs of surrounding properties, objects and structures liable to be damaged or be subject of subsequent claims.

1.34 SETTING OUT WORK

- .1 Assume full responsibility for, and execute complete layout of work to locations, lines and elevations indicated.
- .2 Provide devices, stakes and survey markers required to lay out and construct work.
- .3 Supply such devices as straight edges and templates required to facilitate Departmental Representative inspection of work.

1.35 ROUGHING-IN

- .1 Be responsible for obtaining manufacturer's literature and for correct roughing-in and hook-up of equipment, fixtures and appliances.

1.36 LOCATION OF FIXTURES

- .1 Location of equipment, fixtures and outlets, shown or specified is approximate. Determine actual location as required to suit conditions at time of installation.
- .2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space in accordance with manufacturer's recommendations for safety, access and maintenance.
- .3 Inform Departmental Representative when impending installation conflicts with other components. Follow directives for actual location.
- .4 Submit field drawings to indicate relative position of various services and equipment when required by Departmental Representative

1.37 CUT, PATCH AND MAKE GOOD

- .1 Cut existing surfaces as required to accommodate new work.
- .2 Remove items shown or specified.
- .3 Do not cut, bore, or sleeve load-bearing members.
- .4 Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly.
- .5 Fit work airtight to pipes, sleeves ducts and conduits.
- .6 Patch and make good surfaces cut, damaged or disturbed, to Departmental Representative approval. Match existing material, colour, finish and texture.

1.38 CLEAN UP

- .1 Clean up work area as work progresses. At end of each work period, and more often if required by Departmental Representative, remove debris from site, neatly stack material for use, and clean up generally.

- .2 Upon completion remove scaffolding, temporary protection and surplus materials. Make good defects noted at this stage.
- .3 Wash and polish glass, mirrors, ceramic tile, aluminum, chrome, stainless steel, baked or porcelain enamel, plastic laminate and other plastic surfaces, floors, hardware and washroom fixtures. Clean manufactured articles in accordance with manufacturer's directions.
- .4 Clean areas under contract to condition at least equal to that previously existing and to approval of Departmental Representative.

1.39 WASTE MANAGEMENT

- .1 Provide source separation program to disassemble and collect in an orderly fashion materials designated for alternative disposal from general waste stream as follows:
 - .1 Brick and Portland cement concrete.
 - .2 Cardboard (corrugated).
 - .3 Gypsum board (unfinished).
 - .4 Steel.
 - .5 Wood (not including treated or laminated wood).

1.40 OPERATIONS AND MAINTENANCE MANUALS

- .1 Two (2) weeks prior to any scheduled training, submit to four (4) copies of approved Operations Data and Maintenance Manual, compiled as follows:
 - .1 Bind data in vinyl hard cover 3 "D" ring type loose leaf binders for 212 x 275 mm size paper. Binders must not exceed 75 mm thick or be more than 2/3 full.
 - .2 Enclose title sheet labelled "Operation Data and Maintenance Manual," project name, date and list of contents. Project name must appear on binder face and spine.
 - .3 Organize contents into applicable sections of work to parallel project specifications breakdown. Mark each section by labelled tabs protected with celluloid covers fastened to hard paper dividing sheets.
- .2 Include information as follows plus data specified:
 - .1 Maintenance instruction for finished surface and materials.
 - .2 Copy of hardware and paint schedules.
 - .3 Description: operation of equipment and systems defining start-up, shut-down and emergency procedures, and any fixed or adjustable set points that affect efficiency of operation. Include nameplate information such as make, size, capacity and serial number.
 - .4 Maintenance: use clear drawings, diagrams or manufacturers' literature which specifically apply and detail following:
 - .1 Lubrication products and schedules.
 - .2 Trouble shooting procedures.
 - .3 Adjustment techniques.
 - .4 Operational checks.

- .5 Suppliers names, addresses and telephone numbers and components supplied by suppliers must be included. Identify components by description and manufacturer's part number.
- .5 Guarantees showing:
 - .1 Name and address of projects.
 - .2 Guarantee commencement date (date of Interim Certificate of Completion).
 - .3 Duration of guarantee.
 - .4 Clear indication of what is being guaranteed and what remedial action will be taken under guarantee.
 - .5 Signature and seal of Guarantor.
- .6 Additional material used in project listed under various Sections showing name of manufacturer and source of supply.
- .3 Spare parts: list recommended spares parts and materials to be maintained on site to ensure optimum efficiency. List special tools appropriate to unique application. Parts and tools detailed must be identified as to manufacturer, manufacturer part number and supplier .
- .4 Include one complete set of final shop drawings (bound separately) indicating corrections and changes made during fabrication and installation.

1.41 AS BUILT DRAWINGS

- .1 "As-Built" Drawings
 - .1 Maintain in the job site office in up-to-date condition, one (1) complete set of whiteprints of each of the Electrical Contract Drawings and one (1) set of Specifications, including Revision Drawings, marked clearly and indelibly in red, indicating "As-Built" conditions where such conditions deviate from the original directions of the Contract Documents, and indicating final installation of feeders and branch circuits.
 - .2 Provide "As-Built" red-line markups for review, which shall include but not be limited to the following
 - .1 All changes in circuiting
 - .2 Size and routing of all conduits for all branch circuits including power, lighting, and systems. Note that branch circuit wiring is generally not shown on Drawings. Accurately record on "As-Built" drawings the size and routing of all installed raceways and cables.
 - .3 Number and size of conductors (#10 AWG and larger) in raceways and cables
 - .4 Location of all junction and pull boxes
 - .5 Location of all conduit or duct stubs, installed equipment, devices, and fixtures
 - .6 All changes to electrical installation resulting from Addenda, Change Orders and Field Instructions (Architectural Instructions)
 - .7 Exact location of all services left for future work

- .8 Where extensive changes have been made to an area to the point where it is not practical to update the original tender drawing, the area in question shall be enclosed with a heavy dotted line and reference made to the applicable Change Order, and/or associated Revision Drawing.
- .9 Each "As-Built" drawing as defined above shall bear the Contractor's identification and signature, the date of record, and the notation: "*We hereby certify that these Drawings represent the building as built.*"
- .10 All Addenda and Revision Drawings not having their details transferred onto the submitted "as-built" drawings shall be included in the submission using the same drawing format as previously described.
- .3 Once As-Built drawings are approved, provide As-Built drawings in AutoCAD format with updated Specification Schedules to the Departmental Representative at 'Substantial Completion' of the Contract for review and comment and, if necessary, revision, before ultimate transmittal to the Departmental Representative. A holdback will be effected by the Departmental Representative until "As-Built" drawings are delivered in good order as required herein.

1.42 HAZARDOUS MATERIALS

- .1 Comply with the requirements of the Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and the provision of Material Safety Data Sheets (MSDS) acceptable to Human Resources and Social Development Canada (HRSDC), Labour program.

1.43 CONSTRUCTION MONITORING

- .1 Due to the remote location of the site, the contractor shall send a brief description of the completed work c/w pictures at regular intervals during the construction to the Departmental Representative. The frequency of information will be discussed and agreed upon at the pre-construction meeting.

1.44 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 and required with COVID-19 Protocols to be included in the proposal fee.

END OF SECTION

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

Part 1 General

1.1 ADMINISTRATIVE

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

1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 Submit drawings stamped and signed by professional engineer registered or licensed in Province of BC, Canada.
- .3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .4 Allow 5 working days for Consultants and Departmental Representative's review of each submission.

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

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

1.3 CERTIFICATES AND TRANSCRIPTS

- .1 Immediately after award of Contract, submit Workers' Compensation Board status.
- .2 Submit transcription of insurance immediately after award of Contract.

END OF SECTION

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)

1.2 RELATED SECTIONS

- .1 Refer to the following current NMS sections as required:
 - .1 Section 01 01 11 – Summary of Work

1.3 WORKERS' COMPENSATION BOARD COVERAGE

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

1.4 COMPLIANCE WITH REGULATIONS

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

1.5 SUBMITTALS

- .1 Submit to Departmental Representative submittals listed for review in accordance with Section 01 01 11.
- .2 Work affected by submittal shall not proceed until review is complete.
- .3 Submit the following:
 - .1 Organizations Health and Safety Plan.
 - .2 Site Specific Safety Plan or Health and Safety Plan (SSSP or HASP)
 - .2 Copies of reports or directions issued by Federal and Provincial health and safety inspectors.
 - .3 Copies of incident and accident reports.

- .4 Complete set of Material Safety Data Sheets (SDS), and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.
- .5 Emergency Response Procedures.
- .4 The Departmental Representative will review the Contractor's Site Specific Safety Plan or Health and Safety Plan (SSSP/HASP) and emergency response procedures, and provide comments to the Contractor within 5 days after receipt of the plan. Revise the plan as appropriate and resubmit to Departmental Representative.
- .5 Medical surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of work, and submit additional certifications for any new site personnel to Departmental Representative.
- .6 Submission of the Site Specific Safety Plan or Health and Safety Plan, and any revised version, to the Departmental Representative is for information and reference purposes only. It shall not:
 - .1 Be construed to imply approval by the Departmental Representative.
 - .2 Be interpreted as a warranty of being complete, accurate and legislatively compliant.
 - .3 Relieve the Contractor of his legal obligations for the provision of health and safety on the project.

1.6 RESPONSIBILITY

- .1 Assume responsibility as the Prime Contractor for work under this contract.
- .2 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
- .3 Comply with and enforce compliance by employees with safety requirements of Contract documents, applicable Federal, Provincial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.7 HEALTH AND SAFETY COORDINATOR

- .1 Assign a competent and qualified Health and Safety Coordinator who shall:
 - .1 Be responsible for completing all health and safety training, and ensuring that personnel that do not successfully complete the required training are not permitted to enter the site to perform work.

- .2 Be responsible for implementing, daily enforcing, and monitoring the Site Specific Safety Plan (SSSP) or Health and Safety Plan (HASP)
- .3 Be on site during execution of work.
- .4 Have minimum two (2) years' site-related working experience
- .5 Have working knowledge of the applicable occupational safety and health regulations.

1.8 GENERAL CONDITIONS

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

1.9 PROJECT/SITE CONDITIONS

- .1 Work at site will involve contact with:
 - .1 Multi-employer work site.
 - .2 Federal employees and general public.
 - .3 Energized electrical services.
 - .4 Working from heights.
 - .5 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 Specific Safety Plan (SSSP) and/or Health and Safety Plan (HASP) as required, and re-submit to the Departmental Representative.
 - .5 Departmental Representative's review: the review of Site Specific Safety Plan and/or Health and Safety Plan by Public Works and Government Services Canada (PWGSC) shall not relieve the Contractor of responsibility for errors or omissions in final Site Specific Safety Plan and/or Health and Safety Plan of responsibility for meeting all requirements of construction and Contract documents and legislated requirements.

1.15 EMERGENCY PROCEDURES

- .1 List standard operating procedures and measures to be taken in emergency situations. Include an emergency response and emergency evacuation plan and emergency contacts (i.e.names/telephone numbers) of:
 - .1 Designated personnel from own company.
 - .2 Regulatory agencies applicable to work and as per legislated regulations.

- .3 Local emergency resources.
- .4 Departmental Representative.
- .5 A route map with written directions to the nearest hospital or medical clinic.
- .2 Include the following provisions in the emergency procedures:
 - .1 Notify workers and the first-aid attendant, of the nature and location of the emergency.
 - .2 Evacuate all workers safely.
 - .3 Check and confirm the safe evacuation of all workers.
 - .4 Notify the fire department or other emergency responders.
 - .5 Notify adjacent workplaces or residences which may be affected if the risk extends beyond the workplace.
 - .6 Notify Departmental Representative.
- .3 Provide written rescue/evacuation procedures as required for, but not limited to:
 - .1 Work at high angles.
 - .2 Work in confined spaces or where there is a risk of entrapment.
 - .3 Work with hazardous substances.
 - .4 Underground work.
 - .5 Work on, over, under and adjacent to water.
 - .6 Workplaces where there are persons who require physical assistance to be moved.
- .4 Design and mark emergency exit routes to provide quick and unimpeded exit.
- .5 Revise and update emergency procedures as required, and re-submit to the Departmental Representative.
- .6 Contractors must not rely solely upon 911 for emergency rescue in a confined space, working at heights, etc.

1.16 HAZARDOUS PRODUCTS

- .1 Comply with requirements of Workplace Hazardous Materials Information

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

- .2 Where use of hazardous and toxic products cannot be avoided:
 - .1 Advise Departmental Representative beforehand of the product(s) intended for use. Submit applicable SDS and WHMIS 2015 documents as per Section 01 01 50.
 - .2 In conjunction with Departmental Representative schedule to carry out work during "off hours" when tenants have left the building.
 - .3 Provide adequate means of ventilation in accordance with Section 01 11 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".

2 PRODUCTS

- .1 Not used.

3 EXECUTION

- .1 Not used.

END OF SECTION

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 humans; or degrade environment aesthetically, culturally and/or historically.
- .2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction

1.2 FIRES

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

1.3 DRAINAGE

- .1 Provide temporary drainage and pumping as required to keep excavations on site free of standing water.
 - .1 Obtain Departmental Representative approval before pumping standing water, which is free of suspended materials, into waterways, sewer or drainage systems.
 - .2 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with the site-specific SPPP in compliance with the requirements of authorities having jurisdiction.

1.4 SITE CLEARING AND PLANT PROTECTION

- .1 Protect trees and shrubs adjacent to construction work, storage areas and trucking lanes. Ensure that control measures used for protection are in compliance with Municipal laws and regulations.
- .2 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage.
 - .1 Avoid unnecessary traffic, dumping and storage of materials over root zones.
- .3 Minimize stripping of topsoil and vegetation.
- .4 Restrict tree removal to areas designated by Departmental Representative. Obtain permits before trees removal in accordance with the requirements of the authorities having jurisdiction.

1.5 POLLUTION CONTROL

- .1 Maintain temporary erosion and pollution control features installed under this Contract.
- .2 Control emissions from equipment and plant in accordance with local authorities' emission requirements. Check with local authorities for any environmental compliance requirements.

- .3 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area.
 - .1 Provide temporary enclosures where directed by Departmental Representative.
- .4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

Part 2 Execution

2.1 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 – Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Bury rubbish and waste materials on site is nor permitted unless approved in writing by Departmental Representative.
- .3 Ensure public waterways, storm and sanitary sewers remain free of waste and volatile materials disposal.
- .4 Proceed with final cleaning upon completion and removal of surplus materials, rubbish, tools and equipment.
- .5 Waste Management: separate waste materials for reuse.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 General

1.1 PROJECT CLEANLINESS

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

1.2 FINAL CLEANING

- .1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
- .3 Prior to final review remove surplus products, tools, construction machinery and equipment.
- .4 Remove waste products and debris including that caused by Owner or other Contractors.
- .5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.
- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

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

1.3 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 Canadian Environmental Protection Act (CEPA)
 - .1 SOR/2008-197, Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations.

1.2 ADMINISTRATIVE REQUIREMENTS

- .1 Acceptance of Work Procedures:
 - .1 Contractor's Inspection: Contractor: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
 - .1 Notify Departmental Representative min writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
 - .2 Request Departmental Representative inspection.
 - .2 Departmental Representative Inspection:
 - .1 Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.
 - .2 Contractor to correct Work as directed.
 - .3 Completion Tasks: submit written certificates that tasks have been performed as follows:
 - .1 Work: completed and inspected for compliance with Contract Documents.
 - .2 Defects: corrected and deficiencies completed.
 - .3 Equipment and systems: tested, balanced and fully operational.
 - .4 Operation of systems: demonstrated to Owner's personnel.
 - .5 Work: complete and ready for final inspection.
 - .4 Final Inspection:
 - .1 When completion tasks are done, request final inspection of Work by Departmental Representative and Contractor.
 - .2 When Work incomplete according to Departmental Representative complete outstanding items and request re-inspection.
 - .5 Declaration of Substantial Performance: when Departmental Representative considers deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.
 - .6 Commencement of Lien and Warranty Periods: date of Owner's acceptance of submitted declaration of Substantial Performance to be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.

- .7 Final Payment:
 - .1 When Departmental Representative considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.
 - .2 When Work deemed incomplete by Departmental Representative complete outstanding items and request re-inspection.
- .8 Payment of Holdback: after issuance of Certificate of Substantial Performance of Work, submit application for payment of holdback amount in accordance with contractual agreement.

1.3 FINAL CLEANING

- .1 Clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
- .2 Waste Management: separate waste materials for recycling and reuse.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 General requirements relating to commissioning of project's components and systems, specifying general requirements to PV of components, equipment, sub-systems, systems, and integrated systems.
- .2 Acronyms:
 - .1 AFD - Alternate Forms of Delivery, service provider.
 - .2 BMM - Building Management Manual.
 - .3 Cx - Commissioning.
 - .4 EMCS - Energy Monitoring and Control Systems.
 - .5 O&M - Operation and Maintenance.
 - .6 PI - Product Information.
 - .7 PV - Performance Verification.
 - .8 TAB - Testing, Adjusting and Balancing.

1.2 GENERAL

- .1 A 3rd party commissioning agent will not be required for this project. Completion of factory tests, results reviewed/accepted by the Departmental Representative, and documentation of all completed testing is required.
- .2 Cx is a planned program of tests, procedures and checks carried out systematically on systems and integrated systems of the finished Project. Cx is performed after systems and integrated systems are completely installed, functional and Contractor's Performance Verification responsibilities have been completed and approved. Objectives:
 - .1 Verify installed equipment, systems and integrated systems operate in accordance with Contract Documents and design criteria and intent.
 - .2 Ensure appropriate documentation is compiled into the BMM.
 - .3 Effectively train O&M staff.
- .3 Contractor completes Cx process, operating equipment and systems, troubleshooting and making adjustments as required.
 - .1 Systems to be operated at full capacity under various modes to determine if they function correctly and consistently at peak efficiency. Systems to be interactively with each other as intended in accordance with Contract Documents and design criteria.
 - .2 During these checks, adjustments to be made to enhance performance to meet environmental or user requirements.
- .4 Design Criteria: as per client's requirements or determined by designer. To meet Project functional and operational requirements.

- .5 AFD managed projects the term Departmental Representative in Cx specifications to be interpreted as AFD Service Provider.

1.3 STARTING AND TESTING

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

1.4 WITNESSING OF STARTING AND TESTING

- .1 Provide 14 days notice prior to commencement.
- .2 Departmental Representative to witness of start-up and testing.

1.5 PROCEDURES

- .1 Verify that equipment and systems are complete, clean, and operating in normal and safe manner prior to conducting start-up, testing and Cx.
- .2 Conduct start-up and testing in following distinct phases:
 - .1 Included in delivery and installation:
 - .1 Verification of conformity to specification, approved shop drawings and completion of PI report forms.
 - .2 Visual inspection of quality of installation.
 - .2 Start-up: follow accepted start-up procedures.
 - .3 Operational testing: document equipment performance.
 - .4 System PV: include repetition of tests after correcting deficiencies.
 - .5 Post-substantial performance verification: to include fine-tuning.
- .3 Correct deficiencies and obtain approval from Departmental Representative after distinct phases have been completed and before commencing next phase.

1.6 OPERATION AND MAINTENANCE OF EQUIPMENT AND SYSTEMS

- .1 After start-up, operate and maintain equipment and systems as directed by equipment/system manufacturer.
- .2 With assistance of manufacturer develop written maintenance program and submit Departmental Representative for approval before implementation.
- .3 Operate and maintain systems for length of time required for commissioning to be completed.
- .4 After completion of commissioning, operate and maintain systems until issuance of certificate of interim acceptance.

1.7 WITNESSING COMMISSIONING

- .1 Departmental Representative to witness activities and verify results.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 11 00 – Summary of Work.
- .2 Section 01 33 00 Submittal Procedures.
- .3 Section 01 35 33 – Health and Safety Requirements

1.2 REFERENCES

- .1 Refer to Assessment Report:
 - .1 Hazardous Building Materials Assessment, E0547 RCMP Hangar, #1 Coast Guard Road, Seal Cove/Prince Rupert, BC, dated August 20, 2020, prepared by Arcadis Canada Inc.
- .2 Definitions:
 - .1 Dangerous Goods: product, substance, or organism specifically listed or meets hazard criteria established in Transportation of Dangerous Goods Regulations.
 - .2 Hazardous Building Material: component of a building or structure that will cause adverse impact to environment or adversely affect health of persons, animals, or plant life when altered, disturbed, or removed during maintenance, renovation, or demolition.
 - .3 Hazardous Material: product, substance, or organism used for its original purpose; and is either dangerous goods or material that will cause adverse impact to environment or adversely affect health of persons, animals, or plant life when released into the environment.
 - .4 Hazardous Waste: hazardous material no longer used for its original purpose and that is intended for recycling, treatment or disposal.
- .3 Reference Standards:
 - .1 Canadian Environmental Protection Act,1999 (CEPA 1999)
 - .1 Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations (SOR/2005-149).
 - .2 SOR/2018-196 Prohibition of Asbestos and Products Containing Asbestos Regulations.
 - .2 Department of Justice Canada
 - .1 Transportation of Dangerous Goods Act, 1992 (TDG Act) [1992], (c. 34).
 - .2 Transportation of Dangerous Goods Regulations (T-19.01-SOR/2019-101).
 - .3 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
 - .1 Safety Data Sheets (SDS).
 - .4 National Research Council Canada Institute for Research in Construction (NRC-IRC)
 - .1 National Fire Code of Canada (2015).

- .5 WorkSafe BC
 - .1 British Columbia's Occupational Health and Safety Regulation (BC Reg. 296/97, including amendments to date of work)
 - .2 "Safe Work Practices for Handling Asbestos" (2017)
 - .3 "Lead-Containing Paints and Coatings; Preventing Exposure in the Construction Industry" (2017)
 - .4 "Safe Work Practices for Handling Lead" (2017)
 - .5 "Developing a Silica Exposure Control Plan" (2014)
- .6 British Columbia Hazardous Waste Regulation (BC Reg. 63/88)
- .7 The Federal PCB Regulations (SOR/2008-273).
- .8 The British Columbia Waste Management Act - Ozone Depleting Substances and Other Halocarbons Regulation (BC Reg. 317/2012).
- .9 The Federal Halocarbons Regulation (July 2003).
- .10 The Canada Labour Code, Part II, Canada Occupational Health and Safety Regulations (COHSR)
- .11 Canadian Construction Association
 - .1 Standard Construction Document CCA 82 "Mould Guidelines for the Canadian Construction Industry" (2018)

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data to be used by the Contractor to complete the Work:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets, and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Safety Data Sheets (SDS) in accordance with Section 01 35 30 - Health and Safety Requirements to Departmental Representative for each hazardous material required prior to bringing hazardous material on site.
 - .3 Submit Exposure Control Plan (ECP) to Departmental Representative that identifies hazardous materials, usage, location, personal protective equipment requirements, and disposal arrangements.
 - .4 Construction/Demolition Waste Management:
 - .1 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating percentage of construction/demolition wastes were recycled or salvaged
 - .5 Low-Emitting Materials: submit listing of adhesives and sealants used in building, comply with VOC and chemical component limits or restrictions requirements.

1.4 DELIVERY, STORAGE AND HANDLING

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

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

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

Part 2 Products

2.1 MATERIALS

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

Part 3 Execution

3.1 HAZARDOUS MATERIALS ABATEMENT

- .1 Scope of Abatement Activities.
 - .1 Abatement shall be conducted to handle, alter, remove and/or dispose of hazardous building materials as identified in the Assessment Report in accordance with applicable regulations, guidelines, standards and/or best practices for such work, where such identified hazardous building materials will be impacted (handled, altered, damaged, removed) by the Work.
 - .2 Contractor is responsible for reviewing plans, specifications and reports such that they understand the locations and amounts of hazardous materials that will be impacted by the Work of this contract, and such that appropriate plans and budgets can be included in their overall bids.
 - .3 The listing below is a summary of the identified hazardous building material categories that are anticipated to require disturbance, along with their associated removal and disposal regulations, guidelines and/or standards.
 - .1 Asbestos-Containing Materials (ACMs)
 - .1 No ACM is present in the building. Refer to the Assessment Report for additional details.
 - .2 Should a material suspected to contain asbestos become uncovered during renovation activities all work in the areas that may disturb the material should be stopped. Samples of the suspect material should be submitted for laboratory analysis to determine if asbestos is present..
 - .2 Lead and Lead-Containing Paints (LCPs)
 - .1 Refer to the Assessment Report for identities and locations of lead-containing materials (including LCPs) that may require disturbance during the Work.
 - .2 Although LCPs and items coated with LCPs will be disturbed during the Work, unless deemed necessary through risk assessment or cost analysis conducted by the Contractor, comprehensive removal of LCPs from items or surfaces is not expected to be required during the Work.
 - .3 Polychlorinated Biphenyls (PCBs)
 - .1 Removal, alteration and/or disposal of PCB-containing equipment is not anticipated to be required during the Work.
 - .2 Should a material suspected to contain PCBs become uncovered during renovation activities (i.e., dielectric fluids, hydraulic fluids), all work in the areas that may disturb the material should be stopped. Samples of the suspect material should be submitted for laboratory analysis to determine if PCBs are present.
 - .4 Mould
 - .1 Removal, alteration and/or disposal of mould-impacted materials is not anticipated to be required during the Work.
 - .5 Mercury
 - .1 Removal of mercury-containing materials is not anticipated to be required during the Work:

- .6 Ozone-Depleting Substances (ODSs)
 - .1 Removal, alteration and/or disposal of refrigeration or air conditioning equipment with ODS refrigerants is not anticipated to be required during the Work.
- .7 Silica
 - .1 When silica-containing materials are to be disturbed and/or removed (e.g., coring through concrete slabs, demolition of masonry or concrete units), ensure dust control measures are employed such that airborne silica dust concentrations do not exceed the exposure limit as stipulated by BC Reg. 296/97 (Cristobalite and Quartz – each 0.025 mg/m³). This would include, but not be limited to, the following:
 - .1 Developing a Silica Exposure Control Plan
 - .2 Providing workers with respiratory protection
 - .3 Wetting the surface of the materials, use of water or dust suppressing agents to prevent dust emissions
 - .4 Providing workers with facilities to properly wash prior to exiting the work area.

3.2 CLEANING

- .1 Progress Cleaning: Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.
- .3 Waste Management: separate waste materials for reuse and recycling.
 - .1 Dispose of hazardous waste materials in accordance with applicable federal and provincial acts, regulations, and guidelines.
 - .2 Recycle hazardous wastes for which there is approved, cost effective recycling process available.
 - .3 Send hazardous wastes to authorized hazardous waste disposal or treatment facilities.
 - .4 Burning, diluting, or mixing hazardous wastes for purpose of disposal is prohibited.
 - .5 Disposal of hazardous materials in waterways, storm or sanitary sewers, or in municipal solid waste landfills is prohibited.
 - .6 Dispose of hazardous wastes in timely fashion in accordance with applicable federal and provincial regulations.
 - .7 Minimize generation of hazardous waste to maximum extent practicable. Take necessary precautions to avoid mixing clean and contaminated wastes.
 - .8 Identify and evaluate recycling and reclamation options as alternatives to land disposal, such as:
 - .1 Hazardous wastes recycled in manner constituting disposal.
 - .2 Hazardous waste burned for energy recovery.
 - .3 Hazardous wastes with economically recoverable precious metals.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 Editions of all Referenced Standards to be the ones designated by the applicable Building Code in force at the time of building permit application, as indicated on Structural Drawings. For Standards not referenced by the Building Code, use the latest editions.
- .2 ASTM International (ASTM)
 - .1 ASTM A1064/A1064M, Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
 - .2 ASTM C920, Standard Specification for Elastomeric Joint Sealants.
 - .3 ASTM D1751, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non extruding and Resilient Bituminous Types).
- .3 CSA Group (CSA)
 - .1 CSA A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CAN/CSA A3000, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
 - .3 CAN/CSA G30.18, Billet-Steel Bars for Concrete Reinforcement.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for proprietary materials used in Cast-In-Place Concrete and additives and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Provide testing results for review by Departmental Representative and do not proceed without written approval when deviations from mix design or parameters found.
- .4 Quality Assurance Submittals:
 - .1 Mill Test Report: upon request, submit to Departmental Representative certified copy of mill test report of reinforcing steel.

1.3 QUALITY ASSURANCE

- .1 Provide to Departmental Representative prior to starting concrete work, valid and recognized certificate from plant delivering concrete.
- .2 Quality Control Plan: provide written report to Departmental Representative verifying compliance concrete in place meets performance requirements.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

1.5 AMBIENT CONDITIONS

- .1 Placing concrete during rain or weather events damaging to concrete is prohibited.
- .2 Protect newly placed concrete from rain or weather events in accordance with CSA A23.1/A23.2.
- .3 Cold weather protection:
 - .1 Maintain protection equipment, in readiness on Site.
 - .2 Use such equipment when ambient temperature below 5°C, or when temperature may fall below 5°C before concrete cured.
 - .3 Placing concrete upon or against surface at temperature below 5°C is prohibited.
- .4 Hot weather protection:
 - .1 Protect concrete from direct sunlight when ambient temperature above 27°C.
 - .2 Prevent forms of getting too hot before concrete placed. Apply accepted methods of cooling not to affect concrete adversely.
- .5 Protect from drying.

Part 2 Products

2.1 DESIGN CRITERIA

- .1 Alternative 1 - Performance: to CSA A23.1/A23.2, and as described in MIXES of PART 2 - PRODUCTS.

2.2 PERFORMANCE CRITERIA

- .1 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established by Departmental Representative and provide verification of compliance as described in PART 1 - QUALITY ASSURANCE.

2.3 MATERIALS

- .1 Portland Cement: GU to CSA A3001.
- .2 Cementitious hydraulic slag: to CSA A3000.
- .3 Fly ash: to CSA A3001, Type CI.
- .4 Water: to CSA A23.1/A23.2.
- .5 Admixtures: not to contain chlorides.
- .6 Reinforcing bars:
 - .1 Billet steel, grade 400, deformed bars to CSA G30.18, unless indicated otherwise.

- .7 Premoulded joint filler:
 - .1 Bituminous impregnated fibreboard: to ASTM D1751.
- .8 Joint sealer/filler: to ASTM C920, Type M, Grade NS.
- .9 Other concrete materials: to CSA A23.1/A23.2.

2.4 MIXES

- .1 Alternative 1 - Performance Method for specifying concrete: to meet Departmental Representative performance criteria to CSA A23.1/A23.2.
 - .1 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as described in PART 3 - VERIFICATION.
 - .2 Provide concrete mix to meet following hard state requirements:
 - .1 Durability and class of exposure: F-2.
 - .2 Compressive strength at 28 age: 25 MPa minimum.
 - .3 Intended application: Foundation pad.
 - .4 Aggregate size 20 mm maximum.
 - .3 Concrete supplier's certification: BC Ready-Mixed Concrete Association.
 - .4 Provide quality management plan to ensure verification of concrete quality to specified performance.

Part 3 Execution

3.1 PREPARATION

- .1 Provide Departmental Representative 24 hours notice minimum before each concrete pour.
- .2 Place and bend concrete reinforcing in accordance with CSA A23.1.
- .3 Reinforcing bars shall be accurately placed, accurately supported, and secured against displacement prior to placing of concrete.
- .4 Reinforcing not to be cut at openings; spread reinforcing around opening.
- .5 All concrete is to be vibrated.
- .6 During concreting operations:
 - .1 Development of cold joints not allowed.
 - .2 Concrete delivery and handling to facilitate placing with minimum of rehandling, and without damage to existing structure or Work.
- .7 Protect previous Work from staining.
- .8 Clean and remove stains prior to application of concrete finishes.

3.2 INSTALLATION/APPLICATION

- .1 Do cast-in-place concrete work in accordance with CSA A23.1/A23.2.

- .2 Sleeves and inserts:
 - .1 Cast in sleeves, ties, slots, anchors, reinforcement, frames, conduit, bolts, joint fillers and other inserts required built-in.
 - .2 Sleeves and openings minimum 100 mm x 100 mm not indicated, reviewed by Departmental Representative.

3.3 FINISHES

- .1 Formed surfaces exposed to view: in accordance with CSA A23.1/A23.2.
- .2 Equipment pads: provide smooth trowelled surface.

3.4 EXPANSION AND ISOLATION JOINTS

- .1 Install premoulded joint filler in expansion and isolation joints full depth of slab flush with finished surface to CSA A23.1/A23.2.

3.5 CURING

- .1 Use curing compounds compatible with applied finish on concrete surfaces free of bonding agents and to CSA A23.1/A23.2.

3.6 FIELD QUALITY CONTROL

- .1 An independent Inspection and Testing Agency (certified under CSA A283 with category to suit testing provided) will be appointed to carry out inspection and testing of concrete and concrete materials and check conformance with applicable Standards and Contract documents.
- .2 Assist the Inspection and Testing Agency in its work. Notify as to the Work Schedule and provide safe access to the work area as required. Provide concrete samples.
- .3 The Agency will submit reports covering the work inspected and the testing performed. The reports will be provided not later than five working days after the testing is completed.
- .4 Sampling, storing, curing and testing of concrete will be in accordance with CSA A23.1/A23.2.
- .5 Compressive Strength Testing:
 - .1 A sufficient number of tests shall be made to ensure a uniform slump of concrete. A slump test shall be made with every strength test and every second or third air test.
 - .2 An air content determination shall be made with every strength test.
 - .3 Not less than one strength test (set of 3 cylinders) is required.
 - .4 Testing agency to be retained and paid for by the Contractor.

3.7 CLEANING

- .1 Clean in accordance with Section 01 74 00 - Cleaning.
- .2 Use trigger operated spray nozzles for water hoses.
- .3 Designate cleaning area for tools to limit water use and runoff.

- .4 Cleaning of concrete equipment in accordance with Section 01 35 43 Environmental Procedures.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 CSA Group
 - .1 CSA C22.1-18, Canadian Electrical Code, Part 1 (22nd Edition), Safety Standard for Electrical Installations.
 - .2 CAN3-C235-83 R2010, Preferred Voltage Levels for AC Systems, 0 to 50,000V.
- .2 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 GENERAL

- .1 The contractor shall read electrical drawings in conjunction with all other discipline drawings in order to provide a complete and accurate tender bid.
- .2 Contractor shall provide all seismic bracing, restraints, and associated hardware. Engage a structural engineer to advise and review seismic anchorage and restraint of new electrical equipment/devices. On completion of work, provide a structural letter of assurance before final closeout of for all seismic work.
- .3 Existing information within these drawings is based on information provided by others, extracted from historical records, and site observation. Existing information is provided to facilitate the contractor in providing a fair and accurate tender bid by providing a greater understanding of the scope of work. By no means shall the contractor rely solely on the existing information provided to determine a complete and fully accurate scope of work as not all electrical equipment, devices or associated equipment that are required to be relocated, removed or replaced may be noted.
- .4 Contractor shall utilize existing circuits for new devices where noted. Where it is required to remove fixtures, electrical devices, or wiring devices, but the outlet box is required to be retained to maintain branch circuits to new devices or devices to remain, contractor shall provide the necessary wiring splices and blank cover plates. Match existing colour scheme. Allow time to site verify noted existing conditions. Contractor shall notify department representative of any discrepancies.
- .5 When relocating electrical and associated devices, care shall be taken to avoid damage to devices being removed and to the existing devices within building.
- .6 Make good all existing surfaces, including but not limited to: drywall, paint, ceiling tiles, and finishes.
- .7 Fire stop all new penetrations with an approved fire stopping method rated for the fire rating of the existing wall/surface. Provide consultant with ulc listed system approved for

- fire stopping detail prior to fire stopping penetrations. All other penetrations to be patched to suit wall material. Refer to architectural drawings for fire separations.
- .8 Contractor shall x-ray floors/walls before coring to accommodate new conduit and conductors. Engage a structural engineer before coring floors.
 - .9 Field coordinate electrical devices with new and existing HVAC equipment, fire protection equipment and new lighting. Adjust electrical device placement as required to suit field conditions. Contractor shall notify engineer of any conflicts, or unforeseen site conditions.
 - .10 All conductors shall be run in conduit suitable for the application in accordance with the CEC.
 - .11 Contractor to field locate the exact routing of all feeders and provide an installation that is the least obtrusive and disruptive to the facility.
 - .12 All cabling, conduits, wires, cables, cable tray etc. crossing a seismic gap or expansion joint shall allow up to 150mm movement in all directions.
 - .13 Contractor to note that scope of work includes removal of existing electrical including but not limited to distribution, lighting, power, communications, conduit, conductors, security and all associated devices.
 - .14 Building to remain operational at all times during working hours. All shut down to be coordinated with the detachment commander 72hrs prior to start of the work. Contractor to allow for shut downs outside of regular working hours and weekends.
 - .15 Contractor shall provide all civil and structural works.
 - .16 The hangar facility is to remain fully operational at all times during working hours. All shutdowns to be coordinated with users and departmental representative 72 hours prior to start of the work. Contractor to allow for shutdowns to be done outside of regular working hours or on weekends.
 - .17 The Contractor shall hire concessionaire(s) to be present at all times during any work outside of regular working hours. The contractor shall pay for all related costs.

1.4 SEQUENCE OF WORK:

- .1 Sequence of work is as follows, contractor to refer to drawings for exact requirements:
 - .1 Site assessment
 - .1 Provide ground penetrating radar scan of existing underground services. Locate and protect underground service for the duration of the project all services to remain for the duration of the project.
 - .2 Distribution closet redevelopment
 - .1 Relocate existing telecommunications bix blocks and enclosure. Provide new bix blocks and reconnect existing telecommunication services.
 - .2 Re-work existing telecommunications wiring clean up and make safe to accommodate the installation of new ATS.
 - .3 Relocate existing fire alarm pull station and end of line devices.
 - .4 Install new doors, lockset and door hardware.

- .3 Site works
 - .1 Provide site civil works, including trenching, installing RPVC conduits for new generator under-ground power feeders and control cabling and stub up into the generator location. Rough in power conductors from new ATS location to new generator.
 - .2 Provide and install new generator annunciator panel, internal conduit pathways from transition from ceiling mounted EMT to under ground RPVC to generator and stub up into generator location. Generator annunciator to provide indication of generator running and generator trouble.
 - .3 Install new fire alarm monitor modules for generator running and trouble and rough-in fire alarm cabling.
 - .4 Install conduit pathways for new generator circuits and rough in conductors.
 - .5 Construct the new concrete pathway, generator pad and bollards.
- .4 New generator and ATS
 - .1 Install the new ATS, generator and all permanent conduit/wiring interconnections including the final terminations at panel 'C'.
 - .2 Modify existing panel 'C', add new meter and generator circuits breakers and new adjustable trip breaker.
 - .3 Install new relay, provide power circuit and install new auxiliary contacts in existing welder circuit to provide load shedding to the welder during loss of power.
 - .4 Install conduit and wiring from auxiliary contacts to metering system.
 - .5 Provide load bank, test and commission the new generator and ats. Contractor to do all testing and commissioning of the ats and generator system prior to final switch over from the existing to new emergency power system.
 - .6 Update fire alarm zones and re-verify fire alarm system.
 - .7 Perform site clean up
 - .8 Coordinate with the users for final hand over and training for the new generator/ATS.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for all power, data, breakers, device cover plates and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Submit for review single line electrical diagram.
 - .1 Electrical distribution system in main electrical room.

- .4 Shop drawings:
 - .1 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 co-ordinated installation.
 - .2 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.
 - .3 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.
- .5 Certificates:
 - .1 Provide CSA certified equipment.
 - .2 Submit test results of installed electrical systems and instrumentation.
 - .3 Permits and fees: in accordance with General Conditions of contract.
- .6 Manufacturer's Field Reports: submit to manufacturer's written report, within [3] days of review, verifying compliance of Work and electrical system and instrumentation testing.
- .7 Sustainable Design Submittals:
 - .1 Construction Waste Management:
 - .1 Submit project Waste Management Plan highlighting recycling and salvage requirements.
 - .2 Recycled Content:
 - .1 Submit listing of recycled content products used.

1.6 CLOSEOUT SUBMITTALS

- .1 Operation and Maintenance Data: submit operation and maintenance data and incorporation into manual.
 - .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 Post instructions where directed.
 - .4 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions.

- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 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.

2.2 MATERIALS AND EQUIPMENT

- .1 Factory assemble control panels and component assemblies.

2.3 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS

- .1 Verify installation and co-ordination responsibilities related to motors, equipment and controls, as indicated.
- .2 Control wiring and conduit: in accordance with Section 26 29 03 - Control Devices except for conduit, wiring and connections below 50 V which are related to control systems specified in mechanical sections.

2.4 WARNING SIGNS

- .1 Warning Signs: in accordance with requirements of Departmental Representative. decal signs, minimum size 175 x 250 mm.

2.5 WIRING TERMINATIONS

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

2.6 EQUIPMENT IDENTIFICATION

- .1 Identify electrical equipment with nameplates as follows:
 - .1 Nameplates: 3 lamicoid mm blackface, black core, lettering mechanically attached with self tapping screws.

.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 [6] mm high letters unless specified otherwise.
- .3 Wording on nameplates to be approved by Departmental Representative prior to manufacture.
- .4 Allow for minimum of twenty-five (25) letters per nameplate.
- .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.

2.7 WIRING IDENTIFICATION

- .1 Identify wiring with permanent indelible identifying markings, coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.
- .2 Maintain phase sequence and colour coding throughout.
- .3 Colour coding: to CSA C22.1.
- .4 Use colour coded wires in communication cables, matched throughout system.

2.8 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.

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

2.9 FINISHES

- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.

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 installation in accordance with manufacturer's written instructions.

3.2 INSTALLATION

- .1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.
- .2 Do overhead and underground systems in accordance with CAN/CSA-C22.3 No.1 except where specified otherwise.

3.3 NAMEPLATES AND LABELS

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

3.4 CONDUIT AND CABLE INSTALLATION

- .1 Install conduit and sleeves prior to pouring of concrete.
 - .1 Sleeves through concrete: schedule 40 steel pipe sized for free passage of conduit, and protruding 50 mm.
- .2 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.
- .3 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.

3.5 LOCATION OF OUTLETS

- .1 Locate outlets in accordance with Section 26 05 32 - Outlet Boxes, Conduit Boxes and Fittings.
- .2 Do not install outlets back-to-back in wall; allow minimum 150 mm horizontal clearance between boxes.
- .3 Change location of outlets at no extra cost or credit, providing distance does not exceed 3000 mm, and information is given before installation.
- .4 Locate light switches on latch side of doors.
 - .1 Locate disconnect devices in mechanical and elevator machine rooms on latch side of floor.

3.6 MOUNTING HEIGHTS

- .1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.
- .2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.
- .3 Install electrical equipment at following heights unless indicated otherwise.
 - .1 Local switches: [1400] mm.
 - .2 Wall receptacles:
 - .1 General: [300] mm.
 - .2 Above top of continuous baseboard heater: [200] mm.
 - .3 Above top of counters or counter splash backs: [175] mm.
 - .4 In mechanical rooms: [1400] mm.
 - .3 Panelboards: as required by Code or as indicated.
 - .4 Telephone and interphone outlets: [300] mm.
 - .5 Wall mounted telephone and interphone outlets: [1500] mm.
 - .6 Fire alarm stations: [1500] mm.
 - .7 Fire alarm bells: [2100] mm.
 - .8 Television outlets: [300] mm.
 - .9 Wall mounted speakers: [2100] mm.
 - .10 Clocks: [2100] mm.
 - .11 Door bell pushbuttons: [1500] mm.

3.7 CO-ORDINATION OF PROTECTIVE DEVICES

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

3.8 FIELD QUALITY CONTROL

- .1 Conduct following tests
 - .1 Power system including phasing, voltage, grounding and load balancing.
 - .2 Circuits originating from branch distribution panels.
 - .3 Lighting and its control.
 - .4 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.
 - .5 Systems: communications fire alarm.
 - .6 Insulation resistance testing:
 - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
 - .2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
 - .3 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.
 - .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.

3.9 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 with aspects of its care and operation.

3.10 CLEANING

- .1 Progress Cleaning:
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 This Section includes requirements for selective demolition and removal of electrical distribution components including removal of conduit, junction boxes, and relocation of panels and incidentals required to complete work described in this Section ready for new construction.

1.2 REFERENCE STANDARDS

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

1.3 DEFINITIONS

- .1 Demolish: Detach items from existing construction and legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.
- .2 Remove: Planned deconstruction and disassembly of electrical items from existing construction including removal of conduit, junction boxes, cabling and wiring from electrical component to panel taking care not to damage adjacent assemblies designated to remain; legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.
- .3 Remove and Salvage: Detach items from existing construction
- .4 Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- .5 Existing to Remain: Existing items of construction that are not removed and that are not otherwise indicated as being removed and salvaged, or removed and reinstalled.
- .6 Hazardous Substances: Dangerous substances, dangerous goods, hazardous commodities and hazardous products may include asbestos, mercury and lead, PCB's, poisons, corrosive agents, flammable substances, radioactive substances, or other material that can endanger human health or wellbeing or environment if handled improperly as defined by Federal Hazardous Products Act (RSC 1985) including latest amendments.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Action Submittals:
 - .1 Construction Waste Management Plan (CWM Plan): Submit plan addressing opportunities for reduction, reuse, or recycling of materials prepared.
 - .2 Landfill Records: Indicate receipt and acceptance of selective demolition waste and hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.5 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination: Coordinate work of this Section to avoid interference with work by other Sections.

1.6 QUALITY ASSURANCE

- .1 Regulatory Requirements: Perform work of this Section in accordance with:
 - .1 Provincial/Territorial Workers' Compensation Boards/Commissions.
 - .2 Provincial/Territorial Occupational Health and Safety Standards and Programs.

1.7 SITE CONDITIONS

- .1 Existing Conditions: Condition of materials identified as being salvaged or demolished are based on their observed condition at time of site examination before tendering.

1.8 SALVAGE AND DEBRIS MATERIALS

- .1 Demolished items become Contractor 's property and will be removed from Project site;
- .2 Carefully remove materials and items designated for salvage and store in a manner to prevent damage or devaluation of materials.

Part 2 Products

2.1 MATERIALS

- .1 General Patching and Repair Materials: repair materials incidental to removal or demolition of components associated with work of this Section.
- .2 Electrical Repair Materials: Use only new materials, CSA or ULC labelled as appropriate and matching components remaining after work associated with components identified for removal or demolition are completed.
- .3 Fire stopping Repair Materials: Use fire stopping materials compatible with existing fire stopping systems where removal or demolition work affects rated assemblies, restore to match existing fire rated performance.

Part 3 Execution

3.1 GENERAL

- .1 Contractor to note that scope of work includes removal and relocation of existing electrical, including but not limited to the demolition of the existing electrical closet, electrical devices and relocation of fire alarm, data and security devices and all associated devices to facilitate the new installation.
- .2 Floor plans created from pdf drawings. Contractor to site measure any distance sensitive equipment prior to removing equipment for accurate pricing purposes.
- .3 Coordinate power shutdown with RCMP prior to disconnection of main service into RCMP hangar. Adhere to proper shutdown procedures. Upon re-energization, ensure to follow RCMP maintenance requirements to ensure all equipment becomes re-energized and functioning.

3.2 EXAMINATION

- .1 Verification of Existing Conditions: Visit site, thoroughly examine and become familiar with conditions that may affect the work of this Section before tendering the Bid; Departmental Representative will not consider claims for extras for work or materials necessary for proper execution and completion of the contract that could have been determined by a site visit.

3.3 PREPARATION

- .1 Protection of Existing Systems to Remain: Protect systems and components indicated to remain in place during selective demolition operations and as follows:
 - .1 Prevent movement and install bracing to prevent settlement or damage of adjacent services and parts of existing buildings scheduled to remain.
 - .2 Notify Departmental Representative and cease operations where safety of buildings being demolished, adjacent structures or services appears to be endangered and await additional instructions before resuming demolition work specified in this Section.
 - .3 Prevent debris from blocking drainage inlets.
 - .4 Protect mechanical systems that will remain in operation.

3.4 EXECUTION

- .1 Disconnect electrical circuits and panel feeders; maintain electrical service and main distribution panel as is, ready for subsequent Work.
- .2 Remove existing luminaires, electrical devices and equipment including associated conduits, boxes, wiring, and similar items unless specifically noted otherwise.
- .3 Disconnect and remove existing fire alarm system including associated conduits, boxes, wiring, and similar items unless specifically noted otherwise.
- .4 Disconnect and remove communication systems including associated conduits, boxes, cabling, and similar items unless specifically noted otherwise.
- .5 Disconnect and remove telephone outlets, associated conduit, cabling and sub terminal backboards and related accessories; maintain telephone service and main terminal backboard as is.
- .6 Perform demolition work in a neat and workmanlike manner:
 - .1 Remove tools or equipment after completion of work, and leave site clean and ready for subsequent renovation work.
 - .2 Repair and restore damages caused as a result of work of this Section to match existing materials and finishes.
- .7 Disconnect panel feeders back to main distribution panel and re label respective circuit breaker as "SPARE".
- .8 Place weatherproof blank cover plates on exterior outlet boxes remaining after demolition and removal activities.
- .9 Remove existing conduits, boxes, cabling and wiring associated with removed luminaires, electrical devices and equipment.

- .10 Grind off conduits and make flush with surface of concrete where conduits are cast into concrete; seal open ends of conduit with silicone sealant and leave in place.
- .11 Seal open ends of conduit with silicone sealant and leave in place where they are inaccessible or cannot be removed without damaging adjacent construction.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 CSA Group (CSA)
 - .1 CAN/CSA-C22.2 No.18-98 (R2003), Outlet Boxes, Conduit Boxes and Fittings.
 - .2 CAN/CSA-C22.2 No.65-03 (R2008), Wire Connectors (Tri-National Standard with UL 486A-486B and NMX-J-543-ANCE-03).
- .2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)
 - .1 EEMAC 1Y-2-[1961], Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).
- .3 National Electrical Manufacturers Association (NEMA)

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for wire and box connectors and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Sustainable Design Submittals:
 - .1 Construction Waste Management:
 - .1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

1.3 CLOSEOUT SUBMITTALS

- .1 Operation and Maintenance Data: submit operation and maintenance data for wire and box connectors for incorporation into manual.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect wire and box connectors from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan.
- .5 Packaging Waste Management: remove for reuse and return by manufacturer of packaging materials, padding, pallets, crates, as specified in Construction Waste Management Plan

Part 2 Products

2.1 MATERIALS

- .1 Pressure type wire connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper sized to fit copper conductors as required.
- .2 Fixture type splicing connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper sized to fit copper conductors 10 AWG or less.
- .3 Bushing stud connectors: to EEMAC 1Y-2 NEMA to consist of:
 - .1 Connector body and stud clamp for round copper
 - .2 Clamp for round copper conductors.
 - .3 Clamp for conductors
 - .4 Stud clamp bolts.
 - .5 Bolts for copper conductors.
 - .6 Bolts for cooper conductors .
 - .7 Sized for conductor's as indicated.
- .4 Clamps or connectors for flexible conduit, on-metallic sheathed cable as required to: CAN/CSA-C22.2 No.18.

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 wire and box connectors installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

- .1 Remove insulation carefully from ends of conductor's and cables and:
 - .1 Apply coat of zinc joint compound on aluminum conductors prior to installation of connectors.
 - .2 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CAN/CSA-C22.2 No.65.
 - .3 Install fixture type connectors and tighten to CAN/CSA-C22.2 No.65. Replace insulating cap.
 - .4 Install bushing stud connectors in accordance with EEMAC 1Y-2.

3.3 CLEANING

- .1 Progress Cleaning:
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.
- .3 Waste Management: separate waste materials for reuse recycling.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 General

1.1 PRODUCT DATA

- .1 Provide product data

1.2 DELIVERY, STORAGE AND HANDLING

- .1 Packaging Waste Management: remove for reuse and return by manufacturer of crates pallets padding packaging materials.

Part 2 Products

2.1 BUILDING WIRES

- .1 Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG.
- .2 Copper conductors: size as indicated, with 600V insulation of cross-linked thermosetting polyethylene material rated RW75 XLPE Jacketed.

2.2 TECK 90 CABLE

- .1 Teck 90 cable shall only be used were noted specifically on the drawings.
- .2 Cable: in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .3 Conductors:
 - .1 Grounding conductor: copper
 - .2 Circuit conductors: copper size as indicated.
- .4 Insulation:
 - .1 Cross-linked polyethylene XLPE.
 - .2 Rating:, [1000] [600] V.
- .5 Inner jacket: polyvinyl chloride material.
- .6 Armour: galvanized steel.
- .7 Overall covering: thermoplastic polyvinyl chloride, compliant to applicable Building Code classification for this project.
- .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 1000mm centers.
 - .3 Threaded rods: 6 mm diameter to support suspended channels.
- .9 Connectors:
 - .1 Watertight for TECK cable.

2.3 CONTROL CABLES

- .1 Type: LVT: 2 soft annealed copper conductors, sized as indicated:
 - .1 Insulation: thermoplastic.
 - .2 Sheath: thermoplastic jacket [and armour of closely wound aluminum wire.
- .2 Type: low energy 300 V control cable: solid or stranded annealed copper conductors sized as indicated LVT:
 - .1 Insulation: TW 40 degrees C
 - .2 Overall covering: polyethylene jackets

Part 3 Execution

3.1 FIELD QUALITY CONTROL

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

3.2 GENERAL CABLE INSTALLATION

- .1 Lay cable in cable trays in accordance with Section 26 05 36 - Cable Trays for Electrical Systems.
- .2 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors - (0-1000 V).
- .3 Cable Colour Coding: to Section 26 05 00 - Common Work Results for Electrical.
- .4 Conductor length for parallel feeders to be identical.
- .5 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.
- .6 Wiring in walls: typically drop or loop vertically from above to better facilitate future renovations. Generally wiring from below and horizontal wiring in walls to be avoided unless indicated.
- .7 Branch circuit wiring for surge suppression receptacles and permanently wired computer and electronic equipment to be 2-wire circuits only, i.e. common neutrals not permitted.
- .8 Provide numbered wire collars for control wiring. Numbers to correspond to control shop drawing legend. Obtain wiring diagram for control wiring.

3.3 INSTALLATION OF BUILDING WIRES

- .1 Install wiring as follows:
 - .1 In conduit systems in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

3.4 INSTALLATION OF TECK90 CABLE (0 -1000 V)

- .1 Group cables wherever possible on channels.
- .2 Install cable securely supported by hangers.

3.5 INSTALLATION OF CONTROL CABLES

- .1 Install control cables in conduit.
- .2 Ground control cable shield.

3.6 INSTALLATION OF NON-METALLIC SHEATHED CABLE

- .1 Install cables.
- .2 Install straps and box connectors to cables as required.

END OF SECTION

Part 1 General

1.1 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for hangers and supports and include product characteristics, performance criteria, physical size, finish and limitations.

1.2 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials in dry location indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect hangers and supports from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan related to Work of this Section.
- .5 Packaging Waste Management: remove for reuse by manufacturer and return of pallets, crates, padding, packaging materials as specified in Construction Waste Management Plan.

Part 2 Products

2.1 SUPPORT CHANNELS

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

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 hangers and supports installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from DCC Representative.

3.2 INSTALLATION

- .1 Secure equipment to solid masonry, tile and plaster surfaces with lead anchors.
- .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 diameter threaded rods and spring clips.
 - .2 Support 2 or more cables or conduits on channels supported by 6 mm diameter threaded rod hangers where direct fastening to building construction is impractical.
- .8 For surface mounting of two or more conduits use channels at 1 m 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.

3.3 CLEANING

- .1 Progress Cleaning:
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

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- .3 Waste Management: separate waste materials for recycling reuse.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 CSA Group (CSA)
 - .1 CSA C22.1-[06], Canadian Electrical Code, Part 1, 20th Edition.

Part 2 Products

2.1 SPLITTERS

- .1 Sheet metal enclosure, welded corners and formed hinged cover suitable for locking in closed position.
- .2 Main and branch lugs, connection bars to match required size and number of incoming and outgoing conductors as indicated.
- .3 At least three spare terminals on each set of lugs in splitters less than 400 A.

2.2 JUNCTION AND PULL BOXES

- .1 Welded steel construction with screw-on flat covers for surface mounting.
- .2 Covers with 25 mm [1"] minimum extension all around, for flush-mounted pull and junction boxes.

2.3 CABINETS

- .1 Type E: sheet steel, hinged door and return flange overlapping sides, handle and catch, for surface mountings.
- .2 Type T: sheet steel cabinet, with full length hinged door, latch, lock, 2 keys, containing 19 mm G1S fir plywood backboard for surface or flush mounting as appropriate.
- .3 Include filtered vents and/or fan-cooling when enclosed equipment is heat producing.

Part 3 Execution

3.1 SPLITTER INSTALLATION

- .1 Install splitters as indicated and mount plumb, true and square to the building lines.
- .2 Extend splitters full length of equipment arrangement except where indicated otherwise.

3.2 JUNCTION, PULL BOXES AND CABINETS INSTALLATION

- .1 Install pull boxes in inconspicuous but accessible spaces.
- .2 Only main junction and pull boxes are indicated. Provide pull boxes so as not to exceed 30 m of conduit run between pull boxes.
- .3 Provide pull boxes and junction boxes in locations shown on the drawings and as required to suit job conditions.

- .4 Locate pull boxes and junction boxes above removable ceilings, in electrical rooms, utility rooms or storage areas.
- .5 Junction boxes, when used, to be installed in areas that are accessible through luminaire openings, and/or access panels.
- .6 Where pull boxes are flush mounted, provide overlapping covers with flush head cover retaining screws, prime coated and painted to match wall or ceiling finish.
- .7 Where cast corrosion resistant boxes are used, covers to be of matching type and gasketed.
- .8 For special (not 100mm [4"] square or octagonal) pull boxes and/or junction boxes, paint identification for the system and provide lamicoid nametags to box covers with a size 2 nameplate 5mm [0.25"] lettering identifying system.
- .9 Interior of all pull boxes and junction boxes for each system to be spray painted with colour as specified in Section 26 05 00
- .10 All pull boxes, junction boxes and cabinets to be supported directly from building structure using one or a combination of galvanized screws, galvanized bolts, galvanized rods, and approved box clip.
- .11 Support of pull boxes, junction boxes by conduit fittings or wire is not acceptable.

3.3 CABINETS INSTALLATION

- .1 Mount cabinets with top not higher than 2 m [6'] above finished floor.
- .2 Cabinets shall be flush mounted in finished areas where depth can be accommodated in the walls. Provide flush trim to suit.
- .3 Provide fit up in Type T cabinets as indicated.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 CSA Group (CSA)
 - .1 CSA C22.1-18, Canadian Electrical Code, Part 1, 20th Edition.

1.2 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials
- .2 Waste Management and Disposal:
 - .1 Separate waste materials for reuse recycling.

Part 2 Products

2.1 OUTLET AND CONDUIT BOXES GENERAL

- .1 Size boxes in accordance with CSA C22.1.
- .2 102 mm square or larger outlet boxes as required.
- .3 Gang boxes where wiring devices are grouped.
- .4 Blank cover plates for boxes without wiring devices.
- .5 347 V outlet boxes for 347 V switching devices.
- .6 Combination boxes with barriers where outlets for more than one system are grouped.

2.2 GALVANIZED STEEL OUTLET BOXES

- .1 One-piece electro-galvanized construction.
- .2 and multi Single gang flush device boxes for flush installation, minimum size 76 x 50 x 38 mm or as indicated. 102 mm square outlet boxes when more than one conduit enters one side with extension and plaster rings as required.
- .3 Utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102 x 54 x 48 mm.
- .4 102 mm square or octagonal outlet boxes for lighting fixture outlets.
- .5 Extension and plaster rings for flush mounting devices in finished plaster tile walls.

2.3 OUTLET BOXES FOR NON-METALLIC SHEATHED CABLE

- .1 Electro-galvanized, sectional, screw ganging steel boxes, minimum size 76 x 50 x 63 mm with two double clamps to take non-metallic sheathed cables.

2.4 FITTINGS - GENERAL

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

- .3 Conduit outlet bodies for conduit up to [35] mm and pull boxes for larger conduits.
- .4 Double locknuts and insulated bushings on sheet metal boxes.

Part 3 Execution

3.1 INSTALLATION

- .1 Support boxes independently of connecting conduits.
- .2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.
- .3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.
- .4 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Do not install reducing washers.
- .5 Vacuum clean interior of outlet boxes before installation of wiring devices.
- .6 Identify systems for outlet boxes as required.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 CSA Group (CSA)
 - .1 CAN/CSA C22.2 No. 18-[98 (R2003)], Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.
 - .2 CSA C22.2 No. 45-[M1981 (R2003)], Rigid Metal Conduit.
 - .3 CSA C22.2 No. 56-[04], Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
 - .4 CSA C22.2 No. 83-[M1985 (R2003)], Electrical Metallic Tubing.
 - .5 CSA C22.2 No. 211.2-[M1984 (R2003)], Rigid PVC (Unplasticized) Conduit.
 - .6 CAN/CSA C22.2 No. 227.3-[05], Nonmetallic Mechanical Protection Tubing (NMPT), A National Standard of Canada (February 2006).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product data: submit manufacturer's printed product literature, specifications and datasheets.
 - .1 Submit cable manufacturing data.
- .3 Quality assurance submittals:
 - .1 Test reports: submit certified test reports.
 - .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .3 Instructions: submit manufacturer's installation instructions.

1.3 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse recycling
- .2 Place materials defined as hazardous or toxic waste in designated containers.
- .3 Ensure emptied containers are sealed and stored safely for disposal away from children.

Part 2 Products

2.1 CABLES AND REELS

- .1 Provide cables on reels or coils.
 - .1 Mark or tag each cable and outside of each reel or coil, to indicate cable length, voltage rating, conductor size, and manufacturer's lot number and reel number.
- .2 Each coil or reel of cable to contain only one continuous cable without splices.
- .3 Identify cables for exclusively dc applications.

- .4 Reel and mark shielded cables rated [2,001] volts and above.

2.2 CONDUITS

- .1 Rigid metal conduit: to CSA C22.2 No. 45, hot dipped galvanized steel threaded.
- .2 Epoxy coated conduit: to CSA C22.2 No. 45, with zinc coating and corrosion resistant epoxy finish inside and outside.
- .3 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with expanded ends with couplings.
- .4 Rigid PVC conduit: to CSA C22.2 No. 211.2.
- .5 Flexible metal conduit: to CSA C22.2 No. 56, liquid-tight flexible metal.
- .6 Flexible PVC conduit: to CAN/CSA-C22.2 No. 227.3

2.3 CONDUIT FASTENINGS

- .1 One hole steel straps to secure surface conduits 50 mm and smaller.
 - .1 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 1.0 m on centre.
- .4 Threaded rods, 6 mm diameter, to support suspended channels.

2.4 CONDUIT FITTINGS

- .1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified.
Coating: same as conduit.
- .2 Ensure factory "ells" where 90 degrees bends for 25 mm and larger conduits.
- .3 Supply watertight connectors and couplings for installations in areas exposed to weather, and set-screw couplings elsewhere.

2.5 EXPANSION FITTINGS FOR RIGID CONDUIT

- .1 Weatherproof expansion fittings with internal bonding assembly suitable for 200 mm linear expansion.
- .2 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19 mm deflection.
- .3 Weatherproof expansion fittings for linear expansion at entry to panel.

2.6 FISH CORD

- .1 Polypropylene.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

- .1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.
- .2 Conceal conduits
- .3 Surface mount conduits except.
- .4 Use rigid hot dipped galvanized steel threaded conduit except where specified otherwise.
- .5 Use epoxy coated conduit underground
- .6 Use electrical metallic tubing (EMT) above 2.4 m not subject to mechanical injury except in cast concrete.
- .7 Use rigid PVC conduit in corrosive areas underground.
- .8 Use flexible metal conduit for connection to surface or recessed fluorescent fixtures connection to motors in dry areas work in movable metal partitions.
- .9 Use liquid tight flexible metal conduit for connection to motors or vibrating equipment in damp, wet or corrosive locations.
- .10 Use explosion proof flexible connection for connection to explosion proof motors.
- .11 Install conduit sealing fittings in hazardous areas.
 - .1 Fill with compound.
- .12 Minimum conduit size for lighting and power circuits: 19 mm.
- .13 Install EMT conduit from branch circuit panel to outlet boxes located in sub floor.
- .14 Bend conduit cold:
 - .1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.
- .15 Mechanically bend steel conduit over 19 mm diameter.
- .16 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.
- .17 Install fish cord in empty conduits.
- .18 Remove and replace blocked conduit sections.
 - .1 Do not use liquids to clean out conduits.
- .19 Dry conduits out before installing wire.

3.3 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 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.

3.4 CONCEALED CONDUITS

- .1 Run parallel or perpendicular to building lines.
- .2 Do not install horizontal runs in masonry walls.
- .3 Do not install conduits in terrazzo or concrete toppings.

3.5 CONDUITS UNDERGROUND

- .1 Slope conduits to provide drainage.
- .2 Waterproof joints (PVC excepted) with heavy coat of bituminous paint.

3.6 CLEANING

- .1 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 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 cables and include product characteristics, performance criteria, physical size, finish and limitations.

1.2 DELIVERY, STORAGE AND HANDLING

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

Part 2 Products

2.1 CABLE PROTECTION

- .1 [38 x 140] mm planks pressure treated with coloured or copper naphthenate or 5% pentachlorophenol solution, water repellent preservative.

2.2 MARKERS

- .1 Concrete type cable markers: [600 x 600 x 100] mm with words: cable, joint or conduit impressed in top surface, with arrows to indicate change in direction of cable and duct runs.

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 cable installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.

- .2 Inform DCC Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 DIRECT BURIAL OF CABLES

- .1 After sand bed in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling, is in place, lay cables maintaining [75] mm clearance from each side of trench to nearest cable.
 - .1 Do not pull cable into trench.
- .2 Include offsets for thermal action and minor earth movements.
 - .1 Offset cables [150] mm minimum for each [60] m run, maintaining minimum cable separation and bending radius requirements.
- .3 Make termination and splice only as indicated leaving [0.6] m minimum of surplus cable in each direction.
 - .1 Make splices and terminations in accordance with manufacturer's written recommendations using approved splicing kits.
- .4 Underground cable splices not acceptable.
- .5 Minimum permitted radius at cable bends for rubber, plastic or lead covered cables, 9 times diameter of cable or in accordance with manufacturer's written recommendations; for metallic armoured cables, [12] times diameter of cables or in accordance with manufacturer's instructions.
- .6 Cable separation:
 - .1 Maintain [75] mm minimum separation between cables of different circuits.
 - .2 Maintain [300] mm minimum horizontal separation between low and high voltage cables.
 - .3 When low voltage cables cross high voltage cables maintain [300] mm vertical separation with low voltage cables in upper position.
 - .4 At crossover, maintain [75] mm minimum vertical separation between low voltage cables and [150] mm between high voltage cables.
 - .5 Maintain [300] mm minimum lateral and vertical separation for fire alarm and control cables when crossing other cables, with fire alarm and control cables in upper position.
 - .6 Install treated planks on lower cables [0.6] m minimum in each direction at crossings.
- .7 After sand protective cover specified in Section 31 23 33.01 - Excavating, Trenching and Backfilling, is in place, install continuous row of overlapping pressure treated planks as indicated to cover length of run.

3.3 CABLE INSTALLATION IN DUCTS

- .1 Install cables as indicated in ducts.

- .2 Do not pull spliced cables inside ducts.
- .3 Install multiple cables in duct simultaneously.
- .4 Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.
- .5 To facilitate matching of colour coded multiconductor control cables reel off in same direction during installation.
- .6 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.
- .7 After installation of cables, seal duct ends with duct sealing compound.

3.4 MARKERS

- .1 Mark cable every [150] m along [duct] [cable] runs and changes in direction.
- .2 Mark underground splices.
- .3 Where markers are removed to permit installation of additional cables, reinstall existing markers.

3.5 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Perform tests using qualified personnel.
 - .1 Include 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.
 - .1 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.
 - .2 Ground shields, ground wires, metallic armour and conductors not under test.
 - .3 High Potential (Hipot) Testing.
- .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.

3.6 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 – Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.7 PROTECTION

- .1 Repair damage to adjacent materials caused by cables installation.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 CSA Group (CSA)
 - .1 CSA C22.2 No. 5-[09], Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, and NMX-J-266-ANCE-2010).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for circuit breakers and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Certificates:
 - .1 Production certificate of origin must contain:
 - .1 Manufacturer's name and address and person responsible for authentication. Person responsible must sign and date certificate.
 - .2 Licensed dealer's name and address and person of distributor responsible for Contractor's account.
 - .3 Contractor's name and address and person responsible for project.
 - .4 Local manufacturer's representative name and address. Local manufacturer's representative must sign and date certificate.
 - .5 Name and address of building where circuit breakers will be installed:
 - .1 Project title:
 - .2 End user's reference number:
 - .3 List of circuit breakers:
- .3 Sustainable Design Submittals:
 - .1 Construction Waste Management:
 - .1 Submit project Waste Management Plan highlighting recycling and salvage requirements.
 - .2 Submit calculations on end-of-project recycling rates, salvage rates, and

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store circuit breakers indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect circuit breakers from nicks, scratches, and blemishes.

- .3 Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan related to Work of this Section.
- .5 Packaging Waste Management: remove for reuse and return by manufacturer of crates, packaging materials, padding, pallets, as specified in Construction Waste Management Plan.

Part 2 Products

2.1 BREAKERS GENERAL

- .1 Circuit breakers, accessory high-fault protectors Moulded-case circuit breakers, fused circuit breakers, ground-fault circuit-interrupters, 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 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.

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 installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

- .1 Install circuit breakers as indicated.

3.3 CLEANING

- .1 Progress Cleaning:
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment

- .3 Waste Management: separate waste materials for reuse recycling.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 CSA Group
 - .1 CAN/CSA-C22.2 No.4-[04 (R2009)], Enclosed and Dead-Front Switches (Tri-National Standard, with ANCE NMX-J-162-2004 and UL 98).
 - .2 CSA C22.2 No.39-[13], Fuseholder Assemblies.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for disconnect switches - fused and non-fused and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Sustainable Design Submittals:
 - .1 Construction Waste Management:
 - .1 Submit project Waste Management Plan highlighting recycling and salvage requirements.
 - .2 Recycled Content:
 - .1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-consumer content, and total cost of materials for project.

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect disconnect switches - fused and non-fused from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan to Work of this Section
- .5 Packaging Waste Management: remove for reuse by manufacturer and return of packaging materials, padding, crates, pallets, as specified in Construction Waste Management Plan

Part 2 Products

2.1 DISCONNECT SWITCHES

- .1 Horsepower rated, Non-fusible, disconnect switch in CSA enclosure, to CAN/CSA-C22.2 No.4 size as indicated.
- .2 Provision for padlocking in on-off switch position by 3 locks.
- .3 Mechanically interlocked door to prevent opening when handle in ON position.
- .4 Fuses: size as indicated.
- .5 Quick-make, quick-break action.
- .6 ON-OFF switch position indication on switch enclosure cover.

2.2 EQUIPMENT IDENTIFICATION

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

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 disconnect switches - fused and non-fused installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

- .1 Install disconnect switches complete with fuses if applicable.

3.3 CLEANING

- .1 Progress Cleaning:
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment
- .3 Waste Management: separate waste materials for recycling, reuse
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 CSA Group (CSA)
 - .1 CSA B139-[09], Installation Code for Oil-Burning Equipment.
 - .2 CSA C282-[09], Emergency Electrical Power Supply for Buildings.
- .2 U.S. Coast Guard Equipment List (USCG)
 - .1 164.009-[May 2002], Non-Combustible Materials.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for generating equipment and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Submit verification of diesel electric technician qualification.
- .4 Submit commissioning report.

1.3 QUALIFICATIONS

- .1 Use qualified diesel electric technician.

Part 2 Products

2.1 MATERIALS

- .1 Include materials as follows:
 - .1 Conduits and boxes as required.
 - .2 Copper fuel lines and fittings as required.
 - .3 [ULC automatic fire shut-off valve.]
 - .4 Primary fuel filter/water separator.
 - .5 Insulation for exhaust system.
 - .6 Electrical components as indicated.
 - .7 Wiring material.
 - .8 Antifreeze, ethylene glycol.
 - .9 Diesel fuel; storage [and day] tank initial fill, plus top-up after testing.
 - .10 Manual IPU bypass switch.
 - .11 Wiring and materials, including necessary [rigid] steel conduits and fittings for making connections.

- .12 The power circuit cables will be size of conductor, RW75 (-40 degrees C) cross link polyethylene, multiple conductor PVC jacketed.
- .13 The control circuit cables will not be less than No. 14, RW90, multiple conductor[s], colour or number coded.
- .14 Electronic governor control cable shall be minimum size No. [18] stranded copper conductor, shielded complete with drain wire and overall PVC jacket.
- .15 Battery cable shall be welding cable type, extra flexible, rope stranded copper conductor with neoprene oil-resistant insulation, sized to limit voltage drop to 5% at time of peak load.

2.2 INSULATION

- .1 Removable fibreglass jacket insulation rated for [650] degrees C minimum with stainless lacing hooks and wires.
 - .1 Enclose jacket on inside by stainless steel mesh with outside cover silicone coated or aluminized fibreglass cloth: to USCG approved Non-Combustible Materials No. [164.009].
- .2 Calcium Silicate removable insulation rated for [650] degrees C with exterior stainless steel protective cover and fastenings.

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 generating equipment installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 LOCATING AND MOUNTING

- .1 Locate unit as indicated.
- .2 Fit and adjust isolators in accordance with manufacturer's installation and adjustment instruction bulletin contained in unit manual.
- .3 Do not bolt housings to foundation if isolator housing feet are equipped with 6 mm rubber sound pads.

3.3 ALIGNMENT CHECK

- .1 Since Engine-generator shaft alignment is adjusted at factory, check to ensure that no change has occurred due to shipment and handling.

- .2 Where engine and generator housings are close coupled and instruments at hand are not suitable for measuring alignment within confines of housings, just loosen engine and generator hold down bolts and ensure that each foot is carrying proportionate amount of weight and feet are level on base plate.

3.4 FUEL SUPPLY SYSTEM

- .1 Install fuel tanks to CSA B139.
- .2 Inspect thoroughly fuel tank and lines to confirm they are clean and free of foreign material before connecting fuel system.
- .3 Install primary fuel filter/water separator and servicing shut-off valves as indicated. Provide [3] spare filter elements.
- .4 Install ULC automatic fire shut-off valve. Locate upstream of any combustible fuel system component.
- .5 Install supply and return fuel lines between engine and fuel day tank. Install flexible sections between the engine and fixed end of fuel lines from fuel tank, [using materials supplied with unit].
- .6 Braze or silver solder hard drawn copper pipe joints.
- .7 Brazing or soldering alloys melting point: [450] degrees C minimum.
- .8 Neatly install fuel lines parallel or perpendicular to building lines with no kinks or dents.
- .9 Install soft drawn copper fuel lines using brass 45 degrees flare and pipe fittings as required and bend with correct size lever type bending tool. Entirely replace leaking fuel lines.

3.5 BATTERIES AND CHARGER

- .1 For dry charged batteries, activate in accordance with manufacturer's instructions manual prior to installation.
- .2 For wet batteries, inspect individually each battery cell and check electrolyte level.
 - .1 Check charge condition by measuring temperature and specific gravity of electrolyte.
 - .2 Consult manufacturer's instructions for recommended readings.
 - .3 If readings are lower, give batteries freshening charge until readings are reached.
- .3 Locate batteries as indicated and ensure batteries are accessible for service.
 - .1 Run and protect cables to starting motor using cables supplied with unit.
- .4 Install battery charger on wall, adjacent to batteries and make connection to batteries.
- .5 Clean connections and tighten securely.
- .6 Install removable plexiglass cover on batteries.

3.6 EXHAUST SYSTEM

- .1 Install exhaust pipe and silencer using material supplied with unit.

- .2 Arrange silencer above and approximately in line with engine exhaust manifold with exhaust tail pipe protruding through thimble in wall.
- .3 Extend tail pipe [1] metre minimum beyond outside wall.
- .4 Support silencer with hangers so no weight or stress is applied to engine exhaust manifold or turbocharger.
- .5 Install flexible exhaust pipe between silencer and manifold.
- .6 Install exhaust system fireproof insulating material, after test run.

3.7 COOLING AND VENTILATION

- .1 Install air outlet and inlet louvres and hoods in their respective openings.
- .2 Install louvre motors and linkages, adjust to ensure louvres are tight in closed position and give free damper movements from fully closed to fully open.
- .3 Where canvas boot is not provided, maintain [13] mm clearance between radiator and air outlet duct.
- .4 Mount thermostat [in strategic position, away from inlet louvre] [as indicated].
- .5 Install conduits and junction boxes and make connections from louvre motors to thermostat and to 120/24 V AC transformer [in panel].
- .6 Fill engine radiator with water/ethylene glycol antifreeze mix good for [-40 degrees C].
- .7 Install remote radiator including piping, valves, fittings and pumps as indicated.

3.8 CONTROL AND TRANSFER PANEL

- .1 Locate panels as indicated.
- .2 Make control and power circuit connections as indicated.
- .3 Identify cables at both ends.
- .4 Tag with slip-on wire maker, each wire end with number corresponding to number in panel.
- .5 Make terminations with self-insulated terminals of flanged fork or ring type.

3.9 ADDITIONAL WORKS

- .1 Complete any additional work as instructed by Departmental Representative to:
 - .1 Ensure equipment is safe to operate.
 - .2 Provide complete and operating system.

3.10 FIELD QUALITY CONTROL

- .1 Qualified diesel electric technician to: inspect and verify that installation of interruptible power unit is acceptable and complete. Provide inspection report to the Departmental Representative.

- .2 Commissioning: do site commissioning of diesel electric generator unit by qualified diesel electric technician in accordance with Section 01 91 13 - GENERAL COMMISSIONING REQUIREMENTS.
- .3 Develop and submit commissioning report including time delay settings, operational set points and adjustment ranges.

3.11 SYSTEM STARTUP

- .1 Preparation: before starting unit, carry out thorough mechanical and electrical inspection of equipment, and perform following checks and adjustments:
 - .1 Disconnect battery cables from batteries to prevent accidental starting.
 - .2 Turn engine several revolutions by means of hand-barring devices to ensure parts are free and there are no obstructions to its running.
 - .3 Check engine/generator alignment readings to ensure they match readings attained at time of manufacture.
 - .4 Check fluid levels and top up as necessary. Pre-lubricate engine and turbochargers as recommended by engine manufacturer. Install drip pan beneath engine.
 - .5 Confirm cooling system antifreeze is effective to at least minus 40 degrees C.
 - .6 Check belts for correct tension and adjust as necessary.
 - .7 Check and grease points.
 - .8 Check and tighten properly nuts, bolts.
 - .9 Confirm safety guards are in place and properly secured.
 - .10 Check linkages for damage and freedom of movement.
 - .11 Check fuel supply system for leakage.
 - .12 Ensure fuel supply and fuel injection systems are properly primed.
 - .13 Check and tighten properly electrical connections.
 - .14 Check starting battery electrolyte level specific gravity and for proper installation.
 - .15 Check battery charger for proper operation and adjust as necessary.
 - .16 Carry out generator winding insulation resistance test. If reading is unacceptable, carry out recognized drying procedure. Do not start unit until satisfactory reading has been achieved.
 - .17 Check jacket coolant heater for proper operation.
 - .18 Complete additional preparations deemed necessary.
- .2 Performance verification: on completion of start-up preparations, take following action:
 - .1 Have at hand, during initial start-up, means for choking off air supply to engine air induction manifold in event of engine run away or other emergency.
 - .2 Reconnect starting battery cables to starting battery.
 - .3 Start unit only in presence of Departmental Representative and allow to warm up. Stop unit if abnormal conditions are encountered.
 - .4 Check for and correct leakage from exhaust system, fuel system, cooling system, and lubricating oil system.

- .5 Adjust vibration isolators.
- .6 Observe and confirm lubricating oil pressure and coolant temperature are within limits and no harmful vibration or sounds are evident.
- .7 Ensure voltage is within operating parameters and automatic voltage regulator is operating correctly.
- .8 Ensure manual voltage control is operating correctly.
- .9 Ensure frequency is within operating parameters and electronic governor is operating correctly.
- .10 Check engine air ventilation system for proper operation.
- .11 Check operation of engine-mounted protective sensing devices and adjust as necessary.
- .12 Check phase sequence of normal power supply and ensure emergency power supply are in same sequence.
- .13 Check operation of electronic controller protection, transfer, timing, metering, and annunciator functions and adjust as necessary.
- .14 Check operation and calibration of analog metering and adjust as necessary.
- .15 Apply electrical load, read the metres, and correlate these readings.
- .16 Demonstrate:
 - .1 Unit start, transfer to load, retransfer to normal power, unit shutdown, on "automatic" control.
 - .2 Unit start, transfer to load, retransfer to normal power, unit shutdown, on "test control".
 - .3 Unit cranking, start, and shutdown by means of engine-mounted key switch.
 - .4 Run unit on full (nameplate) load for minimum period of 4 hours to show load-carrying capability, stability of voltage and frequency, and satisfactory performance of engine ventilating system to provide adequate cooling, exhaust system.
 - .5 Every 1/2 hour carry out and record readings on Test Chart.
- .17 Perform additional tests as required by Departmental Representative to confirm unit is operating satisfactorily.

3.12 CLEANING

- .1 Progress Cleaning: clean in accordance with Section [01 74 00 - Cleaning].
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.13 DEMONSTRATION AND TRAINING

- .1 As directed by Departmental Representative carry out demonstrations of complete interruptible power unit for Project Acceptance Board.
- .2 Deliver familiarization training of operating and maintenance staff.
 - .1 Include instruction to site operation and maintenance staff for proper care, operation, and maintenance of equipment.
 - .2 Maintain services for such period, and for as many visits as necessary to put equipment in operation, and confirm that operating personnel are conversant with aspects of its care and operation.
- .3 Include fuel required for performing diesel-generator site test and top-up after acceptance test completion.

3.14 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Protect fuel lines from mechanical damage.
- .3 Repair damage to adjacent materials caused by electric power generating equipment installation.

END OF SECTION

Part 1 General

1.1 GENERAL REQUIREMENTS

- .1 Provide a 50kW standby power system to supply electrical power at 600v Volts, 60 Hertz, 3 Phase 3 wire. The generator shall consist of a liquid cooled diesel engine, a self-contained 'belly tank', a weatherproof enclosure, and system controls with all necessary accessories for a complete operating system, including but not limited to the items as specified hereinafter.
- .2 The overall dimensions of the diesel engine generator set shall not exceed those indicated on the drawings.
- .3 The automatic transfer switches shall be of a compatible manufacturer to the generator and shall match the Voltage and ampacity of the emergency system as shown on the Drawings. Automatic transfer switch shall be installed inside building. Extend engine start and other control wiring as directed by the Standby Generator supplier from main transfer switch to engine generator control panel.
- .4 Provide and install remote annunciator panel as indicated on the drawings.
- .5 Standby generator shall be capable of accepting the entire rated load in one step.
- .6 Acceptable manufacturers Onan, Detroit, Simson-Maxwell or equal.

1.2 WORK INCLUDED

- .1 Provide a 100mm high steel reinforced concrete base as directed by the Structural Engineer. Base shall have 20mm chamfered edges and shall be sized as directed by the Supplier.
- .2 Provide restraining bolts and encase in concrete bases as directed by the supplier and the Earthquake Restraint Design Engineer.
- .3 Equipment shall not be delivered until it can be located on housekeeping pad.
- .4 Connect automatic transfer switch to Utility power supply and generator engine set. Provide controls as per item 1.4 of this Section. Connect to fire alarm panel for 'engine run' and 'engine fail to run' indication.

1.3 SEQUENCE OF OPERATION

- .1 Upon failure of normal power a signal (contact closing) shall be sent to the generator control panel from the transfer switch[es].
- .2 Engine shall crank, start and come up to operating speed. Time for generator engine to operate at full speed shall be less than 15 seconds.
- .3 When generator engine reaches stable voltage and frequency the transfer switch[es] shall operate to the EMERGENCY position.

- .4 Return of normal power shall, after the appropriate time delay, cause the transfer switch to operate back to the NORMAL supply under the control of the transfer switch "in-phase" monitor. If normal power should fail during the "cool down" period, the transfer switch shall immediately re-transfer to the EMERGENCY source and the "cool down" timer shall be re-set.
- .5 After the appropriate "cool down" time delay after re-transfer, a signal will be sent to shut down the engine generator and to reset the entire system.

1.4 WARRANTY AND GUARANTEE

- .1 Engine generator set and installation shall be guaranteed by the system supplier for a period of three (3) years from the date of site test acceptance. Warranty shall include the costs of labour and materials on site.

Part 2 Products

2.1 EQUIPMENT - GENERAL

- .1 The generator shall be a 50kW three phase four wire 600/347V generator, complete with a 3P 60A 600V load bank breaker.
- .2 The generator shall come complete with three 120V receptacles as follows:
 - .1 15A block heater
 - .2 15A battery charger
 - .3 15A convenience receptacle.Coordinate devices with the drawings.
- .3 The generator enclosure shall include a 1' strip light with sealed anodized aluminium channel. The fixture performance shall be equal to 480 lumens/ft at 3500K with a CRI of 90, 50,000 lm-80 rating. Provide all mounting hardware required to provide a complete installation.
- .4 The generator shall be applied at the listed ambient temperature and elevation. Bidders to submit generator rated power output at ambient (°C) and elevation (m).
- .5 A radiator fan guard must be installed for personnel safety that meets UL and OSHA safety requirements.
- .6 The engine's cranking batteries shall be lead acid. The batteries shall be sized per the manufacturer's recommendations.
- .7 The generator set shall have an engine driven, battery charging alternator with integrated voltage. The battery charger to be factory installed on generator set.
- .8 The engine shall include a primary fuel filter, water separator, manual fuel priming pump, and engine flexible fuel lines must be installed at the point of manufacture. Element shall be replaceable paper type.
- .9 Engines that are equipped with an electronic engine control module (ECM) shall monitor and control engine functionality and seamlessly integrate with the generator set controller

- through digital communications. ECM monitored parameters shall be integrated into the generator set controllers NFPA 110 alarm and warning requirements.
- .10 The engine exhaust emissions shall meet the EPA emission requirements for standby power generation.
 - .11 The manufacturer shall supply its recommended stainless steel, flexible connector to couple the engine exhaust manifold to the exhaust system. A rain cap will terminate the exhaust pipe after the silencer. All components must be properly sized to assure operation without excessive back pressure when installed.
 - .12 The manufacturer shall supply a commercial grade exhaust silencer as minimum.
 - .13 The generator sets' weather proof sound attenuated enclosure exhaust piping from the turbo-charged discharge to the silencer shall be thermally wrapped to minimize heat dissipation inside the enclosure.
 - .14 The alternator shall meet temperature rise standards of UL2200 (120 degrees C). The insulation system material shall be class "H" capable of withstanding 150 degrees C temperature rise.
 - .15 The generator control system shall be a fully integrated microprocessor based control system for standby emergency engine generators meeting all requirements of NFPA 110 level 1. The generator control system shall be a fully integrated control system enabling remote diagnostics and easy building management integration of all generator functions. The generator controller shall provide integrated and digital control over all generator functions including: engine protection, alternator protection, speed governing, voltage regulation and all related generator operations.
 - .16 Provide a remote annunciator panel indicating high and low battery voltage, generator running, normal Utility power, EPS supplying load, low and pre-low oil pressure, high and pre-high coolant temperature, over-speed, under-crank, not in automatic transfer, battery charger malfunction, low fuel, low oil pan temp, low battery temp, low coolant temp and fault.
 - .17 Two thermal magnetic circuit breakers carrying the UL mark shall be factory installed. The breakers shall be rated as shown on the single line diagram. The line side connections are to be made at the factory. Output lugs shall be provided for load side connections.
 - .18 The generator set shall be packaged with a sound attenuating marine grade corrosion resistant enclosure. The enclosure shall be completely lined with sound deadening material. This material must be of a self-extinguishing design.
 - .19 The generator set shall come with an oil pan heater, battery heater, water pump heater and coolant heater.
 - .20 The packaging shall include a double wall, sub-base mounted, UL142 listed fuel tank. The tank shall be sized to provide 24 hours of run time and be marine grade.
 - .21 The fuel tank shall use an electric fuel sensor to provide analog indication of fuel level. The controller shall have a warning indication on low fuel level and provide optional

- shutdown functionality for low, low fuel level. The fuel tank must be supplied by the engine-generator set manufacturer and be installed before shipment.
- .22 Two open transition automatic transfer switches shall be provided with maintenance bypass feature on each automatic transfer switch. Transfer switches shall be sized as detailed on the Drawings.
 - .23 The automatic transfer switch control panel shall utilize solid state sensing in normal and emergency for automatic, positive operation. The following shall be provided:
 - .1 Field adjustable time delays to: override momentary normal source outages to delay all transfer switch and engine starting signals (adjustable from 0.5 to 6 seconds and factory set at one second), retransfer to normal source (the time delay shall be automatically bypassed if the emergency source fails and normal source is available) adjustable from 0 to 30 minutes and factory set at five minutes, unloaded running time delay for emergency generator cool down, (adjustable from 0 to five minutes and factory set at five minutes) and transfer to emergency (adjustable up to one minute and factory set at zero).
 - .2 One auxiliary contact that is closed when automatic transfer switch is connected to normal and one auxiliary contact that is closed when automatic transfer switch is connected to emergency. Rated 10 Amps, 600 Volt, 60 Hz AC.
 - .3 A test switch to simulate normal source failure.
 - .24 All generator panel doors shall be lockable. All door hardware and hinges shall be stainless steel.
 - .25 Provide generator enclosure sound proofing so that sound meter readings shall not exceed 65dbA at 7m from the enclosure.
 - .26 Contractor to provide a diesel fuel oil spill kit for generator. Spill kit to be 20 gallons complete with twenty absorbent pads, six x 4' socks, two x 9" x 15 pillows, one pair gloves, one pair goggles, three disposal bags and tie. Contractor to provide 150mm x 250mm stainless steel sign mounted to chain link fence noting "emergency spill kit located in mechanical room".
 - .27 Engine, alternator and control system shall be manufactured by a single supplier and validated by factory prototype testing as a complete generator set package.
 - .28 Maintenance mode function integrated into the generator control system for arc energy reduction with the capability of the following features:
 - .1 External means for enabling/disabling.
 - .2 Automatic detection when connecting with service software.
 - .3 Generator and engine to be developed by the same manufacturer, single source required.
 - .4 Generator overcurrent protection: the generator set shall be provided with a UL listed/CSA certified protective device that is coordinated with the alternator provided to prevent damage to the generator set on any possible overload or overcurrent condition external to the machine. The protective device shall be listed as a utility grade protective device under UL category NRGU. Protector shall perform the following functions:
 - .5 Initiates a generator kW overload alarm when generator has operated at an overload equivalent to 110 percent of full-rated load for 60 seconds. Indication for this alarm is integrated with other generator-set malfunction alarms.

- .6 Under single phase or multiple phase fault conditions, or on overload conditions, indicates an alarm conditions when the current flow is in excess of 110% of rated current for more than 10 seconds.
 - .7 Under single phase or multiple phase fault conditions, operates to switch off alternator excitation at the appropriate time to prevent damage to the alternator.
 - .8 The operator panel shall indicate the nature of the fault condition as either a short circuit or an overload.
 - .9 Senses clearing of a fault by other overcurrent devices and controls recovery of rated voltage to avoid overshoot greater than 120% of nominal voltage.
 - .10 The protective system provided shall not include an instantaneous trip function
- .29 Generator to be installed and verified by factory certified technicians.
- .30 Generator provider to support after hours emergency call centre.

2.2 FACTORY TESTS

- .1 Before shipping, the generator set and control panel shall be fully assembled and set up for tests at the shop/factory.
- .2 The factory test shall include
 - .1 Testing of all shutdown and malfunction devices including but not limited to
 - .1 High water temperature switch. This test shall be performed by actually raising the water temperature to prove sensor operation as well as the shutdown.
 - .2 Low oil pressure switch. This test shall be performed by actually reducing the oil pressure to prove sensor operation as well as the shutdown.
 - .3 Over-cranking switch.
 - .4 Over-speed switch.
 - .5 Low water level. This test shall be performed by actually lowering the water level to prove sensor operation as well as the shutdown.
 - .6 Low fuel supply level main tank.
 - .7 Low fuel supply level day tank.
 - .8 Low battery voltage level. This test shall be performed by connecting an external load to the battery while recording the battery voltage and trigger point of the alarm.
 - .2 Governor response tests.
 - .3 Voltage regulator response tests.
 - .4 Vibration levels measured against factory limits.
 - .5 3-hour full-load test (resistance load acceptable) at rated speed and voltage.
 - .6 Readings at quarter-hour intervals during full-load tests shall be taken for the following
 - .1 Exhaust temperatures (before turbo-charger)
 - .2 Water temperature
 - .3 Lubrication oil temperature
 - .4 Lubrication oil pressure
 - .5 Voltage, current and frequency
 - .6 Kilowatts
- .3 Electronic copies of all test results shall be submitted to the Consultant for review.

Part 3 Execution

3.1 INSTALLATION - GENERAL

- .1 Uncrate, unload, hoist, and install in place the engine generator, remote annunciator panel, automatic transfer switch[es], and all equipment as specified herein.
- .2 Coordinate the installation fully with the supplier, mechanical sub-trade, and the manufacturer of the low voltage switchboard to ensure that all wiring and electrical devices, fuel, air, and exhaust requirements are met and that the system operates as described under "Sequence of Operation".
- .3 Provide all power wiring and connections from generator engine set to transfer switch[es].
- .4 Provide all power wiring and connections to engine auxiliary heaters.
- .5 Provide separate power supply to battery charger.
- .6 Provide all required equipment and system ground connections.
- .7 Provide all required control and annunciator wiring and connections.
- .8 All wiring connections shall be with liquid seal-tight flexible conduit.
- .9 Provide flexible connectors (min. 450mm) at all connections to the diesel engine generator set (fuel, electrical, coolant, exhaust, etc.).

3.2 SERVICE START-UP

- .1 The supplier shall provide supervision, assistance and instructions during installation and initial start-up and prior to site acceptance tests.
- .2 Any malfunctions occurring prior to final acceptance tests shall be corrected.
- .3 A mechanical inspection of the unit shall be made to ensure all fluid seals are properly installed and no leakage occurs.
- .4 After installation is complete and at a time when the unit is at normal operating temperature, the unit shall be stopped and clearances between the faces of any flexible couplings between engine and alternator shall be immediately checked. Adjustments shall be made as required to effect minimum eccentricity.
- .5 Installation of the engine generator set, control panel, and all auxiliary equipment including mechanical and electrical services to same shall be checked for conformity to the manufacturer's recommendations and upon completion of installation, a written acceptance statement shall be provided to the Consultant.
- .6 A list of deficiencies, if any, shall be submitted to the Consultant immediately after inspection has been completed.

3.3 SITE ACCEPTANCE TEST

- .1 The supplier shall carry out all tests outlined in the following. Time of test shall be agreed upon with the General Contractor, Electrical Sub-Contractor, and Consultant.
- .2 A continuous, full-load test on the diesel-engine generator shall be run for four hours. The Generator supplier is responsible to provide suitable resistive type load banks and all required cabling at the site to carry out the load test.
- .3 The following data shall be taken at the start of the test and at half-hour intervals thereafter
 - .1 Frequency (not to be changed)
 - .2 Voltage (not to be changed)
 - .3 Load (Ampere)
 - .4 Kilowatts
 - .5 Water temperature
 - .6 Lubricating oil temperature
 - .7 Lubricating oil pressure
 - .8 Ambient temperature
- .4 On completion of the site acceptance test, the equipment supplier shall perform the following tests and demonstrate the satisfactory operation of the following devices
 - .1 High water temperature switch
 - .2 Low oil pressure switch
 - .3 Over-cranking switch
 - .4 Over-speed switch
 - .5 Low water level
 - .6 Low fuel supply level main tank
 - .7 Low fuel supply level day tank
 - .8 Low battery voltage level
 - .9 Main fuel tank leak
 - .10 Provide alignment of any flexible couplings
- .5 Electronic copies of all test results shall be submitted to the Consultant.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 CSA C22.1, Canadian Electrical Code.
- .2 NFCC, National Fire Code of Canada
- .3 BCBC, BC Building Code.
- .4 Underwriter's Laboratories of Canada (ULC)
 - .1 CAN/ULC S524, Installation of Fire Alarm Systems.
 - .2 CAN/ULC S525, Audible Signal Appliances for Fire Alarm.
 - .3 CAN/ULC S526, Visual Signal Appliances, Fire Alarm.
 - .4 CAN/ULC S527, Control Units.
 - .5 CAN/ULC S528, Manual Pull Stations.
 - .6 CAN/ULC S529, Smoke Detectors.
 - .7 CAN/ULC S530, Heat Actuated Fire Detectors.
 - .8 CAN/ULC-S536, Inspection and Testing of Fire Alarm Systems.
 - .9 CAN/ULC S537, Verification of Fire Alarm Systems.
 - .10 CAN/ULC-S561, Installation and Services for Fire Signal Receiving Centres and Systems.

1.2 SCOPE

- .1 Provide all labour, material and equipment necessary to extend and expand the existing fire alarm system into the new generator system. Make modifications to the existing fire alarm system as indicated in the drawings and specified herein.
- .2 Include all wiring and material required for a completely modify, extent and replace the existing operational system. Items obviously necessary or reasonably implied to complete the work are to be supplied as if indicated on the drawings and called for in the specifications.
- .3 All components shall be ULC listed and approved for use on the intended equipment and to be of the same manufacturer and compatible to the existing fire alarm system. Coordinate on site as required.
- .4 Work Included:
 - .1 Provide and install ancillary relays, modules, and signaling devices as indicated on the drawing.
 - .2 Connect to existing fire alarm panel as required.
 - .3 Modify all existing annunciators as required.
 - .4 Perform all the required programming and verification as required.

1.3 SYSTEM DESCRIPTION

- .1 Modify the existing supervised, microprocessor-based, fire alarm system, utilizing digital techniques for data control and digital multiplexing techniques for data transmission.

- .2 System to carry out fire alarm and protection functions including receiving alarm signals, initiating general alarm, supervising components and wiring, actuating annunciators and auxiliary functions, initiating trouble signals and signalling to monitoring agency.

1.4 SYSTEM OPERATION

- .1 System to operate as existing. Add additional devices and zones as indicated.
- .2 Single stage sequence of operations:
 - .1 Any initiating device activated will result in a temporal audible and visual alarm signal throughout the building, the alarm indicator and initiating devices' zone shall be displayed on the fire alarm panel and annunciator, all elevators shall home, the dialer shall send a signal to the monitoring company, all held open doors shall release, all electrically locked exit doors shall release and all required HVAC equipment designated to start or stop shall do so.

1.5 REQUIREMENTS OF REGULATORY AGENCIES

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

Part 2 Products

2.1 MATERIALS

- .1 Equipment and devices: ULC listed and labelled and supplied by single manufacturer.

2.2 FIRE ALARM PANEL

- .1 Existing.

2.3 ADDRESSABLE MONITOR MODULES

- .1 Addressable monitor elements to meet or exceed the following technical requirements:
 - .1 Field programmed.
 - .2 Individually identifiable.
 - .3 Supervised.
 - .4 Supervises and controls N.O. contact devices on supervised slave line. Supervision in Class B format with end-of-line resistor.
 - .5 Operating Voltage: 24 volts.
 - .6 Complete with lamicoid identification on cover identifying address and device monitored.

2.4 WIRE AND CABLE

- .1 Conductors: Copper, to CSA C22.2 and No.75-M1983 and as follows:
 - .1 Conductor Insulation: Minimum rating 300 volts. Single conductor RW90 X-link. Multi-conductor cables 105°C with outer PVC jacket, colour coded, FAS rated.

- .2 Conductor sizes as follows:
 - .1 Minimum conductor size for alarm initiating circuits shall be #18 AWG.
 - .2 Minimum conductor size for signal circuits shall be #16 AWG.
 - .3 Minimum conductor size for AC circuits shall be #12 AWG.
 - .4 Minimum conductor size for visual signal appliance circuits shall be #14 AWG.
 - .5 Size all fire alarm wiring for maximum 3% voltage drop at maximum load at last device in run.
- .2 All wiring for systems to be PVC insulated, FT6 shielded, twisted pair, multi-conductor or coaxial, as called for or as required. All wiring for systems to be installed in conduit.
- .3 Selection of type of cable to be at discretion of system installer but the system meeting all code requirements, when complete, must perform to the complete satisfaction of the Owner. All wiring to be terminated in terminal panels, junction boxes, etc. on suitable terminal strips or blocks, and to be neatly installed, laced and tagged where required. All terminals in terminal panels and junction boxes shall be made with solderless connectors to terminal blocks with separate terminal for each conductor.

2.5 END-OF-LINE RESISTOR ASSEMBLY

- .1 End-of-line Resistor Assembly: single gang stainless steel plate, terminal strip on back, resistor, red enamel finish and lamicaid nametag on front identifying zone and / or device.

Part 3 Execution

3.1 INSTALLATION

- .1 Install new devices at locations indicated and in accordance with the manufacturer's layout drawings. Relocate and replace all existing devices shown on the Drawings.
- .2 Wire to and connect generator transfer switches and monitoring company as indicated on the Drawings and monitor devices as required by CAN/ULC S524-14.
- .3 Each device shall be clearly identified with its zone and address number, using machine-printed clear adhesive tape with black lettering.
- .4 All fire alarm system junction boxes, conduits, and wiring shall be painted and identified.
- .5 All fire alarm conduits and BX drops shall be identified with a red band at 3 meter intervals and at all wall or slab penetrations.
- .6 Integrate the fire alarm system with the following systems as indicated and/or as required by code or standard.
 - .1 Generator Transfer Switch
- .7 Wiring shall be installed in conduit and shall be as recommended by the system manufacturer and as required by the CEC. Provide 2 hour rated cabling where required by Code.

3.2 OPERATION OF FIRE ALARM SYSTEM DURING RENOVATIONS

- .1 Construction/demolition activities in the existing building may require that certain fire alarm devices are protected from construction dust, damage etc. Coordinate with the Owners representative as required to protect components of the fire alarm system to prevent nuisance operation and alarms.
- .2 Maintain existing fire alarm system in areas under construction where practical. Relocate, rewire and provide interim connections as required while installing the new system to replace the existing. Provide temporary fire alarm devices and audible signals to suit any temporary exiting provisions.
- .3 The fire alarm system is to be fully functional in the area of construction when the contractor is neither on site nor after the contractors normal work hours. (i.e. overnight, holidays, weekends)

3.3 SYSTEM VERIFICATION

- .1 Fire alarm equipment supplier to make a thorough inspection of the complete installed fire alarm system including all components such as manual stations, thermal detections, products-of combustion detectors, and controls to ensure the following:
 - .1 System is complete and functional in accordance with engineer's specifications.
 - .2 System is installed according to CAN/ULC S524 requirements.
 - .3 System is installed in accordance with manufacturer's recommendations.
 - .4 Provide all testing equipment and material required for testing sound levels of the fire alarm signaling devices during verification.
 - .5 Verification to be performed by the system manufacturer or its qualified representative, certified to verify fire alarm system within the Province of British Columbia.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 ASTM C117, Test Method for Material Finer than 0.075mm Sieve in Mineral Aggregates by Washing
- .2 ASTM C136, Methods for Sieve Analysis of Fine and Coarse Aggregates
- .3 CAN/CGSB-8.2M, Sieves, Testing, Woven Wire, Metric
- .4 ASTM D698, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort
- .5 ASTM D4318, Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- .6 ASTM D422, Standard Test Method for Particle-Size Analysis of Soils
- .7 ASTM D698-78, Test Method for Moisture Density Relations of Soils and Soil Aggregate Mixtures Using 2.49kg Rammer and 304.8mm Drop

1.2 DEFINITIONS

- .1 Waste Material: excavated material unsuitable for use in work or surplus to requirements.
- .2 Unsuitable Materials
 - .1 Very weak and compressible materials under excavated areas to depths as indicated.
 - .2 Frost-susceptible materials under excavated areas to depths as indicated.
 - .3 Materials with the following characteristics will be considered as frost-susceptible
 - .1 Fine-grained soils with plasticity index less than 10 when tested to ASTM D4318-95, and gradation within limits specified when tested to ASTM D422-63 (1990) and ASTM C136-92. Sieve sizes to CAN/CGSB-8.2-M88

<u>Sieve Designation</u>	<u>% Passing</u>
2.00mm	100
0.10mm	45-100
0.02mm	10-80
0.0005mm	0-45

- .2 Coarse-grained soils containing more than 20% by mass passing CGSB 80µm sieve.
- .3 Granular backfill: excavated material which is not unsuitable as defined above, with rocks removed.
- .4 Granular bedding: for Sandspit Airport this shall be the same as granular backfill.

1.3 PROTECTION OF EXISTING FEATURES

- .1 Prior to commencing excavation work, verify existing drawings and contract drawings. Obtain approval from Airport Manager and Departmental Representative. Notify Manager of Airside Operations or Departmental Representative to establish location and state of use of buried utilities. Contractor to investigate and clearly mark such locations to prevent disturbance during work.
- .2 Review all existing record drawings available on site for the existence of underground services in the area of proposed excavations. The record drawings will be deemed as "supplementary" drawings.
- .3 Confirm locations of buried utilities by using readily available detection devices.
- .4 Maintain and protect from damage, water, sewer, gas, electric, telephone, and other utilities and structures encountered.
- .5 Any existing cables or utilities damaged by the Contractor during the execution of his work shall be repaired to the satisfaction of the Departmental Representative at the Contractor's expense.
- .6 Record location of maintained, re-routed, and abandoned underground lines.
- .7 Protect open excavation against flooding and damage from surface water run-off.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 19.

Part 2 Products

2.1 MATERIALS

- .1 Type 1 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 C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1 and CAN/CGSB-8.2.
 - .3 Table

Sieve Designation	% Passing Type 1
19 mm	100
12.5 mm	75-100
9.5 mm	50-100
4.75 mm	30-70
2.00 mm	20-45
0.425 mm	10-25
0.180 mm	-
0.075 mm	3-8

- .2 Type 2 Fill: Granular backfill.
- .3 Sand as indicated on the drawings.

Part 3 Execution

3.1 SITE PREPARATION

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

3.2 STOCKPILING

- .1 Stockpile granular materials in areas designated by Departmental Representative. Stockpile granular materials in a manner to prevent segregation. Stockpiled materials must be contained to prevent foreign objects or debris on the airside. Contractor must clean up any contamination of the operating surfaces as soon as possible and in no case less than 1/2 hour prior to surface being used by aircraft. Unless otherwise directed, Contractor will be billed for all clean-up carried out by the Departmental Representative as a direct result of the Contractor's activities.
- .2 Protect granular materials from contamination.

3.3 DEWATERING AND HEAVE PREVENTION

- .1 Keep excavations free of water while work is in progress.
- .2 Protect open excavations against flooding and damage due to surface run-off.
- .3 Dispose of water in a manner not detrimental to public and private property, or any portion of work completed or under construction.

3.4 EXCAVATION

- .1 Excavate to lines, grades, elevations, and dimensions indicated in Contract Documents or as directed by the Departmental Representative.
- .2 Dispose of surplus and unsuitable excavated material off site or as directed by the Departmental Representative.
- .3 Do not obstruct flow of surface drainage or natural watercourses.
- .4 Earth bottom of excavations to be undisturbed soil, level, free from loose soil or organic matter.
- .5 Where required due to removal of unsuitable material or unauthorized excavation, bring the bottom of excavation to design grade with granular backfill.

- .6 Hand trim, make firm, and remove loose material and debris from excavations. Compact bottom of excavation to density at least equal to undisturbed soil.
- .7 Hand-excavate adjacent existing cables and ducts, especially at runway and taxiway crossings.
- .8 Cover excavations left more than one night with plywood held down with sandbags.

3.5 BACKFILLING

- .1 Do not proceed with backfilling operations until Departmental Representative has inspected and approved installations.
- .2 Place and compact granular bedding to dimensions shown in Contract Documents.
- .3 Areas to be backfilled to be free from debris, snow, ice, water, and frozen ground.
- .4 Place granular backfill in uniform layers to grades indicated.
- .5 Compact, using approved mechanical tamping devices or by hand-tamping, to achieve compaction.

3.6 COMPACTION

- .1 Compact each layer of backfill material to 100% maximum density to ASTM D689.
- .2 Use compaction equipment suitable for conditions encountered.
- .3 Contractor to provide documentation and pay for independent testing of compaction of backfill to indicated maximum density.

3.7 RESTORATION

- .1 Replace topsoil as directed by Departmental Representative.
- .2 Reinstate ground to condition and elevation which existed before excavation.
- .3 Clean and reinstate areas affected by work as directed by Departmental Representative.
- .4 Seed.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CSA C22.2 No. 211.1, Rigid Types EBI and DB2/ES2 PVC Conduit.
 - .2 CSA C22.2 No. 211.3, Reinforced Thermosetting Resin Conduit (RTRC) and Fittings (Bi-national standard, with UL 1684).

Part 2 Products

2.1 PVC DUCTS AND FITTINGS

- .1 Rigid PVC duct: to CSA C22.2 No. 211.1, Type DB2/ES2, with fabricated fittings, for direct burial, Trade size 5 or 6. Nominal length: 3 m plus or minus 12 mm.
- .2 Rigid PVC split ducts.
- .3 Rigid PVC bends, couplings, reducers, bell end fittings, plugs, caps, adaptors same product material as duct, to make complete installation.
- .4 Rigid PVC 90 degrees and 45 degrees bends.
- .5 Rigid PVC 5 degrees angle couplings.
- .6 Expansion joints as required.

2.2 SOLVENT WELD COMPOUND

- .1 Solvent cement for PVC duct joints.

2.3 FIBREGLASS DUCTS

- .1 Fibreglass reinforced thermoset duct: to CSA C22.2 No. 211.3, Trade size 5 or 6, watertight type.
- .2 Couplings, reducers, plugs, caps, adaptors, and supports to make complete installation.
- .3 Expansion joints as required.

2.4 PLASTIC POLYETHYLENE PIPE

- .1 Rigid plastic polyethylene pipe with approved couplings and fittings required to make complete installation.

2.5 CABLE PULLING EQUIPMENT

- .1 6 mm stranded nylon pull rope tensile strength 5 kN.

2.6 MARKERS

- .1 Concrete type cable markers: as indicated, with words: "Cable", "Joint" or "Conduit" impressed in top surface, with arrows to indicate change in direction of duct runs.
- .2 Cedar post type markers: 89 x 89mm square, 1.5 m long, pressure treated with clear, copper naphthenate or 5% pentachlorophenol solution, water repellent preservative, with nameplate fastened near post top, on side facing duct.
 - .1 Nameplate: aluminum anodized 89 x 125 mm, 1.5mm thick mounted on cedar post with mylar label 0.125 mm thick with words "Cable" "Joint" or "Conduit" with arrows to indicate change in direction.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

- .1 Install duct in accordance with manufacturer's instructions.
- .2 Clean inside of ducts before laying.
- .3 Ensure full, even support every 1.5 m throughout duct length.
- .4 Slope ducts with 1 to 400 minimum slope.
- .5 During construction, cap ends of ducts to prevent entrance of foreign materials.
- .6 Pull through each duct steel mandrel not less than 300 mm long and of diameter 6 mm less than internal diameter of duct, followed by stiff bristle brush to remove sand, earth and other foreign matter.
- .7 Pull stiff bristle brush through each duct immediately before pulling-in cables.
- .8 In each duct install pull rope continuous throughout each duct run with 3m spare rope at each end.
- .9 Install markers as required.

END OF SECTION

APPENDICES

- Appendix A PSPC – Hazardous Building Materials Assessment, RCMP Buildings – E Division, E0547 RCMP Hangar, #1 Coast Guard Road, Seal Cove/Prince Rupert BC
- Appendix B PSPC Preliminary Hazard Assessment Form

APPENDIX A

**PSPC – HAZARDOUS BUILDING MATERIALS ASSESSMENT, RCMP BUILDINGS –
E DIVISION, E0547 RCMP HANGAR, #1 COAST GUARD ROAD, SEAL
COVE/PRINCE RUPERT BC**

Public Services and Procurement Canada

HAZARDOUS BUILDING MATERIAL ASSESSMENT

RCMP BUILDINGS – E DIVISION

E0547 RCMP Hangar

#1 Coast Guard Road

Seal Cove/Prince Rupert, BC

PSPC Project # R.112077.001

August 24, 2020

Arcadis Project No.: 30053059

HAZARDOUS BUILDING MATERIAL ASSESSMENT

Authored by:



Janine Galandy, ASCT, Dipl T (Env)
Field Technologist

Reviewed by:



Jerry Botti, ASCT, Dipl T (Env Chem)
Senior Project Manager

Prepared for:

Ashley Rabey, Environmental Services
Public Services and Procurement Canada
Suite 401, 1230 Government Street
Victoria, BC, V8W 3X4

Prepared by:

Arcadis Canada Inc.
1080 Mainland Street
Suite 308
Vancouver, BC, V6B 2T4
Tel 604 706 4785

Our Ref. 30053059

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Appendix A: Site Photographs

Appendix B: Laboratory Certificates of Analysis

Appendix C: Floor Plans

Appendix D: Regulations

Appendix E: Classification, Condition and Accessibility

ACRONYMS AND ABBREVIATIONS

ACM	Asbestos-Containing Materials
Arcadis	Arcadis Canada Inc.
CLC	Canada Labour Code
COHSR	Canada Occupational Health and Safety Regulations
HPP	Hazard Prevention Program
LCB	Lead-Containing Paints
NIOSH	National Institute for Occupational Safety and Health
NJC	National Joint Council
OHS	Occupational Health and Safety
PCBs	Polychlorinated Biphenyls
PLM	Polarized Light Microscopy
PSPC	Public Services and Procurement Canada
RCMP	Royal Canadian Mounted Police
TEM	Transmission Electron Microscopy
USEPA	United States Environmental Protection Agency

EXECUTIVE SUMMARY

Arcadis Canada Inc. (Arcadis) was retained by Public Services and Procurement Canada (PSPC, Client) to conduct a hazardous building material assessment of Building E0547, RCMP Hangar located at #1 Coast Guard Road, Seal Cover/Prince Rupert, BC.

The project consisted of a limited pre-construction assessment based on the renovation scope. The objective of the pre-construction assessment was to identify hazardous building materials in preparation for building renovation. The renovation scope was limited to the part of the building, which consisted of new generator installation with electrical tie in to the existing building as outlined in the drawings titled Prince Rupert Hanger Generator Upgrade, E001-E003, dated May 12, 2020, prepared by WSP Global Inc.

Arcadis performed the assessment on August 5, 2020. The assessment was conducted by Janine Galandy, Field Technologist of Arcadis.

The hazardous building materials considered during this assessment included the following:

- Asbestos-containing materials (ACMs)
- Lead, including lead-containing paints (LCPs)
- Polychlorinated biphenyls (PCBs) in electrical equipment
- Suspect visible mould
- Mercury materials/products/equipment
- Ozone-depleting substances (ODS) in heating, ventilation, and air conditioning (HVAC) equipment or fixed fire suppression systems
- Silica in building materials

Summary of Findings

Asbestos: No asbestos was detected in the samples collected during this assessment.

Lead: Lead is confirmed present in the following paints and or surface coatings:

Color (substrate)	Location(s)	Total Quantity	Condition	Concentration (ppm)
Grey paint on drywall	Workshop	Throughout Workshop and Washroom	Good	700

Polychlorinated Biphenyls (PCBs): PCBs were not observed in the assessed area.

Suspect Visible Mould: Suspect visible mould growth or moisture impacted building materials were not observed in the assessed area.

Mercury: Mercury was not observed in the work area.

Ozone Depleting Substances (ODS): ODS were not observed in the assessed area.

Silica: Crystalline silica is a presumed component of the following materials observed in the assessed area:

- poured or pre-cast concrete
- masonry and mortar

- cement board
- asphalt pavement
- drywall

Recommendations

The following is a summary of significant recommendations; refer to the body of the report for detailed recommendations.

1. Prepare plans and performance specifications for hazardous material removal required for the planned work. The specifications should include the scope of work, personal protective equipment, respiratory protection, and disposal of waste materials.
2. Provide this report and the detailed plans and specifications to the contractor prior to bidding or commencing work.
3. Follow appropriate safe work procedures when handling lead, and silica.
4. Retain a qualified consultant to specify, inspect and verify the successful removal of hazardous materials.

Findings of this report are subject to our standard Limitations, as outlined in Section 7.

This Executive Summary is subject to the same standard limitations as contained in the report and must be read in conjunction with the entire report.

1 INTRODUCTION

1.1 Purpose

Arcadis Canada Inc. (Arcadis) was retained by Public Services and Procurement Canada (PSPC, Client) to conduct a hazardous building material assessment of Building E0547, RCMP Hangar located at #1 Coast Guard Road, Seal Cover/Prince Rupert, BC.

The project consisted of a limited pre-construction assessment based on the renovation scope. The objective of the pre-construction assessment was to identify hazardous building materials in preparation for building renovation. The renovation scope was limited to the part of the building, which consisted of new generator installation with electrical tie in to the existing building as outlined in the drawings titled Prince Rupert Hanger Generator Upgrade, E001-E003, dated May 12, 2020, prepared by WSP Global Inc.

Arcadis performed the assessment on August 5, 2020. 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 Workplan dated June 5, 2020, identifies the requirement to conduct a hazardous building material assessment. Specifically, the scope of work included:

- Review of previous reports, construction specifications and drawings and identify any gaps related to hazardous building materials.
- Development of sampling strategy to address the identified gaps.
- Collect and submit representative suspect asbestos material and lead paint chip samples for analysis.
- Collect and submit representative samples of caulking for PCBs where impacted by the proposed renovations.
- Submit samples to accredited laboratories for analysis.
- Evaluation and interpretation of field findings and sample analytical results to develop conclusions and recommendations pertaining to hazardous building materials identified

For the purpose of this assessment, hazardous building materials re defined as follows:

- Asbestos-containing materials (ACMs)
- Lead, including lead-containing paints (LCPs)
- Polychlorinated biphenyls (PCBs) in electrical equipment
- Suspect visible mould
- Mercury materials/products/equipment
- Ozone-depleting substances (ODSs) in heating, ventilation, and air conditioning (HVAC) equipment or fixed fire suppression systems

- Silica in building materials

A general description of the building included in this assessment is provided in the table below:

Table 1. Building Description

Building Number (BU)	Building Name	Address	Total Inside Gross (m ²)	Year Constructed	Building Description
E0547	RCMP Hangar	#1 Coast Guard Road, Seal Cover/Prince Rupert, BC	580	1968 (presumed)	One storey building with a mezzanine. Metal frame and concrete foundation. Metal and torch on bitumen roof, and metal siding. Interior finishes include drywall, wood, and acoustic ceiling tile, concrete, and vinyl sheet flooring, and carpet. Heating is supplied by furnace forced air system.

2 BACKGROUND INFORMATION

Arcadis was provided and instructed to rely on information presented in the following reports:

- Asbestos and Limited Lead Paint Assessment, Prince Rupert BC RCMP Detachment (100 6th Avenue West) and Hangar (50547 Seal Cove), dated April 12, 2019, prepared by Stantec Consulting Ltd. (Stantec Report)

2.1 Exclusions

The assessment was restricted to accessible locations of the building. 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 SURVEY METHODOLOGY

Sampling activities were conducted in accordance with Arcadis' Standard Operation Procedures which take into account current federal and provincial regulations pertaining to such work (i.e., sampling procedures, required number of samples and laboratory analytical procedures). Regulations are presented in Appendix D.

Representative bulk samples were collected of accessible suspect, PCB, lead, and asbestos in sufficient quantities for laboratory analysis. Samples were sealed in polyethylene zip-lock bags labeled with the sample number, suspect material description, and sample location. As part of sampling procedures, sampling tools were cleaned between sample collection events to avoid the potential for cross-contamination of samples.

All sample bags were compiled in order and placed into a single container accompanied with a chain of custody form outlining the project information, date, building location, number of samples, and sample description. Samples were submitted to the analytical laboratory in a sealed container via courier.

3.1 Asbestos-Containing Materials

A separate set of samples was collected of each type of homogenous material suspected to contain asbestos. A homogenous material is defined by the US EPA as material that is uniform in texture and appearance, was installed at one time, and is unlikely to consist of more than one type or formulation of material. The homogeneous materials are determined by visual examination, available information on the phases of the construction and prior renovations.

Bulk sampling protocols followed the ASTM E2356 Standard, which indicates requirements for the number of samples to collect for each homogeneous material. The table below provides an outline of the minimum number of samples to be collected from the ASTM E2356 Standard.

Table 2. Bulk Material Sample Quantities

Type of Material	Size of Area of Homogeneous Material	Minimum Number of Samples Collected
Any homogeneous material, including but not limited to fireproofing, drywall joint compound, ceiling tile stucco, acoustical and stipple finishes, and visually similar floor tiles	Less than 90 m ² (<1,000 ft ²)	3
	90 m ² or more, but less than 450 m ² (1,000-5,000 ft ²)	5
	450 m ² or more (>5,000 ft ²)	7

In some cases, manufactured products such as asbestos cement pipe were visually identified without sample confirmation.

Flooring mastic/adhesive are only sampled and analyzed if present on the underside of flooring samples (vinyl floor tile and vinyl sheet flooring) in sufficient quantity for laboratory analysis.

Attempts to distinguish and delineate asbestos-containing drywall compound from new non-asbestos drywall compound is often unachievable. Arcadis collected drywall joint compound samples from exterior walls, columns or other locations which are unlikely to have been renovated in an attempt to determine the presence of asbestos in the original drywall compound.

Arcadis submitted the bulk samples to a NVLAP accredited laboratory for analysis. The analysis is performed in accordance with Test Method EPA/600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials, July 1993.

EPA Method 600 states that materials characterized by interfering binder/matrix or low asbestos content may require additional gravimetric reduction sample treatment beyond routine polarized light microscopy (PLM) analysis (e.g. dissolution with hydrochloric acid, treatment with organic solvents or ashing in a muffle furnace or low temperature plasma asher to remove unwanted components).

Arcadis submitted one sample of each sample set (3) of vinyl floor tiles be analyzed by transmission electron microscopy (TEM) if the first two samples are reported negative by PLM.

The asbestos analysis was completed using a stop positive approach. Only one result of greater than the regulated criteria is required to determine that a material is asbestos-containing, but all samples must be

analyzed to conclusively determine that a material is non-asbestos. The laboratory stopped analyzing samples from a homogeneous material once greater than the criteria was detected in any of the samples of that material. All samples of a homogeneous material were analyzed if no asbestos was detected. Where building materials are described in this report as non-asbestos, or described as containing no asbestos, this is subject to the limitations of the analytical method used and should be understood to mean no asbestos was detected.

The classification, condition, and accessibility were assessed for the materials which could contain asbestos. To determine these factors, Arcadis followed the methodology outlined in the ASTM E356 Standard. The Standard provides definitions and criteria for the assessment of ACM. The classification, conditions, and accessibility information are provided in Appendix E.

Bulk samples of materials which could contain asbestos were collected and submitted to EMSL Canada Inc. (EMSL) for analysis of asbestos content. Asbestos-containing materials are defined as 0.5% or greater, or any amount if vermiculite.

3.2 Lead

Arcadis collected samples of distinctive paint finishes and surface coatings present in more than a limited application, where removal of the paint is possible. Arcadis collects samples by scraping the painted finish to include base and covering applications. Although the surfaces where samples were collected may be covered with more than one coat of paint, the paint samples are described by the surface (visible) colour only. As analytical results are referenced to the surface paint colour only, the lead content of all painted surfaces similar to that represented by the surface paint colour were presumed to be the same, regardless of differing sub surface paints, if any.

The 2017 WorkSafeBC publication *Safe Work Practices for Handling Lead* (Lead Guideline) indicates the following:

Unlike for asbestos-containing material, WorkSafeBC does not numerically define what would be considered a lead-containing paint or coating. All suspected paints or coatings should be tested for lead because, depending on the nature of the work, even a small amount could pose a risk to workers. In order to determine which controls and personal protective equipment would be required for a particular job, a qualified person must consider this information as part of the risk assessment.

- Improper removal of lead paint containing 600 mg/kg lead results in airborne lead concentrations that exceed half of the exposure limit
 - Exposure limit indicated in both the COHSR and BC Reg. 296/97 is 0.05 mg/m³
 - Potential for exposure exceeding half of the occupational exposure limit would be the trigger for implementation of an exposure control plan.
- Lead concentrations as low as 90 mg/kg may present a risk to pregnant women and children
 - Any risk assessment should include for the presence of high risk individuals within the workplace

When reviewing the above, "high risk" individuals are not expected to be present in the workplace associated with this building during building material alteration activities (i.e., demolition) that would create significant disturbance to paint with such individuals present. As such, paints containing 600 ppm lead or

more will be considered “lead-containing” for the purpose of this report, such that appropriate risk assessments can be completed for demolition planning. However, information regarding the lead content of all paints tested is provided herein, for reference and risk assessment should the consideration of high risk individuals be necessary, based on the requirements of a particular situation.

Although a concentration of 600 ppm lead has been used to define paint coatings as LCPs, it should be noted that this is related to painted surfaces and the determination of appropriate provisions to protect occupants and employees from exposure to elevated concentrations of lead during typical operations and maintenance or simple renovation. This does not include painted metal surfaces that are to be welded, burned or torch-cut.

Using an arc welder or oxyacetylene torch on steel that is coated with lead-containing paint can create hazardous lead fumes and is prohibited by section 12.115 of BC Reg. 296/97.

Regulatory excerpt: **12.115 Coatings on metals**

A coating on metal which could emit harmful contaminants (such as lead, chromium, organic materials, or toxic combustion products) must be removed from the base metal, whenever practicable, before welding or cutting begins.

In addition, the following information is provided in the Lead Guideline:

- Welding or torch cutting of paints or coatings on metal can create very high concentrations of airborne lead fumes. Torch cutting structural steel, coated with paint containing as little as 130 mg/kg (equivalent to ppm) lead, can release airborne levels of lead as high as 0.8 mg/m³ (16 times the exposure limit).

Given this information and that the analytical detection limit for lead paint analysis is approximately 80– 90 ppm (not significantly different than 130 ppm, which, per above, may release airborne lead levels 16 times the exposure limit), any paint coating on a metal surface to be welded, burned or torch-cut must be removed prior to that action being undertaken, unless a project-specific or tasks-specific risk assessment and safe work practices are developed by a qualified person.

Paint and surface coatings are evaluated for condition. The criteria for condition evaluation pertaining to LCPs described herein are generally based on the United States Housing and Urban Development (HUD) 2012 *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*.

When evaluating the condition of LCPs, an attempt should be made to determine whether the deterioration is due to a moisture problem or some other existing building deficiency. “**Poor**” surfaces are considered to be a hazard and should be corrected. “**Fair**” surfaces should be repaired but are not yet considered to be a hazard; if not repaired, they should be monitored frequently. “**Good/intact**” surfaces should be monitored to ensure that they remain in a nonhazardous condition.

In addition, the presence of paint debris must be considered in evaluating condition. Given the variety of paint uses, there are many applications that can have a tendency for the paint to “wear” from the surface

slowly, over an extended period of time. Conditions where paint has worn from a surface are worth noting for maintenance discussions (i.e., related to re-coating the surface should, for example, the coating provide weather protection), however, in the absence of loose paint chip debris/dust, such conditions would not represent a potential exposure situation related to lead.

The condition evaluation criteria for LCPs are summarized in the table below.

Table 3. Lead-Containing Paint Condition Categories

Type of Building Component ¹	Total Area of Deteriorated Paint on Each Component		
	Good/Intact	Fair ²	Poor ³
Exterior components with large surface areas.	Entire surface is intact.	Less than or equal to 10 square feet	More than 10 square feet
Interior components with large surface areas (walls, ceilings, floors, doors).	Entire surface is intact.	Less than or equal to 2 square feet	More than 2 square feet
Interior and exterior components with small surface areas (windowsills, baseboards, soffits, trim).	Entire surface is intact.	Less than or equal to 10% of the total surface area of the component.	More than 10% of the total surface area of the component
<p>NOTES:</p> <ol style="list-style-type: none"> 1 Building component in this table refers to each individual component or side of building, not the combined surface area of all similar components in a room (e.g., a wall with 1 square foot of deteriorated paint is in "fair" condition, even if the other three walls in a room are intact). 2 Surfaces in "fair" condition should be repaired and/or monitored but are not considered to be "lead-containing paint hazards". 3 Surfaces in "poor" condition are considered to be "lead-containing paint hazards" and should be addressed through abatement or interim controls. 			

Analysis for lead in paints or surface coatings was performed in accordance with EPA Method No. 3050B/Method No. 7420; flame atomic absorption at laboratory accredited by the American Industrial Hygiene Association (AIHA).

3.3 Polychlorinated Biphenyls (PCBs)

The presence or absence of fluorescent lights was documented during the course of our investigation to determine whether there were any of the T12 type. T12 fluorescent lamps, with a diameter of 1.5 inches, utilize transformer type magnetic ballasts, which may contain PCBs. The use of T12s has been discontinued and replaced with new high-efficiency 1-inch T8 lamps (and other types) which use electronic ballasts which do not contain PCBs.

Wet transformers were assessed for PCBs based on the age of the building, a review of maintenance records and examination of labels or nameplates on equipment, where present and accessible. The information is compared to known ban dates of PCBs and Environment Canada publications.

Dry type transformers are presumed to be free of dielectric fluids and hence non-PCB. Caulking's were not sampled for PCB content unless specifically impacted by the proposed renovation scope. The material is considered a PCB solid if PCB content is 50ppm or greater based on the threshold given in SOR/2008-273.

3.4 Suspect Visible Mould

Arcadis identified the presence of any suspect mould and/or moisture-impacted building materials by visual inspection during the course of our site investigation. Suspect mould is typically a coloured, textured substance or discolouration/staining on a building material surface which, based on our experience, may be mould growth. If any mould growth is concealed within wall, ceiling, or floor cavities, it is not addressed in this assessment. No mould sampling or moisture testing is performed unless directed by the Client. The adjective *suspect* is used where the presence of mould has not been confirmed by laboratory analysis.

3.5 Mercury

Building materials/products/equipment (e.g. thermostats, barometers, pressure gauges, light tubes), suspected to contain mercury were identified by visually inspection only. Dismantling of equipment suspected of containing mercury was not performed. Sampling of these materials for laboratory analysis of mercury content was not performed.

Mercury spills or damaged mercury-containing equipment was recorded where observed.

3.6 Ozone Depleting Substances (ODS)

Arcadis determined the potential presence of ODS (chlorofluorocarbons, hydrochlorofluorocarbons, hydrofluorocarbons, halons, etc.) in air conditioning units, chillers, commercial coolers, and fire suppression systems by visual inspection of manufactures' labels or plates, maintenance records, or logbooks, etc.

3.7 Silica

Arcadis identified building materials suspected of containing crystalline silica (e.g. concrete, cement, tile, brick, masonry, mortar) by knowledge of current and historic applications and visual inspection only. Arcadis did not perform sampling of these materials for laboratory analysis of crystalline silica content.

4 RESULTS

4.1 Asbestos

During the course of our assessment, representative bulk samples of material were collected by Arcadis staff. The samples were forwarded to EMSL in Burnaby, BC for asbestos analyses. EMSL holds a current Certificate of Accreditation for Bulk Asbestos Fibre Analysis under the Voluntary Accreditation Program (NVLAP). Bulk sampling was performed in general accordance with the requirements specified in ASTM E2356 Standard, BC Reg. 296/97 and in the WorkSafe BC publication Safe Work Practices for Handling Asbestos.

Results of bulk sample analysis for asbestos content are provided in the table below. Samples that exceed the criteria are highlighted in yellow.

Site Photographs provided in Appendix A. Laboratory certificates of analysis have been provided in Appendix B. Floor plans indicating sample locations and room numbers are provided in Appendix C.

Table 4. Results of Bulk Sample Analysis for Asbestos

Sample Number	Sample Description	Sample Location	Asbestos Type %
S-01A	Drywall Joint Compound	Workshop – Electrical Closet	None Detected
S-01B	Drywall Joint Compound	Workshop – By Exit Door	None Detected
S-01C	Drywall Joint Compound	Workshop – North Wall	None Detected
S-01D	Drywall Joint Compound	Washroom – Under Sink	None Detected
S-02A*	Grey Cement Board	Workshop – Electrical Closet	None Detected
S-02B*	Grey Cement Board	Workshop – Electrical Closet	None Detected
S-03A	Asphalt	Exterior – By Main Entrance	None Detected
S-03B	Asphalt	Exterior – By Main Entrance	None Detected
S-03C	Asphalt	Exterior – By Main Entrance	None Detected
S-04A**	Mortar – Concrete Block	Workshop – Electrical Closet	None Detected
S-04B**	Mortar – Concrete Block	Workshop – Electrical Closet	None Detected
S-04C**	Mortar – Concrete Block	Workshop – Electrical Closet	None Detected

*Two samples collected to meet sample quantity regulation requirements (total of three). As per the Stantec Report, only one sample of this material was collected.

**Arcadis conducted intrusive investigation of this concrete block and no vermiculite was observed.

The Stantec Report indicated all previously identified asbestos materials was abated in the building.

The following building materials were common in the assessed area: however, these materials do not contain asbestos and were not sampled during the survey:

- metal walls, doors, and siding, wood trim, concrete, and fiberglass batt insulation.

Presumed Materials

No materials presumed to contain asbestos are suspected to be present in the way of planned work.

4.2 Lead

During the course of our site investigation, representative bulk samples of predominant paint types were collected by Arcadis staff. The samples were forwarded to EMSL for lead analyses. Results of bulk sample analysis for lead content are provided in the table below. Results that exceed the criteria re highlighted in yellow.

The laboratory report is provided in Appendix B.

Table 5. Results of Analyses of Bulk Samples for Paint for Lead

Sample No.	Sample Location(s)	Sample Description	Lead Content (ppm)
L-01	Electrical Closet	White paint on wood wall	<80
L-02	Workshop	Grey paint on drywall	700
L-03	Office/Waiting Room	Beige paint on drywall	<80
L-04	Workshop	Grey paint on concrete floor	<80

Lead was detected at a level above the definition of lead paint (600 mg/kg) in sample L-02: Grey paint on drywall in workshop. Where one colour of paint is indicated in the sample descriptions in the table above, only one layer of paint was observed. Where multiple colours are indicated in the sample description, multiple layers of paint were observed.

All paint applications were noted to be generally in good condition.

4.3 Polychlorinated Biphenyls (PCBs)

PCBs were not observed in the assessed area.

4.4 Suspect Visible Mould

Suspect visible mould growth or moisture impacted building materials were not observed in the assessed area.

4.5 Mercury

Mercury were not observed in the assessed area.

4.6 Ozone Depleting Substances

ODS were not observed in the assessed area.

4.7 Silica

Crystalline silica is a presumed component of the following materials observed in the assessed area:

- poured or pre-cast concrete
- masonry and mortar
- cement board
- asphalt pavement
- drywall

5 RECOMMENDATIONS

If future building renovation or demolition is required beyond the scope of this project, a detailed intrusive assessment must be conducted. The assessment should include destructive testing (i.e. coring and/or removal of building finishes and components), and sampling of materials not previously tested (i.e. roofing materials, mastics etc.).

All hazardous building materials were reported in good condition. All ACM observed were considered to fall under a recommended Action Level 7 (routine surveillance).

5.1 Building Renovation Work

The following specific recommendations are made regarding renovation involving the hazardous materials identified.

1. Prepare plans and performance specifications for hazardous material removal required for the planned work. The specifications should include the scope of work, personal protective equipment, respiratory protection, and disposal of waste materials.
2. Provide this report and the detailed plans and specifications to the contractor prior to bidding or commencing work.
3. Follow appropriate safe work procedures when handling lead, and silica.
4. Retain a qualified consultant to specify, inspect and verify the successful removal of hazardous materials.

The following general recommendations are made regarding renovation involving the hazardous materials identified.

Lead

Construction disturbance of lead in paint and coatings (or other materials) may result in over-exposure to lead dust or fumes. The need for work procedures, engineering controls and personal protective equipment will need to be assessed on a project-by-project basis and must comply with provincial standards or guidelines. Performing an exposure assessment during work that disturbs lead in paints and coatings may be able to alleviate the use of some of the precautions specified by these standards or guidelines.

For building materials that are to be disposed at a landfill, all lead-based paints and associated substrate (concrete, plaster, wood, etc.) must undergo Toxicity Characteristic Leachate Properties (TCLP) metals testing to determine disposal procedures. Upon the completion of the test, the total concentration of metals in the waste extract must be compared to Schedule 4, Table 1 of the Hazardous Waste Regulation. The disposal of lead-containing paint is regulated under the Federal *Transportation of Dangerous Goods Act* and by the British Columbia Ministry of Environment

Suspect Visible Mould

No mould was observed; if mould is uncovered during the proposed work, use appropriate precautions, and protect workers using methods that comply with provincial guidelines.

Silica

Construction disturbance of silica-containing products may result in excessive exposures to airborne silica, especially if performed indoors and dry. Cutting, grinding, drilling or demolition of materials containing silica

should be completed only with proper respiratory protection and other worker safety precautions that comply with provincial standards or guidelines.

6 REFERENCES

The following legislation and documents were referenced in completing the assessment and this report:

1. Occupational Health and Safety Regulation, B.C. Reg. 296/97, WorkSafe BC.
2. Safe Work Practices for Handling Asbestos, WorkSafe BC, 2017 Edition.
3. Hazardous Waste Regulation, B.C. Reg. 63/88, November 2017, BC Environmental Management Act.
4. Ozone Depleting Substances and Other Halocarbons Regulation, B.C. Reg. 317/2012 Environmental Management Act.
5. PCB Regulations, SOR/2008-273, Canadian Environmental Protection Act.
6. Lead-Containing Paint and Coatings, Preventing Exposure in the Construction Industry, WorkSafe BC, June 2017.
7. Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing, United States Housing and Urban Development (HUD) 2012.
8. Mould Guidelines for the Canadian Construction Industry, Standard Construction Document 2018, Canadian Construction Association.
9. Minister of Justice Canada Labour Code. R.S.C., 1985, c. L-2. March 2020.
10. Minister of Justice. 2018. Canada Occupational Health and Safety Regulations. SOR/86-304, June 2019.
11. Public Services and Procurement Canada Asbestos Management Standard. June 2019.
12. Transport Canada Consolidated Transport of Dangerous Goods Regulations including Amendment SOR/2019-101.
13. ASTM E2356 Standard Practice for Comprehensive Buildings Asbestos Surveys.
14. Royal Canadian Mounted Police, Asbestos Management Plan, Version 2020-01, January 2020.

7 LIMITATIONS

This report, prepared for Public Services and Procurement Canada on behalf of Royal Canadian Mounted Police, does not provide certification or warranty, expressed or implied, that the investigation conducted by Arcadis identified all hazardous materials associated with the subject building. The work undertaken by Arcadis was directed to provide information on the presence of hazardous materials in construction materials based on visual inspection of readily accessible areas of the subject building, and on the results

of laboratory analysis of a limited number of bulk samples. The material in this report reflects Arcadis' best judgment in light of the information available at the time of the investigation, which was performed on August 5, 2020. This report is not intended to be used as a scope of work or technical specification for remediation of hazardous materials. Any use which any other party makes of the report, or reliance on, or decisions to be based on it, is the responsibility of such parties.

APPENDIX A

Site Photographs

Project Photographs

Services and Procurement Canada
Building E0547, RCMP Hangar, #1 Coast Guard Road, Seal Cover/Prince Rupert, BC



Photo: 1
Date:
August 5, 2020
Description:
Exterior East Elevation -
Front of Building



Photo: 2
Date:
August 5, 2020
Description:
Exterior East Elevation –
Side of Building outside
Workshop

Project Photographs

Services and Procurement Canada
Building E0547, RCMP Hangar, #1 Coast Guard Road, Seal Cover/Prince Rupert, BC



Photo: 3

Date:
August 5, 2020

Description:
Electrical Closet in Workshop. No asbestos detected in drywall or cement board (sample S-01A and S-02A). Paint is non-lead based



Photo: 4

Date:
August 5, 2020

Description:
Lead-containing grey paint on non asbestos drywall in Workshop. Sample L-02 (700 ppm).

Project Photographs

Services and Procurement Canada
Building E0547, RCMP Hangar, #1 Coast Guard Road, Seal Cover/Prince Rupert, BC



Photo: 5
Date:
August 5, 2020
Description:
Overview of Hangar area
and Mezzanine



Photo: 6
Date:
August 5, 2020
Description:
Overview of asphalt
pavement. No asbestos
detected in samples
collected (sample S-03A,
B, C)

Project Photographs

Services and Procurement Canada
Building E0547, RCMP Hangar, #1 Coast Guard Road, Seal Cover/Prince Rupert, BC



Photo: 7

Date:
August 5, 2020

Description:
Office/Waiting Room.
Beige paint not considered lead-containing. Drywall is non-asbestos.
Sample L-03.

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 692001877
 Customer ID: 55ACAV42
 Customer PO: 30053059
 Project ID:

Attn: Janine Galandy Phone: (604) 632-9941
 ARCADIS Canada Inc. Fax:
 308-1080 Mainland Street Collected: 8/ 5/2020
 Vancouver, BC V6B 2T4 Received: 8/11/2020
 Analyzed: 8/17/2020

Proj: 30053059 / RCMP HANGAR, #1 COAST GUARD RD, PRINCE RUPERT

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:** 692001877-0001

Sample Description: WORKSHOP - ELECTRICAL CLOSET/DRYWALL JOINT COMPOUND

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	8/17/2020	White	0.0%	100.0%	None Detected	

Client Sample ID: S-01B **Lab Sample ID:** 692001877-0002

Sample Description: WORKSHOP - BY EXIT DOOR/DRYWALL JOINT COMPOUND

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	8/17/2020	White	0.0%	100.0%	None Detected	

Client Sample ID: S-01C **Lab Sample ID:** 692001877-0003

Sample Description: WORKSHOP - NORTH WALL/DRYWALL JOINT COMPOUND

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	8/17/2020	White	0.0%	100.0%	None Detected	

Client Sample ID: S-01D **Lab Sample ID:** 692001877-0004

Sample Description: WASHROOM - UNDER SINK/DRYWALL JOINT COMPOUND

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	8/17/2020	White	0.0%	100.0%	None Detected	

Client Sample ID: S-02A **Lab Sample ID:** 692001877-0005

Sample Description: WORKSHOP - ELECTRICAL CLOSET/GREY CEMENT BOARD

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	8/17/2020	Beige	12.0%	88.0%	None Detected	

Client Sample ID: S-02B **Lab Sample ID:** 692001877-0006

Sample Description: WORKSHOP - ELECTRICAL CLOSET/GREY CEMENT BOARD

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	8/17/2020	Beige	12.0%	88.0%	None Detected	

Client Sample ID: S-03A **Lab Sample ID:** 692001877-0007

Sample Description: EXTERIOR - BY MAIN ENTRANCE/ASPHALT

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	8/17/2020	Gray	0.0%	100.0%	None Detected	



EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: (604) 757-3158 / (604) 757-4731
<http://www.EMSL.com> / vancouverlab@EMSL.com

EMSL Canada Order 692001877
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:** 692001877-0008
Sample Description: EXTERIOR - BY MAIN ENTRANCE/ASPHALT

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	8/17/2020	Gray	0.0%	100.0%	None Detected	

Client Sample ID: S-03C **Lab Sample ID:** 692001877-0009
Sample Description: EXTERIOR - BY MAIN ENTRANCE/ASPHALT

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	8/17/2020	Gray	0.0%	100.0%	None Detected	

Client Sample ID: S-04A **Lab Sample ID:** 692001877-0010
Sample Description: WORKSHOP - ELECTRICAL CLOSET/MORTAR - CONCRETE BLOCK

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	8/17/2020	Gray	0.0%	100.0%	None Detected	

Client Sample ID: S-04B **Lab Sample ID:** 692001877-0011
Sample Description: WORKSHOP - ELECTRICAL CLOSET/MORTAR - CONCRETE BLOCK

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	8/17/2020	Gray	0.0%	100.0%	None Detected	

Client Sample ID: S-04C **Lab Sample ID:** 692001877-0012
Sample Description: WORKSHOP - ELECTRICAL CLOSET/MORTAR - CONCRETE BLOCK

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	8/17/2020	Gray	0.0%	100.0%	None Detected	

Analyst(s):
Margaret Lee PLM (12)

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



EMSL Canada Inc.

2333 18th Avenue NE, Unit 48, Calgary, AB T2E 8T6
Phone/Fax: (403) 879-1149 / (403) 879-1152
<http://www.EMSL.com> CalgaryLab@EMSL.com

EMSL Canada Or 652005745
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: 8/12/2020 08:30 AM
Collected: 8/5/2020

Project: **30053059 / RCMP HANGAR, #1 COAST GUARD RD., PRINCE RUPERT**

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

<i>Client Sample Description</i>	<i>Lab ID</i>	<i>Collected</i>	<i>Analyzed</i>	<i>Weight</i>	<i>Lead Concentration</i>
L-01	652005745-0001	8/5/2020	8/13/2020	0.2510 g	<80 ppm
Site: ELECTRICAL CLOSET - WHITE PAINT ON WOOD WALL					
L-02	652005745-0002	8/5/2020	8/13/2020	0.2611 g	700 ppm
Site: WORKSHOP - GREY PAINT ON DRYWALL					
L-03	652005745-0003	8/5/2020	8/13/2020	0.2617 g	<80 ppm
Site: OFFICE/WAITING ROOM - BEIGE PAINT ON DRYWALL					
L-04	652005745-0004	8/5/2020	8/13/2020	0.2559 g	<80 ppm
Site: WORKSHOP - GREY PAINT ON CONCRETE FLOOR					

Jefferson Salvador, Laboratory Manager
or other approved signatory

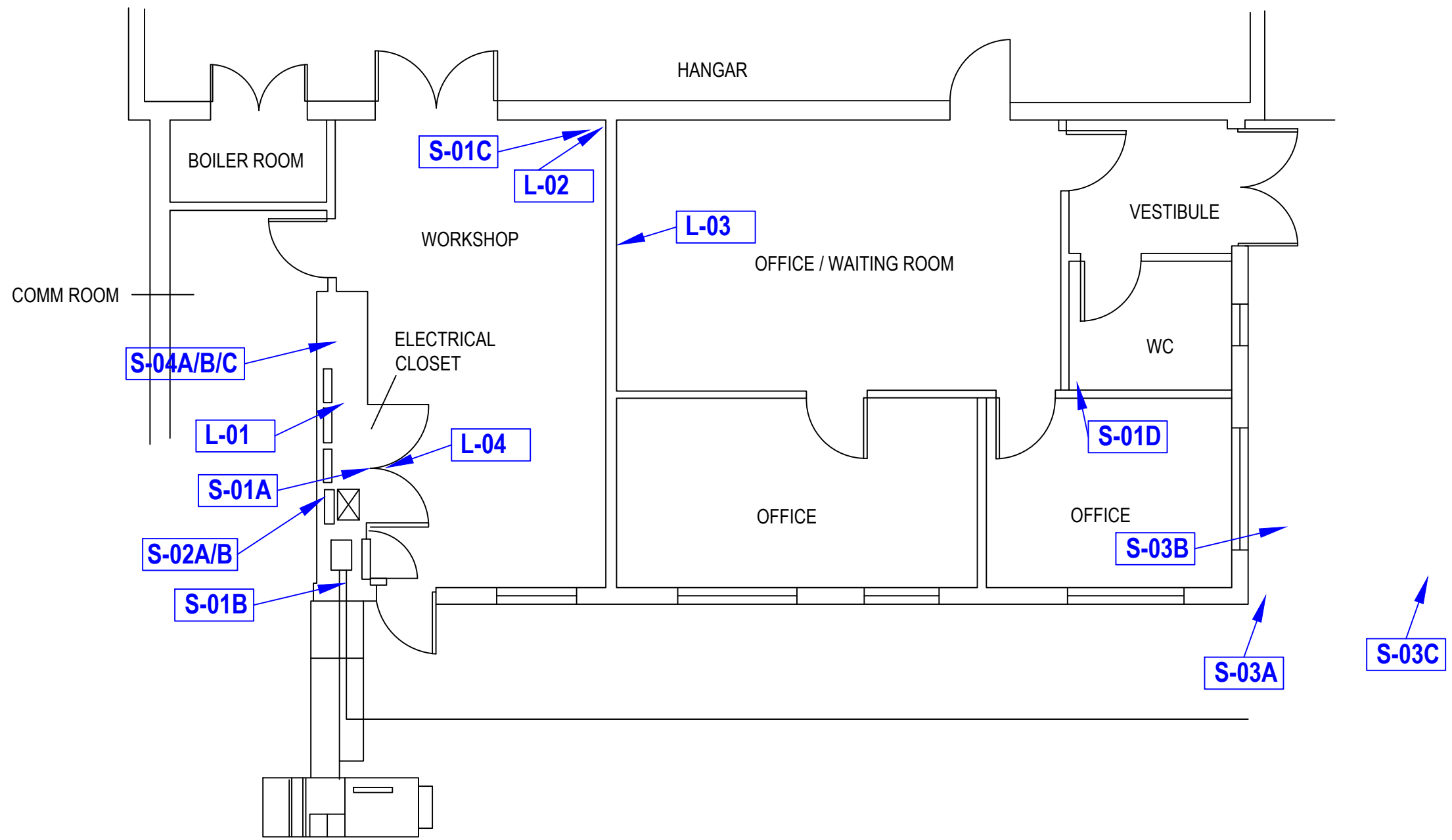
EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted.
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. Calgary, AB CALA Accreditation #A3942

Initial report from 08/18/2020 13:44:17

APPENDIX C

Floor Plans

1. G:\PROJECTS\30053059 - PSPC RCMP Construction 2020\CAD\30053059 - SealCove.dwg



LEGEND

- S-XXX Bulk Asbestos Sample
- L-XXX Bulk Lead Paint Sample

N.T.S

Title: **PRE-RENOVATION HAZARDOUS BUILDING MATERIAL ASSESSMENT**

Project: RCMP HANGAR, #1 COAST GUARD RD., SEAL COVE, PRINCE RUPERT, B.C.

Client: PUBLIC SERVICES AND PROCUREMENT CANADA

Project Number: 30053059	Drawn By: CB	Plot Size: 11X17"	Date: AUGUST 2020
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FIGURE 1

APPENDIX D

Regulations and Health Effects

Asbestos

Occupational Health and Safety (OHS) for federal employees is regulated by the Canada Labour Code (CLC) Part II. The *Canada Occupational Health and Safety Regulations (COHSR), Part X, Hazardous Substances* covers specific requirements related to the management and control of asbestos-containing materials (ACM). The COHSR, Part X, Hazardous Substances, states an employee shall be kept free from exposure to a concentration of airborne chrysotile asbestos in excess of 0.1 fibre/cm³ 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.

Health effects

Undisturbed asbestos within building materials poses no health risks. Asbestos poses a risk when building materials containing asbestos are impacted, or disturbed, thereby releasing the asbestos fibres into the air

Asbestos-related diseases are caused when suspended airborne asbestos fibres are inhaled and the fibres settle into various regions of the lungs and remain for extended periods. Once embedded in the lungs the asbestos fibres cause scarring within the lung tissue, ultimately leading to impaired lung function (asbestosis) and/or various cancers (lung cancer; mesothelioma). These asbestos-related diseases are irreversible and fatal. The risk of lung-related cancers is increased in individuals who smoke.

These asbestos-related diseases most often occur in individuals who have been exposed to high concentrations of airborne asbestos over a long period of time, though mesothelioma has been found in individuals with short-term exposures. Symptoms or the development of these asbestos-related diseases usually occur 10 to 25 years after exposure

Lead

In Canada, the Surface Coating Materials Regulations (SOR/2005-109) under the federal Hazardous Products Act provides a concentration of lead that must not be exceeded in surface coatings that are presently sold in this country. This value has recently been reduced from 600 ppm (2005) to 90 ppm (2010).

With respect to potential lead exposures associated with disturbance to surfaces coated with lead-containing products, the 2017 WorkSafeBC manual titled Lead-Containing Paint and Coatings: Preventing Exposure in the Construction Industry, indicates the following:

- Improper removal of lead paint containing 600 mg/kg lead results in airborne lead concentrations that exceed half of the exposure limit
 - This potential for exposure exceeding half of the occupational exposure limit would be the trigger for implementation of an exposure control plan.
- Lead concentrations as low as 90 mg/kg may present a risk to pregnant women and children
 - Any risk assessment should include for the presence of high risk individuals within the workplace

The disposal of lead-containing paint is regulated under the Federal *Transportation of Dangerous Goods Act* and by the British Columbia Ministry of Environment. All lead-based paints and associated nonmetal substrate (concrete, plaster, wood, etc.) must undergo Toxicity Characteristic Leachate Properties (TCLP) metals testing to determine disposal procedures. Upon the completion of the test, the total concentration of metals in the waste extract must be compared to Schedule 4, Table 1 of the Hazardous Waste Regulation.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of lead waste in British Columbia.

Health Effects

Elemental lead and inorganic lead compounds are absorbed through ingestion or inhalation and can incorporate into the bone marrow, nerve tissue, brain, and kidneys. In children, symptoms of lead poisoning can include headaches, irritability, abdominal pain, vomiting, anemia, weight loss, poor attention span, noticeable learning difficulty, slowed speech development, and hyperactivity. In adults, symptoms of lead poisoning can include pain, numbness or tingling of the extremities, muscular weakness, headache, abdominal pain, memory loss, unsteady gait, pale skin, weight loss, vomiting, irritability, and anemia. Although adults are susceptible to the toxic effects of lead, children are at high risk due to the nature of a child's activities that involve the introduction of non-food items into their bodies.

Excessive airborne lead and surface contamination can be transferred to employees' hands and may result in lead ingestion. Therefore, work practices intended to minimize surface lead concentrations, such as frequent cleaning of work surfaces should be included in an overall lead exposure control plan

PCB

As of September 5, 2008, under subsection 93(1) of the *Canadian Environmental Protection Act*, (CEPA), Federal PCB regulations were published by the Canada Gazette Part II (SOR/2008-273) that imposed specific deadlines for the elimination of all PCBs in concentrations at or above 50 milligrams/kilogram (mg/kg). This regulation required the elimination of all PCBs and PCB-containing materials currently in-use and in storage and limited the period of time PCB materials could be stored before being eliminated. Other aspects of the regulation govern the labelling and reporting of stored PCB materials and equipment as well

as improved practices for the management of PCBs that remain in use (i.e., those with PCB concentrations less than 50 mg/kg) until their eventual elimination.

In British Columbia, PCB equipment becomes PCB wastes as soon as it is removed from service. This is the case even if the intent is to treat, recycle, or reuse the equipment.

When PCB wastes are stored in British Columbia, the full requirements of BC Reg. 63/88 apply to:

- 1.0 kg or more of pure PCB
- 100 L or more of any liquid containing more than 50 ppm of PCB
- 100 kg or more of any material other than a liquid, contaminated with more than 50 ppm of PCB

These amounts are the total of all amounts at a single location owned or controlled by the same person. They include PCB equipment. BC Reg. 63/88 also provides packaging requirements for storage, labeling requirements, waste destruction requirements, and references SOR/2008-273, indicating:

The Federal Transportation of Dangerous Goods Regulation sets out the requirements for the proper transport of PCB waste across provincial boundaries.

In British Columbia, a manifest issued by the Ministry of Environment (or equivalent federal document) must be used for hazardous wastes shipped from sites in British Columbia. A manifest must be used to transport:

- 5 kg or more of PCB solids
- 5 L or more of PCB liquids
- An amount of a PCB solid or PCB liquid containing more than 500 g of PCB within BC
- 500 g or more of solids, liquids, or mixtures of these containing 50 mg/kg of PCB outside of BC

Health effects

PCBs are insoluble in water; however, they readily dissolve in fats and other organic compounds. It is these attributes and fat-solubility that allow PCBs to persist in the environment and bio-accumulate in humans and animals. Exposure to PCBs can affect the immune system, reproductive system, nervous system, and endocrine system. In humans, PCBs are potentially cancer-causing.

Mould

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

Although there are currently no regulations in Canada pertaining specifically to mould in buildings, occupational health and safety regulations typically require employers to take every precaution reasonable in the circumstances for the protection of workers.

The WorkSafeBC Guideline for Part 4 of BC Reg. 296/97 discusses the application of the Regulation to workplaces with mould showing on exposed or hidden surfaces, or where mould may be a factor in complaints regarding indoor air quality. The guideline provides information for investigating indoor air quality complaints with respect to mould contamination, including information on sampling for the

presence of moulds in buildings. Information is also provided on possible health effects and for cleanup personnel involved in the remediation of buildings damaged by water and mould.

Health Effects

There are a number of documented cases of health problems related to exposure to indoor fungi.

Both high-level, short-term exposures and lower-level, long-term exposures can result in illness. The most common symptoms from exposure to mould in indoor environments are runny nose, eye irritation, cough, congestion, aggravation of asthma, headache, flu-like symptoms, fatigue, and skin rash. People with suppressed immune systems may be susceptible to fungal infections as a result of exposure to indoor moulds.

People who are exposed to mould growth on building materials will not necessarily exhibit adverse health effects. However, the mould must still be removed. Humans are at risk from indoor mould when fungal spores, fragments or metabolites are released into the air and inhaled or physically contacted (dermal exposure).

Not everyone experiences allergic reaction; the susceptibility to exposure varies with the individual's genetic predisposition, age, state of health, and concurrent exposures. For these reasons, and because the measurement of exposure is not standardized and biological markers of exposure to fungi are largely unknown, it is not possible to establish "safe" or "unsafe" levels of exposure. However, federal, and provincial policies have been written to minimize mould exposure and the elimination of mould indoors.

Mercury

In Canada, the Surface Coating Materials Regulations (SOR/2005-109) under the federal *Hazardous Products Act* provides a concentration of mercury that must not be exceeded in surface coatings that are presently sold in this country. This value was set at 10 ppm in 2005. However, it is important to note that there is not a direct correlation between the concentration of mercury in a material to the potential occupational exposure if the material is disturbed.

Mercury disposal should be through a scrap dealer (elemental mercury), recycling firm for mercury vapour and returned to the manufacturer for light tubes and fixtures. Disposal of mercury waste is governed by BC Reg. 63/88.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of mercury waste in British Columbia.

Health Effects

Routes of exposure for mercury and mercury compounds include inhalation, ingestion, skin and/or eye contact. Mercury is hazardous if it is inhaled or absorbed through the skin, therefore exposure controls (including both respiratory protection and skin protection) are important to consider.

Elemental (metallic) mercury most often causes health effects through inhalation of its vapour, which can be absorbed through the lungs. This kind of exposure can result when elemental mercury is spilled (or products that contain elemental mercury break) and the mercury is exposed to the air. Vapour concentrations can vary especially in warm or poorly-ventilated indoor spaces where the airborne concentration can exceed the permissible exposure limit (provincially set).

Chronic mercury "poisoning" can be caused by long-term exposure to low airborne concentrations (or low levels) of mercury. Symptoms or effects of mercury exposure include: tremors, emotional changes,

neuromuscular effects, mental changes/disturbances, digestive disturbances, headaches, insomnia, and changes in nervous response.

Silica

Regulations pertaining to silica are provided in BC Reg. 296/97. Included are general provisions (minimizing release; keeping worksite clear of unnecessary accumulations; ensuring methods for decontamination prevent generation of airborne silica), provisions for “restricted areas” (where there is a reasonable chance that the airborne concentration of silica exceeds or may exceed the occupational exposure limit), provisions for use in abrasive blasting, and provisions for health assessments for workers exposed to silica.

Health Effects

Crystalline silica dust particles, which are small enough to be inhaled into the lungs (respirable size), can cause a number of health problems. As with asbestos, silica within building materials poses no threat to human health if left undisturbed.

Exposure to crystalline silica airborne dust may cause scarring of the lungs with coughing and shortness of breath—also known as “silicosis”, a form of disabling, progressive, and sometimes fatal pulmonary fibrosis.

Ozone Depleting Substances (ODS)

ODSs are regulated in British Columbia by the British Columbia *Waste Management Act*—Ozone Depleting Substances and Other Halocarbons Regulation (BC Reg. 387/99 as amended by BC Reg. 317/2012).

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

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

If ODS-containing materials are to be removed and disposed of, all ODSs must be handled, recycled, stored, and/or disposed of in accordance with the requirements of BC Reg. 63/88.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of ODS waste in British Columbia.

Health Effects

Health effects are not typically related to exposure to ODSs directly, but to the consequences of ODS release to the atmosphere, subsequent degradation of the earth’s ozone layer, and implications associated with increased UVB light exposure.

APPENDIX E

Classification, Condition and Accessibility

1.1 Spray Applied Fireproofing, Insulation and Texture Finishes

To evaluate the condition of ACM spray applied as fireproofing, thermal insulation, or texture, decorative or acoustic finishes, the following criteria are applied:

GOOD

Surface of material shows no significant signs of damage, deterioration, or delamination. Up to 1 percent visible damage to surface is allowed within range of **GOOD**. Evaluation of sprayed fireproofing requires the surveyor to be familiar with the irregular surface texture typical of sprayed asbestos products. **GOOD** condition includes un-encapsulated or unpainted fireproofing or texture finishes, where no delamination or damage is observed, and encapsulated fireproofing or texture finishes where the encapsulation has been applied after the damage or fallout occurred.

POOR

Sprayed materials show signs of damage, delamination, or deterioration. More than 1 percent damage to surface of ACM spray.

In observation areas where damage exists in isolated locations, both **GOOD** and **POOR** condition may be reported. The extent or percentage of each condition will be recorded on the survey or re-assessment form.

NOTE: FAIR condition is not utilized in the evaluation of the sprayed fireproofing, sprayed insulation, or texture coat finishes.

The evaluation of ACM spray applied as fireproofing, non-mechanical thermal insulation, or texture, decorative or acoustic finishes which are present above ceilings, may be limited by the number of observations made, and by building components such as ducts or full height walls that obstruct the above ceiling observations. Persons entering the ceiling are advised to be watchful for ACM **DEBRIS** prior to accessing or working above ceilings in areas of buildings with ACM regardless of the reported condition.

1.2 Mechanical Insulation

The evaluation of the condition of mechanical insulation (on boilers, breaching, ductwork, piping, tanks, equipment etc.) utilizes the following criteria:

GOOD

Insulation is completely covered in jacketing and exhibits no evidence of damage or deterioration. No insulation is exposed. Includes conditions where the jacketing has minor surface damage (i.e., scuffs or stains), but the jacketing is not penetrated.

FAIR

Minor penetrating damage to jacketed insulation (cuts, tears, nicks, deterioration, or delamination) or undamaged insulation that has never been jacketed. Insulation is exposed but not showing surface disintegration. The extent of missing insulation ranges should be minor to none.

POOR

Original insulation jacket is missing, damaged, deteriorated, or delaminated. Insulation is exposed and significant areas have been dislodged. Damage cannot be readily repaired.

The evaluation of mechanical insulation may be limited by the number of observations made and building components such as ducts or full height walls that obstruct observations. It is not possible to observe the full length of mechanical insulation from all angles.

1.3 Non-friable and Potentially Friable Materials

Non-friable materials generally have little potential to release airborne fibres, even when damaged by mechanical breakage. However, some non-friable materials, i.e., exterior asbestos cement products, may have deteriorated so that the binder no longer effectively contains the asbestos fibres. In such cases of significantly deteriorated non-friable material, the material should be treated as a friable product.

2. Evaluation of Accessibility

The accessibility of building materials known or suspected of being ACM is rated according to the following criteria:

ACCESS (A)

Areas of the building within reach (from floor level) of all building users. Includes areas such as gymnasiums, workshops, and storage areas where activities of the building users may result in disturbance of ACM not normally within reach from floor level.

ACCESS (B)

Frequently entered maintenance areas within reach of maintenance staff, without the need for a ladder. Includes: frequently entered pipe chases, tunnels and service areas or areas within reach from a fixed ladder or catwalk, e.g. tops of equipment, mezzanines.

ACCESS (C) EXPOSED

Areas of the building above 2.4 metres where use of a ladder is required to reach the ACM. Only refers to ACM that is exposed to view, from the floor or ladder, without the removal or opening of other building components such as ceiling tiles, or service access door or hatch. Does not include infrequently accessed service areas of the building.

ACCESS (C) CONCEALED

Areas of the building which require the removal of a building component, including lay-in ceilings and access panels into solid ceiling systems. Includes rarely entered crawl spaces, attic spaces, etc. Observations will be limited to the extent visible from the access points.

ACCESS (D)

Areas of the building behind inaccessible solid ceiling systems, walls, or mechanical equipment, etc. where demolition of the ceiling, wall, or equipment, etc. is required to reach the ACM. Evaluation of condition and extent of ACM is limited or impossible, depending on the surveyor's ability to visually examine materials in ACCESS D.

3. ACM DEBRIS

3.1 DEBRIS from Friable ACM

The presence of fallen ACM is noted separately from the presumed friable ACM source (sprayed fireproofing, thermal insulation, texture, decorative or acoustic finishes or mechanical insulation) and is referred to as **DEBRIS**.

3.2 DEBRIS from Damaged Non-Friable ACM

The presence of fallen ACM from damaged non-friable ACM is also reported separately from the non-friable ACM source. Only fallen non-friable ACM that has become friable is reported as **DEBRIS**.

The identification of the exact location or presence of **DEBRIS** on the top of ceiling tiles is limited by the number of observations made and the presence of building components such as ducts or full height walls

that obstruct observations. Workers are advised to be watchful for the presence of **DEBRIS** prior to accessing or working in proximity to mechanical insulation or above ceilings in areas of buildings with ACM regardless of the reported presence or absence of **DEBRIS**.

4. Action Matrix and Action Descriptions

The Asbestos Management Plan requires the following responses:

- Immediately clean-up **DEBRIS** that is likely to be disturbed.
- Remove, repair, or enclose friable ACM in **POOR** or **FAIR** condition whose continued deterioration will result in **DEBRIS** that is likely to be disturbed.

The following factors shall be considered in making site-specific recommendations for compliance with the existing applicable regulations or codes and the practical implementation of the Asbestos Management Plan:

1. ACM in **POOR** condition is not routinely repairable. If an abatement action is necessary, removal is the recommended action (enclosure is a viable option in unusual circumstances, e.g. where removal is difficult or costly and the asbestos-containing material can be thoroughly enclosed).
2. Mechanical insulation in **FAIR** condition will be repaired or removed based on the following general recommendations, applied on a case-by-case basis:
 - ACM insulation found in **FAIR** condition in ACCESS (B) or ACCESS (C) EXPOSED areas is to be repaired.
 - ACM mechanical insulation found in **FAIR** condition in ACCESS (B) and ACCESS (C) EXPOSED areas, where future damage to the ACM is likely to occur, is to be removed.
3. ACM in **GOOD** condition present in ACCESS (A) can be managed by surveillance, as long as it is not disturbed by future renovation, maintenance, or demolition. Proactive removal of the ACM in ACCESS (A) will be considered where damage is possible by on-going occupant activity (accidental or intentional).
4. Non-friable or manufactured products are considered in the action matrix as follows:
 - Non-friable and manufactured products reported in **POOR** condition, or friable **DEBRIS** resulting from the deterioration of non-friable ACM, are treated as friable materials and the appropriate action, and depending on accessibility is determined from the action matrix for friable ACM.
 - For non-friable or manufactured products reported in **GOOD** condition, Action 7 (surveillance) is recommended regardless of accessibility.
5. All asbestos-containing material from a particular area is to be removed where small quantities of asbestos are present, and removal will negate the need for the use of an Asbestos Management Program in that area.

The action matrix provided below establishes the recommended asbestos control action. The ACTIONS themselves are described in full following the table.

4.1 Action Matrix Tables

FRIABLE ACM				
ACCESS	CONDITION			DEBRIS
	GOOD	FAIR	POOR	
(A)	ACTION 5/7 ¹	ACTION 5/6 ²	ACTION 3	ACTION 1
(B)	ACTION 7	ACTION 6/5 ³	ACTION 3	ACTION 1
(C) EXPOSED	ACTION 7	ACTION 6	ACTION 4	ACTION 2
(C) CONCEALED	ACTION 7	ACTION 7	ACTION 4	ACTION 2
(D)	ACTION 7	ACTION 7	ACTION 7	ACTION 7

¹ If material in **ACCESS (A)/GOOD** condition is not removed **ACTION 7** is required.

² If material in **ACCESS(A)/FAIR** condition is not removed **ACTION 6** is required.

³ Remove ACM in **ACCESS (B)/FAIR** condition if ACM is likely to be disturbed.

4.2 Action Descriptions

ACTION 1 - Immediate Clean-Up of DEBRIS that is Likely to Be Disturbed

Access that is likely to cause a disturbance of the ACM **DEBRIS** is to be restricted and **clean up ACM DEBRIS is to be done immediately**. Use correct asbestos procedures. This action is required for compliance with regulatory requirements and good practice. The assessor should immediately notify the Asset or Property and Facility Manager, or Regional/Area Asbestos Management Coordinator of this condition.

ACTION 2 - Intermediate risk precautions for Entry into Areas with ACM DEBRIS

At locations where ACM **DEBRIS** can be isolated in lieu of removal or cleaned up, use appropriate means to limit entry to the area. Restrict access to the area to persons using intermediate risk asbestos precautions. The precautions will be required until the ACM **DEBRIS** has been cleaned up, and the source of the **DEBRIS** has been stabilized or removed.

ACTION 3 - ACM Removal Required for Compliance

Remove ACM for compliance with regulatory requirements and good practice. Utilize asbestos procedures appropriate to the scope of the removal work.

ACTION 4 - Access into areas where asbestos-containing material is present and likely to be disturbed by access requires intermediate risk precautions.

Intermediate risk asbestos precautions are to be used when entry or access into an area is likely to disturb the ACM. **ACTION 4** must be used until the ACM is re-moved (Use **ACTION 1** or **2** if **DEBRIS** is present). Intermediate risk or high-risk precautions should be used for removal (depending on extent of removal).

ACTION 5 - Proactive ACM Removal

Removal of ACM in lieu of repair may be considered, even if it is in **GOOD** condition at locations, where ACM is easily accessible, limited in quantity, and removal would be cost-effective.

ACTION 6 - ACM Repair

Repair ACM found in **FAIR** condition, and not likely to be damaged again or disturbed by normal use of the area or room. Upon completion of the re-pair work treat ACM as material in **GOOD** condition and implement **ACTION 7**. If ACM is likely to be damaged or disturbed during normal use of the area or room, **ACTION 5** is to be implemented.

ACTION 7 - Routine Surveillance

Institute routine surveillance of the ACM. Trained workers or contractors must use appropriate asbestos precautions (low, intermediate, or high) during disturbance of the remaining ACM.

Arcadis Canada Inc.

7326 10th Street NE

Suite 320

Vancouver, BC

Tel 604 706 4785

www.arcadis.com

APPENDIX B

PSPC PRELIMINARY HAZARD ASSESSMENT FORM



PRELIMINARY HAZARD ASSESSMENT FORM

Project Number:	R.105637.001
Location:	Prince Rupert Hangar Generator Upgrade, Building E0547, RCMP Hangar #1, Coast Guard, Prince Rupert, B.C..
Date:	2020-12-02
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
	PWGSC, Other Government Departments, and Inmates		General Public or other provincial contractors		
<p>Examples: Chemical, Biological, Natural, Physical, Psychosocial, and Ergonomic</p> <p>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.</p>	Yes	No	Yes	No	<p>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.</p>

Typical Construction Hazards					Comments
Concealed/Buried Services (electrical, gas, water, sewer, etc)	Yes		Yes		
Slip Hazards or Unsound Footing	Yes		Yes		Soft soils
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	



PRELIMINARY HAZARD ASSESSMENT FORM

Heavy overhead lifting operations, mobile cranes etc.		No		No	
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 a 24/7 occupied 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		Soft soils slight slope to land.
Earthquake	Yes		Yes		
Tsunami	Yes		Yes		
Avalanche		No		No	
Forest Fires		No		No	
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		No		No	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)					Reference: Hazardous Building Materials Assessment, Arcadis Dated August 24, 2020
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)					Reference: Hazardous Building Materials Assessment, Arcadis Dated August 24, 2020
Mercury in Thermostats or Switches (See comments)		No		No	Reference: Hazardous Building Materials Assessment, Arcadis Dated August 24, 2020
Application of Chemicals or Pesticides		No		No	
PCB Liquids in Electrical Equipment (See comments)					Reference: Hazardous Building Materials Assessment, Arcadis Dated August 24, 2020
Radioactive Materials in Equipment		No		No	
Other: Silica (See comments)	Yes		Yes		Reference: Hazardous Building Materials Assessment, Arcadis Dated August 24, 2020

Contaminated Sites Hazards					Comments
Hazardous Waste		No		No	
Hydrocarbons		No		No	
Metals		No		No	
Other:					

Security Hazards					Comments
Risk of Assault	Yes		Yes		
Other:					

Other Hazards					Comments



PRELIMINARY HAZARD ASSESSMENT FORM

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?	TBD		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-CONTRACTOR MUST ATTEND A CSC/PSPC SECURITY AND SAFETY ORIENTATION			