


SPECIFICATION DIVISION	SECTION	PAGES
INDEX		
	00 00 10	Table of Contents 2
	00 01 07	Seals Page 1
DIVISION 01 - GENERAL REQUIREMENTS		
	01 11 55	General Instructions 9
	01 14 00	Work Restrictions 4
	01 31 00	Project Management and Coordination 3
	01 31 19	Project Meetings 2
	01 32 17	Construction Progress Schedule 2
	01 33 00	Submittal Procedures 3
	01 35 33	Health and Safety Requirements 10
	01 35 43	Environmental Procedures 3
	01 45 00	Quality Control 1
	01 51 00	Temporary Facilities 2
	01 56 00	Temporary Barriers and Enclosures 1
	01 61 00	Common Product Requirements 3
	01 71 00	Examination and Preparation 1
	01 73 00	Execution Requirements 2
	01 74 11	Cleaning 1
	01 74 21	Construction/Demolition Waste Management 2
	01 77 00	Closeout Procedures 1
	01 78 00	Closeout Submittals 3
	01 79 00	Demonstration and Training 2
DIVISION 02 – EXISTING CONDITIONS		
	02 41 99	Demolition for Minor Works 2
DIVISION 26 - ELECTRICAL		
	26 05 00	Common Work Results – Electrical 12
	26 05 01	Seismic Restraints – Electrical 3
	26 05 10	Firestopping 4
	26 05 12	Demolition Work – Electrical 3
	26 05 20	Wire and Box Connectors (0–1000V) 1
	26 05 21	Wires and Cables (0-1000V) 3
	26 05 28	Grounding – Secondary 2
	26 05 29	Hangers and Supports for Electrical Systems 2
	26 05 31	Splitters, Junction, Pullboxes and Cabinets 2
	26 05 32	Outlet Boxes, Conduit Boxes and Fittings 2
	26 05 34	Conduits, Conduit Fastenings and Fittings 3
	26 28 16.02	Moulded Case Circuit Breakers 2
	26 33 53	Static Uninterruptible Power Supply 15
DIVISION 27 – COMMUNICATIONS		
	27 05 14	Communication Cables Inside Buildings 4
APPENDIX A		
		Hazardous Building Materials Assessment 52

DRAWING NO.	DRAWING TITLE
E0.0	Cover Page
E0.1	Notes and Details
E1.0	Electrical Layouts and Single Line Diagrams
E1.1	Electrical Layouts and Details
E1.2	Proposed Single Line Diagram

END OF SECTION

DISCIPLINE	SEAL
<p>Electrical</p> <p>AES Engineering Ltd.</p>	 <p>A circular red seal for a Professional Engineer in the Province of British Columbia. The seal contains the text: "PROFESSIONAL OF I. A. BARNES # 32870 C. BRITISH COLUMBIA ENGINEER". A blue ink signature is written across the seal. Below the seal, the date "2021-10-06" is printed.</p>

END OF SECTION

1.1 CODES

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

1.2 DESCRIPTION OF WORK

- .1 Work of this Contract comprises installation of a new UPS systems, demolition of the old equipment and coordination with the clients and site users and further identified as:

**RCMP – KELOWNA OCC UPS REPLACEMENT
2611 Norris Road, KELOWNA BC V1X 7M1
Job No. R.108136.001**

- .2 Work to be performed under this Contract includes, but is not limited to, the following items covered further in the Contract documents:
 - .1 Decommissioning of existing UPS 1 and installation of new modular UPS complete with external bypass.
 - .2 Shutdown of existing network and transfer existing critical load to new UPS system.
 - .3 Decommissioning of existing UPS 2, paralleling cabinet, disconnect and associated devices.
 - .4 Coordination to maintain site operations and minimize disruption.
 - .5 Demonstration and training of personnel as directed by the Departmental Representative. Refer to Section 01 79 00 Demonstration and Training.
- .3 "Green" requirements:
 - .1 Use only environmentally responsible green materials/ products with no VOC emissions or minimum VOC emissions of indoor off-gassing contaminants for improved indoor air quality - subject of Departmental Representative's approval of submitted MSDS Product Data.
 - .2 Use materials/products containing highest percentage of recycled and recovered materials practicable - consistent with maintaining cost effective satisfactory levels of competition.
 - .3 Adhere to waste reduction requirement for reuse or recycling of waste materials, thus diverting materials from landfill.
- .4 Perform all work in accordance with National Building Code of Canada (NBC) 2018, WorkSafeBC/Workers' Compensation Board (WCB) Regulations and these Contract Documents. Where there is a conflict between Contract Documents and referenced standards, the most stringent will be applied.

1.3 CONTRACT DOCUMENTS

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

1.4 DIVISION OF SPECIFICATIONS

- .1 The specifications are subdivided in accordance with the current 6-digit National Master Specifications System.
- .2 A division may consist of the work of more than 1 subcontractor. Responsibility for determining which subcontractor provides the labour, material, equipment and services required to complete the work rests solely with the Contractor.
- .3 In the event of discrepancies or conflicts when interpreting the drawings and specifications, the specifications govern.

1.5 HOURS OF WORK

- .1 Restrictive as follows:
 - .1 Site has 24 hours a day, 7 days a week operation. All work to be completed during normal working hours of 0800-1630 hours. Work in all areas to be coordinated with staff to minimize interruption of work and services.
 - .2 Notify Departmental Representative of all after hours work, including weekends and holidays.
 - .3 All work impacting provision of power to the building and its users must be fully coordinated to the benefit of the building occupants. Contractor shall assume that all outages will be during weekends or evenings during low volume hours.

1.6 WORK SCHEDULE

- .1 Do not change approved Schedule without notifying Departmental Representative.
- .2 Interim reviews of work progress based on work schedule will be conducted as decided by Departmental Representative and schedule updated by Contractor in conjunction with and to approval of Departmental Representative.

1.7 TIME TO COMPLETION

- .1 Completion of this project shall be no later than 18 weeks from award of contract.

1.8 COST BREAKDOWN

- .1 Before submitting the first progress claim, submit a breakdown of the Contract lump sum prices in detail as directed by the Departmental Representative and aggregating Contract price.
- .2 Provide a projection of project billing as proposed on a month by month basis accounting for expected delivery of equipment, project phasing and mobilisation.

1.9 CODES, BYLAWS, STANDARDS

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

1.10 DOCUMENTS REQUIRED

- .1 Maintain 1 copy each of the following at the job site:
 - .1 Contract drawings.
 - .2 Contract specifications.
 - .3 Addenda to Contract documents.
 - .4 Copy of approved work schedule.
 - .5 Reviewed/approved shop drawings.
 - .6 Change orders.
 - .7 Other modifications to Contract.
 - .8 Field test reports.
 - .9 Reviewed/approved samples.
 - .10 Manufacturers' installation and application instructions.
 - .11 One set of record drawings and specifications for "as-built" purposes.
 - .12 Canadian Electrical Code 2020 (latest edition).
 - .13 Current construction standards of workmanship listed in technical Sections.
 - .14 Contractor Safety Plan.

1.11 REGULATORY REQUIREMENTS

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

1.12 CONTRACTOR'S USE OF SITE

- .1 Use of site:
 - .1 Shared with users, complete with coordination for execution of work.
 - .2 Assume responsibility for assigned premises for performance of this work.
 - .3 Be responsible for coordination of all work activities on site, including the work of other contractors engaged by the Departmental Representative such as moving contractors and furniture installers.

- .2 Perform work in accordance with Contract documents. Ensure work is carried out in accordance with indicated phasing.
- .3 Do not unreasonably encumber site with material or equipment.
- .4 A 1-hour site safety orientation to be completed by all workers. Personnel that do not successfully complete the required training are not permitted to enter the site to perform work.
- .5 Contractor to provide their own temporary washroom facilities on-site for the duration of the project. The building washroom facilities will not be usable by the contractor or any sub-contractors for the project.
- .6 Limit use of premises for Work, for storage and for access to allow for continuous occupancy of building.
- .7 Co-ordinate use of premises under direction of the Departmental Representative.
- .8 Assume full responsibility for protection and safekeeping of Products under this Contract.
- .9 Do not use any other part of property unless approved in writing by the Departmental Representative.
- .10 Store materials and equipment only where directed by the Departmental Representative. Obtain and pay for use of additional storage and work areas if required.
- .11 Ensure access to assigned lay down or construction areas is maintained for fire and emergency access at all times.
- .12 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.
- .13 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work.
- .14 Condition of existing work at completion of operations to be equal to or better than that which existed before new work started.
- .15 Provide necessary protection and hoarding to prevent unauthorized entry into areas of work at all times by staff and public.
- .16 Inform the Departmental Representative 3 working days prior to performing work inside the building. Entry into areas of work will be by authorized personnel only and must be delineated during execution of work.
- .17 Contractor to perform work during normal workday hours from 0800-1630. The Departmental Representative will provide and coordinate site access requirements with the Contractor at time of award.
- .18 Adjacent portions of building and property will remain in use during Work.
- .19 Co-operate with the Departmental Representative by scheduling operations to minimize conflict and to facilitate continuous use of building. Do not impede, restrict or obstruct use of building or adjacent portions of property.
- .20 Do work in a manner that will minimize creation of noise that would disturb day-to-day operation of building and adjacent property.
- .21 Locate stationary noise generating equipment as far away as practical from occupied parts of building, or where directed by the Departmental Representative.

- .22 Co-ordinate with the Departmental Representative for necessary shutdown of services affecting occupied parts of building and adjacent property where serviced from building. Provide 72 hours of notice prior to shutdown. Minimize occurrences and durations of shutdowns.
- .23 Co-ordinate with the Departmental Representative to ensure that construction activities do not compromise security of building and site.
- .24 Ensure that construction activities do not compromise other active systems within the building and site.

1.13 EXAMINATION

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

1.14 LOCATION OF EQUIPMENT AND FIXTURES

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

1.15 CUTTING AND PATCHING

- .1 Cut existing surfaces as required to accommodate new work.
- .2 Remove items so shown or specified.
- .3 Do not cut, bore, or sleeve load-bearing members.
- .4 Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly.
- .5 Patch and make good surfaces cut, damaged or disturbed, to Departmental Representative's approval. Match existing material, colour, finish and texture.
- .6 Making good is defined as matching construction and finishing materials and the adjacent surfaces such that there is no visible difference between existing and new surfaces when viewed from 1.5 metres in ambient light, and includes painting the whole surface to the next change in plane.
- .7 Provide temporary dust screens, barriers, warning signs in locations where renovation and alteration work is adjacent to areas used by public or government staff.
- .8 Protect adjacent surfaces. Make good or replace damaged surfaces and equipment to satisfaction of the Departmental Representative, at no cost to Contract.
- .9 Provide barricade warning tape to mark perimeter of work area, as directed by the Departmental Representative.

1.16 SETTING OUT OF WORK

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

1.17 ACCEPTANCE OF SUBSTRATES

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

1.18 QUALITY OF WORK

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

1.19 WORKS COORDINATION

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

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

1.20 APPROVAL OF SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

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

1.21 SECURITY CLEARANCES

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

1.22 PROJECT MEETINGS

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

1.23 TESTING AND INSPECTIONS

- .1 The Contractor will appoint and pay for the services of the factory technical representative for the following:
 - .1 Inspection and testing of the system software.
- .2 Contractor shall furnish labour and facilities to:
 - .1 Notify Departmental Representative in advance of planned testing.
- .3 Provide Departmental Representative with 2 copies of testing and commissioning reports as soon as they are available.

1.24 AS-BUILT DOCUMENTS

- .1 The Departmental Representative will provide 2 sets of drawings, 2 sets of specifications, and 2 copies of the original AutoCAD files for "as-built" purposes.
- .2 As work progresses, maintain accurate records to show all deviations from the Contract documents. Note on as-built specifications, drawings and shop drawings as changes occur.

1.25 CLEANING

- .1 Daily conduct cleaning and disposal operations. Comply with local ordinances and anti-pollution laws.
- .2 Ensure cleanup of the work areas each day after completion of work.
- .3 Clean interior building areas when ready to receive finish painting and continue cleaning on an as-needed basis until building is sufficiently completed or ready for occupancy.
- .4 In preparation for interim and final inspections:
 - .1 Examine all sight-exposed interior and exterior surfaced and concealed spaces.
 - .2 Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from sight-exposed interior and exterior finished surfaces, including glass and other polished surfaces.
- .5 Use cleaning materials and methods in accordance with instructions of the manufacturer of the surface to be cleaned.

1.26 DUST CONTROL

- .1 Provide temporary dust tight screens or partitions to localize dust generating activities, and for protection of workers, finished areas of work and public.
- .2 Protect furnishings within work area with polyethylene film during construction. Remove film during non- construction hours and leave premises in clean, unencumbered and safe manner for normal daytime function.
- .3 Maintain and relocate protection until such work is complete.

1.27 ENVIRONMENTAL PROTECTION

- .1 Prevent extraneous materials from contaminating air beyond construction area, by providing temporary enclosures during work.
- .2 Do not dispose of waste or volatile materials into water courses, storm or sanitary sewers.
- .3 Ensure proper disposal procedures in accordance with all applicable territorial regulations.

1.28 MAINTENANCE MATERIALS, SPECIAL TOOLS AND SPARE PARTS

- .1 Specific requirements for maintenance materials, tools and spare parts are specified in individual technical sections of Divisions 02 to 48, where required.

1.29 ADDITIONAL DRAWINGS

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

- .2 Upon request, Departmental Representative may furnish up to a maximum of 3 sets of Contract documents for use by the Contractor at no additional cost. Should more than 3 sets of documents be required the Departmental Representative will provide them at additional cost.

1.30 BUILDING SMOKING ENVIRONMENT

- .1 Smoking on the site is not permitted.

1.31 SYSTEM OF MEASUREMENT

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

1.32 FAMILIARIZATION WITH SITE

- .1 Before submitting tender, it is strongly recommended, however not mandatory, that the contractor visit the site and become familiar with all **conditions likely to affect the cost of the work**.

1.33 SUBMISSION OF TENDER

- .1 Submission of a tender is deemed to be confirmation of the fact that the Tenderer has analyzed the Contract documents, and is fully conversant with all conditions. Tender to be submitted in a lump sum contract.

1.34 CONSTRUCTION MONITORING

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

1.35 COVID-19

- .1 The Contractor shall follow COVID-19 procedures in accordance with the Canadian Construction Associations COVID-19 standardized protocols. The Contractor shall address PPE and hygiene issues as per WorkSafeBC regulations and provincial guidelines. Cost associated and required with COVID-19 protocols shall be included in the contract price.

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 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 to the facility.
 - .1 Any power shut-down (building-wide or partial) shall be confirmed and coordinated with Departmental Representative and the users (e.g. RCMP facility manager) at minimum 72 hours prior to the start of work.
 - .2 Any power shut-down must occur outside of regular working hours of the facility and only during low-volume hours.
 - .3 At no time during regular working hours of the facility, the building or part thereof shall be without power. If a shut-down needs to occur during regular working hours of the facility, the contractor shall provide a temporary generator to accommodate for the entire duration of the work.
 - .4 Partial building shutdowns may occur during regular hours of the facility if previously agreed by Departmental Representative and the users AND the duration of the shutdown is less than 30 minutes.
 - .5 RCMP at any time may cancel a pre-scheduled power shut-down due to unforeseen operational requirements or situations that may arise. The Contractor shall always contact users (e.g. RCMP facility manager) immediately before any shut-down and confirm if a pre-scheduled shut-down may proceed as planned.

1.3 SECURITY REQUIREMENTS

- .1 General
 - .1 To ensure that the security of the project construction and RCMP operation is maintained at all times, all personnel engaged in the execution of the work on the interior or exterior of the building shall have at a minimum, the requisite RCMP Facility Access Level 2 (FA2) clearance in order to be allowed access to the site. Individuals who do not have RCMP FA2 clearance will not be allowed on site.
 - .2 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 FA2 clearance. Ensure all necessary forms and documents are completed as required by RCMP to prevent any delays in the review process.

- .3 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
 - .4 It is the responsibility of the Contractor to ensure that RCMP security requirements are met throughout the performance of the Contract. No delay claims or request for additional costs will be entertained due to Contractor's non-compliance with the mandatory site security requirements.
 - .5 All personnel engaged in the execution of the work on the interior or exterior of the building shall be escorted at all times. The escorts will be provided by the RCMP.
 - .6 All personnel engaged in the execution of the work must not be working in the same area where OCC operators are taking calls. Contractors are not permitted to view protected Information or overhear sensitive conversations.
 - .7 Mobile phones or cameras shall not be brought up to the second floor of the building.
- .2 Restrictions
- .1 A 72-hour notice is required for any access to operational, security and high security zones within the premises to allow RCMP to arrange for a staff member to accompany the Contractor. Operational, security and high security areas include General Duty Areas, Offices, Record 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 This section includes the following:
 - .1 Coordination of Work under administration of Departmental Representative.
 - .2 Scheduled Pre-construction and Site meetings.
 - .3 Project planning and construction schedule.
 - .4 Site progress monitoring and control.

1.1 DESCRIPTION

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

1.2 PRE-CONSTRUCTION MEETING

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

1.3 PROJECT PLANNING

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

1.4 SCHEDULES

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

1.5 CONSTRUCTION MEETINGS

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

1.6 WALK THROUGH FIELD REVIEW BY DEPARTMENTAL REPRESENTATIVE

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

1.7 SUBMITTALS

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

1.8 CLOSEOUT PROCEDURES

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

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE

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

1.2 PRE- CONSTRUCTION MEETING

- .1 Within 10 days after award of Contract: Departmental Representative will request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
- .2 Attendance will include, but is not limited to, the Departmental Representative, members of the RCMP and other stakeholders, PSPC and Contractor.
- .3 Departmental Representative to establish time and location of preconstruction meeting, Contractor to notify parties concerned a minimum of 4 working days before meeting.
- .4 Departmental Representative will chair the meeting, record minutes and issue minutes.
- .5 Agenda to include:
 - .1 Introduction of official representative of participants in the Work.
 - .2 Start date on site.
 - .3 Communication Protocol for submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
 - .4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 51 00 - Temporary Facilities.
 - .5 RCMP Security requirements.
 - .6 Site safety in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.
 - .7 Communication Protocol for proposed changes, change orders, procedures, approvals required.

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

1.3 **PROGRESS MEETINGS**

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

END OF SECTION

1.1 SCHEDULES REQUIRED

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

1.2 FORMAT

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

1.3 SUBMISSION

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

1.4 SCHEDULING

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

1.5 PROGRESS REPORTS

- .1 Contractor to send a brief description of the work completed with pictures to the Departmental Representative at the end of each working week.
- .2 Maintain accurate record of the progress of the Work. Submit progress reports at times requested by the Departmental Representative.
- .3 Include in reports dates of commencement and percentage of work completed for different parts of the Work.

1.6 STAFFING AND OVERTIME

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

1.7 SUBMITTALS SCHEDULE

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

END OF SECTION

1.1 APPROVALS

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

1.2 GENERAL

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

1.3 SUBMISSION REQUIREMENTS

- .1 Co-ordinate each submission with requirements of work and Contract documents. Individual submissions will not be reviewed until all related information is available.
- .2 Allow 10 working days for Departmental Representative's review of each submission, unless noted otherwise.
- .3 Accompany submissions with transmittal letter, in duplicate, containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 Other pertinent data.

- .4 Submissions to include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative, certifying approval of submissions, verification of field measurements and compliance with Contract documents.
- .5 Details of appropriate portions of work as applicable.
 - .1 Fabrication.
 - .2 Layout, showing dimensions (including identified field dimensions and clearances).
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.
- .6 After Departmental Representative's review, distribute copies.

1.4 SHOP DRAWINGS

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

1.5 SHOP DRAWINGS REVIEW

- .1 Review of shop drawings by Department Representative is for the sole purpose of ascertaining conformance with the general concept.
- .2 This review will not mean the Department Representative approves detail design inherent in shop drawings, responsibility for which remains with Contractor submitting same.
- .3 This review will not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting all requirements of construction and Contract documents.

- .4 Without restricting the generality of the foregoing, Contractor is responsible for:
 - .1 Dimensions to be confirmed and correlated at job site.
 - .2 Information that pertains solely to fabrication processes or to techniques of construction and installation.
 - .3 Co-ordination of work of all sub-trades.

1.6 PRODUCT DATA

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

1.7 SAMPLES

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

1.8 PROGRESS SCHEDULE

- .1 Submit work schedule and cost breakdown as required in Section 01 11 55 - General Instructions.

END OF SECTION

Part 1 GENERAL

PWGSC Update on Asbestos Use

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

COVID 19

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

1.1 REFERENCES

- .1 Government of Canada.
 - .1 Canada Labour Code - Part II (as amended)
 - .2 Canada Occupational Health and Safety Regulations. (as amended)
- .2 National Building Code of Canada (NBC): (as amended)
 - .1 Part 8, Safety Measures at Construction and Demolition Sites.
- .3 The Canadian Electrical Code (as amended)
- .4 Canadian Standards Association (CSA) as amended:
 - .1 CSA Z797-2018 Code of Practice for Access Scaffold.
 - .2 CSA S269.1-2016 Falsework for Construction Purposes.
 - .3 CSA S350-M1980 (R2003) Code of Practice for Safety in Demolition of Structures.
 - .4 CSA Z1006-10 Management of Work in Confined Spaces.
 - .5 CSA Z462-18 Workplace Electrical Safety Standard
- .5 National Fire Code of Canada 2015 (as amended)
 - .1 Part 5 – Hazardous Processes and Operations and Division B as applicable and required.
- .6 American National Standards Institute (ANSI): (as amended)
 - .1 ANSI/ASSP A10.3-2013, Operations – Safety Requirements for Powder-Actuated Fastening Systems.
- .7 Province of British Columbia:
 - .1 Workers Compensation Act Part 3-Occupational Health and Safety. (as amended)
 - .2 Occupational Health and Safety Regulation (as amended)
- .8 Hazardous Building Materials Assessment Report – March 19, 2020 (Refer to Appendix A)

1.2 RELATED SECTIONS

- .1 Refer to the following current NMS sections as required:
 - .1 Section 01 01 55 - General Instructions

1.3 WORKERS' COMPENSATION BOARD COVERAGE

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

1.4 COMPLIANCE WITH REGULATIONS

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

1.5 SUBMITTALS

- .1 Submit to Departmental Representative submittals listed for review in accordance with Section 01 01 50.
- .2 Work affected by submittal shall not proceed until review is complete.
- .3 Submit the following:
 - .1 Organizations Health and Safety Plan.
 - .2 Site Specific Safety Plan or Health and Safety Plan (SSSP or HASP)
 - .3 Copies of reports or directions issued by Federal and Provincial health and safety inspectors.
 - .4 Copies of incident and accident reports.
 - .5 Complete set of Material Safety Data Sheets (SDS), and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.
 - .6 Emergency Response Procedures.
- .4 The Departmental Representative will review the Contractor's Site Specific Safety Plan or Health and Safety Plan (SSSP/HASP) and emergency response procedures, and provide comments to the Contractor within 5 days after receipt of the plan. Revise the plan as appropriate and resubmit to Departmental Representative.
- .5 Medical surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of work, and submit additional certifications for any new site personnel to Departmental Representative.

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

1.6 RESPONSIBILITY

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

1.7 HEALTH AND SAFETY COORDINATOR

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

1.8 GENERAL CONDITIONS

- .1 Provide safety barricades and lights around work site as required to provide a safe working environment for workers and protection for pedestrian and vehicular traffic.
- .2 Ensure that non-authorized persons are not allowed to circulate in designated construction areas of the work site.
 - .1 Provide appropriate means by use of barricades, fences, warning signs, traffic control personnel, and temporary lighting as required.
 - .2 Secure site at 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 51 00.

- .4 The contractor shall ensure that the product is applied as per manufacturers recommendations.
- .5 The contractor shall ensure that only pre-approved products are bought onto the work site in an adequate quantity to complete the work.

1.17 ASBESTOS HAZARD

- .1 Carry out any activities involving asbestos in accordance with current applicable Federal and Provincial Regulations.
- .2 Removal and handling of asbestos will be in accordance with current applicable Provincial / Federal Regulations.

1.18 PCB REMOVALS

- .1 Mercury-containing fluorescent tubes and ballasts which contain polychlorinated biphenyls (PCBs) are classified as hazardous waste.
- .2 Remove, handle, transport and dispose of as indicated in Division 2 specifications.

1.19 REMOVAL OF LEAD-CONTAINING PAINT

- .1 All paint containing TCLP lead concentrations above 5 ppm are classified as hazardous.
- .2 Carry out demolition and/or remediation activities involving lead-containing paints in accordance with current applicable Provincial / Territorial Regulations.
- .3 Work with lead-containing paint shall be completed as per Provincial and Federal regulations.
- .4 Dry Scraping/Sanding of any materials containing lead is strictly prohibited.
- .5 The use of Methylene Chloride based paint removal products is strictly prohibited.

1.20 ELECTRICAL SAFETY REQUIREMENTS

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

- .1 Comply with authorities and ensure that, when installing new facilities or modifying existing facilities, all electrical personnel are completely familiar with existing and new electrical circuits and equipment and their operation.
 - .1 Before undertaking any work, coordinate arc flash protection, required energizing and de-energizing of new and existing circuits with Departmental Representative.

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

1.21 ELECTRICAL LOCKOUT

- .1 Develop, implement and enforce use of established procedures to provide electrical lockout and to ensure the health and safety of workers for every event where work must be done on any electrical circuit or facility.
- .2 Prepare the lockout procedures in writing, listing step-by-step processes to be followed by workers, including how to prepare and issue the request/authorization form. Have procedures available for review upon request by the Departmental Representative.
- .3 Keep the documents and lockout tags at the site and list in a log book for the full duration of the Contract. Upon request, make such data available for viewing by Departmental Representative or by any authorized safety representative.

1.22 OVERLOADING

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

1.23 FALSEWORK

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

1.24 SCAFFOLDING

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

1.25 CONFINED SPACES

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

1.26 POWDER-ACTUATED DEVICES

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

1.27 FIRE SAFETY AND HOT WORK

- .1 Obtain Departmental Representative's authorization before any welding, cutting or any other hot work operations can be carried out on site.
- .2 Hot work includes cutting/melting with use of torch, flame heating roofing kettles, or other open flame devices and grinding with equipment which produces sparks.

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

1.28 FIRE SAFETY REQUIREMENTS

- .1 Store oily/paint-soaked rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
- .2 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada. (as amended)
- .3 Portable gas and diesel fuel tanks are not permitted on most federal work sites. Approval from the Departmental Representative is required prior to any gas or diesel tank being brought onto the work site.

1.29 FIRE PROTECTION AND ALARM SYSTEM

- .1 Fire protection and alarm systems shall not be:
 - .1 Obstructed.
 - .2 Shut off.
 - .3 Left inactive at the end of a working day or shift.
- .2 Do not use fire hydrants, standpipes and hose systems for purposes other than firefighting.
- .3 Be responsible/liable for costs incurred from the fire department, the building owner and the tenants, resulting from false alarms.

1.30 UNFORESEEN HAZARDS

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

1.31 POSTED DOCUMENTS

- .1 Post legible versions of the following documents on site:
 - .1 Site Specific Safety Plan (SSSP) or Health and Safety Plan (HASP)
 - .2 Sequence of work.
 - .3 Emergency procedures.
 - .4 Site drawing showing project layout, locations of the first-aid station, evacuation route and marshalling station, and the emergency transportation provisions.
 - .5 Notice of Project.
 - .6 Floor plans or site plans. Must be posted in a non-inmate access area and locked up when not being used.
 - .7 Notice as to where a copy of the Workers' Compensation Act and Regulations are available on the work site for review by employees and workers.

- .8 Workplace Hazardous Materials Information System (WHMIS 2015) documents.
- .9 Material Safety Data Sheets (SDS).
- .10 List of names of Joint Health and Safety Committee members, or Health and Safety Representative, as applicable.
- .11 All Hazardous Material and Substance Reports including Lab Analysis
- .2 Post all Material Safety Data Sheets (MSDS) on site, in a common area, visible to all workers and in locations accessible to tenants when work of this Contract includes construction activities adjacent to occupied areas.
- .3 Postings should be protected from the weather, and visible from the street or the exterior of the principal construction site shelter provided for workers and equipment, or as approved by the Departmental Representative.

1.32 MEETINGS

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

1.33 CORRECTION OF NON-COMPLIANCE

- .1 Immediately address health and safety non-compliance issues identified by the Departmental Representative.
- .2 Provide Departmental Representative with written report of action taken to correct non-compliance with health and safety issues identified.
- .3 The Departmental Representative may issue a "stop work order" if noncompliance of health and safety regulations is not corrected immediately or within posted time. The General Contractor/subcontractors will be responsible for any costs arising from such a "stop work order".

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

1.2 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prior to commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Departmental Representative. Environmental Protection Plan is to present comprehensive overview of known or potential environmental issues which must be addressed during construction.
- .3 Address topics at level of detail commensurate with environmental issue and required construction tasks.
- .4 Environmental protection plan to include:
 - .1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.
 - .2 Names and qualifications of persons responsible for manifesting contaminated soils and hazardous waste to be removed from site.
 - .3 Names and qualifications of persons responsible for training site personnel.
 - .4 Descriptions of environmental protection personnel training program.
- .5 Erosion and sediment control plan which identifies type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.
- .6 Traffic control plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Plans include measures to minimize amount of mud transported onto paved public roads by vehicles or runoff.
- .7 Spill Control Plan: including procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.
- .8 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.
- .9 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, do not become air borne and travel off project site.

- .10 Contaminant prevention plan that: identifies potentially hazardous substances to be used on job site; identifies intended actions to prevent introduction of such materials into air, water, or ground; and details provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.
- .11 Waste water management plan that identifies methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.
- 1.3 FIRES**
 - .1 Fires and burning of rubbish on site is not permitted.
- 1.4 DISPOSAL OF WASTES**
 - .1 Do not bury rubbish and waste materials on site.
 - .2 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways.
- 1.5 WORK ADJACENT TO WATERWAY**
 - .1 Do not dump excavated fill, waste material or debris in waterways.
- 1.6 POLLUTION CONTROL**
 - .1 Maintain temporary erosion and pollution control features installed under this contract.
 - .2 Control emissions from equipment and plant to local authorities' emission requirements.
 - .3 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.
- 1.7 HISTORICAL/ARCHAEOLOGICAL CONTROL**
 - .1 Give immediate notice to the Departmental Representative if evidence of archaeological finds are encountered during construction and await written instructions before proceeding with work in the vicinity of any such finds.
 - .2 Relics, antiquities and items of historical or scientific interest shall remain the property of the Crown. Protect such articles and request directives from the Departmental Representative.
- 1.8 NOTIFICATION**
 - .1 Departmental Representative will notify Contractor in writing of observed non-compliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.
 - .2 Contractor: after receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.
 - .3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.

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

1.9 SPILLS OR RELEASE OF DELETERIOUS SUBSTANCES

- .1 Measures to be implemented to prevent, control or mitigate spills or release of deleterious substances:
 - .1 Contractor shall take due care to ensure no deleterious materials enter any surface drainage pathways located in the project area.
 - .2 Emergency response procedure for spills of deleterious substances must be in place. In the event of a spill, the contractor will immediately implement their Spill Response Protocol.
 - .3 The Contractor is responsible for all costs associated with a spill or release as a result of their actions. This will include but not limited costs of spill response equipment and materials, associated sampling, analysis and any required restoration of the impacted area.
 - .4 Response equipment to be on site at all times (i.e. spill kits) and workers trained in their location and use. The resources on hand must be sufficient to respond effectively and expediently to any spill that could occur on site.
 - .5 All construction equipment brought onto the site will be clean and properly maintained.
 - .6 Any equipment maintenance must occur in a designated area and must be conducted away from any surface water drains or collection points.
 - .7 Any equipment remaining on site overnight shall have appropriately placed drip pans.
 - .8 Waste generated will be prevented from entering the environment.
 - .9 Prevent discharges containing asphalt, grout, concrete or other waste materials from reaching storm drains or the marine environment. This includes, but is not limited to:
 - .1 Cleaning equipment off site; and
 - .2 Protection of any other drainage structures not identified here with filter fences and/or silt socks, if required.
 - .10 Protection of the roadways from tracking of mud, soil and debris needs to be maintained throughout the work.
 - .11 Limit of work activities to normal business hours to minimize noise outside of those hours. Ensure that equipment and machinery is properly maintained to minimize unnecessary noise pollution. Consider local municipal noise bylaws when mobilizing equipment.
 - .12 All utilities must be located prior to excavation.

END OF SECTION

1.1 INSPECTION

- .1 Be responsible for quality control during execution of Work.
- .2 Allow the Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
- .3 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by the Departmental Representative's instructions, or law of Place of Work.
- .4 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
- .5 The Departmental Representative may order any part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Canada will pay cost of examination and replacement.

1.2 ACCESS TO WORK

- .1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.
- .2 Co-operate to provide reasonable facilities for such access.

1.3 REJECTED WORK

- .1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by the Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- .2 Make good other Contractor's work damaged by such removals or replacements promptly.
- .3 If in opinion of the Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, the Departmental Representative may deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by the Departmental Representative.

1.4 REPORTS

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

END OF SECTION

Part 1 General

1.1 ACCESS AND DELIVERY

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

1.2 CONSTRUCTION PARKING

- .1 Parking for construction staff will be available on site.

1.3 STORAGE FACILITIES

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

1.4 SANITARY FACILITIES

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

1.5 HEATING AND VENTILATION

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

- .3 Prevent dust and odour migration to other occupied areas.

1.6 REMOVAL OF TEMPORARY FACILITIES

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

1.7 SIGNS AND NOTICES

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

1.8 CLEAN-UP

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

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 N/A

1.2 INSTALLATION AND REMOVAL

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

1.3 ACCESS TO SITE

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

1.4 FIRE ROUTES

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

1.5 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

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

1.6 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.

1.7 WASTE MANAGEMENT AND DISPOSAL

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

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 PRODUCTS/MATERIAL AND EQUIPMENT

- .1 Use NEW products/material and equipment unless otherwise specified. Term "products" is referred to throughout specifications.
- .2 Use products of one (1) manufacturer for material and equipment of same type or classification unless otherwise specified.
- .3 Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation methods.
- .4 Notify Departmental Representative in writing of any conflict between these specifications and manufacturer instructions. Departmental Representative will designate which document is to be followed.
- .5 Provide metal fastenings and accessories in same texture, colour and finish as base metal in which they occur.
 - .1 Prevent electrolytic action between dissimilar metals.
 - .2 Use non-corrosive fasteners, anchors and spacers for securing exterior work.
- .6 Fastenings which cause spalling or cracking are not acceptable.
- .7 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
- .8 Use heavy hexagon heads, semi-finished unless otherwise specified.
- .9 Bolts may not project more than 1 diameter beyond nuts.
- .10 Types of washers as follows:
 - .1 Plain type washers: use on equipment and sheet metal.
 - .2 Soft gasket lock type washers: use where vibrations occur.
 - .3 Resilient washers: use with stainless steel items and fasteners.
 - .4 FRP fibre reinforced plastic washers: use with FRP items and fabrications.
- .11 Deliver, store and maintain packaged material and equipment with manufacturer seals and labels intact.
- .12 Prevent damage, adulteration and soiling of products during delivery, handling and storage. Immediately remove rejected products from site.
- .13 Store products in accordance with supplier instructions.
- .14 Touch up damaged factory finished surfaces to Departmental Representative's satisfaction:
 - .1 Use primer or enamel to match original.
 - .2 Do not paint over nameplates.

1.2 QUALITY OF PRODUCTS

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

- .2 Defective products will be rejected regardless of previous inspections.
 - .1 Inspection does not relieve responsibility, but is precaution against oversight or error.
 - .2 Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
- .3 Retain purchase orders, invoices and other documents to prove that all products utilized in this Contract meet requirements of specifications. Produce documents when requested by Departmental Representative.
- .4 Should any dispute arise as to quality or fitness of products, the decision rests strictly with Departmental Representative based upon requirements of Contract Documents.
- .5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
- .6 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.3 AVAILABILITY OF PRODUCTS

- .1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for any items.
- .2 If delays in supply of products are foreseeable, notify Departmental Representative of such in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of work.
- .3 In event of failure to notify Departmental Representative at start of work and should it subsequently appear that work may be delayed for such reason, Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in either Contract price or Contract time.

1.4 MANUFACTURER INSTRUCTIONS

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

1.5 CONTRACTOR'S OPTIONS FOR SELECTION OF PRODUCTS FOR TENDERING

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

- .2 Products specified under "Acceptable Products" (used for complex Mechanical or Electrical Systems): select any one of the indicated manufacturers, or any other manufacturer meeting or exceeding Prescriptive specifications and indicated Products.
- .3 Products specified by performance and referenced standard: select any product meeting or exceeding referenced standard.
- .4 Products specified to meet particular design requirements or to match existing materials: use only material specified Approved Product. Alternative products may be considered provided full technical data is received in writing by Departmental Representative in accordance with "Special Instructions to Tenderers".
- .5 When products are specified by referenced standard or by Performance specifications, upon request of Departmental Representative obtain from manufacturer and independent laboratory report showing that product meets or exceeds specified requirements.

1.6 SUBSTITUTION AFTER CONTRACT AWARD

- .1 No substitutions are permitted without prior written approval of Departmental Representative.
- .2 Proposals for substitution may only be submitted after Contract award. Such request must include statements of respective costs of items originally specified and proposed substitution.
- .3 Proposals will be considered by Departmental Representative if:
 - .1 Products selected by tenderer from those specified are not available;
 - .2 Delivery date of products selected from those specified would unduly delay completion of Contract, or
 - .3 Alternative product to that specified, which is brought to attention of Departmental Representative is considered by Departmental Representative as equivalent to product specified and will result in a credit to Contract amount.
- .4 Should the proposed substitution be accepted either in part or in whole, assume full responsibility and costs when substitution affects other work on project. Pay for design or drawing changes required as result of substitution.
- .5 Amounts of all credits arising from approval of substitutions will be determined by Departmental Representative and Contract price will be reduced accordingly.

END OF SECTION

Part 1 General

1.1 EXISTING SERVICES

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

1.2 LAYOUT

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

1.3 LOCATION OF EQUIPMENT AND FIXTURES

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

1.4 RECORDS

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

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

1.1 SUBMITTALS

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

1.2 INCLUDE IN REQUEST

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

1.3 MATERIALS

- .1 Required for original installation.

1.4 PREPARATION

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

1.5 EXECUTION

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

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

1.6 MATCHING TO EXISTING WORK

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

1.7 SETTING OUT OF WORK

- .1 Assume full responsibility for and execute complete layout of work to locations, lines and elevations indicated.
- .2 Provide devices needed to lay out and construct work.
- .3 Supply such devices as straight edges and templates required to facilitate the Departmental Representative's inspection of work.
- .4 Review layouts with the Departmental Representative prior to commencement of work.

1.8 LOCATION OF EQUIPMENT AND FIXTURES

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

END OF SECTION

1.1 PROJECT CLEANLINESS

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

1.2 FINAL CLEANING

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

END OF SECTION

1.1 RELATED WORK

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

1.2 DEFINITIONS

- .1 Waste Reduction Workplan: written report which addresses opportunities for reduction, re-use or recycling of materials.
- .2 Materials Source Separation Program: consists of series of ongoing activities to separate re-usable and recyclable waste material into material categories from other types of waste at point of generation.

1.3 MATERIALS SOURCE SEPARATION

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

1.4 DIVERSION OF MATERIALS

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

1.5 STORAGE, HANDLING AND APPLICATION

- .1 Do work in compliance with Waste Reduction Workplan.
- .2 Handle waste materials not re-used, salvaged, or recycled in accordance with appropriate regulations and codes.
- .3 Materials in separated condition: collect, handle, store on site and transport off-site to approved and authorized recycling facility.
- .4 Materials must be immediately separated into required categories for re-use or recycling.
- .5 Unless specified otherwise, materials for removal become Contractor's property.
- .6 On-site sale of salvaged/recyclable material is not permitted.
- .7 On-site burning of material is not permitted.
- .8 Provide Departmental Representative with receipts indicating quantity of material delivered to landfill.
- .9 Provide Departmental Representative with receipts indicating quantity and type of materials sent for recycling.

END OF SECTION

Part 1 General

1.1 INSPECTION AND DECLARATION

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

END OF SECTION

1.1 SUBMISSION

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

1.2 FORMAT

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

1.3 CONTENTS, EACH VOLUME

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

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

1.4 RECORD DOCUMENTS

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

1.5 EQUIPMENT AND SYSTEMS

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

1.6 MANUFACTURER DOCUMENTATION REPORTS

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

- .2 Departmental Representative will provide list of personnel to receive instructions, and will co-ordinate their attendance at agreed upon times.

1.7 SPARE PARTS

- .1 Provide spare parts in quantities specified in individual specification Sections.
- .2 Provide items of same manufacture and quality as items in work.
- .3 Deliver to on-site location as directed; place and store.
- .4 Receive and catalogue all items. Submit inventory listing to the Departmental Representative. Include approved listings in maintenance manual.
- .5 Obtain receipt for delivered products and submit to Departmental Representative.

1.8 MAINTENANCE MATERIALS

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

1.9 WARRANTIES, BONDS, TEST REPORTS, INSPECTION REPORTS

- .1 Obtain Warranties, Bonds, Test Results, Inspection Reports executed in duplicate by subcontractors, suppliers, manufacturers and inspection agencies within 10 working days after completion of applicable item of work.
- .2 Except for items put into use with Departmental Representative's permission, leave date of beginning of time of warranty until date of substantial performance is determined.
- .3 Verify that documents are in proper form, contain full information and are notarized.
- .4 Co-execute submittals when required.
- .5 Retain warranties and bonds until time specified for submittal.

1.10 COMPLETION

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

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

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

1.2 DESCRIPTION

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

1.3 QUALITY CONTROL

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

1.4 SUBMITTALS

- .1 Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for Departmental Representative's approval.
- .2 Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.
- .3 Give time and date of each demonstration, with list of persons present.

1.5 CONDITIONS FOR DEMONSTRATIONS

- .1 Equipment has been inspected and put into operation in accordance with Manufacturer's recommendations.
- .2 Testing, adjusting, and balancing has been performed RCMP and equipment and systems are fully operational.
- .3 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

1.6 PREPARATION

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

1.7 DEMONSTRATION AND INSTRUCTIONS

- .1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at scheduled times, at the equipment location.
- .2 Instruct personnel in all phases of operation and maintenance using operation and maintenance manuals as the basis of instruction.
- .3 Review contents of manual in detail to explain all aspects of operation and maintenance.

- .4 Prepare and insert additional data in operations and maintenance manuals when the need for additional data becomes apparent during instructions.
- .5 Training and demonstration will be performed by manufacturers representative and will include actual interaction with all systems requiring software or computer interface.

1.8 TIME ALLOCATED FOR INSTRUCTIONS

- .1 Contractor shall provide for a total of 1 working day of demonstration and training for all systems in the project, including but not limited to:
 - .1 UPS System Operation and Maintenance

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

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

1.2 REFERENCES

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

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

1.4 SITE CONDITIONS

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

Part 2 Products

2.1 NOT USED

- .1 Not used.

Part 3 Execution

3.1 EXAMINATION

- .1 Inspect site with Departmental Representative and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.

3.2 PREPARATION

- .1 Protection of In-Place Conditions:
 - .1 Keep noise, dust, and inconvenience to occupants to minimum. Dust control in laboratories to be reviewed with departmental representative prior to starting work to ensure sensitive specimens are not damaged.
 - .2 Protect building systems, services and equipment.
 - .3 Provide temporary dust screens, covers, railings, supports and other protection as required.
 - .4 Do Work in accordance with Section 01 35 33 - Health and Safety Requirements.
- .2 Demolition/Removal:
 - .1 Remove items as indicated.

3.3 CLEANING

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

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 This Section describes the Common Work Results applicable to electrical disciplines.

1.2 GENERAL

- .1 The general conditions and general requirements together with all amendments and supplements contained in the General Specifications shall form an integral part of the electrical specification and will be made part of this contract.
- .2 Reference to "Electrical Divisions" shall mean all Divisions 26, 27, 28, 33, 34 and 48 in the Master Format or the Canadian Master Specifications.
- .3 The word "Provide" shall mean "Supply and Install" the products and services specified. "As Indicated" means that the item(s) specified are shown on the drawings.
- .4 Review existing record plans and site conditions for limitations of penetrations or inclusions of electrical equipment. In tender sum, allow for avoiding critical areas with electrical equipment.
- .5 Comply with the requirements of the General Contract, and coordinate the installation with all other trades on site.
- .6 Confirm on-site the exact location of equipment, outlets, and fixtures and the location of outlets for equipment supplied by other trades.

1.3 WORK INCLUDED

- .1 This work shall include the supply and installation of all the necessary materials and apparatus for complete operating systems as indicated on the plans or mentioned in this specification, with the exception of materials or apparatus specifically mentioned to be omitted or to be supplied by owner.
- .2 Items obviously necessary or reasonably implied to complete the work, shall be included as if shown on drawings and noted in the specifications.
- .3 All materials, tools, appliances, scaffolding, apparatus and labour necessary for the execution, erection and completion of the systems described herein shall be furnished. This includes providing lighting and power for own work.
- .4 This contract shall include, but is not confined to, the following scope of work:
 - .1 Removal of Existing UPS System
 - .2 New UPS system
 - .3 New Communications Connection (for UPS remote monitoring)
- .5 Complete all electrical connections to equipment and accessories pertaining to this contract and leave all in operating condition to the electrical Consultant's satisfaction.
- .6 Remove all existing electrical equipment and material made redundant by this contract or in conflict with work to be carried out. Reroute, reinstall or replace existing electrical material that becomes necessary due to work carried out by this contract so a complete working electrical system will be retained in all areas affected by this installation.

1.4 WORK EXCLUDED

- .1 The contract scope of work shall not include the following:
- .2 Final connection of communications wiring in RCMP/SSC network equipment.

1.5 DRAWINGS AND SPECIFICATIONS

- .1 The drawings and specifications compliment each other and what is called for by one is binding as if called for by both. If there is any doubt as to meaning or true intent due to a discrepancy between the electrical drawings and specifications, and all other contract documents, obtain written ruling from Consultant prior to tender closing. **Failing this, the most expensive alternative is to be allowed for.**
- .2 The plans show the approximate location of outlets and apparatus, but the right is reserved to make such changes in location as may be necessary to meet the emergencies of construction in any way. No extra will be allowed for such changes to any piece of electrical equipment unless the distance exceeds 3 meters, or if the relocation is required after initial installation is complete.
- .3 It is imperative that the contractor visit the site and completely familiarize himself as to the work to be undertaken.

1.6 CODES AND STANDARDS

- .1 All electrical work shall be carried out in accordance with the latest edition of the CEC C22.1 (Canadian Electrical Code) as amended and adopted by the Province of British Columbia and to the satisfaction of the Electrical Inspection Authority having jurisdiction, except where specified or specifically stated otherwise.
- .2 All work shall be carried out in accordance with the National Building Code current edition (including all local amendments) to the satisfaction of local building inspector authority having jurisdiction.
- .3 Any electrical material and/or equipment supplied by any contractor or sub-contractor for installation on this project must bear evidence of CSA approval or special CSA certification acceptable to the Authority Having Jurisdiction.

1.7 CARE, OPERATION AND START-UP

- .1 Instruct Consultant departmental representative in the 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 all aspects of its care and operation.

1.8 VOLTAGE RATINGS

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

1.9 PERMITS, FEES AND INSPECTION

- .1 Submit to Electrical Inspection Department and Supply Authority necessary number of drawings and specifications for examination and approval prior to commencement of work.
- .2 Pay all associated fees.
- .3 Fees will cover all routine inspections by the District Electrical Inspector. Any fees for follow-up inspections found to be necessary by the District Electrical Inspectors as a result of incorrect work shall be borne by this contractor without any cost to the owner.
- .4 Notify Consultant of changes required by Electrical Inspection Department prior to making changes.
- .5 Furnish Certificates of Acceptance from Electrical Inspection Department authorities having jurisdiction on completion of work to Consultant.
- .6 Submit to Electrical Inspection Department and Supply Authority necessary number of drawings and specifications for examination and approval prior to commencement of work. Obtain electrical permit and pay associated fees.
- .7 Consultant will provide drawings and specifications required by Electrical Inspection Department and Supply Authority at no cost to the Contractor.
- .8 Furnish to Consultant on completion of work Certificates of Acceptance from Electrical Inspection Department.

1.10 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with the Construction Waste Management Plan as established by the Construction Manager.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal: paper, plastic, polystyrene, corrugated cardboard and packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal and wiring materials from landfill to metal recycling facility approved by Consultant.
- .5 Fold up metal banding, flatten and place in designated area for recycling.

1.11 SINGLE LINE ELECTRICAL DIAGRAMS

- .1 Provide single line electrical diagrams under plexiglass as follows:
 - .1 Electrical Partial single line: locate in UPS room.
 - .2 UPS System shop drawing single line: locate in UPS room.
- .2 Drawings: 600mm x 600mm minimum size.

1.12 LOCATION OF OUTLETS

- .1 Locate outlets in accordance with these specifications and as indicated on the Architectural and Electrical drawings.
- .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 3000mm, and information is given before installation.

1.13 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 on the Architectural and Electrical drawings.
 - .1 Local switches: 1200 mm.
 - .2 Wall receptacles:
 - .1 General: 400 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: 1200 mm.
 - .3 Panelboards: as required by Code or as indicated.
 - .4 Telephone and interphone outlets: 400 mm.
 - .5 Pay Telephone Outlets: 1194mm
 - .6 Wall mounted telephone and interphone outlets: 1500 mm.
 - .7 Fire alarm stations: 1150 mm.
 - .8 Fire alarm bells: 2100 mm (or if in conflict with ceiling, 300mm below ceiling).
 - .9 Television outlets: 400 mm.
 - .10 Wall mounted speakers: 2100 mm.
 - .11 Clocks: 2100 mm.
 - .12 Door bell pushbuttons: 1500 mm.

1.14 EXTRA WORK

- .1 Any extra work ordered to be done shall be governed by this specification unless specific instructions or clauses are contained in the Change Order. In such cases, these instructions or clauses shall supersede those of the specification for this particular application only.

1.15 FIELD QUALITY CONTROL

- .1 All electrical work to be carried out by qualified, licensed electricians or supervised apprentices as per the conditions of the Provincial Act respecting manpower vocational training and qualification. Employees registered in a provincial apprentices program shall be permitted, under the direct supervision of a qualified licensed electrician, to perform specific tasks. The activities permitted shall be determined based on the level of training attained and the demonstration of ability to perform specific duties.
- .2 The work of this division to be carried out by a contractor who holds a valid Master Electrical Contractor License as issued by the Province that the work is being conducted.
- .3 Conduct and pay for following tests:
 - .1 Power distribution system including phasing, voltage, grounding and load balancing for equipment installed in this contract.

- .4 Furnish manufacturer's certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturer's instructions.
- .5 Insulation resistance testing:
 - .1 Megger circuits, feeders and equipment up to 350V with a 500V instrument.
 - .2 Megger 350V - 600 V circuits, feeders and equipment with a 1000V instrument.
 - .3 Check resistance to ground before energizing.
- .6 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
- .7 Submit test results for Consultant's review.

1.16 CO-ORDINATION OF TRADES

- .1 Consult with Construction Manager and all subtrades involved to confirm the location of the various outlets and equipment, and cooperate fully to ensure that no conflict arises during the installation.
- .2 Special care shall be taken that equipment, outlets, junction boxes or pullboxes will not be obstructed by other structure, equipment, pipes or ducts installed under this general contract by other trades.
- .3 Check drawings of all trades to verify space and headroom limitations for work to be installed. Coordinate work with all trades and make changes to facilitate a satisfactory installation. Make no deviations to the design intent involving extra cost to the Owner, without the Consultant's written approval.
- .4 The drawings indicate the general location and route to be followed by the electrical services. Where details are not shown on the drawings or only shown diagrammatically, the services shall be installed in such a way as to conserve head room and interfere as little as possible with the free use of space through which they pass. Service lines shall run parallel to building lines. All services in the ceiling shall be kept as tight as possible to beams or other limiting members at high level. All electrical services shall be coordinated in elevation to ensure that they are concealed in the ceiling or structural space provided unless detailed otherwise on drawings.
- .5 Work out jointly all interference problems on the site and coordinate all work before fabricating, or installing any material or equipment. Where necessary, produce interference/coordination drawings showing exact locations of electrical systems or equipment within service areas, shafts and the ceiling space. Distribute copies of the final interference/coordination drawings to the Architect and the Consultant and all affected parties.
- .6 Ensure that all materials and equipment fit into the allotted spaces and that all equipment can be properly serviced and replaced, if and when required. Advise the Consultant of space problems before installing any material or equipment. Demonstrate to the Consultant on completion of the work that all equipment installed can be properly, safely serviced and replaced, if and when required.

1.17 SUBSTITUTIONS

- .1 Unless otherwise noted on the plans or specifications, substitutions may be approved by the Consultant if requested by the contractor or by equipment suppliers, for items specified by the manufacturer's catalogue number.

- .2 Requests for approval of such substitutions shall be submitted after contract award.
- .3 Complete description and data sheets of proposed substitution shall accompany the application and supplier must be prepared to submit samples for approval on short notice.
- .4 Proposed substitutions must be at least of equal quality to that of the specified item. The manufacturer's specification of the specified item shall apply for comparison if no other clause of this specification applies. The decision of the Consultant to accept or reject shall be final.
- .5 Off-the-shelf items such as standard boxes, EMT, which are specified by description only or indicated on the drawings, without any manufacturer, model, type or catalogue number, do not require approval prior to the tender closing date.
- .6 Submit list of alternates used, within one week after acceptance of tender.

1.18 PROTECTION OF EQUIPMENT

- .1 This contractor shall provide and ensure maximum protection of electrical equipment on the site. Electrical equipment, including existing electrical equipment, shall be kept clean and dry at all times and caution shall be taken to ensure no mechanical damage is done to the equipment. Equipment shall not be delivered to the site until it can be stored safely or placed in final position and the space is clean.

1.19 DAMAGES

- .1 If the finish of electrical equipment is damaged either when received or during installation, have such equipment completely refinished and restored to its original condition at no cost to the owner.
- .2 Irreparably damaged equipment shall be replaced at no cost to the owner.

1.20 SHOP DRAWINGS

- .1 Submit shop drawings, product data and samples in accordance with the contract specifications.
- .2 Shop drawings and product data shall indicate details of construction, dimensions, capacities, weights and electrical performance characteristics of equipment or material.
- .3 Include wiring, single line and schematic diagrams for UPS system.
- .4 Include wiring drawings or diagrams showing interconnection with work of other sections.
- .5 Prior to manufacture of any item made specifically for this job, submit detailed drawings of the item through the Construction Manager. Shop drawings must be received by the Consultant at a date early enough to permit reasonable study prior to approval and manufacture, or to permit alterations where necessary. Late submissions of shop drawings will be sufficient reason for a stoppage of construction pending approval, or removal and replacement of any unsatisfactory item at the contractor's expense.
- .6 Shop drawings/product data content:
 - .1 Shop drawings submitted title sheet.

- .2 Data shall be specific and technical.
- .3 Identify each piece of equipment.
- .4 Information shall include all schedule data.
- .5 Advertising literature will be rejected.
- .6 The project and equipment designations shall be identified on each document.
- .7 The shop drawings/product data shall include:
 - .1 Dimensioned construction drawings with plans and sections showing size, arrangement and necessary clearances, with all equipment weights and mounting point loads.
 - .2 Mounting arrangements.
 - .3 Control explanation and internal wiring diagrams for packaged equipment.
 - .4 A written description of control sequences relating to the schematic diagrams.

1.21 CUTTING AND PATCHING

- .1 This contractor is responsible for all cutting or blocking out required to install electrical equipment.
- .2 If this contractor makes excessive cuts or does not coordinate work so that finished work requires cutting or patching, then this contractor shall pay for all patching to original condition.
- .3 Any dispute resulting from this shall be referred to the Consultant for decision.
- .4 Prior to any major cutting of walls or floor, review the proposed location, size and method with the Consultant. This includes notification when cutting or coring into any fire rated construction.

1.22 FIRESTOPPING

- .1 Submit Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of ULC or cUL firestop systems to be used and manufacturer's installation instructions to comply with Section 1300.
- .2 Submit material safety data sheets provided with product delivered to job-site.
- .3 Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having the necessary training to install manufacturer's products per specified requirements. A supplier's willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.
- .4 The work is to be installed by a contractor with at least one of the following qualifications:
 - .1 FM 4991 Approved Contractor
 - .2 UL Approved Contractor
 - .3 Hilti Accredited Fire Stop Specialty Contractor
- .5 Installer shall have minimum 3 years of experience with fire stop installation.

- .6 Seal all openings for conduit or sleeve penetrations in fire rated and smoke rated separations using approved materials.
- .7 All block outs and access slots to be sealed using approved fire stopping assembly. Provide full details for all fire stopping applications as they relate to each application.
- .8 Provide shop drawings for all fire stopping products, including assembly details as it relates to each application. Products shall be ULC approved as an assembly.
- .9 Allow for the destructive testing of 10% of fire stopping applications. Should installations not conform to manufacturer's details, an additional 25% of installation will be destructively tested and should there be more failures, the contractor will be responsible to remove all fire stopping products and reinstall products correctly, at no additional cost to the owner.

1.23 PROTECTION OF EXPOSED LIVE EQUIPMENT

- .1 Protect exposed live equipment during construction for personnel safety.
- .2 Shield and mark live parts "LIVE 120 VOLTS", or with appropriate voltage.
- .3 Arrange for installation of temporary doors for rooms containing electrical distribution equipment. Keep these doors locked except when under direct supervision of electrician.

1.24 INSPECTIONS AND TESTS

- .1 Notify the Consultant and authorities having jurisdiction at least five (5) working days in advance when the installations will be ready for inspection or testing.
- .2 Test reports, signed by all attending authorities, shall be submitted to the Consultant through the General Contractor after successful completion of an inspection or test.
- .3 Conduct all tests in a thorough and complete manner to the satisfaction of the Consultant and pay for any fees incurred to complete tests.
- .4 Furnish the Consultant with a copy of Certificate of Inspection from B.C. Electrical Safety Branch indicating that all work has been satisfactorily completed and issued prior to final connection.

1.25 CLEAN UP

- .1 Vacuum clean all new raceways and any electrical equipment. Ensure that no debris or spare parts are left in any electrical equipment.
- .2 Any scrap material shall be removed from the site and disposed of by the Contractor.
- .3 At time of final cleaning, clean lighting reflectors, lenses and other lighting surfaces that have been exposed to construction dust and dirt.

1.26 SURPLUS MATERIALS

- .1 All material removed from existing site and not being reused in this contract shall be the property of the owner and delivered as directed by the Departmental Representative. Material as it becomes surplus shall be reviewed by the Owner or the Departmental Representative and that part considered of value to the owner shall be classed as surplus material, all other becomes scrap material, and shall be disposed of by the contractor.

1.27 SUBSTANTIAL PERFORMANCE

- .1 Provide request to Architect/Consultant in writing that a Substantial Performance Inspection shall be carried out.
- .2 Do not issue this written request until the following have been completed and/or submitted to Consultant:
 - .1 As-installed drawings (CAD files) have been provided.
 - .2 All deficiencies noted during job inspections have been completed.
 - .3 Warranty Certificates have been provided.
 - .4 All systems have been tested and are ready for operation.
 - .5 All Inspection Certificates have been furnished including Final Electrical Inspection Certificate.
 - .6 The Departmental Representative have been instructed in the operation and maintenance of all systems.
 - .7 All equipment identification has been completed.
 - .8 The cleaning up is finished in all respects.
 - .9 All spare parts and replacement parts specified have been provided and receipt of same acknowledged.
 - .10 Copies of Seismic Consultant's Schedules B1, B2 and CB have been submitted.

1.28 AS-BUILT DRAWINGS

- .1 Obtain two (2) sets of white prints for the sole purpose of recording changes in installation as they occur. One (1) set is to be used in the field for day-to-day recording, and one (1) set for submittal after completion.
- .2 These plans shall be kept up-to-date as changes occur and shall be available to be inspected by the Consultant.
- .3 Arrange and pay for the incorporation of any "as-built" changes to reproducible plans and AutoCAD (Revit) disks. These changes shall be of similar quality of presentation as the original plans. NOTE: All plans whether requiring as-built changes or not, shall be included in this set.
- .4 These amended drawings shall be given to the Consultant at time of final inspections.

1.29 OPERATING AND MAINTENANCE MANUALS

- .1 Submit **three sets** of operating and maintenance manuals for equipment or as requested by the general section of the contract. Include descriptive and technical data, all shop drawings, operating procedures, routine and preventative maintenance, wiring diagrams, spare parts lists, warranties, service companies, suppliers for replacement parts, test results, fire alarm certificate of verification, electrical inspection authority certificate and contract guarantee.
- .2 Submit documentation in **green colored** heavy duty three ring binders, with lettering on spine identifying: "OPERATING AND MAINTENANCE MANUAL", project title and system names.
- .3 Submit one copy for approval by Consultant prior to assembly of final sets.

1.30 DEMONSTRATION OF SYSTEMS

- .1 Instruct Consultant and operating personnel in the operation, care and maintenance of equipment.
- .2 Arrange and pay for services of manufacturer's factory service Consultant to supervise start-up of installation, check, adjust, balance and calibrate components.
- .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 all aspects of its care and operation.

1.31 WARRANTY

- .1 Within a period of one year from the date of final acceptance of work, replace or repair at own expense any defect in workmanship or material. Reused material shall be operating satisfactorily at the time of final acceptance but subsequent failures are not the responsibility of this contractor.
- .2 Warranties for equipment having more than one year guarantee shall be made out to owner, and copies shall be provided in the maintenance manuals.
- .3 Maintenance from manufacturer and contractor of all equipment shall be included for first year, including all lamps except incandescent.

1.32 PAINTING

- .1 Arrange and pay for the painting of the devices noted in these specifications, in particular:
 - .1 Exposed conduits and conduit fittings.
- .2 Painting shall be to match colour and finish of adjacent walls, with at least two coats of sprayed enamel paint to the satisfaction of the Consultant.

Part 2 Products

2.1 MANUFACTURERS AND CSA LABELS

- .1 Visible and legible, after equipment is installed.

2.2 MATERIALS AND EQUIPMENT

- .1 Equipment and material to be CSA certified. Where there is no alternative to supplying equipment which is not CSA certified, obtain special approval from Electrical Inspection Department.
- .2 Factory assemble control panels and component assemblies.

2.3 WARNING SIGNS

- .1 As specified and to meet the requirements of the Authority Having Jurisdiction and the Consultant.
- .2 Decal signs, minimum size 175mm x 250mm.

2.4 FINISHES

- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
 - .1 Paint indoor switchgear and distribution enclosures light grey to EEMAC 2Y-1-1958.
- .2 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.
- .3 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.

2.5 EQUIPMENT IDENTIFICATION

- .1 Identify electrical equipment with nameplates matching building's standard. Label existing equipment noted on drawings. Use the following as a guide:
- .2 Nameplates:
 - .1 Lamicoid 3mm thick plastic engraving sheet, mechanically attached with self tapping screws.
 - .2 Nameplate colors shall be as follows:
 - .1 Normal power: Black face with white letters;
 - .2 Standby power: Blue face with white letters.
 - .3 UPS power: Green with white letters.
 - .3 Nameplate sizes shall be as follows

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
- .3 Labels:
 - .1 Embossed plastic labels with 6mm high letters unless specified otherwise.
- .4 Wording on nameplates and labels to be approved by Consultant prior to manufacture.
- .5 Allow for average of twenty-five (25) letters per nameplate and label.
- .6 Identification to be English

- .7 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
- .8 *Identify equipment with Size 3 labels engraved "ASSET INVENTORY No. [___]".* Number as and if directed by Consultant.
- .9 Disconnects, starters and contactors: indicate equipment being controlled and voltage.
- .10 Terminal cabinets and pull boxes: indicate system and voltage.
- .11 Label all receptacles with branch circuit label indicating panel name and branch circuit number. Use Brother P-Touch device or similar. Labels are to be white with black lettering.

2.6 WIRING IDENTIFICATION

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

2.7 CONDUIT AND CABLE IDENTIFICATION

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

	Prime	Auxiliary
UPS power up to 250 V	Blue	Yellow

Part 3 Execution

3.1 PROJECT CLOSEOUT REQUIREMENTS

- .1 The following items are required for the Contractor to provide to the Electrical Consultant prior to releasing a Schedule C-B.
 - .1 Final record drawings (as-built)
 - .2 Maintenance manual
 - .3 Warranty letter
 - .4 System briefing to Owner and Departmental Representative
 - .5 Electrical final from AHJ
 - .6 Fire stopping letter
 - .7 Seismic restraint
 - .8 Single line electrical diagram under plexiglass

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

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

1.2 REGULATORY REQUIREMENTS

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

1.3 SCOPE

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

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

1.4 SHOP DRAWINGS & SUBMITTALS

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

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 GENERAL

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

3.2 CONDUITS

- .1 Provide restraint installation information and details on conduit and equipment as indicated below:
- .2 Vertical Conduit:
 - .1 Attachment - Secure vertical conduit at sufficiently close intervals to keep the conduit in alignment and carry the weight of the conduits and wiring. Stacks shall be supported at their bases and, if over 2 stories in height, at each floor by approved metal floor clamps.
 - .2 At vertical conduit risers, wherever possible, support the weight of the riser, at a point or points above the center of gravity of the riser. Provide lateral guides at the top and bottom of the riser, and at intermediate points not to exceed 9.2 m [30 ft] o.c.
 - .3 Riser joints shall be braced or stabilized between floors.
- .3 Horizontal Conduits:
 - .1 Supports - Horizontal conduit shall be supported at sufficiently close intervals to keep it in alignment and prevent sagging.
 - .2 EMT tubing - tubing shall be supported at approximately 1.2 m [4 ft] intervals for tubing.

- .4 Provide transverse bracing at 12.2 m [40 ft] intervals maximum unless otherwise noted. Provide bracing at all 90° bend assemblies, and pull box locations.
- .5 Provide longitudinal bracing at 24.4 m [80 ft] intervals maximum unless otherwise noted.
- .6 Do not brace conduit runs against each other. Use separate support and restraint system.
- .7 Support all conduits in accordance with the capability of the pipe to resist seismic load requirements indicated.
- .8 Trapeze hangers may be used. Provide flexible conduit connections where conduits pass through building seismic or expansion joints, or where rigidly supported conduits connect to equipment with vibration or seismic isolators.
- .9 A conduit system shall not be braced to dissimilar parts of a building or two dissimilar building systems that may respond in a different mode during an earthquake. Examples: wall and a roof; solid concrete wall and a metal deck with lightweight concrete fill.
- .10 Provide large enough conduit sleeves through walls or floors to allow for anticipated differential movements with firestopping where required.
- .11 It is the responsibility of the contractor to ascertain that an appropriate size restraint device be selected for each individual piece of equipment. Submit details on shop drawings. Review with seismic Engineer and submit shop drawings to consultants for their reference.

3.3 FLOOR MOUNTED EQUIPMENT

- .1 Bolt all equipment, e.g. modular UPS and battery cabinets to the structure. Design anchors and bolts for seismic force applied horizontally through the center of gravity to a seismic force of 0.5g. For equipment which may be subject to resonances, use a nominal 1.0 g seismic force.
- .2 Provide flexible conduit connections between floor mounted equipment to be restrained and its adjacent associated electrical equipment.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 This section includes materials and installation for tested firestopping systems as follows:
 - .1 Penetrations for the passage of duct, cable, cable tray, conduit, piping, electrical busways and raceways through fire-rated separations.

1.2 REFERENCES

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

1.3 QUALITY ASSURANCE

- .1 Contractor's certified installer, or manufacturer's direct installation trainer to assist with initial installation of firestop systems to ensure appropriate contractor system selection and installation procedures.
- .2 Firestop System application, products and installation must meet requirements of a listed system in accordance with CAN/ULC-S115, tested to provide the appropriate fire (and temperature if applicable) rating for the penetrated assembly. Systems may be approved by any Standards Council of Canada approved testing agency.

1.4 SUBMITTALS

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

1.5 INSTALLER QUALIFICATIONS

- .1 Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having the necessary training to select and install manufacture's products per applicable requirements. A supplier's willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer. Qualification should consist of training, successful completion of testing based on the Firestopping Contractors International Association Manual of Practice, and continuing education.
- .2 The work is to be installed by a contractor with at least one of the following qualifications:
 - .1 ULC Qualified Firestop Contractor
 - .2 Hilti Accredited Fire Stop Specialty Contractor
 - .3 Nuco Accredited Fire Stop Installer
 - .4 Other approved manufacturer qualification program

1.6 DELIVERY, STORAGE, AND HANDLING

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

- .2 Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.
- .3 Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements.
- .4 Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.
- .5 Do not use damaged or expired materials.

1.7 PROJECT CONDITIONS

- .1 Do not use materials that contain flammable solvents.
- .2 Scheduling
 - .1 Schedule installation of CAST IN PLACE firestop devices after completion of floor formwork, metal form deck, or composite deck but before placement of concrete.
 - .2 Schedule installation of Drop-In firestop devices after placement of concrete but before installation of the pipe penetration. Diameter of sleeved or cored hole to match the listed system for the device
 - .3 Schedule installation of other firestopping materials after completion of penetrating item installation but prior to covering or concealing of openings.
- .3 Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.
- .4 Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.
- .5 During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

Part 2 Products

2.1 FIRESTOPPING, GENERAL

- .1 Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.
- .2 Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.
- .3 For penetrations that are anticipated to be re-used (communication cable-trays, riser shaft sleeves, etc.), use a firestopping system that is re-enterable without the use of additional materials or detailed knowledge of the system (EZ-Path, Flamestopper, Speedsleeve or equivalent).

2.2 MATERIALS

- .1 Use only firestop products that have been tested and approved for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.
- .2 Provide Departmental Representative with ULC listed system approved for fire stopping prior to fire stopping penetrations.

Part 3 Execution

3.1 PREPARATION

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

3.2 COORDINATION

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

3.3 INSTALLATION

- .1 Regulatory Requirements: Install firestop materials in accordance with ULC Fire Resistance Directory or equivalent.
- .2 Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration and construction joint materials.
 - .1 Seal all holes or voids made by penetrations to ensure an air and water resistant seal.
 - .2 Consult with mechanical engineer, project manager, and damper manufacturer prior to installation of ULC firestop systems that might hamper the performance of fire dampers as it pertains to duct work.
 - .3 Protect materials from damage on surfaces subjected to traffic.

3.4 FIELD QUALITY CONTROL

- .1 Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.
- .2 Keep areas of work accessible until inspection by authority having jurisdiction.

- .3 Inspection of through-penetration firestopping shall be performed in accordance with ASTM E 2174, "Standard Practice for On-Site Inspection of Installed Fire Stops" or other recognized standard.
- .4 Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.

3.5 IDENTIFICATION

- .1 Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:
 - .1 The words: "Warning -Through Penetration Firestop System-Do Not Disturb. Notify Building Management of Any Damage."
 - .2 Contractor's Name, address, and phone number.
 - .3 Through-Penetration firestop system designation of applicable testing and inspecting agency.
 - .4 Date of Installation.
 - .5 Through-Penetration firestop system manufacturer's name.
 - .6 Installer's Name.

END OF SECTION

Part 1 General

1.1 SCOPE OF WORK

- .1 Remove all redundant or abandoned electrical equipment, devices, wiring, cabling, raceways, wireways at associated devices serving the existing UPS system as noted on drawings. This shall include all wiring outside the area of work that serves the UPS room, except breakers that become surplus in existing panels. These breakers shall be labeled as spares, unless specifically stated to be reused.
- .2 The Electrical Division shall take note that the demolition will be done in an occupied building that is normally occupied during the day. Maintain electrical and as required to minimize services disruption.
- .3 The Electrical Division shall also take note of the dust containment requirements as outlined in the front end specification.
- .4 Any discrepancies appearing on the drawings or in this specification are to be brought to the attention of the Consultant who will provide instruction.
- .5 Where devices are not shown on the new plans in walls that are not being removed, such devices are to be reinstated and remain.
- .6 **All** existing branch circuits for **existing panelboards** designated “**existing circuit**” as noted in Panelboard Schedules in specifications are to be tested and traced to source/termination point to confirm circuit is currently in use and in operation. **All existing unused redundant branch circuits wiring shall be completely removed and the related breakers labelled as “spare”**. Provide upgraded typed panel directories to the satisfaction of the Departmental Representative.
- .7 **All** existing branch circuits re-connected to **new panelboards** designated “**Reconnected Exist. Re-Used Circuit**”, as noted in panelboard schedules in specifications, are to be tested and traced to source/termination point to conform circuit is currently in use and in operation. **All** existing unused redundant or abandoned branch circuits wiring, outlets, and devices shall be completely removed, and the associated breakers are to be re-labelled as “**spares**”.
- .8 All surplus electrical equipment, devices, and luminaires shall be considered Owner’s property. Determine from the Departmental Representative which materials are required to be retained, and transport and store such items at a location as directed by the Departmental Representative. All other surplus materials such as conduit, wiring, devices, etc. shall be removed from the site. Request a signed receipt for surplus material turned over to the Owner and provide a copy of same to Departmental Representative.
- .9 Continuity of power and communication shall be maintained or restored promptly where services to other portions of a site are affected by renovation or demolition that is outlined on the architectural, structural, mechanical or electrical plans or specifications.

- .10 Test all concrete slabs requiring cutting or coring by **x-ray testing** and opening a small sample area to obtain the depth of conduit runs. Avoid excessive cutting of slabs to depths that may interfere with existing conduits that are to be retained. Repair all damaged conduits and wiring that are to be retained. Allow for such repair in tender sum. The Departmental Representative may consider an extra if an unexpected large number of conduits are unavoidably damaged.
- .11 When any cutting of walls, ceiling, or floor in electrical rooms is part of the contract **all** electrical equipment shall be sealed from dust. At completion of work the room and all electrical components shall be fully vacuumed out, except primary voltage gear (exceeding 750 volts). Primary gear shall be cleaned out if the project requires that the gear be de-energized. At time of cleaning, a visual check shall be made of all terminations, and any discoloring brought to the attention of the Departmental Representative.

1.2 RELATED SECTIONS

- .1 Common Work Results – Electrical 26 05 00.

1.3 SUSTAINABLE REQUIREMENTS

- .1 Materials and products in accordance with Division 01 Sustainable Requirements: Construction.
- .2 Do verification requirements in accordance with Division 01 Sustainable Requirements: Contractor's Verification.

1.4 COMPLETENESS

- .1 The electrical installation and reinstallation shall be carried out to present codes and to at least as good a workmanship level as the original.
- .2 Test the completed installation to ensure all aspects are fully functional. Unless noted in writing to the Departmental Representative before the work is commenced, all systems are assumed to function fully and correctly and must do so at completion of contract.

1.5 ASBESTOS

- .1 It is understood that this site is asbestos free. If during renovations / demolition, asbestos is discovered (or material suspected to be asbestos), all work in that area shall immediately cease and the General Contractor advised. The General Contractor shall take appropriate action without delay to verify presence of friable asbestos and shall be responsible for the removal of all friable asbestos.

Part 2 Products

2.1 STANDARDS

- .1 Refer to applicable material standards in other specification sections and/or as detailed on drawings.

Part 3 Execution

3.1 DEMOLITION

- .1 Demolition shall be carried out in strict conformance to provincial, local and municipal authorities and Part 8 of the BC Building Code current edition.
- .2 All redundant electrical components in the areas of demolition excluding those specifically identified in the following clauses shall become the property of the Electrical Division and shall be removed from site.

3.2 DISRUPTION TO OPERATIONS

- .1 Contractor to issue a scheduled shutdown time and coordinate installation of the new equipment as appropriate. All equipment installed and modified requires testing before startup.
- .2 Contractor to provide temporary connections to all required equipment for temporary power during the installation of any new equipment.

3.3 INTERRUPTION TO EXISTING SERVICES

- .1 Circuit: power, voice/data, fire alarm, control etc. which are disrupted during demolition and are essential, shall be made good immediately. All such activities shall be coordinated with Department Representative prior to commencing work. The Electrical Contractor shall identify these circuits to the Consultant. Specific tasks involving the demolition of essential circuits will require that the contractor obtain permission from the Departmental Representative before proceeding.
- .2 Circuits disrupted by floor cutting or drilling (ie. buried cables) to be brought to the attention of the consultant. Obvious systems disturbed because due care and attention was not followed, shall be repaired immediately at no additional cost to owner.
- .3 Where interruption of existing services is necessary as a part of the renovation, contractor must coordinate timing with base building maintenance 10 working days prior to interruption.

3.4 ABANDONED SERVICES

- .1 All abandoned conduit and wire shall be removed and disposed of by the Electrical Contractor.
- .2 Remove all accessible (eg. Surface) wiring and cables back to source.
- .3 All remaining circuits to be rerouted as required and suitably secured to the building structure.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

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

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-C22.2No.18 latest edition, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.
 - .2 CSA C22.2No.65 latest edition, Wire Connectors.
- .2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)
 - .1 EEMAC 1Y-2, latest edition, Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).
- .3 National Electrical Manufacturers Association (NEMA)

Part 2 Products

2.1 MATERIALS

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

Part 3 Execution

3.1 INSTALLATION

- .1 Remove insulation carefully from ends of conductors and:
 - .1 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 CSA C22.2 No.65.
 - .3 Install fixture type connectors and tighten. Replace insulating cap.
 - .4 Install bushing stud connectors in accordance with EEMAC 1Y-2.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 This section specifies copper, ACM alloy and aluminum conductors rated 0-1000 Volts and the most common electrical insulation and covering materials.
- .2 This section does not include fire rated building wire to ULC S139 and CSA C83, marine, hazardous, mining, instrumentation, communication and fire alarm wiring.

1.2 REFERENCES

- .1 CSA C22.2 No .0.3 latest edition, Test Methods for Electrical Wires and Cables.
- .2 CAN/CSA-C22.2 No. 131 latest edition, Type TECK 90 Cable.

1.3 GENERAL REQUIREMENTS

- .1 Typically use insulated 98% conductivity copper conductor wiring enclosed in EMT (steel) conduit for the general wiring systems unless otherwise indicated.
- .2 Aluminium conductors NOT permitted.
- .3 Teck cable may only be used where specifically indicated on the drawings or in the specifications. Where permitted, Teck wiring up to 750 system volts to be PVC jacketed armoured cable, multi-copper conductor type Teck90 1000 volt having a PVC jacket with FT-4 flame spread rating.
- .4 Flexible AC90 armoured cabling (BX) shall not be used.
- .5 Non-metallic sheathed wiring is not to be used on this project.
- .6 All wiring supplying power to the emergency power distribution system (including generator feeder to ATS, normal feeder to ATS and all downstream feeders) must be minimum 1hr rated in all buildings and 2hr rated when classified as High Building under VBBL, BCBC or the code consultant report.

Part 2 Products

2.1 WIRE AND CABLE GENERAL

- .1 Conductors: stranded for 10 AWG and larger. Minimum size #12 AWG.
- .2 Insulation to be 600 volt RW90XLPE (X link) for the general building wiring in conduit.
- .3 Main feeders to be conduit and copper insulated wiring unless otherwise noted on drawings. Provide ground wiring for all conduits. Increase conduit size as required.
- .4 Conductors to be colour-coded. Conductors No.10 gauge and smaller shall have colour impregnated into insulation at time of manufacture. Conductors size No.8 gauge and larger may be colour-coded with adhesive colour coding tape, but only black insulated conductors shall be employed in this case, except for neutrals which shall be white wherever possible. Where colour-coding tape is utilized, it shall be applied for a minimum of 50 mm at terminations, junctions and pullboxes and conduit fittings. Conductors not to be painted.

2.2 TECK CABLE

- .1 Teck cable shall be used only when specifically noted on drawings.
- .2 Cable: to CAN/CSA-C22.2 No. 131 (latest edition).
- .3 Conductors:
 - .1 Grounding conductor: copper.
 - .2 Circuit conductors: copper, size as indicated.
- .4 Insulation:
 - .1 Type: ethylene propylene rubber.
 - .2 Chemically cross-linked thermosetting polyethylene rated type RW90, 600 V.
- .5 Inner jacket: polyvinyl chloride material.
- .6 Armour: interlocking galvanized steel or aluminum.
- .7 Overall covering: thermoplastic polyvinyl chloride material.
- .8 Fastenings:
 - .1 One hole steel straps to secure surface cables 50 mm and smaller. Two hole steel straps for cables larger than 50 mm.
 - .2 Channel type supports for two or more cables at 1000 mm centers.
 - .3 Threaded rods: 6 mm dia. to support suspended channels.
- .9 Connectors:
 - .1 Approved for TECK cable.

2.3 CONTROL CABLES

- .1 Type LVT: 2 soft annealed copper conductors, sized as indicated, with thermoplastic insulation, outer covering of thermoplastic jacket.
- .2 Low energy 300 V control cable: solid annealed copper conductors sized as indicated, with TWH over each conductor and overall covering of PVC jacket.

Part 3 Execution

3.1 INSTALLATION OF BUILDING WIRES

- .1 Install wiring as follows:
 - .1 In conduit systems in accordance with Section 26 05 34.
 - .2 In wireways and auxiliary gutters in accordance with Section 26 05 37.
 - .3 All wires are to be pulled in together in a common raceway, using liberal amounts of Compound 77 lubricant.
 - .4 No combining of circuits onto common neutral will be permitted. Use 2 pole or 3 pole breakers for combined circuits, no connector clips will be allowed.

3.2 INSTALLATION OF TECK CABLE 0 -1000 V

- .1 Install cables.
 - .1 Group cables wherever possible on channels.
- .2 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors - 0 - 1000 V.

3.3 INSTALLATION OF CONTROL CABLES

- .1 Control cable and conduit will be supplied and installed by the Electrical Contractor in per with the UPS supplier requirements.
- .2 Ground control cable shield.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 This section specifies the materials and installation for grounding electrical systems rated 750V or less.

1.2 REFERENCES

- .1 ANSI/IEEE 837- 2004 – Standard for Qualifying Permanent Connections Used in Substation Grounding.
- .2 CSA C22.2 No. 41 - 2007 – Grounding and Bonding Equipment.

Part 2 Products

2.1 EQUIPMENT

- .1 Insulated grounding conductors: green, copper conductors, sized as per C.E.C.
- .2 Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:
 - .1 Grounding and bonding bushings.
 - .2 Protective type clamps.
 - .3 Bolted type conductor connectors.
 - .4 Bonding jumpers, straps.
 - .5 Pressure wire connectors.

Part 3 Execution

3.1 INSTALLATION GENERAL

- .1 Install connectors in accordance with manufacturer's instructions.
- .2 Use mechanical connectors for grounding connections to equipment provided with lugs.
- .3 Soldered joints not permitted.
- .4 Install bonding wire for flexible conduit, connected at both ends to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit.
- .5 Install flexible ground straps for bus duct enclosure joints, where such bonding is not inherently provided with equipment.
- .6 Bond single conductor, metallic armoured cables to cabinet at supply end and load end.

3.2 SYSTEM AND CIRCUIT GROUNDING

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

3.3 EQUIPMENT GROUNDING

- .1 Install grounding connections from service entrance ground bus to equipment ground bus in all equipment including but not limited to the: modular UPS, UPS battery cabinet and bypass cabinet.

3.4 FIELD QUALITY CONTROL

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

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 This section specifies U shape support channels either surface mounted or suspended.

Part 2 Products

2.1 SUPPORT CHANNELS

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

Part 3 Execution

3.1 INSTALLATION

- .1 Secure equipment to surfaces with lead anchors or nylon shields as required.
- .2 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.
- .3 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.
- .4 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.
- .5 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.
- .6 Suspended support systems.
 - .1 Support individual cable or conduit runs with 6 mm dia threaded rods and spring clips.
 - .2 Support 2 or more cables or conduits on channels supported by 6 mm dia threaded rod hangers where direct fastening to building construction is impractical.
- .7 For surface mounting of two or more conduits use channels at 1.5m on centre spacing.
- .8 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.
- .9 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.
- .10 Do not use wire lashing or perforated strap to support or secure raceways or cables.

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

END OF SECTION

Part 1 General

1.1 Section Includes

- .1 This section specifies splitters, junction, pull boxes and cabinets and installation.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CSA C22.1, Canadian Electrical Code, Part 1, 20th Edition.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Provide shop drawings: in accordance with Section 01 33 00 - Submittal Procedures.

1.4 DELIVERY, STORAGE AND HANDLING

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

Part 2 Products

2.1 JUNCTION AND PULL BOXES

- .1 Construction: welded steel enclosure.
- .2 Covers Flush Mounted: 25 mm minimum extension all around.
- .3 Covers Surface Mounted: screw-on flat covers.

Part 3 Execution

3.1 JUNCTION, PULL BOXES AND CABINETS INSTALLATION

- .1 Install pull boxes in inconspicuous but accessible locations.
- .2 Mount cabinets with top not higher than 2 m above finished floor except where indicated otherwise.

- .3 Only main junction and pull boxes are indicated. Install additional pull boxes as required by CSA C22.1.

3.2 IDENTIFICATION

- .1 Equipment Identification: to Section 26 05 00 - Common Work Results for Electrical.
- .2 Identification Labels: size 2 indicating system name, voltage, and phase.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

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

Part 2 Products

2.1 OUTLET AND CONDUIT BOXES – GENERAL

- .1 Size boxes in accordance with CSA C22.1.
- .2 102 mm square or larger outlet boxes as required for special devices.
- .3 Gang boxes where wiring devices are grouped. Do not use sectional boxes.
- .4 Blank cover plates for boxes without wiring devices.
- .5 Combination boxes with barriers where outlets for more than one system are grouped.

2.2 SHEET STEEL OUTLET BOXES

- .1 Electro-galvanized steel single and multi-gang device boxes for flush installation, minimum size 76 x 51 x 38 mm or as indicated.
- .2 Larger 102 mm square x 54mm deep outlet boxes to be used for single gang when more than one conduit enters one side, for telecommunication outlets (for slack storage), or for flush mounting devices in finished plaster and/or tile walls. Provide raised device covers as required.

2.3 SURFACE CONDUIT BOXES

- .1 Cast FS or FD aluminum boxes with factory-threaded hubs and mounting feet for surface wiring of switches and receptacles.

2.4 FITTINGS – GENERAL

- .1 Bushing and connectors with nylon insulated throats.
- .2 Knock-out fillers to prevent entry of foreign materials.
- .3 Conduit outlet bodies for conduit up to 35 mm. Use pull boxes for larger conduits.
- .4 Double locknuts and insulated bushings on sheet metal boxes.

Part 3 Execution

3.1 INSTALLATION

- .1 Typical outlet box mounting heights are indicated in Section 26 05 00 or refer to wiring device and communication specification sections and to architectural layouts for particular mounting heights of outlet boxes where indicated.
- .2 Support boxes independently of connecting conduits.
- .3 Ceiling outlet boxes to be provided for each surface mounted fixture or row of fixtures installed in other than T bar ceilings with removable tiles.

- .4 Fill open boxes with paper, sponges, foam or similar approved material to prevent entry of construction material. Remove upon completion of work.
- .5 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.
- .6 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Reducing washers are not to be used.
- .7 All outlet boxes to be flush mounted in all areas, excluding mechanical rooms, electrical rooms, and above removable ceilings.
- .8 Adjust position of outlets in finished masonry walls to suit masonry course lines. Coordinate cutting of masonry walls to achieve neat openings for all boxes. All cutting of masonry work for installation of electrical fittings to be done using rotary cutting equipment.
- .9 No sectional or handy boxes to be installed.
- .10 Provide vapour barrier wrap or boots behind outlets mounted in exterior walls. Maintain integrity of the vapour barrier and insulation to prevent condensation through boxes.
- .11 Coordinate location and mounting heights of outlets above counters, benches, splash-backs and with respect to heating units and plumbing fixtures. Coordinate with architectural details.
- .12 Outlets installed back to back in party stud walls to be off-set by one stud space.
- .13 Back-boxes for all communications systems equipment to be provided in accordance with specific manufacturer's recommendations and as specified in the communications sections of these specifications.
- .14 Separate outlets located immediately alongside one another to be mounted at exactly the same height above finished floor. Similarly, outlets mounted on a wall in the same general location at varying heights to be on the same vertical centre-line unless otherwise noted.
- .15 Where outlet boxes penetrate an assembly with a fire-resistance rating (fire separation), ensure that the boxes are externally tightly fitted with an approved non-combustible material to prevent passage of smoke or flame in the event of a fire. Such boxes may not exceed 0.016 mm² per NBCC 3.1.9.2.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

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

1.2 REFERENCES

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

1.3 BASIC WIRING METHODS

- .1 Partition walls and ceilings:
 - .1 All wiring to be run in EMT conduit for:
 - .1 Branch circuits.
 - .2 Distribution feeders and sub-feeders.
 - .3 Surface wiring in electrical and mechanical rooms.
- .2 Surface raceways - interior:
 - .1 All surface raceways shall be EMT, except if located without protection in areas susceptible to damage, which shall be rigid steel conduit.

1.4 LOCATION

- .1 Electrical drawings are diagrammatic and do not show all conduits, wire, cable, etc. Electrical contractor to provide conduit, wire cable, etc., for a complete operating job to meet in all respects the intent of the drawings and specifications.
- .2 Review the exact location criteria of each electrical outlet and device with the Departmental Representative prior to rough-in. Relocate any item installed without confirmation as required by departmental representative at no cost to the Owner as long as the relocation is within 3m of the location originally shown on the electrical drawings.
- .3 All outlets located on exterior walls to be complete with moulded plastic vapour barriers to maintain integrity of wall vapour barrier system.
- .4 All raceways and wiring shall be installed concealed in building fabric, except for mechanical and electrical rooms where they shall be installed on the surface.
- .5 All outlet boxes, junction boxes, and cabinets to hold electrical devices shall be mounted so the equipment can be flush mounted unless indicated otherwise.
- .6 All junction boxes mounted, out of necessity, on surface of solid walls shall be painted to match adjacent surface, with junction boxes painted to match designated systems.

Part 2 Products

2.1 EMT RACEWAY

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

2.2 OUTLET BOXES AND JUNCTION BOXES

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

2.3 CONDUIT FASTENINGS

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

2.4 CONDUIT FITTINGS

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

2.5 FISH CORD

- .1 Polypropylene.

Part 3 Execution

3.1 INSTALLATION

- .1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.
- .2 Conceal conduits except in mechanical and electrical service rooms and in unfinished areas.
- .3 Use rigid galvanized steel threaded conduit where specified.
- .4 Use epoxy coated conduit underground corrosive areas.
- .5 Use electrical metallic tubing (EMT) except in cast concrete and above 2.4 m not subject to mechanical injury.
- .6 Install conduit sealing fittings in hazardous areas. Fill with compound.
- .7 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.

- .8 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.
- .9 Install fish cord in empty conduits.
- .10 Dry conduits out before installing wire.
- .11 Conduit bends shall be made with no more than 10% flattening of the conduit. Bends shall be smooth throughout deformations.
- .12 On surface wall runs, all conduit shall be installed in true vertical or horizontal direction and on ceilings in true 90 degree angles or parallel to the walls. Crossings of conduits shall also be made at 90 degree angles. Parallel running conduit shall be kept on equal spacing on the entire length of run including bends.
- .13 All conduits shall be fastened to structure with steel straps.
- .14 Where more than three conduits are run parallel in ceiling cavity, they shall be installed on cantruss type channel, complete with all manufacturers fittings to secure channel to structure and to conduit.
- .15 Raceways extending out concrete slabs shall be securely protected using rebar stubs or similar material. All duct stubs are to be kept sealed during construction

3.2 SURFACE CONDUITS

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

3.3 CONCEALED CONDUITS

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

3.4 FIRESTOPPING

- .1 Apply ULC approved fire stopping assembly to all conduit penetrations passing through fire rated walls and floors.
- .2 Provide shop drawings showing details for each type of application on the project. Shop drawings shall include catalogue data and installation details.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 This Section specifies molded case circuit breakers and their installation.

1.2 SCOPE OF WORK

- .1 Provide and install new breakers in existing panelboards as indicated on the drawings, single line diagram, panel schedules and these specifications.
- .2 Types of panelboards in this section include the following:
 - .1 CDP type Power distribution panelboards.

1.3 REFERENCES

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

1.4 Product Information

- .1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Shop drawings to include custom cover to match new breaker assembly and existing enclosure.

Part 2 Products

2.1 BREAKERS GENERAL

- .1 Moulded-case circuit breakers to CSA C22.2 No. 5
- .2 Bolt-on moulded case circuit breaker: quick- make, quick-break type, for manual and automatic operation.
- .3 Plug-in moulded case circuit breakers: quick- make, quick-break type, for manual and automatic operation.
- .4 Common-trip breakers: with single handle for multi-pole applications.
- .5 Circuit breakers with interchangeable trips.
- .6 Circuit breaker interrupting capacity to match existing rating of adjacent breakers in existing panels.

- .7 Moulded case circuit breakers shall be of one manufacturer and match distribution equipment manufacturer.

2.2 MAGNETIC BREAKERS

- .1 Moulded case circuit breaker to operate automatically by means of magnetic tripping devices to provide instantaneous tripping for short circuit protection.

2.3 SOLID STATE TRIP BREAKERS

- .1 Moulded case circuit breaker to operate by means of solid-state trip unit with associated current monitors and self-powered shunt trip to provide inverse time current trip under overload condition, and long time, short time and instantaneous tripping for phase fault short circuit protection.

Part 3 Execution

3.1 Installation

- .1 Replace breakers as indicated and mount securely, plumb true and square, to existing enclosure.
- .2 Connect new and loads to circuits as indicated. Do not splice conductors in panelboard. Ensure breaker and neutral bus locations suit existing panel and conductor arrangements.
- .3 Connect neutral conductors to common neutral bus with respective neutral identified.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 This specification describes the operation and functionality of a continuous duty, three-phase, solid-state, static Uninterruptible Power Supply (UPS) hereafter referred to as the UPS.
- .2 Each UPS system will consist of a series of modules that are assembled in a common frame to provide a total power rating as noted.

1.2 REFERENCES

- .1 American National Standards Institute (ANSI)
 - .1 ANSI S1.13-1995(R1999) Measurement of Sound Pressure Levels in Air.
 - .2 ANSI S1.4-1983(R2001) with Amd. S1.4A-1995, Specification for Sound Level Meters.
- .2 Canadian Standards Association (CSA International)
 - .1 CSA C813.1-01, Performance Test Method for Uninterruptible Power Supplies.
- .3 Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - .1 ANSI/IEEE 519, "Guide for Harmonic Control and Reactive Compensation of Static Power Converters" (copyrighted by IEEE, ANSI-approved).

1.3 GENERAL DESCRIPTION

- .1 Included Features of the UPS:
 - .1 The UPS utilizes double conversion online topology.
 - .2 The UPS features internal static bypass, external maintenance bypass and input power factor correction.
 - .3 The UPS system shall consist of a series of identical, hot swappable UPS modules that sum to the total power rating noted in these documents. These modules will act to provide internal redundancy such that the failure of one UPS module does not compromise the operation of the UPS within the remaining load capability.
 - .4 The system also includes the following features.
 - .1 Field-replaceable battery modules
 - .2 Removable input/output wiring trays
 - .3 Battery disconnects
 - .4 Emergency Power Off (EPO)
 - .5 An integrated UPS Network Management Card 2 with Environmental
- .2 **Performance, Design, and Configurations:** The UPS and associated equipment operates in conjunction with a primary power supply and an output distribution system to provide quality uninterrupted power for electronic equipment load.
 - .1 This specification describes the performance, functionality, and design of the UPS, the external Battery Systems, and connectivity solutions.

- .2 All programming and miscellaneous components for a fully operational system as described in this section are available as part of the UPS.
- .3 This UPS must fit into specific spatial requirements as noted within the contract drawings. Refer to these drawings and site conditions to ensure that the UPS System will fit within the space noted, with all required clearances maintained.

1.4 SYSTEM DESCRIPTION

- .1 Mechanical Design
 - .1 The UPS is to be of a modular, 30kVA UPS rack scalable design and N+1 capable. The minimum frame size shall accommodate an additional 10kVA of installed power output for future scalability.
- .2 System Characteristics
 - .1 System Capacity:
 - .1 30kVA /30kW unity power factor 120/208V three phase output,
 - .2 **Efficiency:** The UPS efficiency shall meet or exceed 94%.
 - .3 Input:
 - .1 AC Input Nominal Voltage:
 - .1 120/208 VAC, three phase, hardwired.
 - .2 AC Input Voltage Window:
 - .1 160 – 280 Vac (any line to line) at full load.
 - .2 100 – 280 Vac (any line to line) at 50% load.
 - .3 **Input Frequency Range:** 45-65 Hz, auto-selecting.
 - .4 **Input Power Factor:** >0.98 lagging @ 100% load
 - .5 Input Current Distortion:
 - .1 Less than 4% at 100% load at nominal voltage.
 - .4 UPS Output:
 - .1 AC Output Nominal Voltage:
 - .2 120/208 V three phase with neutral.
 - .3 Output Connectors:
 - .1 Hardwire: 4-wire (3Ph + N + G)
 - .4 AC output static voltage regulation:
 - .1 +/-1%.
 - .5 AC output dynamic voltage regulation:
 - .1 +/-5%, for 10 to 90% load step at <50 ms recovery time:
 - .6 Output Voltage Harmonic Distortion:
 - .1 <2% THD maximum for a 100% linear load
 - .2 <5% THD maximum for a 100% non-linear load
 - .7 Overload Rating:
 - .1 Normal Operation (Online):
 - .1 150% for 30 seconds
 - .2 125% for 1 minute

- .3 105% continuous
- .2 Bypass Operation: Overload is limited by the external input circuit breaker feeding the UPS:
- .8 Output Power Factor Rating:
 - .1 0.8 lagging to 0.8 leading at rated load.
- .9 Output Frequency:
 - .1 50/60 +/- 3Hz (Tracking) or 50/60 +/- 0.1 Hz (free-running) or 50/60 +/- 1 Hz (free-running), user-selectable.

1.5 MODES OF OPERATION

- .1 **Normal:** The UPS output power stage (inverter) constantly recreates the UPS output voltage waveform by converting the DC bus voltage to AC voltage through a set of IGBT switches. In both online operation and battery operation, the output power stage (inverter) creates an output voltage waveform independent of the mains input voltage waveform. Input voltage anomalies such as brown-outs, spikes, surges, sags, and outages do not affect the amplitude or sinusoidal nature of the recreated output voltage sine wave of the output power stage (inverter). The input Power Factor Correction (PFC) power stage and the output power stage (inverter) operate in an on-line manner to continuously regulate power to the critical load. The input PFC stage is capable of full battery recharge while simultaneously providing regulated power to the load for all line and load conditions within the range of the UPS specifications.
 - .1 **Overload Capability:** The output power stage (inverter) is capable of withstanding 150% overload for 30 seconds or 125% overload for 1 minute or 105% overload for an indefinite length of time.
 - .2 **Output Contactor:** The output power stage (inverter) is equipped with an output mechanical relay to provide physical isolation of the inverter from the critical bus. With this feature a failed inverter will be removed from the critical bus.
 - .3 **Battery Protection:** The inverter is provided with monitoring and control circuits to limit the level of discharge on the battery system.
- .2 **Battery:** Upon failure of the AC input source, the critical load continues being supplied by the output inverter, which derives its power from the internal battery system. There is no interruption in power to the critical load during both transfers to battery operation and retransfers from battery to normal operation. The UPS system consists of user-replaceable, cartridges within each hot-swappable UPS module.
 - .1 The batteries of the UPS models in this specification are maintenance-free, lithium ion type batteries.
 - .2 The batteries shall be flame retardant as per UL 94V2.
 - .3 The UPS shall incorporate a battery monitor system to continuously monitor the health of each battery module. This system shall notify the user in the event that a failed or weak battery module is found.
 - .4 UPS shall be expandable for additional runtime with additional UPS modules. These modules are hot-pluggable, allowing for easy and quick installation or replacement without the need for electrical wiring, electrician services or powering down of the UPS system.

- .3 **Charging:** Upon restoration of the AC input source, the UPS simultaneously recharges the battery and provides regulated power to the critical load.
 - .1 The intelligent battery management system contains a temperature monitoring circuit and compensation algorithm that regulates the battery charging voltage and current so as to optimize battery life. The UPS shall monitor the temperature of all battery packs and use the highest one as a reference to adjust the battery float voltage.
 - .2 The battery charging circuit remains active when in bypass or online states.
- .4 **Bypass:** During bypass operation the utility power is connected to the load, bypassing the internal converters. The system automatic bypass provides a transfer of the critical load from the Inverter output to the automatic bypass input source during times when the inverter cannot support the load. The UPS constantly monitors the output current, as well as the bypass source voltage, and inhibits potentially unsuccessful transfers to automatic bypass from taking place. The design of the automatic bypass switch power path consists of a heavy-duty electromechanical bypass relay or contactor.
 - .1 **Automatic Transfers:** An automatic transfer of load to bypass takes place if the load on the critical bus exceeds the overload rating of the UPS, if both normal and battery operation modes are unavailable, if the UPS has an internal fault, or if for any reason the UPS cannot support the critical bus. Automatic transfers of the critical load from bypass back to normal operation takes place when the overload condition is removed from the critical bus output of the system or when other causes are corrected. If the bypass mode becomes unavailable, the UPS will automatically switch to mains power. In the event that mains power is unavailable the system will switch to battery power.
 - .2 **Manual Transfers:** Manually initiated transfers to and from bypass may be initiated through the UPS computer interface (via serial or USB communications) or by engaging the bypass switch on the unit.

1.6 INPUT PFC POWER STAGE

- .1 **General:** The input Power Factor Correction (PFC) power stage of the UPS constantly rectifies the power imported from the mains input of the system, converting input mains AC power to DC power for precise regulation of the DC bus voltage, battery charging, and output power stage (inverter) regulated output power
- .2 Input Current Limit:
 - .1 The input converter shall control and limit the input current drawn from the utility supply to 150% of the UPS output.
 - .2 During conditions where input current limit is active, the UPS shall be able to support 100% load, charge batteries at 10% of the UPS output rating, and provide voltage regulation with mains deviation of up to +/-20% of the nominal input voltage.
 - .3 In cases where the source voltage to the UPS is nominal and the applied UPS load is equal to or less than 100% of UPS capacity, input current shall not exceed 130% of UPS output current, while providing full battery recharge power and importing necessary power for system losses.

- .3 Charging:
 - .1 The battery charging circuit contains a temperature monitoring circuit, which regulates the battery charging current to optimize battery life.
 - .2 The battery charging circuit remains active when the UPS is in automatic bypass and in normal operation.

1.7 OUTPUT POWER STAGE (INVERTER)

- .1 **General:** The UPS output power stage (inverter) constantly recreates the UPS output voltage waveform by converting the DC bus voltage to AC voltage through a set of IGBT-driven power converters. In both normal operation and battery operation, the output power stage (inverter) creates an output voltage independent of the mains input voltage. Input voltage anomalies such as brown-outs, spikes, surges, sags, and outages, shall not affect the amplitude or sinusoidal nature of the recreated output voltage sine wave of the output power stage (inverter).
- .2 **Overload Capability:** The output power stage (inverter) is capable of withstanding 150% overload for 30 seconds or 125% overload for 1 minute or 105% overload for indefinite length of time.
- .3 **Output Contactor:** The output power stage (inverter) is equipped with an output mechanical contactor to provide physical isolation of the inverter from the critical bus. With this feature a failed inverter will be removed from the critical bus.
- .4 **Battery Protection:** The inverter is provided with monitoring and control circuits to limit the level of discharge on the battery system.

1.8 DISPLAY AND CONTROLS

- .1 **Control Logic:** The UPS is controlled by an embedded microcontroller which performs the following functions:
 - .1 Monitoring the quality of the output voltage
 - .2 Monitoring vital parameters of the UPS
 - .3 Intelligent battery management
 - .4 Controlling the input and output power stage
 - .5 Remaining runtime calculation
 - .6 Self-diagnostics, self-test, and proactive fault detection
 - .7 Communication to the host server via a serial port
 - .8 Communication to the Network Management Card
- .2 **Display/Control Unit:** Located on the front of the UPS is a display/control unit.
 - .1 **Control Functions:** The following controls functions can be accomplished by use of the pushbutton switches or LCD display:
 - .1 Turn the UPS on
 - .2 Turn the UPS off
 - .3 Initiate a self-test to test the battery condition
 - .4 Silence an audible alarm
 - .5 Cold-start the UPS
 - .6 Display the input RMS voltage

- .2 **Display Data:** The following indicators are available on the Display/Control Unit:
 - .1 The UPS load LED bar
 - .2 The UPS is online
 - .3 The UPS is on battery
 - .4 The UPS is in bypass
 - .5 The UPS is overloaded
 - .6 The UPS is in fault state
 - .7 The battery needs to be replaced
 - .8 The battery capacity/utility voltage LED bar
- .3 **Communication Interface:** The following are contained within the UPS for remote communications with a network via web browser or SNMP.
 - .1 An RJ-45 serial interface port.
- .4 **Bypass switch:** On the panel of the UPS there shall be a switch that when engaged forces the UPS into bypass state provided the input voltage and frequency are within acceptable limits.
- .5 **Maintenance Bypass:** Externally mounted, fully rated bypass switch interlocked with UPS for correct operation.
- .6 **EPO switch:** UPS shall be equipped with an Emergency Power Off (EPO) terminal that can be wired so as to provide the means to instantaneously de-energize the UPS and its load from a remote location in case of emergency.
- .7 **Audible Alarms:** Using audio signal, the UPS will notify the user about important events. The following is the list of distinct audio alarms:
 - .1 The UPS is on battery
 - .2 The UPS is on battery and the remaining battery capacity is low
 - .3 The UPS has shut down due to low battery capacity
 - .4 The battery needs to be replaced
 - .5 The UPS is overloaded
 - .6 The UPS is in fault state
- .8 **Potential Free (Dry) Contacts:** The following dry alarm contacts shall be available on the UPS:
 - .1 The UPS is on battery
 - .2 The UPS is on battery and the remaining battery capacity is low
 - .3 The UPS is off
 - .4 The battery needs to be replaced
 - .5 The UPS is in bypass
 - .6 The UPS is overloaded;
 - .7 The UPS is in fault state.

1.9 Battery

- .1 The UPS battery is of modular construction made up of owner-replaceable, fused units. Each battery module is monitored to determine the highest battery unit temperature for use by the UPS battery diagnostic, and temperature compensated charger circuitry.

- .2 The batteries are to be lithium Nickel Manganese Cobalt Oxide (NMC).

1.10 ACCESSORIES

- .1 Software and Connectivity:
 - .1 **Network Management Card:** The Network Management Card allows one or more network management systems (NMSs) to monitor and manage the UPS in TCP/IP network environments.
 - .2 **Unattended Shutdown:** The UPS, in conjunction with a network interface card, is capable of gracefully shutting down one or more operating systems during the time when the UPS is on battery mode.
- .2 **Remote UPS Monitoring:** The following methods of remote UPS monitoring shall be available:
 - .1 **Web Monitoring:** Remote monitoring is available via a web browser such as Internet Explorer. Connect to building ethernet network and integrate for local network access.
 - .2 **Dry Contact Monitoring and Control:** The UPS must be equipped dry contact monitoring. Extend contact to local junction box for future use.

1.11 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Include:
 - .1 Outline sketch showing arrangement of meters, controls, recommended aisle spaces, battery rack, battery arrangement and dimensions.
 - .2 Dimensioned layout of actual UPS system assemblies and bypass switches situated in the prescribed location showing all clearances and access spaces.
 - .3 Shipping weight
 - .4 Schematic diagram showing interconnection of rectifier, inverter, battery, bypass switch, meters, controls and indicating lamps.
 - .5 Description of system operation, referenced to schematic diagram, for:
 - .1 Manual control during initial start-up and load transfer to bypass and back to inverter output;
 - .2 Inverter;
 - .6 System performance and reliability:
 - .1 Consider any deviation from the required output power waveform as failure in UPS and include estimate, with supporting calculations, of the Mean Time Between Failures (MTBF) expressed in hours.
 - .2 Provide estimate with supporting data for Mean Time To Repair factor (MTTR).
 - .7 Full load kVA output at unity power factor.
 - .8 Efficiency of system at 25%, 50%, 75% and 100% rated load.
 - .9 Type of ventilation: natural or forced.
 - .10 Battery:
 - .1 Number of cells;

- .2 Maximum and minimum voltages;
- .3 Type of battery;
- .4 Type of plates;
- .5 Catalogue data with cell trade name and type;
- .6 Size and weight of each cell;
- .7 Cell charge and discharge curves of voltage, current, time and capacity;
- .8 Derating factor for specified temperature range;
- .9 Nominal ampere hour capacity of each cell;
- .10 Maximum short circuit current;
- .11 Maximum charging current expected for fully discharged condition;
- .12 Recommended low voltage limit for fully discharged condition;
- .13 Expected life.
- .11 Heat losses at no load, 25%, 50%, 75% and 100% of rated output, in kW.
- .12 Cooling air required in m³/s.
- .13 List of recommended spare parts, tools and instruments with catalogue numbers and current prices.
- .14 Typical operation and maintenance manual.
- .15 Description of factory test facilities.
- .16 Manufacturer's maintenance capabilities including:
 - .1 Willingness to undertake maintenance contract;
 - .2 Number of trained personnel available;
 - .3 Location of trained personnel and repair facilities.

1.12 QUALITY ASSURANCE

- .1 Submit for approval to Departmental Representative, indicating and recording instruments calibration certificates, including meters installed as part of system, in accordance with Section 01 33 00 - Submittal Procedures.

1.13 CLOSEOUT SUBMITTALS

- .1 Provide data for incorporation into operation and maintenance manual specified in Section 26 05 00 – Common Work Results - Electrical.
- .2 Submit interim, draft final, and final Operation and Maintenance (OM) Manual. Final manual approved by Departmental Representative. Submit interim copies to Departmental Representative prior to notification of factory test date.
- .3 Operation and Maintenance Manual to include:
 - .1 Operation and maintenance instructions concerning design elements, construction features, component functions and maintenance requirements to permit effective operations maintenance and repair.
 - .2 Technical data:
 - .1 Approved shop drawings;
 - .2 Characteristic curves for automatic circuit breakers and protective devices;
 - .3 Project data;

- .4 Technical description of components;
- .5 Parts lists with names and addresses of suppliers.

1.14 DELIVERY, STORAGE AND HANDLING

- .1 Crating:
 - .1 Adequately enclosed and protected from weather and shipping damage by use of minimum 12 mm plywood with vapour barrier inside.
 - .2 For tractor train or sea shipment use double layer of vapour barrier and 19 mm plywood covering.
 - .3 Subassemblies may be packed separately.
 - .4 Label crates:
 - .1 Shipping address.
 - .2 Weight and dimensions
 - .3 Serial number of unit and brief description of contents.
 - .4 Stencilled with durable paint on at least two sides of each crate.
 - .5 List of contents:
 - .1 In weatherproof envelope stapled on outside of each crate;
 - .2 Copy placed inside each crate.

1.15 SYSTEM START-UP

- .1 Provide for:
 - .1 For factory service engineer to supervise start-up of system, checking, adjusting and testing on site;
 - .2 For instruction of Departmental personnel on theory, construction, installation, operation and maintenance of system:
 - .1 After installation and during site testing;
- .2 Advise on:
 - .1 Expected failure rate of equipment;
 - .2 Type of expected failures;
 - .3 Estimated time between major overhauls based on 20 year equipment life;
 - .4 Estimated cost of major overhaul based on current costs and excluding travelling expenses;
 - .5 Type and cost of test equipment needed for fault isolating and performing preventive maintenance.
 - .6 UPS manufacturer to have a minimum of two factory employed, factory trained field technicians, who reside in the province of British Columbia and can offer a 24-hour, on-site response time.
 - .7 Third party technicians, not employed, by the UPS manufacturer are not permitted.

Part 2 Products

2.1 UNINTERRUPTIBLE POWER SYSTEM

- .1 Input power:
 - .1 120/208 V, three phase, 4 wire with ground, 60 Hz.
 - .2 Normal supply from AC mains.
 - .3 Emergency supply from existing standby automatic diesel-electric unit connected to the main distribution via an automatic transfer switch.
- .2 Output power:
 - .1 120/208 V, three phase, 4 wire, grounded neutral, 60 Hz.
 - .2 Full load output at 1.0, Unity power factor.
 - .3 Overload capability: 125% of rated full load current at 1.0 power factor and rated voltage for 7 min.
 - .4 Frequency - nominal 60 Hz:
 - .5 Duration of 100% load output after mains failure not less than 20 min.
 - .6 Efficiency: Overall system efficiency not less than 94%.

2.2 ELECTRICAL REQUIREMENTS

- .1 In accordance with Section 26 05 00 - Common Work Results - Electrical.
- .2 Wires number tagged or colour coded with same designation on drawings. Tags: non deteriorating type.
- .3 Components and sub-assemblies accurately made for interchangeability.

2.3 ENCLOSURE

- .1 Dead front free rack mounting minimum 2.5 mm thick, CSA Enclosure 1.
- .2 Service Access from **front** only.
- .3 Meters, indicating lamps and controls group mounted in panel front.
- .4 Panel front enclosed by hinged doors to prevent tampering and to protect instruments and controls during shipping. Doors formed wrap-around type, rigid, to open and close smoothly, locking type handle with 2 keys. Hinges to permit doors to be lifted off cubicle.
- .5 Module sizes not to exceed number of rack units indicated in drawings for main module and battery modules.
- .6 External cable connections at top or side of cubicle through bolted plate for drilling at site to suit.
- .7 Ambient temperature range during operation -20 degrees C to +40 degrees C. Natural or forced ventilation as required. For forced ventilation power from inverter output and fan directly driven by motor mounted on vibration isolators. Each enclosure to have redundant fans, with fan failures alarmed. Air inlet and outlet openings protected with screens and metal guards.
- .8 Disposable air filters on fan cooled enclosures. Method of attachment and opening locations to make removal convenient and safe.
- .9 Maximum operating sound level not to exceed 73 dbA as measured on sound level meter with A weighting and slow response, at distance of 1 meter.

- .10 Enclosure frames interconnected by ground bus with ground lug for connection to ground.

2.4 RECTIFIER

- .1 Input disconnect: bolt-on moulded case three pole air circuit breaker, quick make, quick break type for manual or automatic operation, temperature compensated for 40 degrees C ambient, magnetic instantaneous trip element.
- .2 Surge suppressor: to protect equipment from supply voltage switching transients.
- .3 **Rectifier:**
 - .1 Solid-state Pulse Width Modulation (PWM) rectifier utilizing Insulated Gate Bipolar Transistor (IGBT)
 - .2 Filter: for rectifier DC output.
 - .3 Fuse: to protect DC output.
 - .4 Performance of rectifier:
 - .5 Automatically maintain battery in fully charged state while mains power available, and maintain DC float voltage within +/-1% of setting, no load to full load, during mains voltage variations up to +15% to -20%.
 - .6 Battery charging rate such that after battery has provided full load power output for specified duration, charger returns battery to 95% of fully charged state in 4 hours.
 - .7 Programmable Automatic equalize charging circuit to initiate equalize charging of battery.

2.5 INVERTER

- .1 Input power supply from:
 - .1 Rectifier DC output;
 - .2 Battery DC output.
- .2 Input disconnect: bolt-on moulded case, single pole, circuit breaker, quick make, quick break type, for manual or automatic operation, temperature compensated for 40 degrees C ambient, magnetic instantaneous trip element.
- .3 Input filter: with separately fused computer grade capacitor banks and indicator lights, to eliminate inverter source noise and restrictions on input cable length.
- .4 Power stage: High efficiency Solid-state Pulse Width Modulation (PWM) rectifier utilizing Insulated Gate Bipolar Transistor (IGBT). Components, solid state devices capable of satisfactory operation under ambient conditions of -20 degrees C to +40 degrees C.
- .5 Output filter: output of high frequency switching stage contains elements of carrier frequency which are filtered to low harmonic sine wave.
- .6 Output disconnect: bolt-on, moulded case, three pole circuit breaker or magnetic contactor, quick make, quick break type, for manual or automatic operation, temperature compensated for 40 degrees C ambient, magnetic instantaneous trip element.

2.6 BATTERY

- .1 Battery to be Lithium-Ion (Li-Ion).
 - .1 Discharge current to supply inverter at full load output, for 20 min.
 - .2 Battery are replaceable without shutting down UPS or going into bypass.
 - .3 Battery modules are connected via an internal battery breaker.

2.7 STATIC BYPASS SWITCH

- .1 Solid state closed circuit automatic transfer switch.
- .2 Logic unit with three normal source voltage sensors, which monitor overvoltage undervoltage and loss of voltage.
- .3 High speed automatic transfer from normal voltage to alternate source when:
 - .1 Normal source voltage lost: transfer time and sensing 1/4 cycle;
 - .2 Normal source: undervoltage at 80% of nominal value; adjustable.
 - .3 Normal source: over voltage at 115% of nominal value.
 - .4 Loss of normal source static switch continuity.
 - .5 Short circuit on normal source trips normal source breaker.
- .4 Return to normal source:
 - .1 When normal source remains within return voltage limits of 95% to 110% of nominal value (adjustable) for approximately 1 s timing interval, circuit checks voltage balance and phase synchronization, then initiates return with zero switching time.
- .5 Accessories:
 - .1 Manual bypass switch for maintenance and testing without load disturbance.
 - .2 Continuity monitor: automatic transfer to alternate source in event of static switch discontinuity.
 - .3 Alternate power source loss alarm contacts.

2.8 OPERATING DEVICES

- .1 Mode lights mounted on front panel to indicate:
 - .1 Ac output on inverter - green;
 - .2 Ac input available - green;
 - .3 Static bypass switch in bypass position - red;
 - .4 Overtemperature alarms – red;
 - .5 UPS on battery operation - red;
 - .6 Rectifier in equalize mode - amber;
 - .7 Battery discharging indicator - red, to change from steady to flashing during final 5 to 10 min of battery duration.
- .2 Alarms: audible alarm when any mode light shows red. Silence pushbutton not to extinguish trouble light.

2.9 FINISHES

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

- .2 Cubicles:
 - .1 Inside finish: To match exterior
 - .2 Exterior finish: black or manufacturer's standard color;
 - .3 Exterior hardware and trim: corrosion resistant and not requiring painting such as stainless steel or aluminum.

2.10 EQUIPMENT IDENTIFICATION

- .1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results - Electrical.
- .2 For major components such as AC input breaker, inverter breakers, bypass switch: size 5 nameplates.
- .3 For mode lights, alarms, meters: size 3 nameplates.

2.11 SOURCE QUALITY CONTROL

- .1 Complete system component test, including rectifier, inverter, bypass switch, remote annunciator panel, controls and battery factory test report is to be provided to Department Representative.
- .2 Notify Departmental Representative:
 - .1 One week in advance of date of factory test;
 - .2 That system has had preliminary testing and has met design requirements satisfactorily.
 - .3 Test procedures:
 - .4 Prepare blank forms and check sheet with spaces for recording data.
 - .5 Mark check sheet and record test data on forms in duplicate as test proceeds. Attach meter recordings.
 - .6 Provide Departmental Representative's signature on form to indicate concurrence in results reported.
 - .7 Duplicate given to Departmental Representative at end of test.
 - .8 Information from original presented as part of O&M Manual.
- .3 Test equipment:
 - .1 Instruments used during test, including indicating meters installed as part of system to have recent calibration certificate.
 - .2 Dummy load for testing, adjustable to 150% of system rated output at 0.8 power factor lagging. Load on each phase adjustable from zero to 100 % so that unbalanced output maybe tested for 3 phase systems.
- .4 Tests:
 - .1 Visual inspection to determine:
 - .1 Materials, workmanship, and assembly conform with design requirements;
 - .2 Parts are new and free of defects;
 - .3 Battery and components are not damaged;
 - .4 Each battery cell polarity and polarity of connections to inverter are correct;
 - .5 Proper size fuses are installed;

- .6 Accessories are present;
- .7 Portable metres for acceptance tests are suitable and instrument transformers connected correctly.
- .2 Demonstrate:
 - .1 System start-up and shut down;
 - .2 Operation during mains power failure, recording output during failure and return of mains power. Repeat several times;
 - .3 Adjustable settings;
 - .4 Record values measured at test points using oscilloscope, digital multimeter, and camera attachment;
 - .5 Bypass switch automatic operations. Record absence of load disturbance during automatic bypass switching.
- .3 Operating sound level:
 - .1 Measure sound level according to ANSI S1.13 using sound level meter with A weighting and slow response, conforming to ANSI S1.4.
 - .2 Operator to take reading by placing meter in front of him with microphone pointed at right angles to path of travel of generated sound, positioned at height of 1.5 m and distance of 1 m from equipment to be tested.
 - .3 Measure sound level during low ambient sound level.

Part 3 Execution

3.1 INSTALLATION

- .1 Locate UPS modules and battery modules as indicated.
- .2 Assemble and interconnect components to provide complete UPS as specified.
- .3 Connect AC mains to main input terminal.
- .4 Connect UPS output to load.
- .5 Start-up UPS and make preliminary tests to ensure satisfactory performance.

3.2 TESTING

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results - Electrical and CSA-C813.1.
- .2 Provide:
 - .1 Competent field personnel to perform test, adjustments and instruction on UPS equipment.
- .3 Notify Departmental Representative 10 working days in advance of test date.
- .4 Tests:
 - .1 Inspection of cubicles, battery rack and battery.
 - .2 Inspection of electrical connections.
 - .3 Inspection of installation of remote mode lights and alarms.
 - .4 Demonstration of system start-up and shut-down.

- .5 Run UPS for minimum period of 20 minutes at full rated load to demonstrate proper operation with ac mains input, emergency generator input, no ac input.
- .6 Discharge battery by operating UPS with ac mains open for specified duration of full load. Record readings of temperature of each cell.
- .7 Recharge battery automatically with full rated load on UPS for 4 hours and record readings of voltage of each cell.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 This section specifies the materials and installation for communication cables inside buildings.

1.2 SCOPE

- .1 Supply and installation of a communication cabling system complete with provision of cables and connectors, as per the drawings and as required for the monitoring of the new UPS system.
- .2 All materials and installation shall meet the requirements of these specifications.
- .3 The complete data/communications system installation is to be in accordance with EIA/TIA-568 Standards.
- .4 All cables made redundant by new installation are to be removed. All existing abandoned cables are also to be removed back to the source.

1.3 REFERENCES

- .1 Canadian Standards Association, (CSA International)
 - .1 CSA-T529-latest edition, Telecommunications Cabling Systems in Commercial Buildings (Adopted ANSI/EIA TIA 568a with modifications).
 - .2 CSA-C22.2 No. 214-latest edition, Communications Cables (Bi-national Standard, with UL 444).
 - .3 CAN/CSA-C22.2 No. 182.4-latest edition, Plugs, Receptacles, and Connectors for Communication Systems.
- .2 Telecommunications Industry Association (TIA)
 - .1 TIA/EIA-568-latest edition, Commercial Building Telecommunications Cabling Standards Set.

1.4 SYSTEM DESCRIPTION

- .1 Structured system of telecommunications cables (copper) installed within buildings for distributing data.

Part 2 Products

2.1 CABLES AND CONNECTORS

- .1 Each UTP cable shall meet the requirements of will consist of four unshielded twisted pairs of 24 AWG (0.5mm) 100-ohm nominal characteristic impedance, solid round annealed copper conductors insulated with flame retardant polymer.
- .2 All cables will be certified/approved by CSA Standard PCC FT4 flammability test and UL CMR.

- .3 UTP cables will meet or exceed the requirements in the proposed National Electrical Manufacturers Association (NEMA) Standard for Low-Loss Extended Frequency Premises Telecommunication Cable. The cable will meet the performance requirements of Category cable of the Underwriters Laboratories Inc. specifications and cable surface markings shall indicate this classification.

2.2 COMMUNICATION OUTLETS AND TERMINAL CONNECTIONS

- .1 Cable runs will have 1000mm length of cable left coiled up inside UPS cabinet for termination of RS232C connection. Confirm termination requirements with manufacturer.

2.3 LABELLING

- .1 Labels on wall plates and patch panels to be Brother P-Type or equivalent, black lettering on white tape. Labelling identification numbering to be as directed by Owner's representative.
- .2 All raceways shall be clearly and permanently marked at both ends to indicate destination and function. The markings shall be clearly visible after construction is completed.
- .3 Each cable shall be clearly marked with a permanent sequential identifier at each end of the cable. All horizontal cable terminations will be labelled at patch panels and at data/comm. outlets. Label of wiring to be the same identifier as the label at the termination point.

2.4 PERFORMANCE REQUIREMENTS

- .1 The complete end-to-end installation, including jacks, cables, patch panels, and patch cords shall meet the industry standard performance parameters for enhanced Category 6 as recommended by CAN/CSA-T529, latest revision. Test parameters shall include: Attenuation, Return Loss, NEXT, Power Sum NEXT, ELNEXT, Power Sum NEXT, ELFEXT, ACR, Power Sum ACR, Propagation Delay, and Delay Skew.

Part 3 Execution

3.1 INSTALLATION OF HORIZONTAL DISTRIBUTION CABLES

- .1 Communications raceway shall be minimum 20mm EMT conduit stubbed into accessible ceiling space. All cables in ceiling space shall be installed in conduit and cable support system and cable tray and as indicated on the drawings.
- .2 Wires and cable shall be as short as practical except that sufficient slack shall be provided to:
- .3 Prevent undue stress on cable forms, wires, and connections.
- .4 Enable network components to be removed and replaced during servicing without disconnecting other parts.
- .5 Facilitate movement of equipment for maintenance purposes.

- .6 Wires and cables shall be placed and protected to avoid contact with rough surfaces or sharp edges. Where wires or cables run through holes in metal, they shall be protected by suitable grommets or bushings.
- .7 Clearance between cables and heat emitting or interference generating devices shall be such as to avoid deterioration of these wires and cables due to heat dissipation from these devices, and to comply with industry standards. In particular cables shall have a minimum separation of 150mm from unshielded power lines and 600mm from fluorescent lighting.
- .8 The horizontal wiring shall be continuous with no splice points. Bridged taps are not permitted and there will be no cross-connects between the outlet and the patch panel.
- .9 The maximum cable length for each run is 90 metres and will allow for 3 extra metres at the UPS end and 7 extra metres for the patch cord end.
- .10 Each cable shall be clearly marked with a permanent sequential identifier at each end of the cable. All horizontal cable terminations will be labelled at cross-connects and at telecommunications outlets. Labelling will include room number or patch panel as per labelling requirements reference.
- .11 Horizontal conduit fill must comply with the Canadian Electrical Code requirements.

3.2 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results - Electrical.
- .2 Test intra-building telephone cable for continuity.
- .3 All data/communications cables shall be tested using testing equipment approved for Category 5e installations.
- .4 Testing shall be conducted by authorized representative of cable and hardware manufacturer.
- .5 Tests shall be performed from termination block to wall outlet jack on horizontal cables.
- .6 Testing set-up shall be for a channel test, maximum length of 95m.
- .7 Testing shall include verification of labelling integrity.
- .8 Test results shall be documented and shall include the following information in addition to the cable parameters:
 - .1 Cable ID
 - .2 Transmit and Receive locations
 - .3 Test Equipment used to complete the test
 - .4 Contractor's name
 - .5 Technician's name and signature
 - .6 Date test was performed
 - .7 Relevant additional comments

-
- .9 The complete end-to-end installation, including jacks, cables and patch panels shall meet or exceed industry standard performance requirements for Category 6. Cable test parameters are to include: Attenuation, Return Loss, NEXT, Power Sum NEXT, ELFEXT, Power Sum ELFEXT, ACR, Power Sum ACR, Propagation Delay, and Delay Skew. Permanent Link Test is required.
 - .10 Test results must include the Telecommunication Room number from which the cables terminate and indicate the following information:
 - .1 Telecommunication Room
 - .2 Room number of outlet box location
 - .3 Communication jack number.

END OF SECTION

Appendix A



Hazardous Building Materials Assessment

E0015—RCMP District Office,
2611 Norris Road, Kelowna, BC

March 19, 2020

Prepared for:

Public Services and Procurement
Canada, Pacific Region
1230 Government Street
Victoria, BC V8W 3X4

Prepared by:

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Project No.: 123221396
PSPC Project No. R. 105597.001

HAZARDOUS BUILDING MATERIALS ASSESSMENT

This document entitled Hazardous Building Materials Assessment was prepared by Stantec Consulting Ltd. ("Stantec") for the account of Public Services and Procurement Canada, Pacific Region (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Personnel conducting site work and documentation reviews for this project, as indicated below, have appropriate knowledge and experience in the management and control of asbestos hazards to be considered "qualified persons" by WorkSafeBC as it pertains to the provision of consultation in relation to asbestos in buildings.

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Table of Contents

EXECUTIVE SUMMARY	I
ABBREVIATIONS	III
1.0 INTRODUCTION.....	1
1.1 UNDERSTANDING OF THE PROJECT	1
2.0 SCOPE.....	2
2.1 LIMITATIONS.....	2
2.1.1 Physical and Sampling Limitations	3
2.1.2 Areas Not Accessed.....	4
3.0 HAZARDOUS BUILDING MATERIALS ASSESSMENT.....	4
3.1 FACILITY DESCRIPTION	4
3.2 ASBESTOS.....	5
3.2.1 Methodology	5
3.2.2 Findings	7
3.2.3 Recommendations	8
3.3 LEAD.....	9
3.3.1 Methodology	9
3.3.2 Findings	12
3.3.3 Recommendations	13
3.4 POLYCHLORINATED BIPHENYLS	14
3.4.1 Methodology	14
3.4.2 Findings	14
3.4.3 Recommendations	14
3.5 MOULD.....	14
3.5.1 Methodology	14
3.5.2 Findings	15
3.5.3 Recommendations	15
3.6 MERCURY.....	15
3.6.1 Methodology	15
3.6.2 Findings	15
3.6.3 Recommendations	16
3.7 OZONE DEPLETING SUBSTANCES.....	16
3.7.1 Methodology	16
3.7.2 Findings	16
3.7.3 Recommendations	16
3.8 SILICA.....	17
3.8.1 Methodology	17
3.8.2 Findings	17
3.8.3 Recommendations	17
4.0 CLOSURE.....	18



LIST OF TABLES

Table 1 Lead-Containing Paint Condition Categories12

LIST OF APPENDICES

APPENDIX A HAZARDOUS BUILDING MATERIALS BACKGROUND INFORMATION, HEALTH EFFECTS INFORMATION AND REGULATORY FRAMEWORKA.1

A.1 Asbestos A.1

 A.1.1 Health Effects..... A.1

 A.1.2 Regulatory Framework..... A.2

A.2 Lead A.3

 A.2.1 Health Effects..... A.3

 A.2.2 Regulatory Framework..... A.3

A.3 Polychlorinated Biphenyls (PCBs)..... A.5

 A.3.1 Health Effects..... A.5

 A.3.2 Regulatory Framework..... A.5

A.4 Mould A.7

 A.4.1 Health Effects..... A.7

 A.4.2 Susceptibility to Mould Exposure..... A.8

 A.4.3 Regulatory Framework..... A.8

A.5 Mercury A.9

 A.5.1 Health Effects..... A.9

 A.5.2 Regulatory Framework..... A.10

A.6 Ozone-Depleting Substances A.10

 A.6.1 Health Effects..... A.11

 A.6.2 Regulatory Framework..... A.11

A.7 Silica A.11

 A.7.1 Health Effects..... A.12

 A.7.2 Regulatory Framework..... A.12

APPENDIX B FLOOR PLANSB.1

APPENDIX C SUMMARY OF RESULTS: ANALYSIS OF BULK SAMPLES FOR ASBESTOS C.1

APPENDIX D LABORATORY ANALYTICAL REPORT—ASBESTOS: POLARIZED LIGHT MICROSCOPYD.1

APPENDIX E SUMMARY OF RESULTS: ANALYSIS OF PAINT CHIP SAMPLES FOR LEAD..... E.1

APPENDIX F LABORATORY ANALYTICAL REPORT—LEAD: PAINT CHIP ANALYSIS..... F.1

APPENDIX G SUMMARY OF IDENTIFIED LCPS.....G.1



Executive Summary

Stantec Consulting Ltd. (Stantec) was commissioned by Public Services and Procurement Canada (PSPC) on behalf of the Royal Canadian Mounted Police (RCMP) to conduct a hazardous building materials assessment of E0015—RCMP District Office, 2611 Norris Road, Kelowna, BC (subject building).

The purpose of the assessment was to check for potential hazardous building materials that may require special management practices in accordance with applicable federal and provincial regulations, during continued operations and maintenance.

The work was carried out in accordance with the requirements of the current versions of the following:

- Canada Labour Code, Part II Canada Occupational Health and Safety Regulations (COHSR)
- British Columbia's Occupational Health and Safety Regulation (BC Reg. 296/97)
- WorkSafeBC 2017 publication "Safe Work Practices for Handling Asbestos" (BC Asbestos Guide)
- PSPC June 5, 2017 "Asbestos Management Standard" (AMS) and "Asbestos Management Directive" (AMD)

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

- Asbestos-containing materials (ACMs)
- Lead, including lead-containing paints (LCPs)
- Polychlorinated biphenyls (PCBs) in electrical equipment
- Mould and/or moisture-impacted building materials
- Mercury in electrical equipment
- Ozone-depleting substances (ODSs) in heating, ventilation and air conditioning (HVAC) equipment or fire suppression systems
- Silica in building materials

Based on Stantec's visual assessment and the laboratory analyses performed on the samples collected, limited hazardous building materials were identified to be present.

A summary of our findings is presented in Table ES 1. Recommendations pertaining to the handling, removal, transportation and disposal of identified hazardous building materials are provided in the body of this report.



HAZARDOUS BUILDING MATERIALS ASSESSMENT

Table ES 1 Summary of Findings

Hazardous Building Material	Summary of Findings
Asbestos	ACMs were not identified through this assessment.
Lead	<p>The following LCPs were identified through this assessment:</p> <ul style="list-style-type: none"> • Red paint on exterior metal bollards and trim <p>Identified LCP was observed to be in good condition</p> <p>Lead may also be present in the following materials:</p> <ul style="list-style-type: none"> • Lead-acid batteries used in emergency lighting • Solder used in bell fittings for cast iron pipes and in electrical equipment • Ceramic tile glaze • Vent and pipe flashings
Polychlorinated biphenyls (PCBs)	Based on the construction date of the subject building, PCBs are not anticipated to be present.
Mould	No suspect mould or moisture staining was observed.
Mercury	Mercury vapour is present in the light tubes/bulbs in the approximately 215 fluorescent light fixtures observed throughout.
Ozone-depleting substance (ODS)	<p>The following equipment was identified by labels to be ODS-containing:</p> <ul style="list-style-type: none"> • Seven rooftop Carrier HVAC units (32.75 lbs. of R-22 total)
Silica	<p>Silica is expected to be present in the following, which were observed in various locations throughout:</p> <ul style="list-style-type: none"> • Cement products such as: <ul style="list-style-type: none"> – Concrete—foundations, floors, walls, blocks – Masonry units and associated grout and mortar – Ceramic floor tiles and associated grouts and mortars • Gypsum and associated wall/ceiling finish materials • Suspended ceiling tiles • Stucco • Asphalt and asphalt products containing rock or stone (e.g., roof membrane)

The statements made in this Executive Summary text are subject to the same limitations included in this report and are to be read in conjunction with the remainder of this report.



Abbreviations

ACGIH	American Conference of Governmental Industrial Hygienists
ACM	asbestos-containing material
AIHA	American Industrial Hygiene Association
BC	British Columbia
COHSR	Canada Occupational Health and Safety Regulations
ELLAP	Environmental Lead Laboratory Approval Program
EMSL	EMSL Canada Inc.
HVAC	heating, ventilation and air conditioning
LCP	lead-containing paint
NVLAP	National Voluntary Laboratory Accreditation Program
ODS	ozone-depleting substance
OEL	occupational exposure limit
PCB	polychlorinated biphenyl
PSPC	Public Services and Procurement Canada
RCMP	Royal Canadian Mounted Police
USEPA	United States Environmental Protection Agency



HAZARDOUS BUILDING MATERIALS ASSESSMENT

E0015—RCMP District Office, 2611 Norris Road, Kelowna, BC
March 19, 2020

1.0 INTRODUCTION

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- Mercury in electrical equipment
- Ozone-depleting substances (ODSs) in heating, ventilation and air conditioning (HVAC) equipment or fire suppression systems
- Silica in building materials

The site work was conducted by Ms. Amanda Bell on November 7, 2019.

1.1 UNDERSTANDING OF THE PROJECT

Stantec understands that information pertaining to the identity, location and approximate extent of hazardous building materials (if any) within the subject building is not on-file. As such, PSPC commissioned this assessment on behalf of the RCMP as a measure of diligence in maintaining compliance with the COHSR and BC Reg. 296/97 pertaining to the identification of hazardous building materials in the workplace.



HAZARDOUS BUILDING MATERIALS ASSESSMENT

E0015—RCMP District Office, 2611 Norris Road, Kelowna, BC
March 19, 2020

2.0 SCOPE

The scope of work for this assessment involved the following:

- Review of existing information, including site drawings, previous assessment and/or abatement documentation and discussions with site personnel, where available
- Visual assessment of readily accessible areas for the presence of suspected hazardous building materials
- Collection of representative bulk samples from building materials suspected to contain asbestos fibres
- Collection of paint chip samples for the determination of the lead content in paint finishes
- Submission of samples collected for laboratory analysis
- Evaluation and interpretation of field findings and sample analytical results to develop conclusions and recommendations pertaining to hazardous building materials identified

2.1 LIMITATIONS

This report has been prepared for general information purposes associated with continued operations and maintenance of the subject building. This report does not necessarily constitute a pre-renovation or pre-demolition assessment, which can involve destructive removal of building finishes to observe concealed conditions. Prior to any renovation or demolition work within the subject building, this report should be reviewed by an appropriately qualified professional (with education and experience associated with the management of hazardous building materials) to determine what, if any, additional assessment is necessary.

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

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

This report has been prepared for the exclusive use of the Client for the purpose of assessing general conditions in the subject building. Any use that a third party makes of this report, or reliance on, or decisions to be made on it, are the responsibility of such third parties. Stantec accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.



HAZARDOUS BUILDING MATERIALS ASSESSMENT

E0015—RCMP District Office, 2611 Norris Road, Kelowna, BC
March 19, 2020

2.1.1 Physical and Sampling Limitations

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

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

- Although the potential for asbestos in many building materials is significantly reduced based on the building construction date, building materials that may still contain asbestos but were not accessible and/or considered for sampling include, but are not limited to the following:
 - Roofing materials
 - Sub-grade materials (e.g., asbestos cement drainage pipe)
- Samples of paint applications suspected to contain lead were collected from surfaces of major paint applications where visually different paint colours and/or types were identified. Although the surfaces where samples were collected may be covered with more than one coat of paint, the paint samples are described by the surface (visible) colour only. Attempts were made to represent all layers of paint in the samples collected. As analytical results are referenced to the surface paint colour only, the lead content of all painted surfaces similar to that represented by the surface paint colour were presumed to be the same, regardless of differing sub surface paints, if any.
- Conclusions and recommendations regarding the presence of PCBs are based on limited observations in combination with construction date information and are presented to provide guidance regarding the likelihood that PCB-containing equipment is or is not present.
- Visual assessment for the presence of suspected visible mould and/or suitable conditions for mould growth (e.g., moist and/or water-stained building materials) was conducted. The conclusions made in this report provide description(s) of the potential source(s) of moisture that may have led to suitable conditions for mould growth, only in those cases where potential source(s) of moisture were identified. The conclusions provided herein will not necessarily identify all sources of moisture leading to suitable conditions for mould growth within the impacted area(s).
 - This assessment does not constitute a building envelope/building systems assessment, which would include an intrusive investigation to assess the internal condition, potential moisture sources, and expected remaining service life of the various components and systems comprising the envelope of a building.



HAZARDOUS BUILDING MATERIALS ASSESSMENT

E0015—RCMP District Office, 2611 Norris Road, Kelowna, BC
March 19, 2020

- The potential presence of mercury or mercury-containing equipment in inaccessible areas or as internal parts of HVAC mechanisms or other equipment was not assessed.
 - Although limited amounts of mercury may be present in paints and adhesives, mercury is not expected to be present in those materials in concentrations that would necessitate the requirement for mercury-specific handling procedures, separate removal and/or disposal considerations for demolition. As such, these items were not considered in our assessment.
- Investigation was limited to a visual review in accessed areas of readily accessible building-related cooling and refrigeration equipment which could contain ODSs. Testing was not conducted. Equipment or materials that were not assessed but that may contain ODSs included, but were not limited to, portable equipment (including domestic-type refrigerators and water coolers, occupant-owned refrigeration equipment), flexible plastic foam or rigid insulation foam, solvents, aerosol spray propellants and portable fire extinguishing equipment.
- In general, the assessment for the presence of hazardous building materials was visual in nature and was conducted pertaining to readily visible surfaces within accessible accessed spaces only. Additional hazardous building materials are potentially present in inaccessible areas not assessed including, but not limited to: ceiling spaces, wall cavities and crawlspace areas not accessed, as well as buried materials.

2.1.2 Areas Not Accessed

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

- Records room, exhibit rooms and offices behind reception (secure area—access not provided)

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

3.0 HAZARDOUS BUILDING MATERIALS ASSESSMENT

Building information and the results of the assessment for each of the considered hazardous building materials are provided in the following sub-sections.

Background information and health effects information, as well as information regarding regulatory framework and relevant legislation with respect to hazardous building materials are provided in Appendix A.

Floor plans showing the locations of samples collected during this assessment are provided in Appendix B.

3.1 FACILITY DESCRIPTION

The subject building is located at 2611 Norris Road, Kelowna, BC and consists of a two level office building. The reported construction date of the building was 1997. Although this construction time period is not consistent with those dates when hazardous building materials were commonly used, various hazardous building materials may still be present.



HAZARDOUS BUILDING MATERIALS ASSESSMENT

E0015—RCMP District Office, 2611 Norris Road, Kelowna, BC
March 19, 2020

The typical structural components, mechanical components and building finishes associated with this building consist of the following:

- Foundation—concrete
- Exterior cladding—stucco
- Structural—wood framing and concrete walls
- Mechanical—a combination of un-insulated pipes and systems and pipes and vessels insulated with fibreglass
- Heating, ventilation and air conditioning (HVAC)—rooftop units with a combination of uninsulated and insulated, fiberglass wrapped metal ducted supply, open air return
- Interior walls—combination of finished gypsum, unfinished gypsum, cinder block and concrete
- Interior ceilings—combination of t-bar with acoustic ceiling tiles and finished gypsum
- Interior flooring—combination of bare concrete, vinyl floor tiles, vinyl sheet flooring, laminate flooring and carpeting
- Roofing material—asphalt membrane

3.2 ASBESTOS

A summary list of the bulk samples collected by Stantec, including a description of the material, sampling location and laboratory test results is provided in Appendix C. Copies of the Laboratory Certificates of Analysis for bulk samples analyzed are provided in Appendix D.

Based on our observations of building construction (estimated vintage of interior finishes and uniformity of building material use) and on our interpretations of the analytical results of suspected ACMs collected through this assessment, ACMs were not identified.

Our assessment methodologies and findings are further summarized in the following sub-sections.

3.2.1 Methodology

Asbestos-containing materials are grouped into two classifications, friable and non-friable materials. Friable ACMs are those that can easily be crumbled or broken apart by mere hand pressure. When these materials break apart asbestos fibres are then released into the atmosphere. Non-friable ACMs are materials that by the nature of their manufacturing and/or construction do not readily allow the release of asbestos fibres. Some non-friable materials such as plaster, drywall joint compound and ceiling tiles that are considered to be non-friable in an undisturbed state can more readily release fibres when damaged or disturbed.

The presence of asbestos in federal workplaces and pertaining to federally regulated workers is governed by the COHSR. According to the COHSR, ACM means:

- Any article that is manufactured and contains 1% or more asbestos (by weight) at the time of manufacture, or any material that contains 1% or more asbestos when tested in accordance with accepted methods.



HAZARDOUS BUILDING MATERIALS ASSESSMENT

E0015—RCMP District Office, 2611 Norris Road, Kelowna, BC
March 19, 2020

The presence of asbestos in the workplace in British Columbia pertaining to provincially regulated workers is governed by BC Reg. 296/97. According to the current version of BC Reg. 296/97, ACM means:

- Any material containing at least 0.5% asbestos, or vermiculite insulation with any asbestos

As both federally regulated workers and provincially regulated workers (e.g., contractors) are expected to carry out work activities within the subject building, and as the provincial regulations have a more stringent definition of ACM, and generally include the requirements noted in the COHSR, this assessment was conducted to meet the requirements of BC Reg. 296/97.

Based on these criteria, a visual assessment of accessible areas was undertaken to check for the presence of suspected ACMs. Locations to collect discrete bulk samples of suspected ACMs were identified and samples of representative materials were then collected at these locations.

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

The number of samples to be collected for each homogenous application of a suspected ACM was based on accepted occupational hygiene standards and protocols, on the recommendations provided in the 2017 WorkSafeBC publication *Safe Work Practices for Handling Asbestos (Asbestos Guide)*, and on the assessor’s experience and understanding of the consistency of that building material’s application.

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

3.2.1.1 Potential Asbestos-Containing Vermiculite Insulation

As part of the assessment, Stantec assessed the subject building for areas where vermiculite insulation, a potential ACM, would likely be present. This included making note of and assessing attic spaces, floor cavities and masonry block or brick walls, which are typical areas where vermiculite is found. Where masonry or brick walls were observed, destructive assessment (drilling) was conducted to assess the cavity for the presence of vermiculite, unless penetrations, breaches and/or sufficient other openings were present.

3.2.1.2 Sample Results Interpretation

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



HAZARDOUS BUILDING MATERIALS ASSESSMENT

E0015—RCMP District Office, 2611 Norris Road, Kelowna, BC
March 19, 2020

3.2.1.3 Asbestos Sampling Quality Assurance/Quality Control

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

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

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.

3.2.2 Findings

No ACMs were identified through this assessment.

3.2.2.1 Non-Asbestos-Containing Materials

The bulk samples collected during this assessment for which no asbestos was detected through laboratory analysis can be seen in the table in Appendix C.

Materials Not Suspected to Contain Asbestos

Various materials within the subject building were observed and/or presumed to be present, which are not suspected to contain asbestos. Typical materials of this nature that were observed and are not considered suspected ACMs, include but are not limited to the following:

- Materials comprised of glass, such as:
 - Window panes
 - Pre-formed fibreglass insulation on mechanical pipes or vessels (potentially excluding attached wrap layers)
 - Fibreglass batt insulation in wall, floor or ceiling cavities, or used in other applications (potentially excluding attached paper backing)
 - Lights and lighting components



HAZARDOUS BUILDING MATERIALS ASSESSMENT

E0015—RCMP District Office, 2611 Norris Road, Kelowna, BC
March 19, 2020

- Materials comprised of metal, such as:
 - Wall framing
 - Flashings on siding or roofs
 - Electrical wiring (excluding wrap) and conduit
 - Plumbing components
 - Components of doors, windows and associated trim
 - Structural components
 - Handrails
 - Siding
 - Roofing
- Materials comprised of wood, such as:
 - Wall framing
 - Components of doors, windows and associated trim
 - Structural components
- Other materials generally not suspected to contain asbestos:
 - Gypsum board/"drywall" (including finishing compounds)
 - Poured concrete items such as foundations, floors, pads or structural beams (including finishing compounds)
 - Granite, slate, ceramic or other non-suspect stone-like materials (including grouts or adhesives, for a building of this vintage)
 - Masonry units such as bricks or blocks (including mortar, but excluding potential loose-fill insulation)
 - Silicone-based clear caulking or sealants

3.2.2.2 Potential for Vermiculite Insulation

As part of the assessment, Stantec assessed the subject building for areas where vermiculite insulation, a potential ACM, would likely be present. This included making note of and assessing attic spaces, floor cavities and masonry block or brick walls, which are typical areas where vermiculite is found. No vermiculite or locations that may potentially contain vermiculite (that could not otherwise be assessed) were observed. Based on the construction date on the building, ACM vermiculite insulation is not anticipated to be present.

3.2.3 Recommendations

No ACMs were identified through this assessment. If encountered or in need of disturbance during renovation or demolition activities, any suspected ACMs not accessible during this assessment should be considered as asbestos-containing and handled as such, unless proven otherwise, through analytical testing.



HAZARDOUS BUILDING MATERIALS ASSESSMENT

E0015—RCMP District Office, 2611 Norris Road, Kelowna, BC
March 19, 2020

3.3 LEAD

A summary list of the samples collected including a description of the samples, sampling locations and laboratory analytical results is provided in Appendix E. Copies of the Laboratory Certificates of Analysis for paint chip samples analyzed are included in Appendix F.

Based on our observations and interpretations of suspected LCP sample analytical results, the paints presented in the table in Appendix G were identified as LCPs.

The following information is included for each identified LCP:

- Paint colour
- Substrate to which paint is applied
- Location/approximate extent of the LCP within the building
- Lead content of paint
- Condition
- Representative photographs, where available

Our assessment methodologies and findings are further summarized in the following sub-sections.

3.3.1 Methodology

A visual assessment of accessible areas was undertaken in order to check for the presence of materials that may contain lead. These materials included paint applications, wiring and plumbing, batteries, etc.

3.3.1.1 Lead in Paint

With respect to potential lead exposures associated with disturbance to surfaces coated with lead-containing products, the 2011 WorkSafeBC manual titled *Lead-Containing Paint and Coatings: Preventing Exposure in the Construction Industry*, indicates the following:

- Improper removal of lead paint containing 600 mg/kg lead results in airborne lead concentrations that exceed half of the exposure limit
 - The exposure limit indicated in both the COHSR and BC Reg. 296/97 is 0.05 mg/m³.
 - The 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



HAZARDOUS BUILDING MATERIALS ASSESSMENT

E0015—RCMP District Office, 2611 Norris Road, Kelowna, BC
March 19, 2020

In addition to the above, 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.

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., renovation/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 renovation/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.

Based on the above, samples of potential LCPs were collected from major paint applications, in sufficient quantity to conduct analysis for total lead content. The sampling of paint applications involved the collection of paint chip samples of paint layers to the substrate, where possible. A minimum volume of 5 cc or a half teaspoon of paint chips was typically collected. Wherever necessary and possible, paint was separated from any backing material such as paper, concrete or wood and placed in a sealed, clearly labelled plastic bag.

Samples collected were submitted to EMSL in Mississauga, Ontario for analysis of total lead content using EPA Method SW 846 3050B*/7000B. EMSL’s analytical laboratory is also accredited by the AIHA Environmental Lead Laboratory Approval Program (ELLAP).

Welding, Burning or Torch Cutting

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.



HAZARDOUS BUILDING MATERIALS ASSESSMENT

E0015—RCMP District Office, 2611 Norris Road, Kelowna, BC
March 19, 2020

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.

3.3.1.2 Assessment of Paint Condition

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

When evaluating the condition of LCPs, an attempt should be made to determine whether the deterioration is due to a moisture problem or some other existing building deficiency.

“**Poor**” surfaces are considered to be a hazard and should be corrected. “**Fair**” surfaces should be repaired but are not yet considered to be a hazard; if not repaired, they should be monitored frequently. “**Good/intact**” surfaces should be monitored to ensure that they remain in a nonhazardous condition.

In addition, the presence of paint debris must be considered in evaluating condition. Given the variety of paint uses, there are many applications that can have a tendency for the paint to “wear” from the surface slowly, over an extended period of time. Conditions where paint has worn from a surface are worth noting for maintenance discussions (i.e., related to re-coating the surface should, for example, the coating provide weather protection), however, in the absence of loose paint chip debris/dust, such conditions would not represent a potential exposure situation related to lead.

The condition evaluation criteria for LCPs are summarized in Table 1, below.



HAZARDOUS BUILDING MATERIALS ASSESSMENT

E0015—RCMP District Office, 2611 Norris Road, Kelowna, BC
 March 19, 2020

Table 1 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 (window sills, 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> <p>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).</p> <p>² Surfaces in “fair” condition should be repaired and/or monitored but are not considered to be “lead-containing paint hazards.”</p> <p>³ Surfaces in “poor” condition are considered to be “lead-containing paint hazards” and should be addressed through abatement or interim controls.</p>			

3.3.2 Findings

Lead is expected to be present in the following within the subject building:

- Lead-acid batteries used in emergency lighting
- Solder used in bell fittings for cast iron pipes and in electrical equipment
- Ceramic tile glaze
- Vent and pipe flashings

3.3.2.1 Lead in Paint

Greater than 600 ppm lead was detected through laboratory analysis of chip samples of the following paint:

- Red paint on exterior metal bollards and trim

Additional information regarding extent and current condition of identified LCPs, including photographs (where available) is provided in Appendix G.



HAZARDOUS BUILDING MATERIALS ASSESSMENT

E0015—RCMP District Office, 2611 Norris Road, Kelowna, BC
March 19, 2020

3.3.3 Recommendations

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

When paints or other lead-containing equipment/materials within the subject building are to be disturbed and/or removed, ensure compliance with the following:

- Exposure protection requirements of the COHSR and BC Reg. 296/97, including the provisions of the Lead Guideline
- Transportation and disposal requirements of the British Columbia Hazardous Waste Regulation (BC Reg. 63/88)
- Transportation requirements of the Federal Transportation of Dangerous Goods Regulation

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

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

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

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

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



HAZARDOUS BUILDING MATERIALS ASSESSMENT

E0015—RCMP District Office, 2611 Norris Road, Kelowna, BC
March 19, 2020

3.3.3.1 Welding, Burning or Torch Cutting

Any paint coating on a metal surface to be welded, burned or torch-cut must be removed prior to that action being undertaken, unless project-specific or tasks-specific risk assessments and safe work practices are developed by a qualified person. Development of such risk assessments and work practices will involve consideration of information including, but not limited to, the following:

- Composition of the material to be disturbed
- Lead content of the paint coating
- Methods and tools to be used, including exhaust ventilation
- Duration of the work and/or work shift
- Training of the personnel conducting the task
- Respiratory protection program in effect

3.4 POLYCHLORINATED BIPHENYLS

3.4.1 Methodology

A visual review and/or a review of estimated/reported construction dates was completed to assess the potential presence of PCBs in electrical equipment. Equipment that is generally suspected of containing PCBs includes lamp ballasts, transformers, hydraulic systems, compressors, switchgear and capacitors.

No sampling of dielectric fluids was undertaken as part of this assessment.

3.4.2 Findings

Based on the construction date of the subject building, PCBs are not anticipated to be present.

3.4.3 Recommendations

As PCB-containing items are not anticipated to be present based on the reported construction date of the subject building, no recommendations have been provided.

3.5 MOULD

3.5.1 Methodology

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



HAZARDOUS BUILDING MATERIALS ASSESSMENT

E0015—RCMP District Office, 2611 Norris Road, Kelowna, BC
March 19, 2020

The scope of work and procedures utilized for the visual assessment were based on the recommendations for such provided in the documents listed below:

- Standard Construction Document CCA 82 *Mould Guidelines for the Canadian Construction Industry*, Canadian Construction Association, 2004 (referred to as CCA 82)
- *Guidelines on Assessment and Remediation of Fungi in Indoor Environment*, New York City Department of Health and Mental Hygiene, November 2008 (referred to as the NYC Guidelines)
- *Fungal Contamination in Public Buildings: Health Effects and Investigation Methods*, Federal-Provincial Committee on Environmental and Occupational Health, 2004 (referred to as the Health Canada Guide)
- *Indoor Air Quality in Office Buildings: A Technical Guide*, Report of the Federal-Provincial Advisory Committee on Environmental and Occupational Health, 1995 (referred to as the IAQ Guide)
- *Bioaerosols: Assessment and Control*, American Conference of Governmental Industrial Hygienists (ACGIH), 1999 (referred to as the ACGIH Report)
- *Field Guide for the Determination of Biological Contaminants in Environmental Samples*, AIHA, Second Edition 2005

3.5.2 Findings

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

3.5.3 Recommendations

As no mould and/or moisture-impacted building materials were observed within the subject building during the assessment, no recommendations have been provided.

3.6 MERCURY

3.6.1 Methodology

An assessment for equipment that is likely to contain mercury (such as thermostats, thermometers and fluorescent light tubes) was completed visually. Information on the type of equipment (i.e., gauges, switches, batteries, thermometers, etc.), model and serial numbers and quantities was recorded, where such information was available.

3.6.2 Findings

Mercury vapour is present in the light tubes within the approximately 215 fluorescent light fixtures observed throughout.



HAZARDOUS BUILDING MATERIALS ASSESSMENT

E0015—RCMP District Office, 2611 Norris Road, Kelowna, BC
March 19, 2020

3.6.3 Recommendations

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

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

- Transportation and disposal requirements of BC Reg. 63/88
- Transportation requirements of the Federal Transportation of Dangerous Goods Regulation

Precautions should be taken if workers may potentially be exposed to mercury or mercury vapours to ensure that workers exposure levels do not exceed the occupational exposure limit of 0.025 mg/m³ as per the COHSR and BC Reg. 296/97. This can be achieved by providing respiratory and skin protection applicable to the hazard and task to be completed.

3.7 OZONE DEPLETING SUBSTANCES

3.7.1 Methodology

An assessment for equipment or systems likely to contain ODSs (such as refrigeration/cooling equipment or fire suppression systems) was completed visually. Information on the type of equipment, manufacturer and type and quantity of refrigerants was recorded, where available.

3.7.2 Findings

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

- Seven rooftop Carrier HVAC units (32.75 lbs. of R-22 total)

Additional building-related refrigeration and/or air conditioning equipment observed was confirmed (by label information) to be charged with refrigerants that are not considered ODSs.

3.7.3 Recommendations

ODS-containing equipment can be managed in place and must be serviced by licensed refrigeration technicians (as defined in SOR/2003-289 and associated amendments).

When refrigeration equipment that is suspected or confirmed to be ODS-containing is decommissioned, it should be emptied and inspected by licensed refrigeration technicians, as defined in the Federal Halocarbon Regulations (SOR/2003-289 and associated amendments).



HAZARDOUS BUILDING MATERIALS ASSESSMENT

E0015—RCMP District Office, 2611 Norris Road, Kelowna, BC
March 19, 2020

If ODS-containing equipment is to be removed during demolition activities, ODSs must be handled, recycled, stored, transported and/or disposed of in accordance with the requirements of the following:

- British Columbia *Waste Management Act—Ozone Depleting Substances and Other Halocarbons Regulation* (BC Reg. 387/99)
- Transportation requirements of the Federal Transportation of Dangerous Goods Regulation
- SOR/2003-289 and associated amendments

3.8 SILICA

3.8.1 Methodology

An assessment for the presence of silica was conducted visually. The presence of typical silica-containing building materials such as concrete, masonry, stone, terrazzo, refractory brick, gypsum, ceramic tile, ceiling tile and other items, was noted.

3.8.2 Findings

Silica is expected to be present in the following, which were observed in various locations throughout:

- Cement products such as:
 - Concrete—foundations, floors, walls, blocks
 - Brick/masonry units and associated grout and mortar
 - Ceramic floor tiles and associated grouts and mortars
- Gypsum and associated wall/ceiling finish materials
- Suspended ceiling tiles
- Stucco
- Asphalt and asphalt products containing rock or stone (e.g., roof membrane).

3.8.3 Recommendations

Silica-containing materials can be managed in place; therefore, no further action is recommended at this time.

When silica-containing materials within the subject building 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 the COHSR and BC Reg. 296/97 (cristobalite and quartz—each 0.025 mg/m³). This would include, but not be limited to, the following:

- Providing workers with respiratory protection
- Wetting the surface of the materials, and use of water or dust suppressing agents to prevent dust emissions
- Providing workers with facilities to properly wash prior to exiting the work area



HAZARDOUS BUILDING MATERIALS ASSESSMENT

E0015—RCMP District Office, 2611 Norris Road, Kelowna, BC
March 19, 2020

4.0 CLOSURE

This report has been prepared for the sole benefit of the PSPC on behalf of the RCMP. Any use which a third party makes of this report, or any reliance on decisions based on it, is the responsibility of such third parties. Stantec Consulting Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

The information and conclusions contained in this report are based upon work undertaken by trained professionals and technical staff in accordance with generally accepted engineering, scientific and occupational health and safety practices current at the time the work was performed. Conclusions presented in this report should not be construed as legal advice.

The conclusions presented in this report represent the best technical judgment of Stantec Consulting Ltd. based on the data obtained from the work. The conclusions are based on the site conditions encountered by Stantec Consulting Ltd. at the time the work was performed at the specific assessment and/or sampling locations, and can only be extrapolated to an undefined limited area around these locations. The extent of the limited area depends on building construction and conditions, weather, building usage and other factors. Due to the nature of the investigation and the limited data available, Stantec Consulting Ltd. cannot warrant against undiscovered environmental or health and safety liabilities.

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

We trust that the above is satisfactory for your purposes at this time. Should you have any questions or concerns, or require additional information, please do not hesitate to contact the Stantec Project Manager at your convenience.

Regards,

Stantec Consulting Ltd.



APPENDIX A

**Hazardous Building Materials Background Information,
Health Effects Information and Regulatory Framework**

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix A Hazardous Building Materials Background Information, Health Effects Information and Regulatory Framework
March 19, 2020

Appendix A HAZARDOUS BUILDING MATERIALS BACKGROUND INFORMATION, HEALTH EFFECTS INFORMATION AND REGULATORY FRAMEWORK

A.1 ASBESTOS

Asbestos is a naturally occurring form of fibrous silicate that is durable and flexible; has high thermal and tensile strength; is resistant to heat, chemical corrosion and friction; does not conduct electricity; and insulates well against condensation, heat and noise. Due to these properties, asbestos was used in over 3,000 commercial products, and it is estimated that approximately 70% of the asbestos that was used in North America was used in building materials.

In buildings, and among many other potential asbestos-containing materials, asbestos is typically found in plaster, mechanical insulation, gaskets, thermal insulation on pipes, refractory material, roofing felts, floor tiles, ceiling tiles and parging, heat resistant panels, incandescent light fixture reflector plates, and any other material requiring a high degree of durability or thermal resistance.

Asbestos-containing materials are grouped into two classifications, friable and non-friable materials. Friable ACMs are those that can easily be crumbled or broken apart by mere hand pressure. When these materials break apart asbestos fibres are then released into the atmosphere. Non-friable ACMs or “manufactured products” are materials that by the nature of their manufacturing/construction do not readily allow the release of asbestos fibres. These materials should not be cut or shaped with power tools, since this procedure may allow for the release of the asbestos fibres. Some materials or “manufactured products”, such as plaster, drywall and ceiling tiles that are considered to be non-friable in an undisturbed state can become friable when damaged or disturbed.

The common use of friable (breakable by hand) asbestos-containing materials (ACMs) in construction ceased voluntarily in the mid-1970s; however, the spray application of asbestos-containing fireproofing was not prohibited until 1986. A material known as vermiculite, which was commonly used for insulation within attics, floor spaces or within masonry block wall systems and may be contaminated with asbestos due to its production processes, was used into the mid-1990s. In addition, asbestos cement products and roofing products (e.g., sealants) currently used in the construction of buildings may still contain asbestos.

A.1.1 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.



HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix A Hazardous Building Materials Background Information, Health Effects Information and Regulatory Framework
March 19, 2020

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.

A.1.2 Regulatory Framework

Asbestos is included in the Canada Labour Code, Part II Canada Occupational Health and Safety Regulations (COHSR) and British Columbia's Occupational Health and Safety Regulation (BC Reg. 296/97). Included in both regulatory instruments are provisions for the general duties of employers, requirements for health assessments, training and project notification. There are also sections that will also apply to abatement projects, depending on the work procedures and specific work site hazards.

The COHSR and BC Reg. 296/97 also established an 8-hour occupational exposure limit (OEL) for asbestos (all forms) to be 0.1 fibre/cubic centimetre.

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).

According to the COHSR, ACM means:

- Any article that is manufactured and contains 1% or more asbestos (by weight) at the time of manufacture, or any material that contains 1% or more asbestos when tested in accordance with accepted methods.

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

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.



HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix A Hazardous Building Materials Background Information, Health Effects Information and Regulatory Framework
March 19, 2020

A.2 LEAD

Lead may be used in its pure metallic form or combined chemically with other elements to form lead compounds. Metallic lead is used to make products such as electric storage batteries, ammunition, lead solder, radiation shields, pipes, and sheaths for electric cables. Metallic lead is sometimes combined with other metals such as copper, tin and antimony as lead alloys for use in the manufacture of a variety of metal products.

Organic lead compounds contain a lead atom covalently bonded to carbon. Common examples of organic lead compounds include lead “soaps” such as lead oleates, high pressure lubricants, and anti-knock agents in gasoline.

Inorganic lead compounds (or lead salts) result when lead is combined with an element other than carbon. Examples are lead oxide, lead chromate, lead carbonate and lead nitrate. Inorganic lead compounds may occur as solids or in solutions, and are used in insecticides, pigments, paints, frits, glasses, plastics, and rubber compounds.

Lead is commonly found in buildings in items such as the solder used on copper domestic pipes; the caulking on bell fittings of cast iron drainage pipes; electrical equipment/wiring; batteries (e.g., emergency exit signage batteries); lead sheeting (e.g., x-ray rooms); vent and pipe flashings; and paints and ceramic tile glazes.

A.2.1 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.

A.2.2 Regulatory Framework

In the past, the United States Department of Housing and Urban Development (HUD) set a criteria of lead-based paint as 0.5% lead (by weight) or 5,000 parts per million (ppm) for evaluating whether lead is a hazard in a residential setting.



HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix A Hazardous Building Materials Background Information, Health Effects Information and Regulatory Framework
March 19, 2020

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). However, it is important to note that this regulation does not comment on the potential occupational exposure if the material is disturbed.

Under the COHSR and BC Reg. 296/97, a regulatory limit has been established for occupational exposure to airborne lead that may be present in a workplace. The OEL for airborne lead dust or fumes per both regulatory instruments should not exceed the TWA value of 0.05 milligram per cubic metre of air (mg/m³). The OEL represents the time-weighted average concentration for a conventional 8-hour workday and a 40-hour workweek, to which it is believed that nearly all workers may be repeatedly exposed, day after day, without adverse health effects.

With respect to potential lead exposures associated with disturbance to surfaces coated with lead-containing products, the 2011 WorkSafeBC manual titled *Lead-Containing Paint and Coatings: Preventing Exposure in the Construction Industry*, indicates the following:

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

In addition to the above, 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.

Work procedures that can be used to assist in protecting workers and adjacent work areas from exposure to lead during disturbance activities can also be found in this document.

According to the British Columbia Hazardous Waste Regulation (BC Reg. 63/88), lead waste may be considered a toxic leachate (and require special disposal) if lead is in a dispersible form and its leachate contains greater than 5.0 milligrams per litre (mg/L) lead.

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.



HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix A Hazardous Building Materials Background Information, Health Effects Information and Regulatory Framework
March 19, 2020

A.3 POLYCHLORINATED BIPHENYLS (PCBS)

PCBs are man-made toxic chemicals whose physical and chemical properties produce the following attributes: fire resistance, low electrical conductivity, high resistance to thermal breakdown, high chemical stability and resistance to oxidants and other chemical.

PCBs were used widely as coolants and lubricants in transformers, capacitors, and other electrical equipment. In fluorescent fixtures, PCBs were usually found within the small capacitors inside the ballast that controls the lamp. The Federal Chlorobiphenyls Regulation, SOR/91-152, prohibited the use of PCBs in electrical equipment manufactured after July 1, 1980. Stocks of items such as ballasts containing PCBs may have been used into the early or mid-1980s.

A.3.1 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.

A.3.2 Regulatory Framework

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.

Under SOR/2008-273, the following end-of-use dates were established:

- December 31, 2009
 - Equipment containing PCBs in a concentration of 500 mg/kg or more
 - Equipment containing PCBs in a concentration of at least 50 mg/kg but less than 500 mg/kg when located in sensitive locations (i.e., drinking-water treatment plant, food or feed processing plant, child care facility, preschool, primary or secondary school, hospital, or senior citizen care facility or the property on which the plant or facility is located, within 100 m of it)
- December 31, 2014
 - Certain specified equipment not replaced by the 2009 deadline due to technical constraints for engineered-to-order equipment or if the facility is scheduled for permanent closure before 2014
- December 31, 2025
 - Equipment containing PCBs in a concentration of at least 50 mg/kg but less than 500 mg/kg when located in non-sensitive locations



HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix A Hazardous Building Materials Background Information, Health Effects Information and Regulatory Framework
March 19, 2020

In addition to the above, a maximum storage period of one year is allowed for PCBs and products that contain PCBs at each of the following non-sensitive locations:

- Owner's PCB storage site
- PCB storage site of an authorized facility for decontamination or of an authorized transfer site
- PCB storage site of an authorized destruction facility

For British Columbia, according to the British Columbia Hazardous Waste Regulation (BC Reg. 63/88):

- PCB wastes are defined as: PCB liquid, PCB solid, and PCB equipment that have been taken out of service for the purpose of treatment, recycling, reuse, or disposal, or for the purpose of storage prior to treatment, recycling, reuse, or disposal
 - "PCB liquid" means any liquid containing more than 50 parts per million (ppm) by weight of PCB
 - "PCB solid" means any material or substance other than PCB liquid that contains or is contaminated with chlorobiphenyls at a concentration greater than 50 ppm by weight of chlorobiphenyls
 - "PCB Equipment" means any manufactured item that contains or is contaminated with a PCB liquid or PCB solid is PCB equipment. While items of PCB equipment are often electrical components such as transformers or capacitors, the definition includes other items such as contaminated drums and containers.
 - o NOTE: An item of equipment from which PCB liquid or PCB solid has been removed is still PCB equipment until it has been decontaminated by an approved protocol. This is because the removal is a treatment process and the equipment, until decontaminated, is a residue from the treatment

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, and waste destruction requirements.

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



HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix A Hazardous Building Materials Background Information, Health Effects Information and Regulatory Framework
March 19, 2020

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

A.4 MOULD

Mould can be found everywhere in the outside environment—on plants, in soil and on dead and decaying matter (i.e., dead leaves). Mould requires two main conditions in order to grow—a source of food (a substrate typically comprised of cellulose) and water. Sources of food for mould are plentiful in outdoor and indoor environments; however, it is the presence of water in an indoor environment that will determine mould growth. The source of water can be a result of a water pipe leak or even excess condensation. Thus, the key to controlling mould indoors is to control the presence of water.

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

A.4.1 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.



HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix A Hazardous Building Materials Background Information, Health Effects Information and Regulatory Framework
March 19, 2020

A.4.2 Susceptibility to Mould Exposure

People's reaction to mould exposure is quite varied, and although anyone can be affected, some people may be more susceptible and at greater risk, including:

- Infants and children
- Elderly
- Pregnant women
- Individuals with respiratory conditions or allergies and asthma
- Persons with weakened immune system (e.g., chemotherapy patients, organ or bone marrow transplant recipients, and people with HIV infections or autoimmune diseases)

People with specific health concerns should consult their doctor if concerned about mould exposure. Symptoms that may appear to stem from mould exposure may be due to other causes such as bacterial or viral infections or other allergies.

A.4.3 Regulatory Framework

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. For example, BC Reg. 296/97 indicates the following:

- Section 4.79(1):
 - Employer must ensure that the indoor air quality is investigated when
 - a) complaints are reported
- Section 4.79(2):
 - Air quality investigation must include
 - c) sampling for airborne contaminants suspected to be present in concentrations associated with the reported complaints



HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix A Hazardous Building Materials Background Information, Health Effects Information and Regulatory Framework
March 19, 2020

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.

Several additional guidelines and other resources describe procedures for the investigation and remediation of mould. The following documents indicate that mould observed in occupied building should be remediated in accordance with these procedures:

- Environmental Abatement Council of Ontario's (EACO) *Mould Abatement Guidelines*, 2010—Edition 2
- *Mould Guidelines for The Canadian Construction Industry*, Canadian Construction Association—82, 2004
- *Guidelines on Assessment and Remediation of Fungi in Indoor Environment*, New York City Department of Health and Mental Hygiene, November 2008
- *Bioaerosols: Assessment and Control*, ACGIH 1999
- *Fungal Contamination in Public Buildings: Health Effects and Investigation Methods*, Federal-Provincial Committee on Environmental and Occupational Health 2004
- *Field Guide for the Determination of Biological Contaminants in Environmental Samples*, AIHA 1996
- *Clean-Up Procedures for Mould in Houses*, Canada Mortgage and Housing Corporation (CMHC) 2004

A.5 MERCURY

Mercury is commonly found in buildings as mercury vapour lighting, thermostats/thermometers with mercury-containing glass ampoules, electrical switches and can also be found in minor amounts in fluorescent lamp tubes and vapour bulbs and may be present in stable forms in adhesives. If mercury is exposed to the air, odourless vapours are formed.

A.5.1 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).



HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix A Hazardous Building Materials Background Information, Health Effects Information and Regulatory Framework
March 19, 2020

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 (e.g., mood swings, nervousness, irritability, etc.), neuromuscular effects (e.g., muscular weakness, twitching), mental changes/disturbances, digestive disturbances, headaches, insomnia, and changes in nervous response.

Factors that determine the severity of the health effects from mercury exposure include the following:

- Chemical form of mercury (e.g., elemental, methylmercury, inorganic and organic)
- Dose
- Age of individual exposed
- Duration of exposure
- Route of exposure—as listed above
- Health of individual exposed

A.5.2 Regulatory Framework

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.

Exposure to mercury is regulated by the COHSR and BC Reg. 296/97. The regulated occupational exposure limit for airborne mercury according to both regulatory instruments is 0.025 mg/m³ (eight-hour TWA).

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.

A.6 OZONE-DEPLETING SUBSTANCES

Ozone-depleting substances (ODSs) are chemical agents known as chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) used in various refrigeration equipment including air-conditioning, heat pump, refrigeration or freezer units. They have also been used in solvents, as aerosol additives in the production of foam insulation and in fire extinguishing equipment.



HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix A Hazardous Building Materials Background Information, Health Effects Information and Regulatory Framework
March 19, 2020

A.6.1 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.

A.6.2 Regulatory Framework

ODSs are regulated in British Columbia by the British Columbia *Waste Management Act*—Ozone Depleting Substances and Other Halocarbons Regulation (BC Reg. 387/99 as amended by BC Reg. 109/2002).

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

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

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

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

A.7 SILICA

Silica is a scientific name that refers to a mineral group made up of silicon and oxygen. It is the crystalline form of silica that is of concern when considering health effects. Crystalline silica occurs in several forms including quartz, cristobalite and tridymite. Silica's many uses include sand in golf courses and playgrounds, sandblasting abrasives, glass, ceramics, building materials (concrete, grout, bricks, blocks, asphalt, acoustical tiles, floor tiles, and plaster), electronic components.



HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix A Hazardous Building Materials Background Information, Health Effects Information and Regulatory Framework
March 19, 2020

Dust containing respirable crystalline silica is produced during construction-related activities such as the following:

- Demolition
- Masonry, bricklaying and/or stone setting
- Rock drilling
- Repair and/or finishing of concrete materials
- Abrasive blasting
- Dry sweeping
- Quarrying and mining

A.7.1 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.

A.7.2 Regulatory Framework

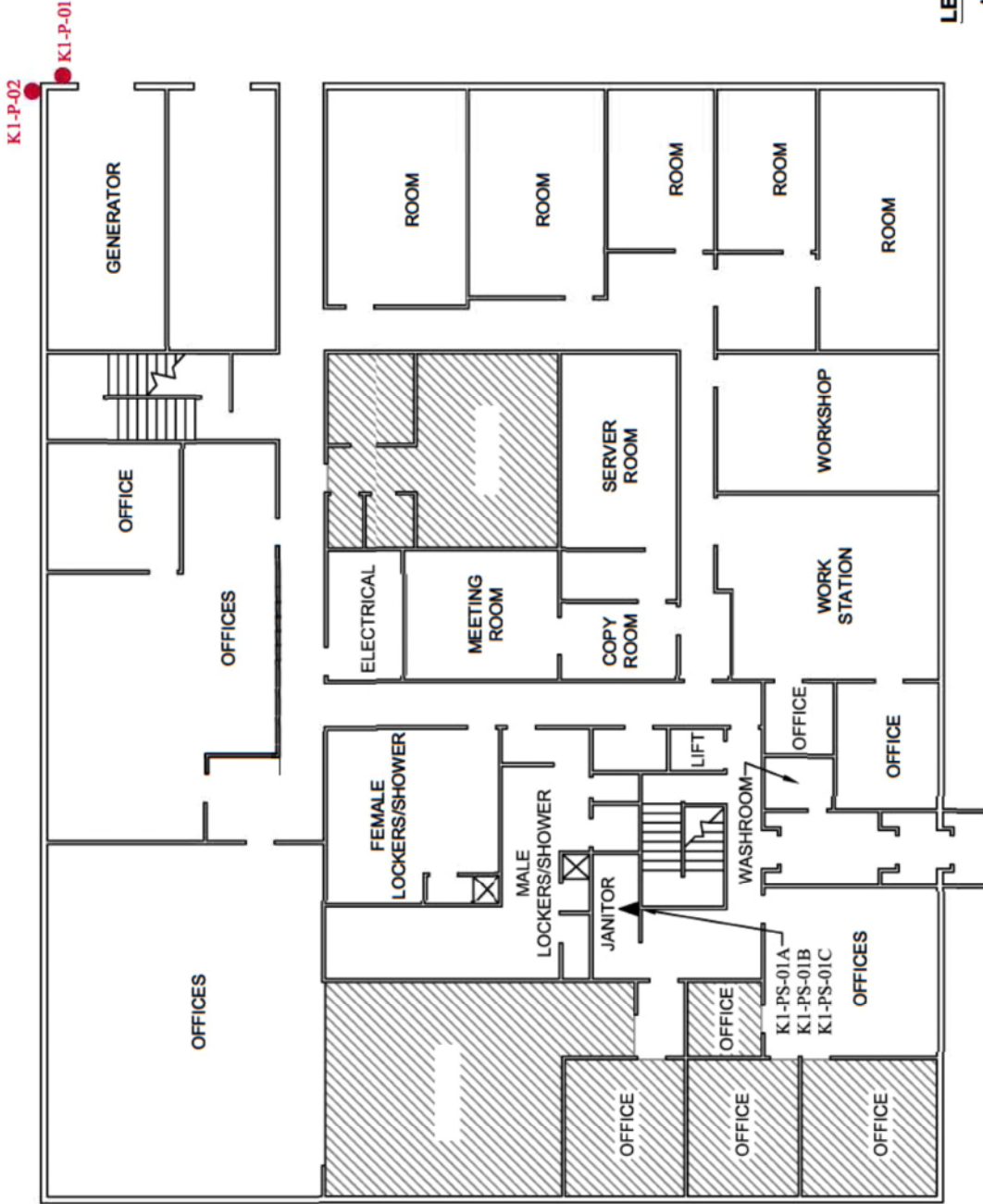
Regulations pertaining to silica are provided in BC Reg. 296/97. Included are general provisions (minimizing release; keeping worksite clear of unnecessary accumulations; ensuring methods for decontamination prevent generation of airborne silica), provisions for “restricted areas” (where there is a reasonable 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.

BC Reg. 296/97 and the COHSR also established the eight-hour OEL for silica to be 0.025 mg/m³ for each cristobalite and quartz.



APPENDIX B

Floor Plans



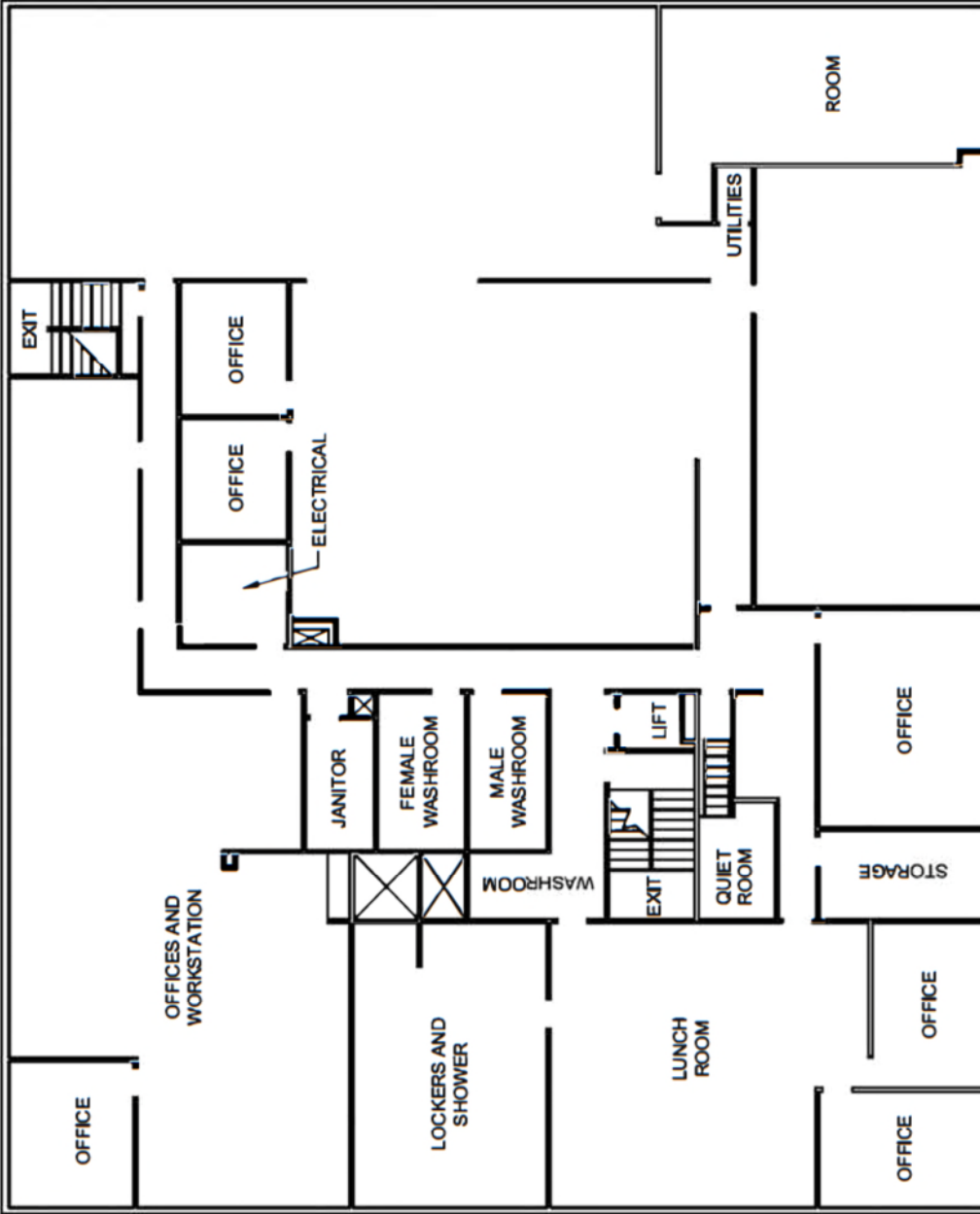
LEGEND

- ▲ BULK SAMPLE
- PAINT CHIP SAMPLE
- ▨ AREAS NOT ACCESSED

MAIN FLOOR

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App'd By: TW		
FLOOR PLAN SHOWING HAZARDOUS BUILDING MATERIALS AND BULK SAMPLE LOCATIONS E0015 - RCMP DISTRICT OFFICE, 2611 NORRIS ROAD, KELOWNA, BC		
Client: PUBLIC SERVICES AND PROCUREMENT CANADA		



SECOND FLOOR

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FLOOR PLAN SHOWING HAZARDOUS BUILDING MATERIALS AND BULK SAMPLE LOCATIONS

E0015 - RCMP DISTRICT OFFICE, 2611 NORRIS ROAD, KELOWNA, BC

PUBLIC SERVICES AND PROCUREMENT CANADA

Project No.: 123221396

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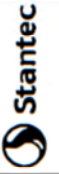
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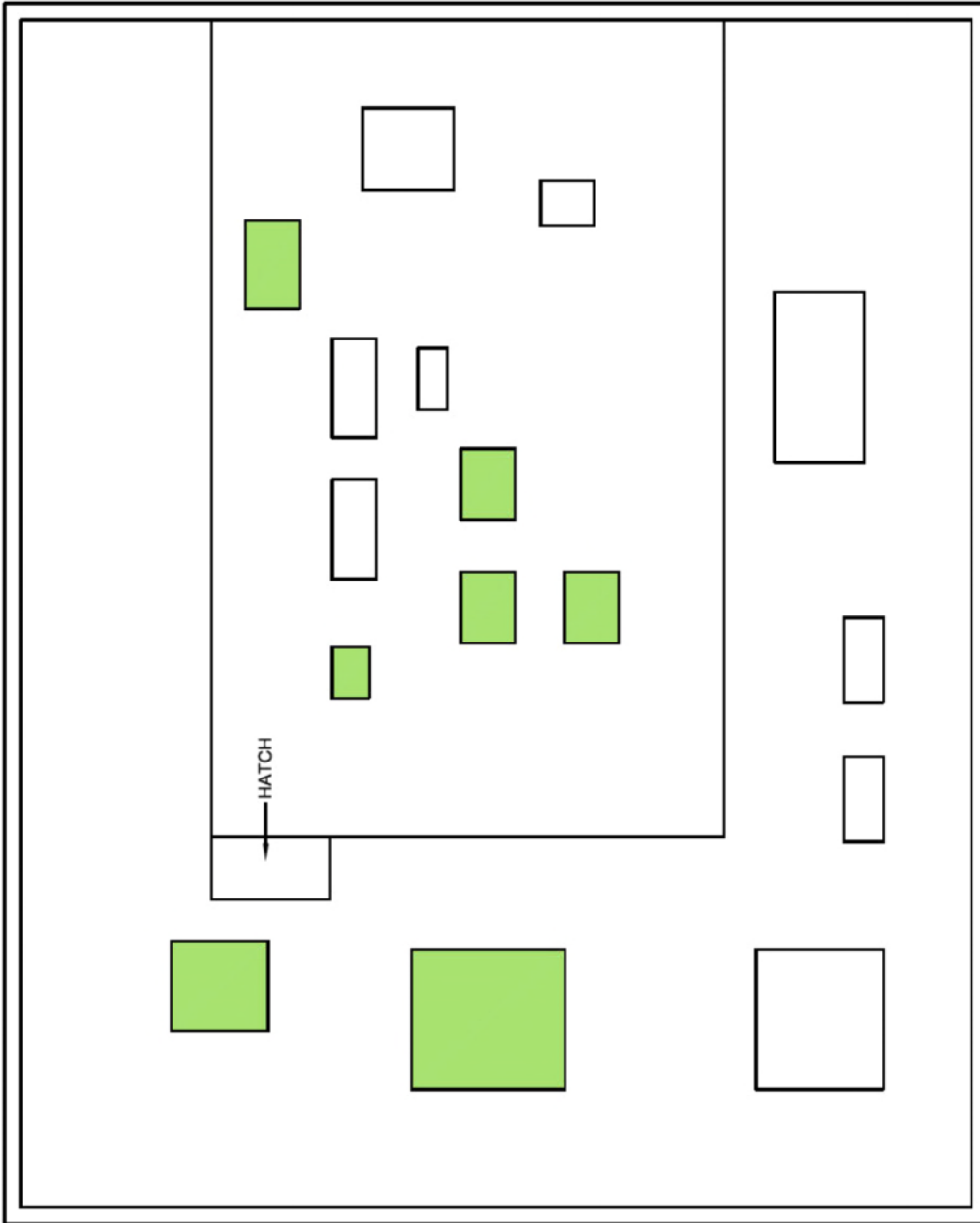
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LEGEND

 ODS-CONTAINING EQUIPMENT

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FLOOR PLAN SHOWING HAZARDOUS BUILDING MATERIALS AND BULK SAMPLE LOCATIONS

E0015 - RCMP DISTRICT OFFICE, 2611 NORRIS ROAD, KELOWNA, BC

Client: PUBLIC SERVICES AND PROCUREMENT CANADA

Project No.: 123221396

Scale: N.T.S.

Date: 20/02/26

Dwn. By: CD SL2020020445
CS/DM

App'd By: TW

Dwg. No.:

3



APPENDIX C

Summary of Results: Analysis of Bulk Samples for Asbestos

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix C Summary of Results: Analysis of Bulk Samples for Asbestos
March 19, 2020

Appendix C SUMMARY OF RESULTS: ANALYSIS OF BULK SAMPLES FOR ASBESTOS

**Table C-1 Suspected ACM Bulk Sample and Analytical Results Summary
E0015—RCMP District Office, 2611 Norris Road, Kelowna, BC**

Material/Homogenous Application Description	Sample Number	Sample Location	Result (% Asbestos)
Pipe sealant—white applied to seams of domestic water pipes	K1-PS-01A	Main floor janitor room	None Detected
	K1-PS-01B	Main floor janitor room	None Detected
	K1-PS-01C	Main floor janitor room	None Detected
NOTE: 1. Discrepancies between sampled material or location descriptions between this table and the laboratory certificate—this table is to be considered correct			



APPENDIX D

**Laboratory Analytical Report—Asbestos: Polarized Light
Microscopy**



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 691902986
Customer ID: 55JACQ30L
Customer PO: 123221396.300
Project ID:

Attn: Amanda Bell Phone: (604) 412-3004
Stantec Consulting Ltd. Fax:
500 - 4730 Kingsway Collected:
Burnaby, BC V5H 0C6 Received: 11/13/2019
Analyzed: 11/19/2019
Proj: RCMP/EDIVHAZMAT/123221396.300 / KELOWNA DISTRICT OFFICE - 2611 NORRIS RD

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: K1-PS-01A **Lab Sample ID:** 691902986-0001

Sample Description: MAIN FLOOR JANITOR ROOM/PIPE SEALANT - WHITE APPLIED TO SEAMS OF DOMESTIC WATER PIPES

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	11/19/2019	White/Green	0.0%	100%	None Detected	

Client Sample ID: K1-PS-01B **Lab Sample ID:** 691902986-0002

Sample Description: MAIN FLOOR JANITOR ROOM/PIPE SEALANT - WHITE APPLIED TO SEAMS OF DOMESTIC WATER PIPES

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	11/19/2019	White/Green	0.0%	100%	None Detected	

Client Sample ID: K1-PS-01C **Lab Sample ID:** 691902986-0003

Sample Description: MAIN FLOOR JANITOR ROOM/PIPE SEALANT - WHITE APPLIED TO SEAMS OF DOMESTIC WATER PIPES

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	11/19/2019	White/Green	0.0%	100%	None Detected	

Analyst(s): _____

Dane Sorochuk PLM Grav. Reduction (3)

Reviewed and approved by: _____

Nicole Yeo, Laboratory Manager
or Other Approved Signatory

None Detected = <0.1%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted. This report must not be used to claim product endorsement by NVLAP of any agency or the U.S. Government

Samples analyzed by EMSL Canada Inc. Burnaby, BC

Initial report from: 11/20/2019 11:41:02

APPENDIX E

**Summary of Results: Analysis of Paint Chip Samples for
Lead**

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix E Summary of Results: Analysis of Paint Chip Samples for Lead
March 19, 2020

Appendix E SUMMARY OF RESULTS: ANALYSIS OF PAINT CHIP SAMPLES FOR LEAD

**Table E-1 Suspected Lead-Containing Paint Sample and Analytical Results Summary
E0015—RCMP District Office, 2611 Norris Road, Kelowna, BC**

Sample Number	Paint Colour/Application	Sample Location	Result (ppm)
K1-P-01	Light blue on concrete siding	Exterior near generator room	<86
K1-P-02	Red on metal bollards	Exterior bollard near generator room	630
NOTE: Bold, highlighted text indicates confirmed LCP			



APPENDIX F

Laboratory Analytical Report—Lead: Paint Chip Analysis



EMSL Canada Inc.

2756 Slough Street, Mississauga, ON L4T 1G3

Phone/Fax: (289) 997-4602 / (289) 997-4607

<http://www.EMSL.com>

torontolab@emsl.com

EMSL Canada Or 551913878
CustomerID: 55JACQ30L
CustomerPO: 123221396.300
ProjectID:

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

Phone: (604) 412-3004
Fax:
Received: 11/14/19 11:46 AM
Collected:

Project: **RCMP / EDivHazmat123221396.300 (Kelowna District Office - 2611 Norris Rd)**

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

<i>Client SampleDescription</i>	<i>Collected</i>	<i>Analyzed</i>	<i>Weight</i>	<i>RDL</i>	<i>Lead Concentration</i>
K1-P-01 551913878-0001		11/15/2019	0.2333 g	86 ppm	<86 ppm
	Site: Exterior near generator room Desc: Light blue on concrete siding				
K1-P-02 551913878-0002		11/15/2019	0.1638 g	120 ppm	630 ppm
	Site: Exterior bollard near generator room Desc: Red on metal bollards				

Rowena Fanto, Lead Supervisor
or other approved signatory

*Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.008 % wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities. Samples received in good condition unless otherwise noted. "<" (less than) result signifies the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements unless specifically indicated otherwise. Definitions of modifications are available upon request.

Samples analyzed by EMSL Canada Inc. Mississauga, ON A2LA Accredited Cert #2845 08; AIHA-LAP, LLC - ELLAP #196142

Initial report from 11/21/2019 09:27:57

APPENDIX G


Summary of Identified LCPS

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix G Summary of Identified LCPs
March 19, 2020

Appendix G SUMMARY OF IDENTIFIED LCPS

Table G-1 Summary of Identified LCPs
E0015—RCMP District Office, 2611 Norris Road, Kelowna, BC

LCP Description		Photo
Paint colour	Red	
Substrate	Metal	
Location/approx. extent	Exterior bollards and trim	
Lead content	630 ppm	
Condition	Good	

