



# Public Works and Government Services Canada

Requisition No. EZ899-181569/A

DRAWINGS & SPECIFICATIONS  
for

Canada Border Service Agency  
Douglas PoE, Surrey  
Generator Power System Upgrade

R.087312.001

September 8, 2017

**APPROVED BY:**

  
\_\_\_\_\_  
Regional Manager, AES

2017 Sept 13


Date

  
\_\_\_\_\_  
Construction Safety Coordinator

2017-09-11

Date

**TENDER:**

  
\_\_\_\_\_  
Project Manager

2017-09-11

Date



**CONSULTANTS – SEAL & SIGNATURE**

**Discipline**

**Seal / Signature / Date**

Electrical  
(Prime)



**END OF SECTION**



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**DRAWING LIST**

ELECTRICAL	E-00	Cover Sheet, Site Plan, Symbols Legend and Drawing List	
	E-01	Existing Single Line Diagram, Feeder and Temporary Power Schedule and Line Legend	
	E-02	Existing Single Line Diagram – Relocated Loads, Feeder Schedules and Line Legend	
	E-03	Parkade Power Layout, Level 1 – Temp. Provisions, and Conduit Mounting Detail	
	E-04	Site Photos	

**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 The work is to be undertaken at the CBSA Douglas Border Crossing. The Border Crossing is a 24 hour, 365 day a year operation so consequently, all associated work under this contract must be undertaken considering the security/ sensitivity of the site, the restrictions on access and to minimize the impact of the associated work on the operation of the Border Crossing.
- .2 All work must be carefully scheduled, coordinated and pre-approved by Authorities Having Jurisdiction, the Departmental Representative and CBSA prior to starting any work. Also all workers involved in the project on site, must be preapproved by the Departmental Representative and CBSA before accessing the site.
- .3 The project scope is 8 weeks.
- .4 The scope of the project is as follows
  - .1 Relocate existing electrical building load on normal power distribution board to backup power panel. Supply, install and fully commission all feeders, breakers, conduits and supports to relocate these loads. The new distribution will include all back up power on the backup generator supply.

**1.4 CONTRACT METHOD**

- .1 Construct Work under single, stipulated price contract.

**1.5 WORK BY OTHERS**

- .1 N/A

**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, temporary power provided to critical loads and total shutdown time to be minimized to no more than 2 hours.

- .2 The following is a proposed sequence; however, the final construction sequence including number of shutdown and temporary generator and feeds required to be completed by Contractor upon award of project and submitted with construction schedule:
  - .1 Install new temporary power generators, lighting and heaters.
    - a. Temporary battery powered light to be installed in the enforcement block hallway
    - b. Additional lights to be provided inside the office area for staff. Allow for minimum of 6 desk lamps to maintain operational lighting.
    - c. Portable space heaters to be provided for the office area for the longer shut downs. All for a minimum of 6 portable heaters.
  - .2 Install new pull box in the electrical room ceiling close to 'SHDE' and prepare all conduits and connection to SHDE for new feeders.
  - .3 Install all new electrical feeders and conduit from main electrical room to south of parkade as near as possible to final disconnect switches and MCCs.
  - .4 Shutdown #1: provide temporary power to 'SHDE' loads, shut down 'SHDE', install new breakers and conduit connectors in panel.
  - .5 Pull all conductors leaving sufficient length in electrical room to reach from pull box to new breakers in SHDE.
  - .6 Shutdowns #2 and #3: remove existing feeders from 'MDC' and panels and make safe. Connect new feeders at both ends.
- .3 Maintain fire access/control.
- .4 Contractor shall coordinate with the Departmental Representative and CBSA, and allow adequate construction stages in the tender prices to meet the site condition, minimal interruption to the building services permitted, and the phased nature of the project, understanding that each phase of the project needs to be fully functional and operating before proceeding with the next phase.
- .5 Staged testing, balancing, 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 use of the facility.
  - .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, 7:00 am - 4:00 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. As work the work area is primarily within the parkade and electrical rooms, extended hours may be approved upon request.
- .7 Any power shutdowns are to be scheduled, in writing, a minimum of 72 hours in advance with the Departmental Representative. A written approval from the Departmental Representative must be obtained prior to proceeding.
- .8 Any work performed by the contractor requires notification of on-site security commissionaires.
- .9 Contractor shall supply all hoarding and fencing. See Section 01 35 00.
- .10 Contractor shall abide by all on-site security provisions and regulations.

#### **1.9 OWNER OCCUPANCY**

- .1 CBSA 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 Owner 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 Contractor shall include arrangement and pay for commissionaires during construction.
  - .5 Contractor shall apply and pay for permits.
  - .6 Provide temporary generators as noted on the drawings.
  - .7 Handle products at site, including uncrating and storage.
  - .8 Protect products from damage and from exposure to elements.
  - .9 Assemble, install, connect, adjust, and finish products.
  - .10 Provide installation inspections required by local authorities.

- .11 Repair or replace and make good items damaged by contractor on site during construction.
- .12 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.”

**END OF SECTION**

**Part 1 General**

**1.1 CODES**

- .1 Perform work in accordance with National Building Code for Canada 2015, 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 generator standby power distribution improvement at CBSA Douglas Border Crossing, Surrey, BC 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.

**1.5 HOURS OF WORK**

- .1 CBSA 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, except for that noted in Clause 1.5.1, 1.5.2 and all shut-downs shall be executed during the normal operating hours:
  - Weekday or Weekend – 7:00AM to 4:00 PM normal operating hours.
- .4 All work conducted during or outside of normal operating hours will be subject to restrictions outlined in Sections 01 14-00, 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;
    - .2 Shut-down periods shall be between the hours of **01:30** and **05:30**, Tuesday to Thursday only, with a maximum of **two** shut-downs;
    - .3 The contractor is to provide a detailed written sequence of work for each shutdown for review by Departmental Representative (DP) and that the contractor is to proceed with shutdown only after written confirmation from DP acceptance.
    - .4 Commencement and completion of work of each section of the specifications or trades for each phase as outlined;
    - .5 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 hours notice for any electrical 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 General Contractor, Electrical Sub-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) 2015, 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 Manufacturer's installation and application instructions;
  - .10 One set of record drawings and specifications for "as-built" purposes;
  - .11 National Building Code of Canada 2015;
  - .12 Current construction standards of workmanship listed in technical sections;
  - .13 Building Safety Plan.

## **1.10 REGULATORY REQUIREMENTS**

- .1 Electrical Permit
  - .1 Confirm with the Authority Having Jurisdiction if a electrical permit requirement for this project.
- .2 If an Electrical Trades Permit is required, provide inspection authorities with plans and information required for issue of acceptance certificates. And contractor is responsible to pay permit application fee.
- .3 Furnish inspection certificates in evidence that the work installed conforms to the requirements of the specification and in conformance with the Authority Having Jurisdiction's requirements.

## **1.11 CONTRACTOR'S USE OF SITE**

- .1 Use of site:
  - .1 Assume responsibility for assigned premises for performance of this work.
  - .2 Be responsible for coordination of all work activities on site, including the work of other contractors engaged by the Departmental Representative.
  - .3 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 2015 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 no 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 Convene meetings between subcontractors whose work interfaces and ensure awareness of areas and extent of interface required.
    - .1 Provide each subcontractor with complete plans and specifications for Contract, to assist them in planning and carrying out their respective work.
    - .2 Develop coordination drawings when required, illustrating potential interference between work of various trades and distribute to affected parties.
      - .1 Pay particularly close attention to overhead work above ceilings and within or near to building structural elements.
      - .2 Identify on coordination drawings, building elements, services lines, rough-in points and indicate location services entrance to site.
    - .3 Facilitate meeting and review coordination drawings. Ensure subcontractors agree and sign off on drawings.
    - .4 Publish minutes of each meeting.
    - .5 Plan and coordinate work in such a way to minimize quantity of service line offsets.
    - .6 Submit copy of coordination drawings and meeting minutes to Departmental Representative for information purposes.
- .3 Submit shop drawings and order of prefabricated equipment or rebuilt components only after coordination meeting for such items has taken place.

- .4 Work cooperation:
    - .1 Ensure cooperation between trades in order to facilitate general progress of Work and avoid situations of spatial interference.
    - .2 Ensure that each trade provides all other trades reasonable opportunity for completion of Work and in such a way as to prevent unnecessary delays, cutting, patching, and removal or replacement of completed work.
    - .3 Ensure disputes between subcontractors are resolved.
  - .5 Departmental Representative is not responsible for, nor accountable for, extra costs incurred as a result of Contractor's failure to coordinate Work.
  - .6 Maintain efficient and continuous supervision.
- 1.20 APPROVAL OF SHOP DRAWINGS, PRODUCT DATA AND SAMPLES**
- .1 In accordance with Section 01 33 00, submit the requested shop drawings, product data, 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 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.
- .5 Refer to Section 01 78 00 – Close-out Submittals.

**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 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.

**1.29 SYSTEM OF MEASUREMENT**

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

**1.30 FAMILIARIZATION WITH SITE**

- .1 Only one optional pre-tender site visit will be arranged. All bidding contractors are strongly encouraged to attend this site visit.
- .2 No further site visits will be available for the bidders without prior rewritten consent with department representative.

**1.31 SECURITY REQUIREMENTS**

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

**1.32 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.

**1.33 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 35 00 – Special Procedures

**1.3 EXISTING SERVICES**

- .1 Notify Departmental Representative and utility companies of intended interruption of services and obtain required permission.
- .2 Where Work involves breaking into or connecting to existing electrical system, give Departmental Representative sufficient notice for necessary interruption of mechanical or electrical service throughout course of work. Refer to section 01 11 55 for shutdown requirements.
- .3 Provide for unobstructed pedestrian and vehicular traffic.

**1.4 SPECIAL REQUIREMENTS**

- .1 Paint public or staff occupied areas. Normal weekday and weekend working hours of the building are 07:00 to 16:00. Coordinate with Departmental Representative.
- .2 Carry out noise generating work with the prior approval of the Departmental Representative (such as drilling and coring building structures or similar noise level generating work). Coordinate with Departmental Representative.
- .3 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. Refer to Sections 01 11 00 - Summary of Work for the stages and phases of construction.
- .4 Contractor and sub-contractors shall undergo security screening.
- .5 Maintain an acceptable indoor environmental quality during construction. Apply measures such as:
  - .1 Prevention of the construction dust from spreading into the office 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.

**1.5 RESTRICTED OR SECURE AREA**

- .1 Any area on project property except the area assigned specifically to the Contractor is a secure or restricted area.

**1.6 CONTRACTOR'S RESPONSIBILITY**

- .1 General Contractor and subcontractor shall be responsible for construction, personnel and vehicles employed on project and requiring access to restricted areas.
- .2 All Contract personnel and equipment must remain within designated work areas at all times.

- .3 Contractors shall be responsible for the security of their own equipment and materials.

**1.7 PASSES AND KEYS**

- .1 Keys necessary for access to restricted areas to be responsibility of Contractor when issued and controlled by the Departmental Representative. All keys will be returned as laid down by the Departmental Representative. Keys not returned or lost shall be subject to a charge of \$200.00.
- .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 the site.

**1.8 ESCORT**

- .1 General
- .1 Security escort is required when accessing secured locations in the commercial building on CBSA property. The contractor's personnel must be within direct line of sight of a security escort at all times.
- .2 Security escort shall be provided by Commissionaires BC.
- .3 Contractor shall set up direct contract with Commissionaires BC. Contractor is responsible for costs of all security escorts throughout the project.
- .4 The contractor shall book Commissionaires directly with Commissionaires BC. Book as many Commissionaires as required to satisfy the requirements of .1 above. Notify the Departmental Representative all bookings and cancellations for information purpose.
- .5 Book Commissionaires in advance as much as possible. A minimum callout of 4 hours is required. Any cancellations shall be made 24 hours in advanced.
- .6 Commissionaires BC web site: <http://commissionaires.bc.ca>

**1.9 RESPONSIBLE PERSONNEL**

- .1 Provide Departmental Representative 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 including the escort must attend a briefing with the security services division prior to the project.

**1.10 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 Departmental Representative of area and times.

**1.11 EVACUATION**

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

**1.12 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.

**1.13 VEHICLES**

- .1 Contractors' vehicles shall be removed from the construction site when not actually in use. If contractors' vehicles are left at the site, they are to be stored in a location determined by the Departmental Representative.

**END OF SECTION**



**Part 1 General**

**1.1 ADMINISTRATIVE**

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

**1.2 PRE-CONSTRUCTION MEETING**

- .1 Within 15 days after award of Contract: Departmental Representative will request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
- .2 Attendance will include, but is not limited to, the Departmental Representative. Departmental Representative to establish time and location of pre-construction meeting, Contractor to notify parties concerned a minimum of four (4) working days before meeting.
- .3 Departmental Representative will chair the meeting, record minutes, and issue minutes.
- .4 Agenda to include:
  - .1 Introduction of official representative of participants in the Work.
  - .2 Start date on site.
  - .3 Communication Protocol for submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
  - .4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 51 00 - Temporary Utilities.
  - .5 [Deleted]
  - .6 Communication Protocol for proposed changes, change orders, procedures, approvals required.
  - .7 Owner's Work.
  - .8 Record drawings in accordance with Section 01 78 00 - Closeout Submittals.
  - .9 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.
  - .10 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.
  - .11 Monthly progress claims, administrative procedures, photographs, hold backs.
  - .12 Appointment of inspection and testing agencies or firms.

**1.3 PROGRESS MEETINGS**

- .1 During course of Work and two weeks prior to Project Completion, schedule progress meetings bi-weekly.
- .2 Attendance to include, but is not limited to, Departmental Representative, and Contractor.
- .3 Not Used
- .4 Record next meeting dates in the meeting minutes or notify parties a minimum of seven (7) days in advance for other ad-hoc meetings.
- .5 Agenda to include, at a minimum, the following:

- .1 Review, approval of minutes of previous meeting;
- .2 Review of Health and Safety including any incidents, near misses, and WorkSafe BC visits;
- .3 Review of Work progress since previous meeting;
- .4 Construction schedule review;
- .5 Review of off-site fabrication delivery schedules;
- .6 Corrective measures and procedures to regain projected schedule;
- .7 Request for Information (RFI) log review;
- .8 Engineering Disciplines Reviews:
  - .1 Electrical;
- .9 Change order log review;
- .10 Review submittal schedule;
- .11 Review updated as-builts;
- .12 Review and resolve site issues;
- .13 New business.

**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.

### **1.3 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.

### **1.4 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 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 Execution**

**2.1 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.

**2.2 ARCHAEOLOGICAL / HISTORICAL FINDS**

- .1 Give immediate notice to the Departmental Representative if evidence of archaeological / historical finds are encountered during excavation/construction and await Departmental Representative written instructions before proceeding with work in this area.

**2.3 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.

**2.4 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

### 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 sections as required:
  - .1 Submittals procedures: Section 01 33 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 01 33 00.
- .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.
- .7 Contractor to acknowledge receipt of the 'PSPC Preconstruction Hazard Assessment Form' by signing the form and submitting to PSPC before mobilization to site.

#### **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.

#### **1.12 WORK PERMITS**

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

#### **1.13 FILING OF NOTICE**

- .1 The General Contractor is to complete and submit a Notice of Project as required by Provincial authorities.
- .2 Provide copies of all notices to the Departmental Representative.

#### **1.14 HEALTH AND SAFETY PLAN**

- .1 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.

#### **1.15 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.

#### **1.16 HAZARDOUS PRODUCTS**

- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials, and regarding 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.

**1.17 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.

**1.18 PCB REMOVALS**

- .1 Mercury-containing fluorescent tubes and ballasts which contain polychlorinated biphenyls (PCBs) are classified as hazardous waste.
- .2 Remove, handle, transport and dispose of as indicated in NMS Section 02 8 00.

**1.19 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.

**1.20 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.

**1.21 ELECTRICAL LOCKOUT**

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

**1.22 OVERLOADING**

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

**1.23 FALSEWORK**

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

**1.24 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.

**1.25 CONFINED SPACES**

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

**1.26 POWDER-ACTUATED DEVICES**

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

**1.27 FIRE SAFETY AND HOT WORK**

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

**1.28 FIRE SAFETY REQUIREMENTS**

- .1 Store oily/paint-soaked rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
- .2 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.
- .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.

**1.29 FIRE PROTECTION AND ALARM SYSTEM**

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

**1.30 UNFORESEEN HAZARDS**

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

**1.31 POSTED DOCUMENTS**

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

**1.32 MEETINGS**

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

**1.33 CORRECTION OF NON-COMPLIANCE**

- .1 Immediately address health and safety non-compliance issues identified by the Departmental Representative.
- .2 Provide Departmental Representative with written report of action taken to correct non-compliance with health and safety issues identified.
- .3 The Departmental Representative may issue a "stop work order" if 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 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 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
- .4 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 will 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. 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. Provide sufficient space to store and cure test samples.

**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
- .2 Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- .3 Make good other Contractor's work damaged by such removals or replacements promptly.
- .4 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 Not used.

**1.8 MILL TESTS**

- .1 Submit mill test certificates as requested.

**1.9 EQUIPMENT AND SYSTEMS**

- .1 Submit adjustment and commissioning reports for electrical equipment systems.

**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 Do not rely on labels or enclosures provided with products.
  - .2 Obtain written instructions directly from the manufacturer.
- .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                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        Clear snow and ice from access to building, bank/pile snow in designated areas only.
- .4        Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5        Provide on-site containers for collection of waste materials and debris.
- .6        Provide and use marked separate bins for recycling. Refer to Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- .7        Dispose of waste materials and debris off site.
- .8        Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.
- .9        Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .10       Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .11       Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .12       Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

**1.3                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 Clean and sweep gutters.
- .16 Sweep and wash clean paved areas.
- .17 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.
- .18 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.
- .19 Remove snow and ice from access to buildings.

**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						
Doors & Windows						
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 GOVERNMENTAL 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

**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, the existing manuals and as built is required to be updated to reflect the changes.
- .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 An electronic copy Interactive Operating and Maintenance Manual System is required as specified under clause 1.3. Provide four (4) sets of the Electronic Interactive Operating and Maintenance Manual System to the Departmental Representative.
- .6 Hard copies of the Operating and Maintenance Manual System is required as specified under clause 1.4. Provide four (4) sets of the Hard Copy Interactive Operating and Maintenance Manual System to the Departmental Representative.
- .7 Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work. Refer to individual specification sections of this specification for all extra parts, materials, fixtures and equipment required.
- .8 If requested, furnish evidence as to type, source and quality of products provided.
- .9 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.
- .10 Pay costs of transportation.
- .11 Certificate of Completion.

**1.3 FORMAT HARD COPY MANUALS (UPDATE EXISTING)**

- .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 [Deleted]
- .8 Arrange for and be responsible for the preparation of as-built drawings in AutoCAD computerized drafting system. 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 depths of elements of foundation in relation to finish first floor datum.
  - .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  - .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
  - .4 Field changes of dimension and detail.
  - .5 Changes made by change orders.
  - .6 Details not on original Contract Drawings.

- .7 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 performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
  - .1 Operation data to include:
    - .1 Control schematics for systems including environmental controls.
    - .2 Description of systems and their controls.
    - .3 Description of operation of systems at various loads together with reset schedules and seasonal variances.
    - .4 Operation instruction for systems and component.
    - .5 Description of actions to be taken in event of equipment failure.
    - .6 Valves schedule and flow diagram.
    - .7 Colour coding chart.
  - .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 Description of plumbing specialties and accessories, giving manufacturer's name, type, model, year, capacity. List of recommended spare parts.
  - .3 Performance data to include:
    - .1 Equipment performance verification test results.
    - .2 Special performance data as specified.
- .2 Operating Procedures: 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.
- .3 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 WARRANTIES AND BONDS**

- .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
- .2 List 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 RELATED SECTIONS**

- .1 This section covers items common to Sections of Division 26. This section supplements requirements of Division 01.

**1.2 REFERENCES**

- .1 Canadian Standards Association (CSA International)
  - .1 CSA C22.1-15, Canadian Electrical Code, Part 1 Safety Standard for Electrical Installations.
  - .2 CSA C22.2 No. 0-10 (R2015), General requirements-Canadian electrical code, part II.
  - .3 CAN/CSA-C22.3 No. 1-01(Update March 2005), Overhead Systems.
  - .4 CAN3-C235-83(R2000), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.
- .2 Electrical and Electronic Manufacturer's Association of Canada (EEMAC)
  - .1 EEMAC 2Y-1-[1958], Light Gray Colour for Indoor Switch Gear.
- .3 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)
  - .1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

**1.3 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-C235-83.
- .2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.
  - .1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.
- .3 Language operating requirements: provide identification nameplates for control items in English.

**1.5 SUBMITTALS**

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop drawings:
  - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of British Columbia, Canada.

- .2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.
- .3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.
- .4 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.
- .5 If changes are required, notify Engineer Consultant of these changes before they are made.
- .3 Quality Control: in accordance with Section 01 45 00 - Quality Control.
  - .1 Provide CSA certified equipment and material.
  - .2 Where CSA certified equipment and material is not available, submit such equipment and material to inspection authorities for special approval before delivery to site.
  - .3 Submit test results of installed electrical systems and instrumentation.
  - .4 Permits and fees: in accordance with General Conditions of contract.
  - .5 Submit, upon completion of Work, load balance report as described in PART 3 - LOAD BALANCE.
- .4 Manufacturer's Field Reports: submit to Departmental Representative manufacturer's written report, within 3 days of review, verifying compliance of Work and electrical system and instrumentation testing, as described in PART 3 - FIELD QUALITY CONTROL.

## 1.6 QUALITY ASSURANCE

- .1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.
- .2 Qualifications: electrical Work to be carried out by qualified, licensed electricians who hold valid Master Electrical Contractor license or apprentices in accordance with authorities having jurisdiction as per the conditions of Provincial 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:
  - .1 In accordance with Section 01 - Construction Progress Schedule - Critical Path Method (CPM). Section 01 - Construction Progress Schedule - Bar (GANTT) Charts.
  - .2 Site Meetings: as part of Manufacturer's Field Services [described in Part 3 - FIELD QUALITY CONTROL, in appropriate NMS Section, schedule site visits, to review Work, at stages listed.
    - .1 After delivery and storage of products, and when preparatory Work is complete but before installation begins.



- .2 Twice during progress of Work at 25% and 60% complete.
- .3 Upon completion of Work after cleaning is carried out.
- .4 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

#### **1.7 DELIVERY, STORAGE AND HANDLING**

- .1 Material Delivery Schedule: provide Departmental Representative with schedule within 2 weeks after award of Contract.
- .2 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

#### **1.8 SYSTEM STARTUP**

- .1 Instruct Departmental Representative and operating personnel in operation, care and maintenance of systems, system equipment and components.
- .2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.
- .3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with aspects of its care and operation.

#### **1.9 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:
  - .1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
  - .2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.
  - .3 Safety precautions.
  - .4 Procedures to be followed in event of equipment failure.
  - .5 Other items of instruction as recommended by manufacturer of each system or item of equipment.
- .3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.
- .4 Post instructions where directed.
- .5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.
- .6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

**Part 2 Products**

**2.1 MATERIALS AND EQUIPMENT**

- .1 Provide material and equipment in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Material and equipment to be CSA certified. Where CSA certified material and equipment is not available, obtain special approval from inspection authorities before delivery to site and submit such approval as described in PART 1 - SUBMITTALS.
- .3 Factory assemble control panels and component assemblies.

**2.2 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS**

- .1 Verify installation and co-ordination responsibilities related to motors, equipment and controls, as indicated.

**2.3 WARNING SIGNS**

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

**2.4 WIRING TERMINATIONS**

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

**2.5 EQUIPMENT IDENTIFICATION**

- .1 Identify electrical equipment with nameplates as follows:
  - .1 Nameplates: Lamicoid 3 mm thick plastic engraving sheet black face, white core. Lettering accurately aligned and engraved into core mechanically attached with self-tapping screws.

- .2 Sizes as follows:

**NAMEPLATE SIZES**

Size 1	10 x 50 mm	1 line	3 mm high letters
Size 2	12 x 70 mm	1 line	5 mm high letters
Size 3	12 x 70 mm	2 lines	3 mm high letters
Size 4	20 x 90 mm	1 line	8 mm high letters
Size 5	20 x 90 mm	2 lines	5 mm high letters
Size 6	25 x 100 mm	1 line	12 mm high letters
Size 7	25 x 100 mm	2 lines	6 mm high letters

- .2 Labels: embossed plastic labels with 6mm high letters unless specified otherwise.
- .3 Wording on nameplates to be approved by Departmental Representative prior to manufacture.
- .4 Allow for minimum of twenty-five (25) letters per nameplate.
- .5 Nameplates for terminal cabinets and junction boxes to indicate system and voltage characteristics.

- .6 Identify equipment with Size 3 labels engraved "ASSET INVENTORY NO. " as directed by Departmental Representative.
- .7 Disconnects, starters and contactors: indicate equipment being controlled and voltage.
- .8 Terminal cabinets and pull boxes: indicate system and voltage.
- .9 Transformers: indicate capacity, primary and secondary voltages.

## **2.6 WIRING IDENTIFICATION**

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

## **2.7 CONDUIT AND CABLE IDENTIFICATION**

- .1 Colour code conduits, boxes and metallic sheathed cables.
- .2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m intervals.
- .3 Colours: Contractor to following existing building cable and conduit identification scheme.

## **2.8 FINISHES**

- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
  - .1 Paint indoor switchgear and distribution enclosures light gray to EEMAC 2Y-1-1958.

## **Part 3 Execution**

### **3.1 INSTALLATION**

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

### **3.2 NAMEPLATES AND LABELS**

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

### **3.3 CONDUIT AND CABLE INSTALLATION**

- .1 Install conduit and sleeves prior to pouring of concrete.
  - .1 Sleeves through concrete: schedule 40 steel pipe, sized for free passage of conduit, and protruding 50mm.
- .2 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.

- .3 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.

### **3.4 LOCATION OF OUTLETS**

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

### **3.5 CO-ORDINATION OF PROTECTIVE DEVICES**

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

### **3.6 FIELD QUALITY CONTROL**

- .1 Load Balance:
  - .1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.
  - .2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.
  - .3 Provide upon completion of work, load balance report as directed in PART 1 - SUBMITTALS: phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load, as well as hour and date on which each load was measured, and voltage at time of test.
- .2 Conduct following tests in accordance with Section 01.45 00 - Quality Control.
  - .1 Power distribution system including phasing, voltage, grounding and load balancing.
  - .2 Insulation resistance testing:
    - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
    - .2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
    - .3 Check resistance to ground before energizing.
  - .3 Carry out tests in presence of Departmental Representative.
  - .4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
  - .5 Manufacturer's Field Services:

- .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
- .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
- .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

**3.7**

**CLEANING**

- .1 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.
- .2 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.

**END OF SECTION**



**Part 1 General**

**1.1 SECTION INCLUDES**

- .1 General requirements related to existing buildings.

**1.2 RELATED SECTIONS**

- .1 Section 26 05 00 - Common Work Results

**Part 2 Sequencing, Phasing and Scheduling of Work**

- .1 Refer to Section 26 05 00 - Electrical Common Work Results and ensure that all work on existing buildings, facilities, services and utilities is coordinated, sequenced, phased, and scheduled with all other work. Refer to specification documents for phasing and scheduling.

**Part 3 Existing Conditions**

- .1 Indication on the drawings of existing conduit, outlets and other electrical apparatus is based on casual field observations and records of past contracts. As such, this information represents the best data available but is not guaranteed to be full or accurate. Verify that field measurements and circuiting diagrams as indicated on Drawings and that abandoned wiring and equipment serve only abandoned facilities. Report discrepancies to Departmental Representative before disturbing existing installation. Disregard types of existing light fixture shown on the demolition drawings, as they represent mosaic of types retrieved from the past projects and observations, and do not relate to the light fixture schedule of the new design. Confirm existing circuiting on site, disregard circuiting shown on demolition drawings, unless verified by Contractor.
- .2 Where alterations and/or additions to existing equipment or apparatus are required to be made by these documents, it shall be assumed that any existing CSA certification may be in jeopardy. Ensure that all changes are made in accordance with the current edition of the Canadian Electrical Code, Part 2, obtain re-certification, and include re-certification costs in the tender.
- .3 Permit no interruptions to the electric power, fire alarm, telephone, security or other similar systems in the existing building during normal working hours. Advise the Departmental Representative in writing of any intended interruptions outside of these normal hours, including the time and duration of outage. Obtain permission from Departmental Representative at least 24 hours before partially or completely disabling any of the systems. The Departmental Representative may cancel such permission in emergencies at the last minute without penalty or extra cost. Contractor may be required to work in evenings and weekends as required for the existing main building or to minimize duration of outage with no extra cost to the project.
- .4 Assume full responsibility for any disruption to existing services and systems. Provide all necessary material and equipment and provide all labour at no extra cost for any temporary connections be required to maintain services during work in the existing buildings. Include the removal of such temporary connections at completion of the work in the tender price.
- .5 Provide new breakers for all additional circuits as required. Update and retype panel schedules. Where existing panels are affected by the scope of work, provide all necessary blank covers and filler pieces: under no circumstances breaker spaces shall be left open.

- .6 All systems such as power, lighting, security, CCTV, door control, alarm, sound system, fire alarm system, shall be fully operational during renovation and after renovation and be accepted by the Departmental Representative.
- .7 Contractor shall remove all surplus electrical equipment, F.A. devices, speakers, security sensors, wiring, conduits, etc. from renovated areas and return to the Departmental Representative unless otherwise noted.
- .8 Contractor shall relocate, rewire or reroute all wiring which passes through renovated areas, or is in line or on the same circuit as the existing device to be removed to ensure continuity of proper operation of all electrical, fire alarm, security systems, etc. in areas which are not renovated, or devices which are to remain operational. Provide blank covers on all removed devices as required.
- .9 All equipment shown dotted is existing and shall remain in its present location (unless otherwise noted) or shall be relocated as required as per drawings. Rewire, extend wiring, conduits as required.
- .10 Contractor shall allow for adequate removal (without damage) of all fixtures, wiring devices, wires, etc. to facilitate renovation.
- .11 Any fixtures, wiring devices, etc. damaged during and after removal shall be replaced with new approved equipment at Contractor's cost.
- .12 Contractor is responsible for adequate protection of equipment, furniture, etc. (plastic covers, etc.) during the execution of the work.
- .13 Contractor is responsible for cleaning up working area each day before leaving the job site.
- .14 Allow for multiple verifications for fire alarm system and other electrical systems dictated by phasing and scheduling as required for partial building occupancy or substantial performance.

**Part 4 Installation**

- .1 Examine drawings and allow for all work such as the removal, temporary relocation, and re-installation of electrical fixtures, equipment, devices, wiring, raceways, etc., where such work is required due to alterations in or about existing buildings.
- .2 Where work requires modification, extension, and additions to power and low tension services within the existing building, the wiring required for this work shall be installed concealed wherever possible. In certain cases (e.g., where it is necessary to clear obstructions, or to avoid damage to existing structure and/or finish materials), concealed wiring may not be possible. In such cases, special wiring methods such as mineral-insulated cable or wiremold surface mounted raceway, shall be used, provided that, for each specific instance, approval for same is requested from and granted in writing by the Departmental Representative.
- .3 Chisel and patch concrete for conduits feeding new pedestal-mounted floor outlets in existing building.
- .4 Remove abandoned wiring to source. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.



- .5 Clean and repair existing materials and equipment which remain or are to be reused, as described elsewhere in these Specifications.
- .6 Refer to Division 01 for Phasing of the Work.

**END OF SECTION**



**Part 1 General**

**1.1 SECTION INCLUDES**

- .1 Materials and installation for wire and box connectors.

**1.2 RELATED SECTIONS**

- .1 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

**1.3 REFERENCES**

- .1 Canadian Standards Association (CSA International)
  - .1 CAN/CSA-C22.2No.18-98, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.
  - .2 CSA C22.2No.65-93(R1999), Wire Connectors.
- .2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)
  - .1 EEMAC 1Y-2, 1961 Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).
- .3 National Electrical Manufacturers Association (NEMA)

**1.4 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 – Construction / Demolition Waste Management and Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Divert unused wiring materials from landfill to metal recycling facility as approved by Engineer.

**Part 2 Products**

**2.1 MATERIALS**

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

- .4 Clamps or connectors for armoured cable, aluminum sheathed cable, mineral insulated cable, flexible conduit, non-metallic sheathed cable as required to:  
CAN/CSA-C22.2No.18.

**Part 3 Execution**

**3.1 INSTALLATION**

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

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 26 05 34 – Conduit, Conduit fastenings and fittings.

**1.2 REFERENCES**

- .1 CSA C22.2 No.0.3-96, Test Method for Electrical Wires and Cables.
- .2 CAN/CSA C22.2 No.131-M89(R1994), Type TECK 90 Cable.

**1.3 PRODUCT DATA**

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

**1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding and packaging materials in accordance with Section 01 74 21 – Construction / Demolition Waste Management and Disposal.

**Part 2 Products**

**2.1 BUILDING WIRES**

- .1 Conductors: stranded for 6 AWG and larger. Minimum size: 12 AWG.
- .2 Copper conductors: size as indicated, with 600V insulation of cross-linked thermosetting polyethylene material rated RW90 or RWU90 Jacketed.
- .3 Neutral supported cable: 3 phase insulated conductors of Copper and one neutral conductor of Copper steel reinforced, size as indicated.

**2.2 TECK 90 CABLE**

- .1 Cable: in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Conductors:
  - .1 Grounding conductor: copper as indicated.
  - .2 Circuit conductors: copper as indicated, size 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: thermoplastic polyvinyl chloride, compliant to applicable Building Code classification for this project.
- .7 Fastenings:
  - .1 One hole steel straps to secure surface cables 50 mm and smaller. Two hole steel straps for cables larger than 50 mm.
  - .2 Channel type supports for two or more cables.
  - .3 Threaded rods: 6 mm diameter to support suspended channels.

- .8 Connectors:
  - .1 Watertight, explosion-proof approved for TECK cable.

### **2.3 ARMOURED CABLES**

- .1 Conductors: insulated, copper, size as indicated.
- .2 Type: AC90, 600V XLPE RW90.
- .3 Armour: interlocking type fabricated from galvanized steel strip.
- .4 Connectors: anti short connectors.

### **Part 3 Execution**

#### **3.1 FIELD QUALITY CONTROL**

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

#### **3.2 GENERAL CABLE INSTALLATION**

- .1 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors - (0-1000 V).
- .2 Cable Colour Coding: to Section 26 05 00 Common Work Results for Electrical.
- .3 Conductor length for parallel feeders to be identical.
- .4 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.
- .5 Wiring in walls: typically drop or loop vertically from above to better facilitate future renovations. Generally wiring from below and horizontal wiring in walls to be avoided unless indicated.
- .6 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.
- .7 Provide numbered wire collars for control wiring. Numbers to correspond to control shop drawing legend. Obtain wiring diagram for control wiring.

#### **3.3 INSTALLATION OF BUILDING WIRES**

- .1 Install wiring as follows:
  - .1 In conduit systems in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.
  - .2 Perform insulation resistance testing on all cable and wiring, submit results to the department representative.
  - .3 Perform continuity test on all new cable and wiring; submit results to the department representative.
  - .4 Check each conductor tested for unintentional grounds.

- .5 Check if wire and cable are properly tightened to manufacturer's recommendations.
- .2 Install straps and box connectors to cables as required.

**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 Departmental Representative. The Seismic Consulting Engineer should be familiar with SMACNA, ECABC & NFPA guidelines as well as BCBC requirements.
- .3 The Contractors Seismic Consultant shall submit original signed BC Building Code "Letters of Assurance" "Schedules B and C-B" to the Departmental Representative.
- .4 The above requirements shall not restrict or supplant the requirements of any local bylaws, codes, or other certified agencies which may have jurisdiction over all or part of the installation.

**1.3 SCOPE**

- .1 It is the responsibility of equipment manufacturers to design their equipment so that the strength and anchorage of internal components of the equipment exceeds the force level used to restrain and anchor the unit itself to the supporting structure.
- .2 Manufacturer's shop drawings to be submitted with seismic information on equipment structure, bracing and internal components and as required by Division 01.
- .3 Provide restraint on all equipment and machinery, which is part of the building electrical services and systems, to prevent injury or hazard to persons and equipment in and around the structure. Restrain all such equipment in its normal position in the event of an earthquake.
- .4 The total electrical seismic restraint design and field review and inspection will be by a B.C. registered professional structural engineer who specializes in the restraint of building elements. Contractor to allow for coordination, provision of seismic restraints, as well as all costs for the services of the Seismic Restraint Engineer. This engineer, herein referred to as the Seismic Consultant, 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 Consultant 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 Consultant 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 consultant.
- .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 Consultant.

### **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 restraints shall be provided on suspended and shelf mounted transformers along with associated equipment and assemblies connected to them at the points of vertical support (4 points). The restraint wires shall be oriented at approximately 90° to each other (in plan), and tied back to the ceiling slab or its structure at approximately 45° to the slab or basic structure. The restraints shall be selected for a 1 g earthquake loading, i.e. each wire shall have a working load capacity equal to the weight of the transformer. The anchors in the structure shall be selected for a load equal to the weight of the transformers at a 45° pull.
- .3 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.
- .4 Coordinate requirements of slack cables with suppliers prior to installation.

### **3 Execution**

#### **3.1 GENERAL**

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

#### **3.2 CONDUITS**

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

- .3 Riser joints shall be braced or stabilized between floors.
- .3 Horizontal Conduits:
  - .1 Supports - Horizontal conduit shall be supported at sufficiently close intervals to keep it in alignment and prevent sagging.
  - .2 EMT tubing - tubing shall be supported at approximately 1.2 m [4 ft] intervals for tubing.
- .4 Provide transverse bracing at 12.2 m [40 ft] o.c. maximum unless otherwise noted. Provide bracing at all 90° bend assemblies, and pull box locations.
- .5 Provide longitudinal bracing at 24.4 m [80 ft] o.c. maximum unless otherwise noted.
- .6 Do not brace conduit runs against each other. Use separate support and restraint system.
- .7 Support all conduits in accordance with the capability of the pipe to resist seismic load requirements indicated.
- .8 Trapeze hangers may be used. Provide flexible conduit connections where conduits pass through building seismic or expansion joints, or where rigidly supported conduits connect to equipment with vibration or seismic isolators.
- .9 A conduit system shall not be braced to dissimilar parts of a building or two dissimilar building systems that may respond in a different mode during an earthquake. Examples: wall and a roof; solid concrete wall and a metal deck with lightweight concrete fill.
- .10 Provide large enough conduit sleeves through walls or floors to allow for anticipated differential movements with firestopping where required.
- .11 It is the responsibility of the contractor to ascertain that an appropriate size restraint device be selected for each individual piece of equipment. Submit details on shop drawings. Review with seismic consultant and submit shop drawings to the Departmental Representative for his reference.

### 3.3

#### **FLOOR MOUNTED EQUIPMENT**

- .1 Bolt all equipment, e.g. transformers, motor control centres, free standing panelboards, control panels, capacitor banks, etc. to the structure. Design anchors and bolts for seismic force applied horizontally through the center of gravity to a seismic force of 0.5g. For equipment which may be subject to resonances, use a nominal 1.0 g seismic force.
- .2 Provide flexible conduit connections between floor mounted equipment to be restrained and its adjacent associated electrical equipment.

**END OF SECTION**



**Part 1 General**

**1.1 RELATED SECTIONS**

- .1 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

**1.2 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 – Construction / Demolition Waste Management and Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal materials from landfill to metal recycling facility as approved by Consultant.
- .5 Fold up metal banding, flatten and place in designated area for recycling.

**Part 2 Products**

**2.1 SUPPORT CHANNELS**

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

**Part 3 Execution**

**3.1 INSTALLATION**

- .1 Secure equipment to solid masonry, tile and plaster surfaces with lead anchors.
- .2 Secure equipment to poured concrete with expandable inserts.
- .3 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.
- .4 Secure surface mounted equipment with twist clip fasteners to inverted T bar ceilings. Ensure that T bars are adequately supported to carry weight of equipment specified before installation.
- .5 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.
- .6 Fasten exposed conduit or cables to building construction or support system using straps.
  - .1 One-hole steel straps to secure surface conduits and cables 50 mm and smaller.
  - .2 Two-hole steel straps for conduits and cables larger than 50 mm.
  - .3 Beam clamps to secure conduit to exposed steel work.
- .7 Suspended support systems.
  - .1 Support individual cable or conduit runs with 6 mm dia threaded rods and spring clips.

- .2 Support 2 or more cables or conduits on channels supported by 6 mm dia threaded rod hangers where direct fastening to building construction is impractical.
- .8 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.
- .9 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.
- .10 Do not use wire lashing or perforated strap to support or secure raceways or cables.
- .11 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Consultant.
- .12 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

**END OF SECTION**

**Part 1 General**

**1.1 SHOP DRAWINGS AND PRODUCT DATA**

- .1 Submit shop drawings and product data for cabinets in accordance with Section 01 33 00 - Submittal Procedures.

**1.2 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 – Construction / Demolition Waste Management and Disposal, and with the Waste Reduction Workplan.
- .2 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.
- .3 Fold up metal banding, flatten and place in designated area for recycling.

**Part 2 Products**

**2.1 JUNCTION AND PULL BOXES**

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

**2.2 CABINETS**

- .1 [Not used]

**Part 3 Execution**

**3.1 JUNCTION, PULL BOXES AND CABINETS INSTALLATION**

- .1 Install pull boxes in inconspicuous but accessible locations.
- .2 [Deleted]
- .3 [Deleted]
- .4 Only main junction and pull boxes are indicated. Install pull boxes so as not to exceed 30 m of conduit run between pull boxes.

**3.2 IDENTIFICATION**

- .1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results - Electrical.
- .2 Install size 2 identification labels indicating system name voltage and phase.

**END OF SECTION**





**Part 1        General**

**1.1            REFERENCES**

- .1        CSA C22.1-1998, Canadian Electrical Code, Part 1.

**1.2            WASTE MANAGEMENT AND DISPOSAL**

- .1        Separate and recycle waste materials in accordance with Section 01 74 21 – Construction / Demolition Waste Management and Disposal, and with the Waste Reduction Workplan.
- .2        Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

**Part 2        Products**

**2.1            OUTLET AND CONDUIT BOXES GENERAL**

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

**2.2            SHEET STEEL OUTLET BOXES**

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

**2.3            MASONRY BOXES**

- .1        Electro-galvanized steel masonry single and multi gang boxes for devices flush mounted in exposed block walls.

**2.4            CONCRETE BOXES**

- .1        Electro-galvanized sheet steel concrete type boxes for flush mount in concrete with matching extension and plaster rings as required.

**2.5            CONDUIT BOXES**

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

**2.6            FITTINGS - GENERAL**

- .1        Bushing and connectors with nylon insulated throats.

- .2 Knock-out fillers to prevent entry of debris.
- .3 Conduit outlet bodies for conduit up to 35 mm and pull boxes for larger conduits.
- .4 Double locknuts and insulated bushings on sheet metal boxes.

**Part 3 Execution**

**3.1 INSTALLATION**

- .1 Support boxes independently of connecting conduits.
- .2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.
- .3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.
- .4 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Reducing washers are not allowed.

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES**

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

**1.2 SUBMITTALS**

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

**1.3 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Place materials defined as hazardous or toxic waste in designated containers.
- .3 Ensure emptied containers are sealed and stored safely for disposal away from children.

**Part 2 Products**

**2.1 CABLES AND REELS**

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

## **2.2 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.

## **2.3 CONDUIT FASTENINGS**

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

## **2.4 CONDUIT FITTINGS**

- .1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified.  
Coating: same as conduit.
- .2 Ensure factory "ells" where 90 degrees bends for 25 mm and larger conduits.
- .3 Watertight connectors and couplings for EMT.
  - .1 Set-screws are not acceptable.

## **2.5 EXPANSION FITTINGS FOR RIGID CONDUIT**

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

## **Part 3 Execution**

### **3.1 MANUFACTURER'S INSTRUCTIONS**

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

### **3.2 INSTALLATION**

- .1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.
- .2 Conceal conduits except in mechanical and electrical service rooms in unfinished areas.
- .3 Use rigid galvanized steel threaded conduit except where specified otherwise.

- .4 Use epoxy coated conduit underground in corrosive areas.
- .5 Use electrical metallic tubing (EMT) except in cast concrete above 2.4 m not subject to mechanical injury.
- .6 Use rigid PVC conduit underground in corrosive areas.
- .7 Use flexible metal conduit for connection to motors in dry areas, connection to surface or recessed fluorescent fixtures, and work in movable metal partitions.
- .8 Use liquid tight flexible metal conduit for connection to motors or vibrating equipment in damp, wet or corrosive locations.
- .9 Use explosion proof flexible connection for connection to explosion proof motors.
- .10 Install conduit sealing fittings in hazardous areas. Fill with compound.
- .11 Bend conduit cold:
  - .1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.
- .12 Mechanically bend steel conduit over 19 mm diameter.
- .13 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.
- .14 Install fish cord in empty conduits.
- .15 Remove and replace blocked conduit sections.
  - .1 Do not use liquids to clean out conduits.
- .16 Dry conduits out before installing wire.

### **3.3 SURFACE CONDUITS**

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

### **3.4 CONCEALED CONDUITS**

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

### **3.5 CLEANING**

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**



**Part 1 General**

**1.1 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**

- .1 Submit shop drawings in accordance with Section 26 05 00.

**1.3 COORDINATION OF PROTECTIVE DEVICES, SHORT CIRCUIT, GROUND FAULT AND ARC FLASH STUDY**

- .1 This contract includes an alteration to an existing power system. The coordination documents to include all the existing power devices upstream and in-line to this installation.
- .2 Include all associated costs in this Division for the preparation of a complete system study that shall include of Protective Coordination, Short Circuit, Ground Fault, and Arc Flash. The base and system short circuit study values, electrical coordination curves and breaker settings to be based on the Utility the Manufacturers information.
- .3 The arc flash study shall analyze the Flash Boundary Distance and the range of incident energy based on the calculated available fault current range at each device. The arc flash analysis, short circuit and coordination study shall be performed using the latest version of ETAP or SKM system analysis power tools for Windows software, which meets the calculation requirements of IEEE Std 1584a, NFPA 70E, ANSI C.37, and IEEE Std. 399.
- .4 The Coordination Study and Curves to be sealed by a practicing professional engineer registered in the jurisdiction of the project installation. (Province, Territory, State, etc).
- .5 Documentation to include the following:
  - .1 Available symmetrical fault current including Utility and large motor contribution.
  - .2 Symmetrical withstand current rating for bussing.
  - .3 Transformer damage curves and in-rush for the main power transformers and major distribution transformers.
  - .4 Large Motor starting and damage curves.
  - .5 Breaker interrupting capacities including any cascade arrangements.
  - .6 Transfer switch interrupting or withstand capacity as appropriate.
  - .7 Relay information, manufacturer and type, sensor ratings and tap setting, relay pickup and delay settings.
  - .8 Settings for all breakers having adjustable solid state trips or thermal magnetic trips.
  - .9 Single line of system illustrated on curves. All curves to be justified using upstream and downstream conditions. Provide alternative scenarios where applicable.

- .10 Submit, with the main distribution switchgear and secondary distribution switchboard general arrangement drawings, a complete set of coordination curves. Coordination curves to be submitted prior to selection of primary fuses, main and secondary air circuit breaker trip settings and ground fault relay pick-up and time delay settings.
- .11 Coordination curves to include the main primary feeder protective devices in the utility system, the primary fuses in the main switchgear, transformer damage curves, all main and secondary air circuit breakers.
- .12 Coordination curves to be plotted on log-log graph paper and shall be accomplished by individual time current trip curves of each device.
- .6 The review will not eliminate the responsibility of this Division to provide system coordination and protection.
- .7 Circuit protective devices such as overcurrent trips, relays and fuses to be set to the required values and settings. Prior to final inspection, arrange for the switchgear manufacturer, or the (coordination agency) to visit the site to check all settings to ensure they are in accordance with coordination study values.
- .8 Arc Flash Analysis
  - .1 Perform an arc flash analysis study in conjunction with the previous specified short circuit and protective device coordination study. This arc flash analysis study to be performed in accordance with IEEE Std 1584a.
  - .2 The study shall be calculated by means of a digital computer, using the latest version of applicable software. Pertinent data and the rational employed in developing the calculations shall be incorporated in the introductory remarks of the student.
  - .3 Determine the following for each bus analyzed:
    - .1 Flash Hazard Protection Boundary
    - .2 Incident Energy Level
    - .3 Required Personal Protective Equipment Category
    - .4 Type of Fire Rated Clothing
    - .5 Limited Approach Boundary
    - .6 Restricted Approach Boundary
    - .7 Prohibited Approach Boundary
  - .4 The analysis to include all system panels including 120/208V branch panels

**Part 2 Products**

**2.1 WARNING LABELS**

- .1 Produce an Arc Flash Warning label for each piece of electrical equipment with a specific equipment ID. Also include the system operating voltage and date of issue. Labels shall be printed in colour on adhesive backed nylon labels.



- .2 Provide Arc Flash Warning labels in PDF format to be reviewed by design engineer for acceptance prior to printing.

**Part 3 Execution**

**3.1 ANALYSIS OF SHORT CIRCUIT CALCULATIONS**

- .1 Analyze the short circuit calculations, protective device coordination, and arc flash calculations and highlight an equipment that is determined to be underrated as specified or cause abnormally high incident energy levels. Propose approaches to effectively protect the underrated equipment and to reduce the energy levels. Provide minor modifications to conform with the study (Examples of minor modifications are trip sizes within the same frame, the time curve characteristics of induction relays, CT ranges, etc.). After developing the coordination curves, highlight areas lacking coordination. Present a technical evaluation with a discussion of the logical compromises for best coordination. Proposed major corrective modifications will be taken under advisement by the Engineer, and the Contractor will be given further instructions.

**3.2 ARC FLASH ANALYSIS STUDY**

- .1 Present the data determined by the Arc Flash Analysis Study in a tabular format summary sheet. Include the following for each bus analyzed:
  - .1 Flash Bus Name
  - .2 Protective Device Name
  - .3 Bus Operating Voltage
  - .4 Bus Bolted Fault Current
  - .5 Protective Device Bolted Fault Current
  - .6 Protective Device Arcing Fault Current
  - .7 Trip/Delay Time (Sec)
  - .8 Breaker Opening Time (Sec)
  - .9 Ground
  - .10 Equipment Type
  - .11 Gap (mm)
  - .12 Arc Flash Boundary (in)
  - .13 Working Distance (in)
  - .14 Incident Energy (cal/cm<sup>2</sup>)
  - .15 Required Protective FR Clothing Category

**3.3 FINAL WRITTEN REPORT**

- .1 The results of the power system study shall be summarized in a final written report. The report shall include the following sections:
  - .1 Introduction, executive summary, recommendations, and assumptions



**Part 1 General**

**1.1 SECTION INCLUDES**

- .1 Materials for moulded-case circuit breakers, circuit breakers, ground-fault circuit-interrupters, fused circuit breakers, and accessory high-fault protectors.

**1.2 RELATED SECTIONS**

- .1 Section 01 33 00 - Submittal Procedures
- .2 Section 01 74 21 - Construction/Demolition Waste Management and Disposal

**1.3 REFERENCES**

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

**1.4 SUBMITTALS**

- .1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Include time-current characteristic curves for breakers with interrupting capacity of 22,000 A symmetrical (rms) and over at system voltage.

**1.5 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard and packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .3 Separate for reuse and recycling and place in designated containers Steel, Metal, Plastic waste in accordance with Waste Management Plan.

**Part 2 Products**

**2.1 BREAKERS GENERAL**

- .1 Moulded-case circuit breakers, Circuit breakers, and Ground-fault circuit-interrupters, Fused circuit breakers, and Accessory high-fault protectors: to CSA C22.2 No. 5
- .2 Bolt-on moulded case circuit breaker: quick- make, quick-break type, for manual and automatic operation with temperature compensation for 40 degrees C ambient.
- .3 Common-trip breakers: with single handle for multi-pole applications.
- .4 Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting.
  - .1 Trip settings on breakers with adjustable trips to range from 3-8 times current rating.
- .5 Circuit breakers with interchangeable trips as indicated.
- .6 Circuit breakers to have minimum 18 KA symmetrical rms interrupting capacity rating.

**Part 3 Execution**

**3.1 INSTALLATION**

- .1 Install circuit breakers as indicated.
- .2 Supply and install matching circuit breaker to match the existing CDP and panelboards.  
Existing switchgear unit SHDE is Eaton Pow-r-line C. S.C. rating 25 k.A.
- .3 Check circuit breaker operation in accordance with the manufacturer's requirements.
- .4 Check for breaker installed correspond to short circuit ratings and trip setting in accordance with coordination study, provide coordination study for review prior to field installation.
- .5 Provide *lamicoid* identification for all new breakers.

**END OF SECTION**