Public Works and Government Services Canada

Requisition No. EZ899 191983/A

DRAWINGS & SPECIFICATIONS
for

Sandspit Airport
Lighting Upgrade
R.089425.001 June 27, 2018

APPROVED BY:

Regional Manager, AES — July 5, 2018.

Construction Safety Coordinator — 2018-10-19

TENDER:

Project Manager — Oct 22, 2018

Date

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

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CONSULTANTS – SEAL & SIGNATURE

Electrical
Stantec Consulting Ltd.

(Professional's Seal and Signature)

27 June 2018
Date

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES:

.1 Work covered by Contract Documents;

.2 Contract Method;

.3 Work by others;

.4 Future work;

.5 Work sequence;

.6 Contractor use of premises;

.7 Owner occupancy.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 35 00 – Special Procedures

1.3 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract comprises in lighting and lighting control renovations in the Sandspit Inn as well as the Sandspit Airport Terminal Building, CSB Building, Pole mounted apron lighting and parking lot lighting at the Sandspit Airport,in Sandspit, BC.

The project includes but is not limited to:

.1 Replacement of existing lighting in the Sandspit Inn, Airport Terminal building (ATB) and Airport Combined Services Building (CSB).

.2 Replacement of existing poles and luminaires in the ATB parking lot, retaining existing pole bases.

.3 Replacement of existing Apron luminaires, retaining existing pole.

.4 Replacement and Upgrade of existing DDC controlled, low voltage lighting control system in the ATB, including addition of daylight harvesting controls and occupancy sensors in concourse area. Include cost of reprogramming existing BMS as indicated in 26 09 24 Part 3.

.5 Replacement of existing line voltage light switches in Sandspit Inn, ATB and CSB, with line voltage occupancy sensor switches installed in areas as indicated in drawings.

.6 Phased construction as required, to accommodate limited interruption to the services of the building.

.7 Supply and installation of a complete, fully functional, tested, and commissioned lighting system, with ancillaries.

.8 Contractor to coordinate, apply for, and submit all necessary documentation for BC Hydro Business Energy Savings Incentives, as further described in section 1.4.

.2 All materials and equipment supplied and installed shall be new except the relocated equipment specified in the drawings.

.3 Commissioning works includes electrical components and systems.

.4 Unless otherwise noted, all existing electrical and lighting fixtures removed are to be removed from site and disposed of by contractor.

.5 All electrical, life safety and building systems are to remain fully operational during construction.

1.4 BC HYDRO BUSINESS ENERGY SAVINGS INCENTIVES – CONTRACTOR SCOPE

.1 The Contractor will be responsible for all coordination and documentation required for BC Hydro Business Energy Savings Incentives application on behalf of Transport Canada, including:

.1 Initial Application to BC Hydro at Contract Award. Application Approval from BC Hydro is required prior to Shop Drawing Review.

.2 Submit Project Declaration to BC Hydro at Substantial Completion of work.

.3 Submit Invoices to BC Hydro within 10 days of declaration. Invoice to include list of all luminaire types, quantity, Model Number, Description, Rate and Total Price. A single line is to be provided for labor, permitting and eco fees.

.4 Receive Incentive payable to Transport Canada.

.2 Refer to BC Hydro website below for additional information and application:

https://www.bchydro.com/powersmart/business/programs/express.html

1.5 CONTRACT METHOD

.1 Construct Work under single, stipulated price contract.

1.6 WORK SEQUENCE

.1 Construct Work in stages to accommodate Owner's continued use of premises during construction. Refer to sections 01 11 55 for shutdown requirements. All shutdowns to be coordinated within allowable window and approved with Departmental Representative.

.2 Construction sequence to be completed by Contractor upon award of project and submitted with construction schedule

.3 Maintain fire access/control.

.4 Contractor shall coordinate with the Departmental Representative and Transport Canada and allow adequate construction stages in the tender prices to meet the site condition, minimal interruption to the building services permitted, and the staged nature of the project, understanding that each stage of the project needs to be fully functional and operating before proceeding with the next stage.

.5 Staged testing and commissioning shall be provided such that the equipment and the systems are fully functional, tested, balanced, controlled and commissioned after each phase of work, before proceeding with the next phase.

1.7 SITE MEETINGS

.1 Construction meetings with Departmental Representative to be held on site bi-weekly.

.2 All contractors shall also attend bi-weekly site meetings.

.3 Contractors shall attend commissioning meetings.

1.8 CONTRACTOR USE OF PREMISES

.1 Contractor shall limit use of premises for work, for storage, and for access, to allow:

.1 Owner occupancy.

.2 Coordinate use of premises, such as work areas, storage, delivery of materials and equipment, parking, washroom facilities provision and use, elevator, power and water use shall be coordinated with and under direction of Departmental Representative. See Section 01 35 00 for contractor entry/exit of primary staging area, entry log, and contractor parking locations.

.3 Contractor shall supply all necessary signage, hoarding and fencing.

.4 Contractor is responsible for all dust control measures. Contractor shall maintain the work areas under negative pressure to minimize potential for dust spread in the building.

.5 Contractor shall coordinate all work during normal hours of operation, Monday to Friday, 8:00 am - 5:00 pm. Coordinate all deliveries to minimize the disruption to the normal operation of the facility - coordinate with the Departmental Representative.

.6 All work to be performed after hours shall be coordinated with the Departmental Representative.

.7 Any work performed by the contractor outside of normal working hours requires notification of on-site security commissionaires.

.8 A Security Escort will be required for all work in secured areas as well as for all after hours work, Contractor will be responsible for all costs associated with security escorts. Areas requiring escort shall include Apron and ATB Air-side exterior lightings (Canopy Lighting), ATB Hold Room 119, Security Screen 120, Airport and Airline Offices 121, 122, 123, 123A, 124B, 126, Baggage Room 127, Cooler and Cargo areas 128 and 129 and Storage/CCTV room and office on South end of ATB.

.9 A temporary storage area for removed equipment is to be located in a designated storage area (e.g. adjacent to the Sandpit Inn); coordinate with, and work under direction of Departmental Representative.

.10 Contractor shall supply all hoarding and fencing. See Section 01 35 00.

.11 Contractor shall abide by all on-site security provisions and regulations.

1.9 OWNER OCCUPANCY

.1 Sandpsit Airport staff and the public will occupy premises, and carry out normal operation of the facility, during entire construction period.

.2 Cooperate with Departmental Representative in scheduling operations to minimize interruption or conflict and to facilitate usage of the facility.

1.10 CONTRACTOR FURNISHED ITEMS

.1 Contractor Responsibilities:

.1 Designate submittals and delivery date for each product in progress schedule.

.2 Review shop drawings, product data, samples, and other submittals. Submit to Departmental Representative notification of any observed discrepancies or problems anticipated due to non-conformance with Contract Documents.

.3 Receive and unload products at site.

.4 Handle products at site, including uncrating and storage.

.5 Protect products from damage and from exposure to elements.

.6 Assemble, install, connect, adjust, and finish products.

.7 Provide installation inspections required by local authorities.

.8 Repair or replace and make good items damaged by contractor on site during construction.

.9 The word "make good" used in the contract documents means "to restore new or existing work after being damaged, cut, patched or rejected by the Departmental Representative" and also means "using materials identical to the original materials with visible surfaces matching the appearance of the original surfaces in all details and with no apparent junctions between new and original surfaces. Where original materials are no longer available, the Contractor may submit a proposal of materials for review by the Departmental Representative."

1.11 ASBESTOS REMOVAL

.1 If the Contractor, during renovations / demolition, should discover asbestos (or material suspected to be asbestos) on piping, ductwork, etc., he shall immediately cease all work in that area and advise the General Contractor. The General Contractor shall take immediate appropriate action to verify presence of friable asbestos and be responsible for the removal of all friable asbestos.

.2 The Contractor will not be entitled to a claim for any delays resulting from the investigation of or removal of asbestos.

.3 Asbestos shall be removed in accordance with the regulations for handling hazardous material.

.4 Asbestos removal will be considered extra cost.

1.12 CONSTRUCTION PERIOD

.1 Allowable time for construction: 18 weeks after award of contract.

END OF SECTION

Part 1 General

1.1 CODES

.1 Perform work in accordance with National Building Code for Canada 2010, Workers' Compensation Board of BC, BC Building Code 2012, and any other code of provincial or local regulation, standard or application provided that, in any case of conflict or discrepancy, the more stringent requirements shall apply.

.2 Meet or exceed requirements of specified standards, codes, and referenced documents.

1.2 DESCRIPTION OF WORK

.1 Work under this Contract comprises, but is not limited to, the provision of all labour, materials, services, and equipment necessary for the work for the Sandspit Airport Lighting Upgrade project as fully described in the Tender Documents.

1.3 CONTRACT DOCUMENTS

.1 The Contract documents, drawings, and specifications are intended to complement each other.

.2 Drawings are, in general, diagrammatic and are intended to indicate the scope and general arrangement of the work.

.3 Coordinate with pre-purchased equipment suppliers in carrying out their respective works and carry out instructions from Departmental Representative.

.4 Coordinate work with that of pre-purchased equipment suppliers. If any part of work under this Contract depends on its proper execution or result upon work of said suppliers, report promptly to Departmental Representative, in writing, any defects which may interfere with proper execution of this Work.

1.4 TIME OF COMPLETION

.1 Commence work immediately upon official notification of acceptance of offer and complete the project, including testing, adjusting, and commissioning, per Section 01 11 00 – 1.12 – Construction Period.

1.5 HOURS OF WORK

.1 Sandspit Airport Staff and members of the public will occupy premises, and carry out normal operation of the facility during entire construction period. Cooperate with Departmental Representative in scheduling operations to minimize interruption or conflict and to facilitate Owner usage of the facility.

.2 All work which generates excessive noise and vibration, including cutting and coring, removal of floor slab shall be executed outside of the normal operating hours.

.3 All other work shall be executed during the normal operating hours:

- Monday through Sunday – 0800 to 1700 hours.

.4 All work conducted during or outside of normal operating hours will be subject to restrictions outlined in Sections 01 14 00 and 01 51 00, including security arrangements.

1.6 WORK SCHEDULE

.1 Carry out work as follows:

.1 Within 10 working days after Contract award, provide a "phasing bar chart" and a schedule showing anticipated progress stages and final completion of the work within the time period required by the Contract documents. Indicate the following:

.1 Submission of shop drawings, product data, and samples;

.2 Commencement and completion of work of each section of the specifications or trades for each phase as outlined;

.3 Final completion date within the time period required by the Contract documents.

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

.3 Interim reviews of work progress based on work schedule will be conducted as decided by Departmental Representative and the schedule updated by Contractor in conjunction with and to approval of Departmental Representative.

.4 All activities will be coordinated with and to approval of Departmental Representative. Provide minimum 72 hour notice for any shutdowns; arrange work to minimize shutdown duration. Coordinate with Departmental Representative

1.7 COST BREAKDOWN

.1 Before submitting the first progress claim, submit a breakdown of the Contract price in detail as directed by the Departmental Representative and aggregating Contract price. After approval, the cost breakdown will form the basis of progress payments.

.2 Contractor should attend meetings with Departmental Representative, as required, to finalize the breakdown.

1.8 CODE, BYLAWS, STANDARDS

.1 Perform work in accordance with the National Building Code of Canada (NBC) 2010, 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.

1.9 DOCUMENTS REQUIRED

.1 Maintain one (1) copy each of the following at the job site:

.1 Contract drawings;

.2 Contract specifications;

.3 Addenda to Contract documents;

.4 Copy of work schedule;

.5 Reviewed shop drawings;

.6 Change orders;
.7 Other modifications to Contract;
.8 Field test reports;
.9 Reviewed samples;
.10 Manufacturer's installation and application instructions;
.11 One set of record drawings and specifications for "as-built" purposes;
.12 Current construction standards of workmanship listed in technical sections;
.13 Building Safety Plan.

1.10 REGULATORY REQUIREMENTS

.1 Building Permit

.1 There is no building permit requirement for this project.

.2 Electrical Permit

.1 Electrical Contractor to obtain Electrical Permit and pay all associated fees.

.3 Provide inspection authorities with plans and information required for issue of acceptance certificates.

.4 Furnish inspection certificates in evidence that the work installed conforms to the requirements of the specification.

1.11 CONTRACTOR'S USE OF SITE

.1 Use of site:

.1 Exclusive and complete for execution of work.
.2 Assume responsibility for assigned premises for performance of this work.
.3 Be responsible for coordination of all work activities on site, including the work of other contractors engaged by the Departmental Representative.
.4 Coordinate with Departmental Representative for use of storage or work areas needed for operations under this Contract.

.2 Perform work in accordance with Contract documents. Ensure work is carried out in accordance with approved schedules.

.3 Do not unreasonably encumber site with material or equipment.

1.12 EXAMINATION

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

1.13 EXISTING SERVICES

.1 Where Work involves breaking into or connecting to existing services, carry out work as directed in Section 01 14 00 – Work Restrictions.

.2 Record locations of maintained, re-routed, and abandoned service lines.

.3 Construct hoarding and barriers in accordance with Section 01 56 00 – Temporary Barriers and Enclosures.

1.14 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 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 Fit work airtight to pipes, sleeves, ducts and conduits.

.6 Conceal pipes, ducts and wiring in raised floors, wall, and ceiling construction of finished areas except where indicated otherwise.

.7 Patch and make good surfaces cut, damaged, or disturbed, to Departmental Representative's approval. Match existing material, colour, finish, and texture.

.8 "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.

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 SUBTRADES

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

1.18 QUALITY OF WORK

.1 Ensure that quality workmanship is performed through use of skilled tradesmen, under supervision of qualified journeyman.

.2 The workmanship, erection methods and procedures to meet minimum standards set out in the National Building Code of Canada 2010 and Construction Standards as specified herein.

.3 In cases of dispute, decisions as to standard or quality of work rest solely with the Departmental Representative, whose decision is final.

.4 Quality of work shall in to case be of lesser standard compared to the existing.

1.19 WORKS COORDINATION

.1 Coordinate work of sub-trades:

.1 Designate one person to be responsible for review of contract documents and shop drawings and managing coordination of Work.

.2 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.

.3 Departmental Representative is not responsible for, nor accountable for, extra costs incurred as a result of Contractor's failure to coordinate Work.

.4 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 individual technical sections of specifications.

1.21 PROJECT MEETINGS

.1 Departmental Representative to schedule project meetings and provide meeting facilities. Meeting minutes, meeting agenda, etc. to be recorded by Stantec.

1.22 TESTING AND INSPECTION

.1 Particular requirements for inspection and testing to be carried out by testing service or

laboratory approved by the Departmental Representative are specified in Sections 01 45 00 – Quality Control.

.2 The Contractor will appoint and pay for the services of testing agency or testing laboratory as specified, and where required for the following:

.1 Inspection and testing required by laws, ordinances, rules, regulations, or orders of public authorities.

.2 Inspection and testing performed exclusively for Contractor's convenience.

.3 Testing, adjustment, and balancing of electrical equipment and systems.

.1 Mill tests and certificates of compliance.

.2 Tests specified in the contract documents to be carried out by Contractor which may be under the Departmental Representative's supervision.

.3 Within 15 working days after Contract award provide a list of proposed testing services or testing laboratories for Departmental Representative's approval.

.4 Contractor shall furnish labour and facilities to:

.1 Notify Departmental Representative in advance of planned testing.

.5 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.

.6 Pay costs for uncovering and making good work that is covered before required inspection or testing is completed and approved by Departmental Representative.

.7 Provide Departmental Representative with two (2) copies of testing laboratory reports as soon as they are available.

1.23 AS-BUILT DOCUMENTS

.1 As the 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.

.2 At completion of the Work, transfer all deviations, including those called up by addenda, revisions, clarifications, shop drawings, and change order, to a set of Issued for Construction drawings. Submit the 'red-marked' as-built set to the Department Representatives, in hard copy and in PDF.

.3 Arrange for and be responsible for the preparation of as-built "record" drawings in AutoCAD computerized drafting system. Contractor to prepare AutoCAD as-built drawings only after red-marked as-built drawings, noted in point above have been reviewed and accepted by Department Representative.

.4 Be responsible for the cost of preparation of as-built "record" drawings. Submit electronic copy of the as-built drawings on USB Flash Drive media in CAD and PDF format, as well as 2 sets of hard copies. Submit as-built drawings before requesting Substantial Completion.

1.24 CLEANING

.1 Refer to Section 01 74 11 - Cleaning.

1.25 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 and equipment within work area with 0.102 mm thick 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.

1.26 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.

1.27 MAINTENANCE MATERIALS, SPECIAL TOOLS AND SPARE PARTS

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

1.28 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 drawings referred to in the Contract Documents.

1.29 BUILDING SMOKING ENVIRONMENT

.1 Smoking within the building and within 7.5m of all air intakes is not permitted.

.2 A 'No Smoking' sign to be put up by Contactor.

1.30 SYSTEM OF MEASUREMENT

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

1.31 FAMILIARIZATION WITH SITE

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

1.32 SECURITY REQUIREMENTS

.1 Refer to Section 01 14 00 – Work Restrictions.

1.33 SUBMISSION OF TENDER

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

1.34 **SUBSTANTIAL COMPLETION**

.1 Substantial Completion of work will only apply after all phases are complete, connection of all equipment and piping, the new systems are commissioned and functional, and confirmed that all systems are operational for commissioning by the Departmental Representative.

.2 All submissions shall be complete prior to requesting Substantial Performance.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES:

.1 Connecting to existing services.

.2 Special scheduling requirements.

1.2 RELATED SECTIONS

.1 Section 01 32 19 – Security

.2 Section 01 35 00 – Special Procedures

.3 Section 01 56 00 - Temporary Barriers and Enclosures.

1.3 EXISTING SERVICES

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

.2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours of notice for necessary interruption of electrical service throughout course of work. Keep duration of interruptions to a minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends.

.3 Provide for unobstructed pedestrian and vehicular traffic.

.4 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.4 SPECIAL REQUIREMENTS

.1 Paint public or staff occupied areas Monday to Friday from 1800 to 0700 hours only and on Saturdays, Sundays, and statutory holidays. Coordinate with Departmental Representative.

.2 Contractor shall only work on the areas for which the construction works are scheduled, and the testing and commissioning are required to perform before occupancy.

.3 Security Escort is to be provided by Airport Staff for all work in secured area, to be coordinated with Departmental Representative.

.4 Maintain an acceptable indoor environmental quality during construction. Apply measures such as:

.1 Prevention of the construction dust from spreading into the laboratory or other spaces;

.2 Pressure differential is to be maintained between the construction and the occupied zones;

.3 Prevention of fumes from welding or cutting.

.5 Refer to section 01 32 19 - Security

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES:

.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.

1.2 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.

1.3 PRE-CONSTRUCTION MEETING

.1 Within 10 days after award of Contract, Departmental Representative will arrange pre-construction meeting.

.2 Departmental Representative, Consultant, Contractor and representatives from Transport Canada will be in attendance.

.3 Departmental Representative will establish time and location of meeting and notify parties concerned.

.4 The Consultant 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, Transport Canada representatives, and consultants.

.2 Communication protocol for submittals.

.3 Start date on site.

.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.

1.4 PROJECT PLANNING

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

.2 Contractor to provide two (2) weeks look ahead schedule at every bi-weekly site meeting.

1.5 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 two (2) weeks after Pre-Construction meeting.

.3 During progress of Work, revise and resubmit as directed by Departmental Representative.

1.6 CONSTRUCTION SITE MEETINGS

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

.2 All construction site meetings will be chaired by the Consultant. Consultant will record minutes of meetings and circulate to attending parties and affected parties not in attendance.

.3 Agenda to include following:

- .1 Review and approval of minutes of previous meeting;
- .2 Review of Work progress since previous meeting;
- .3 Review work to be carried out until the next meeting;
- .4 Field observations, problems, conflicts;
- .5 Review of Health and Safety including any incidents, near misses, and WorkSafe BC visits;
- .6 Problems which impede construction schedule;
- .7 Review of off-site fabrication delivery schedules;
- .8 Corrective measures and procedures to regain projected schedule;
- .9 Revision to construction schedule;
- .10 Progress schedule, during succeeding work period;
- .11 Review submittal schedules: expedite as required;
- .12 Update of Red Line As-Built Drawings;
- .13 Maintenance of quality standards;
- .14 Review proposed changes for effect on construction schedule and on completion date;
- .15 Other business.

1.7 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 five (5) days of field review.

1.8 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.

1.9 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.

.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 RESTRICTED OR SECURED AREA

.1 Any area on airport property to which access is restricted by sign and/or monitored is a secure or restricted area.

1.2 CONTRACTOR'S RESPONSIBILITY

.1 Be responsible for construction, personnel, and vehicles employed on project and requiring access to restricted areas.

1.3 KEYS

.1 Keys necessary for access to restricted areas to be responsibility of Contractor when issued and controlled by the Airport Manager. All keys will be returned as laid down by the Airport Manager. Keys not returned or lost shall be subject to a charge of $200.

.2 Contractor is responsible for ensuring that the gate is closed and locked after each truck goes through it. This will require that a Contractor's employee be present to open and close the gate when trucks are hauling to and from the site.

1.4 RESPONSIBLE PERSONNEL

.1 Provide Airport Manager with a list of responsible personnel, and those of sub-contractors, who may be contacted after working hours in case of emergency.

.2 The contractor will be responsible for all personnel and vehicles employed by the Contractor as well as personnel and vehicles of a sub-contractor and suppliers of materials or services requiring access to restricted areas.

.3 All security staff employed by the Contractor must attend a briefing with the security services division prior to the project.

1.5 SECURITY BARRIERS

.1 Security barriers, such as doors, fences, gates, locks, or door hardware, which are required to be removed, must be replaced, if practicable, at the end of each work day. If it is necessary to remove barriers for an extended period, enclose unprotected areas with temporary hoarding. Where possibility exists that restricted area may be left unprotected at end of work day, inform the Airport Manager immediately.

.2 Failure to restore such security barriers when required will result in their restoration by other forces and cost of such restoration shall be recovered from Contractor.

.3 When it is necessary to remove security barriers for access to construction, or deliveries, provide a uniformed security guard to control access to area. Access control procedures will be monitored by Transport Canada

1.6 DAILY SECURITY

.1 Ensure that access to restricted area is secured at end of each work day.

.2 When work is to be done within restricted area after normal working hours, notify Airport Manager of area and times.

1.7 EVACUATION

.1 The Contractor shall be required to abandon and evacuate the work sites, as directed, should an emergency situation be declared by Airport Authorities.

1.8 RADIO ESCORT

.1 Any Contractor's employee found outside of the work site limit without an escort will no longer be allowed inside the secure area.

1.9 VEHICLES

.1 Vehicles required to be in a restricted area by the Contractor shall operate in accordance with Transport Directive for the Operation of Vehicles on Airport Movement Areas.

.2 Vehicles required to be in a restricted area must be equipped with a 360-degree rotating amber beacon.

.3 Company vehicles shall be removed from the construction site when not actually in use. If company vehicles are left at the Airport, they are to be stored in a location determined by the Airport Manager.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE

.1 Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

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

.3 Present shop drawings, product data, samples, and mock-ups in SI Metric units.

.4 Where items or information is not produced in SI Metric units converted values are acceptable.

.5 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated, and identified as to specific project will be returned without being examined and considered rejected.

.6 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.7 Verify field measurements and affected adjacent Work are coordinated.

.8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.

.9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.

.10 Keep one reviewed copy of each submission on site.

.11 Do not proceed with work until relevant submissions are reviewed by Departmental Representative.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures, and other data which are to be provided by Contractor to illustrate details of a portion of Work.

.2 When specified in the Contract document, submit drawings stamped and signed by professional engineer registered or licensed in Province of British Columbia of Canada.

.3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes, and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

.4 Allow 10 days for Departmental Representative's review of each submission, unless noted otherwise.

.5 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

.6 Make changes in shop drawings as Departmental Representative may require consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.

.7 Accompany submissions with transmittal letter, in 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.

.8 Submissions include:

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

.9 After Departmental Representative's review, distribute copies.

.10 Submit electronic copy of shop drawings for each requirement requested in specification sections and as Departmental Representative may reasonably request.

.11 Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.

.12 Submit electronic copies of test reports for requirements requested in specification sections and as requested by Departmental Representative.

.1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.

.2 Testing must have been within 3 years of date of contract award for project.

.13 Submit electronic copies of certificates for requirements requested in specification sections and as requested by Departmental Representative.

.1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.

.2 Certificates must be dated after award of project contract complete with project name.

.14 Submit electronic copies of manufacturer's instructions for requirements requested in specification sections and as requested by Departmental Representative.

.1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

.15 Submit copies of Manufacturer's Field Reports for requirements requested in specification sections and as requested by Departmental Representative.

.16 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

.17 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification sections and as requested by Departmental Representative.

.18 Delete information not applicable to project.

.19 Supplement standard information to provide details applicable to project.

.20 If upon review by Departmental Representative no errors or omissions are discovered or if only minor corrections are made, electronic copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

.21 The review of shop drawings by Departmental Representative is for sole purpose of ascertaining conformance with general concept.

.1 This review shall not mean that Departmental Representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of Construction and Contract Documents.

.2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for coordination of Work of sub-trades.

.22 Shop drawings format larger than 11" x17" (275mm x 430mm) must be submitted with hardcopies together with electronic format. Submit sufficient copies such that Departmental Representative will be provided with five (5) copies plus contractor's distribution and maintenance manual.

.23 Electronic submissions will only be reviewed and returned electronically. No hardcopies will be returned to contractor.

.24 All electronic submissions to be uploaded to Document Control System FTP site hosted by PWGSC.

1.3 SAMPLES

.1 Submit for review samples in duplicate as required in respective specification sections. Label samples with origin and intended use.

.2 Deliver samples prepaid to Departmental Representative's business address.

.3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.

.4 Where colour, pattern, or texture is criterion, submit full range of samples.

.5 Adjustments made on samples by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

.6 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.

.7 Reviewed and accepted samples will be kept onsite and will become standard of workmanship and material against which installed Work will be verified.

1.4 MOCK-UPS

.1 Erect mock-ups in accordance with Section 01 45 00 - Quality Control.

1.5 PHOTOGRAPHIC DOCUMENTATION

.1 Submit electronic copy of colour digital photography in jpg format, standard resolution monthly with progress statement and as directed by Departmental Representative.

.2 Project identification: name and number of project and date of exposure indicated.

.3 Viewpoints and their locations as reasonably determined by Departmental Representative.

.4 Provide photographic documentation of adjacent existing conditions prior to commencement of construction for determining and accidental damage as a result of contractor's work.

.5 Frequency of photographic documentation: monthly as directed by Departmental Representative.

.1 Upon completion of: demolition, framing and services before concealment of Work, and as directed by Departmental Representative.

1.6 CERTIFICATES AND TRANSCRIPTS

.1 Submit electronic copies of test results and inspection reports required as noted in each section of specifications.

END OF SECTION

Part 1 GENERAL

1.1 GENERAL

.1 Use new material and equipment unless otherwise specified.

.2 Within seven (7) days of written request by Departmental Representative, submit the following information for any and all materials and products proposed for supply:

- .1 Name and address of manufacturer
- .2 Trade name, model and catalogue number
- .3 Performance, descriptive, and test data
- .4 Manufacturer's installation or application instructions
- .5 Evidence of arrangements to procure

.3 Provide material and equipment of specified design and quality, performing to published ratings and for which replacement parts are readily available.

.4 Use products of one manufacturer for equipment or material of same type of classification unless otherwise specified.

1.2 MANUFACTURER'S INSTRUCTIONS

.1 Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation methods.

.2 Notify Departmental Representative in writing of any conflict between these specifications and manufacturer's instructions. Departmental Representative will designate which document is to be followed.

1.3 DELIVERY AND STORAGE

.1 Deliver, store, and maintain packaged material and equipment with manufacturer's seals and labels intact.

.2 Prevent damage, water damage, adulteration and soiling of material and equipment during delivery, handling and storage. Immediately remove rejected material and equipment from site.

.3 Store material and equipment in accordance with supplier's instructions.

.4 Touch up damaged factory-finished surfaces to Departmental Representative's satisfaction. Use primer or enamel to match original. Do not paint over name plates.

1.4 SUBSTITUTION AFTER CONTRACT AWARD

.1 No substitutions are permitted without prior written approval of the Departmental Representative.

.2 Proposals for substitutions may on be submitted after Contract award. Such request must include statements of respective costs of items originally specified and the proposed substitution.

.3 Proposals will be considered by the Departmental Representative if:

- .1 Products selected by Tenderer from those specified are not available.
- .2 Delivery date of products selected from those specified would unduly delay completion of Contract, or

.3 Alternative product to that specified, which is brought to the attention and considered by Departmental Representative as equivalent to the product specified, will result in a credit to the Contract amount.

.4 **Should the proposed substitution be accepted either in part or in whole, assume full responsibility and costs when substitution affects other work on the project. Pay for design or drawing charges required as result of substitution.**

.5 Amounts of all credits arising from approval of the substitutions will be determined by the Departmental Representative, and the Contract Price will be reduced accordingly.

END OF SECTION

Part 1 General

1.1 SPECIAL PROCEDURES

.1 All procedures listed in the following section are designed as a minimum standard that the Contractor must achieve, and all work procedures submitted to the Departmental Representative will be reviewed against the following.

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 RESTRICTED ACCESS

.1 Areas of the facility are subject to access restrictions.

.2 When access is required to such areas, coordinate with Departmental Representative and follow directions and instructions from Departmental Representative.

3.2 WASTE DISPOSAL PROCEDURE

.1 Requirements

.1 All non-metal and non-glass waste will be transported and disposed of in accordance with the requirements of the Transportation of Dangerous Goods Act, the BC Ministry of Water Lands and Air Protection, and all other applicable regulations.

.2 Any materials stored on site will be stored in an isolated and secure area. The secure area shall be restored to the condition it was before. This area shall be adjacent to the pesticide storage area at the secondary staging area. Contractor shall provide fencing and devices to secure this area.

3.3 ALTERNATIVE PROCEDURES

.1 General Requirements

.1 Procedures described in this specification are to be utilized at all times.

.2 If the specified procedures cannot be utilized, a request must be made in writing to the Departmental Representative providing details of the problems encountered and recommended alternatives.

.3 Alternative procedures shall provide equivalent or greater protection than procedures they replace.

.4 Any alternative procedure must be approved in writing by the Departmental Representative prior to its implementation.

END OF SECTION

Part 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 01 32 19 – Security

.2 Section 01 51 00 - Temporary Facilities

.3 Section 01 56 00 – Temporary Barriers Enclosures

1.2 GENERAL PROTECTION

.1 Do not disrupt airport business except as permitted by Departmental Representative

.2 Coordinate work so as not to interfere with on-going and regular maintenance activities.

.3 Provide temporary protection for safe handling of public, personnel, pedestrians and vehicular traffic. (Refer to Section 01 32 19, 01 51 00 and 01 56 00.)

.4 Provide barricades, markers, delineators and where directed by the drawings, specifications and the Departmental Representative.

.5 Provide radio operator, radio, and vehicle as defined in this Section.

1.3 WORK PLAN

.1 Work of this Contract shall be conducted in stages to ensure no interruption to the Airport operations.

.2 Work will be performed during normal working hours as defined within this specification and shall be confined to the area indicated on the drawings. All work schedules are to be approved by the Airport Manager

.3 Airport and all airfield lighting shall be fully operational every morning at 5:00 a.m.

.4 Contractor vehicles shall not be run on runway pavement.

.5 Contractors shall submit a work plan and obtain Departmental Representative's approval before commencing work. Work plan shall detail sequencing, scheduling, and work method for all of the Work of this Contract.

1.4 OPERATIONAL REQUIREMENTS

.1 Sandspit Airport must remain operational throughout the duration of this contract.

END OF SECTION

Part 1 General

PSPC Update on Asbestos Use

Effective April 1, 2016, all Public Services and Procurement Canada (PSPC) contracts for new construction and major rehabilitation will prohibit the use of asbestos-containing materials. Further information can be found at http://www.tpsgc-pwgsc.gc.ca/comm/vedette-features/2016-04-19-00-eng.html

1.1 REFERENCES

.1 Government of Canada.

- .1 Canada Labour Code - Part II
- .2 Canada Occupational Health and Safety Regulations.

.2 National Building Code of Canada (NBC):

- .1 Part 8, Safety Measures at Construction and Demolition Sites.

.3 The Canadian Electric Code (as amended)

.4 Canadian Standards Association (CSA) as amended:

- .1 CSA Z797-2009 Code of Practice for Access Scaffold
- .2 CSA S269.1-1975 (R2003) Falsework for Construction Purposes
- .3 CSA S350-M1980 (R2003) Code of Practice for Safety in Demolition of Structures
- .4 CSA Z1006-10 Management of Work in Confined Spaces.
- .5 CSA Z462- Workplace Electrical Safety Standard

.5 National Fire Code of Canada 2010 (as amended)

- .1 Part 5 – Hazardous Processes and Operations and Division B as applicable and required.

.6 American National Standards Institute (ANSI):

- .1 ANSI A10.3, Operations – Safety Requirements for Powder-Actuated Fastening Systems.

.7 Province of British Columbia:

- .1 Workers Compensation Act Part 3-Occupational Health and Safety.
- .2 Occupational Health and Safety Regulations

1.2 RELATED SECTIONS

.1 Refer to the following current NMS sections as required:

.1	Construction progress schedules:	Section 01 32 18
.2	Submittals procedures:	Section 01 33 00
.3	Temporary utilities:	Section 01 51 00
.4	Temporary barriers and enclosures:	Section 01 56 00

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 PSPC may terminate the Contract without liability to PSPC where the Contractor, in the opinion of PSPC, 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 013300

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

.3 Submit the following:

.1 Site Specific Health and Safety Plan.

.2 Copies of reports or directions issued by Federal and Provincial health and safety inspectors.

.3 Copies of incident and accident reports.

.4 Complete set of current Material Safety Data Sheets (MSDS), and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.

5 Emergency Procedures.

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

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

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

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

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

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

1.6 RESPONSIBILITY

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

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

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

1.7 HEALTH AND SAFETY COORDINATOR

.1 The Health and Safety Coordinator:

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

.2 Be responsible for implementing, revising, daily enforcing, and monitoring the Site Specific Health and Safety Plan.

.3 Be on site during execution of work.

1.8 GENERAL CONDITIONS

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

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

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

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

1.9 PROJECT/SITE CONDITIONS

.1 Work at site will involve contact with:

.1 Multi-employer work site.

.2 Federal employees and general public.

.3 Energized electrical services.

.4 Working from heights

.5 Working in the open exposed to unpredictable weather.

.6 High volumes of vehicular and pedestrian traffic

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.

1.11 WORK PERMITS

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

1.12 FILING OF NOTICE

.1 The General Contractor is to complete and submit a Notice of Project as required by Provincial authorities.

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

1.13 HEALTH AND SAFETY PLAN

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

.2 Prepare and comply with a site-specific project Health and Safety Plan based on hazard assessment, including, but not limited to, the following:

.1 Primary requirements:

.1 Contractor's safety policy.

.2 Identification of applicable compliance obligations.

.3 Definition of responsibilities for project safety/organization chart for project.

.4 General safety rules for project.

.5 Job-specific safe work procedures.

.6 Inspection policy and procedures.

.7 Incident reporting and investigation policy and Procedures.

.8 Occupational Health and Safety Committee/Representative procedures.

.9 Occupational Health and Safety meetings.

.10 Occupational Health and Safety communications and record keeping procedures.

.2 Summary of health risks and safety hazards resulting from analysis of hazard assessment, with respect to site tasks and operations which must be performed as part of the work.

.3 List hazardous materials to be brought on site as required by work.

.4 Indicate Engineering and administrative control measures to be implemented at the site for managing identified risks and hazards.

.5 Identify personal protective equipment (PPE) to be used by workers.

.6 Identify personnel and alternates responsible for site safety and health.

.7 Identify personnel training requirements and training plan, including site orientation for new workers.

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

.4 Revise and update Health and Safety Plan as required, and re-submit to the Departmental Representative.

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

1.14 EMERGENCY PROCEDURS

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

.1 Designated personnel from own company.

.2 Regulatory agencies applicable to work and as per legislated regulations.

.3 Local emergency resources.

.4 Departmental Representative.

.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.

1.15 HAZARDOUS PRODUCTS

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

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

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

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

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

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

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

1.16 ASBESTOS HAZARD

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

.2 Removal and handling of asbestos will be performed as indicated in NMS Sections 02 41 16 and 02 82 10 and 02 82 11 and 02 82 12.

1.17 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 NMS Section 02 8 00.

1.18 REMOVAL OF LEAD CONTAINING PAINTS

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

.2 Carry out demolition activities involving lead-containing paints in accordance with applicable Provincial Regulations.

1.19 ELECTRICAL SAFETY REQUIREMENTS

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

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

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

1.20 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.

1.21 OVERLOADING

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

1.22 FALSEWORK

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

1.23 SCAFFOLDING

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

1.24 CONFINED SPACES

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

1.25 POWDER-ACTUATED DEVICES

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

1.26 FIRE SAFETY AND HOT WORK

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

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

1.27 FIRE SAFETY REQUIREMENTS

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

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

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

1.28 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.

1.29 UNFORESEEN HAZARDS

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

1.30 POSTED DOCUMENTS

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

.1 Site Specific Health and Safety Plan.

.2 Sequence of work.

.3 Emergency procedures.

.4 Site drawing showing project layout, locations of the first-aid station, evacuation route and marshalling station, and the emergency transportation provisions.

.5 Notice of Project.

.6 Floor plans or site plans.

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

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

.9 Material Safety Data Sheets (MSDS).

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

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

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

1.31 MEETINGS

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

1.32 CORRECTION OF NON-COMPLIANCE

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

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

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

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 NOT USED

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES:

.1 References and Codes.

.2 Discovery of Asbestos (if any).

1.2 PRECEDENCE

.1 Refer to General Conditions clauses.

1.3 REFERENCES AND CODES

.1 Perform Work in accordance with National Building Code of Canada (NBC) including all amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.

.2 New construction works shall meet or exceed requirements of:

- .1 Contract documents.
- .2 Specified standards, codes and referenced documents.
- .3 British Columbia Building Code 2012.
- .4 National Building Code of Canada 2010.
- .5 CSA C22.1 Canadian Electrical Code 2015
- .6 Labour Canada Code Part II.
- .7 Occupational Safety and Health Standards.

1.4 BUILDING SMOKING ENVIRONMENT

.1 Comply with smoking restrictions.

END OF SECTION

Part 1 General

1.1 INSPECTION

.1 Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.

.2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative instructions, or law of Place of Work.

.3 Departmental Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Departmental Representative shall pay cost of examination and replacement.

1.2 INDEPENDENT INSPECTION AGENCIES

.1 Independent Inspection/Testing Agencies may be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Departmental Representative.

.2 Provide equipment required for executing inspection and testing by appointed agencies.

.3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.

.4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Departmental Representative. Pay costs for retesting and re-inspection.

1.3 ACCESS TO WORK

.1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.

.2 Cooperate to provide reasonable facilities for such access.

1.4 PROCEDURES

.1 Notify appropriate agency and Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.

.2 Submit samples and/or materials required for testing, as specifically requested in specifications or drawings. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.

.3 Provide labour and facilities to obtain and handle samples and materials on site.

1.5 REJECTED WORK

.1 Remove defective work, whether result of poor workmanship, use of defective products or damage and whether incorporated in work or not, which has been rejected by

Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

.2 Make good other Contractor's work damaged by such removals or replacements promptly.

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

1.6 REPORTS

.1 Submit electronic copy of inspection and test reports to Departmental Representative.

.2 Provide copies to subcontractor of work being, inspected or tested or manufacturer or fabricator of material being inspected or tested.

1.7 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as requested.

.2 Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work will be appraised by Departmental Representative and may be authorized as recoverable.

1.8 MOCK-UPS

.1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.

.2 Construct in locations acceptable to Departmental Representative as specified in specific Section.

.3 Prepare mock-ups for Departmental Representative review with reasonable promptness and in orderly sequence, to not cause delays in Work.

.4 Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

.5 If requested, Departmental Representative will assist in preparing schedule fixing dates for preparation.

.6 Specification section identifies whether mock-up may remain as part of Work or if it is to be removed.

1.9 EQUIPMENT AND SYSTEMS

.1 Refer to Divisions 26 for definitive requirements.

END OF SECTION

Part 1 General

1.1 ACCESS AND DELIVERY

.1 Only the designated entrance may be used for personnel access to the site.

.2 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.

.3 Provide and maintain access roads, sidewalk crossing ramps and construction runways as may be required for access to the work. All roadways and walkways outside of the Contractor's work site must be kept clear of materials and equipment at all times.

.4 Provide and maintain competent flag operators, traffic signals, barricades and flares, lights or lanterns as may be required to perform work and protect other users of the facility.

1.2 CONSTRUCTION PARKING

.1 Construction staff is allowed to park in the designated stalls at the facility parking lot. Departmental Representative will have full discretion of the assignment of the number of stalls. Assigned stalls may not be sufficient to meet construction staff requirement.

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 Storage space for containers will be provided, as coordinated with Departmental Representative.

1.4 POWER

.1 Subject to coordination with Departmental Representative, electrical power within the facility may be used at no extra cost. There is no guarantee of uninterrupted power supply. Contractor will use this power source at their own risk. Contractor will not be compensated for any incurred cost or time owing to any power failure. Contractor will be responsible for other power source as they consider to be required for completing the project. Contractor will be responsible for all the cost of connecting and disconnecting from this power source after completion of project to the satisfaction of the Departmental Representative.

1.5 WATER SUPPLY

.1 Water supply is available for use by Contractor.

1.6 SANITARY FACILITIES

.1 Construction staff will be allowed to use the facility washrooms.

1.7 SCAFFOLDING

.1 Construct and maintain scaffolding in rigid, secure and safe manner.

.2 Erect scaffolding independent of walls. Remove promptly when no longer required.

1.8 HOISTING

.1 Provide, operate and maintain hoists required for moving of workers, materials and equipment. Make financial arrangements with sub-contractors for their use of hoists.

.2 Hoists shall be operated by qualified operator.

1.9 HOARDING

.1 Prior to all demolition and construction, install dust proof hoarding or protective barrier to separate construction zone and the rest of the operating facility; maintain in safe and clean condition throughout duration of project. Submit hoarding plan to Departmental Representative for approval.

.2 Erect and maintain safety barricades around all openings and other danger areas as required by Building Code and WCB.

.3 Make good all floor, ceiling and wall to their original condition after removal of hoarding at completion of project.

1.10 SITE OFFICE

.1 Contractor to provide their own trailer as temporary site office. Coordinate with Departmental representative for exact location.

.2 Contractor should clear and demolish site office at end of project according to contract requirement.

1.11 REMOVAL OF TEMPORARY FACILITIES

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

1.12 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.

1.13 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.

1.14 USE OF EXISTING UTILITIES

.1 It is the intention of the Departmental Representative to supply temporary services where specified, however, in the event of any unforeseen occurrence, the Departmental Representative may discontinue such temporary service, without notice, and without

acceptance of any liability, for damage or delay, caused by such withdrawal of temporary services.

.2 Supply of temporary services by Department Representative is subject to the requirements of the facility and level of availability of existing services.

.3 Contractor shall bear costs of all temporary services required for the project, subject to approval by Departmental Representative those available from existing services.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian General Standards Board (CGSB)

.1 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.

.2 CAN/CGSB 1.189-00, Exterior Alkyd Primer for Wood.

.2 Canadian Standards Association (CSA International)

.1 CSA-O121-M1978 (R2003, Douglas Fir Plywood.

.3 Public Works Government Services Canada (PWGSC) Standard Acquisition Clauses and Conditions (SACC)-ID: R0202D, Title: General Conditions 'C', In Effect as of: May 14, 2004.

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 HOARDING

.1 Refer to Section 01 51 00 - Temporary Utilities, Clause 1.10.

1.4 ACCESS TO SITE

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

1.5 FIRE ROUTES

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

.2 Maintain clearance for all egress routes.

1.6 PROTECTION OF OFF-SITE AND PUBLIC PROPERTY

.1 Protect surrounding private and public property from damage during performance of Work.

.2 Be responsible for damage incurred.

1.7 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 Protect existing operating equipment within the project area

.4 Be responsible for damage incurred due to lack of or improper protection.

1.8 WASTE MANAGEMENT AND DISPOSAL

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

END OF SECTION

Part 1 General

1.1 PRODUCTS/MATERIAL AND EQUIPMENT

.1 Use NEW products/material and equipment unless otherwise specified. The term "products" is referred to throughout the specifications.

.2 Use products of one manufacturer for material and equipment of the same type or classification unless otherwise specified.

.3 Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation methods.

.4 Notify Departmental Representative in writing of any conflict between these specifications and manufacturer's instructions. Departmental Representative will designate which document is to be followed.

.5 Provide metal fastenings and accessories in the same texture, colour and finish as base metal in which they occur.

- .1 Prevent electrolytic action between dissimilar metals.
- .2 Use non-corrosive fasteners, anchors and spacers for securing exterior work.
- .3 Fastenings which cause spalling or cracking are not acceptable.
- .4 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
- .5 Use heavy hexagon heads, semi-finished unless otherwise specified.
- .6 Bolts may not project more than 1 diameter beyond nuts.
- .7 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.
- .8 Deliver, store, and maintain packaged material and equipment with manufacturer's seals and labels intact.
- .9 Prevent damage, adulteration and soiling of products during delivery, handling and storage. Immediately remove rejected products from site.
- .10 Store products in accordance with suppliers' instructions.
- .11 Touch up damaged factory finished surfaces to Departmental Representative's satisfaction.
  - .1 Use primer or enamel to match original.
  - .2 Do not paint over nameplates.

1.2 QUALITY OF PRODUCTS

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

.2 Defective products will be rejected regardless of previous inspections.

.1 Inspection does not relieve responsibility but is precaution against oversight or error.

.2 Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.

.3 Retain purchase orders, invoices and other documents to prove that all products utilized in this Contract meet the requirements of the specifications. Produce documents when requested by the Departmental Representative.

.4 Should any dispute arise as to quality or fitness of products, the decision rests strictly with the Departmental Representative based upon the requirements of the Contract documents.

.5 Unless otherwise indicated in the specifications, maintain uniformity of manufacture for any particular or like item throughout the building.

.6 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.3 AVAILABILITY OF PRODUCTS

.1 Immediately upon signing the Contract, review product delivery requirements and anticipate foreseeable supply delays for any items.

.2 If delays in supply of products are foreseeable, notify Departmental Representative of such in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of the work.

.3 In event of failure to notify Departmental Representative at the start of work and should it subsequently appear that the work may be delayed for such reason, the Departmental Representative reserves the right to substitute more readily available products of similar character, at no increase in either the Contract price or the Contract time.

1.4 MANUFACTURER'S INSTRUCTIONS

.1 Unless otherwise indicated in the specifications, install or erect products in accordance with the manufacturer's instructions.

.1 Obtain written instructions directly from the manufacturer as required.

.2 Notify Departmental Representative in writing of conflicts between the specifications and the manufacturer's instructions so that the Departmental Representative may establish the course of action.

.3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes the Departmental Representative to require removal and reinstallation at no increase in either the Contract price or the Contract time.

1.5 CONTRACTOR'S OPTIONS FOR SELECTION OF PRODUCTS FOR TENDERING

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

.2 Products specified under "Acceptable Products": select any one of the indicated manufacturers, or any other manufacturer meeting or exceeding the Prescriptive specifications and indicated Products.

.3 Products specified by performance and referenced standard: select any product meeting

or exceeding the referenced standard.

.4 Products specified to meet particular design requirements or to match existing materials: use only material specified Approved Product. Alternative products may be considered provided full technical data is received in writing by Departmental Representative in accordance with "Special Instructions to Tenderers."

.5 When products are specified by a referenced standard or by or Performance specifications, upon request of Departmental Representative obtain from manufacturer an independent laboratory report showing that the product meets or exceeds the specified requirements.

1.6 SUBSTITUTION AFTER CONTRACT AWARD

.1 No substitutions are permitted without prior written approval of the Departmental Representative.

.2 Proposals for substitution may only be submitted after Contract award. Such request must include statements of respective costs of items originally specified and the proposed substitution.

.3 Proposals will be considered by the Departmental Representative if:

.1 Products selected by tenderer from those specified are not available;

.2 Delivery date of products selected from those specified would unduly delay completion of Contract; or

.3 Alternative product to that specified, which is brought to the attention of and considered by Departmental Representative as equivalent to the product specified, and will result in a credit to the Contract amount.

.4 Should the proposed substitution be accepted either in part or in whole, assume full responsibility and costs when substitution affects other work on the project. Pay for design or drawing changes required as result of substitution.

.5 Amounts of all credits arising from approval of the substitutions will be determined by the Departmental Representative and the Contract price will be reduced accordingly.

END OF SECTION

Part 1 General

1.1 SUBMITTALS

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

.2 Submit written request in advance of cutting or alteration which affects:

- .1 Structural integrity of elements of project.
- .2 Integrity of weather-exposed or moisture-resistant elements.
- .3 Efficiency, maintenance, or safety of operational elements.
- .4 Visual qualities of sight-exposed elements.
- .5 Work of Owner or separate contractor.

.3 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 Owner or separate contractor.
- .7 Written permission of affected separate contractor.
- .8 Date and time work will be executed.

1.2 MATERIALS

.1 Required for original installation.

.2 Change in Materials: submit request for substitution in accordance with Section 01 33 00 - Submittal Procedures.

1.3 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 Provide protection from elements for areas which are to be exposed by uncovering work.

Part 2 Execution

2.1 GENERAL

.1 Execute cutting, fitting, and patching, including excavation and fill, to complete Work.

.2 Fit several parts together, to integrate with other Work.

.3 Uncover Work to install ill-timed Work.

.4 Remove and replace defective and non-conforming Work.

.5 Provide openings in non-structural elements of Work for penetrations of electrical Work.

.6 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.

.7 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.

.8 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.

.9 Restore work with new products in accordance with requirements of Contract Documents.

.10 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

.11 At penetration of fire rated wall, ceiling, or floor construction, completely seal voids with firestopping material, full thickness of the construction element.

.12 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.

.13 Conceal ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

2.2 WASTE MANAGEMENT AND DISPOSAL

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

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Public Works Government Services Canada (PWGSC) Standard Acquisition Clauses and Conditions (SACC)-ID: 2020, Title: General Conditions. In Effect as Of: April 25, 2013.

1.2 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by Owner or other Contractors.

.2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.

.3 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.

.5 Provide and use marked separate bins for recycling. Refer to Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

.6 Dispose of waste materials and debris off site.

.7 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.

.8 Store volatile waste in covered metal containers, and remove from premises at end of each working day.

.9 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

.10 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

.11 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.3 FINAL CLEANING

.1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.

.2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.

.3 Prior to final review remove surplus products, tools, construction machinery and equipment.

.4 Remove waste products and debris including that caused by Owner or other Contractors.

.5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.

.6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.7 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.

.8 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, millwork floors and ceilings.

.9 Clean lighting reflectors, lenses, and other lighting surfaces.

.10 Vacuum clean and dust building interiors, behind grilles, louvres and screens.

.11 Wax, seal, shampoo or prepare floor finishes, as recommended by manufacturer.

.12 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.

.13 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.

.14 Remove dirt and other disfiguration from exterior surfaces.

.15 Sweep and wash clean paved areas.

.16 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.

.17 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

1.4 WASTE MANAGEMENT AND DISPOSAL

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

END OF SECTION

Part 1 General

1.1 WASTE MANAGEMENT GOALS

.1 Prior to start of Work conduct meeting with Departmental Representative to review and discuss PWGSC's Waste Management Plan and Goals.

.2 Accomplish maximum control of solid construction waste.

.3 Preserve environment and prevent pollution and environment damage.

1.2 DEFINITIONS

.1 Class III: non-hazardous waste - construction renovation and demolition waste.

.2 Cost/Revenue Analysis Workplan (CRAW): based on information from WRW, and intended as financial tracking tool for determining economic status of waste management practices.

.3 Demolition Waste Audit (DWA): relates to actual waste generated from project.

.4 Inert Fill: inert waste - exclusively asphalt and concrete.

.5 Materials Source Separation Program (MSSP): consists of series of ongoing activities to separate reusable and recyclable waste material into material categories from other types of waste at point of generation.

.6 Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.

.7 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.

.8 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

.9 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:

.1 Salvaging reusable materials from re-modeling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.

.2 Returning reusable items including pallets or unused products to vendors.

.10 Salvage: removal of structural and non-structural materials from deconstruction/dis-assembly projects for purpose of reuse or recycling.

.11 Separate Condition: refers to waste sorted into individual types.

.12 Source Separation: acts of keeping different types of waste materials separate beginning from first time they became waste.

.13 Waste Audit (WA): detailed inventory of materials in building. Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project. Indicates quantities of reuse, recycling and landfill. Refer to Schedule A.

.14 Waste Management Coordinator (WMC): contractor representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.

.15 Waste Reduction Workplan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials. Refer to Schedule B. WRW is based on information acquired from WA (Schedule A).

1.3 DOCUMENTS

.1 Maintain at job site, one copy of following documents:

- .1 Waste Audit.
- .2 Waste Reduction Workplan.
- .3 Material Source Separation Plan.
- .4 Schedules A, B, C, D, E completed for project.

1.4 SUBMITTALS

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

.2 Prepare and submit following prior to project start-up:

- .1 Submit two (2) copies of completed Waste Reduction Workplan (WRW): Schedule B.
- .2 Submit two (2) copies of completed Demolition Waste Audit (DWA): Schedule C.
- .3 Submit two (2) copies of Materials Source Separation Program (MSSP) description.

.3 Submit before final payment summary of waste materials salvaged for reuse, recycling or disposal by project using deconstruction/disassembly material audit form.

- .1 Failure to submit could result in hold back of final payment.
- .2 Provide receipts, scale tickets, waybills, and show quantities and types of materials reused, recycled, co-mingled and separated off-site or disposed of.
- .3 For each material reused, sold or recycled from project, include amount quantities by number, type and size of items and the destination.
- .4 For each material land filled or incinerated from project, include amount in tonnes of material and identity of landfill, incinerator or transfer station.

1.5 WASTE AUDIT (WA)

.1 Conduct WA prior to project start-up.

.2 Prepare WA: Schedule A.

.3 Record, on WA - Schedule A, extent to which materials or products used consist of recycled or reused materials or products.

1.6 WASTE REDUCTION WORKPLAN (WRW)

.1 Prepare WRW prior to project start-up.

.2 WRW should include but not limited to:

- .1 Destination of materials listed.

.2 Deconstruction/disassembly techniques and sequencing.
.3 Schedule for deconstruction/disassembly.
.4 Location.
.5 Security.
.6 Protection.
.7 Clear labelling of storage areas.
.8 Details on materials handling and removal procedures.
.9 Quantities for materials to be salvaged for reuse or recycled and materials sent to landfill.

.3 Structure WRW to prioritize actions and follow 3R's hierarchy, with Reduction as first priority, followed by Reuse, then Recycle.

.4 Describe management of waste.

.5 Identify opportunities for reduction, reuse, and recycling of materials. Based on information acquired from WA.

.6 Post WRW or summary where workers at site are able to review content.

.7 Set realistic goals for waste reduction, recognize existing barriers and develop strategies to overcome these barriers.

.8 Monitor and report on waste reduction by documenting total volume and cost of actual waste removed from project.

1.7 DEMOLITION WASTE AUDIT (DWA)

.1 Prepare DWA prior to project start-up.

.2 Complete DWA: Schedule C.

.3 Provide inventory of quantities of materials to be salvaged for reuse, recycling, or disposal.

1.8 MATERIALS SOURCE SEPARATION PROGRAM (MSSP)

.1 Prepare MSSP and have ready for use prior to project start-up.

.2 Implement MSSP for waste generated on project in compliance with approved methods and as reviewed by Departmental Representative.

.3 Provide on-site facilities for collection, handling, and storage of anticipated quantities of reusable and recyclable materials.

.4 Provide containers to deposit reusable and recyclable materials.

.5 Locate containers in locations, to facilitate deposit of materials without hindering daily operations.

.6 Locate separated materials in areas which minimize material damage.

.7 Collect, handle, store on-site, and transport off-site, salvaged materials in separate condition.

.1 Transport to approved and authorized recycling facility.

1.9 STORAGE, HANDLING AND PROTECTION

.1 Store materials to be reused, recycled and salvaged in locations as directed by Departmental Representative.

.2 Unless specified otherwise, materials for removal become Contractor's property.

.3 Protect surface drainage, mechanical and electrical from damage and blockage.

.4 Separate and store materials produced during dismantling of structures in designated areas.

.5 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.

.1 On-site source separation is recommended.

.2 Remove co-mingled materials to off-site processing facility for separation.

.3 Provide waybills for separated materials.

1.10 DISPOSAL OF WASTES

.1 Do not bury rubbish or waste materials.

.2 Do not dispose of waste, volatile materials, mineral spirits, oil, paint thinner, into waterways, storm, or sanitary sewers.

.3 Keep records of construction waste including:

.1 Number and size of bins.

.2 Waste type of each bin.

.3 Total tonnage generated.

.4 Tonnage reused or recycled.

.5 Reused or recycled waste destination.

.4 Remove materials from deconstruction as deconstruction/disassembly Work progresses.

.5 Prepare project summary to verify destination and quantities on a material-by-material basis as identified in pre-demolition material audit.

1.11 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises.

.2 Provide temporary security measures approved by Departmental Representative.

1.12 SCHEDULING

.1 Coordinate Work with other activities at site to ensure timely and orderly progress of Work.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 APPLICATION

.1 Do Work in compliance with WRW.

.2 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

3.2 CLEANING

.1 Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.

.2 Clean-up work area as work progresses.

.3 Source separate materials to be reused/recycled into specified sort areas.

3.3 DIVERSION OF MATERIALS

.1 From following list, separate materials from general waste stream and stockpile in separate piles or containers, as reviewed by Departmental Representative, and consistent with applicable fire regulations.

.1 Mark containers or stockpile areas.

.2 Provide instruction on disposal practices.

.2 On-site sale of salvaged recovered reusable and/or recyclable materials is not permitted.

.3 Demolition Waste:

Material Type	Recommended Diversion %	Actual Diversion %
Electrical Equipment	80	
Metals	100	
Rubble	100	
Wood (uncontaminated)	100	
Other		

.4 Construction Waste:

Material Type	Recommended Diversion %	Actual Diversion %
Cardboard	100	
Plastic Packaging	100	
Rubble	100	
Steel	100	
Wood (uncontaminated)	100	
Other		

3.4 WASTE AUDIT (WA)

The following pertains to Schedule A - Waste Audit (WA). Column-1 refers to the category of waste, and a physical description of the material (e.g. off-cuts, clean drywall, etc.). Column-2 refers to the total quantity of materials received by the Contractor. Measurement units must be specified. Column-3 refers to the estimated percentage of material that is waste. Column-4 refers to the total quantity of waste (column-2 x column-

3). Column-5 refers to the areas(s) in which the waste was generated. Column-6 refers to the total percentage of recycled material from the specified total quantity of waste (column-4). Column-7 refers to the total percentage of reused material from the specified total quantity of waste (column-4).

.1 Schedule A - Waste Audit (WA):

(1) Material Category	(2) Material Quantity Unit %	(3) Estimated Waste	(4) Total Quantity of Waste (unit)	(5) Generation Point	(6) % Recycled	(7) % Reused
Wood & Plastics						
Material Description						
Off-Cuts						
Warped						
Plastic						
Cardboard						
Other						
Material Description						
Frames						
Glass						
Wood						
Metal						
Other						

3.5 WASTE REDUCTION WORKPLAN (WRW)

The following pertains to Schedule B - Waste Reduction Workplan (WRW). Column-1 refers to the category and type of waste materials. Column-2 refers to the persons responsible for completing the WRW. Column-3 refers to Column-4 of Schedule A. Column-4 refers to the amount of reused waste predicted and realized. Column-5 refers to the amount of recycled waste predicted and realized. Column-6 refers to the approved recycling facility.

.1 Schedule B:

(1) Material Quantity Category	(2) Person Amount Responsible Waste	(3) Total of Project (units)	(4) Reused Actual (units)	(5) Recycle Actual(s) Amount	(6) Material Destination(s)
Wood & Plastics					
Material Description					
Chutes					
Warped					
Plastic					
Cardboard Packaging					
Other					
Doors & Windows					
Material Description					
Painted					
Frames					
Glass					
Wood					
Metal					
Other					

3.6 DEMOLITION WASTE AUDIT (DWA)

The following pertains to Schedule C - Demolition Waste Audit (DWA). Column-1 refers to the type of material salvaged. Column-2 refers to the material quantity shown in column-1. Several columns may be required to identify specific demolition areas. Column-3 refers to the unit of measurement used to describe Column-2. Column-4 refers to the total quantity of salvaged material. Column-5 refers to the cumulative volume of salvaged material. Column-6 refers to the total weight in kilograms. Column-7 refers to remarks and assumptions made about the specified material.

.1 Schedule C - Demolition Waste Audit (DWA):

(1) Material Description Assumptions	(2) Quantity	(3) Unity	(4) Total	(5) Volume (cum)	(6) Weight (cum)	(7) Remarks & Assumptions
Wood						
Wood						
Stud						
Plywood						
Baseboard -wood						
Door						
Trim-Wood						
Cabinet						
Doors & Windows						
Panel						
Regular						
Slab Regular						
Wood						
Laminate						
Byfold-Closet						
Glazing						

3.7 CANADIAN GOVERMENTAL DEPARTMENTS CHIEF REPSONSIBLITY FOR THE ENVIROMENT

.1 Schedule E - Government Chief Responsibility for the Environment:

.1 Ministry of Environment Lands and Parks
810 Blanshard Street, 4th Floor
Victoria, BC, V8V 1X4
604-387-1161 / 604-356-6464

.2 Waste Reduction Commission Soils and Hazardous Waste
770 South Pacific Blvd, Suite 303
Vancouver, BC, V6B 5E7
604-660-9550 / 604-660-9596

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES:

.1 Administrative procedures preceding preliminary and final inspections of Work.

1.2 RELATED SECTIONS

.1 Section 01 78 00 - Closeout Submittals.

1.3 INSPECTION AND DECLARATION

.1 Contractor's Inspection: Contractor and all Subcontractors shall conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.

- .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.
- .2 Request Departmental Representative's Inspection.
- .3 Departmental Representative's Review: Departmental Representative and Contractor will perform review of Work to identify obvious defects or deficiencies. Contractor shall correct Work accordingly.
- .4 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 Equipment and systems have been tested, adjusted, and balanced and are fully operational.
  - .4 Certificates required by authorities having jurisdiction.
  - .5 Commissioning of all systems: final commissioning reports have been submitted to the Departmental Representative.
  - .6 Operation of systems has been demonstrated to Owner's personnel.
  - .7 All Completion Submittals have been finalized.
  - .8 Work is complete and ready for Final Inspection.

.2 Submit required forms as described in General Conditions and Standard Acquisition Contract Clause (SACC) manual.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 45 00 - Quality Control

.2 Section 01 77 00 - Closeout Procedures

.3 Section 01 79 00 - Demonstration and Training

1.2 SUBMISSION

.1 Prepare instructions and data using personnel experienced in maintenance and operation of described products.

.2 Copy will be returned after final inspection, with Departmental Representative's comments.

.3 Revise content of documents as required prior to final submittal.

.4 Two weeks prior to Completion of the Work, submit to the Departmental Representative, four (4) final copies of operating and maintenance manuals in English.

.5 Hard copies of the Operating and Maintenance Manual System is required as specified under clause 1.3. Provide four (4) sets of the Hard Copy Interactive Operating and Maintenance Manual System to the Departmental Representative.

.6 If requested, furnish evidence as to type, source and quality of products provided.

.7 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.

.8 Pay costs of transportation.

.9 Certificate of Completion.

1.3 FORMAT HARD COPY OPERATING AND MAINTENANCE MANUALS

.1 Organize data in the form of an instructional manual.

.2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.

.3 When multiple binders are used, correlate data into related consistent groupings. Identify contents of each binder on spine.

.4 Cover: Identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

.5 Arrange content by Section numbers and sequence of Table of Contents.

.6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

.7 Text: Manufacturer's printed data, or typewritten data.

.8 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

.9 Provide 1:1 scaled CAD files in .dwg format on CD.

1.4 CONTENTS - EACH VOLUME

.1 Table of Contents: provide title of project;

- .1 Date of submission;
- .2 Names, addresses, and telephone and fax numbers of Contractor, Subcontractors, Suppliers with name of responsible parties;
- .3 Schedule of products and systems, indexed to content of volume;
- .4 Copy of hardware schedule and paint schedules, complete with the actual manufacturer, supplier and identification names and numbers;
- .5 All extended guarantees, warranties, maintenance bonds, certificates, letters of guarantees, registration cards, as called for in the various sections of the specification;
- .6 Complete set of all final reviewed shop drawings;
- .7 Certificates of inspection by authorities having jurisdiction;
- .8 Test reports and certificates as applicable;
- .9 Complete set of as constructed drawings.

.2 For each product or system:

- .1 List names, addresses, and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.3 Product Data: mark each sheet to clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information.

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

.5 Typewritten Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.

.6 Training: refer to Section 01 79 00 - Demonstration and Training.

1.5 'AS CONSTRUCTED' DRAWINGS AND SAMPLES

.1 In addition to requirements in General Conditions, maintain at the site one record copy of:

- .1 Contract Drawings.
- .2 Specifications.
- .3 Addenda.
- .4 Change Orders and other modifications to the Contract.
- .5 Reviewed shop drawings, product data, and samples.
- .6 Field test records.
- .7 Inspection certificates.
- .8 Manufacturers' certificates.

.2 Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.

.3 Label record documents and file in accordance with section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.

.5 Keep record documents and samples available for inspection by Departmental Representative.

.6 Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring. Transfer information weekly to reproducibles, revising reproducibles to show work as actually installed. Use different colour waterproof ink for each service.

.7 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW ELECTRICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).

.8 Contractor to prepare red-line as-built drawings and provide scanned copy to the Departmental Representative for review and acceptance at completion of work.

.9 Arrange for and be responsible for the preparation of as-built drawings in AutoCAD computerized drafting system after review and acceptance of the red-line as-builts by the Departmental Representative. Be responsible for the cost of preparation of as-built drawings. Submit electronic copy of the as-built drawings on CD/DVD media in CAD and PDF format, as well as 2 sets of hard copies. Submit as-built drawings before requesting Substantial Completion.

1.6 RECORDING ACTUAL SITE CONDITIONS

.1 Record information on set of black line opaque drawings, provided by Departmental Representative.

.2 Provide felt tip marking pens, maintaining separate colours for each major system, for recording information.

.3 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.

.4 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.

.5 Specifications: legibly mark each item to record actual construction, including:

- .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
- .2 Changes made by Addenda and change orders.

.6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

1.7 EQUIPMENT AND SYSTEMS

.1 Each Item of Equipment and Each System: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include complete nomenclature and commercial number of replaceable parts.

- .1 Operation data to include:
  - .1 Controls Schematic.
  - .2 Description of systems and their controls.
  - .3 Operation instruction for systems and component.
  - .4 Description of actions to be taken in event of equipment failure.
- .2 Maintenance data to include:
  - .1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
  - .2 Data to include schedules of tasks, frequency, tools required and task time.
- .3 Performance data to include:
  - .1 Equipment performance verification test results.
  - .2 Special performance data as specified.

.2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.

.3 Include installed colour coded wiring diagrams.

.4 Operating Procedures: as applicable, include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

.5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions.

.6 Provide servicing schedule, and list of parts required.

.7 Include manufacturer's printed operation and maintenance instructions.

.8 Include sequence of operation by controls manufacturer.

.9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.10 Provide installed control diagrams by controls manufacturer.

.11 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

.12 Additional requirements: as specified in individual specification sections.

1.8 MATERIALS AND FINISHES

.1 Building Products, Applied Materials, and Finishes: include product data, with catalogue number, size, composition, and colour and texture designations. Provide information for re-ordering custom manufactured products.

.2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.3 Moisture-protection and Weather-exposed Products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.4 Additional requirements: as specified in individual specifications sections.

1.9 SPARE PARTS

.1 Provide spare parts, in quantities specified in individual specification sections and as per luminaire schedule on drawings.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to location as directed by Departmental Representative.

.4 Receive and catalogue all items.

.5 Submit inventory listing to Departmental Representative.

.6 Include approved listings in Maintenance Manual.

.7 Obtain receipt for delivered products and submit prior to final payment.

1.10 MAINTENANCE MATERIALS

.1 Provide maintenance and extra materials, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to location as directed; place and store.

.4 Receive and catalogue all items. Submit inventory listing to Departmental Representative. Include approved listings in the Operating and Maintenance Manuals.

.5 Obtain receipt for delivered products and submit prior to final payment.

1.11 SPECIAL TOOLS

.1 Provide special tools, in quantities specified in individual specification section.

.2 Provide items with tags identifying their associated function and equipment.

.3 Deliver to location as directed; place and store.

.4 Receive and catalogue all items. Submit inventory listing to Departmental Representative. Include approved listings in Maintenance Manual.

1.12 STORAGE, HANDLING AND PROTECTION

.1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.

.2 Store in original and undamaged condition with manufacturer's seal and labels intact.

.3 Store components subject to damage from weather in weatherproof enclosures.

.4 Store paints and freezable materials in a heated and ventilated room.

.5 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.

1.13 WARRANTIES AND BONDS

.1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.

.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers within ten days after completion of the applicable item of work.

.4 Except for items put into use with Owner's permission; leave date of beginning of time of warranty until the Date of Substantial Performance is determined.

.5 Verify that documents are in proper form, contain full information, and are notarized.

.6 Co-execute submittals when required.

.7 Retain warranties and bonds until time specified for submittal.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE REQUIREMENTS

.1 Demonstrate scheduled operation and maintenance of equipment and systems to Owner's personnel two weeks prior to date of substantial performance.

.2 Owner to provide list of personnel to receive instructions, and coordinate their attendance at agreed upon times.

.3 Preparation:

.1 Verify conditions for demonstration and instructions comply with requirements.

.2 Verify designated personnel are present.

.3 Ensure equipment has been inspected and put into operation in accordance with each division.

.4 Demonstration and Instructions:

.1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at agreed upon times, at the equipment location.

.2 Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.

.3 Review contents of manual in detail to explain aspects of operation and maintenance.

.4 Prepare and insert additional data in operations and maintenance manuals when needed during instructions.

.5 Time Allocated for Instructions: ensure adequate amount of time required for instruction of each item of equipment or system: refer to Section 01 91 41 – Commissioning Training.

1.2 SUBMITTALS

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

.2 Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for Departmental Representative's approval.

.3 Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.

.4 Give time and date of each demonstration, with list of persons present.

.5 Provide electronic & hard copies (refer to Section 01 78 00 - Closeout Submittals) of completed operation and maintenance manuals for use in demonstrations and instructions.

1.3 QUALITY ASSURANCE

.1 When specified in individual sections requiring manufacturer to provide authorized representative to demonstrate operation of equipment and systems:

.1 Instruct Owner's personnel.

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

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section includes:

.1 This Section specifies roles and responsibilities of Commissioning Training.

.2 Related Sections:

.1 Section 01 91 33 - Commissioning Forms

1.2 TRAINEES

.1 Trainees: personnel selected for operating and maintaining this facility (includes Facility Manager, building operators, maintenance staff, security staff, and technical specialists as required).

.2 Trainees will be available for training during later stages of construction for purposes of familiarization with systems.

1.3 INSTRUCTORS

.1 Engineer will provide:

.1 Descriptions of systems;

.2 Instruction on design philosophy, design criteria, and design intent.

.2 Contractor and certified factory-trained manufacturers' personnel: to provide instruction on the following:

.1 Start-Up, operation, shut-down of equipment, components and systems;

.2 Control features, reasons for, results of, implications on associated systems of, adjustment of set points of control and safety devices;

.3 Instructions on servicing, maintenance and adjustment of systems, equipment and components.

.3 Contractor and equipment manufacturer to provide instruction on:

.1 Start-up, operation, maintenance and shut-down of equipment they have certified installation, started up and carried out PV tests.

1.4 TRAINING OBJECTIVES

.1 Training to be detailed and duration to ensure:

.1 Safe, reliable, cost-effective, energy-efficient operation of systems in normal and emergency modes under all conditions;

.2 Effective on-going inspection, measurements of system performance;

.3 Proper preventive maintenance, diagnosis and trouble-shooting;

.4 Ability to update documentation;

.5 Ability to operate equipment and systems under emergency conditions until appropriate qualified assistance arrives.

1.5 TRAINING MATERIALS

.1 Instructors to be responsible for content and quality.

.2 Training materials to include:

- .1 "As-Built" Contract Documents;
- .2 Operating Manual;
- .3 Maintenance Manual;
- .4 Management Manual;
- .5 TAB and PV Reports.

.3 Project Manager, Commissioning Manager and Facility Manager will review training manuals.

.4 Training materials to be in a format that permits future training procedures to same degree of detail.

.5 Supplement training materials:

- .1 Multimedia presentations;
- .2 Manufacturer's training videos;
- .3 Equipment models;

1.6 SCHEDULING

.1 Include in Commissioning Schedule time for training.

.2 Deliver training during regular working hours, training sessions to be 8 hours in length.

.3 Training to be completed prior to acceptance of facility.

1.7 RESPONSIBILITIES

.1 Be responsible for:

- .1 Implementation of training activities,
- .2 Coordination among instructors,
- .3 Quality of training, training materials.

.2 Commissioning Authority will evaluate training and materials.

.3 Upon completion of training, provide written report, signed by Instructors, witnessed by Commissioning Authority.

1.8 ELECTRICAL SYSTEM TRAINING

.1 Organize and conduct training courses to instruct the Departmental Representative in the operation and preventative maintenance of equipment and systems provided at the completion of the project.

.2 Provide services of qualified personnel, including each sub-trade, each major equipment supplier and design engineer to and instruct on their equipment or systems.

.3 One-person day shall be eight (8) hours including one half hour for breaks, and one person week shall be five (5) person days.

.4 Submit sessions schedule and list of representatives to the Departmental Representative

for approval 30 days prior to course starting date. Confirm attendance of course by written notification to all participants, followed by verbal confirmation just prior to course starting date.

.5 Submit final copies of record drawings and operating and maintenance manuals to Departmental Representative. Submit a written follow-up of all courses, complete with an attendants list to the Departmental Representative.

.6 Systems Course: Allow a minimum of eight (8) hours of instruction to conduct systems training courses addressing the following topics:

.1 Lighting - Luminaires:

.1 Review operation and maintenance of equipment.

.2 Lighting Control System:

.1 Review operation of systems and equipment.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 Green Seal Environmental Standards (GS)

1. GS-11-2008, 2nd Edition, Paints and Coatings.

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

1. Material Safety Data Sheets (MSDS).

.3 The Master Painters Institute (MPI)

1. Architectural Painting Specification Manual - current edition.
2. Maintenance Repainting Manual - current edition.

.4 National Research Council Canada (NRC)

1. National Building Code of Canada 2015 (NBC).

.5 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards

1. SCAQMD Rule 1113-A2007, Architectural Coatings.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

1. Submit manufacturer's instructions, printed product literature and data sheets for paint and coating products and include product characteristics, performance criteria, physical size, finish and limitations.
2. Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 33 - Health and Safety Requirements.

.3 Samples:

1. Submit for review and acceptance of each unit.
2. Samples will be returned for inclusion into work.

.4 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

1. Provide and maintain dry, temperature controlled, secure storage.
2. Store painting materials and supplies away from heat generating devices.
3. Store materials and equipment in well ventilated area within temperature as recommended by manufacturer.

.4 Fire Safety Requirements:

1. Supply fire extinguisher adjacent to storage area.
2. Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
3. Handle, store, use and dispose of flammable and combustible materials in accordance with National Fire Code of Canada (NFC) requirements.

1.4 SITE CONDITIONS

.1 Heating, Ventilation and Lighting:
Ventilate enclosed spaces in accordance with Section 01 51 00- Temporary Utilities.

1. Co-ordinate use of existing ventilation system with Departmental Representative and ensure its operation during and after application of paint as required.
2. Provide minimum lighting level of 323 Lux on surfaces to be painted.

.2 Temperature, Humidity and Substrate Moisture Content Levels:

1. Apply paint finishes when ambient air and substrate temperatures at location of installation can be satisfactorily maintained during application and drying process, within MPI and paint manufacturer's prescribed limits.
2. Test concrete, masonry and plaster surfaces for alkalinity as required.
3. Apply paint to adequately prepared surfaces, when moisture content is below paint manufacturer's prescribed limits.

.3 Additional application requirements:

1. Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.

Part 2 Products

2.1 MATERIALS

.1 Supply paint materials for paint systems from single manufacturer.

.2 Conform to latest MPI requirements for painting work including preparation and priming.

.3 Materials in accordance with MPI - Architectural Painting Specification Manual "Approved Product" listing.

.4 Colours:

1. Colors to match existing.

.5 Mixing and tinting:

1. Use and add thinner in accordance with paint manufacturer's recommendations.
    1. Do not use kerosene or similar organic solvents to thin water-based paints.
2. Thin paint for spraying in accordance with paint manufacturer's written recommendations.
3. Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

.6 Gloss/sheen ratings:

1. Paint gloss is defined as sheen rating of applied paint, in accordance with following values:

Gloss Level-Category	**Gloss @ 60 degrees**	**Sheen @ 85 degrees**
Gloss Level 1 - Matte Finish	Max. 5	Max. 10
Gloss Level 2 - Velvet	Max.10	10 to 35
Gloss Level 3 - Eggshell	10 to 25	10 to 35
Gloss Level 4 - Satin	20 to 35	min. 35
Gloss Level 5 - Semi-Gloss	35 to 70	
Gloss Level 6 - Gloss	70 to 85	
Gloss Level 7 - High Gloss	More than 85	

2. Gloss level ratings of painted surfaces shall match existing condition in surrounding areas.

.7 Exterior painting:

1. Concrete Vertical Surfaces: (including horizontal soffits)
    1. EXT 3.1A - Latex finish to match existing surrounding area.
2. Concrete Masonry Units: smooth and split face block and brick
    1. EXT 4.2A - Latex finish to match existing surrounding area.
3. Structural Steel and Metal Fabrications: columns, beams, joists and miscellaneous metal.
    1. EXT 5.1D - Alkyd finish to match existing surrounding area.
4. Galvanized Metal: high contact/high traffic areas (doors, frames, railings and handrails, etc.).
    1. EXT 5.3B - Alkyd finish to match existing surrounding area.
5. Dimension Lumber: columns, beams, exposed joists, underside of decking, siding, fencing, etc.
    1. EXT 6.2B - Waterborne solid colour stain finish.
    2. EXT 6.2C - Alkyd finish to match existing surrounding area.
    3. EXT 6.2L - Semi-transparent stain finish.

.8 Interior painting:

1. Concrete horizontal surfaces: floors.
    1. INT 3.2B - Alkyd floor enamel finish to match existing surrounding area.

2. Structural Steel and Metal Fabrications: columns, beams, joists and miscellaneous metal.
    1. INT 5.1E Alkyd - finish to match existing surrounding area.
3. Galvanized Metal: high contact/high traffic areas (doors, frames, railings and handrails, etc.).
    1. INT 5.3C - Alkyd finish to match existing surrounding area. (over cementitious primer).
4. Dressed Lumber: doors, door and window frames, casings, mouldings, etc.:
    1. INT 6.3A - Latex finish to match existing surrounding area.
    2. INT 6.3B - Alkyd finish to match existing surrounding area.
    3. INT 6.3E - Polyurethane varnish finish to match existing surrounding area. (over stain).
    4. INT 6.3K - Polyurethane varnish finish to match existing surrounding area.
5. Plaster and gypsum board: gypsum wallboard, drywall, "sheet rock" type material, etc.
    1. INT 9.2A - Latex finish to match existing surrounding area. (over latex sealer).
    2. INT 9.2C - Alkyd finish to match existing surrounding area. (over latex sealer).
    3. INT 9.2M - Institutional low odour/low VOC [insert gloss level] finish.

Part 3 Execution

3.1 GENERAL

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

.2 Perform preparation and operations for interior painting in accordance with MPI - Maintenance Repainting Manual except where specified otherwise.

3.2 EXAMINATION

.1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Departmental Representative damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.

.2 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test". Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

3.3 PREPARATION

.1 Protection of in-place conditions:

1. Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by Departmental Representative.
2. Protect items that are permanently attached such as Fire Labels on doors and frames.

3. Protect factory finished products and equipment.

.2 Surface Preparation:

1. Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-installed after painting is completed.
2. Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
3. Place "WET PAINT" signs in occupied areas as painting operations progress. Signs to approval of \Departmental Representative.
4. Clean and prepare surfaces in accordance with MPI - Maintenance Repainting Manual and MPI - Architectural Painting Specification Manual specific requirements and coating manufacturer's recommendations.
5. Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.
6. Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.
7. Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements.
8. Touch up of shop primers with primer as specified.

3.4 APPLICATION

.1 Use method of application approved by Departmental Representative

1. Conform to manufacturer's application recommendations.

.2 Apply coats of paint in continuous film of uniform thickness.

1. Repaint thin spots or bare areas before next coat of paint is applied.

.3 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.4 Sand and dust between coats to remove visible defects.

.5 Mechanical/Electrical Equipment:

1. Paint conduits, piping, hangers, ductwork and other mechanical and electrical equipment exposed in finished areas, to match adjacent surfaces, except as indicated.
2. Do not paint over nameplates.
3. Keep sprinkler heads free of paint.
4. Paint disconnect switches for fire alarm system and exit light systems in red enamel.

3.5 CLEANING

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

1. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for 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.

.4 Place paint defined as hazardous or toxic waste, including tubes and containers, in containers or areas designated for hazardous waste.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS & SUMMARY

.1 The General Conditions, Supplements and Amendments shall govern this Section (read in conjunction with Instructions to Tenderers / Bidders). This section covers items common to all Electrical sections and is intended only to supplement the requirements of Division 01.

.2 Reference to "Electrical Divisions" shall mean all sections of Divisions 26, 27, 28, 33, 34 & 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 Provide materials, equipment and plant, of specified design, performance and quality; and, current models with published certified ratings for which replacement parts are readily available. Provide project management and on-site supervision to undertake administration, meet schedules, ensure timely performance, ensure coordination, and establish orderly completion and the delivery of a fully commissioned installation.

.5 The most stringent requirements of this and other electrical sections shall govern.

.6 All work shall be in accordance with the Sandspit Airport Lighting Upgrade Drawings and Specifications and their intent, complete with all necessary components, including those not normally shown or specified, but required for a complete installation.

.7 Provide seismic restraints for all required equipment and wiring systems.

.8 Connect to equipment specified in other Sections and to equipment supplied and installed by other Contractors or by the Owner. Uncrate equipment, move in place and install complete; start-up and test. Include all field assembly of loosely/separately packaged accessories

1.2 REFERENCES

.1 Install in accordance with CSA C22.1 (current adopted edition) - except where specified otherwise.

.2 Refer to CSA C22.1 Appendix A "Safety Standards for Electrical Equipment" for applicable codes and the related revisions

.3 Refer to CSA C22.1 Pages xxix - xxxii for related 'Reference Publications'

.4 Refer to NBCC Table 1.3.1.2 for applicable codes and the related revisions.

.5 Comply with Local Electrical Bulletins and by-laws relating to the Authority having Jurisdiction.

.6 Install overhead and underground systems in accordance with CSA C22.3 No.1 (current adopted edition) - except where specified otherwise.

.7 Preferred Voltage Levels for AC Systems, 0-50,000V in accordance with CAN3-C235 (current adopted edition)

1.3 DEFINITIONS

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

1.4 DESIGN REQUIREMENTS

.1 Operating voltages: to CAN3-C235- current 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.

1.5 SUBMITTALS

.1 Submittals to be in accordance with Division 01.

.2 Product Data: submit WHMIS MSDS in accordance with Division 01 - Sustainable Requirements and Division 02- Hazardous Materials

.3 Shop Drawings:

.4 Submit shop drawings, product data and samples in accordance with Division 01. The submission shall be reviewed, signed and processed as described in Division 01.

.5 Indicate details of construction, dimensions, capacities, weights and electrical performance characteristics of equipment or material.

.6 Where applicable, include wiring, line and schematic diagrams. Include wiring drawings or diagrams showing interconnection with work of other Sections.

.7 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 scheduled 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 Detailed drawings of bases, supports and anchor bolts.
  - .4 Control explanation and internal wiring diagrams for packaged equipment.
  - .5 A written description of control sequences relating to the schematic diagrams.

.8 Format

- .1 PDF

.9 Coordination

- .1 Where electrical equipment requires support or backing by other trades or mechanical connections, the shop drawings shall also be circulated through the other "services" contractor(s) prior to submission to the Departmental Representatives.

.10 Keep one [1] copy of shop drawings and product data, on site, available for reference.

.11 Quality Control: in accordance with Division 01 - Quality Control

- .1 Provide CSA certified equipment and material. Where CSA certified equipment and/or material is not available, submit such equipment and/or material to the authority having jurisdiction for special approval before delivery to site.

.2 Submit test results of installed electrical systems and instrumentation.

.12 Permits and Fees:

.1 Submit to Electrical Inspection Department, Local Fire Authorities and Supply Authority the necessary number of drawings and specifications for examination and approval prior to commencement of work. Obtain all required permits and pay all fees.

.2 Arrange for inspection of all Work by the authorities having jurisdiction. On completion of the Work, furnish final unconditional certificates of approval by the inspecting authorities.

1.6 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Division 01 - Quality Control

.2 Qualifications: electrical Work to be carried out by qualified, licensed electricians who hold valid Master Electrical Contractor license or apprentices in accordance with authorities having jurisdiction as per the conditions of Provincial and/or Territorial Act respecting manpower vocational training and qualification.

.1 Employees registered in provincial apprentices program: permitted, under direct supervision of qualified licensed electrician, to perform specific tasks.

.2 Permitted activities: determined based on training level attained and demonstration of ability to perform specific duties.

.3 Site Meetings: in accordance with Division 01 - Construction Progress Schedule

.1 Site Meetings: as part of Manufacturer's Field Services: schedule site visits, to review Work, at stages listed below:

.1 At time of initial shop drawing submission to confirm any existing conditions and to coordinate with the project schedule and any cross discipline requirements.

.2 After delivery and storage of products, and when preparatory Work is complete but before installation begins.

.3 During progress of Work at key schedule points as determined.

.4 At commissioning.

.5 Upon completion of Work, after cleaning is carried out.

.4 Health and Safety Requirements: do construction occupational health and safety in accordance with Division 01 - Health and Safety Requirements.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Material Delivery Schedule: provide Departmental Representative with schedule within 4 weeks after award of Contract.

.2 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and/or recycling in accordance with Division 01 Construction/Demolition Waste Management and Disposal.

1.8 SYSTEM START-UP

.1 Refer to Division 01, and as follows.

.2 Instruct Departmental Representative and operating personnel in the operation, care and maintenance of equipment.

1.9 OPERATING INSTRUCTIONS

.1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.

.2 Operating instructions to include following, as required:

.1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.

.2 Procedures to be followed in event of equipment failure.

.3 Other items of instruction as recommended by manufacturer of each system or item of equipment.

.3 Post instructions where directed.

1.10 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Division 01 - Construction/Demolition Waste Management and Disposal and with the Waste Reduction Work plan.

.2 Avoid using landfill waste disposal procedures when recycling facilities are available.

1.11 DRAWINGS AND MEASUREMENTS

.1 Drawings are generally diagrammatic and are intended to indicate the scope and general arrangement of work and are not detailed installation drawings. Do not scale the drawings. Obtain accurate dimensions from the Architectural and Structural drawings.

.2 Consult the architectural drawings and details for exact locations of fixtures and equipment. Obtain this information from the Departmental Representative where definite locations are not indicated.

.3 Take field measurements, where equipment and material dimensions are dependent upon building dimensions.

.4 Where imperial units have been indicated in brackets [ ] following the requirements in SI units, the conversion is approximate and provided for convenience. The SI units shall govern.

1.12 PROJECT COORDINATION

.1 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 Departmental Representative's written approval.

.2 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.

.3 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 Departmental Representative of space problems before installing any material or equipment. Demonstrate to the Departmental Representative on completion of the work that all equipment installed can be properly, safely serviced and replaced, if and when required.

1.13 EQUIPMENT RESTRAINT

.1 Related Section: 26 05 05 Seismic Restraint.

.2 It is the entire 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.

1.14 REUSED EQUIPMENT

.1 Where existing equipment is being relocated and re-used, check and report on the condition to the Departmental Representative before reinstallation. Protect and carefully store equipment designated for reuse.

1.15 SEQUENCE OF WORK

.1 Before interrupting major services notify the Owner well in advance and arrange an acceptable schedule for the interruptions.

.2 Before interrupting any services complete all preparatory work as far as reasonably possible and have all necessary materials on site and prefabricated (where practical) and work continuously to keep the length of interruption to a minimum.

.3 Include for the cost of all work that may be required out of regular hours to minimize the period of service interruption when modifying the existing systems.

1.16 BUILDING OPERATION DURING CONSTRUCTION

.1 In order to minimize operational difficulties for the existing building staff, the various trades must cooperate with the owner throughout the entire construction period and particularly ensure that noise is minimized.

.2 Convenient access for the staff and public to the building must be maintained at all times. Minor inconvenience and interruption of services will be tolerated, provided advance notice is given, but the Contractor will be expected to coordinate his work, in consultation with the owner, so the operation of the facility can be maintained as nearly normal as possible.

1.17 EXISTING SERVICES

.1 Refer to section 26 05 10 – Electrical Demolition

.2 Protect all existing services encountered. Every effort has been made to show the known existing services. However, the removal of concealing surfaces may reveal other existing services. Work with the Owner's staff to trace the originating source and points served. Obtain instructions from the Departmental Representative when existing services require relocation or modifications, other than those already indicated in the Contract Documents.

.3 Arrange work to avoid shutdowns of existing services. Where shutdowns are unavoidable, obtain the Owner's approval of the timing, and work to minimize any interruptions.

.4 Shutdowns, to permit connections, to be coordinated with the maintenance staff.

.5 In order to maintain existing services in operation, temporary relocations and wiring may be required.

.6 Be responsible for any damages to existing systems by this work.

.7 The interruption of utility services to permit tie-ins shall be arranged through the owner's representative. Application must be received in writing at least seven (7) calendar days prior to the date required for the shutdown. Service shutdowns shall only be carried out by Physical Plant and will normally be scheduled to occur during evenings or weekends. The Owner reserves the right to withhold permission for a reasonable period with respect

to any shutdown, if the shutting-off of a service interferes with essential building operations.

1.18 SALVAGE

.1 All conduit, wiring and equipment which becomes redundant and is no longer required due to the work in this Contract shall be completely removed.

.2 All existing items which need to be removed, and which have a reasonable salvage value, shall be carefully removed and handed over to the Owner. Handing over to the Owner includes moving to Owner's designated storage place on site. These items shall not become the property of the Contractor. Obtain a written receipt from the Owner detailing each of the items handed over.

.3 Remove all redundant material not required by the Owner from the site.

1.19 WARRANTY

.1 Use of installed equipment during construction shall not shorten or alter the warranty period as specified in the Division 01.

.2 Take note of any extended warranties specified.

.3 Furnish a written warranty stating that all work executed under this Division will be free from defects of material and workmanship for a period of two (2) year from the date of substantial performance. Contractor to include for two warranty visits (not including investigation and repair/replacement of defective work as described in 1.19.4) , one at 1 year post completion, and the other at two years.

.4 Promptly investigate any electrical or control malfunction, and repair or replace all such defective work and all other damages thereby which becomes defective during the time of the warranty.

1.20 TENDER INQUIRIES

.1 All contractor queries during the tender period shall be made in writing to the Departmental Representative. Contractor queries will be collected and suitable addenda will be issued for clarification. No verbal information will be considered valid or issued by the Departmental Representative's office during tender. All tender queries may be faxed, mailed or couriered to the Departmental Representative's office. No telephone questions will be answered.

1.21 EXAMINATION

.1 Examine the documents for details of work included. Obtain a written clarification in the event of conflict within the specification, between the specification and the drawing, or in the drawing. Obtain written clarification from the Departmental Representative if work affecting the installation is not clear. Where this is not done in advance, allow in the tender sum for providing the more costly alternative.

1.22 RESPONSIBILITIES

.1 Ensure that equipment does not transmit noise and/or vibration to other parts of the building, as a result of poor installation practice.

.2 Where the Contract Documents do not contain sufficient information for the proper selection of equipment for bidding, notify the Departmental Representative during the tendering period. If clarification is not obtainable, allow for the most expensive arrangement. Failure to do this shall not relieve the Contractor of responsibility to provide the intended equipment.

.3 Protect equipment and material from the weather, moisture, dust and physical damage.

.4 Cover equipment openings and open ends of conduit, piping and pullboxes as work progresses. Failure to do so will result in the Trade being required to adequately clean or replace materials and equipment at no extra cost to the Owner.

.5 Protect all existing services encountered. Obtain instructions from the Engineer when existing services require relocation or modification.

.6 Refinish damaged or marred factory finish to factory finish.

.7 The specifications and drawings form an integral part of the Contract Documents. Neither the drawings nor the specifications shall be used alone. Work omitted from the drawings but mentioned or reasonably implied in the specifications, vice versa, shall be considered as properly and sufficiently specified and shall be provided. Misinterpretation of any requirement of either plans or specifications shall not relieve this Contractor of the responsibility of properly completing his trade to the approval of the Departmental Representative.

1.23 STANDARD OF ACCEPTANCE

.1 Standard of Acceptance means that the item named and specified by manufacturer and/or catalogue number forms part of specification and sets standard regarding performance, quality of material and workmanship and when used in conjunction with a referenced standard, shall be deemed to supplement the standard.

.2 A visible manufacturer's nameplate shall indicate manufacturer's name, model number, serial number, capacity data, electrical characteristics and approval stamps.

1.24 ADDITION OF ACCEPTABLE MANUFACTURERS

.1 Material/products considered to satisfy the specification, but of a manufacturer other than those named may be submitted to the Departmental Representative for consideration not later than five (5) working days prior to closing of tender or of bid depository subtrade tender whichever is earlier.

.2 Alternate approvals will be given by written addendum only. No other substitution will be permitted after closing of tenders.

.3 Alternate approvals granted before the closing of tenders will be limited to a manufacturer's system and/or series only. This limited approval will not preclude substitute equipment/material from complying with specific features included with equipment/material specified. Determine that the alternate product meets the specification intent before basing a tender on the product

.4 Where alternate equipment/materials are selected, allow for effects on other parts of the work of this Trade and other Trades. Where substantial changes in arrangement are required, submit shop drawings of the proposed changes with Plan and Section views and show effects on work of other Trades. Alternate equipment/materials shall not exceed the available space limitations. Maintain installation, access and servicing clearances. No extra will be allowed due to the use of alternate equipment/materials.

.5 Where two or more items of equipment and/or material, of the same type, are required, provide products of a single manufacturer.

.6 Install and test all equipment and material, in accordance with the detailed recommendations of the manufacturer.

1.25 EQUIPMENT LIST

.1 Submit a completed Equipment List, showing the make of equipment and material included in the Tender, including the names of the subtrades, 10 days after the award of the Contract. **Form EF110** in Appendix A shall be used for this purpose.

.2 The equipment list shall be a full list of materials or systems intended for installation.

1.26 PROGRESS CLAIM AND CHANGEORDER BREAKDOWNS

.1 Ten (10) days after the award of contract, submit price breakdowns on photocopies of the Price Breakdown **Form EF112** included in Appendix A.

.2 Provide details for each section of the electrical work listed for each separate electrical change order item.

.3 Mark-up information is required for change orders but is optional on the original tender price.

.4 Progress claims will not be certified nor payment made beyond 90% of the overall Electrical contract until commissioning and verification of the systems are complete. This procedure is to allow for any necessary deficiency holdbacks on items which do not become apparent until the systems are commissioned.

1.27 PROJECT CLOSE-OUT REQUIREMENTS

.1 Refer to detailed specifications in each section for detailed requirements. Also refer to Specification Appendix A Form EF-142 for list of required substantial completion submissions. Record drawings to be submitted to Departmental Representative and all life safety systems must be operational, verified and tested and demonstrated to Departmental Representative prior to issuance of Schedule C.

1.28 SUBSTANTIAL PERFORMANCE REQUIREMENTS

.1 Before the Departmental Representative is requested to make an inspection for substantial performance of the work:

.1 Commission all systems and prove out all components, interlocks and safety devices.

.2 Submit a letter certifying that all work is complete for the intended use, operational, clean and all required submissions have been completed. **Form EF143** in Appendix A should be used for this purpose.

.3 A complete list of incomplete or deficient items shall be provided. If, in the opinion of the Departmental Representative, this list indicates the project is excessively incomplete, a substantial completion inspection will not be performed.

.2 The work will not be considered to be ready for use or substantially complete until the following requirements have been met:

.1 All reported deficiencies have been corrected.

.2 Operating and Maintenance Manuals completed.

.3 "As Built" Record Drawing ready for review.

.4 Systems Commissioning has been completed and has been verified by Departmental Representative.

.5 All demonstrations to the owner have been completed.

.6 All documents required on **Form EF142** in Appendix A have been submitted.

.7 All documentation required for LEED ™ certification has been submitted.

.3 Departmental Representatives Letters of Assurance will not be issued until the following requirements have been met:

.1 All items listed in .1 above have been completed or addressed.

.2 Certificate of Penetrations through separations (**Form EF130**).

.3 Provincial or City Electrical Inspection - Certificate of inspection.

.4 Seismic Engineers letter of Assurance and final inspection report.

.5 Certificate of Substantial Performance (**Form EF143**).

.6 Signed off copy of Departmental Representatives final inspection report.

.7 Fire alarm verification.

1.29 DEFICIENCY HOLDBACKS AND DEFICIENCY INSPECTIONS

.1 Work under this Division which is still outstanding when substantial performance is certified will be considered deficient and a sum equal to at least twice the estimated cost of completing that work will be held back.

.2 It is expected that outstanding work will be completed in an expeditious manner and the entire holdback sum will be retained until the requirements for Total Performance of Division 26, 27, 28, 33 (electrical) work have been met and verified.

Part 2 Products

2.1 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.

2.2 MATERIALS AND EQUIPMENT

.1 Provide materials and equipment in accordance with Division 01 and as follows.

.2 Material and equipment to be CSA certified. Where CSA certified material or equipment is not available, obtain special approval from authority having jurisdiction before delivery to site and submit such approval.

.3 Where equipment or materials are specified by technical description only, they are to be of the best commercial quality available for the intended purpose.

.4 Factory assemble control panels and component assemblies.

2.3 WIRING TERMINATIONS

.1 Lugs, terminals, screws used for termination of wiring to be suitable for either copper or aluminum conductors.

2.4 WIRING IDENTIFICATION

.1 Identify wiring with permanent indelible identifying markings, either numbered or coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.

.2 Maintain phase sequence and colour coding throughout.

.3 Colour code: to CSA C22.1.

.4 Use colour coded wires in communication cables, matched throughout system.

2.5 FINISHES

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

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

.3 Clean and prime paint exposed hangers, racks, fastenings to prevent rusting. Finish painting shall be provided by Division 09.

.4 Paint outdoor electrical equipment "equipment green" finish.

.5 .Paint indoor switchgear and distribution enclosures light gray unless otherwise indicated in particular specification sections for specialised or emergency power equipment.

2.6 ACCESS PANELS (DOORS)

.1 Unless otherwise noted, access doors shall be minimum: 450mmx450mm [18"x18"] for body entry; 300mmx300mm [12"x 12"] for hand entry.

.2 Access doors in fire separations of 3/4 hour rating, and higher, and firewalls shall have a compatible fire rating and a ULC label with tamper-proof latch, self closing.

.3 Minimum Requirements:

.1 180 degree door swing, mitred rounded safety corners flush welded, concealed hinges, screwdriver latches, and anchor straps or lugs to suit construction, all steel prime coated.

.2 Plaster or wet wall construction: 14 gauge bonderized steel flush with wall or ceiling type with concealed flange.

.1 Acceptable Product: Acudor PS-5030.

.3 Masonry or drywall construction: 16 gauge for 400 mm [16"] x 400 mm [16"] and smaller, 14 gauge for 450 mm [18"] x 450 mm [18"] and larger bonderized steel face of wall type with exposed flange.

.1 Acceptable Product: Acudor UF-5000.

.4 Tile, ceramic tile, marble, terrazzo, plaster or wet wall construction in washrooms and other special areas: 14 gauge stainless steel flush with wall or ceiling type with concealed flange.

.1 Acceptable Product: Acudor PS-5030 stainless.

.5 Acoustical tile ceiling and similar block materials: 14 gauge bonderized steel recessed ceiling type.

.1 Acceptable Product: Acudor AP-5010 or AT-5020.

.6 Feature wall construction: Recessed wall type that is selected to complement and conform to the architectural module, treatment, or panelling. The size shall conform to adjacent finishes.

.7 Access panels in fire separations and fire walls shall have a compatible fire rating and ULC label. (ie. Acudor Fire Rated FW-5050 or FB-5060).

.4 Standard of Acceptance : Zurn, Wade, Acudor, Can-Aqua, Milcor, Maxam, Van-Met.

2.7 FASTENING TO BUILDING STRUCTURE

.1 General:

.1 Do not use inserts in base material with a compressive strength less than 13.79 MPa [2000 psi] [refer to structural drawings].

.2 All inserts supporting conduit racks shall have a factor of safety of 5. All other inserts shall have a factor of safety of 4.

.2 Types:

.1 Cast-in-place type:

.1 Channel type - Burndy, Canadian Strut, Unistrut, Cantruss or Hilti Channel.

.2 Wedge type galvanized steel concrete insert, Grinnell Fig. 281 for up to 200 mm [8"] pipe size.

.3 Universal type malleable iron body insert, Grinnell Fig. 282 for up to 200 mm [8"] pipe size.

.2 Drilled, mechanical expansion type:

.1 Hilti HSL or UCAN LHL heavy duty anchor for use in concrete with compressive strength not less than 19.6 MPa [2840 psi].

.2 Hilti Kwik-Bolt or UCAN WED stud anchor for concrete. (Do not use in seismic restraint applications).

.3 Hilti HDI or UCAN IPA drop-in anchor for concrete.

.4 Hilti or UCAN Sleeve Anchor (medium and light duty) for concrete and masonry.

.5 Hilti ZBP or UCAN Zamac pin bolt (light duty) for concrete and masonry.

.3 Drilled, adhesive type:

.1 Hilti HVA or UCAN Adhesive Anchor consisting of anchor rod assembly with a capsule containing a two-component adhesive, resin and hardener.

.2 Hilti HY150 consisting of anchor rod with a 2 part adhesive system.

.3 For use in concrete housekeeping bases (in vertical downward position) where the distance to the edge of the concrete base could cause weakness if a mechanical expansion type anchor were used.

.4 Rod assemblies shall extend a minimum of 50 mm [2"] into the concrete slab below the housekeeping bases.

.3 Note:

.1 All drilling for inserts shall be performed using the appropriate tool specifically designed for the particular insert. The diameter and depth of each drilled hole shall be to the exact dimensions as specified by the insert manufacturer.

.2 Refer to manufacturer's recommendations for tightening torques to be applied to inserts.

.3 Where specifically called for, drills shall include a dust vacuum system, Hilti SAV Dust Vacuum System.

2.8 MISCELLANEOUS METAL

.1 Be responsible for all miscellaneous steel work relative to Electrical Divisions of the Specifications, including but not limited to:

.1 Support of equipment .

.2 Hanging, support, anchoring, guiding and relative work as it applies to wiring raceways and electrical equipment.

.3 Earthquake restraint devices - refer also to "Seismic Restraint" sections

.4 Bridle rings - secure to structure or steel supports.

.2 All steel work shall be prime and undercoat painted ready for finish under the related Division.

2.9 MAINTENANCE MATERIALS

.1 Provide maintenance materials in accordance with Division 01 and specified in appropriate Sections.

.2 Maintenance materials to include spare luminaires and drivers, in quantity shown on luminaire schedule.

.3 Refer to Specification Appendix A Electrical **Form EF140** "Items to be handed to the Owner" Obtain the Building Owners representative sign off. Use **Form EF 140** for this purpose.

2.10 OPERATION AND MAINTENANCE DATA

.1 Provide operation and maintenance data for incorporation into maintenance manual specified in Division 01 and as follows.

.2 Include in operations and maintenance data:

.1 Details of design elements, construction features, component function and maintenance requirements, to permit effective operation, maintenance, repair, modification, extension and expansion of any portion or feature of installation.

.2 Technical data, product data, supplemented by bulletins, component illustrations, exploded views, technical descriptions of items, and parts lists. Advertising or sales literature not acceptable.

.3 Wiring and schematic diagrams.

.4 Names and addresses of local suppliers for items included in maintenance manuals.

.3 Include in the manual the following major sections:

.1 Title page (in plastic cover).

.2 Comprehensive description of the operation of the systems, including the function of each item of equipment within the system.

.3 Detailed instructions for the normal maintenance of all systems and equipment installed including procedures and frequency of operational checks and service and troubleshooting instructions.

.4 Local source of supply for each item of equipment.

.5 Wiring and control diagrams.

.6 Spare parts list.

.7 Copies of guarantees and certificates.

.8 Manufacturer's maintenance brochures and shop drawings.

.4 The manual information shall be bound in a three "D-ring" hard back reinforced vinyl covered ("bar lock" post type where more than 50mm [2"] rings required) binder c/w index tab separators to divide the different sections. The binder cover shall be black with white lettering. Printing of the binder cover shall be completed before the binder is manufactured and the wording shall be approved by the Departmental Representative before printing.

.5 Submit a draft copy to the Departmental Representative for review thirty (30) days prior to start up of the systems and equipment.

.6 Submit three (3) copies in the final approved form.

2.11 PROJECT RECORD DRAWINGS

.1 Provide project record documents as specified in Division 01 as further called for in this Division.

.2 During the construction period, keep on Site a clean set of drawings marked up to reflect the "As-Built" state, for examination by the Departmental Representative on a regular

basis. Include elevations and detailed locations of buried services, empty conduit systems and junction and pull boxes.

.1 Contractor to prepare red-line as-built drawings and provide scanned copy to the Departmental Representative for review and acceptance at completion of work.

.2 Arrange for and be responsible for the preparation of as-built drawings in AutoCAD computerized drafting system after review and acceptance of the red-line as-builts by the Departmental Representative. Be responsible for the cost of preparation of as-built drawings. Submit electronic copy of the as-built drawings on CD/DVD media in CAD and PDF format, as well as 2 sets of hard copies. Submit as-built drawings before requesting Substantial Completion.

.3 Note: The Contractor will be required to sign a standard Stantec / Contractor agreement entitled "Authorization to Use CAD drawing files". The agreement restricts the use of the CAD files to the purpose of "as-built" only and determines the editing procedures.

Part 3 Execution

3.1 INSTALLATION

.1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.

3.2 NAMEPLATES AND LABELS

.1 Ensure manufacturers nameplates and CSA labels to be visible and legible after equipment is installed.

.2 Provide new labelling for all new line and low voltage switches.

3.3 CONDUIT AND CABLE INSTALLATION

.1 Install conduit and sleeves prior to pouring of concrete. Sleeves through concrete: schedule 40 steel pipe, sized for free passage of conduit and protruding 50 mm [2"].

.2 Install cables, conduits and fittings to be embedded or plastered over, neatly and close to building structure so furring can be kept to minimum.

.3 Install roof jacks where conduit and cables penetrate roofs. Apply sealant after installation.

.4 All cables and conduits to be installed concealed in finished areas.

3.4 FIELD QUALITY CONTROL

.1 Load and Balance:

.1 Measure voltage and phase & neutral currents to panelboards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.

.2 Measure phase and neutral currents to dry-core transformers and motor control centres, operating under normal load,

.3 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.

.2 Conduct and pay for the following tests:

.1 Lighting and its control.

.2 Insulation resistance testing on affected circuits:

.1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.

.2 Check resistance to ground before energizing.

.3 Provide Departmental Representative with at least one weeks notice prior to testing.

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

.5 Reports:

.1 Provide written reports in a timely manner upon completion of the testing and load balance. Indicate test hour and date.

3.5 CLEANING

.1 Do final cleaning in accordance with Division 01.

.2 At time of final cleaning, clean lighting reflectors, lenses and other lighting surfaces that have been exposed to construction dust and dirt.

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

.4 Clean and prime paint exposed non-galvanised hangers, racks, fastenings to prevent rusting. Coordinate finish painting with Division 09.

3.6 WORKMANSHIP

.1 Workmanship shall be in accordance with well established practice and standards accepted and recognized by the Departmental Representative and the Trade.

.2 The Departmental Representative shall have the right to reject any item of work that does not conform to the Contract Documents and accepted standards of performance, quietness of operation, finish and appearance.

.3 Employ only tradesmen holding valid Provincial Trade Qualification Certificates. Tradesmen shall perform only work that their certificate permits. Certificates shall be available for inspection by the Departmental Representative.

3.7 PROTECTION OF WORK

.1 Protect equipment and materials, stored or in place, from the weather, moisture, dust and physical damage.

.2 Mask machined surfaces. Secure covers over equipment openings and open ends of equipment and conduit, as the installation work progresses.

.3 Equipment having operating parts, bearings or machined surfaces, showing signs of rusting, pitting or physical damage will be rejected.

.4 Refinish damaged or marred factory finish.

3.8 PROTECTION OF ELECTRICAL EQUIPMENT

.1 Protect exposed live equipment during construction for personnel safety.

.2 Shield and mark live parts, e.g. "LIVE 120 VOLTS".

.3 Arrange for installation of temporary doors for rooms containing electrical distribution equipment. Keep these doors locked except when under direct supervision of electrician.

3.9 CONCEALMENT

.1 Conceal wiring and conduit in partitions, walls, crawlspaces and ceiling spaces, unless otherwise noted.

.2 Do not install wiring and conduit on outside walls or on roofs unless specifically directed.

3.10 ACCESSIBILITY AND ACCESS PANELS

.1 Install all equipment, controls and junction boxes so as to be readily accessible for future modification, adjustment, operation and maintenance as appropriate.

.2 Provide access panels where required in building surfaces. Do not locate access panels in panelled or special finish walls, without prior approval of the Departmental Representative.

.3 Access panels in U.L.C. fire separations and fire walls shall have a compatible fire rating and U.L.C. label. Acquire approval in writing from the local fire authority if required.

.4 Access panels shall be painted with a primer coat if applicable and then with a finish coat, colour and type to the Departmental Representative's approval.

.5 Locate equipment and junction boxes in service areas wherever possible.

3.11 EQUIPMENT INSTALLATION

.1 Provide means of access for servicing equipment.

.2 CSA identification and equipment labels to be clearly visible after installation.

3.12 CUTTING, PATCHING, DIGGING, CANNING, CORING & CONCRETE

.1 Lay out all cutting, patching, digging, canning and coring required to accommodate the electrical services. Coordinate with other Divisions. The performance of actual cutting, patching, digging, canning and coring is specified under other Divisions.

.2 Be responsible for all cutting, patching, digging, canning and coring required to accommodate the electrical services.

.3 Be responsible for correct location and sizing of all openings required under Electrical Divisions, including piped sleeves.

.4 Verify the location of existing and planned service runs and structural components within concrete floor and walls prior to core drilling and/or cutting. Repairs to existing services and structural components damaged as a result of core drilling and cutting is included in this section of the work.

.5 Openings through structural members of the building shall not be made without the approval of the Structural Departmental Representative.

.6 Openings in Concrete:

.1 Be responsible for the layout of all openings in concrete, where openings are not left ready under previous contract.

.2 All openings shall be core drilled or diamond saw cut.

.3 Refer to structural drawings for permissible locations of openings and permissible opening sizes in concrete floors and walls.

.4 Refer to structural drawings for locations of steel reinforcing.

.5 Be responsible for repairing any damage to steel reinforcing.

.7 Openings in building surfaces other than concrete:

.1 Lay out all openings required.

.8 Poured concrete for duct encasements, pole bases, transformer pads and housekeeping pads shall be provided by other Divisions, coordinated and supervised by the Electrical Divisions.

.9 Precast concrete items such as transformer pad bases, pull boxes and light pole bases to be provided and installed by the Electrical Divisions unless otherwise specified.

.10 Excavation and backfilling will be provided by other Divisions. This Division to superintend the work and provide all layouts and parameters.

3.13 PAINTING

.1 Clean exposed bare metal surfaces supplied under the Electrical Divisions removing all dirt, dust, grease and millscale. Apply at least one coat of corrosion resistant primer paint to all supports and equipment fabricated from ferrous metal.

.2 Paint all hangers and exposed sleeves, in exposed areas, with a rust inhibiting primer, as they are installed.

.3 Repaint all marred factory finished equipment supplied under the Electrical Divisions, to match the original factory finish.

.4 Coordinate with Division 09.

END OF SECTION

Part 1 General

1.1 RELATED WORK

.1 This Section of the Specification is to be read, coordinated and implemented in conjunction with all other parts of the Contract Documents.

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 Consulting Engineer should be able to provide a proof of professional insurance and the related practice credentials if requested by the Electrical Engineer. The Seismic Consulting Engineer should be familiar with SMACNA, ECABC & NFPA guidelines as well as BCBC and VBBL requirements.

.3 The Contractors Seismic Consulting Engineer shall submit original signed BC Building Code "Letters of Assurance" "Schedules B1, B2, and C-B" to the Departmental Representative.

.4 Use the City Vancouver details in the absence of any local requirements.

.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 pendant luminaires as deemed necessary by Seismic Engineer, 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 will provide normal engineering functions as they pertain to seismic restraint of electrical installations.

.5 The Contractor shall be aware of, and comply with, all current seismic restraining requirements and make provision for those that may come into effect during construction of the project. Make proper allowance for such conditions in the tender.

.6 The Seismic Engineer shall provide detailed seismic restraint installation shop drawings to the Contractor. Copies of the shop drawings to be included in the final project manual.

.7 Provide seismic restraints on all equipment, and/or installations or assemblies, which are suspended, pendant, shelf mounted, freestanding and/or bolted to the building structure or support slabs.

.8 The Seismic Engineer shall provide inspections during and after installation. The Contractor shall correct any deficiencies noted without additional cost to the contract.

.9 Include all costs associated with the Seismic installation and certification in the base tender.

1.4 SHOP DRAWINGS & SUBMITTALS

.1 Submit shop drawings of all seismic restraint systems including details of attachment to the structure, either tested in an independent testing laboratory or approved by the Seismic Engineer.

.2 Submit all the proposed types and locations of inserts or connection points to the building structure or support slabs. Follow the directions and recommendations of the Seismic Engineer.

Part 2 Products

2.1 SLACK CABLE SYSTEMS

.1 Slack cable restraint systems shall be as designed and supplied by Vibra-Sonic Control or equal.

.2 Slack cable systems to allow normal maintenance of equipment and shall not create additional hazard by their location or configurations. Contractor shall rectify any such installations at no additional cost, all to the satisfaction of the engineer and inspection authority having jurisdiction.

.3 Coordinate requirements of slack cables with suppliers prior to installation.

Part 3 Execution

3.1 GENERAL

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

3.2 LIGHT FIXTURES

.1 LED fixtures in suspended ceilings shall be hung independently of the ceiling system. Fixtures shall be secured to concrete or structural deck above by at least two taught cables which are connected to the fixture at diagonal points.

.2 Surface and recessed style fixtures shall be hung independently of the ceiling system. Fixtures shall be secured to concrete or structural deck above by taut cables.

.3 Fixtures which are hung independently of ceiling systems shall have minimum of one seismic cable in addition to the chain or cable used to support the fixture. Seismic restraint cables shall be secured into the concrete or structural deck above.

.4 Cables shall be corrosion resistant and approved for the application.

.5 Fixtures which are rod hung shall have seismic ball alignment fittings at the ceiling and fixture.

END OF SECTION

Part 1 General

1.1 RELATED WORK

.1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

1.2 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.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Division 01 – Construction / Demolition Waste Management and Disposal and with the Waste Reduction Workplan.

.2 Avoid using landfill waste disposal procedures when recycling facilities are available.

.3 Place materials defined as hazardous or toxic waste in designated containers.

1.4 ASBESTOS

.1 Refer to specification Division 01 for procedures, removal and disposal of asbestos.

.2 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 be responsible for the removal of all friable asbestos.

.3 This division will not be entitled to a claim for any delays resulting from the investigation of or removal of asbestos.

1.5 PCB (POLYCHLORINATED BIPHENYLS)

.1 Carefully remove any electrical items containing PCB's (eg light fixture ballasts) from equipment or fixtures to be renovated or demolished. Removed items (containing PCB's) to be catalogued and stored on site in approved labelled storage containers in accordance with regulations.

1.6 SCOPE

.1 The Electrical Division to take note that the demolition and renovation will be done in an occupied building that is normally occupied during the day. Maintain electrical and communication systems as required to minimize services disruption.

.2 The Electrical Division to also take note of the dust containment requirements as outlined in the architectural and front end specification.

.3 Electrical tender documents do not show all existing luminaires, wiring devices, conduit, boxes or wire. Conduit routing and wire grouping is not known. During demolition, the Electrical trade(s) are to deactivate all existing electrical and communication systems affected in such a manner that complete systems are not deactivated and system circuits affected in party wall partitions to be reactivated immediately on a temporary or permanent basis as site conditions dictate.

.4 Any discrepancies appearing on the drawings or in this specification are to be brought to the attention of the Departmental Representative 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.

1.7 SCHEDULING

.1 Refer to Prime Departmental Representative divisions.

1.8 EXAMINATION

.1 Refer to Prime Departmental Representative divisions.

1.9 PHASING

.1 Refer to Prime Departmental Representative divisions.

1.10 PROTECTION

.1 Refer to Prime Departmental Representative divisions.

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 to be carried out in strict conformance to provincial, local and municipal authorities and Part 8 of the B.C. 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 The following existing electrical components to be disconnected by the Electrical Trade(s), cleaned and suitably packaged where applicable, and turned over to the Owner at designated location established on site. If the Owner refuses these items they become property of the Electrical Division and are to be removed from site

.1 All fluorescent luminaires complete with lamps and ballasts.

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 start-up.

.2 Contractor to provide temporary connections to all required equipment for temporary power during the installation of any new equipment.

3.3 REUSE OF EXISTING COMPONENTS

.1 Existing components may be reused only where so specifically indicated on the drawings or in the specifications, however in all cases all wiring shall be new and no splicing shall be permitted at any location.

3.4 DISTRIBUTION OF CIRCUITS

.1 Circuit: power, voice/data, fire alarm, control etc. which are disrupted during demolition and are essential, to be made good immediately. The Electrical Trade(s) to identify these circuits to the Departmental Representative. Specific tasks involving the demolition of essential circuits will require that the contractor to obtain permission from the Owner before proceeding.

3.5 ABANDONED CONDUIT, WIRE AND EXISTING CIRCUITS

.1 All abandoned conduit and wire to be removed and disposed of by the Electrical Divisions.

.2 Remove all accessible (eg. Surface) wiring and cables back to source.

.3 Remove abandoned outlets and raceway, even if in or behind drywall, where they are located behind millwork or in locations unsuitable for reuse i.e. not at standard heights for switches or outlets.

.4 All remaining circuits to be rerouted as required and suitably secured to the building structure.

.5 Any cabling, including voice/data wiring, presently resting on any suspended ceiling system to be removed as part of the renovation process and shall be neatly bundled, protected and permanently secured to building structure. No cabling is permitted to rest on the ceiling system.

3.6 FIRE ALARM SYSTEM

.1 Construction/demolition activities in existing building may require that certain fire alarm devices are protected from construction dust, damage etc. Coordinate with the Owners representative as required to protect components of the fire alarm system to prevent nuisance operation and alarms.

.2 Provide temporary replacement of smoke detectors with heat detectors including interim programming and testing and final re-verification where deemed necessary to minimize false alarms and to ensure other occupants of the building are protected.

.3 Contractor to check in with the Owners representative at the start and end of each working day to confirm the fire alarm status in the area of work. Arrange for the related fire alarm zone card or area to be deactivated either to suit the progress of the work and/or where dust will be present on a day to day basis. Bag and protect fire detectors in dusty areas during construction. Remove any bagging at the end of the work day. Any existing detectors subject to construction dust to be immediately vacuumed and marked to be replaced at the end of the project. Any fire alarm devices subject to moisture to be replaced immediately.

.4 The fire alarm system is to be fully functional in the area of construction when the contractor is neither on site nor after the contractors normal work hours. (ie overnight, holidays, weekends)

End of Section

Part 1 General

1.1 RELATED WORK

.1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

.2 Refer to Division 27 & 28 for particular Communications, Electronic Safety & Security wiring systems and types.

1.2 TERMS OF REFERENCE

.1 Typically use insulated 98% conductivity copper conductor wiring enclosed in EMT (steel) conduit for the general wiring systems unless otherwise indicated. Refer to "Site Services" Section for allowable site conduits as an alternative to steel.

.2 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-6 flame spread rating.

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

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

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

1.3 PRODUCT DATA

.1 Provide product data in accordance with Division 01

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Division 01 - Construction/Demolition Waste Management And Disposal and with the Waste Reduction Workplan.

.2 Avoid using landfill waste disposal procedures when recycling facilities are available.

.3 Place materials defined as hazardous or toxic waste in designated containers.

Part 2 Products

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

.4 Armoured (BX) cable may only be utilized for recessed tee bar luminaire drops from ceiling mounted outlet boxes. "Tite Bite" connectors and their counterparts of other manufacturers shall not be used. Use anti-short connectors. Cable from luminaire to luminaire is discouraged. Allow nominally 900mm [3'] extra cable looped and supported in the ceiling space to permit fixture relocations of one tile space.

.5 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 condulet fittings. Conductors not to be painted.

2.2 TECK 90 CABLE

.1 Cable: to CAN/CSA-C22.2 No. 131.

.2 Conductors: copper and sized as indicated.

.3 Insulation: Chemically cross-linked thermosetting polyethylene rated type RW90XLPE,600V

.4 Inner jacket: polyvinyl chloride material.

.5 Armour: flat galvanized steel.

.6 Overall covering: PVC jacket with FT-6 flame spread rating. PVC flame retardant jacket over armour meeting requirements of Vertical Tray Fire Test of CSA C22.2 No. 0.3 with maximum flame travel of 1.2 m.

.7 Fastenings:

.1 One (1) 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 (2) or more cables.

.3 Threaded rods: 6 mm dia. to support suspended channels.

.8 Connectors: Watertight approved for TECK cable

2.3 ARMOURED CABLE (*BX*)

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

.2 Type: AC90 600 V rated.

.3 Armour: interlocking type fabricated from galvanized steel.

.4 Anti-short connectors.

2.4 LOW VOLTAGE CONTROL CABLES

.1 Type LVT: soft annealed copper conductors, with thermoplastic insulation, outer covering of thermoplastic jacket. Minimum size #18 AWG.

.2 Unless otherwise specified wiring to be multicore individually identified and colour coded with grey sheath enclosed in conduit or (EMT).

2.5 WIRE & BOX CONNECTORS

.1 Pressure type wire connector current carrying parts to be copper and sized to fit conductors used.

.2 Fixture type splicing connector current carrying parts to be copper sized to fit conductors 10 AWG or less.

.3 Bushing stud connectors to EEMAC 1Y-2 and suitable for stranded copper conductors

.4 Clamps or connectors for armoured cable, flexible conduit, as required.

Part 3 Execution

3.1 INSTALLATION

.1 Install all cables and wiring as required to extend existing circuits.

.2 Conductor length for parallel feeders to be identical. Provide permanent plastic nametag indicating load fed.

.3 Lace or clip groups of feeder conductors at all distribution centres, pullboxes, and termination points.

.4 Wiring in walls should typically drop or loop vertically from above to better facilitate future renovations. Generally wiring from below and horizontal wiring in walls should be avoided unless indicated.

.5 All grounding conductors and straps to be copper. All bonding conductors to have green insulation jacket.

.6 Provide sleeves where cables enter or exit cast concrete or masonry.

.7 Power wiring up to and including No.6 gauge shall be spliced with nylon-insulated expandable spring-type connectors. Large conductors shall be spliced using split-bolt or other compression type connectors wrapped with cambric tape then PVC tape.

.8 Wires shall be sized for 2% maximum voltage drop to farthest outlet on a loaded circuit. Increase home run cable size to meet these requirements.

.9 All branch circuit wiring for surge suppression receptacles and permanently wired computer and electronic equipment to be 2-wire circuits only, i.e. common neutrals not permitted.

.10 Install all control cables in conduit.

.11 Provide numbered wire collars for all control wiring. Numbers to correspond to control drawing legend. Obtain wiring diagram for control wiring of other Divisions.

3.2 VOLTAGE REGULATION

.1 The drawings are diagrammatic and indicate the general routing of conduit runs and not exact routing, either horizontally or vertically.

.2 Branch circuit conductor sizes shall be #12 AWG or larger based on the Canadian Electrical Code CSA 22.1 Section 8, which allows a maximum 3% voltage drop for branch circuits.

3.3 WIRE & BOX CONNECTORS

.1 Remove insulation carefully from ends of conductors and:

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

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

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

End of Section

Part 1 General

1.1 RELATED WORK

.1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

1.2 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Division 01 - Construction/Demolition Waste Management And Disposal and with the Waste Reduction Workplan.

.2 Avoid using landfill waste disposal procedures when recycling facilities are available.

.3 Place materials defined as hazardous or toxic waste in designated containers.

1.3 REFERENCES

.1 All conduits and accessories to be manufactured and certified by the related CSA standard.

1.4 SCOPE

.1 Drawings do not show all conduits. Those shown are in diagrammatic form only.

.2 Conceal all conduits where possible in finished areas. Conduits may be surface mounted either only where indicated or in service areas accessible only to authorized personnel.

.3 If a finished area is concrete (existing) or concealment is not practical, obtain ruling from Consultant where exposed wiremold may be substituted.

.4 Note particular requirements for routing of conduits where detailed.

.5 Provide polypropylene pull cord in all "empty" conduits.

Part 2 Products

2.1 CONDUITS

.1 Rigid metal conduit: to CSA C22.2 No.45 Galvanized Steel.

.2 Epoxy coated conduit: to CSA C22.2 No.45 with zinc coating and corrosion resistant epoxy finish inside and outside.

.3 Electrical Metallic Tubing (EMT): to CSA C22.2 No.83.

.4 Rigid PVC conduit: to CSA C22.2 No.211.2.

.5 Flexible metal conduit: to CSA C22.2 No.56 liquid-tight flexible metal conduit.

2.2 CONDUIT FASTENINGS

.1 One hole steel straps to secure surface conduits 41mm [1.5"] and smaller. Use two hole steel straps to conduits larger than 41mm [1.5"].

.2 Beam clamps to secure conduits to exposed steel work.

.3 Channel type supports for two or more conduits.

.4 10mm [3/8"] threaded rods to support suspended channels.

2.3 CONDUIT FITTINGS

.1 Fittings manufactured for use with conduits specified. Coating same as conduit.

.2 Provide factory "ells" where 90 degree bends are required for 27mm [1"] and larger conduits.

.3 EMT couplings and connectors shall be steel, or Regal Die-cast zinc alloy. Couplings used on conduit containing fire-rated cable shall be steel. Regular die-cast alloy fittings and couplings are not acceptable. Provide plastic bushings (insulated throat) for all connectors unless there is no chance of burrs. Provide water-tight connectors in damp or wet locations and for surface equipment (e.g. Panelboards, MCC's, etc) in rooms that are fire sprinkler protected.

2.4 EXPANSION FITTINGS FOR RIGID CONDUIT

.1 Weatherproof expansion fittings with internal bonding assembly suitable linear expansion.

.2 Water-tight expansion fittings: with integral bonding jumper, suitable for linear expansion and 21mm [3/4"] deflection in all directions.

.3 Weatherproof expansion fittings for linear expansion at entry to panel as required.

2.5 RIGID P.V.C. CONDUIT

.1 Conduit: rigid non-metallic conduit of unplasticized polyvinyl chloride as manufactured C.G.E. "Sceptre".

.2 Fittings: threaded male or female solvent weld connectors and solvent weld couplings, as supplied by conduit manufacturer.

.3 Solvent: as recommended by conduit manufacturer.

Part 3 Execution

3.1 INSTALLATION - GENERAL

.1 Generally use electrical metallic tubing (EMT) in the building interior and in above grade slabs except where subject to mechanical injury or where otherwise indicated.

.2 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass. Set out the work and coordinate with other services prior to installation. Maintain access to junction and pull boxes.

.3 Where practical conceal conduits.

.4 Any exposed conduit in finished areas to be free of unnecessary labels and trade marks.

.5 All conduit ends to be reamed to ensure a smooth interior finish that will not damage the insulation of the wiring.

.6 Ensure grounding continuity in all conduit systems.

.7 Surface conduits are acceptable in mechanical and electrical service rooms and in unfinished areas or where indicated.

.8 Use rigid galvanized steel (RGS) threaded conduit where the installation is subject to mechanical injury. In any event, use RGS conduit for surface installations up to 1.5m [5'] above the finished floor.

.9 Field threads on rigid conduit shall be sufficient length to draw conduits ends together.

.10 Unless otherwise noted and where practical, all conduits to be routed through the ceiling space rather than in, or below, slabs or floor structures to facilitate future changes.

.11 Conduits in walls should typically drop (or loop) vertically from above to better facilitate future renovations. Generally conduits from below and horizontal conduits in walls and concrete structures should be avoided unless indicated.

.12 Locate conduits more than 75mm [3"] parallel to steam or hot water lines with a minimum of 25mm [1"] at crossovers.

.13 Bend conduits cold, so that conduit at any point is not flattened more than 1/10th of its original diameter. Conduits bent more than this or kinked to be replaced.

.14 Provide polypropylene pull cord in empty conduits to facilitate pulling wiring in future.

.15 Where conduits become blocked, the use of corrosive agents is prohibited. Remove and replace blocked section.

.16 Damaged conduits to be repaired or replaced.

.17 Dry conduits out thoroughly before installing wiring. Swab out conduit and thoroughly clean internally before wires and cables are pulled.

.18 Conduits shall not pass through structural members except as indicated.

.19 Conduit sizes indicated on drawings are minimum only. Increase sizes as required to suit alternative wiring types or to comply with Code.

.20 Conduits and ducts crossing building expansion joints shall have approved conduit expansion fittings to suit the type of conduit used.

.21 Seal conduits with approved sealant where conduits are run between heated and unheated areas.

.22 Seal openings with approved sealant where conduits, cables, or cable trays pierce fire separations.

.23 Use "Condulet" fittings for power and telephone type conduit terminations in lieu of standard boxes where box support is not provided.

.24 Install conduit-sealing fittings in hazardous areas, isolation rooms and clean rooms. Fill with compound.

3.2 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Locate conduits behind infrared or gas fired heaters with minimum 1.5m [5'] clearance.

.3 Conduits to be run in flanged portion of structural steel.

.4 Group conduits wherever possible on suspended and/or surface channels.

.5 Surface conduits will not be accepted in finished areas unless detailed.

3.3 CONDUIT SIZE REFERENCE

.1 The following schedule has been included to clarify conduit dimensions used throughout these specifications and on the drawings.

Imperial Standard Size	Common Metric Size	2009 CEC Metric Designation
3/8"	10 mm	12 mm
1/2"	12 mm	16 mm
3/4"	19 mm	21 mm
1"	25 mm	27 mm
1 1/4"	32 mm	35 mm

1½"	38 mm	41 mm
2"	50 mm	53 mm
3"	75 mm	78 mm
4"	100 mm	103 mm

END OF SECTION

Part 1 General

1.1 RELATED WORK

.1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

.2 Section 26 05 00 Common Work Results

1.2 OVERVIEW

.1 Line Voltage Lighting Control Systems within the CSB and Sandspit Inn to remain, with renovation limited to replacement of switches with new, decora style switches.

.2 The existing BMS controlled lighting control system in the ATB will be replaced with a new stand-alone lighting control system interfaced to the central Building Management System (BMS).

.3 Lighting control system for each building shall the following components:

.1 Low Voltage Lighting Control System (ATB Only)

.2 Daylight Harvesting Control System Components (ATB Only)

.3 Line Voltage Light Switches

.4 Line Voltage Dimmer Switches

.5 Line Voltage Occupancy Sensor Switches

.6 Interface with BMS (ATB Only)

1.3 MANUFACTURERS

.1 All components are to be supplied by same manufacturer. Manufacturer to be a supplier of this type of equipment for over 10 years.

.2 Lighting control system Minimum Standard of Acceptance is the Dialog system manufactured by Douglas Lighting Controls Inc.

1.4 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings & product data in accordance with Section 26 05 00.

.2 Retain the equipment supplier's representative to assist with the review of the equipment application at the shop drawing stage.

.3 Provide custom schematic shop drawings of the complete systems and devices specified in this section.

1.5 SYSTEM DESCRIPTION

.1 Provide a complete lighting control system for the specified areas as shown on the plans and specified herein.

.2 All existing light switches to be replaced with new Decora Style Line Voltage Switch, Line Voltage Occupancy Sensor Switch, or Line Voltage Dimmer Switch as indicated on drawings.

.3 ATB: A Low Voltage Control System Will be provided to replace the existing low voltage lighting control system in the ATB. For all existing zones new relays will replace the existing relays.

.4 ATB: A 4 output, 0-10V Dimming controller is to be provided for daylight harvesting in Concourse General Areas. Provide Dimming Controller, Addressable signal connection and all 0-10V wiring to luminaires as indicated on drawings.

.5 New Low Voltage Lighting Control System will be interfaced to existing BMS system for time scheduling and control over-ride.

.6 Provide all required interfaces, relays and power supplies required between the various systems including any different control technologies specified and any specified central control Building Management System (BMS). Refer to drawings for Lighting Control drawings and details.

.7 Low Voltage Lighting control system shall utilize networking technology connecting relay panels, switches and sensors based upon a 2-wire data line providing both power and data to all field devices. The network shall be free topology; therefore a serial loop is not necessary to achieve maximum network distance. The system shall utilize a web server device complete with a touch screen located in a relay panel so that programming and viewing of status can be accomplished at the panel or by any PC connected to the same LAN or via the internet.

.8 All relay panel interiors shall be pre-assembled complete with the necessary relays, transformers and devices. Relay panels that are wall mounted shall have interiors separate from enclosure so as to permit easy mounting, conduit installation and wire pull to enclosures. Enclosures mounted in the ceiling space are not required to have separate interiors.

Part 2 Products

2.1 RELAYS

.1 Lighting control relays shall be mechanically latching and shall come complete with a manual ON/OFF switch. The mechanical switch shall continuously display the true state of the relay's internal contacts.

.2 Single pole relays shall be rated and UL/CSA listed for 120VAC, 277VAC and 347VAC lighting loads at 20 amps (30A General Use) and have a general, tungsten, standard and electronic ballast rating.

- Minimum Standard of Acceptance: Douglas Lighting Controls WR-6161.

.3 Double pole relays shall be rated and UL listed for 208VAC, 240VAC and 480VAC and CSA for up to 347VAC lighting loads at 20 amps and have a general, tungsten, standard and electronic ballast rating.

- Minimum Standard of Acceptance: Douglas Lighting Controls WR-6172.

.4 The relays shall have a label indicating the short circuit fault current rating as per the NEC 2005. The relays shall have passed UL 508 short circuit tests at 14,000 amperes.

.5 Each lighting control relay shall be capable of controlling incandescent, fluorescent, electronic ballast and H.I.D. lighting loads and have an inrush capability of 3000 amperes. Relays shall be complete with a 5-year Manufacturer's Limited Warranty.

.6 Lighting control relays shall include captive screw terminals for both the line voltage and the low voltage connections. Switching the relay shall be accomplished with ONE signal wire and a common return. The signal wire shall be able to signal ON and OFF and shall carry status current that indicates if the relay is ON or OFF.

.7 Provide 2 Spare Relays.

2.2 PRE-ASSEMBLED RELAY PANELS:

.1 Where indicated on the drawings, provide a factory pre-assembled relay panel. The panel's enclosure shall be for surface or flush installation, with a screw-on cover or a hinged door assembly as required.

.2 The panel shall consist of a pre-assembled interior insert; UL/CSA approved with capacities for 6, 12, 24, 48 or 72 relays as required. Panel enclosure must be UL/CSA Approved.

.3 Panel interior shall have the following pre-assembled and pre-wired:

a. Suitable dividers separating class 1 and class 2 and emergency/life safety compartments.

b. Dual-Tapp Control transformer, UL/CSA approved for class 2 circuits.

c. Low voltage relays as required by switched circuits shown on plans or schedules.

d. Control devices as required.

.4 Minimum Standard of Acceptance: Douglas Lighting Controls WR-6172. Douglas Lighting Controls CxxM or WxxM series

2.3 DEVICE NETWORK CONTROLS - LIGHTING CONTROL UNIT

.1 The Lighting Control Unit (LCU) shall be able to operate the local lighting control system on a stand-alone basis. For large installations that require multiple LCUs, all units must be able to operate on a stand-alone basis should they become disconnected from the network.

.2 The LCU shall provide the following user interfaces for viewing and editing data:

a. Built-in touch screen with editable IP address field for convenient at panel configuration and providing web accessible configuration.

b. Built-in web server, accessed via TCP/IP connection.

c. LCU shall be accessible via a web browser with no additional software required.

.3 Each LCU shall provide the following standard lighting control functions:

a. Program and control up to 252 relays and 252 dimmers.

b. Link Outputs to switches and/or sensors to provide ON/OFF, Preset, or Dim Up/Down commands. In addition, functions such as Flick Warn, Time Out, Natural Daylight, Enable/Disable and Quiet Time can be associated with switches, sensors and relays and have these features scheduled by time-of-day or date.

c. Be able to group Outputs and Inputs to facilitate various control schemes.

d. Be able to program peripheral devices (switches, sensors, etc.) to function differently based on specific situations such as time-of-day, demand response status, user intervention, etc.

e. Photo Sensor to provide Dusk-to-Dawn (switching) and/or Natural Daylight (dimming) with multiple set points to different groups.

f. Astronomic Controls for Dusk-to-Dawn applications not requiring Photo Sensor.

g. Provide Log Reports for diagnostic and run-time tracking purposes.

h. Time Schedule types include: 7-day weekly scheduling, 365-day date specific, Holiday, and event scheduling.

.4 The system shall have pre-defined logical applications for lighting controls.

a. Astronomical Time Clock

b. Natural Daylight (CLC) – Open Loop & Close Loop

c. Exterior Threshold Photo Control

d. Time Out (Unoccupied Mode)

e. Quiet Mode

f. Permanent Block

g. Flick Warn

.5 The system must shall the ability to operate multiple items and modes with a single action and sequence them with time offsets.

.6 Behaviors: The system shall have the ability to program multiple actuations and modes with a single activation. Each item must be able to be programmed with a time offset. When the deactivation occurs a separate and unique list of actuations can be programmed.

.7 Triggers: The system shall be able to utilize the status or the one or many relay/group statuses to send an actuation to the system. The statuses must be able to be programmed in an AND or OR logic.

.8 Each LCU shall provide the following system functions:

a. Demand response: connection via contact input.

b. Accept configuration updates via USB port or Ethernet connection.

c. Backup data via Ethernet or USB port.

.9 Minimum Standard of Acceptance: Douglas Lighting Controls Dialog WLC-4150

2.4 RELAY CONTROLS INSTALLED IN RELAY PANELS - RELAY DRIVERS

.1 The low voltage relays shall be connected to the Low Voltage Lighting Control System system by a relay driver unit. Each relay driver to have 8 outputs and shall provide enough relay driver units so that each relay in the system is connected to an output.

.2 Relay drivers shall be able to control relays ON and OFF, determine relay status, provide feedback as to whether a relay is connected and be addressable within the Lighting Control network.

.3 Minimum Standard of Acceptance: Douglas Lighting Controls WRD-3408

2.5 DIMMING BALLAST CONTROL – BALLAST/DRIVERS:

.1 The Lighting Control system shall be able to control industry standard 0-10VDC dimming ballasts or 0-10VDC LED drivers by using a Dimming Ballast Module. Each Dimming ballast module shall have 4 dimming address outputs, be able to support 35 ballasts per output and support sink current of 100mA per output.

.2 Minimum Standard of Acceptance: Douglas Lighting Controls WDB-3314

2.6 TELEPHONE INTERFACE:

.1 Provide a telephone interface for direct code communication via the regular TOUCHTONE® telephone system, so that dialing a special number and entering a definable code shall allow various zone control from any regular push button telephone. A password module shall protect the system from unauthorized access.

.2 Minimum Standard of Acceptance: Douglas Lighting Controls WTI-3101

2.7 BACNET IP GATEWAY

.1 If required, the system shall have the ability to communicate to a system integrator or other software specialist to program the system through a BACnet IP Gateway. It shall be possible to view/control the system via the BACnet integration software through TCP/IP connection. The system shall provide the following features:

a. Program and control up to 252 relays and dimming points.

b. Control and receive status for Groups

c. Control and receive status for Presets

d. Receive status from Occupancy Sensors

.2 Minimum Standard of Acceptance: Douglas Lighting Controls WNG-3131

2.8 GLOBAL WEB SERVER

.1 The Global Web Server (GWS) shall be able to operate the entire lighting control system from a single interface.

.2 The GWS shall provide the built-in web server interfaces for viewing and editing data, accessed via TCP/IP connection and connect to a PC/laptop using IE9+.

.3 The GWS will give access to up to 25 LCUs and shall provide the following standard lighting control functions within each LCU:

a. Program and control up to 252 relays and 252 dimmers.

b. Link Outputs to switches and/or sensors to provide ON/OFF, Preset, or Dim Up/Down commands. In addition, functions such as Flick Warn, Time Out, Natural Daylight, Enable/Disable and Quiet Time can be associated with switches, sensors and relays and have these features scheduled by time-of-day or date.

c. Be able to group Outputs and Inputs to facilitate various control schemes.

d. Be able to program peripheral devices (switches, sensors, etc.) to function differently based on specific situations such as time-of-day, demand response status, user intervention, etc.

e. Photo Sensor to provide Dusk-to-Dawn (switching) and/or Natural Daylight (dimming) with multiple set points to different groups.

f. Astronomic Controls for Dusk-to-Dawn applications not requiring Photo Sensor.

g. Provide log reports for diagnostic and run-time tracking purposes.

h. Time schedule types include: 7-day weekly scheduling, 365-day date specific and event scheduling.

.4 The GWS shall provide the additional following system functions:

a. Centralized Programming

b. Synchronization of time clocks

c. Download and upload of all system files

d. OPC Server Deployment

e. The ability to operate with an GUI interactive floor plan

.5 Minimum Standard of Acceptance: Douglas Lighting Controls GWS-xxxx

2.9 GRAPHICS PACKAGE

.1 In normal operation / manual command mode, the computer shall enable the viewing of one or more graphic drawings of the controlled building along with the status of each of the controlled sectors. Using the mouse or optional Touch Screen, the operator can view into various portions of the building and switch relays, groups, presets, and active modes. No special control code memorization shall be necessary.

.2 The owner shall provide direction on colors and logos

.3 The lighting symbols shall be established by the user through the graphic editor and shall change color in order to display the real time status of that particular relay or zone.

.4 The Graphics shall be deployed on the Lighting Controls Global Web Server (GWS) and served up via a mobile app or desktop app.

2.10 LOW VOLTAE WALL SWITCH – DATA LINE SWITCHES

.1 Switches connect to the lighting control network via a common 2-wire, non-polarized data line. Switches shall be configured and programmed to control one or more outputs in the lighting control system.

.2 Switches shall have the capability to be configured an Douglas Lighting Controls WIR-3110 infrared setting unit that accesses programming fields of the switch without removing the switch from the wall box.

.3 Switches are linked to a single output or a group of outputs.

.4 Switches, Occupancy Sensors and Photo Sensors can be set to a common output address to permit multiple points of control for a single relay or dimming output.

.5 Switches, Occupancy Sensors and Photo Sensors can be set to a common group address to permit multiple points of control for a group of outputs.

.6 Each switch can be programmed for ON/OFF control of outputs, UP/DOWN control of 0-10VDC dimming ballasts, 0-10VDC LED drivers and/or preset control to set a specific lighting scene.

.7 Switches, with LED indicators to indicate both ON and OFF output/group status, shall be available with 1, 2, 3, 4 or 8 single button switches per gang. Switch to fit standard Decora opening.

.8 Switches and switch hardware shall mount to standard wall boxes.

.9 Each switch shall provide a location for a label to identify function. The label shall be under a clear plastic cover and shall be field replaceable should the operation of the switch change. Permanently etched switches are not acceptable.

.10 Adhere to the factory recommended wiring practices so that physical removal of any single switch shall still permit communication between relay panels in the rest of the lighting control network.

.11 Minimum Standard of Acceptance: Douglas Lighting Controls WSW-35xx.

.12 Provide 1 Spare Low Voltage Switch.

2.11 LOW VOLTAGE DIMMER SWITCH:

.1 Dimmer switches shall be connected to the lighting control network via a 2-wire, non-polarized data line. Each switch shall be capable of raising or lowering light levels of individual or groups of lighting fixtures.

.2 Switches shall include integral LED indication for light levels as well as a switch for ON/OFF control.

.3 Dimmer switch can be programmed with the infrared setting unit.

.4 Minimum Standard of Acceptance: Douglas Lighting Controls WSD-3501

.5 Provide 1 Spare Low Voltage Dimmer Switch.

2.12 LOW VOLTAGE CEILING SENSORS

.1 Sensors shall be Dual Technology with Passive Infrared (PIR) and ADI-Voice detection.

.2 Ceiling sensors shall mount recessed in to the ceiling space.

.3 Sensors shall have a 360 degree coverage pattern with an adjustable tilt head to maximize coverage, focus on particular areas, or provide adjustment when mounted on sloped ceilings.

.4 Sensors shall provide an adjustable time out period of 30 seconds to 30 minutes.

.5 Provide transformer as if required. (Transformer Minimum Standard of Acceptance: Douglas Lighting Controls WR-4075)

.6 If a Photo Sensor is required, it shall be incorporated into the Occupancy Sensor device and operate so that when occupancy is detected, the sensor will only allow the load to be switched ON if the light level is below the daylight level set by the user.

.7 A Manual Override Switch is to be provided on the sensor to allow the load to be manually switched ON and OFF for the purpose of testing during installation.

.8 Where 2 level switching is required, a 2-pole sensor shall be provided. The sensors must be able to be set to activate alternating poles to provide even lamp wear.

.9 Provide as required on the plans, options that are available from the following list:

.10 0-10VDC outputs for dimming ballast option for Natural Daylight with user settable light levels

.11 Configurable high and low light level set points so that the sensor can toggle between light levels upon occupancy

.12 Auxiliary relay, for signaling other systems, which can be configured so that it synchronizes with the ON/OFF status of the load or the status of occupancy/vacancy

.13 Minimum Standard Of Acceptance: Dialog WOR series

.14 Provide 1 Spare Occupancy Sensor.

2.13 CONTACT INPUT UNIT

.1 Use a contact input unit when inputs from other devices (including other manufacturers) are required. Each unit shall provide DC power for each sensor and will accept a momentary or maintained contact signal from each sensor that can be assigned to any relay or group. Check with factory to ensure compatibility.

.2 Devices connected to Contact input unit shall include the following features:

a. Adjustable Timeout (3 min to 30 min).

b. Function selection: ON only, OFF only, toggle (ON/OFF)

c. Multiple sensors may work together using either direct connection to sensors or via multi-sensor function built into contact input units.

.3 Minimum Standard of Acceptance: Douglas Lighting Controls WCI-3928

2.14 PHOTO SENSOR & DAYLIGHT CONTROLS - INTERIOR DAYLIGHT SENSOR

.1 Provide where required an Interior Daylight Sensor capable of sensing from 0 to 65,000 lux (0 to 6500 fc) of direct light. The sensor shall derive both its power and data information from the Lighting Control Network data line.

.2 The ambient light level shall be continuously monitored in lux by the sensor. The sensor shall broadcast to the network the existing light level when requested or when there is a change in detected light level.

.3 Set point adjustments can be made via a touch screen or web server interface to the LCU.

.4 Each sensor can be programmed to provide ON/OFF control of relays, raise/lower of 0-10vdc type or ballasts and LED drivers via a touch screen or web server interface to the LCU.

.5 One sensor shall permit different outputs to switch and/or control light levels as ambient light changes. Light levels shall be controlled by 'sensor only' or in combination with a time schedule or with a dimming switch.

.6 It shall be possible to set a maximum light level which cannot be exceeded during Natural Daylight operations or for non-daylight-controlled areas, a permanent or "tuned" light level to maximize energy savings.

.7 Minimum Standard of Acceptance: Douglas Lighting Controls WPS-3711

.8 Provide 1 Spare Interior Daylight Sensor

2.15 INFRARED SETTING UNIT

.1 Provide a Infrared Setting Unit to facilitate the following functions:

a. Set input device and address

b. Configure input device presets, group, and individual control

c. Set local or global functionality

.2 Minimum Standard of Acceptance: Douglas Lighting Controls WIR-3110

.3 Provide 1 spare Infrared Setting Unit

2.16 OCCUPANCY SENSORS WALL SWITCHES (LINE VOLTAGE)

.1 Line voltage wall switch sensors shall be capable of detecting presence, in the floor area to be controlled, by detecting shifts in infrared energy and doppler shift ultrasonic. Utilize dual technology PIR/Ultrasonic sensors.

.2 Provide a neutral wire at each switch position using ultrasonic or dual technology.

.3 Sensors shall be complete with the following:

.1 Override push switch.

.2 LED detection status indicator.

.3 Low profile recessed design to suit "Decorator Plate

.4 Dual level lens to enhance detection at desk top level.

.5 Ability to maintain luminaires in operation when occupancy is only one person sitting at a desk in accordance with NEMA WD7 guidelines.

.6 Temperature and humidity resistance.

.7 Time delay range from 30 seconds to 30 minutes.

.8 Sensitivity adjustment from 20% to 100%.

.9 Compatible with electronic ballasts and CF ballasts.

.10 Immunity to RFI and EMI interference.

.11 Integrated light level sensor option holds light off when the natural light are above the preset levels.

.12 CSA approved

.13 Five-year warranty.

.4 Provide a total of 5 spare line voltage occupancy sensor wall switches.

2.17 WIRING

.1 Provide all control wiring as required and recommended by the manufacturer.

.2 The removal of any addressable device shall have no effect on the communication between other devices and the relay panels in the rest of the lighting control network.

Part 3 Execution

3.1 INSTALLATION

.1 The control system shall be installed and fully wired as shown on the plans by the installing contractor. The contractor shall complete all electrical connections to all control circuits.

.2 Install the work of this Section in accordance with manufacturer's printed instructions unless otherwise indicated.

.3 Provide and install all equipment including all components needed to make the system work in the intended manner.

.4 Confirm control wiring individual conductor sizes with equipment manufacturer prior to installation.

.5 Retain the equipment supplier's representative to assist with the proper device placement at the rough-in stage.

.6 Confirm control wiring individual conductor sizes with equipment manufacturer prior to installation.

.7 Provide written or computer-generated documentation on the commissioning of the system including room by room description including:

.1 Sensor parameters, time delays, sensitivities and daylighting setpoints.

.2 Sequence of operation, (e.g. manual ON, Auto OFF. etc.).

.3 Load parameters (e.g. blink warning, ETC.).

.8 BMS System revisions to interface with new lighting control system. Contractor is responsible for coordination and to allow for acquiring services of Cougar Pacific (Victoria) to reprogram existing BMS system to maintain all existing functionality. Include all costs associated including on-site verification performed by Cougar Pacific.

.9 Relay panels and conduit:

.1 Ensure that conduit for line voltage wires enters panel in line voltage areas and conduit for low voltage control wires enters panel on low voltage areas. Check manufacturer's drawings for location of line and low voltage areas.

.10 Daylight Sensors:

.1 Install daylight sensors as per manufacturer's recommendations for closed loop and open loop applications. Ensure there is no artificial light shining directly into the sensor head.

.2 Adhere to manufacturer's recommendations for wiring and programming.

.11 Occupancy Sensors:

.1 Install Occupancy Sensors so objects do not block the coverage area. Keep away from HVAC vents and light directly from light fixtures.

.2 Adhere to manufacturer's recommendations for location, wiring and programming.

.12 Wiring:

.1 For low voltage wiring, provide wire type as recommended by the manufacturer.

.2 Adhere to manufacturer's recommendations as to maximum wire length and maximum quantity of relays per switch.

.3 Lighting Control Data line shall be single pair #18AWG LVT wire type or equivalent.

.13 Line Voltage Wiring:

.1 Use wire gauges from #12AWG to #14AWG as appropriately sized for the branch circuit.

3.2 PRODUCT SUPPORT AND SERVICE

.1 Factory telephone support shall be available at no cost to the owner. Factory assistance shall consist of solving programming or application questions concerning the control equipment.

3.3 INSPECTION

.1 Coordinate controls and interfaces to other Divisions including the BMS.

3.4 COMMISSIONING

.1 Check and confirm that all control devices and sensors work in the intended manner.

.2 Retain the equipment supplier's representative to review the coverage patterns and finally adjust sensor settings after the move in and furniture installation. Provide a Suppliers sign off letter and a schedule indicating the set points of all devices.

End of Section

Part 1 General

1.1 RELATED WORK

.1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section 26 05 00.

1.3 RELATED SECTIONS

.1 Section 26 09 24 Lighting Controls

1.4 REFERENCES

.1 Canadian Standards Association (CSA International)

- .1 CSA-C22.2 No.42, General Use Receptacles, Attachment Plugs and Similar Devices.
- .2 CSA-C22.2 No.42.1, Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).
- .3 CSA-C22.2 No.55, Special Use Switches.
- .4 CSA-C22.2 No.111, General-Use Snap Switches (Bi-national standard, with UL 20, twelfth edition).

Part 2 Products

2.1 SWITCHES

.1 For the ATB and CSB provide Heavy Duty Specification Grade switches.

.2 For the Sandspit Inn, provide Commercial Specification Grade switches.

.3 All switches to be Decora Style.

.4 20 A, 120 V or 347 V, single pole, double pole, three-way, four-way switches as indicated.

.5 Manually-operated general purpose ac switches as indicated and with following features:

- .1 Terminal holes approved for No.10 AWG wire.
- .2 Silver alloy contacts.
- .3 Urea or melamine molding for parts subject to carbon tracking.
- .4 Suitable for back and side wiring.
- .5 White toggle (red toggle for emergency power circuits).

.6 Switches of one manufacturer throughout project.

.7 Minimum Standard of acceptance:

- .1 Sandspit Inn - Leviton 5631-2W Decora Plus Rocker Switch with Pilot Light
- .2 ATB, CSB - Leviton M5983-W Decora Plus Rocker Switch

2.2 RECEPTACLES – GENERAL

.1 Heavy duty specification grade.

.2 Duplex receptacles, CSA type 5-15 R, 125 V, 15 A, U ground, with following features:

.1 White nylon molded housing (red for emergency power circuits)
.2 Suitable for No.10 AWG for back and side wiring.
.3 Break-off links for use as split receptacles.
.4 Eight back wired entrances, four side wiring screws.
.5 Triple wipe contacts and non riveted grounding contacts.

.3 Use shuttered safety receptacles in Day Care or similar children play areas or as indicated.

.4 Receptacles of one manufacturer throughout project.

.5 Minimum Standard of acceptance:

.1 Hubbell 5252 heavy duty, construction series
.2 Leviton 5262 series
.3 Pass & Seymour 5262 series

2.3 DIMMERS

.1 Flush mounted - Specification grade.

.2 Incandescent application: 600-1500 watts based on connected load plus 25% spare.

.3 Electronic driver application: compatible with drivers specified.

.4 Radio interference suppression.

.5 Thin profile: slide to OFF feature.

.6 Finished in white or as indicated.

.7 Standard of acceptance:

.1 Lutron 'NOVA-T' NT series.
.2 Leviton « Illumatech » series.

2.4 COVER PLATES

.1 Cover Plates in ATB and CSB to be stainless steel. Cover Plates in Sandspit Inn to be Nylon.

.2 Stainless steel: Type 302 or 304, No. 4 finish, 1mm thick, accurately die cut, protective cover for shipping. For general interior flush mounted wiring devices and surface type FS or FD type boxes.

.3 Nylon plates: Heavy duty, unbreakable and flush. All nylon plates to match wiring device colour.

.4 Steel: sheet steel hot dip galvanized with rolled edges for surface mounted utility boxes.

.5 Wall plates to be flush mounting with "positive bow" feature to ensure that all edges of plate are flush with wall or surface box when installed.

.6 All plates to be bevelled type with smooth rolled outer edge and smooth face. Exposed sharp edges are not acceptable.

.7 Cast metal: die cast profile, ribbed for strength, flash removed, primed with grey enamel finish and complete with four mounting screws to box for special purpose wiring devices.

.8 Weatherproof double lift spring-loaded cast aluminum cover plates, complete with gaskets for wiring devices as indicated. Double doors for standard duplex receptacles. Coverplates to fasten to box by four screws.

.9 Gaskets: resilient rubber or close cell foam urethane.

.10 Cover plates for all wiring devices to be from one manufacturer throughout project.

Part 3 Execution

3.1 INSTALLATION GENERAL

.1 Mount wiring devices to height specified in Section 26 05 00 or as indicated.

.2 Upper edge of plates located on separate outlets immediately alongside one another to be at exactly the same height above finished floor.

.3 All plates to be installed parallel or perpendicular to building lines.

3.2 INSTALLATION PARTICULAR

.1 Switches:

.1 Install single throw switches with handle in "UP" position when switch closed.

.2 Install switches in gang type outlet box when more than one switch is required in one location.

.2 Receptacles:

.1 Install all receptacles in the vertical plane unless otherwise noted.

.2 Generally install the 5-15/20R U ground pin down unless otherwise noted. Neutral up when receptacle in mounted horizontal.

.3 Install receptacles vertically in gang type outlet box when more than one receptacle is required in one location.

.4 Where split receptacles has one portion switched, mount vertically and switch the upper portion.

.5 Surge suppression duplex receptacles to be provided for all communication and computer terminal equipment backboards and cabinets including fire alarm, telephone, public address, door security, nurse call, central dictation, RF television, security television, etc. Provide dedicated neutral conductors for each surge suppression receptacle.

.6 Ground fault interrupter duplex receptacles to be used, adjacent sinks or water sources.

.3 Cover plates:

.1 Protect cover plate finish with paper or plastic film until painting and other work is finished.

.2 Install suitable common cover plates where wiring devices are grouped.

.3 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

END OF SECTION

Part 1 General

1.1 RELATED WORK

.1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

1.2 REFERENCES

.1 CAN/CSA C22.1-15, Canadian Electrical Code, Part I.

.2 CAN/CSA C22.2 No.9.0, General Requirements for Luminaires.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Division 01 - Construction/Demolition Waste Management and Disposal and with the Waste Reduction Workplan.

.2 Avoid using landfill waste disposal procedures when recycling facilities are available.

.3 Place materials defined as hazardous or toxic waste in designated containers.

1.4 ADDITION OF ACCEPTABLE MANUFACTURERS

.1 Refer to Section 26 05 00 and as noted below.

.2 All Luminaires and Low Voltage Lighting Control Equipment manufacturer and product numbers provided are Minimum Standard of Acceptance and act as a baseline for product performance requirements.

.3 All luminaires meeting or exceeding the baseline standard of acceptance product, in terms of performance and features, will be reviewed and accepted at Shop Drawing review after contract award. No alternate luminaires to be submitted during tender period.

.4 In general, all luminaires must be of equivalent or better aesthetics, build quality and performance than the Minimum Standard of Acceptance Product and must meet all requirements noted on drawings and in specification.

1.5 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section 26 05 00.

.2 Where available, shop drawings to include LM-79/80 and TM-21 test data.

1.6 SAMPLE LUMINAIRES

.1 Submit sample luminaires for review prior to manufacturing when requested by the Consultant.

.2 Sample luminaires to be operable and complete with lamps, accessories and a plug-in power cord if requested by the Consultant.

.3 Deliver samples to the Consultants office or to another location as directed. Collect the sample(s) at the conclusion of the review.

1.7 INTENT

.1 Provide lighting luminaires and accessories for all outlets as listed in the Luminaire Schedule and as shown on drawings.

.2 Lighting luminaires shall be structurally well designed and constructed, using new parts and materials of the high quality commercial grade.

.3 Ground all lighting equipment to grounding system.

.4 Verify all ceiling types and finishes before ordering luminaires and provide luminaires suitable for mounting in or on ceilings being installed in each area, as specified. Where luminaire types specified are not suitable for ceiling being installed, obtain written instructions from the Consultant before ordering luminaires.

.5 Luminaires of the same or similar type shall be supplied by the same manufacturer.

Incandescent/Fluorescent luminaires with retro-fit LED lamps will not be considered as alternate luminaires.

Part 2 Products

2.1 DRIVERS

.1 Drivers intended for indoor use shall have a rating of IP20.

.2 Drivers intended for outdoor use shall have a rating of IP67.

.3 Drivers and all luminaire electronics to meet FCC rules and regulations as per Title 47 CFR part 15. Submit sample luminaires to Transport Canada for testing as requested.

.4 Dimming performance:

.1 0-10V Drivers to achieve a range from 10-100% dimming. Electrical contractor to confirm dimmer and driver compatibility to ensure specified dimming range is achieved.

.5 Class 2 per UL1310

.6 Power Factor Correction >0.9.

.7 Must be cUL/UL Listed.

2.2 LUMINAIRES

.1 Accessories and components shall comply with relevant CSA Standards.

.2 Drivers and all luminaire electronics to meet FCC rules and regulations as per Title 47 CFR part 15. Submit sample luminaires to Transport Canada for testing as requested.

.3 Recessed downlight luminaires shall be of the approved prewired type with junction box forming an integral part of the luminaire assembly and so located in relation to the luminaire that the junction box is CSA approved for 60 degree C wire. The electrical trade shall supply and install all necessary plaster rings, supports, etc., required for complete and proper installation.

.4 Except where otherwise noted in the Luminaire Schedule, depth of recessed linear and troffer luminaires shall not exceed 150 mm, including mounting yokes, or bridges and the distance from the back face of the diffuser or lens to the centre of the lamp shall be not less than 75 mm. Design of reflector and lamp position shall be to provide high efficiency, even brightness and lack of lamp lines.

.5 Recessed troffers luminaires shall be constructed of not less than code gauge steel or equivalent quality aluminium. All metal parts shall be thoroughly cleaned and finished in high reflectance baked white enamel over corrosion-resistant primer or equivalent. Reflecting surfaces and exposed surface shall have not less than two coats of baked white enamel or equivalent with reflectance of not less than 85%.

.6 All luminaire diffusers, lens panels, lens frames, etc., shall be securely and adequately supported.

.7 Luminaires shall incorporate adequate gasketting, stops and barriers to form light traps and prevent light leaks.

.8 Luminaires shall be designed for adequate dissipation of driver and lamp heat to avoid short life, nuisance thermal tripping and decreased lumen output. Heat test reports by independent laboratories shall be provided where required by the Consultant.

.9 Construction of all luminaires shall be such as to provide a rigid well aligned luminaire. Formed or ribbed backplates, end plates, reinforcing channel, straps, etc., shall be used where required to accomplish this.

.10 The construction and performance of all luminaires shall be subject to the acceptance of the Consultant. Full photometric data from an independent testing laboratory shall be provided when requested by the Electrical Consultant.

.11 Incandescent/Fluorescent luminaires with retro-fit LED lamps are not acceptable.

.12 LED tape light is to be installed in extruded aluminum channel. No LED tape should ever be mounted directly to building structure or finishes. Provide aluminum extruded channel and frosted acrylic lens (to minimize lamp image), complete with mounting clips, for all LED tape light. Provide all wiring, adequately sized power supplies and control interfaces as required for a fully functioning lighting system.

.13 All LED product to meet the following minimum specifications:

.1 Color Rendition – CRI > 80, R9 > 0

.2 Efficacy – Minimum 100 LPW for linear luminaires, Min 70 LPW for all other luminaires over 5W. No minimum requirement for luminaires 5W or less.

.3 Lamp Life – Minimum 50,000 HR L70 lamp life.

Part 3 Execution

3.1 INSTALLATION AND SUPPORTS

.1 Provide complete and proper support for all luminaires, luminaire hangers, etc., including headers in ceiling space, where required, for proper support of outlet boxes and luminaire hanger assemblies.

.2 Support luminaires as shown on the drawings, level, plumb and true with the structure and other equipment in a horizontal or vertical position as intended. Wall or side bracket mounted luminaire housings shall be rigidly installed and adjusted to give a neat flush fit to the surface on which it is mounted.

.3 All hangers, supports, fastenings or accessory fittings shall be protected against corrosion. Care shall be taken during the installation to assure that insulation and corrosion protection is not damaged.

.4 Self aligning seismically rated ball joint hangers shall be used for rod suspended luminaires. Ceiling canopies or hood assemblies intended to cover the suspension attachments shall be installed to fit tightly to the ceiling without restricting the alignment of the hanger. Support luminaires by hangers and mounting arrangements which will not cause the luminaire frame, housing, sides or lens frame to be distorted; or prevent complete alignment of several luminaires in a row.

.5 The suspension length of all ceiling mounted suspended types of lighting luminaires as listed in the Luminaire Schedule or annotated drawings shall be the overall length from the ceiling to the lowest point of the luminaire body, reflector or glassware in its hanging position. Mounting heights listed as AFF to be above finished floor to the center point of the luminaire.

.6 Metal inserts, expansion bolts or toggle bolts in concrete slabs for stems which do not carry wiring must be accurately located in relation to the outlet boxes, to allow perfect alignment and spacing of suspension stems.

.7 Where luminaires are surface mounted on the underside of an inverted tee bar ceiling, the luminaire shall be supported either directly from the building structure by means of rod hangers and inserts or by means of metal angle headers, supported from the tee bar framing structure above the tile. Luminaires shall be supported from the quarter points.

.8 Wiring from outlet boxes to luminaires and wiring through luminaire channels shall be rated for 90 degrees C.

.9 All recessed luminaires to be installed so that they are removable from below to gain access to outlet box or prewired luminaire box. Connect all recessed luminaires to boxes with flexible conduit and approved luminaire wire. Provide approved drywall enclosures in insulated ceilings. Volume of enclosure to comply with Electrical Code.

.10 Install luminaire lenses as late as possible to protect from dirt and dust. Remove and clean or replace lenses to the satisfaction of the Consultant.

.11 Where drivers and power supplies are to be remotely located, they shall be racked together and labelled with size 3 lamicoid. Label shall bear the driver number which has a corresponding location on an adjacent floor plan reference drawing. Labels and floor plans shall be provided by electrical contractor.

.12 For LED tape light luminaires, allow for all labour associated with cutting of led tape, connection of jumper cables, installation in extruded aluminum channel and lens, mounting, adjustment and aiming of luminaire, as well as all power supplies, control devices and associated 120V and low voltage DC wiring.

END OF SECTION

Part 1 General

1.1 RELATED WORK

.1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

1.2 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Division 01 - Construction/Demolition Waste Management and Disposal and with the Waste Reduction Workplan.

.2 Avoid using landfill waste disposal procedures when recycling facilities are available.

.3 Place materials defined as hazardous or toxic waste in designated containers.

1.3 PRODUCT DATA

.1 Submit product data in accordance with Section 26 05 00.

.2 Shop drawings to include a load schedule on each battery pack and spare capacity.

1.4 GUARANTEE

.1 Provide a written guarantee, stating that the battery for emergency lighting is guaranteed against defects in material and workmanship for a period of ten years, with a no-charge replacement during the first five years and a pro-rate charge on the second five years, from the date of the Final Certificate of Completion.

Part 2 Products

2.1 BATTERY UNIT EQUIPMENT

.1 Unit equipment for emergency lighting: to CSA C22.2 No.141.

.2 Supply voltage: 120 V, ac.

.3 Output voltage: 12 V dc.

.4 Operating time: 30 minutes.

.5 Nominal size – 200 watt, or as indicated on drawings.

.6 Battery: lead acid, sealed, maintenance free.

.7 Charger: solid state, multi-rate, voltage/current regulated, inverse temperature compensated, short circuit protected, modular constructed.

.8 Solid state transfer.

.9 Low voltage disconnect: solid state, modular, operates at 80% battery output voltage.

.10 Signal lights: solid state, life expectancy 100,000 h minimum, for 'AC Power ON' and 'High Charge'.

.11 Cabinet: suitable for direct or shelf mounting to wall and c/w knockouts for conduit. Provide shelf mounting brackets.

.12 Provide integral self diagnostic testing feature which exercises the unit every 30days.

.13 Auxiliary equipment:

.1 Test switch.

.2 Time delay relay.
.3 Shelf bracket.
.4 Cord and plug connection for ac.
.5 Double quartz lamp fixtures mounted on unit where noted on plans.

.14 Minimum Standard of Acceptance:

.1 Lumacel RG12S200
.2 Readylite LD12 series
.3 Emergi-Lite 12EL240
.4 Beghelli
.5 Dual-Lite EDW series
.6 Lithonia M12 series

2.2 REMOTE LAMP HEADS

.1 LED lamp.

.2 12 volt DC operation.

.3 300 lumens.

.4 360 degree adjustable rotation without tools.

.5 Decorative vandal-resistant frosted cube fixtures (double head) in high risk areas or where indicated.

.6 Provide equipment guards for Gymnasium and similar installations.

.7 Minimum Standard of Acceptance:

.1 Lumacel MQ/RSQB series
.2 Readylite RQ/VQ2 series
.3 Emergi-lite
.4 Beghelli
.5 Dual-Lite CBR series

2.3 WIRING FOR REMOTE EQUIPMENT

.1 Conduit to Section 26 05 34

.2 Wiring 12V battery standby circuits to all EXIT signs and remote heads.

.3 Low voltage wiring to be installed so that the maximum volt drop does not exceed 5%. The following wiring/load sizes shall not be exceeded for the 12-volt system:

.1 #8 AWG not to exceed 6500 watt feet per run.
.2 #10 AWG not to exceed 4000 watt feet per run (minimum size).

2.4 RELAY EQUIPMENT

.1 Provide 120V relays to control battery packs as required by BC Building code to operate in the event of power failure to the related area lighting circuits.

Part 3 Execution

3.1 INSTALLATION

.1 Install unit equipment for emergency lighting in accordance with CSA C22.1, Section 46.

.2 Install unit equipment and remote mounted fixtures as indicated.

.3 Direct heads as indicated.

.4 Provide a junction box adjacent to the battery pack for the purpose of splicing the separate wiring runs together.

.5 Provide a 15 Amp, 125 volt receptacle adjacent to each battery unit.

END OF SECTION

Part 1 General

1.1 RELATED WORK

.1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

1.2 REFERENCES

.1 Canadian Standards Association:

.1 CSA C22.2 No.141, Unit Equipment for Emergency Lighting.

.2 CSA C860, Performance of Internally-Lighted Exit Signs.

.2 BC Building Code, Part 3, Section 3.4.5.

1.3 PRODUCT DATA

.1 Submit product data in accordance with Section 26 05 00.

Part 2 Products

2.1 SCHEDULE

.1 Refer to drawings for location and types. Provide directional signs as indicated.

2.2 EXIT SIGNS GENERAL

.1 Green "running man" pictogram.

.2 Universal mounting.

.3 Wall, end, or ceiling mounted as shown on drawings.

.4 Single or double-faced as indicated

.5 Light Emitting Diode (LED) light source for 120 volt operation. Less than 3 watt consumption per face.

.6 Extruded aluminum housing. Housing depth to be maximum 63 mm.

.7 Faceplate and housing to have no visible unused knockouts.

.8 Provide weatherproof exit signs for all exterior installations.

.9 CSA 860 (latest version) approved.

2.3 SPARE EXIT SIGN MATERIAL

.1 Refer to Appendix E2 Electrical **Form EF140** for Spare Material hand over requirements to Owner.

.2 Provide four spare Exit Signs (lights)

.3 Include in base tender to install the "spare" Exit Signs in locations as directed by the Consultant. Include for the installation and up to 30m of wiring for each spare Exit Sign. The unused Exit Signs to be handed over as spare material.

Part 3 Execution

3.1 INSTALLATION

.1 Install Exit Signs as indicated.

.2 Connect Exit Signs to dedicated circuits and breakers as required by the Canadian Electrical Code.

.3 Provide circuit breaker locks for Exit Sign circuits.

.4 Power to exit lights to be sourced from emergency power where available.

.5 Provide at least one Exit Sign circuit for each floor level except as noted.

.6 All Exit Sign wiring to be installed in separate conduit and boxes.

.7 All conductors to be minimum #12 AWG with RW90 X-link insulation.

.8 Provide Exit Sign 12VDC standby lighting and separate connection points where standby emergency lighting battery packs are used for the emergency lighting. For remote connections low voltage cable sizing refer to the battery systems specification section.

.9 Support Exit Signs from ceiling tile in tee bar installation locations so as to provide a flush/neat installation and minimize tile lift.

.10 Provide approved support hardware to the tee bar rail assembly to minimize tile stress and provide independent seismic cable(s) restraint from building structure.

.11 Wall mounted exit lights to be mounted 2290mm to underside or as detailed.

.12 Ceiling mounted exit lights in all service spaces to be suspended to 2290mm to the underside.

3.2 FINAL ACCEPTANCE

.1 Position exit lights to optimize viewing angles and to avoid line of site obstructions.

.2 Attend the building occupancy review with the Authority Having Jurisdiction and adjust any locations as required.

.3 Install any additional exit signs as requested in accordance with "Spare Exit Sign Material" clause noted above.

END OF SECTION

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1.1 EF 100 Check List – Submissions to Departmental Representative

ITEM	CHECKED BY	DATE
5 WORKING DAYS BEFORE CLOSE OF SUBTRADE TENDER – Request for addition of acceptable manufacturers		
10 DAYS AFTER AWARD OF THE CONTRACT – List of equipment suppliers and subtrades (EF 110) – Detailed price breakdown (EF 112)		
A.S.A.P. – Shop drawings and Product Samples (EF 111)		
WITH EACH APPLICATION FOR PROGRESS PAYMENT – Price breakdown (EF 112)		
PRIOR TO DEMONSTRATION OF SYSTEMS – Demonstration agenda		
DEMONSTRATION OF SYSTEMS – Checklists for sign off of Demonstrations (EF 141)		
10 DAYS PRIOR TO SUBSTANTIAL PERFORMANCE – Submission of items listed on Form EF-142		
WHEN REQUESTING REVIEW OF OUTSTANDING WORK – Checklist of work remaining (EF 144) – Certificate of total completion (EF 145)		

1.2 EF 110 Equipment/Sub-Trade List

ITEM	COMPANY/SUPPLIER
Wiring Devices	
Luminares	
Lighting Control	
Seismic Engineer	
Testing and Commission Agency	
Other	
Other	

1.3 EF 111 Check List –Shop drawings and Product and Samples

		REVIEW	
ITEM	DATE SUBMITTED	ACTION	DATE
Wiring Devices/Switches			
Luminaires (list groups)			
EXIT Signs and Emergency Lighting			
Lighting Control			

1.4 EF 112 Progress Claim Summary – Division26, 27, 28, 33

PROJECT: **CLAIM NO:** _____

FOR MONTH OF: _____

ITEM		PRICE	WORK TO DATE		PREVIOUS WORK		THIS MONTH	
		$	%	$	%	$	%	$
Base Contract:								
General Conditions								
Mobilization (not to exceed 2%)								
Demolition								
Site Work & Utility	Mat Lab.							
Conduit, Boxes & Wire	Mat Lab.							
Wiring Devices & Plates	Mat Lab.							
Lighting	Mat Lab.							
Lighting Control	Mat Lab.							
O & M								
Testing &								
Other								
Cash Allowances								
Total Base Contract								
Change Order								
Total Change Orders								
Total Contract:								
Amount due less 10% mechanics lien holdback								

Submit this form as called for on **EF 100** for tender price breakdown and for each progress claim

1.6 EF 130 Certificate of Penetrations Through Separations

Project Identification: _____

I hereby declare that I _____

am an employee/a principal of _____

have personally witnessed that all electrical service penetrations through fire separations (rated & non-rated) and sound separations in the following areas have been properly sealed in accordance with the specified requirements.

SIGNED _____ DATE _____

AREA	SIGNED	DATE
Building/Level:		
Building/Level:		
Building/Level:		
Building/Level:		
Building/Level:		
Building/Level:		
Building/Level:		
Building/Level:		

NOTES:

.1 This certificate shall be submitted to the Departmental Representative prior to Substantial Performance.

1.7 EF 131 Certificate of Seismic Restraint Installation

Project Identification: _____

I hereby declare that I _____

am an employee/a principal of _____

Certify that the seismic restraint of all electrical equipment and wiring system installation meets the requirements of the B.C. Building Code as it relates to seismic restraint and the Schedules B, B1 & CB have been submitted and signed and to the Departmental Representative.

SIGNED _____ DATE _____

NOTES:

.1 This certificate shall be submitted to the Departmental Representative prior to Substantial Performance

1.8 EF 132 Certificate of Acoustic and Vibration Isolation

Project Identification: _____

I hereby declare that I _____

am an employee/a principal of _____

Certify that the vibration isolation installation for the Electrical Equipment has been satisfactorily completed.

SIGNED _____ DATE _____

NOTES:

.1 This certificate shall be submitted to the Departmental Representative prior to Substantial Performance

1.9 EF 140 Check List & Record – Items to be Handed to Owner

ITEM	QUANTITY	RECEIVED	DATE
Spare Luminaires (Attach List)			
Spare Drivers (Attach List)			
Salvaged Materials (Attach List)			

NOTES:

.1 Copies of this form shall be submitted to the Departmental Representative and the owner with all items signed off prior to substantial performance.

Prepared By _____

Owners Sign Off _____ DATE _____

1.10 EF 141 Check List – Owners Demonstration

	CONTRACTOR		OWNER	
SYSTEM/ITEM	**SIGNED**	**DATE**	**SIGNED**	**DATE**
Lighting System Controls				
Location of Control Devices				
Access to Equipment				
Review of Maintenance Manual				
Points of required Maintenance.				

NOTES:

.1 Contractor shall submit copies of this form with each appropriate item signed and dated by the person having overall charge of commissioning prior to substantial performance. (See **EF 143**).

.2 Owners representative shall sign off each item during or after the demonstration.

.3 Contractor to strike out items where they do not apply to the systems being demonstrated.

.4 Interlocks and controls to be demonstrated by following the descriptions and diagrams in the contract documents and proving that all controls function as required.

.5 Where multiple identical controls are installed the Owners representative may elect to only witness sample items, but the person having charge of commissioning is expected to have checked them all.

1.11 EF 142 Check List – Substantial Performance Submissions - Electrical

SECTION	ITEM	DATE	STATUS
260500	Final Electrical Inspector Certificate		
260500	Fire Stop Penetration Certificate. (**EF-130**)		
260500	Acoustic & Vibration Isolation Certificate. (**EF-132**)		
260500	Items handed to Owner Checklist (**EF 140**)		
260500	Identification		
260500	Record Drawings		
260500	Operating & Maintenance Manuals		
260505	Seismic Engineer Report and Schedules (**EF131**)		
260924	Lighting Controls Commissioning		
	Contractors Letter of Guarantee		
	Demonstration to Operating Staff agenda		
	Demonstrations Checklists (**EF 141**)		
	Substantial Performance Certificate (**EF143**)		
	Checklist of work remaining after Substantial (**EF 144**).		

NOTES:

.1 This list is provided as a checklist and may not include all Substantial Performance requirements.

1.12 EF 143 Certificate of Substantial Performance - Electrical

I hereby certify that I _____
am an employee / a principal /an agent

of _____

and have personally witnessed the following with regard to the electrical systems work specified for the above project and that to the best of my knowledge except as noted on **EF 144** (attached);

- The installation is complete and as specified.
- The systems have been commissioned and operate satisfactorily.
- Every control sequence and every control performs as specified.
- The systems are clean.
- All of the required submissions have been made to the Departmental Representative.

SIGNED _____ DATE _____

NOTES:

.1 This certificate must be completed and submitted to the Departmental Representative prior to substantial performance.

.2 If it is apparent that the systems or their operation are seriously deficient then all reasonable costs and Departmental Representative time charges relating to any subsequent site reviews shall be deducted from the contract sum.

1.13 EF 144 Check List – Work Remaining After Substantial Performance

		COMPLETION		
ITEM NO.	DESCRIPTION	CLAIMED BY	DATE	VERIFIED DATE

NOTES:

.1 This form must be filled in and submitted to the Departmental Representative prior to substantial performance.

.2 Any discovered outstanding items will be added to the list by the Departmental Representative. Copies of the complete list will be circulated to the Owner, the Architect and the Contractor.

.3 The Contractor may include estimated values against the outstanding work but determination of the actual amounts to be held will be made by the Departmental Representative.

.4 The Contractor shall sign off each item as it is completed and submit the list monthly to the Departmental Representative. When all items are signed off the completed list shall be submitted with the certificate of total performance **EF 145**.

1.14 EF 145 Certificate of Total Performance – Electrical

I hereby certify that I _____
am an employee / a principal / an agent

of _____

and have personally witnessed that each item of outstanding work on the checklist and record of work remaining after substantial completion EF 144 (attached) has been satisfactorily completed and I hereby certify that the Electrical systems work specified on the above project is complete.

SIGNED _____ DATE _____

NOTES:

.1 This certificate must be completed and submitted to the Departmental Representative when requesting total performance.

.2 If it is apparent during the final review that the systems or their operation are seriously deficient then all reasonable costs and Departmental Representative time charges relating to any subsequent site reviews shall be deducted from the contract sum.

End of Section

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CLIENT:

TRANSPORT CANADA

620 - 800 Burrard Street

Vancouver, BC

PROJECT:

HMIM PROGRAM

Hazardous Materials Identification and Management Program

Transport Canada Buildings at Sandspit Airport (YZP)

Sandspit, BC

REF: 18164HMIM

DATE: September 2017

E-Copy

#101-Bldg.C-17802-66th Avenue
Cloverdale, BC, Canada V3S 7X1
Tel: 604-575-1122 Fax: 604-575-1152

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LOCATION OF HMIM PROGRAM REPORT COPIES

Copy #1 of 3 - Contact: Mr. Bob Ells, Airport Manager
Location: APM Office Boardroom, Airport Terminal Building (ATB) (Bldg. No. 1)
Transport Canada, 1 Airport Road, PO Box 439, Sandspit, BC V0T 1T0
Phone: 250-637-5313 Email: robert.ells@tc.gc.ca

Copy #2 of 3 - Contact: Mr. Warren Foster, Operations & Maintenance Supervisor
Location: Maintenance Office, Combined Services Building (CSB) (Bldg. No. 18)
Transport Canada, 1 Airport Road, PO Box 439, Sandspit, BC V0T 1T0
Phone: 250-637-1059 Email: warren.foster@tc.gc.ca

Copy #3 of 3 - Location: Maintenance Shop Office, Combined Services Building (CSB) (Bldg. No. 18)
Transport Canada, 1 Airport Road, PO Box 439, Sandspit, BC V0T 1T0

ANNUAL REVIEW OF THE HMIM PROGRAM AND PROJECT PLANNING

The Workers' Compensation Board of British Columbia (WorkSafeBC) Occupational Health and Safety Regulation requires that this Hazardous Materials Identification and Management (HMIM) Program be reviewed at least annually. The annual review shall incorporate a reassessment of the potential hazard by a "qualified person", remedial action as required, review and update of the asbestos materials inventory. **Additionally, prior to a renovation or demolition project**, the Owner/Employer **must conduct a separate survey** of all hazardous building materials within the subject area(s) of the building(s) in accordance with WCB Occupational Health and Safety Regulation 20.112 and the corresponding Guideline G20.112, as referenced in **Section 2.5 Owner's and Employer's Responsibility for Project Planning** of this report.

1.0 INTRODUCTION

1.1 ASBESTOS CONTAINING MATERIALS AND POTENTIAL ASBESTOS CONTAINING MATERIALS

"Asbestos" is a generic term that describes a variety of naturally occurring mineral silicates that separate into fibres. Asbestos fibres are incombustible, possess high tensile strength, yet remain flexible, and have outstanding thermal and electrical insulating properties. Asbestos fibres also have excellent acoustical properties, and good chemical resistance. These unique physical properties are the reason asbestos became a popular ingredient or component in a wide variety of industrial and commercial building products.

Respiratory diseases such as asbestosis, lung cancer, and mesothelioma have been associated with occupational exposure to asbestos fibres in shipbuilding, mining, milling, fabricating and construction industries where asbestos products were manufactured or used. Most of the medical knowledge concerning the adverse health effects associated with the inhalation of asbestos fibres has come from the study of workers who were routinely exposed to high levels of airborne asbestos fibres over extended time periods. A latency period of between 10 and 35 years is common between initial exposure and recognizable symptoms of asbestos related disease. Medical evidence also indicates that cigarette smoking greatly enhances the disease potential of asbestos exposure.

In the past, asbestos containing building materials were used extensively in the construction of public and commercial buildings. Asbestos was commonly used in floor tiles, sheet flooring, gypsum board filling compound, acoustic plaster, acoustic ceiling tiles, thermal and electrical insulation, fireproofing, cement pipe, cement sheeting, insulation on boilers pipes and ducts, firedoor liners, textiles, coatings, mastics, and roofing materials.

Certain types of asbestos containing materials are considered more hazardous than others. The term "friable" refers to a material that when dry can be easily crumbled, pulverized, or reduced to powder by hand pressure. "Friable" may also describe a previously non-friable material that has deteriorated or becomes broken or damaged by mechanical force. The asbestos fibres in "non-friable" materials are bound within a matrix, or are mixed with binder agents, and do not become airborne as easily as friable materials. In general the more friable an asbestos containing material is, the greater the potential for airborne fibre release.

The mere presence of asbestos containing materials in a building does not necessarily mean that the health of the building occupants is endangered. Intact asbestos containing materials that are not damaged or disturbed are not likely to release asbestos fibres into the air, and therefore do not pose a health risk. Asbestos containing materials may, however, become hazardous as a result of damage, deterioration, or a physical disturbance such as renovations or maintenance activities.

The hazards associated with asbestos can be eliminated by preventing the occurrence of airborne asbestos fibres. The Hazardous Building Materials Management Program that has been installed at this facility is designed to ensure that the day to day operations and maintenance of the buildings are performed in a manner that avoids the release of asbestos fibres into the air, and ensures proper control and cleanup if asbestos containing materials are inadvertently disturbed.

The principal objective of the Program is to incorporate a plan of education, training, surveillance, and safe work practices to maintain asbestos containing materials in good condition, while preventing the exposure of custodial and maintenance personnel, contracted trades, and building occupants to asbestos fibres.

Conscientious administration of the Program can control the release of asbestos fibres until the asbestos containing materials in the buildings are removed during a scheduled maintenance, renovation, or demolition project.

1.2 LEAD AND POTENTIAL LEAD CONTAINING PAINTS/COATINGS AND OTHER BUILDING MATERIALS

Lead is a soft, bluish-grey metal that is pliable and corrosion-resistant. Until the 1980s, lead was used in paint because it increased durability, made colours more vibrant, and helped paint dry faster. Lead-containing paint is still used for the yellow lane dividers on roads and highways, and there is no restriction on lead in industrial coatings. Lead-containing paints and coatings do not present a hazard if they are left intact. The health risk occurs when they chip, peel, or are otherwise damaged. When lead-containing materials are disturbed (e.g., scraped or sanded), lead dust can be released into the work environment and be inhaled or ingested by workers and other people.

WorkSafeBC has adopted the federal Ministry of Health definition under the Hazardous Products Act and defines lead-containing surface coating material as a paint or other similar material that dries to a solid film that contains over 90 PPM (90 mg/kg or 90 μg/g or 0.009%) dry weight of lead.

1.3 POLYCHLORINATED BIPHENYL (PCB) CONTAINING BALLASTS

The commercial production of PCBs started in 1929 but their use has been banned or severely restricted in many countries since the 1970s and 1980s because of the possible risks to human health and the environment.

As PCBs are resistant to acids and bases as well as to heat, they have been used as an insulating material in electric equipment, such as light ballasts and capacitors, transformers, and also in heat transfer fluids and lubricants. PCBs have also been used in wide range of products such as plasticizers, surface coatings, inks, adhesives, flame-retardants, paints, and carbonless duplicating paper.

PCBs present in light fixture ballasts/capacitors do not mean that there is a health risk to building occupants as long as they are not damaged to cause leaking. However, PCB or potential PCB containing ballasts/ capacitors in light fixtures should be removed from the fixtures once they are no longer functioning properly so that they are not at risk of rusting and/or deteriorating to a condition that would cause leaking of the PCB fluid which is packed within a viscous non-PCB potting fluid inside the outer metal casing of the ballast/capacitor.

The hazards associated with absorbing or ingesting PCB containing materials can be eliminated by preventative maintenance that assures that older light ballasts/capacitors are removed soon after they are no longer functioning properly, and replaced with new non-PCB containing ballasts/capacitors which are commercially available and labelled as such.

1.4 MERCURY

Mercury switches (thermostats), still available today, have one or more sets of electrical contacts in a sealed glass vial which contains a bead of mercury. The vial may also contain air, an inert gas, or a vacuum. Gravity is constantly pulling the drop of mercury to the lowest point in the vial. When the switch is tilted in the appropriate direction, the mercury touches a set of contacts, thus completing the electrical circuit through those contacts. Tilting the switch the opposite direction causes the mercury to move away from that set of contacts, thus breaking that circuit.

Mercury in thermostats that remain in place do not pose a risk to building occupants as long as the glass vial is not damaged. However, since mercury is a poisonous heavy metal, devices containing mercury switches must be treated as a hazardous waste for recycle.

Fluorescent light tubes have been around for many years and more recently compact fluorescent light bulbs (CFLs). They use a different method than incandescent bulbs to produce light, which makes them energy-efficient. They are low-pressure, mercury vapour lamps that produce invisible ultraviolet (UV) rays.

When the lamp is turned on, the mercury vaporizes inside the lamp and becomes 'excited' by the high voltage electricity. The UV then 'excites' the phosphor coating inside the lamp, which emits the light you see.

Mercury vapour in fluorescent light tubes and bulbs that remain in place do not pose a risk to building occupants as long as the glass tube is not damaged. However, since mercury is a poisonous heavy metal, fluorescent tubes and bulbs must be treated as a hazardous waste for recycle.

1.5 STORED CHEMICALS AND OTHER HAZARDOUS BUILDING MATERIALS

Products such as paint, cleaners, petroleum products, garden chemicals, rodent poison, pool chemicals, batteries, automotive tires, refrigerators, freezers, smoke/heat detectors, and natural gas are common building products and consumables which are widely utilized in residential and commercial buildings to the present day. In an undisturbed condition, these products and consumables, following manufacturer's instructions, WHMIS, and/or safety data sheets, do not pose a hazard to building occupants.

Instructions with some of the above listed products and consumables indicate that once their service life has ended, they should be properly recycled or disposed of.

1.6 SILICA

Silica is the basic component of sand and rock. The best-known and most abundant type of crystalline silica is quartz. Some common silica-containing materials include: Concrete, concrete block, cement, mortar, masonry, brick, granite, sand, fill dirt, top soil, asphalt containing rock or stone, abrasive used for blasting.

Construction workers may be exposed to silica when working with or disturbing these materials. When silica dust builds up in your lungs, you are at risk of developing a serious lung disease called silicosis, which can lead to death. Silicosis is not curable, but it is preventable. The hazards associated with silica can be prevented by utilizing proper personal protective clothing and respirators, and work area enclosure to contain airborne dust.

2.0 PROGRAM PARTICIPANTS AND RESPONSIBILITIES

2.1 PROGRAM MANAGER

The **Program Manager** for this facility is:

Mr. Bob Ells, Airport Manager
TRANSPORT CANADA
Airport Terminal Building (ATB) (Bldg. No. 1)
1 Airport Road, PO Box 439, Sandspit, BC V0T 1T0

Phone: 250-637-5313 **Email:** robert.ells@tc.gc.ca

Overall responsibility and authority for the administration of the Program has been assigned to the Program Manager who shall:

a) Implement and manage the Program in a conscientious manner, and be informed through training and/or experience in the safe handling of asbestos and other hazardous building materials, in accordance with the Workers' Compensation Board of British Columbia requirements. The **Program Manager** must be actively involved in the planning of renovations and maintenance activities, and all hazardous building materials related work activities.

b) Ensure that the location of asbestos containing materials and presence of potential asbestos containing materials and other hazardous building materials are documented in a written inventory. The condition, friability, and accessibility of asbestos containing materials must be assessed to determine the potential for fibre release. Damaged, deteriorated or exposed friable asbestos containing materials are to be repaired or removed as required to prevent the release of airborne asbestos fibres.

c) Inform custodial and maintenance personnel as well as contracted trades about the presence and location of asbestos and other hazardous building materials, the hazards of asbestos and lead paint exposure including safe work procedures that must be followed when working in close proximity to, or contacting asbestos containing materials, in order to prevent asbestos fibres from becoming airborne.

d) Develop and implement a surveillance program to monitor the condition of asbestos containing materials and lead paint throughout the buildings. Damaged or deteriorated asbestos containing materials must be promptly removed, enclosed, or encapsulated to prevent the release of airborne asbestos fibres. A formal re-evaluation of the Program must be performed at least annually. The annual re-evaluation shall incorporate reassessment of the potential hazard, remedial action as required, and an update of the written inventory.

e) When asbestos containing materials are involved, ensure that a "Notice of Project for work involving Asbestos" is sent to the Workers' Compensation Board of British Columbia by the qualified asbestos abatement contractor that will be performing work activities that involve asbestos containing materials. As well, detailed site specific work procedures, a risk assessment, and an exposure control plan by the qualified asbestos abatement contractor must be submitted with their Notice of Project.

f) When lead paints/coatings are involved, ensure that a "Notice of Project for work involving Lead" is sent to the Workers' Compensation Board of British Columbia by the qualified lead abatement contractor that will be performing work activities that involve lead containing paints/coatings. As well, detailed site specific work procedures, a risk assessment, and an exposure control plan by the qualified lead abatement contractor must be submitted with their Notice of Project.

g) Develop and maintain written work procedures for all service and maintenance activities involving asbestos containing materials and other hazardous building materials, if and when necessary.

h) Monitor and review work performed by custodial and maintenance personnel including contracted trades to ensure that their work activities are not disturbing asbestos containing materials or other hazardous building materials.

i) Communicate with building occupants to ensure that their work activities are not disturbing asbestos containing materials or other hazardous building materials. Building occupants must have even minor renovations or maintenance and service activities authorized by the **Program Manager.**

j) Renovations and maintenance activities increase the potential for disturbance of asbestos containing materials or other hazardous building materials. Prior to conducting renovation and maintenance projects, the **Program Manager** will review the project in order to determine if asbestos containing materials or other hazardous building materials may be disturbed, and take appropriate action as necessary to prevent any type of disturbance. The **Program Manager** will ensure that safe work practices in accordance with the Workers' Compensation Board of British Columbia requirements will be followed by trained and qualified abatement contractor personnel prior to authorizing renovation or maintenance projects involving asbestos containing materials or other hazardous building materials. The **Program Manager** must also see Section 2.5 of this report for project planning.

2.2 MAINTENANCE AND CUSTODIAL PERSONNEL (including Contracted Trades and Services)

Maintenance and custodial personnel shall:

a) be familiar with the presence and location of hazardous building materials, and the Program.

b) avoid disturbing asbestos containing materials to prevent asbestos fibres from becoming airborne.

c) if required to contact asbestos containing materials or perform work in close proximity to asbestos containing materials, be trained in the safe handling of asbestos containing materials and have a clear understanding of the Workers' Compensation Board of British Columbia **Occupational Health and Safety Regulation Part 6: Substance Specific Requirements, Sections 6.1 to 6.32.** All asbestos related work activities must be authorized by the **Program Manager** prior to starting work.

d) if required to disturb lead containing paints/coatings, be trained in safe work practices for preventing lead exposure in the workplace and have a clear understanding of the Workers' Compensation Board of British Columbia **Occupational Health and Safety Regulation Part 6: Substance Specific Requirements, Sections 6.59 to 6.69.** All lead paint/coating related work activities must be authorized by the **Program Manager** prior to starting work.

e) have all renovation, maintenance or service work at risk of disturbing hazardous building materials authorized by the **Program Manager** prior to commencing work.

f) inform the **Program Manager** immediately when damage or disturbance of asbestos containing or other hazardous building materials occurs or is discovered.

2.3 INSPECTION BY A QUALIFIED PERSON

A Qualified Person shall:

a) inspect asbestos containing and other hazardous building materials, at least annually, for damage and deterioration, and submit the findings in a written report to the **Program Manager** for updating existing documentation.

2.4 BUILDING OCCUPANTS

Building Occupants shall:

a) be informed in writing that all renovation, maintenance or service work could be at risk of disturbing asbestos containing and/or lead paint, and that this work must first be authorized by the **Program Manager** prior to commencement.

b) be familiar with the presence and location of asbestos containing and lead paint, and the Management Program.

c) avoid disturbing asbestos containing materials to prevent asbestos fibres from becoming airborne.

d) inform the **Program Manager** immediately when damage or disturbance of asbestos containing materials and/or lead paint occurs or is discovered.

2.5 OWNER'S AND EMPLOYER'S RESPONSIBILITY FOR PROJECT PLANNING

Prior to any renovation or demolition project, the Owner/Employer must have a "Qualified Person" **conduct a separate project specific survey** of all hazardous building materials within the subject area(s) of the building(s) in accordance with WCB Occupational Health and Safety Regulation 20.112 and the corresponding Guideline G20.112.

Listed below are applicable excerpts from the Workers' Compensation Board of British Columbia Occupational Health and Safety Regulation 20.112 regarding pre-project hazardous building material assessments, which is required regardless of the contents of this report. However, this report, which is designed to meet the requirements of WCB Regulation 6.4, would be a useful aid for amalgamation when conducting the inspection specified in WCB Regulation 20.112.

PART 20: CONSTRUCTION, EXCAVATION AND DEMOLITION

"hazardous materials" means a hazardous substance, or material containing a hazardous substance, including

(a) asbestos-containing material,
(b) lead or any other heavy metal, or
(c) toxic, flammable or explosive material,

that may be handled, disturbed or removed in the course of the demolition or salvage of machinery, equipment, a building or a structure, or the renovation of a building or structure;

"qualified person" means a person who

(a) has, through education and training, knowledge of the management and control of the hazardous materials that the qualified person is made aware of by the employers, and the owner, or that are reasonably foreseeable by the qualified person, as being
  (i) on or in the machinery, equipment, building or structure that is the subject of the demolition, salvage or renovation, or
  (ii) at the worksite, and
(b) has experience in the management and control of those hazardous materials.

3.0 INVENTORY REPORT - HAZARDOUS BUILDING MATERIALS

It is the intention of this section of the report to document the type and location of accessible asbestos containing materials, lead paints, polychlorinated biphenyl (PCB) containing ballasts, mercury containing thermostats and light tubes/bulbs, stored chemicals, and other hazardous building materials at the Transport Canada Buildings at Sandspit Airport (YZP) located in Sandspit, BC.

3.1 ASBESTOS CONTAINING MATERIALS AND POTENTIAL ASBESTOS CONTAINING MATERIALS

METHODOLOGY

A visual inspection was undertaken in order to determine the type, location, and homogeneous nature of asbestos and potential asbestos containing building materials located at the subject buildings. During this inspection, two hundred seventy-four (274) bulk samples of potential asbestos containing materials were collected from specific locations of the buildings. The number of samples collected during these surveys are in accordance with the guidelines established by WorkSafeBC in their publication Safe Work Practices for Handling Asbestos (2017 Edition), and as indicated by actual site conditions. The samples collected

were submitted for analysis at our in-house laboratory in accordance with the Workers' Compensation Board of British Columbia Occupational Health and Safety Regulation, utilizing polarized light microscopy, and dispersion staining techniques. Results of laboratory analysis of samples collected during this survey and useable results previously collected in February 2005 are attached.

INSPECTION RESULTS AND RISK ASSESSMENTS

The following is a general description and risk assessment of fibrated building materials including **asbestos containing** and potential **asbestos containing** materials at the buildings. The detailed room by room inventory for **asbestos containing** and potential **asbestos containing** materials at each building follows these general descriptions and risk assessments.

a) **Floor Tiles, Sheet Floorings, Associated Adhesives, & Floor Levelling Compounds** - Most accessible floor tiles, floor tile adhesives, sheet floorings, foam backed sheet flooring, jute backed sheet flooring, associated adhesives, and floor levelling compounds in the buildings have been sampled and identified as either **asbestos containing** or non-asbestos.

Unsampled vinyl flooring materials and associated adhesives located in the buildings (concealed beneath newer flooring materials, carpet, wood, and/or other building materials), not specifically sampled and identified as non-asbestos, must be considered as **asbestos containing** until such time as destructive testing and laboratory analysis determines otherwise.

Risk Assessment: The flooring materials can be described as non-friable **asbestos containing** or potential **asbestos containing** materials in which the **asbestos** fibres are considered to be safely encapsulated within a non-asbestos vinyl wear surface and/or encapsulated within a non-asbestos vinyl compound or cementitious matrix, and in their present undisturbed condition do not pose a hazard to building occupants or workers required to work in close proximity.

b) **Paper Backed Sheet Floorings** - The paper backed sheet floorings and/or paper backing residue located in several of the buildings have been sampled and identified as either **asbestos containing** or non-asbestos.

Unsampled paper backed sheet floorings and/or paper backing residue located in the buildings (concealed beneath newer flooring materials, carpet, wood, and/or other building materials), not specifically sampled and identified as non-asbestos, must be considered as **asbestos containing** until such time as destructive testing and laboratory analysis determines otherwise.

Risk Assessment: The paper backed sheet floorings and/or paper backing residue can be described as friable **asbestos containing** or potential **asbestos containing** materials in which the **asbestos** fibres are considered to be safely enclosed behind a non-asbestos vinyl wear surface, and in their present undisturbed condition do not pose a hazard to building occupants or workers required to work in close proximity.

c) **Ceramic Floor and Wall Tile Grouts & Mortars/Adhesives** - The ceramic floor and wall tile grouts and mortars/adhesives located in several of the buildings (some may be concealed beneath newer flooring materials), not specifically sampled and identified as non-asbestos, must be considered as **asbestos containing** until such time as destructive testing and laboratory analysis determines otherwise.

Risk Assessment: The grouts and mortars/adhesives can be described as non-friable potential **asbestos containing** materials in which the **asbestos** fibres are considered to be safely encapsulated within a non-asbestos cement-like and/or elastomeric matrix, and in their present undisturbed condition do not pose a hazard to building occupants or workers required to work in close proximity. As well, upon removal, the ceramic tile products in direct contact with

asbestos containing filling compounds on gypsum board walls must be considered as **asbestos contaminated** materials.

d) **Cove Base and Cove Base Adhesives** - All cove bases and cove base adhesives located in the buildings have been sampled and identified as non-asbestos.

Risk Assessment: Although the cove bases and cove base adhesives are non-asbestos, upon removal, the cove base products in direct contact with **asbestos containing** filling compounds on gypsum board walls must be considered as **asbestos contaminated** materials.

e) **Filling Compounds on Gypsum Board** - The filling compounds on gypsum board located in several buildings have been sampled and identified as either **asbestos containing** or non-asbestos. Although the analytical results for some of the gypsum board filling compound samples indicate non-asbestos results because of renovations conducted in the 1980s or later, site investigation and laboratory analysis of other representative samples have determined that there is **asbestos containing** filling compound on older gypsum board or gypsum board residue (installed between approximately 1964 and 1979), or there is newer gypsum board with non-asbestos filling compound fastened directly to or abutting the older gypsum board with **asbestos containing** filling compound (some multi-layered and some concealed), as listed in the room by room inventory.

As well, unsampled filling compound residue on floors (that may be concealed beneath carpets and other flooring materials, plumbing fixtures, cabinetry, mouldings, millwork, and other building materials), not specifically sampled and identified as non-asbestos, must be considered as **asbestos containing** until such time as destructive testing and laboratory analysis determines otherwise.

Risk Assessment: The filling compounds and filling compound residues can be described as friable **asbestos containing** or potential **asbestos containing** materials in which the **asbestos** fibres are considered to be safely encapsulated beneath a liberal coat of paint or enclosed beneath/behind other building materials, and in their present undisturbed condition do not pose a hazard to building occupants or workers required to work in close proximity.

f) **Filling Compound Putty on Wood Walls** - The filling compound putty on wood walls in the Main Floor Side Entrance Foyer of Residence (Bldg. No. 49) has been sampled and identified as **asbestos containing.**

Risk Assessment: The filling compound putty can be described as a non-friable **asbestos containing** material in which the **asbestos** fibres are considered to be safely encapsulated within a non-asbestos elastomeric matrix, and in its present undisturbed condition does not pose a hazard to building occupants or workers required to work in close proximity.

g) **Cement Board** - The cement board on walls in the Old Field Electrical Centre has been sampled and identified as **asbestos containing.** The cement board behind a wood burning stove in the Detached Shed at Residence (Bldg. No. 50) has been sampled and identified as non-asbestos.

Risk Assessment: The cement board can be described as a non-friable **asbestos containing** material in which the **asbestos** fibres are considered to be safely encapsulated within a non-asbestos cement-like matrix, and in its present undisturbed condition does not pose a hazard to building occupants or workers required to work in close proximity.

h) **Cement Wall Shingles** - The cement shingles and/or cement shingle residue at the exterior walls of some of the buildings (concealed behind newer non-asbestos siding) have been sampled and identified as **asbestos containing.** The **asbestos containing** cement shingles are also located on the walls of a room in Residence (Bldg. No. 49), and cement shingles and/or shingle residue may be concealed

behind wood and/or gypsum board in a room in Residence (Bldg. No. 49). Associated caulkings, sealants, and/or adhesives in contact with the **asbestos containing** cement shingles must be considered as **asbestos contaminated.**

Risk Assessment: The cement shingles and/or shingle reside can be described as a non-friable **asbestos containing** material in which the **asbestos** fibres are considered to be safely encapsulated within a non-asbestos cement-like matrix, and in their present undisturbed condition do not pose a hazard to building occupants or workers required to work in close proximity. As well, the caulkings, sealants, and/or adhesives that may be in contact with the cement shingles can be described as non-friable potential **asbestos containing** materials in which the **asbestos** fibres including those from the cement cladding are considered to be safely encapsulated within an elastomeric matrix, and in their present undisturbed condition do not pose a hazard to building occupants or workers required to work in close proximity.

i) **Exterior Wall Stucco** - The stucco on the exterior walls of the Old Field Electrical Centre Building has been sampled and identified as non-asbestos.

j) **Ceiling Tile Adhesive** - Ceiling tile adhesive concealed above non-asbestos 12" ceiling tiles located in the Basement of Residence (Bldg. No. 47), and not specifically sampled and identified as non-asbestos, must be considered as **asbestos containing** until such time as destructive testing and laboratory analysis determines otherwise.

Risk Assessment: The ceiling tile adhesive can be described as a non-friable potential **asbestos containing** material in which the **asbestos** fibres are considered to be safely encapsulated within a non-asbestos elastomeric matrix, and concealed behind the non-asbestos ceiling tiles, and in its present undisturbed condition does not pose a hazard to building occupants or workers required to work in close proximity.

k) **Spray Applied Texture Coat** - The spray applied texture coats located in Residence (Bldg. No. 47) and Residence (Bldg. No. 49) have been sampled and identified as non-asbestos.

l) **Coatings on Underside of Metal Sinks** - The coatings on the underside of several metal sinks located in the buildings have been sampled and identified as either **asbestos containing** or non-asbestos.

Risk Assessment: The coatings can be described as non-friable **asbestos containing** materials in which the **asbestos** fibres are considered to be safely encapsulated within a non-asbestos asphaltic or elastomeric matrix, and in their present undisturbed condition do not pose a hazard to building occupants or workers required to work in close proximity.

m) **Paper Insulation within Incandescent Light Fixtures** - The paper insulation located within older incandescent light fixtures at some of the Residences has been sampled and identified as **asbestos containing.**

Risk Assessment: The paper insulation can be described as a friable **asbestos containing** material in which the **asbestos** fibres are considered to be safely enclosed behind a reflective foil finish within the light fixtures, and in their present undisturbed condition do not pose a hazard to building occupants or workers required to work in close proximity.

n) **Woven Textile Gaskets at Doors** - The woven textile gaskets at doors of old flammable liquid storage cabinets in the Old Field Electrical Centre and Combined Services Building have been sampled and identified as **asbestos containing.**

Risk Assessment: The woven textile gaskets can be described as a non-friable **asbestos containing** material in which the **asbestos** fibres are considered to be tightly bound and safely encapsulated with a non-asbestos sealant, and in their present undisturbed condition do not pose a hazard to building occupants or workers required to work in close proximity.

o) **Mastics on Joints of Ductwork** - The mastics at joints of ductwork in the Combined Services Building have been sampled and identified as non-asbestos. However, a mastics at joints of older ductwork in some areas of the Residence buildings and may be in inaccessible wall cavities and ceiling spaces have been sampled and identified as **asbestos containing.**

Risk Assessment: The older mastics can be described as non-friable **asbestos containing** or potential **asbestos containing** materials in which the **asbestos** fibres are considered to be safely encapsulated within a non-asbestos asphaltic or elastomeric matrix, and in their present undisturbed condition do not pose a hazard to building occupants or workers required to work in close proximity.

p) **Paper and/or Paper Tape on Joints of Ductwork, Wood, and Registers, and Millboard at Registers** - The paper and/or paper tape on joints of ductwork, wood, and registers located in some Residences have been sampled and identified as **asbestos containing.** The paper and/or paper tape on joints of ductwork is also located within floor cavities, wall cavities, and ceiling spaces of these Residences. The millboard located within floor cavities, wall cavities, and ceiling spaces of Residences (Bldg. nos. 52A/B, 55A/B, and 58A/B) has been sampled and identified as **asbestos containing.**

Risk Assessment: The paper and/or paper tape can be described as friable **asbestos containing** materials in which the **asbestos** fibres are considered to be safely encapsulated beneath a liberal coat of paint or enclosed within floor cavities, wall cavities, and ceiling spaces, and in their present undisturbed condition do not pose a hazard to building occupants or workers required to work in close proximity. The millboard can be described as a friable **asbestos containing** material in which the **asbestos** fibres are considered to be safely enclosed within floor cavities, wall cavities, and ceiling spaces, and in its present undisturbed condition does not pose a hazard to building occupants or workers required to work in close proximity.

q) **Hot Water Tanks** - The hot water tanks located in the buildings have been identified as having non-asbestos fibreglass insulation beneath the metal casings.

r) **Mechanical Pipe Insulation** - The fibreglass and neoprene pipe insulations on mechanical piping systems located in some of the buildings including in accessible ceiling spaces have been identified as non-asbestos.

s) **Metal Exhaust Vents** - Metal exhaust vents located at some of the buildings may have **asbestos containing** insulation concealed within their metal exterior casing leading from heating equipment to rooftops (including in wall cavities and ceiling spaces).

Risk Assessment: The insulation can be described as a friable potential **asbestos containing** material that is considered to be safely enclosed within the metal casing, and in their present undisturbed condition do not pose a hazard to building occupants or workers required to work in close proximity.

t) **Through Hole Penetration Firestop Grouts and Putties** - The firestop grouts and putties at the through hole penetrations located at some of the buildings have been sampled and identified as either **asbestos containing** or non-asbestos.

Unsampled through hole penetration firestop grouts and/or putties (including within wall cavities and ceiling spaces), not specifically sampled and identified as non-asbestos, must be considered as **asbestos containing** until such time as destructive testing and laboratory analysis determines otherwise.

Risk Assessment: The firestop grouts and putties can be described as non-friable **asbestos containing** or potential **asbestos containing** materials that are considered to be safely encapsulated within a non-asbestos cementitious or elastomeric matrix, and in their present undisturbed condition do not pose a hazard to building occupants or workers required to work in close proximity.

u) **Pipe Thread Compounds at Threaded Fittings of Piping Systems** - The differing colours of pipe thread compounds at threaded fittings of piping systems located at many of the buildings have been sampled and identified as **asbestos containing.**

Risk Assessment: The pipe thread compounds can be described as non-friable **asbestos containing** materials in which the **asbestos** fibres are considered to be safely encapsulated within a non-asbestos putty-like or elastomeric matrix, and in their present undisturbed condition do not pose a hazard to building occupants or workers required to work in close proximity.

v) **Sealants, Glazing Tapes, Putties, and Caulkings in and/or around Interior and Exterior Windows and Doors** - Numerous sealants, glazing tapes, putties, and/or caulkings in, on, and/or around interior and exterior windows and doors, including overhead doors, have been sampled and identified as either **asbestos containing** or non-asbestos.

Unsampled sealants, glazing tapes, putties, and caulkings in, on, and/or around all interior and exterior windows and doors at the buildings, not specifically sampled and identified as non-asbestos, must be considered as **asbestos containing** until such time as destructive testing and laboratory analysis determines otherwise.

Risk Assessment: The sealants, glazing tapes, putties, and caulkings can be described as non-friable **asbestos containing** or potential **asbestos containing** materials in which the **asbestos** fibres are considered to be safely encapsulated within a non-asbestos putty-like or elastomeric matrix, and in their present undisturbed condition do not pose a hazard to building occupants or workers required to work in close proximity.

w) **Caulkings, Mastics, and Sealants at Wall Openings, Penetrations, Metal Flashings/Gutters, and Other Areas** - Caulking at openings, penetrations, door frames, and flashing at the exterior metal wall cladding at Pumphouse Building (Bldg. No. 38,39) has been sampled and identified as **asbestos containing.**

Unsampled caulkings, mastics, and sealants at wall openings, penetrations, metal flashings/gutters, and other areas at the buildings, not specifically sampled and identified as non-asbestos, must be considered as **asbestos containing** until such time as destructive testing and laboratory analysis determines otherwise.

Risk Assessment: The **asbestos containing** caulking and these unsampled caulkings, mastics, and sealants can be described as non-friable **asbestos containing** or potential **asbestos containing** materials in which the **asbestos** fibres are considered to be safely encapsulated within a non-

asbestos putty-like or elastomeric matrix, and in their present undisturbed condition do not pose a hazard to building occupants or workers required to work in close proximity.

x) **Sealants and/or Sealant Tapes at Overlap Joints of Metal Wall and Roof Cladding** - The sealants and/or sealant tapes at overlap joints and flashings of metal wall and roof cladding located at a few of the buildings, not specifically sampled and identified as non-asbestos, must be considered as **asbestos containing** until such time as destructive testing and laboratory analysis determines otherwise.

Risk Assessment: The sealants and/or sealant tapes can be described as non-friable potential **asbestos containing** materials in which the **asbestos** fibres are considered to be safely encapsulated within a non-asbestos putty-like or elastomeric matrix, and in their present undisturbed condition do not pose a hazard to building occupants or workers required to work in close proximity.

y) **Roofing and Rooftop Materials** - In order to avoid damaging the roofing systems, roofing materials have not been sampled during this survey. All roof membranes, papers, felts, mastics, and other affected materials, including newer roofing materials must be sampled prior to roof repair, replacement, or other disturbance to the materials. All roof membranes, papers, felts, mastics, sealants, caulkings, and patching compounds on the rooftops including at mounted equipment, ductwork, parapet walls, metal flashings, and electrical/plumbing penetrations must be considered as **asbestos containing** until such time as destructive testing and laboratory analysis determines otherwise.

Risk Assessment: The roofing and rooftop materials can be described as non-friable potential **asbestos containing** materials in which the **asbestos** fibres are considered to be safely encapsulated within a non-asbestos asphaltic/putty-like/elastomeric matrix, and in their present undisturbed condition do not pose a hazard to building occupants or workers required to work in close proximity.

z) **Cementitious Drain Pipe - Asbestos containing** cementitious drain pipe may have been utilized as underground drain pipe at the buildings and throughout the property.

Risk Assessment: The cementitious drain pipes can be described as a non-friable potential **asbestos containing** material in which the **asbestos** fibres are considered to be safely encapsulated within a non-asbestos cement-like matrix, and in their present undisturbed condition do not pose a hazard to building occupants or workers required to work in close proximity.

In order to facilitate the day to day operations of a building, the **HMIM Program** survey format is concerned primarily with accessible asbestos containing materials. This program makes no attempt to investigate areas such as inaccessible floor cavities, wall cavities, or ceiling cavities that would require dismantling portions of buildings in order to gain access.

Prior to initiating renovations, maintenance, or service activities that would involve disturbing asbestos or potential asbestos containing building materials, or if it becomes necessary to either cut, drill, abrade, or otherwise disturb building materials, additional sampling in accordance with the WCB **Occupational Health and Safety Regulation 20.112** must be conducted. Where asbestos containing building materials are to be impacted by the work, the work must be performed by a qualified contractor's trained personnel in accordance with the WCB **Occupational Health and Safety Regulation Part 6: Substance Specific Requirements, Sections 6.1 to 6.32.**

3.1.1 Airport Terminal Building (ATB) (Bldg. No. 1) - Ground Floor

Lobbies and Waiting Area
- Non-asbestos filling compound on gypsum board.
- No asbestos materials observed.

Restaurant (Java on the Spit)
- Potential asbestos containing ceramic wall tile grout and mortar (some concealed).
- Non-asbestos filling compound on gypsum board.
- Non-asbestos off-white coatings on underside of metal sinks.

Departure Vestibule (Ground Side)
- Non-asbestos filling compound on gypsum board.
- No asbestos materials observed.

Mechanical Room
- Asbestos containing pipe thread compounds at fittings of piping systems (mostly concealed).
- Non-asbestos filling compound on gypsum board.

Electrical Room (accessed from exterior)
- Non-asbestos 12" floor tiles and floor tile adhesive.
- Non-asbestos filling compound on gypsum board.
- No asbestos materials observed.

Land Lines/Telecommunications Room (accessed from exterior)
- Asbestos containing black firestop putty at floor penetration (some concealed). **Note:** The grey firestop putty is non-asbestos.
- Non-asbestos 12" floor tiles and floor tile adhesive.
- Non-asbestos filling compound on gypsum board.

Janitor's Room
- Non-asbestos filling compound on gypsum board.
- No asbestos materials observed.

Men's Washroom
- Potential asbestos containing ceramic floor tile grout and mortar (some concealed).
- Non-asbestos sheet flooring and adhesive.
- Non-asbestos filling compound on gypsum board.

Women's Washroom, and
Handicap Washroom
- Non-asbestos sheet flooring and adhesive.
- Non-asbestos filling compound on gypsum board.
- No asbestos materials observed.

Storage Room (adjacent to vending machines),
Information Office,
Gift Shop,
Arrival Vestibule (Ground Side),
Car Rental Booths (2), and
Arrival Baggage Claim Area
- Non-asbestos filling compound on gypsum board.
- No asbestos materials observed.

Arrival Vestibule (Air Side),
Pilots Room,
Hold Room,
Security, and
Baggage Handling Area
- Non-asbestos filling compound on gypsum board.
- No asbestos materials observed.

Ticketing Counter and adjacent Hallway
- Non-asbestos paper backed sheet flooring and adhesive.
- Non-asbestos filling compound on gypsum board.
- Non-asbestos grey firestop putty at ceiling electrical penetration.
- No asbestos materials observed.

Airlines Office Area & Rooms within (6 rooms)
- Non-asbestos filling compound on gypsum board.
- Non-asbestos black coating on underside of metal sink in CATSA Lunchroom.
- No asbestos materials observed.

Cargo Reception,
Cargo Office, and
Cargo Handling
- Non-asbestos filling compound on gypsum board.
- No asbestos materials observed.

Airport Staff Office Area & Rooms within
- Non-asbestos filling compound on gypsum board.
- Non-asbestos white coating on underside of metal sink in Meeting Room.
- Non-asbestos seals in interior brown metal-framed windows.
- No asbestos materials observed.

Wall Cavities and Ceiling Spaces
- **Asbestos** containing pipe thread compounds at fittings of piping systems (mostly concealed).

3.1.2 Airport Terminal Building (ATB) (Bldg. No. 1) - Exterior

Piping
- **Asbestos** containing pipe thread compounds at fittings of piping systems (mostly concealed).

Walls, Soffits, and Canopies
- No asbestos materials observed.

Windows
- Potential **asbestos** containing sealants and/or glazing tapes in windows and doors with windows (concealed and inaccessible).

Rooftops
- Potential **asbestos** containing sealant and/or sealant tape at overlap joints of metal roof cladding (concealed and inaccessible).

3.1.3 Old Field Electrical Centre (formerly named Powerhouse Building) (Bldg. No. 16) - Ground Floor

Workshops (2) and adjacent Parts Storage Rooms (2)
- Non-asbestos filling compound on gypsum board.
- Non-asbestos putty in interior metal-framed window.
- No asbestos materials observed.

Storage beneath Stairwell
- No asbestos materials observed.

Janitors/Washroom
- Non-asbestos filling compound on gypsum board.
- Non-asbestos firestop grout at drain pipe ceiling penetration.
- Non-asbestos off-white pipe thread compound at fittings of mechanical piping at hot water tank.
- No asbestos materials observed.

Electrical Room
- Asbestos containing sealant in window of metal door in storage (mostly concealed).

Shop/Emergency Generator Room
- Asbestos containing cement board on walls.
- Non-asbestos filling compound on gypsum board.
- Non-asbestos firestop grout at wall penetration above storage tank.

Flammable Liquid Storage Room
- Asbestos containing woven textile gaskets at doors of two old flammable liquid storage cabinets.

Stairwell to Upper Floor
- Non-asbestos filling compound on gypsum board.
- No asbestos materials observed.

Wall Cavities and Ceiling Spaces
- No asbestos materials suspected.

3.1.4 Old Field Electrical Centre (formerly named Powerhouse Building) (Bldg. No. 16) - Upper Floor

Storage Rooms (2)
- Non-asbestos 9" felt back floor tiles and adhesive.
- Non-asbestos filling compound on gypsum board.
- No asbestos materials observed.

Floor Cavities, Wall Cavities, and Ceiling Spaces
- No asbestos materials suspected.

3.1.5 Old Field Electrical Centre (formerly named Powerhouse Building) (Bldg. No. 16) - Exterior

Walls/Underside of Entranceway
- Non-asbestos stucco and stucco patches on walls and underside of entranceway.
- Non-asbestos coating on stucco.
- Non-asbestos firestop grout at wall penetration.
- No asbestos materials observed.

Windows

- Potential **asbestos** containing sealant and/or glazing tape at windows (concealed and inaccessible).

Rooftops

- Potential **asbestos** containing papers, felts, mastics, and patching compounds on rooftops (some concealed).

3.1.6 Combined Services Building (CSB) (Bldg. No. 18) - Ground Floor

Shop/Vehicle Bays (3) Area

- **Asbestos** containing pipe thread compounds at fittings of piping systems (mostly concealed).
- Non-asbestos filling compound on gypsum board.

Battery Room

- Potential **asbestos** containing sealant in window of interior metal door (mostly concealed).
- Non-asbestos filling compound on gypsum board.
- Non-asbestos off-white coating on underside of metal sink.

Oil Room

- Non-asbestos filling compound on gypsum board.
- No asbestos materials observed.

Parts Room

- Non-asbestos filling compound on gypsum board.
- Non-asbestos sealant in window of interior metal door.
- Non-asbestos caulking around interior metal door frame.
- No asbestos materials observed.

Welding Area

- Potential **asbestos** containing sealant in windows of interior metal doors (mostly concealed).
- Non-asbestos filling compound on gypsum board.

Carpentry Workshop including Closet and Paint Storage Room

- **Asbestos** containing pipe thread compounds at fittings of piping systems (mostly concealed).
- **Asbestos** containing sealant in windows of interior metal doors (mostly concealed).
- Non-asbestos 12" floor tiles and adhesive.
- Non-asbestos filling compound on gypsum board.

Office Area & Rooms within including Electronics Workshop, Hallways, and Washrooms

- **Asbestos** containing pipe thread compounds at fittings of piping systems (mostly concealed).
- Potential **asbestos** containing sealant in windows of interior metal doors (mostly concealed).
- Non-asbestos 12" floor tiles and adhesive.
- Non-asbestos filling compound on gypsum board.

Sprinkler Room

- **Asbestos** containing pipe thread compounds at fittings of piping systems (mostly concealed).
- Non-asbestos filling compound on gypsum board.

Firehall Vehicle Bays (2), Storage Room, and Mezzanine Storage Area
- **Asbestos** containing pipe thread compounds at fittings of piping systems (mostly concealed).
- Potential **asbestos** containing sealant in window of interior metal door (mostly concealed).
- Non-asbestos 12" floor tiles and adhesive.
- Non-asbestos filling compound on gypsum board.
- Non-asbestos grey firestop putty at electrical wall penetrations.

Firehall Office Area including Lunchroom & Rooms within
- **Asbestos** containing gold & black coating on underside of metal sink in Lunchroom.
- Potential **asbestos** containing sealant in windows of interior metal doors (mostly concealed).
- Non-asbestos 12" floor tiles and adhesive.
- Non-asbestos filling compound on gypsum board.

Men's Washroom, and
Women's Washroom
- Potential **asbestos** containing ceramic floor tile grout and mortar (some concealed).
- Non-asbestos ceramic wall tile grout and mortar.
- Non-asbestos filling compound on gypsum board.

Two Stairwells to Upper Floor
- Potential **asbestos** containing sealant in windows of interior metal doors (mostly concealed).
- Non-asbestos 12" floor tiles and adhesive.
- Non-asbestos vinyl stair tread and adhesive.
- Non-asbestos filling compound on gypsum board.

Groundskeeper Storage Room (accessed from exterior)
- No asbestos materials observed.

Wall Cavities and Ceiling Spaces
- **Asbestos** containing pipe thread compounds at fittings of piping systems (mostly concealed).

3.1.7 Combined Services Building (CSB) (Bldg. No. 18) - Upper Floor

Storage Mezzanine (3 rooms, adjacent to Shop/Vehicle Bays)
- **Asbestos** containing pipe thread compounds at fittings of piping systems (mostly concealed).
- **Asbestos** containing woven textile gasket at door of flammable liquid storage cabinet.
- Non-asbestos 12" floor tiles and adhesive.
- Non-asbestos filling compound on gypsum board.
- Non-asbestos paper backed sheet flooring rolls in storage.
- Non-asbestos grey coating on underside of metal sink in storage.

Office Area & Rooms within including Hallways and AHU Mechanical Room
- **Asbestos** containing pipe thread compounds at fittings of piping systems (mostly concealed).
- Potential **asbestos** containing sealant in windows of interior metal doors (mostly concealed).
- Non-asbestos 12" floor tiles and adhesive.
- Non-asbestos filling compound on gypsum board.

Boiler Room
- **Asbestos** containing sealant (grey) on and around non-asbestos rigid insulation within boiler.
- **Asbestos** containing pipe thread compounds at fittings of piping systems (mostly concealed).

Electrical Room

- Non-asbestos 12" floor tiles and adhesive.
- Non-asbestos filling compound on gypsum board.
- Non-asbestos red firestop caulking at electrical penetration(s).
- Non-asbestos grey firestop putty at electrical penetration(s).
- No asbestos materials observed.

Stairwell to Rooftop

- Non-asbestos 12" floor tiles and adhesive.
- Non-asbestos filling compound on gypsum board.
- No asbestos materials observed.

Floor Cavities, Wall Cavities, and Ceiling Spaces

- **Asbestos** containing pipe thread compounds at fittings of piping systems (mostly concealed).

3.1.8 Combined Services Building (CSB) (Bldg. No. 18) - Exterior

Piping

- **Asbestos** containing pipe thread compounds at fittings of piping systems (mostly concealed).

Soffits and Canopies

- No asbestos materials observed.

Walls

- Potential **asbestos** containing firestop putty at wall penetrations (inaccessible).

Windows and Doors including on Vehicle Bay Doors

- **Asbestos** containing sealant in windows of exterior metal doors (mostly concealed).
- Potential **asbestos** containing sealant and/or glazing tape in windows (mostly concealed).
- Non-asbestos sealant in windows of new overhead doors at truck bays.
- Non-asbestos seals in and non-asbestos caulking around exterior white vinyl windows.

Rooftops

- Potential **asbestos** containing sealant and/or sealant tape at overlap joints of metal roof cladding (concealed and inaccessible).

3.1.9 Pumphouse Building (Bldg. No. 38,39)

Interior

- **Asbestos** containing firestop putty at telecommunications cabinet penetrations and pipe sleeve penetration.
- Potential **asbestos** containing sealant and/or sealant tape at overlap joints of metal roof cladding (concealed and inaccessible).

Exterior including Rooftop

- **Asbestos** containing caulking at openings, penetrations, door frames, and flashings of metal wall cladding (some concealed).
- **Asbestos** containing putty on metal cladding and flashing at fire hose wall penetration (some concealed).
- **Asbestos** containing pipe thread compounds at fittings of piping systems (mostly concealed).
- Potential **asbestos** containing sealant and/or sealant tape at overlap joints of metal roof cladding (concealed and inaccessible).