



**Public Works and
Government Services Canada**

Requisition No. EZ108-160636

MERX I.D. No. _____

SPECIFICATIONS

For

Electrical Safety Repairs (Arc Flash Mitigation)

Esquimalt Graving Dock,

Victoria, BC

Project No. R.016116.119

March 2015

APPROVED BY:


Regional Manager, A&E Services

2015-07-05

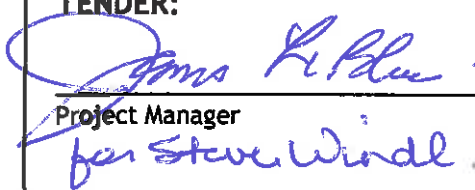
Date


Construction Safety Coordinator

20150704

Date

TENDER:


Project Manager

2015/07/03

Date

for Steve Windle

ISSUED FOR 100% TENDER

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DRAWING NO. DRAWING TITLE

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END OF SECTION 00 00 10

1.1 CODES

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

1.2 DESCRIPTION OF WORK

- .1 Work of this Contract comprises installation of electrical equipment at the Esquimalt Graving Dock, and further identified as:
Electrical Safety Repairs (Arc Flash Mitigation)
Esquimalt Graving Dock, Victoria, BC
Job No. R.016116.119
- .2 Work to be performed under this Contract includes, but is not limited to, the following items covered further in the Contract documents:
 - .1 Supply and installation of digital protection relays and current transformers to replace existing overcurrent protection devices.
 - .2 Supply and installation of replacement molded case and air circuit breakers in existing switchboards.
 - .3 Commissioning and testing of all equipment installed as part of this contract.
 - .4 Demonstration and training of personnel as directed by the Departmental Representative. Refer to Section 01 79 00 Demonstration and Training.
- .3 "Green" requirements:
 - .1 Use only environmentally responsible green materials/ products with no VOC emissions or minimum VOC emissions of indoor off-gassing contaminants for improved indoor air quality - subject of Departmental Representative's approval of submitted MSDS Product Data.
 - .2 Use materials/products containing highest percentage of recycled and recovered materials practicable - consistent with maintaining cost effective satisfactory levels of competition.
 - .3 Adhere to waste reduction requirement for reuse or recycling of waste materials, thus diverting materials from landfill.
- .4 Perform all work in accordance with National Building Code of Canada (NBC) 2012, WorkSafeBC/Workers' Compensation Board (WCB) Regulations and these Contract Documents. Where there is a conflict between Contract Documents and referenced standards, the most stringent will be applied.

1.3 CONTRACT DOCUMENTS

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

1.4 DIVISION OF SPECIFICATIONS

- .1 The specifications are subdivided in accordance with the current 6-digit National Master Specifications System.

- .2 A division may consist of the work of more than 1 subcontractor. Responsibility for determining which subcontractor provides the labour, material, equipment and services required to complete the work rests solely with the Contractor.
- .3 In the event of discrepancies or conflicts when interpreting the drawings and specifications, the specifications govern.

1.5 HOURS OF WORK

- .1 Restrictive as follows:
 - .1 Schedule deconstruction, removal and construction work after normal working hours of the building and during the day on weekends and/or holidays. Normal weekday working hours of the building are 0800 – 1630 hours, Monday to Friday.
 - .2 Notify Departmental Representative of all after hours work, including weekends and holidays.

1.6 WORK SCHEDULE

- .1 Carry on 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, MSDS sheets and samples.
 - .2 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 schedule updated by Contractor in conjunction with and to approval of Departmental Representative.
- .4 Project completion shall be 180 days from award of contract.

1.7 COST BREAKDOWN

- .1 Before submitting the first progress claim, submit a breakdown of the Contract lump sum prices in detail as directed by the Departmental Representative and aggregating Contract price.

1.8 CODES, BYLAWS, STANDARDS

- .1 Perform work in accordance with the Canadian Electrical Code 2012, 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 1 copy each of the following at the job site:
 - .1 Contract drawings.
 - .2 Contract specifications.
 - .3 Addenda to Contract documents.
 - .4 Copy of approved work schedule.
 - .5 Reviewed/approved shop drawings.
 - .6 Change orders.
 - .7 Other modifications to Contract.
 - .8 Field test reports.
 - .9 Reviewed/approved samples.
 - .10 Manufacturers' installation and application instructions.
 - .11 One set of record drawings and specifications for "as-built" purposes.
 - .12 Canadian Electrical Code 2012.
 - .13 Current construction standards of workmanship listed in technical Sections.
 - .14 Contractor Safety Plan.

1.10 REGULATORY REQUIREMENTS

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

1.11 CONTRACTOR'S USE OF SITE

- .1 Use of site:
 - .1 Exclusive and complete for execution of work.
 - .2 Assume responsibility for assigned premises for performance of this work.
 - .3 Be responsible for coordination of all work activities on site, including the work of other contractors engaged by the Departmental Representative such as moving contractors and furniture installers.
- .2 Perform work in accordance with Contract documents. Ensure work is carried out in accordance with indicated phasing.
- .3 Do not unreasonably encumber site with material or equipment.
- .4 A 1-hour site safety orientation to be completed by all workers. Personnel that do not successfully complete the required training are not permitted to enter the site to perform work.

- .5 Limit use of premises for Work, for storage and for access to allow for continuous occupancy of building.
- .6 Co-ordinate use of premises under direction of the Departmental Representative.
- .7 Assume full responsibility for protection and safekeeping of Products under this Contract.
- .8 Do not use any other part of property unless approved in writing by the Departmental Representative.
- .9 Store materials and equipment only where directed by the Departmental Representative. Obtain and pay for use of additional storage and work areas if required.
- .10 Ensure access to assigned lay down or construction areas is maintained for fire and emergency access at all times.
- .11 Protect environment in accordance with requirements described in Section 01 35 43 - Environmental Procedures.
- .12 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.
- .13 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work.
- .14 Condition of existing work at completion of operations to be equal to or better than that which existed before new work started.
- .15 Provide necessary protection and hoarding to prevent unauthorized entry into areas of work at all times by staff and public.
- .16 Inform the Departmental Representative 3 working days prior to performing work inside the building. Entry into areas of work will be by authorized personnel only and must be delineated during execution of work.
- .17 The contractor can have limited access to the site from 7:00 to 17:00. The Departmental Representative will provide and coordinate site access requirements with the Contractor at time of award.
- .18 Adjacent portions of building and property will remain in use during Work.
- .19 Co-operate with the Departmental Representative by scheduling operations to minimize conflict and to facilitate continuous use of building. Do not impede, restrict or obstruct use of building or adjacent portions of property.
- .20 Do work in a manner that will minimize creation of noise that would disturb day-to-day operation of building and adjacent property.
- .21 Locate stationary noise generating equipment as far away as practical from occupied parts of building, or where directed by the Departmental Representative.
- .22 Co-ordinate with the Departmental Representative for necessary shutdown of services affecting occupied parts of building and adjacent property where serviced from building. Provide 72 hours of notice prior to shutdown. Minimize occurrences and durations of shutdowns.
- .23 Co-ordinate with the Departmental Representative to ensure that construction activities do not compromise security of building and site.

- .24 Ensure that construction activities do not compromise other active systems within the building and site.

1.12 EXAMINATION

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

1.13 LOCATION OF EQUIPMENT AND FIXTURES

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

1.14 CUTTING AND PATCHING

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

1.15 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.

1.16 ACCEPTANCE OF SUBSTRATES

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

1.17 QUALITY OF WORK

- .1 Ensure that quality workmanship is performed through use of skilled tradesmen, under supervision of qualified journeyman.
- .2 The workmanship, erection methods and procedures to meet minimum standards set out in the National Building Code of Canada 2010 and local Construction Standards.
- .3 In cases of dispute, decisions as to standard or quality of work rest solely with the Departmental Representative, whose decision is final.

1.18 WORKS COORDINATION

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

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

1.19 APPROVAL OF SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

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

1.20 RELICS AND ANTIQUITIES

- .1 Relics and antiquities and items of historical or scientific interest shall remain property of Department. Protect such articles and request directives from Departmental Representative.
- .2 Give immediate notice to Departmental Representative if evidence of archeological finds are encountered during excavation/construction, and await Departmental Representative's written instructions before proceeding with work in this area.

1.21 SECURITY CLEARANCES

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

1.22 PROJECT MEETINGS

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

1.23 TESTING AND INSPECTIONS

- .1 The Contractor will appoint and pay for the services of the factory technical representative for the following:
 - .1 Inspection and testing required of individual door controllers.
 - .2 Inspection and testing of the system software.
 - .3 Testing, adjustment and balancing of overhead door/gate and associated electrical equipment and systems.
 - .1 Tests specified to be carried out by Contractor under the Departmental Representative's supervision.
- .2 Contractor shall furnish labour and facilities to:
 - .1 Notify Departmental Representative in advance of planned testing.
- .3 Pay costs for uncovering and making good work that is covered before required inspection or testing is completed and approved by Departmental Representative.
- .4 Provide Departmental Representative with 2 copies of testing and commissioning reports as soon as they are available.

1.24 AS-BUILT DOCUMENTS

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

1.25 CLEANING

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

1.26 DUST CONTROL

- .1 Provide temporary dust tight screens or partitions to localize dust generating activities, and for protection of workers, finished areas of work and public.

- .2 Protect furnishings within work area with polyethylene film during construction. Remove film during non- construction hours and leave premises in clean, unencumbered and safe manner for normal daytime function.
- .3 Maintain and relocate protection until such work is complete.

1.27 ENVIRONMENTAL PROTECTION

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

1.28 MAINTENANCE MATERIALS, SPECIAL TOOLS AND SPARE PARTS

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

1.29 ADDITIONAL DRAWINGS

- .1 The Departmental Representative may furnish additional drawings for clarification. These additional drawings have the same meaning and intent as if they were included with plans referred to in the Contract documents.
- .2 Upon request, Departmental Representative may furnish up to a maximum of 10 sets of Contract documents for use by the Contractor at no additional cost. Should more than 10 sets of documents be required the Departmental Representative will provide them at additional cost.

1.30 BUILDING SMOKING ENVIRONMENT

- .1 Smoking on the site is not permitted.

1.31 SYSTEM OF MEASUREMENT

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

1.32 FAMILIARIZATION WITH SITE

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

1.33 SUBMISSION OF TENDER

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

END OF SECTION

Part 1 General

1.1 FACILITY OPERATIONS AND SECURITY PROCEDURES

- .1 All construction staff shall become thoroughly familiar with and abide by all provisions and requirements of Esquimalt Graving Dock's Operations, Safety and Security Procedures and Restrictions.
 - .1 The parking area(s) to be used by construction employees will be designated by the Director of EGD. Parking in other locations will be prohibited and vehicles may be subject to removal.
 - .2 Speed limits are posted on site. Failure to abide by site speed limits may result in removal of employee and vehicle from site.
 - .3 EGD is under surveillance at all times on closed circuit TV. All activities are monitored internally for security purposes. All construction staff should be advised that they are being recorded.
 - .4 Director of EGD may require photographs to be taken for construction identification badges used to access the site.
 - .5 EGD enforces a zero tolerance policy for the following misbehavior:
 - .1 Appear to be under the influence of alcohol, drugs or narcotics.
 - .2 Behave in an unusual or disorderly manner.
 - .3 In possession of contraband.
- .2 Cooperate with and coordinate construction/demolition activities with Esquimalt Graving Dock.

1.2 ACCESS AND EGRESS

- .1 Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders and scaffolding, independent of finished surfaces and in accordance with relevant Federal, municipal, provincial and other regulations.
- .2 Provide hoarding, and scaffolding plan for Departmental Representative to review 5 business days prior to installation.

1.3 USE OF SITE AND FACILITIES

- .1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated.
- .2 Maintain existing services to building and provide for personnel and vehicle access.
- .3 Where security is reduced by work, provide temporary means to maintain security as per Departmental Representatives direction.
- .4 Closures: protect work temporarily until permanent enclosures are completed.
- .5 The entire dockyard will be occupied by the public, government staff and other PWGSC construction contractors and other dock lease operations during entire construction period.
- .6 Coordinate with Departmental Representative in scheduling operations to minimize conflict and to facilitate use of space.

1.4 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

- .1 Execute work with least possible interference or disturbance to Esquimalt Graving Dock's operations, occupants, and normal use of pump house. Arrange with Departmental Representative to facilitate execution of work.

1.5 EXISTING SERVICES

- .1 Notify, Departmental Representative and utility companies of intended interruption of services and obtain required permission.
- .2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 3 working days of notice for necessary interruption of civil, mechanical or electrical service throughout course of work. Keep duration of interruptions minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends.
 - .1 Optimize and plan shut-downs so that services are restored in time for normal facility operation hours. Coordinate all shut-downs with utility providers and facility users.
 - .2 Contractor shall be held responsible for damages to facility equipment as the result of service shut-downs.
 - .3 Contractor shall be held responsible for any and all unscheduled shut-downs of building utilities and services.
 - .4 Contractor will not be allowed to connect to Departmental Representative's existing data and communication services.
 - .5 Submit a "Fire Alarm Bypass" request to Departmental Representative 3 working days in advance for approval.
 - .6 Obtain permission from Departmental Representative for access to restricted areas outside the construction zones 3 working days in advance.
- .3 Provide for personnel and vehicular traffic.

1.6 BUILDING SMOKING ENVIRONMENT

- .1 Comply with smoking restrictions. Smoking is not permitted within Esquimalt Graving Dock.

1.7 NOISE CONTROL

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

END OF SECTION

Part 1 General

- .1 This section includes the following:
 - .1 Coordination of Work under administration of Departmental Representative.
 - .2 Scheduled Pre-construction and Site meetings.
 - .3 Project planning and construction schedule.
 - .4 Site progress monitoring and control.

1.1 DESCRIPTION

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

1.2 PRE-CONSTRUCTION MEETING

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

1.3 PROJECT PLANNING

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

1.4 SCHEDULES

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

1.5 CONSTRUCTION SITE MEETINGS

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

1.6 WALK THROUGH FIELD REVIEW BY DEPARTMENTAL REPRESENTATIVE

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

1.7 SUBMITTALS

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

1.8 CLOSEOUT PROCEDURES

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

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE

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

1.2 PRE- CONSTRUCTION MEETING

- .1 Within 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, members of the EGD Project Management Office (PMO) and Contractor.
- .3 Departmental Representative to establish time and location of preconstruction meeting, Contractor to notify parties concerned a minimum of 4 working days before meeting.
- .4 Departmental Representative will chair the meeting, record minutes and issue minutes.
- .5 Agenda to include:
 - .1 Introduction of official representative of participants in the Work.
 - .2 Start date on site.
 - .3 Communication Protocol for submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
 - .4 EGD Security requirements.
 - .5 Communication Protocol for proposed changes, change orders, procedures, approvals required.
 - .6 Owner's Work.
 - .7 Record drawings in accordance with Section 01 78 00 - Closeout Submittals.

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

1.3 PROGRESS MEETINGS

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

END OF SECTION

1.1 SCHEDULES REQUIRED

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

1.2 FORMAT

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

1.3 SUBMISSION

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

1.4 SCHEDULING

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

1.5 PROGRESS REPORTS

- .1 Maintain accurate record of the progress of the Work. Submit progress reports at times requested by the Departmental Representative.
- .2 Include in reports dates of commencement and percentage of work completed for different parts of the Work.

1.6 STAFFING AND OVERTIME

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

1.7 SUBMITTALS SCHEDULE

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

END OF SECTION

1.1 APPROVALS

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

1.2 GENERAL

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

1.3 SUBMISSION REQUIREMENTS

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

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

1.4 SHOP DRAWINGS

- .1 Shop drawings: original drawings or modified standard drawings provided by Contractor to illustrate details of portion of work which are specific to project requirements.
- .2 Maximum sheet size: 850 x 1050 mm.
- .3 Submit 6 prints of shop drawings for each requirement requested in specification sections and/or as requested by Departmental Representative.
- .4 Cross-reference shop drawing information to applicable portions of Contract documents.

1.5 SHOP DRAWINGS REVIEW

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

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

1.6 PRODUCT DATA

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

1.7 SAMPLES

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

1.8 PROGRESS SCHEDULE

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

1.9 SUSTAINABLE (GREEN) REQUIREMENTS SUBMITTALS

- .1 Provide submittals to show compliance with waste management and disposal requirements in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- .2 Submit 6 copies of documentation.

END OF SECTION

Part 1 General**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 2010):
 - .1 Part 8, Safety Measures at Construction and Demolition Sites.
- .3 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 Fire Protection Engineering Services, HRSDC:
 - .1 FCC No. 301, Standard for Construction Operations.
 - .2 FCC No. 302, Standard for Welding and Cutting.
- .5 American National Standards Institute (ANSI):
 - .1 ANSI A10.3, Operations – Safety Requirements for Powder-Actuated Fastening Systems.
- .6 Province of British Columbia:
 - .1 Workers Compensation Act Part 3-Occupational Health and Safety.
 - .2 Occupational Health and Safety Regulation
- .7 Current B.C. Electrical Code

1.2 RELATED SECTIONS

- .1 Construction Progress Schedule Bar (GANTT) Chart Section 01 32 17
- .2 Submittal 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 PWGSC may terminate the Contract without liability to PWGSC where the Contractor, in the opinion of PWGSC, refuses to comply with a requirement of the Workers' Compensation Act or the Occupational Health and Safety Regulations.
- .2 It is the Contractor's responsibility to ensure that all workers are qualified, competent and certified to perform the work as required by the Workers' Compensation Act or the Occupational Health and Safety Regulations.

1.5 SUBMITTALS

- .1 Submit to Departmental Representative submittals listed for review. In accordance with Section 01 33 00.
- .2 Work effected by submittal shall not proceed until review is complete.
- .3 Submit the following:
 - .1 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 Material Safety Data Sheets (MSDS), and all other documentation required by Workplace Hazardous Material Information System (WHMIS) requirements.
 - .5 Emergency Procedures.
- .4 The Departmental Representative will review the Contractor's site-specific project Health and emergency procedures, and provide comments to the Contractor within 2 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 Health and Safety Plan, and any revised version, to the Departmental Representative is for information and reference purposes only. It shall not:
 - .1 Be construed to imply approval by the Departmental Representative.
 - .2 Be interpreted as a warranty of being complete, accurate and legislatively compliant.
 - .3 Relieve the Contractor of his legal obligations for the provision of health and safety on the project.

1.6 RESPONSIBILITY

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

1.7 HEALTH AND SAFETY COORDINATOR

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

- .2 Be responsible for implementing, daily enforcing, and monitoring the site-specific 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 as deemed necessary to protect site against entry.

1.9 PROJECT/SITE CONDITIONS

- .1 The Esquimalt Graving Dock is a dry dock and ship repair facility. It is an industrial site wherein industrial, manufacturing, fabrication, heavy construction, and like works are conducted by a variety of contractors and sub-trades for a variety of owners and/or the Departmental Representative.
- .2 Work at site will involve a number of hazards known to PWGSC as noted in the Preliminary Job hazard Analysis in Appendix C attached. This site may involve contact with hazardous and/or toxic materials and substances such as but not limited to:
 - .1 Waste sandblast grit.
 - .2 Paint spray, including solvents and mineral spirits.
 - .3 Waste water.
 - .4 Contaminated soils and debris
 - .5 Polychlorinated biphenyl (PCB)
 - .6 Creosote and creosote materials.
 - .7 Asbestos.
 - .8 Lead paints and other paints containing toxic substances such as arsenic and carcinogens.
- .3 Other safety hazards or risks which may be encountered include, but are not limited to:
 - .1 Contact with traveling and mobile cranes, forklifts, manlifts and other motorized vehicles.
 - .2 Overhead hazards such as that created by material transported by cranes.
 - .3 Fall hazards.
 - .4 Drowning hazards.
 - .5 Confined space hazards.
 - .6 Electrical hazards.

- .7 Contact with operating mechanical, electrical, electronic, pneumatic, thermal, and hydraulic machinery and equipment.
- .8 Fire hazards.

1.10 REGULATORY REQUIREMENTS

- .1 Comply with specified codes, acts, bylaws, standards and regulations to ensure safe operations at site.
- .2 In event of conflict between any provision of the above authorities, the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, the Departmental Representative will advise on the course of action to be followed.

1.11 WORK PERMITS

- .1 Obtain specialty trade permits related to project before start of work.

1.12 FILING OF NOTICE

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

1.13 HEALTH AND SAFETY PLAN

- .1 Conduct a site-specific hazard assessment based on review of Contract documents, required work, and project site. Identify any known and potential health risks and safety hazards.
- .2 Prepare and comply with a site-specific project Health and Safety Plan based on hazard assessment, including, but not limited to, the following:
 - .1 Primary requirements:
 - .1 Contractor's safety policy.
 - .2 Identification of applicable compliance obligations.
 - .3 Definition of responsibilities for project safety/organization chart for project.
 - .4 General safety rules for project.
 - .5 Job-specific safe work, procedures.
 - .6 Inspection policy and procedures.
 - .7 Incident reporting and investigation policy and procedures.
 - .8 Occupational Health and Safety Committee/Representative procedures.
 - .9 Occupational Health and Safety meetings.
 - .10 Occupational Health and Safety communications and record keeping procedures.
 - .2 Summary of health risks and safety hazards resulting from analysis of hazard assessment, with respect to site tasks and operations which must be performed as part of the work.
 - .3 List hazardous materials to be brought on site as required by work.

- .4 Indicate Engineering and administrative control measures to be implemented at the site for managing identified risks and hazards.
- .5 Identify personal protective equipment (PPE) to be used by workers.
- .6 Identify personnel and alternates responsible for site safety and health.
- .7 Identify personnel training requirements and training plan, including site orientation for new workers.
- .3 Develop the plan in collaboration with all subcontractors. Ensure that work/activities of subcontractors are included in the hazard assessment and are reflected in the plan.
- .4 Revise and update Health and Safety Plan as required, and re-submit to the Departmental Representative.
- .5 Departmental Representative's review: the review of Health and Safety Plan by Public Works and Government Services Canada (PWGSC) shall not relieve the Contractor of responsibility for errors or omissions in final Health and Safety Plan or of responsibility for meeting all requirements of construction and Contract documents.

1.14 EMERGENCY PROCEDURES

- .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 and site staff.
- .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 and site staff.
- .3 Provide written rescue/evacuation procedures as required for, but not limited to:
 - .1 Work at high angles.
 - .2 Work in confined spaces or where there is a risk of entrapment.
 - .3 Work with hazardous substances.
 - .4 Underground work.
 - .5 Work on, over, under and adjacent to water.
 - .6 Workplaces where there are persons who require physical assistance to be moved.
- .4 Design and mark emergency exit routes to provide quick and unimpeded exit.

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

1.15 HAZARDOUS PRODUCTS

- .1 Comply with requirements of Workplace Hazardous Materials Information system (WHMIS) regarding use, handling, storage and disposal of hazardous materials, and regarding labeling 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 Esquimalt Graving Dock Staff have left the building.
 - .3 Provide adequate means of ventilation in accordance with Section 01 51 00.

1.16 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.

1.17 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.

1.18 OVERLOADING

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

1.19 CONFINED SPACES

- .1 Carry out work in confined spaces in compliance with Occupational Health and Safety Regulation, Part 9.

1.20 POWDER-ACTUATED DEVICES

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

1.21 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.

1.22 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.

1.23 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.

1.24 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.

1.25 POSTED DOCUMENTS

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

1.26 MEETINGS

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

1.27 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".

END OF SECTION

Part 1 General

1.1 DEFINITIONS

- .1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade environment aesthetically, culturally and/or historically.
- .2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.2 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prior to commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Departmental Representative. Environmental Protection Plan is to present comprehensive overview of known or potential environmental issues which must be addressed during construction.
- .3 Address topics at level of detail commensurate with environmental issue and required construction tasks.
- .4 Environmental protection plan to include:
 - .1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.
 - .2 Names and qualifications of persons responsible for manifesting contaminated soils and hazardous waste to be removed from site.
 - .3 Names and qualifications of persons responsible for training site personnel.
 - .4 Descriptions of environmental protection personnel training program.
- .5 Erosion and sediment control plan which identifies type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.
- .6 Traffic control plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Plans include measures to minimize amount of mud transported onto paved public roads by vehicles or runoff.
- .7 Spill Control Plan: including procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.
- .8 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.

- .9 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, do not become air borne and travel off project site.
- .10 Contaminant prevention plan that: identifies potentially hazardous substances to be used on job site; identifies intended actions to prevent introduction of such materials into air, water, or ground; and details provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.
- .11 Waste water management plan that identifies methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.

1.3 FIRES

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

1.4 DISPOSAL OF WASTES

- .1 Do not bury rubbish and waste materials on site.
- .2 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways.

1.5 DRAINAGE

- .1 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.
- .2 Do not pump water containing suspended materials into waterways, sewer or drainage systems.
- .3 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.6 WORK ADJACENT TO WATERWAY

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

1.7 POLLUTION CONTROL

- .1 Maintain temporary erosion and pollution control features installed under this contract.
- .2 Control emissions from equipment and plant to local authorities' emission requirements.
- .3 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

1.8 HISTORICAL/ARCHAEOLOGICAL CONTROL

- .1 Give immediate notice to the Departmental Representative if evidence of archaeological finds are encountered during construction and await written instructions before proceeding with work in the vicinity of any such finds.
- .2 Relics, antiquities and items of historical or scientific interest shall remain the property of the Crown. Protect such articles and request directives from the Departmental Representative.

1.9 NOTIFICATION

- .1 Departmental Representative will notify Contractor in writing of observed non-compliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.
- .2 Contractor: after receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.
- .3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.
- .4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

1.10 SPILLS OR RELEASE OF DELETERIOUS SUBSTANCES

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

- .11 Limit of work activities to normal business hours to minimize noise outside of those hours. Ensure that equipment and machinery is properly maintained to minimize unnecessary noise pollution. Consider local municipal noise bylaws when mobilizing equipment.
- .12 All utilities must be located prior to excavation.

1.11 IMPORT OF FILL MATERIAL

- .1 Prior to import of any material used for surfacing, backfilling or any other use requiring fill material the Contractor will provide sufficient documentation, as agreed on by Departmental Representative, to ensure that the imported material meets the Canadian Council of Ministers of the Environment (CCME) Residential/Parkland (RL/PL) Land Usage Soil Quality Guidelines.
- .2 Environmental characterization of fill material must be conducted in accordance with the following: British Columbia, Ministry of Environment, Technical Guidance Document #1 – Site Characterization and Confirmation Testing.
- .3 Prior to import of any material the Contractor must inform the Departmental representative of the proposed fill source(s) and identify the nature of current and historic activities conducted at the source.
- .4 The Departmental Representative reserves the right to request additional testing of imported material at the source and at the deposit site to satisfy their requirements. All testing will be done at the Contractor's cost.
- .5 All material brought to the site that does not meet the CCME RL/PL Guidelines will be removed from the property immediately at the Contractors cost.

END OF SECTION

1.1 INSPECTION

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

1.2 ACCESS TO WORK

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

1.3 REJECTED WORK

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

1.4 REPORTS

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

END OF SECTION

1.1 PRODUCTS/MATERIAL AND EQUIPMENT

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

1.2 QUALITY OF PRODUCTS

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

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

1.3 AVAILABILITY OF PRODUCTS

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

1.4 MANUFACTURER INSTRUCTIONS

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

1.5 CONTRACTOR'S OPTIONS FOR SELECTION OF PRODUCTS FOR TENDERING

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

1.6 SUBSTITUTION AFTER CONTRACT AWARD

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

END OF SECTION

Part 1 General

1.1 EXISTING SERVICES

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

1.2 LAYOUT

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

1.3 LOCATION OF EQUIPMENT AND FIXTURES

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

1.4 RECORDS

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

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

1.1 SUBMITTALS

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

1.2 INCLUDE IN REQUEST:

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

1.3 MATERIALS

- .1 Required for original installation.

1.4 PREPARATION

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

1.5 EXECUTION

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

moisture-resistant elements, and sight-exposed surfaces.

- .8 Restore work with new products in accordance with requirements of Contract Documents.
- .9 Include cost of making good all surfaces, substrates and work disturbed by removal of existing work and by installation of new work.

1.6 MATCHING TO EXISTING WORK

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

1.7 SETTING OUT OF WORK

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

1.8 LOCATION OF EQUIPMENT AND FIXTURES

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

END OF SECTION

1.1 PROJECT CLEANLINESS

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

1.2 FINAL CLEANING

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

END OF SECTION

1.1 RELATED WORK

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

1.2 DEFINITIONS

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

1.3 MATERIALS SOURCE SEPARATION

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

1.4 DIVERSION OF MATERIALS

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

1.5 STORAGE, HANDLING AND APPLICATION

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

END OF SECTION

1.1 INSPECTION AND DECLARATION

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

END OF SECTION

1.1 SUBMISSION

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

1.2 FORMAT

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

1.3 CONTENTS, EACH VOLUME

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

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

1.4 RECORD DOCUMENTS

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

1.5 EQUIPMENT AND SYSTEMS

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

1.6 MANUFACTURER DOCUMENTATION REPORTS

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

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

1.7 SPARE PARTS

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

1.8 MAINTENANCE MATERIALS

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

1.9 WARRANTIES, BONDS, TEST REPORTS, INSPECTION REPORTS

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

1.10 COMPLETION

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

.5 Work is complete and ready for final inspection.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

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

1.2 RELATED SECTIONS

- .1 Section 01 78 00 - Closeout Submittals.
- .2 Section 01 91 13 – General Commissioning (Cx) Requirements.
- .3 Section 01 91 31 –Commissioning (Cx) Plan.
- .4 Section 01 91 33 – Commissioning: Forms.
- .5 Section 01 91 41 – Commissioning: Training.

1.3 DESCRIPTION

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

1.4 QUALITY CONTROL

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

1.5 SUBMITTALS

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

1.6 CONDITIONS FOR DEMONSTRATIONS

- .1 Equipment has been inspected and put into operation in accordance with Manufacturer's recommendations.
- .2 Testing, adjusting, and balancing has been performed in accordance with Section 01 91 13 - General Commissioning (Cx) Requirements and equipment and systems are fully operational.
- .3 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

1.7 PREPARATION

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

1.8 DEMONSTRATION AND INSTRUCTIONS

- .1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at scheduled times, at the equipment location.
- .2 Instruct personnel in all phases of operation and maintenance using operation and maintenance manuals as the basis of instruction.
- .3 Review contents of manual in detail to explain all aspects of operation and maintenance.
- .4 Prepare and insert additional data in operations and maintenance manuals when the need for additional data becomes apparent during instructions.
- .5 Training and demonstration will be performed by manufacturers representative and will include actual interaction with all systems requiring software or computer interface.

1.9 TIME ALLOCATED FOR INSTRUCTIONS

- .1 Contractor shall provide for a total of one working day of demonstration and training for all systems in the project, including but not limited to:
 - .1 Protection Relays
 - .2 Ground Fault Protection Devices
 - .3 Air Circuit Breakers
 - .4 Molded Case Circuit Breakers
 - .5 Secondary current injection tester for circuit breakers

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General**1.1 SUMMARY****.1 Section Includes:**

General requirements relating to commissioning of project's components and systems, specifying general requirements to Performance Verification of components, equipment, sub-systems, systems, and integrated systems.

.2 Acronyms:

- .1 AFD - Alternate Forms of Delivery, service provider.
- .2 BMM - Building Management Manual.
- .3 Cx - Commissioning.
- .4 EMCS - Energy Monitoring and Control Systems.
- .5 O&M - Operation and Maintenance.
- .6 PI - Product Information.
- .7 PV - Performance Verification.
- .8 TAB - Testing, Adjusting and Balancing.

1.2 REFERENCE**.1 Public Works and Government Services Canada (PWGSC)**

- .1 PWGSC-Commissioning Manual CP.1 - 4th edition-06.
- .2 ANSI/NETA Standard for Maintenance Testing Specifications for Electrical Power Distribution Equipment and Systems.

1.3 GENERAL**.1 Cx is a planned program of tests, procedures and checks carried out systematically on systems and integrated systems of the finished Project. Cx is performed after systems and integrated systems are completely installed, functional and Contractor's Performance Verification responsibilities have been completed and approved. Objectives:**

- .1 Verify installed equipment, systems and integrated systems operate in accordance with contract documents and design criteria and intent.
- .2 Ensure appropriate documentation is compiled into the BMM.
- .3 Effectively train O&M staff.

.2 Cx is to be performed by an independent third party after work is completed and prior to energizing any equipment. The independent third party must have performed similar HV work for a minimum of 5 years. Contractor shall provide documentation attesting to the qualifications and experience of the proposed Testing Agency(ies) performing all commissioning work and preparing commissioning documents. These references shall be reviewed by the Consultant and Departmental Representative confirming the suitability of the Testing Agencies. The Testing Agency may only be engaged after review and approval of these documents by the Consultant and Departmental Representative.

- .3 Retain the services of a qualified Testing Agency to carry out the tests and calibration as required herein. Testing Agency shall be familiar with NETA Standards as specified herein and shall have accreditation equivalent to a full NETA member company:
 - .1 This project shall only be undertaken by firms familiar with and having a long and demonstrable successful track record in the field of switchgear and transformer modification and installation, protection and control, and arc flash mitigation. The proponent shall be experienced in working with an industrial type primary voltage distribution system using parallel feeders. Provide documented experience on projects of this type.
 - .2 All protection settings must be reviewed by a Professional Engineer registered in British Columbia who is an employee of Testing Agency. Provide documentation naming this individual along with their credentials.
 - .3 All work must be performed by qualified technicians/electricians with applicable accreditation for the appropriate permitting required. Provide a list of all personnel and their qualifications.
 - .4 Provide three references, including contact information for completed projects similar to this in scope and technical content.
- .4 Furnish Independent Testing agency professional engineer's letter confirming that entire installation as it pertains to each system has been installed to manufacturer's instructions. The letter is to be submitted stamped by a Professional Engineer, registered in BC, and provided to the Departmental Representative
- .5 Employ only personnel who are qualified and experienced in high voltage work. Personnel must be familiar with the equipment and procedures necessary to complete the work as specified herein.
- .6 Contractor assists in Cx process, operating equipment and systems, troubleshooting and making adjustments as required.
 - .1 Systems to be operated at full capacity under various modes to determine if they function correctly and consistently at peak efficiency. Systems to be interactively with each other as intended in accordance with Contract Documents and design criteria.
 - .2 During these checks, adjustments to be made to enhance performance to meet environmental or user requirements.
- .7 Design Criteria: as per client's requirements or determined by designer to meet Project functional and operational requirements.

1.4 COMMISSIONING OVERVIEW

- .1 Cx to be a line item of General Contractor's cost breakdown.
- .2 Cx activities supplement field quality and testing procedures described in relevant technical sections.
- .3 Cx is to ensure the built facility is constructed and proven to operate satisfactorily under weather, environmental and occupancy conditions to meet functional and operational requirements. Cx activities includes transfer of critical knowledge to facility operational personnel.

- .4 Complete all start-up and verification of systems prior to review by Commissioning Agent.
 - .1 To bring mechanical, electrical and building architectural systems and components from a state of static completion to a state of dynamic operation.
 - .2 To verify conformance to contract requirements.
 - .3 To confirm installations meet requirements of Contract Documents.
 - .4 To provide all testing documents and records.
 - .5 To ensure completed facility meets contract requirements.
 - .6 To provide a documented operator training program.
 - .7 To verify accuracy of project record drawings and operating and maintenance manuals.
- .5 Departmental Representative will issue Interim Acceptance Certificate of Substantial Completion when:
 - .1 Completed Cx documentation has been received, reviewed for suitability and approved by Departmental Representative.
 - .2 Equipment, components and systems have been commissioned.
 - .3 O&M training has been completed.

1.5 NON-CONFORMANCE TO PERFORMANCE VERIFICATION REQUIREMENTS

- .1 Should equipment, system components, and associated controls be incorrectly installed or malfunction during Cx, correct deficiencies, re-verify equipment and components within the unfunctional system, including related systems as deemed required by Departmental Representative, Departmental Representative to ensure effective performance.
- .2 Costs for corrective work, additional tests, inspections, to determine acceptability and proper performance of such items to be borne by General Contractor. Above costs to be in form of progress payment reductions or hold-back assessments.

1.6 PRE-CX REVIEW

- .1 Before Construction:
 - .1 Review contract documents, confirm by writing to Departmental Representative.
 - .1 Adequacy of provisions for Cx.
 - .2 Aspects of design and installation pertinent to success of Cx.
- .2 During Construction:
 - .1 Co-ordinate provision, location and installation of provisions for Cx.
- .3 Before start of Cx:
 - .1 Have completed Cx Plan up-to-date.
 - .2 Ensure installation of related components, equipment, sub-systems, systems is complete.
 - .3 Fully understand Cx requirements and procedures.
 - .4 Have Cx documentation shelf-ready.

- .5 Understand completely design criteria and intent and special features.
- .6 Submit complete start-up documentation to Departmental Representative.
- .7 Have Cx schedules up-to-date.
- .8 Ensure systems have been cleaned thoroughly.
- .9 Complete TAB procedures on systems, submit TAB reports to Departmental Representative for review and approval.
- .10 Submit factory testing report of Electrical Equipment to Departmental Representative for review and approval.
- .11 Ensure "As-Built" system schematics are available.
- .12 Conduct coordination and protection study of upstream breakers, as indicated in drawings, to determine if trip settings are adequate for additional demand. Determine trip setting adjustments and where required re-set breakers accordingly.
- .4 Inform Departmental Representative in writing of discrepancies and deficiencies on finished works.

1.7 CONFLICTS

- .1 Report conflicts between requirements of this section and other sections to Departmental Representative before start-up and obtain clarification.
- .2 Failure to report conflict and obtain clarification will result in application of most stringent requirement.

1.8 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Submit no later than 4 weeks after award of Contract:
 - .1 Name of Contractor's Cx agent.
 - .2 Draft Cx documentation.
 - .3 Preliminary Cx schedule.
 - .2 Request in writing to Departmental Representative for changes to submittals and obtain written approval at least 8 weeks prior to start of Cx.
 - .3 Submit proposed Cx procedures to Departmental Representative where not specified and obtain written approval at least 8 weeks prior to start of Cx.
 - .4 Provide additional documentation relating to Cx process required by Departmental Representative, specifically;
 - .1 Cx Plan and Schedule
 - .2 Accepted Shop drawings
 - .3 Completed PI forms
 - .4 Approved TAB report
 - .5 Approved PV forms
 - .6 Approved O&M manuals
 - .7 Approved System and Integrated System Test Report
 - .8 Approved Factory testing reports

- .9 Approved Training and Attendance forms
- .10 Accepted "As-built" Plans and Specifications
- .11 Final Cx Report

1.9 COMMISSIONING DOCUMENTATION

- .1 Refer to Section 01 91 33 - Commissioning (Cx) Forms: Installation Check Lists and Product Information (PI) / Performance Verification (PV) Forms for requirements and instructions for use.
- .2 General Contractor to review and approve Cx documentation submitted by Cx Agent prior to submission to Departmental Representative for review.
- .3 Provide completed and approved Cx documentation to Departmental Representative.

1.10 COMMISSIONING SCHEDULE

- .1 Provide detailed Cx schedule as part of construction schedule in accordance with Section 01 32 17 Construction Progress Schedule Bar (GANTT Chart).
- .2 Provide adequate time for Cx activities prescribed in technical sections and commissioning sections including:
 - .1 Approval of Cx reports.
 - .2 Verification of reported results.
 - .3 Repairs, retesting, re-commissioning, re-verification.
 - .4 Training.

1.11 COMMISSIONING MEETINGS

- .1 Convene Cx meetings following project meetings: Section 01 32 17 Construction Progress Schedule Bar (GANTT Chart) and as specified herein.
- .2 Purpose: to resolve issues, monitor progress, identify deficiencies, relating to Cx.
- .3 Continue Cx meetings on regular basis until commissioning deliverables have been addressed.
- .4 At 60% construction completion stage. Section 01 32 17 Construction Progress Schedule Bar (GANTT Chart). General Contractor to call a separate Cx scope meeting to review progress, discuss schedule of equipment start-up activities and prepare for Cx. Issues at meeting to include:
 - .1 Review duties and responsibilities of General Contractor and subcontractors, addressing delays and potential problems.
 - .2 Determine the degree of involvement of trades and manufacturer's representatives in the commissioning process.
- .5 Thereafter Cx meetings to be held until project completion and as required during equipment start-up and functional testing period.
- .6 Meeting will be chaired by General Contractor with their Commissioning Agent, who will record and distribute minutes.
- .7 Ensure subcontractors and relevant manufacturer representatives are present at 60% and subsequent Cx meetings and as required.

1.12 STARTING AND TESTING

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

1.13 WITNESSING OF STARTING AND TESTING

- .1 Provide 14 days' notice prior to commencement.
- .2 Departmental Representative to witness of start-up and testing.
- .3 Departmental Representative shall be advised of and shall be in attendance during energization of any and all equipment as part of this project.
- .4 General Contractor's Cx Agent to be present at tests performed and documented by sub-trades, suppliers and equipment manufacturers.
 - .1 Minimum of 5 years experience in design, installation and operation of equipment and systems.
 - .2 Ability to interpret test results accurately.
 - .3 To report results in clear, concise, logical manner.

1.14 PROCEDURES

- .1 Verify that equipment and systems are complete, clean, and operating in normal and safe manner prior to conducting start-up, testing and Cx.
- .2 Conduct start-up and general testing in following distinct phases:
 - .1 Included in delivery and installation
 - .1 Verification of conformity to specification, approved shop drawings and completion of PI report forms.
 - .2 Visual inspection of quality of installation.
 - .2 Prior to startup:
 - .1 Insulation resistance test and continuity test of all new cables and all cables with connections changed during construction
 - .2 All high voltage terminations tested with infrared imaging. Spot temperature readings are not acceptable
 - .3 Refer to the NETA Acceptance Testing specifications for detailed commissioning requirements for the following equipment:
 - .1 Switches, Air, Low Voltage
 - .2 Circuit Breakers, Air, Insulated/Molded Case
 - .3 Circuit Breakers, Air, Low-Voltage Power
 - .4 Instrument Transformers
 - .5 Metering Devices, Microprocessor-Based
 - .6 Protective Relays, Microprocessor-Based
 - .4 Startup: follow accepted start-up procedures.
 - .5 Operational testing: document equipment performance.
 - .6 System PV: include repetition of tests after correcting deficiencies.
 - .7 Post-substantial performance verification: to include fine-tuning.

- .3 Conduct following tests in accordance with Section 01 45 00 - Quality Control.
 - .1 Power distribution system including phasing, voltage, grounding and load balancing.
 - .2 Circuits originating from branch distribution panels.
 - .3 Lighting and its control.
 - .4 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.
 - .5 Systems: fire alarm system communications.
 - .6 Insulation resistance testing:
 - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
 - .2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
 - .3 Megger 600-2.4kV circuits, feeder and equipment with a 5000V instrument.
 - .4 Check resistance to ground before energizing.
- .4 Conduct additional start-up and specific testing in following:
 - .1 Provide Main Dewatering Pumps 1, 2, and 3 Test Reports prior to and after completion. Tests to include but not limited to:
 - .1 Motor Starting Curves. Record voltage, amps, power, and kVA on a typical start using a high speed data recorder.
 - .2 Insulation resistance of Stator and Rotor.
 - .3 Winding resistance of Stator and and Rotor.
 - .4 Insulation and winding resistance of DC Exciter.
 - .5 Resistance of exciter field rheostat and Motor field resistor.
- .5 Correct deficiencies and obtain approval from Departmental Representative after distinct phases have been completed and before commencing next phase.
- .6 Document requires tests on approved PV forms.
- .7 Failure to follow accepted start-up procedures will result in re-evaluation of equipment by an independent testing agency selected by Departmental Representative. If results reveal that equipment start-up was not in accordance with requirements, and resulted in damage to equipment, implement following
 - .1 Minor equipment/systems: implement corrective measures approved by Departmental Representative.
 - .2 Major equipment/systems: if evaluation report concludes that damage is minor, implement corrective measures approved by Departmental Representative.
 - .3 If evaluation report concludes that major damage has occurred, Departmental Representative shall reject equipment.
 - .1 Rejected equipment to be removed from site and replace with new.
 - .2 Subject new equipment/systems to specified start-up procedures.

1.15 START-UP DOCUMENTATION

- .1 Assemble start-up documentation and submit to Departmental Representative for approval before commencement of commissioning.
- .2 Start-up documentation to include:
 - .1 Factory and on-site test certificates for specified equipment.
 - .2 Pre-start-up inspection reports.
 - .3 Signed installation/start-up check lists.
 - .4 Start-up reports,
 - .5 Step-by-step description of complete start-up procedures, to permit Departmental Representative to repeat start-up at any time.

1.16 OPERATION AND MAINTENANCE OF EQUIPMENT AND SYSTEMS

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

1.17 TEST RESULTS

- .1 If start-up, testing and/or PV produce unacceptable results, repair, replace or repeat specified starting and/or PV procedures until acceptable results are achieved.
- .2 Provide manpower and materials, assume costs for re-commissioning.

1.18 START OF COMMISSIONING

- .1 Notify Departmental Representative at least 4 weeks prior to start of Cx.
- .2 Start Cx after elements of building affecting start-up and performance verification of systems have been completed.

1.19 INSTRUMENTS / EQUIPMENT

- .1 Submit to Departmental Representative for review and approval:
 - .1 Complete list of instruments proposed to be used.
 - .2 Listed data including, serial number, current calibration certificate, calibration date, calibration expiry date and calibration accuracy.
- .2 Provide the following equipment as required:
 - .1 2-way radios.
 - .2 Ladders.
 - .3 Equipment as required to complete work.

1.20 COMMISSIONING PERFORMANCE VERIFICATION

- .1 Carry out Cx:
 - .1 Under accepted simulated operating conditions, over entire operating range, in all modes.
 - .2 On independent systems and interacting systems.
- .2 Cx procedures to be repeatable and reported results are to be verifiable.
- .3 Follow equipment manufacturer's operating instructions.
- .4 EMCS trending to be available as supporting documentation for performance verification.

1.21 WITNESSING COMMISSIONING

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

1.22 AUTHORITIES HAVING JURISDICTION

- .1 Where start-up, testing or commissioning procedures duplicate verification requirements of authority having jurisdiction, arrange for authority to witness procedures so as to avoid duplication of tests and to facilitate expedient acceptance of facility.
- .2 Obtain certificates of approval, acceptance and compliance with rules and regulation of authority having jurisdiction.
- .3 Provide copies to Departmental Representative within 5 days of test and with Cx report.
- .4 Authorities having jurisdiction in this project include Township of Esquimalt and BC Safety Authority.

1.23 EXTRAPOLATION OF RESULTS

- .1 Where Cx of weather, occupancy, or seasonal-sensitive equipment or systems cannot be conducted under near-rated or near-design conditions, extrapolate part-load results to design conditions when approved by Departmental Representative in accordance with equipment manufacturer's instructions, using manufacturer's data, with manufacturer's assistance and using approved formulae.

1.24 SUNDRY CHECKS AND ADJUSTMENTS

- .1 Make adjustments and changes which become apparent as Cx proceeds.
- .2 Perform static and operational checks as applicable and as required.

1.25 DEFICIENCIES, FAULTS, DEFECTS

- .1 Correct deficiencies found during start-up and Cx to satisfaction of Departmental Representative.
- .2 Report problems, faults or defects affecting Cx to Departmental Representative in writing. Stop Cx until problems are rectified. Proceed with written approval from Departmental Representative.

1.26 COMPLETION OF COMMISSIONING

- .1 Upon completion of Cx, leave systems in normal operating mode.
- .2 Except for warranty and seasonal verification activities, complete Cx prior to issuance of Certificate of Substantial Performance.
- .3 Cx to be considered complete when contract Cx deliverables have been submitted and accepted by Departmental Representative.

1.27 ACTIVITIES UPON COMPLETION OF COMMISSIONING

- .1 When changes are made to baseline components or system settings established during Cx process, provide updated Cx form for affected item.

1.28 MAINTENANCE MATERIALS, SPARE PARTS, SPECIAL TOOLS

- .1 Supply, deliver, and document maintenance materials, spare parts, and special tools as specified in contract.

1.29 OCCUPANCY

- .1 Cooperate fully with Departmental Representative during stages of acceptance and occupancy of facility.

1.30 INSTALLED INSTRUMENTATION

- .1 Use instruments installed under Contract for TAB and PV if:
 - .1 Accuracy complies with these specifications.
 - .2 Calibration certificates have been deposited with Departmental Representative.

1.31 PERFORMANCE VERIFICATION TOLERANCES

- .1 Application tolerances:
 - .1 Specified range of acceptable deviations of measured values from specified values or specified design criteria. Except for special areas, to be within +/- 10% of specified values.
- .2 Instrument accuracy tolerances:
 - .1 To be of higher order of magnitude than equipment or system being tested.
- .3 Measurement tolerances during verification:
 - .1 Unless otherwise specified actual values to be within +/- 2% of recorded values.

1.32 OWNER'S PERFORMANCE TESTING

- .1 Performance testing of equipment or system by Departmental Representative will not relieve Contractor from compliance with specified start-up and testing procedures.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 Description of overall structure of Cx Plan and roles and responsibilities of Cx team.

1.2 REFERENCES

- .1 American Water Works Association (AWWA)
- .2 Public Works and Government Services Canada (PWGSC)
 - .1 PWGSC - Commissioning Guidelines CP.3 -3rd edition-03.
- .3 Underwriters' Laboratories of Canada (ULC)
- .4 ANSI/NETA Standard for Maintenance Testing Specifications for Electrical Power Distribution Equipment and Systems.

1.3 GENERAL

- .1 Provide fully functional facilities:
 - .1 Systems, equipment and components meet user's functional requirements before date of acceptance, and operate consistently at peak efficiencies and within specified energy budgets under normal loads.
 - .2 Facility user and O&M personnel have been fully trained in aspects of installed systems.
 - .3 Optimized life cycle costs.
 - .4 Complete documentation relating to installed equipment and systems.
- .2 Term "Cx" in this section means "Commissioning".
- .3 Use this Cx Plan as master planning document for Cx:
 - .1 Outlines organization, scheduling, allocation of resources, documentation, pertaining to implementation of Cx.
 - .2 Communicates responsibilities of team members involved in Cx Scheduling, documentation requirements, and verification procedures.
 - .3 Sets out deliverables relating to O&M, process and administration of Cx.
 - .4 Describes process of verification of how built works meet design requirements.
 - .5 Produces a complete functional system prior to issuance of Certificate of Substantial Performance.
 - .6 Management tool that sets out scope, standards, roles and responsibilities, expectations, deliverables, and provides:
 - .1 Overview of Cx.
 - .2 General description of elements that make up Cx Plan.
 - .3 Process and methodology for successful Cx.
- .4 Acronyms:
 - .1 Cx - Commissioning.

- .2 BMM - Building Management Manual.
- .3 EMCS - Energy Monitoring and Control Systems.
- .4 MSDS - Material Safety Data Sheets.
- .5 PI - Product Information.
- .6 PV - Performance Verification.
- .7 TAB - Testing, Adjusting and Balancing.
- .8 WHMIS - Workplace Hazardous Materials Information System.
- .5 Commissioning terms used in this Section:
 - .1 Bumping: short term start-up to prove ability to start and prove correct rotation.
 - .2 Deferred Cx - Cx activities delayed for reasons beyond Contractor's control due to lack of occupancy, weather conditions, need for heating/cooling loads.

1.4 DEVELOPMENT OF 100% CX PLAN

- .1 Cx Plan to be 100% completed within 12 weeks of award of contract to take into account:
 - .1 Approved shop drawings and product data.
 - .2 Approved changes to contract.
 - .3 Contractor's project schedule.
 - .4 Cx schedule.
 - .5 Contractor's, sub-contractor's, suppliers' requirements.
 - .6 Project construction team's and Cx team's requirements.
- .2 Submit completed Cx Plan to Departmental Representative and obtain written approval.

1.5 REFINEMENT OF CX PLAN

- .1 During construction phase, revise, refine and update Cx Plan to include:
 - .1 Changes resulting from Client program modifications.
 - .2 Approved design and construction changes.
- .2 Revise, refine and update every 3 months during construction phase. At each revision, indicate revision number and date.
- .3 Submit each revised Cx Plan to Departmental Representative for review and obtain written approval.
- .4 Include testing parameters at full range of operating conditions and check responses of equipment and systems.

1.6 COMPOSITION, ROLES AND RESPONSIBILITIES OF CX TEAM

- .1 General Contractor to maintain overall responsibility for project and is sole point of contact between members of commissioning team.
- .2 General Contractor will select independent Commissioning Agent to ensure Cx activities are carried out to ensure delivery of a fully operational project including:
 - .1 Organizing Cx.

- .2 Monitoring operations Cx activities.
- .3 Review of Cx documentation from operational perspective.
- .4 Review for performance, reliability, durability of operation, accessibility, maintainability, operational efficiency under conditions of operation.
- .5 Protection of health, safety and comfort of occupants and O&M personnel.
- .6 Monitoring of Cx activities, training, development of Cx documentation.
- .7 Work closely with members of Cx Team.
- .8 Certifying accuracy of reported results
- .9 Certifying tabs and other results
- .10 Developing BMM.
- .11 Ensuring implementation of final Cx Plan.
- .12 Implementation of Training Plan
- .3 Departmental Representative is responsible for:
 - .1 Witnessing reported results.
 - .2 Witnessing TAB and other tests.
 - .3 Provides basis of design data not included in the Contract Documents.
 - .4 Reviews commissioning checklists and test forms to ensure applicability to the project and provide comments to the Commissioning Agent.
 - .5 Attends commissioning activities as required to certify the site adaptation and related work meet the design intent and the project requirements.
- .4 Construction Team: contractor, sub-contractors, suppliers and support disciplines, is responsible for construction/installation in accordance with contract documents, including:
 - .1 Testing.
 - .2 TAB.
 - .3 Performance of Cx activities.
 - .4 Delivery of training and Cx documentation.
 - .5 Assigning one person as point of contact Departmental Representative for administrative
 - .6 and coordination purposes.
- .5 General Contractor's Cx agent implements specified Cx activities including:
 - .1 Demonstrations.
 - .2 Training.
 - .3 Testing.
 - .4 Preparation, submission of test reports.
 - .5 Performing verification of performance of installed systems and equipment.
- .6 EGD Facility Manager: represents lead role in Operation Phase and onwards and is responsible for:
 - .1 Receiving facility.
 - .2 Day-To-Day operation and maintenance of facility.

1.7 EXTENT OF CX

- .1 The General Contractor shall provide commissioning services for the following items .
 - .1 List of Electrical Equipment and Acceptance Tests:
 - .1 Protective Relay System
 - .2 Molded case and air circuit breakers
 - .3 Instrument Transformers
 - .4 Implementation of Coordination Study Settings
 - .5 Certificates and/or Equipment Test Report
 - .6 Equipment Spare Parts Report
 - .7 Generic Acceptance Report
 - .8 Twelve Step Final Acceptance Report

1.8 DELIVERABLES RELATING TO O&M PERSPECTIVES

- .1 General requirements:
 - .1 Compile English documentation.
 - .2 Documentation to be computer-compatible format ready for inputting for data management.
- .2 Provide deliverables:
 - .1 Warranties.
 - .2 Project record documentation.
 - .3 Inventory of spare parts, special tools and maintenance materials.
 - .4 Maintenance Management System (MMS) identification system used.
 - .5 WHMIS information.
 - .6 MSDS data sheets.
 - .7 Electrical Panel inventory containing detailed inventory of electrical circuitry for each panel board. Duplicate of inventory inside each panel.

1.9 DELIVERABLES RELATING TO THE CX PROCESS

- .1 General:
 - .1 Start-up, testing and Cx requirements, conditions for acceptance and specifications form part of relevant technical sections of these specifications.
- .2 Definitions:
 - .1 Cx as used in this section includes:
 - .1 Cx of components, equipment, systems, subsystems, and integrated systems.
 - .2 Factory inspections and performance verification tests.
- .3 Deliverables: provide:
 - .1 Cx Specifications.
 - .2 Startup, pre-Cx activities and documentation for systems, and equipment.

- .3 Completed installation checklists (ICL).
- .4 Completed product information (PI) report forms.
- .5 Completed performance verification (PV) report forms.
- .6 Results of Performance Verification Tests and Inspections.
- .7 Description of Cx activities and documentation.
- .8 Description of Cx of integrated systems and documentation.
- .9 Tests witnessed by Departmental Representative.
- .10 Training Plans.
- .11 Cx Reports.
- .12 Prescribed activities during warranty period.
- .4 Departmental Representative to witness and certify tests and reports of results provided to Departmental Representative.

1.10 PRE-CX ACTIVITIES AND RELATED DOCUMENTATION

- .1 Items listed in this Cx Plan include the following:
 - .1 Pre-Start-Up inspections: by Departmental Representative prior to permission to start up and rectification of deficiencies to Departmental Representative's satisfaction.
 - .2 Departmental Representative to use approved check lists.
 - .3 Departmental Representative will monitor some of these pre-start-up inspections.
 - .4 Include completed documentation with Cx report.
 - .5 Conduct pre-start-up tests: conduct pressure, static, flushing, cleaning, and "bumping" during construction as specified in technical sections. To be witnessed and certified by Departmental Representative and does not form part of Cx specifications.
 - .6 Departmental Representative will monitor some of these inspections and tests.
 - .7 Include completed documentation in Cx report.
- .2 Pre-Cx Activities - ELECTRICAL:
 - .1 Low voltage, medium voltage and high voltage distribution systems require independent testing agency to perform pre-energization and post-energization tests.

1.11 START-UP

- .1 Start up components, equipment and systems.
- .2 Departmental Representative to monitor some of these start-up activities.
 - .1 Rectify start-up deficiencies to satisfaction of Departmental Representative.
- .3 Performance Verification (PV):
 - .1 Approved Cx Agent to perform.
 - .1 Repeat when necessary until results are acceptable to Departmental Representative.

- .2 Use procedures modified generic procedures to suit project requirements.
- .3 Departmental Representative to witness and certify reported results using approved PI and PV forms.
- .4 Departmental Representative to approve completed PV reports and provide to Departmental Representative.
- .5 Departmental Representative reserves right to will verify up to 30% of reported results at random.
- .6 Failure of randomly selected item shall result in rejection of PV report or report of system startup and testing.

1.12 CX ACTIVITIES AND RELATED DOCUMENTATION

- .1 Perform Cx by specified Cx agency using procedures developed by Departmental Representative and approved by Departmental Representative.
- .2 Departmental Representative to monitor Cx activities.
- .3 Upon satisfactory completion, Cx agency performing tests to prepare Cx Report using approved PV forms.
- .4 Departmental Representative to witness, certify reported results of, Cx activities and forward to Departmental Representative.
- .5 Departmental Representative reserves right to verify a percentage of reported results at no cost to contract.

1.13 MECHANICAL SYSTEMS TESTING, ADJUSTING AND BALANCING

- .1 Testing:
 - .1 Quality Assurance:
 - .1 Test equipment and material where specified or required by authority having jurisdiction to demonstrate its proper and safe operation.
 - .2 Test procedures shall be in accordance with applicable portions of NFPA, NETA, CSA and other recognized test codes as far as field conditions permit.
 - .3 Provide notice to the Departmental Representative before tests.
 - .2 Liability: During tests, assume responsibility for damages in the event of injury to personnel, building or equipment and bear costs for liability, repairs and restoration.

1.14 ELECTRICAL TESTING, ADJUSTING AND BALANCING

- .1 Conduct and pay for tests of the following:
 - .1 Distribution system including phasing, voltage, grounding, load balancing, hi-pot testing of the 12.5/25kV system and transformer prior to energizing.
 - .2 Circuits originating from branch distribution panels.
 - .3 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.

- .2 Furnish manufacturers certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturer' s instructions .
- .3 Carry out tests in presence of the Departmental Representative.
- .4 Give advance notice of proposed time of tests so that the Departmental Representative can be represented at the tests.
- .5 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
- .6 Submit test results for review by the Departmental Representative.
- .7 Test all systems in accordance with details in appropriate sections.
- .8 Testing methods and test results: in accordance with CSA, CEC, NETA MTS, and regulations of the supply authority and other authorities having jurisdiction.
- .9 Liability: During tests, assume responsibility for damages in the event of injury to personnel, building or equipment and bear costs for liability, repairs and restoration .
- .10 Remove and replace with new materials all conductors that are found to be shorted or grounded.
- .11 Conduct dielectric tests, hi-pot tests, insulation resistance tests and ground continuity tests as required by the nature of the various systems and equipment.
- .12 With the systems completely connected and lamped, conduct the following tests on the power system:
 - .1 Control and Switching: test all circuits for the correct operation of devices, switches and controls.
 - .2 Polarity Tests: test all circuits for correct operation of devices, switches and controls.
 - .3 Voltage Tests: make a voltage test at the last outlet of each circuit. Maximum drop in potential permitted will be 2% on 120V, and 208V branch circuits. 2% on 208V feeder circuits, and 5% on 600V feeder circuits. Correct any deficiency in this respect.
 - .4 Phase Balance: measure the load on each phase at each switchboard, splitter, distribution panel board and lighting and power panel board. Report results in writing to the Departmental Representative. Re-arrange phase connections as necessary to balance the load on each phase as instructed by the Departmental Representative with the re-arrangement being restricted to the exchanging of connections at the distribution points mentioned in this paragraph. After marking any such changes, make available to the Departmental Representative, drawings or marked prints showing the modified connections.
 - .5 Supply Voltage: measure the line voltage of each phase at the load terminals of the main breakers and report the results in writing to the Departmental Representative. Perform this test with the majority of electrical equipment in use.

- .6 Motor Loading: measure the line current of each phase of each motor with the motor operating under load and report the results in writing to the Departmental Representative. Upon indications of any imbalance or overload, thoroughly examine electrical connections and rectify any defective parts or wiring. If electrical connections are correct, overloads due to defects in the driven machines shall be reported in writing to the Departmental Representative. Verify motor full load amps and overload
- .7 Relays are properly sized and adjusted accordingly.
- .8 General Operations: energize and put into operation each and every electrical circuit and item. Make repairs, alterations, replacements, tests and adjustments necessary for a complete and satisfactory operating electrical system.
- .13 Carry out tests covering "General Operation" at the time of acceptance of the work.
- .14 Test all systems and obtain written confirmation from the manufacturer of each system that all components have been installed correctly and that the system is functioning as intended. Present separate certification for all systems including: fire alarm, power distribution, to the Departmental Representative.
- .15 Provide labour, instruments, apparatus and pay all expenses required for the tests. The Departmental Representative reserves the right to demand proof of the accuracy of all instruments used.
- .16 When tests are performed, the Departmental Representative may require that equipment be opened and removed from their housings to examine interior of equipment, terminations and connections. Provide all required labour and tools.
- .17 Co-ordinate the testing of motors with the trades providing the equipment driven by the motors so that they are carried out at the time the driven equipment is put on test. In addition to the motor loading tests, provide labour and instruments to take and record all motor load readings required to supplement the tests on the driven equipment through various load sequences, as required by the trades involved.
- .18 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 Megger 600-2.4kV circuits, feeder and equipment with 5000 V instrument.
 - .4 Check resistance to ground before energizing.

1.15 INSTALLATION CHECK LISTS (ICL)

- .1 Refer to Section 01 91 33 - Commissioning (Cx) Forms: Installation Check Lists and Product Information (PI) / Performance Verification (PV) Forms.

1.16 PRODUCT INFORMATION (PI) REPORT FORMS

- .1 Refer to Section 01 91 33 - Commissioning (Cx) Forms: Installation Check Lists and Product Information (PI) / Performance Verification (PV) Forms.

1.17 PERFORMANCE VERIFICATION (PV) REPORT

- .1 Refer to Section 01 91 33 - Commissioning (Cx) Forms: Installation Check Lists and Product Information (PI) / Performance Verification (PV) Forms.

1.18 DELIVERABLES RELATING TO ADMINISTRATION OF CX

- .1 General:
 - .1 Because of risk assessment, complete Cx of occupancy, weather and seasonal-sensitive equipment and systems in these areas before building is occupied.

1.19 CX SCHEDULES

- .1 Prepare detailed Cx Schedule and submit to Departmental Representative for review and approval same time as project Construction Schedule. Include:
 - .1 Milestones, testing, documentation, training and Cx activities of components, equipment, subsystems, systems and integrated systems, including:
 - .1 Design criteria, design intents.
 - .2 Pre-TAB review: 28 days after contract award, and before construction starts.
 - .3 Cx agents' credentials: 60 days before start of Cx.
 - .4 Cx procedures: 3 months after award of contract.
 - .5 Cx Report format: 3 months after contract award.
 - .6 Discussion of heating/cooling loads for Cx: 3 months before start-up.
 - .7 Submission of list of instrumentation with relevant certificates: 21 days before start of Cx.
 - .8 Notification of intention to start TAB: 21 days before start of TAB.
 - .9 TAB: after successful start-up, correction of deficiencies and verification of normal and safe operation.
 - .10 Notification of intention to start Cx: 14 days before start of Cx.
 - .11 Notification of intention to start Cx of integrated systems: after Cx of related systems is completed 14 days before start of integrated system Cx.
 - .12 Identification of deferred Cx.
 - .13 Implementation of training plans.
 - .14 Cx reports: immediately upon successful completion of Cx.
 - .2 Detailed training schedule to demonstrate no conflicts with testing, completion of project and hand-over to Property Manager.
 - .3 Six (6) months in Cx schedule for verification of performance in all seasons and wear conditions.
- .2 After approval, incorporate Cx Schedule into Construction Schedule.
- .3 Consultant, Contractor, Contractor's Cx agent, and Departmental Representative will monitor progress of Cx against this schedule.

1.20 CX REPORTS

- .1 Submit reports of tests, witnessed and certified by Departmental Representative to Departmental Representative who will verify reported results.
- .2 Include completed and certified PV reports in properly formatted Cx Reports.
- .3 Before reports are accepted, reported results to be subject to verification by Departmental Representative.

1.21 TESTS TO BE PERFORMED BY OWNER/USER

- .1 None is anticipated on this project.

1.22 TRAINING PLANS

- .1 Refer to Section 01 91 41 - Commissioning (Cx) - Training.

1.23 FINAL SETTINGS

- .1 Upon completion of Cx to satisfaction of Departmental Representative lock control devices in their final positions, indelibly mark settings marked and include in Cx Reports.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

- .1 Commissioning forms to be completed for equipment, system and integrated system.

1.2 INSTALLATION/START-UP CHECK LISTS

.1 Include the following data:

- .1 Product manufacturer's installation instructions and recommended checks.
- .2 Special procedures as specified in relevant technical sections.
- .3 Items considered good installation and engineering industry practices deemed appropriate for proper and efficient operation.
- .2 Equipment manufacturer's installation/start-up check lists are acceptable for use. As deemed necessary by Departmental Representative supplemental additional data lists will be required for specific project conditions.
- .3 Use check lists for equipment installation. Document check list verifying checks have been made, indicate deficiencies and corrective action taken.
- .4 Installer to sign check lists upon completion, certifying stated checks and inspections have been performed. Return completed check lists to Departmental Representative. Check lists will be required during Commissioning and will be included in Building Maintenance Manual (BMM) at completion of project.
- .5 Use of check lists will not be considered part of commissioning process but will be stringently used for equipment pre-start and start-up procedures.

1.3 PRODUCT INFORMATION (PI) REPORT FORMS

- .1 Product Information (PI) forms compiles gathered data on items of equipment produced by equipment manufacturer, includes nameplate information, parts list, operating instructions, maintenance guidelines and pertinent technical data and recommended checks that is necessary to prepare for start-up and functional testing and used during operation and maintenance of equipment. This documentation is included in the BMM at completion of work.
- .2 Prior to Performance Verification (PV) of systems complete items on PI forms related to systems and obtain Departmental Representative's approval.

1.4 PERFORMANCE VERIFICATION (PV) FORMS

- .1 PV forms to be used for checks, running dynamic tests and adjustments carried out on equipment and systems to ensure correct operation, efficiently and function independently and interactively with other systems as intended with project requirements.
- .2 PV report forms include those developed by Contractor records measured data and readings taken during functional testing and Performance Verification procedures.

- .3 Prior to PV of integrated system, complete PV forms of related systems and obtain Departmental Representative approval.

1.5 COMMISSIONING FORMS

- .1 Use Commissioning forms to verify installation and record performance when starting equipment and systems.
- .2 Strategy for Use:
 - .1 Contractor provides project-specific Commissioning forms with Specification data included.
 - .2 Contractor will provide required shop drawings information and verify correct installation and operation of items indicated on these forms.
 - .3 Confirm operation as per design criteria and intent.
 - .4 Identify variances between design and operation and reasons for variances.
 - .5 Verify operation in specified normal and emergency modes and under specified load conditions.
 - .6 Record analytical and substantiating data.
 - .7 Verify reported results.
 - .8 Form to bear signatures of recording technician.
 - .9 Submit immediately after tests are performed.
 - .10 Reported results in true measured SI unit values.
 - .11 Provide Departmental Representative with originals of completed forms.
 - .12 Maintain copy on site during start-up, testing and commissioning period.

1.6 LANGUAGE

- .1 To suit the language profile of the awarded contract.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 This Section specifies roles and responsibilities of Commissioning Training.
- .2 Related Sections:
 - .1 General Commissioning (Cx) Requirements Section 01 91 13
 - .2 Commissioning (Cx) Plan Section 01 91 31

1.2 TRAINEES

- .1 Trainees: personnel selected for operating and maintaining this facility. Includes Facility Manager, building operators, maintenance staff, security staff, and technical specialists as required.
- .2 Trainees will be available for training during later stages of construction for purposes of familiarization with systems.

1.3 INSTRUCTORS

- .1 Engineer will provide:
 - .1 Descriptions of systems.
 - .2 Instruction on design philosophy, design criteria, and design intent.
- .2 Contractor and certified factory-trained manufacturers' personnel: to provide instruction on the following:
 - .1 Start-Up, operation, shut-down of equipment, components and systems.
 - .2 Control features, reasons for, results of, implications on associated systems of, adjustment of set points of control and safety devices.
 - .3 Instructions on servicing, maintenance and adjustment of systems, equipment and components.
- .3 Contractor and equipment manufacturer to provide instruction on:
 - .1 Start-up, operation, maintenance and shut-down of equipment they have certified installation, started up and carried out PV tests.

1.4 TRAINING OBJECTIVES

- .1 Training to be detailed and duration to ensure:
 - .1 Safe, reliable, cost-effective, energy-efficient operation of systems in normal and emergency modes under all conditions.
 - .2 Effective on-going inspection, measurements of system performance.
 - .3 Proper preventive maintenance, diagnosis and trouble-shooting.
 - .4 Ability to update documentation.
 - .5 Ability to operate equipment and systems under emergency conditions until appropriate qualified assistance arrives.

1.5 TRAINING MATERIALS

- .1 Instructors to be responsible for content and quality.
- .2 Training materials to include:
 - .1 "As-Built" Contract Documents.
 - .2 Operating Manual.
 - .3 Maintenance Manual.
 - .4 Management Manual.
 - .5 TAB and PV Reports.
- .3 Project Manager, Commissioning Manager and Facility Manager will review training manuals.
- .4 Training materials to be in a format that permits future training procedures to same degree of
- .5 detail.
- .6 Supplement training materials:
 - .1 Transparencies for overhead projectors.
 - .2 Multimedia presentations.
 - .3 Manufacturer's training videos.
 - .4 Equipment models.

1.6 SCHEDULING

- .1 Include in Commissioning Schedule time for training.
- .2 Deliver training during regular working hours, training sessions to be 8 hours in length.
- .3 Training to be completed prior to acceptance of facility.

1.7 RESPONSIBILITIES

- .1 Be responsible for:
 - .1 Implementation of training activities,
 - .2 Coordination among instructors,
 - .3 Quality of training, training materials.
- .2 Commissioning Authority will evaluate training and materials.
- .3 Upon completion of training, provide written report, signed by Instructors, witnessed by Commissioning Authority.

1.8 ELECTRICAL SYSTEM TRAINING

- .1 Organize and conduct training courses to instruct the Departmental Representative in the operation and preventative maintenance of equipment and systems provided at the completion of the project.
- .2 Provide services of qualified personnel, including each sub-trade, each major equipment supplier and design engineer to and instruct on their equipment or systems.
- .3 One-person day shall be eight hours including one half hour for breaks, and one person week shall be five person days.

- .4 Submit sessions schedule and list of representatives to the Departmental Representative for approval 30 days prior to course starting date. Confirm attendance of course by written notification to all participants, followed by verbal confirmation just prior to course starting date.
- .5 Submit final copies of record drawings and operating and maintenance manuals to Departmental Representative. Submit a written follow-up of all courses, complete with an attendants list to the Departmental Representative.
- .6 Systems Course: Allow a minimum of 64 hours of instruction (Eight 8-hour training sessions) to conduct systems training courses addressing the following topics
 - .1 Standard Power Systems:
 - .1 Review operation of systems and equipment.
 - .2 Protective Relay System:
 - .1 Review operation of systems and equipment.
 - .2 Review of setting adjustment.
 - .3 Review of control software.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

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

1.2 REFERENCES

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

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

1.4 SITE CONDITIONS

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

Part 2 Products

2.1 NOT USED

- .1 Not used.

Part 3 Execution

3.1 EXAMINATION

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

3.2 PREPARATION

- .1 Protection of In-Place Conditions:
 - .1 Keep noise, dust, and inconvenience to occupants to minimum.
 - .2 Protect building systems, services and equipment.
 - .3 Provide temporary dust screens, covers, railings, supports and other protection as required.
 - .4 Do Work in accordance with Section 01 35 33 - Health and Safety Requirements.
- .2 Demolition/Removal:
 - .1 Remove items as indicated.
 - .2 Trim edges of partially demolished building elements to tolerances as defined by Departmental Representative to suit future use.

3.3 CLEANING

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

END OF SECTION

Part 1 General**1.1 REFERENCES**

- .1 Canadian Standards Association (CSA International)
 - .1 CSA C22.1-2012, Canadian Electrical Code, Part 1 (21st Edition), Safety Standard for Electrical Installations.
 - .2 CAN3-C235-83(R2000), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.
- .2 Electrical and Electronic Manufacturer's Association of Canada (EEMAC)
 - .1 EEMAC 2Y-1-1958, Light Gray Colour for Indoor Switch Gear.
- .3 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)
 - .1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

1.2 DEFINITIONS

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

1.3 DESIGN REQUIREMENTS

- .1 Operating voltages: to CAN3-C235.
- .2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.
 - .1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.
- .3 Language operating requirements: provide identification nameplates and labels for control items in English

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of BC, Canada.
 - .2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure coordinated installation.
 - .3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.
 - .4 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.

- .5 Submit copies of 600 x 600 mm minimum size drawings and product data to authority having jurisdiction.
- .6 If changes are required, notify Departmental Representative of these changes before they are made.
- .3 Quality Control: in accordance with Section 01 45 00 - Quality Control. Provide CSA certified equipment and material.
 - .1 Where CSA certified material is not available, submit such material to authority having jurisdiction for special approval before delivery to site.
 - .2 Submit test results of installed electrical systems and instrumentation.
 - .3 Permits and fees: in accordance with General Conditions of contract.
 - .4 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Departmental Representative.
- .4 Manufacturer's Field Reports: submit to Departmental Representative manufacturer's written report, within 3 days of review, verifying compliance of Work and electrical system and instrumentation testing, as described in PART 3 - FIELD QUALITY CONTROL.

1.5 QUALITY ASSURANCE

- .1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.
- .2 Qualifications: electrical Work to be carried out by qualified, licensed electricians who hold valid "FSR-A" Contractor license or apprentices in accordance per the conditions of Provincial Act respecting manpower vocational training and qualification.
- .3 Site Meetings:
 - .1 In accordance with Section 01 32 17 - Construction Progress Schedule - Bar (GANTT) Charts.
 - .2 Site Meetings: as part of Manufacturer's Field Services described in Part 3 - FIELD QUALITY CONTROL, schedule site visits, to review Work, at stages listed.
 - .1 After delivery and storage of products, and when preparatory Work is complete but before installation begins.
 - .2 Twice during progress of Work at 25% and 60% complete.
 - .3 Upon completion of Work, after cleaning is carried out.
- .4 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

1.6 DELIVERY, STORAGE AND HANDLING

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

1.7 SYSTEM STARTUP

- .1 Instruct Departmental Representative in operation, care and maintenance of systems, system equipment and components.

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

1.8 OPERATING INSTRUCTIONS

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

Part 2 Products

2.1 MATERIALS AND EQUIPMENT

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

2.2 WARNING SIGNS

- .1 Warning Signs: in accordance with requirements of inspection authorities.
- .2 Decal signs, minimum size 175 x 250 mm.

2.3 WIRING TERMINATIONS

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

2.4 EQUIPMENT IDENTIFICATION

- .1 Identify electrical equipment with nameplates and labels as follows:
 - .1 Nameplates: lamicoid 3 mm thick plastic engraving sheet, black face, white core, lettering accurately aligned and engraved into core.

.2 Sizes as follows:**NAMEPLATE SIZES**

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

- .2 Labels: embossed plastic labels with 6mm high letters unless specified otherwise.
- .3 Wording on nameplates and labels to be approved by Departmental Representative prior to manufacture.
- .4 Allow for minimum of twenty-five (25) letters per nameplate and label.
- .5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
- .6 Disconnects, starters and contactors: indicate equipment being controlled and voltage.
- .7 Terminal cabinets and pull boxes: indicate system and voltage.
- .8 Transformers: indicate capacity, primary and secondary voltages.

2.5 WIRING IDENTIFICATION

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

2.6 CONDUIT AND CABLE IDENTIFICATION

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

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

2.7 FINISHES

- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
 - .1 Paint outdoor electrical equipment light gray to EEMAC 2Y-1.

- .2 Paint indoor switchgear and distribution enclosures light gray to EEMAC 2Y-1.

Part 3 Execution

3.1 INSTALLATION

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

3.2 NAMEPLATES AND LABELS

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

3.3 CONDUIT AND CABLE INSTALLATION

- .1 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.
- .2 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.

3.4 LOCATION OF OUTLETS

- .1 Change location of outlets at no extra cost or credit, providing distance does not exceed 3000 mm, and information is given before installation.

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 Circuits originating from branch distribution panels.
 - .3 Lighting and its control.

- .4 Motors, heaters and associated control equipment including sequenced operation of systems.
- .5 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 Megger 5001-25kV circuits, feeders and equipment with a 5000 V instrument.
 - .4 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

- .4 Motors, heaters and associated control equipment including sequenced operation of systems.
- .5 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 Megger 5001-25kV circuits, feeders and equipment with a 5000 V instrument.
 - .4 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 This section specifies the materials and installation for wire and box connectors, rated to 1000V.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-C22.2 No.18 latest edition, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.
 - .2 CSA C22.2 No.65 latest edition, Wire Connectors.
- .2 National Electrical Manufacturers Association (NEMA)

Part 2 Products**2.1 MATERIALS**

- .1 Pressure type wire connectors to: CSA C22.2 No.65, with current carrying parts of copper alloy sized to fit copper conductors as required.
- .2 Fixture type splicing connectors to: CSA C22.2 No.65, with current carrying parts of copper alloy sized to fit copper conductors 10 AWG or less.
- .3 Clamps or connectors for armoured cable, flexible conduit, as required to: CAN/CSA-C22.2 No.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. Installation shall meet secureness tests in accordance with CSA C22.2 No.65.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 American National Standards Institute /Institute of Electrical and Electronics Engineers (ANSI/IEEE)
 - .1 ANSI/IEEE 837-02, IEEE Standard for Qualifying Permanent Connections Used in Substation Grounding.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for grounding equipment and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for grounding equipment for incorporation into manual.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect grounding equipment from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 EQUIPMENT

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

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for grounding equipment installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION GENERAL

- .1 Install complete permanent, continuous grounding system including conductors, connectors, accessories. Where EMT is used, run ground wire in conduit.
- .2 Install connectors in accordance with manufacturer's instructions.
- .3 Protect exposed grounding conductors from mechanical injury.
- .4 Use mechanical connectors for grounding connections to equipment provided with lugs.
- .5 Soldered joints not permitted.
- .6 Install flexible ground straps for bus duct enclosure joints, where such bonding is not inherently provided with equipment.
- .7 Connect building structural steel and metal siding to ground by welding copper to steel.
- .8 Make grounding connections in radial configuration only, with connections terminating at single grounding point. Avoid loop connections.

3.3 SYSTEM AND CIRCUIT GROUNDING

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

3.4 EQUIPMENT GROUNDING

- .1 Install grounding connections to typical equipment included in, but not necessarily limited to following list. Service equipment, transformers, switchgear, duct systems, frames of motors, motor control centres, starters, control panels, building steel work, generators, elevators and escalators, distribution panels, outdoor lighting, cable trays.

3.5 FIELD QUALITY CONTROL

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

3.6 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 This section specifies U shape support channels either surface mounted. Suspended or set in poured concrete walls or ceilings.

Part 2 Products

2.1 SUPPORT CHANNELS

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

Part 3 Execution

3.1 INSTALLATION

- .1 Secure equipment to surfaces with lead anchors or nylon shields as required.
- .2 Secure equipment to poured concrete with expandable inserts.
- .3 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.
- .4 Secure surface mounted equipment with twist clip fasteners to inverted T bar ceilings. Ensure that T bars are adequately supported to carry weight of equipment specified before installation.
- .5 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.
- .6 Fasten exposed conduit or cables to building construction or support system using straps.
 - .1 One-hole steel straps to secure surface conduits and cables 50 mm and smaller.
 - .2 Two-hole steel straps for conduits and cables larger than 50 mm.
 - .3 Beam clamps to secure conduit to exposed steel work.
- .7 Suspended support systems.
 - .1 Support individual cable or conduit runs with 6 mm dia threaded rods and spring clips.
 - .2 Support 2 or more cables or conduits on channels supported by 6 mm dia threaded rod hangers where direct fastening to building construction is impractical.
- .8 For surface mounting of two or more conduits use channels at 1.5m on centre spacing.
- .9 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.
- .10 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.
- .11 Do not use wire lashing or perforated strap to support or secure raceways or cables.

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

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 This section specifies unit substation enclosures.

1.2 REFERENCES

- .1 American National Standards Institute (ANSI)
 - .1 ANSI C37.121-1989(R2000), Unit Substations - Requirements.
- .2 Canadian Standards Association (CSA International)
 - .1 CSA G40.20/G40.21-98(June 2000), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .3 Underwriters' Laboratories (UL)
 - .1 UL 1062-97, Unit Substations.

1.3 SYSTEM DESCRIPTION

- .1 Modifications to existing unit substation equipment.

1.4 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Section 01 33 00 Submittal Procedures.
- .2 Indicate:
 - .1 Equipment layout.
 - .2 Equipment dimensions including door openings.

1.5 CLOSEOUT SUBMITTALS

- .1 Provide maintenance data for unit substation for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.6 QUALITY ASSURANCE

- .1 Submit manufacturer's type test certificates indicating switchgear cubicles and components tested as integrated assembly.
- .2 Submit test procedures, at least 10 days prior to testing.
- .3 Submit production test results before equipment is shipped from factory.

Part 2 Products

2.1 MATERIALS

- .1 10 gauge steel to be used for all replacement panels, faceplates and doors.
- .2 Hinge assemblies shall be new, and matching existing as best as possible.
- .3 Door closures shall be knurled thumb screws or pan-head machine screws to match existing. All fasteners shall be captive to the door or panels that they affix.

2.2 SHOP FABRICATION

- .1 All fabricated metal face plates, panels or replacement doors shall be shop fabricated, including drilling and cutting of device openings and fasteners.

- .2 All edges to fully relieved, rounded and deburred. All cutting and drilling shall be completed prior to application of primer and finish.

2.3 FINISHES

- .1 Apply finishes in accordance with Section 26 05 00 - Common Work Results - Electrical.
- .2 All sheet metal shall be primed for corrosion protection and finish painted with a powder coat finish. The finish paint and color shall be smooth, glossy polyester powder coat with baked curing.
- .3 Exterior color: electrical light grey.
- .4 Cubicle interiors: white.
- .5 Supply 2 spray cans touch up paint for exterior color.

2.4 EQUIPMENT IDENTIFICATION

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

2.5 WARNING SIGNS

- .1 Provide warning signs in accordance with Section 26 05 00 - Common Work Results - Electrical.

Part 3 Execution

3.1 INSTALLATION

- .1 Remove existing devices, wiring and mounting arrangements.
- .2 Install replacement devices, panels, adapters, faceplates and doors.
- .3 Confirm correct, free operation of all doors, door holders, barriers and locking means.
- .4 All terminal block layouts, wiring and labeling to be complete and documented in asbuilt drawings.
- .5 Provide evidence of approval or inspection. Affix appropriate decals and provide suitable documentation.

END OF SECTION

Part 1 General**1.1 REFERENCES**

- .1 CSA International
 - .1 CSA C22.2 No.14-13, Industrial Control Equipment.
 - .2 CSA G40-20/G40.21-04 (R2009) General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 National Electrical Manufacturers Association (NEMA).

1.2 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for primary switchgear assembly for incorporation into manual.

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.

1.4 EXTRA MATERIALS

- .1 Submit maintenance materials in accordance with 01 78 00 - Closeout Submittals.

Part 2 Products**2.1 MATERIALS**

- .1 Switchgear assembly: to CSA C22.2 No.31
- .2 Steel for cubicles: to CSA G40.21.

2.2 MATERIALS

- .1 10 gauge steel to be used for all replacement panels, faceplates and doors.
- .2 Hinge assemblies shall be new, and matching existing as best as possible.
- .3 Door closures shall be knurled thumb screws or pan-head machine screws to match existing. All fasteners shall be captive to the door or panels that they affix.

2.3 SHOP FABRICATION

- .1 All fabricated metal face plates, panels or replacement doors shall be shop fabricated, including drilling and cutting of device openings and fasteners.
- .2 All edges to fully relieved, rounded and deburred. All cutting and drilling shall be completed prior to application of primer and finish.

2.4 FINISHES

- .1 Apply finishes in accordance with Section 26 05 00 - Common Work Results - Electrical.
- .2 All sheet metal shall be primed for corrosion protection and finish painted with a powder coat finish. The finish paint and color shall be smooth, glossy polyester powder coat with baked curing.
- .3 Exterior color: electrical light grey.
- .4 Cubicle interiors: white.
- .5 Supply 2 spray cans touch up paint for exterior color.

2.5 EQUIPMENT IDENTIFICATION

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

2.6 WARNING SIGNS

- .1 Provide warning signs in accordance with Section 26 05 00 - Common Work Results - Electrical.

Part 3 Execution**3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for switchgear assembly installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

- .1 Remove existing devices, wiring and mounting arrangements.
- .2 Install replacement devices, panels, adapters, faceplates and doors.
- .3 Confirm correct, free operation of all doors, door holders, barriers and locking means.
- .4 All terminal block layouts, wiring and labeling to be complete and documented in as-built drawings.
- .5 Provide evidence of approval or inspection. Affix appropriate decals and provide suitable documentation.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Materials and installation for low voltage switchgear for breakers larger than 400 amps.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-C22.2 No.31-M89(R2000), Switchgear Assemblies.
- .2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)
 - .1 EEMAC G8-3.3, Metal Enclosed Interrupter Switchgear Assemblies.

1.3 SHOP DRAWINGS PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate on shop drawings:
 - .1 Time-current characteristic curves for circuit breakers.
 - .2 Bus and panel mounting arrangements.
 - .3 Covers, panels and blanking plates.
- .3 Indicate on product data:
 - .1 Time-current characteristic curves for circuit breakers.
 - .2 Bus and panel mounting arrangements.
 - .3 Covers, panels and blanking plates.

1.4 CLOSEOUT SUBMITTALS

- .1 Provide maintenance data for secondary switchgear for incorporation into manual in accordance with Section 26 05 00 – Common Work Results - Electrical.

Part 2 Products

2.1 MATERIALS

- .1 Switchgear assembly: to CAN/CSA-C22.2No.31.

2.2 RATING

- .1 Secondary switchgear: Interior mounted, ratings as noted in drawings.

2.3 ENCLOSURE

- .1 Existing enclosure, covers and plates to be modified as required to accept replacement circuit breakers.
- .2 All mounting arrangements shall be approved or certified by the manufacturer for this application, or certified by special inspection.

2.4 BUSBARS

- .1 Three phase and full capacity neutral busbars, continuous current rating self-cooled, extending full width of multi-cubicle switch board, suitably supported on insulators.

- .2 Main connections between bus and major switching components to have continuous current rating to match major switching components.
- .3 Busbars and main connections: 99.30% conductivity copper.
- .4 Tin plated joints, secured with non-corrosive bolts and Belleville washers.
- .5 Identify phases of busbars by suitable marking.

2.5 AIR CIRCUIT BREAKER

- .1 See Section 26 28 16 - Air Circuit Breakers.

2.6 MOULDED CASE CIRCUIT BREAKERS

- .1 See Section 26 28 21 – Moulded Case Circuit Breakers.

2.7 SWITCHBOARD PROTECTIVE RELAYS

- .1 See Section 26 29 05 – Protective Relays.

2.8 FINISHES

- .1 Apply finishes in accordance with Section 26 05 00 - Common Work Results - Electrical.
 - .1 Cubicle exteriors gray.
 - .2 Cubicle interiors white.

2.9 EQUIPMENT IDENTIFICATION

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

2.10 SOURCE QUALITY CONTROL

- .1 Consultant to witness final factory tests.
- .2 Notify Consultant in writing 15 days in advance that switchgear assembly is ready for testing.

Part 3 Execution

3.1 INSTALLATION

- .1 Remove circuit breakers, mounting and bus connections as noted in drawings.
- .2 Install replacement circuit breakers, mounting, bus connections and any required adaptor faceplates or covers as noted in drawings.
- .3 Connect control wiring to new terminal block in adjacent control compartment. Support wiring as required. All terminal block layouts, wiring and labelling to be complete and documented in asbuilt drawings.
- .4 Provide evidence of approval or inspection. Affix appropriate decals and provide suitable documentation.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 This Section specifies the materials, components, operational features and installation for air circuit breakers.

1.2 REFERENCES

- .1 American National Standards Institute (ANSI) / Institute of Electrical and Electronics Engineers (IEEE)
 - .1 ANSI/IEEE C37.13-1993, Low Voltage AC Power Circuit Breakers Used in Enclosures.
- .2 Canadian Standards Association (CSA International)
 - .1 CSA C22.2 No. 5- latest issue, 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).

1.3 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Include time-current phase protection coordination characteristic curves for breakers.
- .3 Provide complete wiring diagrams for all auxiliary contacts, controls and communications interfaces.

Part 2 Products

2.1 AIR CIRCUIT BREAKER

- .1 Air circuit breaker to: to ANSI/IEEE C37.13 and CSA C22.2 No.5.
- .2 Drawout or Fixed type (as noted in drawings), 600 V class or as indicated.
- .3 Solid-state tripping system consisting of 1 current sensor per pole, 1 solid state trip unit and self-powered trip actuator. Equipped with long, short, instantaneous, ground fault function and phase overload and ground fault indication.
- .4 Breakers with normal stored energy, motorized closing mechanism to provide quick-make operation for all ratings.
- .5 Breakers with on-off indicator and spring charged/discharged indicator.
- .6 Interlocks to prevent circuit breaker drawout when in closed position and to prevent closing unless fully engaged or in test position.
- .7 Supply manufacturers' secondary current injection tester compatible with all air circuit breakers used in this project. Device shall be capable of confirming correct time and current operation for all long, short, instantaneous and ground fault elements of these circuit breakers. Tester shall provide time and current levels (not just a pass/fail result) for all tests performed. Provide all required cables, interface, documents and training required for operation.

2.2 ADDITIONAL FEATURES

- .1 Provide the following features or components:
 - .1 Shunt trip.
 - .2 Auxiliary switches: 2 N.O., 2 N.C.
 - .3 Motor operator for open, closing and charging breaker.
 - .4 Alarm switch.
 - .5 Pilot light.
 - .6 Key interlock (where noted in drawings).
 - .7 Remote open and close (installed where noted in drawings; functionality provided regardless).
 - .8 Lockout devices.
 - .9 Padlocking provision.
 - .10 Operation counter.
 - .11 Integral energy, harmonics and phase current/voltage metering.
 - .12 Secondary injection current testing equipment and accessories.

Part 3 Execution

3.1 INSTALLATION

- .1 Install air circuit breakers as indicated.
- .2 Connect remote open/close signals.
- .3 Connect power source to breaker auxiliary controls.
- .4 All auxiliary devices noted on circuit breakers shall be wired to a terminal block in adjacent control compartments. Where function are not used, these shall be terminated, tagged and marked on asbuilt drawings.

END OF SECTION

Part 1 General**1.1 SECTION INCLUDES**

- .1 Materials for moulded-case circuit breakers, circuit breakers, and ground-fault circuit-interrupters.

1.2 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .3 Section 26 23 00 - Low Voltage Switchgear.

1.3 REFERENCES

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

1.4 SUBMITTALS

- .1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Include time-current characteristic curves for breakers with ampacity of 100A and over.
- .3 Include product information and manuals for secondary current injection test equipment to be provided for ongoing testing and verification of molded case circuit breakers. This documentation shall include operating instructions, product information and data for verification of correct operation of all molded case circuit breakers supplied as part of this project.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Separate for recycling all 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 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 as noted.
- .5 Circuit breakers with interchangeable trips as indicated.

- .6 Circuit breakers to have minimum 10kA symmetrical rms interrupting capacity rating or as noted in drawings or panel schedules.

2.2 SOLID STATE TRIP BREAKERS

- .1 Moulded case circuit breaker to operate by means of solid-state trip unit with associated current monitors and self-powered shunt trip to provide inverse time current trip under overload condition, and long time, short time, instantaneous tripping for phase and/or ground fault short circuit protection.
- .2 All circuit breakers with a frame rating of 100 amps or greater shall be equipped with connection ports suitable for using secondary injection type test equipment suitable for testing all time and current levels for all trip functions.
- .3 Supply manufacturers' secondary current injection tester compatible with all molded case circuit breakers used in this project. Device shall be capable of confirming correct time and current operation for all long, short, instantaneous and ground fault elements of these circuit breakers. Tester shall provide time and current levels (not just a pass/fail result) for all tests performed. Provide all required cables, interface, documents and training required for operation.

2.3 ADDITIONAL FEATURES

- .1 Refer to drawings, single lines and panel schedules for features to be included on moulded case breakers.
- .2 Include:
 - .1 Shunt trip.
 - .2 Auxiliary switches providing two sets of normally open and normally closed contacts
 - .3 Integral metering device
 - .4 Solid state trip unit with long time, short time, instantaneous and ground fault elements.
 - .5 On-off locking device.
 - .6 Handle mechanism.
 - .7 Secondary injection current testing equipment and accessories.

Part 3 Execution

3.1 INSTALLATION

- .1 Install circuit breakers in switchboard or panel board assemblies as noted in drawings.
- .2 All auxiliary devices noted on circuit breakers shall be wired to a terminal block in adjacent control compartments. Where function are not used, these shall be terminated, tagged and marked on asbuilt drawings.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 26 11 13 – Unit Substation to 27KV.
- .2 Section 26 13 18 – Primary Switchgear Assembly to 27KV.
- .3 Section 26 23 00 – Low Voltage Switchgear.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for interlock systems and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors in dry locations and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect interlock systems from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 DIFFERENTIAL PROTECTION

- .1 The microprocessor-based relay shall provide protection, monitoring, control, and automation. Relay self-checking functions shall be included. Specific requirements are as follows:
- .2 Protection and Control
 - .1 Differential Protection: Six low-impedance current differential elements.
 - .2 Directional Element: Phase-comparator directional elements for each zone.
 - .3 Check Zone: Three dedicated check zones. Each check zone will have its own adaptive differential element and settings.
 - .4 Analog Inputs: 21 current and 3 voltage inputs.
 - .5 Current Transformer Inputs: Accept CTs from different classes and a ratio mismatch of 10:1. Measuring quantities shall be on a phase-segregated basis and not from summation CTs.
 - .6 Minimum CT Requirement: The relay requires primary CTs that shall reproduce the primary current without saturation for at least 2 ms after external fault inception.
 - .7 Current Transformer Alarm: The relay shall include an element in each zone to detect CT open or short-circuit conditions.

- .8 Ground Overcurrent: Dedicated current input for current and time based overcurrent and ground fault monitoring/indication.
- .9 Digital Inputs: As indicated on the drawings.
- .10 Outputs: As indicated on the drawings.
- .11 Breaker Failure Protection: Internal breaker failure protection with retrip functions for each of the terminals, but be selectable to also accept external breaker failure protection.
- .12 Overcurrent Fault Protection: Instantaneous and time-overcurrent elements for each of the 21 current inputs. Torque control capability shall be provided for the inverse-time overcurrent elements.
- .13 Voltage Elements: Three phase over- and undervoltage elements as well as negative- and zero-sequence overvoltage elements configured to be measured from the transformer secondary.
- .14 End-Zone Protection: Provide protection for a fault between the open circuit breaker and the CT.
- .15 External Faults: Detection of an external fault and enter into a high-security mode but not block the differential protection at any time.
- .16 Pushbutton control for opening/closing circuit breaker shall be provided on faceplate of protection relay. These controls shall be fitted with a programmable time delay.
- .3 Communications/Integration
 - .1 Network communications: Ethernet (Dual port).

2.2 CURRENT TRANSFORMERS

- .1 Current transformers shall be solid core where cable mounted; Split core where bus mounted.
- .2 Ratio as noted in drawings.
- .3 Accuracy class 5P.
- .4 Accuracy power 15VA.
- .5 Insulation class: 1000V or 15kV as noted in drawings to applicable primary voltages.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for interlock systems installation in accordance with manufacturer's written instructions.
 - .1 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.

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

3.3 INSTALLATION

- .1 Install equipment in accordance with the drawings.
- .2 Configure all relay settings as directed by Departmental Representative and Consultant.

END OF SECTION



APPENDIX A

CHECKLIST OF HEALTH & SAFETY PLAN REQUIREMENTS

CHECKLIST OF SUBMITTALS



CHECKLIST OF HEALTH & SAFETY PLAN REQUIREMENTS

Prepare and comply with a site-specific project Health and Safety Plan (see sample below) based on hazard assessment, including, but not limited to, the following:

- ☐ Reference to Contractor's health & safety policy.
- ☐ Indication Health & Safety has been fully considered in the bid.
- ☐ General safety rules for the project.
- ☐ Commitment to comply with all applicable regulations and applicable policies and procedures of PWGSC and Esquimalt Graving Dock.
- ☐ Confirmation that PWGSC will be informed of any sub-contractors before they enter the site and that PWGSC has the right to remove any sub it deems unsatisfactory.
- ☐ Commitment to completion of a Job Hazard Analysis and ensuring workers are made aware of the hazards and comply with specific requirements.
- ☐ Summary of health risks and safety hazards resulting from analysis of hazard assessment, with respect to site tasks and operations.
- ☐ Commitment to the documentation of job-specific safe work procedures and ensuring workers are trained in those procedures before starting work.
- ☐ Define regular communication channels to ensure information is transferred between the Construction team and the Departmental Representative/ operations and record keeping procedures.
- ☐ Commitment to provision of plans by Qualified Persons when required by regulation (e.g. fall arrest program, etc.), ensuring workers are trained in the plan, have approved equipment and follow the agreed plan.
- ☐ Commitment to ensuring no worker (including sub-trades) enters the job site without proper training. Ensuring Workers are made aware of their right to refuse work they consider too hazardous. Acknowledgement that the PWGSC orientation is not to be considered complete training.
- ☐ Commitment to using only "Qualified Persons" on the project and provision of proof of qualification as required.
- ☐ Definition of roles & responsibilities for project safety/organization for project specifically the Construction Superintendent, OH&S Representative and Worker Safety Representative. Identify any alternates and the qualifications of all individuals.
- ☐ A commitment to holding Occupational Health and Safety Meetings at a frequency agreed with the Departmental Representative and provision of minutes within 2 days of the meeting.
- ☐ Define Inspection Policy & Procedures. A commitment to holding formal site inspections at a frequency agreed with the Departmental Representative and provision of a report within 2 days of the inspection. The Worker Safety Representative will participate whenever possible.
- ☐ A commitment to conform to all environmental requirements and safe work procedures for hazardous materials. This includes provision of MSD Sheets and training of workers in correct use, handling, disposal and personal protective measures to be used.
- ☐ Definition of how First Aid will be provided and how medical emergencies will be treated.



- ❑ Incident reporting and investigation policy and procedures. Commitment to reporting all incidents, accidents, near-miss and WORKSAFEBC inspections/orders to the Departmental Representative immediately followed by copies of relevant reports etc. within 2 days.
- ❑ Occupational Health and Safety Committee/Representative procedures.
- ❑ Occupational Health & Safety communications and record keeping procedures.
- ❑ List hazardous materials to be brought on site as required by work.
- ❑ Indicate engineering and administrative control measures to be implemented at the site for managing identified risks and hazards.
- ❑ Identify personal protective equipment (PPE) to be used by workers.
- ❑ Identify personnel and alternates responsible for site safety and health.
- ❑ Identify personnel training requirements and training plan, including site orientation for new workers.

XYZ CONSTRUCTION

CONTRACTOR'S HEALTH & SAFETY PLAN – sample only

XYZ Construction (XYZ) considers safety to be an integral part of doing the work and takes pride in its safety program and record. See XYZ safety policy and program documentation attached.

XYZ's Safety Plan to ensure compliance with WORKSAFEBC Regulations and Environmental practices as required under this contract includes the following elements.

Safety & Health Considered in Bid:

XYZ confirms all known hazards and safety requirements have been considered in the bid and that it will follow all applicable policies and procedures of PWGSC as the owner's representative and comply with all applicable regulations.

Sub-Contracting:

XYZ confirms it will not enter into any sub-contracting agreements without the approval of the PWGSC Departmental Representative. XYZ confirms PWGSC will retain the right to remove any sub-XYZ from the work site if the Departmental Representative deems it necessary and has so informed its sub-contractors.

Sub contractors will be identified to the Departmental Representative prior to entering the work site.

Job Hazard Analysis

XYZ will work with sub-trades and other resources to complete the Job Hazard Analysis to the extent possible. XYZ will then assist in finalizing the Job Hazard Analysis documentation with the Departmental Representative, Safety specialists and IOS Operations Representatives *prior* to starting work. The Departmental Representative will review the Job Hazard Analysis provided by the XYZ prior to worker orientation proceeding. XYZ will ensure worker compliance with requirements included in the Job Hazard Analysis, job/site specific procedures and all regulations.

XYZ will comply with the PWGSC Lockout Policy, Confined Space Entry Policy and other applicable site rules/ policies.

Safe Work Procedures:

XYZ will work with safety professionals, engineers and others as required to document safe working procedures for all hazardous work and ensure workers are trained in these procedures prior to starting work. Where required, Personal Protective Equipment will be provided and a list is attached.

Provision of Plans by Qualified Persons:

Where regulations require plans provided by Qualified Persons (e.g. Fall Protection Plan, Crane lifting plans, Confined Space Entry procedures) XYZ will identify the requirement, provide the plan and commit to ensuring workers are trained in the plan, have suitable approved equipment and follow the agreed plan. ABC Engineering will provide the required documentation for the 3 identified needs.

XYZ CONSTRUCTION

CONTRACTOR'S HEALTH & SAFETY PLAN – sample only

Worker Training:

XYZ will ensure no worker (including sub-trades) enters the job site without proper training in applicable WORKSAFEBC Regulations and project specific procedures as defined in the Job Hazard Analysis, Emergency Response /Rescue Plans, or detailed work procedure. XYZ will ensure all workers understand the hazards of the work and those inherent in working at IOS and that they have the right to refuse work they consider to be too hazardous. XYZ will provide documentation confirming training to the Departmental Representative prior to the workers starting work. It is understood that the Orientation to be conducted by PWGSC cannot be considered complete training in everything the worker must know and Supervisors are ultimately responsible for workers being fully trained. No worker will enter the site without a complete orientation.

Qualified Persons:

XYZ will ensure that only “Qualified Persons” are used on the project and provide proof of qualification prior to the Pre-startup Orientation and Tour for workers as requested by the Departmental Representative. The list of designate qualified persons for this project is attached.

Construction Superintendent:

XYZ will ensure that the Construction Superintendent is qualified to supervise the work and will be capable of carrying out the following roles & responsibilities. John Smith, an employee with 34 years experience in building/construction type of work will supervise during the most critical activities and otherwise Dustin Brown, a senior employee with 10 years experience will act as alternate Construction Superintendent. Resumes are attached. The Construction Superintendent and Alternate meet the requirements outlined below:

1. To document a Project Safety Plan (this document) for both his people and any sub-trades involved on the project. This will be prepared in conjunction with the sub-contractor management as necessary and provides the framework for safety and health related activity on the project.
2. To train and/or ensure training has been done for any worker under his/her supervision including sub-trades.
3. To monitor the daily activities of his workers, including sub-trades, for compliance with safe work practices and immediately correct any violations.
4. To ensure no worker operates IOS equipment of any kind.
5. To re-train and coach workers as required for the purpose of correcting improper practices. To ensure the same is done for workers of sub-trades.
6. To report any injury, near miss or hazardous condition observed or brought to his attention to the PWGSC Departmental Representative immediately.
7. To report any WORKSAFEBC Orders or Inspections received by XYZ to the PWGSC Departmental Representative immediately.
8. To conduct safety meetings as outlined in the section below.

XYZ will ensure sufficient supervision to monitor the activities of the workers and ensure compliance with safe work practices. For this project, the Construction Superintendent or his alternate Construction Superintendent will be on site at all times when work is proceeding.

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CONTRACTOR'S HEALTH & SAFETY PLAN – sample only

Designated O H & S Person:

XYZ will employ and assign to the work, a competent and authorized representative as the Health and Safety Officer. Jack Brown, the Health and Safety Officer meets the following requirements (resume attached):

1. Have a minimum of 2 years of site-related working experience specific to activities associated with the work.
2. Have basic working knowledge of specified occupational safety and health regulations and site-specific safe work procedures.
3. To finalize the Job Hazard Analysis and safe work practices with the Departmental Representative, Safety Representative(s) and Operations Representative(s).
4. Be responsible for completing Health and Safety Worker Training and Site Orientation sessions, and ensuring that personnel who do not successfully complete the required training are not permitted to enter the site to perform work.
5. Be responsible for implementing and enforcing daily, and monitoring, the site-specific Health and Safety Plan.
6. Be on site during execution of work.
7. To be responsible for carrying out accident/incident investigations and provide a copy of the report to the PWGSC Departmental Representative. The Departmental Representative and/or his representative will assist in doing this.
8. Conduct regular drills, in co-ordination with Departmental Representative, to test adequacy of emergency response procedures and worker knowledge of their roles and responsibilities.
9. To conduct site inspections daily, as agreed with the PWGSC Departmental Representative and provide documentation of inspections to the Departmental Representative on a weekly basis.
10. To participate in safety meetings as outlined in the section below.

Worker Safety Representative:

The Worker Safety Representative on this project will be Sam White. Sam has been XYZ's worker safety rep for 5 years and is very familiar with applicable WORKSAFEBC regulations and safe work practices. Workers will be encouraged to contact their safety rep regarding safety and health issues that may arise. The Worker Safety Rep will participate in safety meetings and inspections and the resolution of health & safety issues.

Safety Meetings:

It is agreed that safety meetings with workers will consist of weekly meetings to be held every Monday morning with minutes to be provided to the Departmental Representative by the following Wednesday. The Construction Superintendent will document the actions of the meetings, who attended and provide a copy to the PWGSC Departmental Representative or his designate.

Typical topics for meetings will include but are not limited to:

- Review of hazards and safe work procedures and use of protective equipment.
- Changes in work practices, schedule or adjacent work areas which could affect worker safety,

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- A review of critical procedures (e.g. Fall arrest plan, Fire and Emergency procedures,)
- Discussion of any injury, near miss or accident and steps to prevent recurrence.
- Worker health & safety concerns.

If changing conditions require communication to the workers prior to the next safety meeting, a “tail-gate” meeting will be held to train the workers prior to commencing work.

Inspections:

The Construction Superintendent/ OH&S resource will carry out daily inspections to identify new hazards, observe adherence to safe work practices and record findings and actions in his log. Written Inspection Reports will be provided to the PWSCG Departmental Representative weekly. Whenever possible, the weekly inspection will be conducted together with the Workers Safety Representative. This inspection will make use of the Job Hazard Analysis as a checklist of items to inspect.

Hazardous Materials & Environmental:

XYZ confirms it will conform to all environmental requirements as defined in the contract and comply with Environmental Services best practices and directives. Material Safety Data Sheets will be provided prior to finalizing the Job Hazard Analysis for all potentially hazardous materials to be used. Workers will be fully trained by XYZ in the hazards of these materials and the proper use, storage, handling, Personal Protective Equipment (PPE) usage, disposal of these materials, appropriate emergency response and any other relevant information from the MSD Sheets. XYZ will ensure workers have received WHMIS training as required by regulations. A list of hazardous materials and PPE to be used on this job is attached.

First Aid/ Medical Assistance:

XYZ will provide a written risk assessment and detailed procedures for dealing with various types of possible injuries to comply with WORKSAFEBBC First Aid amendments effective 31 Mar/04 and ensure required First Aid coverage is in place prior to the first day of work. A Level 1 First Aid Kit will be kept at the XYZ field office trailer near the work area. All First Aid Attendants will have their Original certificates on site for inspection by WORKSAFEBBC if required. Three employees, Bob Horvath, Brian West, and George Taylor have level 1 First Aid training.

In the case of non-serious injury not requiring a stretcher or ambulance, the injured worker will be taken to:

Admirals Walk Health Centre, 105-1505 Admirals Rd. (PH. 380-9070) using a company truck.

In the case of more serious injury, 911 will be called and ambulance service will be provided. Two XYZ workers will have 4-channel radios and can raise the alarm. The Construction Superintendent has a cell phone and will call 911.

Emergency Response Plan

XYZ will work with sub-trades, fire departments and others to document the response procedures in

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the event of an emergency or serious injury if work is of a nature that requires these details. Documentation will be posted and all workers trained. Plans will be compatible with IOS emergency response for fire, bomb threat, earthquake and confined space rescue.

**SAMPLE
ONLY**

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Accident/Incident/Injury/WORKSAFEBC Order Reporting & Investigation:

XYZ will emphasize to employees that ALL accidents, injuries, equipment damage and incidents are to be reported and will ensure they are documented and reported to the PWGSC Departmental Representative immediately. Also, report to WORKSAFEBC as required by regulation and cooperate with any officer performing inspections or investigations. Any WORKSAFEBC Order or Inspection will be immediately reported to the PWGSC Departmental Representative.

XYZ will complete a full investigation of all incidents, near misses and accidents and take immediate corrective action as required to prevent recurrence. The Departmental Representative will participate with XYZ in investigations and planning appropriate action to prevent recurrence.

Approved by (XYZ): _____ Date: _____.

General Manager, XYZ Construction

**SAMPLE
ONLY**

CHECKLIST OF SUBMITTALS

Spec Note: This list is intended to highlight documentation, etc. that PWGSC expects to be provided by the successful bidder. Delete items not applicable to this project.

General:

- ☐ Finalized Job Hazard Analysis (see Spec 01 35 33). Mandatory. See Appendix B for Preliminary Job Hazard Analysis (JHA) provided by PWGSC that identifies those hazards known to PWGSC.
- ☐ Documentation of Contractor's Health & Safety Policy and Program to extent required by WORKSAFEBC. Mandatory
- ☐ Names of all Sub-Contractors and their Superintendents and phone numbers.
- ☐ Names of Worker's Safety Representative or Joint Safety Committee Representatives (where required by regulation).
- ☐ Documented methods and procedures to be used to carry out the work. This is not required for certain routine work (e.g. lawn maintenance, garbage collection). Engineer will indicate if not required.
- ☐ Confirm WORKSAFEBC clearance on WORKSAFEBC website
- ☐ Contingency & Emergency Response Plan. General site emergency response will be defined by Esquimalt Graving Dock (EGD) for earthquake, tsunami, fire, hazardous material spills.
- ☐ Plans for PWGSC Site Orientation and introductory Site Visit for the Contractor's Workers. If workers join the project later, they must be given the same orientation and training.
- ☐ Regular Safety Meeting Schedule including when minutes will be delivered. For projects of short duration (5 days or less) additional safety meetings not required. Carry out tailgate meeting if changing conditions require communication to workers.
- ☐ Regular Site Inspection Schedule including when reports will be delivered. For projects of short duration (5 days or less) additional formal inspections not required. Construction Superintendent will carry out observations while supervising and correct work practices, site conditions etc. and note in log.

Environmental:

- ☐ Complete set of Material Safety Data Sheets (MSDS), and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements. These are provided to Environmental Services at EGD and must be accepted before use on the project.
- ☐ WHMIS plans and training documentation, where required. Workers must receive WHMIS training before working with hazardous materials.



Qualifications/Certificates/Procedures:

- ☐ Contractor's Superintendent qualifications and those of any alternate. Mandatory.
- ☐ Provide qualifications of Contractor's dedicated OH & S Qualified Person (and any alternate) to provide OH & S coordination (mandatory). The Contractor's Superintendent may fulfill this role, if qualified.
- ☐ Rigging and Lifting plans by Qualified Person (when required).
- ☐ Fall protection methods and procedures developed by a Qualified Person (when required).
- ☐ Scaffolding plans by a Qualified Person (when required).
- ☐ Fire Safety Plan. Hot Work Permits, when required, are obtained through the Engineer.
- ☐ Participate in Lockout Plan including details of all steps and points to be locked out and numbers of locks required. The EGD Guarantor will review the plan before issuing a Record of Isolation. PWGSC will be responsible for determining lockout points, completing isolation and reviewing with the Contractor. Contractor's workers will apply personal locks as required.
- ☐ Insulated aerial device certification (last 12 months).
- ☐ First Aid provision and copies of certificates for all F.A. Attendants. Plans for treatment of injuries including transport to clinic/hospital.
- ☐ First Aid assessment and written procedures for providing first aid to comply with WORKSAFEBC first aid amendments effective 31 Mar/04.
- ☐ Exposure control plans for Heat, Cold, Vibration, Noise, Radiation (where required by regulation).
- ☐ In addition to names of Qualified Persons referenced in preceding submittals, provide names of persons qualified as:
 - Electricians
 - Operate other equipment where required by regulation.

Records:

- ☐ Equipment inspection & maintenance logbooks required on site (copies not required).
- ☐ Records of workers instruction in use, care, fit etc. of Personal Protective Equipment (PPE) including fit tests. Produce for Engineer to review, copies not required.
- ☐ Supervisors & Worker training plan and documentation. Documentation must be received before any work begins (mandatory).

Site/Project Specific Health & Safety Plan:

Prepare and comply with a site-specific project Health and Safety Plan. See Appendix A accompanying Health And Safety Specification 013533 for detailed checklist.



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Electrical Safety Repairs (Arc Flash Mitigation)

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PRELIMINARY JOB HAZARD ANALYSIS CHECKLIST



Inspection Date: 3 May 2012

Inspection/Job Hazard Analysis Conducted By: Ken Nielson

Note:

1. This form is also intended for use as a checklist when making daily inspections of the worksite. Therefore some questions will not apply to the initial inspection/ job hazard analysis.
2. This form is intended as a guide only and does not necessarily cover every situation regulated by WORKSAFEBC or other jurisdictions. It is imperative that the Contractor be familiar with safety requirements and add anything that is relevant but not listed below. New items should be noted to the attention of the Project Manager for inclusion in future revisions. Contractors must finalize the JHA to reflect the methods/equipment etc. they will use to do the work.
3. Project Managers must review all items as part of creating preliminary JHA. Do not simply reuse this form from a previous project. Delete or add to "Hazard/Action Required" items as appropriate for your project and enter checkmarks or NA (not applicable) or TBD (to be determined with Contractor) under "Existing" column as appropriate.
4. **CODES:**
 - "*" indicates covered in Basic Site Orientation for Contractors presentation by PWGSC.
 - "S" indicates item covered in startup meeting with Contractor and up to Contractor to carry out appropriate action. Not covered in EGD orientation session.
 - "O" indicates item covered in EGD project specific orientation session. This does not relieve the contractor of responsibility for training workers with regards to this item.
5. Column "WORKSAFEBC Ref." May also contain Canadian Occupational Safety & Health (COSH) regulation references.

This project involves installing a wire in two load banks, one for each stand by generator. One is located at the main north side electrical building and one at the south side electrical building. Work involves installation of concrete pads for the load banks, installing the load banks and associated ductwork on the roof of the buildings to exhaust heat.

Risks include but are not limited to:

- Electrocution if proper isolation procedures are not followed.
- Falling over 25 ft when installing ventilation ducts if proper fall arrest/restraint procedures are not followed.
- Exposure to noise and dust when cutting and removing concrete. Use PPE.
- Exposure to lead if existing paint is disturbed by the work. Controls and worker protection will be required when drilling anchors for conduit. Details of potential locations to be provided.
- Be aware of low level (2%) asbestos contained in caulking around doors in the S. Side Substation. There should be no need to disturb this caulking.

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	Cond No.	Condition	Existing √	CODE	WORKS AFEBC Ref. #	Hazard/ Action Required
GENERAL	1.1	Notice of Project (NOP) given to WORKSAFEBC? Check regulations for conditions requiring notice: <ul style="list-style-type: none"> - Over \$100,000. - All or part of works are required to be designed by P.Eng. - Asbestos removal - Disturb Lead coatings - Significant Risk of Occupational Disease - New construction, major alteration, structural repair or demolition of : <ul style="list-style-type: none"> - Bldg over 2 stories (or 20ft.) - Bridge - Earth/water retaining structure over 10' - Silo/chimney over 20' - Work in compressed air environment - Work in a caisson - Work in a tunnel (see 22.2) - Work on underground working (22.6) - Trenches 4' deep and 100' long or other type of excavation over 4' a worker must enter. - Diving Operations check 24.9 - Aircraft involved? check 29.8 	√	S	20.2 24.9 22.6 29.8	Contractor to provide NOP to WORKSAFEBC and provide copy to Project Manager before pre-startup safety orientation meeting. Note that WORKSAFEBC NOP Form 52E49 is used for general construction work and when asbestos or lead is involved. Use WORKSAFEBC Form 52E48 for NOP when diving, underground workings or aircraft are involved. NOP should go to WORKSAFEBC 4-5 days before starting work if possible and MUST be submitted no less than 24 hrs before commencing work. The white copy is for the site and the canary and pink copies go to the WORKSAFEBC. Photocopies should be posted on the safety notice board, placed on the project file, contract file and sent to the Regional Safety Coordinator. Note also the requirement to provide written notice to WORKSAFEBC before commencing (under Part 19) if workers, equipment, machinery or materials could come in contact with energized high voltage conductors or other exposed electrical equipment. Note application to underground workings in WORKSAFEBC section 22.2
	1.2	Multiple Contractor Coordination. <ul style="list-style-type: none"> - 2 or more employers? - Overlapping work areas - Appoint qualified safety coordinator - Post construction procedures and JHA 	√	S	Review WORK SAFEBC 20.3	Contractor to appoint Worker Safety Representative and Construction Superintendent. Coordination with EGD personnel and others on site will be through Project Manager. Post Final JHA and procedures.
	1.3	Building and other permits obtained?	√	S		Building permit required for new construction.
	1.4	Notice of Project Posted?	√	S		Contractor will post on safety notice board.

1.5	Post emergency response plan and site plan? Workers trained in emergency response? Conduct risk assessment for: Work at high-angles Special needs individuals Others as required by 4.13 or identified in other sections below	√	*	4.13-4.18 20.3	Site plan and emergency response to be posted on safety notice board. Contractor to ensure all workers trained in emergency response for fire, earthquake, medical, bomb threats and hazardous materials accidents before starting work. Note the special rescue requirements for high-angle work and the need for written agreements to provide service.
1.6	Regular Safety Meeting Minutes Posted?	√	*	3.2	Weekly safety meeting to be held. Contractor to provide minutes to Project Manager for posting.
1.7	WORKSAFEBC Orders, Inspections or “Notice to Workers” Posted? Notification of compliance posted?	√	S	Div. 10 183	Contractor to provide any WORKSAFEBC inspections and/or orders to Project Manager and post any inspections and compliance reports.
1.8	Regular Inspections carried out with Safety Rep and Posted? Conduct special inspection if required due to malfunction or accident.	√	S	3.5 3.7 3.8	Provide inspection reports to P.M. and post.
1.9	Contractor’s workers safety representative identified for each employer? Alternatively, a Joint Committee set up if required by WORKSAFEBC Div. 4?	√	S	20.3 Div4 125-140	Worker Safety representative if 9 or more workers.
1.10	Insufficient lighting?	√	S	4.65	Contractor to ensure lighting levels are sufficient for work to be performed. Provide portable lighting where necessary.
1.11	Workers informed of the hazards of the job and that they have the right to refuse work they consider too hazardous without discriminatory action?	√	*	Review 3.12	To be covered in orientation session and reinforced by Contractor.
1.12	Workers with physical or mental impairment that could affect work must inform their supervisor.	√	*	4.19	To be covered in orientation session and reinforced by Contractor. Do not work at heights if subject to dizziness or if worker has a fear of heights.
1.13	Workers informed no alcohol, drugs or other substance so as to endanger self or others?	√	*	4.20	To be covered in orientation session and reinforced by Contractor. Inform First Aid attendant of any medications being taken as they may be important in case of accident.
1.14	Firearms of any kind are prohibited on site.	√	*		To be covered in orientation session and reinforced by Contractor.
1.15	Duties of Employers, Workers, Supervisors and Owners	√	*	Div.3 115-119	Review duties/responsibilities of parties involved. To be covered in orientation session.
1.16	General Duty: In the absence of a specific requirement, all work must be carried out without undo risk of injury or disease to anyone.	√	*	2.2	To be covered in orientation session and reinforced by Contractor.



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Electrical Safety Repairs (Arc Flash Mitigation)

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1.17	Do not remove or render inoperative any safeguard and ensure safeguards are in place before operating equipment.	√	*	4.11 4.12	To be covered in orientation session and reinforced by Contractor.
1.17a	All workers must be given adequate instruction in the fire prevention and emergency evacuation procedures applicable to their workplace.	√	O	4.16	To be covered in orientation session and reinforced by Contractor.
1.18	Do not operate any EGD equipment. Only those trained and authorized by the contractor are to operate contractor's equipment.	√	*	4.10	
1.19	Ensure equipment inspection & maintenance record (s) are readily available to equipment operators or inspectors.	√	*	4.9	To be covered in orientation session and reinforced by Contractor.
1.20	Workers must not engage in improper activity that could constitute a hazard to themselves or others including horseplay threats or physical force. Improper activity must be investigated.	√	*	4.24-4.31	To be covered in orientation session and reinforced by Contractor. Violence or harassment will not be tolerated. Contractor carry out risk assessment of injury from violence if there is potential for violence. Inform workers and prepare plans to minimize risk as required by 4.30
1.21	Workers to restrict activity to designated areas of the site.	√	*		Restrictions to be discussed at pre-start-up safety orientation meeting.
1.22	Workers informed of location of copy of WORKSAFEBC Regulations and Worker's Compensation Act.	√	*		Cover at orientation meeting. Contractor to ensure current copy of Regulations and the Act is available on site.
1.23	Written work procedures developed? Provided to P.M. and workers?	√	S & O		Contractor to document work procedures and sequence of activities and provide to Project Manager and workers before starting work.
1.24	Do not work on site outside of agreed working hours.	√	*		EGD must ensure an employee is on site anytime contractors are on site. Therefore notice is required.
1.25	If work damages a utility it must be reported.	√	O	4.18	Immediately inform the Utility and then the Project Manager
1.26	Wildlife, rodents may be encountered on the site.	√	O		Be aware of potential for encounters with wildlife on the site. Rodents may leave droppings in crawl spaces that could present a hazard if dust is breathed. Also, raccoons may be aggressive if cornered and deer may protect their young.

FIRST AID & INVESTIGATIONS	2.1	Has the Contractor carried out an assessment and identified the numbers of workers who may require first aid at any time; the types of injuries that might occur; barriers to first aid being provided to an injured worker; and time required to transport an injured worker to medical attention?	√	*	3.16 & 3.17	Contractor to provide <u>written</u> first aid assessment and written procedures for providing first aid to comply with first aid amendments effective 1 Feb/08.
	2.2	Workers instructed to report ALL injuries or near misses, hazardous conditions?	√	*	3.10	To be covered at the pre-startup safety orientation meeting.
	2.3	Workers know where first aid is located and how to call for first aid? Communication between first aid attendant and ambulance service defined?	√	*	3.17 & 3.18	Contractor MUST have own F.A. Before starting work. Identify location & adequacy of Contractor's F.A. equipment. Cover procedures in orientation.
	2.4	First Aid qualified person(s) on contractor's crew? ORIGINAL Certificate(s) must be with person(s) on site. Provide photocopy to Project Manager.	√	S	Part 3	Required. Provide certificate(s) to Project Manager before orientation session.
	2.5	F.A. equipment on site where required? Must comply with "High" Hazard class 20 min or less travel to hospital.	√	S	3.16	Provide location and type.
	2.6	Provide immediate investigation & notice to WORKSAFEBC for: - serious injury/death - major structural failure of bldg., bridge, tower, crane, hoist, excavation, temp. construction support system. - major release of a hazardous substance. - incident required to be reported.	√	S	Div. 10 172	To be covered in project startup meeting with Contractor. Do not disturb the accident site except to attend injured persons, prevent further injuries or protect property. Assist investigators every way possible.
	2.7	Provide emergency transport to hospital as required by WORKSAFEBC and written procedures for transport.	√	S	3.17	Contractor to define procedures for provision of first aid, calling ambulance service etc. as required by regulation. Post them and ensure workers are informed.
	2.8	Is the first aid attendant available to render prompt service?	√	S	3.18	Do not assign activities that will interfere with the attendant's ability to receive and respond to call for first aid. Ensure coverage during lunch and other breaks. Provide backup first aid immediately for planned absences. About ½ shift absence is permissible for unplanned absence until replacement attendant is in place.



	2.9	Has the general contractor included all subs in determining the numbers or workers and first aid requirements	√	S	3.20	General Contractor's first aid assessment and procedures to include sub-contractors.
	2.91	Has the contractor assigned a person to manage first aid service?	√	S	3.17	Assign someone to ensure attendants, supplies, facilities and equipment are always available.
	2.92	Does the Contractor have New or Young Workers as defined by WorkSafeBC regulations?	√	S	3.22-3.25	Ensure New or Young workers receive special orientation and training as required by regulations and documentation is provided to the Project Manager. Ensure follow up observation and provide reinforcement training if required or requested by the worker.
	2.91	Has the contractor assigned a person to manage first aid service?	√	S	3.17	Assign someone to ensure attendants, supplies, facilities and equipment are always available.
CHEMICAL/ BIOLOGICAL - WHMIS	3.1a	Hazardous Substances Used? Provide details.	√	O	PART 5	No hazardous substances expected to be used by the contractor. Contractor to provide Material Safety Data (MSD) Sheets for all hazardous substances to be used including welding materials and gases. Sheets must be provided by the contractor at first meeting with the engineer in order to complete the Job Hazard Analysis and define safe work practices. Ensure effective written procedures are prepared and implemented to prevent exposure by any route that could cause an adverse health effect, and to address emergency and cleanup procedures in the event of a spill or release of the substance. Ensure the supervisor and the workers are trained in and follow the established procedures.
	3.1b	Environmental Assessment completed? Check identified hazards and measures to be taken.	NA	S		Formal Environmental Assessment not required.
	3.1c	EGD Environmental Best Management Practices applicable?	√	O		Contractor to follow Best Management Practices provided by Environmental Services.
	3.2	Implementation Plan Checklist completed?	TBD	S	5.7	Contractor to follow Implementation plan checklist for hazardous substances. See WORKSAFEBC section 5.7
	3.3	Material Safety Data Sheets Available?	TBD	O	5.16	Contractor to provide MSD Sheets and make available at worksite to all workers.
	3.5	Emergency Response Defined?	TBD	O		Contractor to define emergency response as appropriate for hazardous substances.
	3.6	Training Checklist Completed?	TBD	S	5.7	Contractor to follow education & training checklist for hazardous substances provided by WORKSAFEBC. See 5.7
	3.7	Flammable/Combustible Substances?	TBD	O	5.27-5.35	

3.8	Substances under pressure?	TBD		5.36-5.47	
3.9	Controlling Worker Exposure	TBD	O	5.48-5.59	
3.10	Ventilation controls?	TBD	O	5.60-5.71	
3.11	Internal Combustion Engines operated in poorly ventilated areas?	TBD		5.72-5.75	
3.12	Hazardous Wastes & Emissions	TBD	O	5.76-5.81	
3.13	Personal Hygiene	√	O	5.82-5.84	Wash hands before eating or smoking or at breaks as required by regulation.
3.14	Emergency Washing Facilities, eyewash required?	TBD	O	5.85-5.96	Contractor to provide emergency washing facilities where required due to hazardous substances.
3.15	Emergency Procedures defined? Review First Aid, Fire, Spill Control.	TBD	O	5.97-5.102	Contractor to review emergency procedures with workers.
3.16	First Aid and Fire depts. aware of substance and quantities used and locations stored?	TBD	S	4.17	Contractor provide notice if required by regulations.
3.17	Supervisor & Workers trained? General WHMIS instruction as well as substance specific training?	TBD	S		Contractor to ensure Workers and Supervisors have WHMIS training and training in dealing with specific substances.
3.18	Substance specific requirements?	TBD	S	PART 6	Review Part 6 and ensure compliance as per MSD sheets. See also sections 25, 28 and 29 below.
3.19	Evaluate worker understanding of substance specific requirements and emergency/spill procedures during inspections.	TBD	S		Inspection item.
3.20	Ensure containers for hazardous substances are maintained to ensure secure containment. Keep covered when not in use.	TBD	S	5.20-5.22	Inspection item.
3.21	Keep only enough for one shift, store balance of quantity in designated separate area. Ensure workplace/supplier labels are on EVERY container.	TBD	S	5.23	To reduce the risk of a major spill, fire etc. minimize quantities on site. Ensure workers can easily tell what is in every container. Inspection item.
3.22	Store incompatible substances so that they can not mix in event of leakage, breakage etc.	TBD	S	5.24	Serious consequences can result from mixing certain substances. Ensure they cannot mix. Inspection item.
3.23	Store hazardous substances so they can't fall, be damaged or exposed to extreme temperatures.	TBD	S	5.25	Inspection item.
3.24	Ensure the designated storage area meets design requirements.	TBD	S	5.26	Inspection item.

	3.25	Protective and spill equipment available?	TBD	O		Contractor to ensure all personal protective equipment and spill response equipment is readily available and workers are trained in spill response plan.
	3.26	Follow proper procedures in disposing of hazardous substances.	TBD	S		Follow MSD Sheet instructions.
	3.27	Other	TBD			
		Note: Refer to WHMIS Implementation Plan checklist when doing inspections for hazardous substances	TBD	S		Create inspection checklist where required.
WORKING ALONE	4.1	Working alone process defined for workers assigned to work alone? Note new guidelines Nov./08 for determining if working alone regs apply. Amongst other things a "person check" system alone is unlikely to meet the "readily available" test.	No working alone	*	4.21-4.23	There will generally be no working alone. Document special procedures and agree with Project Manager if working alone is necessary. Note regulation changes 1 Feb/08
	4.2	Working alone process followed?	√		4.21-4.23	Inspection item.
	4.3	Restricted Access area?	√	O		Contractor to ensure workers follow procedures for restricted access.
LOCK-OUT & ELECTRICAL	6.1	Has the EGD Lockout policy been reviewed and relevant sections complied with?	√	S		Policy to be reviewed by Contractor with workers as part of training.
	6.2	Each worker has own lock, no combination locks? Means of identifying lock owner?	√	O	PART 10	Every worker must have own lock and tag identifying worker and company.
	6.3	Lockout procedures documented for project?	√	O	PART 10	To be documented and agreed with J. Lezetc and permit issued before initiating lockout.
	6.4	Workers and Supervisors trained in lockout? Only certified electricians to do electrical work.	√	O	PART 10	Contractor to ensure all Workers and Supervisors are trained in the lockout procedure. Contractor to provide proof of certification to Project Manager before start of work.
	6.5	All isolation points identified?	√	S	PART 10	To be done in conjunction with J. Lezetc and documented in lockout procedure.
	6.6	Electrical ground hazard?	√	S		To be done in conjunction with J. Lezetc and documented in lockout procedure.
	6.7	Pneumatic Devices hazard?	√	S		Document if this type of hazard exists and controls required.
	6.8	Potential Energy hazards? All parts secured against inadvertent movement?	√	S		Document if this type of hazard exists and controls required.
	6.9	Kinetic Energy hazards? All parts secured against inadvertent movement?	√	S		Document if this type of hazard exists and controls required.



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6.14	If over 750V follow H.V. guidelines in lockout policy.	NA	O		No H.V. work required.
6.15	No working NEAR energized H.V. equipment or conductors.	Not permitted	S	Lockout Policy	Not permitted.
6.17	Control the use of metal ladders, wire reinforced ladders, metal scaffolds or work platforms.	√	S	19.10	Planned use of ladders, scaffolds etc. to be determined with Contractor and electrical risks assessed.
6.18	No Qualified workers within 1 m. of uninsulated, energized parts.	Not permitted	S	Lockout Policy	Not permitted. Keep unqualified personnel at least 3 m. from energized parts.
6.19	If using an insulated aerial device has it been tested as required by WORKSAFEBC Reg. 19.9	√	S	19.9	Check plans to use aerial device & insure compliance.
6.20	Is all portable electrical equipment either double insulated and so marked or effectively grounded? Workers trained to inspect?	√	S	19.14	Contractor to check any portable equipment and ensure workers trained in inspecting electrical equipment for safe operation.
6.21	Is all portable electrical equipment used outdoors or in wet/damp conditions protected by Class A Type ground fault circuit interrupters?	√	S	19.15	Contractor to check any portable equipment and ensure workers trained in inspecting electrical equipment for safe operation.
6.22	Ensure good access to electrical equipment and that no flammable materials are stored or placed close to electrical equipment.	√	O	19.7	Practice good housekeeping. Keep areas clear in front of electrical panels, fire alarms & extinguishers. No flammables inside work areas unless agree by Project Manager.
6.23	Other, specify:				
6.24	Are lockout points easily identifiable (e.g. By number) to prevent lockout errors and identify the equipment it serves?	√	S	19.13	All lockout points are labelled.
6.25	Note that lockout of a panel door preventing access to other live breakers is unacceptable.	√	S		Generally there should be no other users of panels while the project work is underway. Confirm.
6.26	Note lockout of Control Circuits is not sufficient for total isolation.	√	S		Reminder item
6.27	Be SURE to understand what will happen if an energy source is activated.	√	S		Reminder item
6.28	Consider severity of injury, frequency of doing the job and probability of injury in assessing tasks.	√	S		Reminder item
6.29	Before the conclusion of the job and after energizing, have conspicuous signs been placed near the equipment stating "Danger – Energized Equipment"?	√	O	19.11 19.17	Place signs when finished.

	6.30	Ensure electrical instrumentation is functioning properly and has not been the subject of recall by the manufacturer.	√			Note that some Fluke Model 179 Multimeters have exhibited faulty readings and need to be replaced.
FALL PROTECTION	7.0	Fall Protection required? Yes work over 7.5 ft above unguarded surfaces.	√	S	11.2	1. Work over 7.5 ft. (CLC requirement) or shorter distance if risk of injury greater than fall to flat surface. 2. Use guardrails or similar restraint if practicable. 3. Use other fall restraint if 2 not practicable. 4. If 3 not practicable use fall arrest system. 5. If 4 not practicable ensure work procedures acceptable to WORKSAFEBC are used. Note changes to WORKSAFEBC regulations 1 Jan/05
	7.1	Fall Protection System defined in writing?	√	S&O	11.3	Contractor to define fall protection plan for any work over 7.5 ft. (CLC requirement) above ground on unguarded surfaces from which fall greater than 7.5m.(25ft) can occur or 11.2(5) applies.
	7.2	Workers & Supervisors Trained?	√	S&O	11.2(6)	Contractor to ensure all workers & supervisors trained in fall protection procedures before work starting and provide documentation to Project Manager.
	7.3	Workers trained & Fall Protection Procedures followed?	√		11.2(6)	Inspection item.
	7.4	Inspection of fall arresting equipment before each use by a qualified person being done?	√	S	11.9-	Qualified Person to perform inspection before use on each shift. Keep free from foreign substances & conditions that can contribute to deterioration & keep in good working order.
	7.5	Fall Protection System used?	√	S	11.2(7)	Ensure workers use system
	7.6	Safety Belts used for fall restraint only? Otherwise use body harness.	√	S	11.4	Follow written fall protection plan.
	7.7	Ensure equipment meets standards	√	S	11.5	Ensure components are suitable and compatible, sufficient to support the forces and meet and are used in accordance with standards.
	7.8	Ensure anchors meet standards	√	S	11.6	Check anchors meet WORKSAFEBC requirements. Changed 17 May/06
	7.9	Temporary horizontal lifeline system used?	TBD	S	11.7	Acceptable if 1) manufactured for commercial use and installed and used per written instructions and drawings (available on site) 2) designed, installed & used per written instruction and drawings (available on site) certified by P.Eng. 3) other acceptable to WORKSAFEBC Changed 17 May/06



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	7.10	Need to remove from service?	√	s	11.10	If fall protection system has arrested fall of a worker remove from service until inspected and recertified safe by manufacturer or P.Eng.
FIRE RELATED	8.1	Workers aware they generally do not fight fires? First priority is to raise the alarm and get selves and others to safety.	√	*		Workers to fight fires only if small (2'x2') and they have been trained in fire extinguisher use and they are confident they can extinguish the fire. To be reinforced at orientation meeting and reinforced by Contractor.
	8.2	Fire Extinguishers Available and accessible?	√	O		Contractor to ensure proper type and number of extinguishers available. Check monthly inspection and tags.
	8.3	Electrostatic Discharge	√	O		Contractor to determine risk of ignition due to discharge and take preventive measures.
	8.4	Ignition Sources eliminated or controlled if flammable gas or liquid used or stored?	√	O	5.27	No smoking on this project except in designated areas defined by Project Manager. Define any other ignition sources and controls required.
	8.5	Flammable gas concentrations	√	S&O		Ensure adequate ventilation to comply with WORKSAFEBC regulations. Monitor flammable gas concentrations and use forced ventilation if required.
	8.6	Combustible materials	√	O		Keep area clear of combustibles. Practice good housekeeping. Store oily rags in approved metal containers with tight fitting lids and empty daily. Burning of waste is prohibited.
	8.7	No smoking in buildings, on cranes, in caissons or tunnels. Define other restrictions. Rules being followed?	√	O	4.81	Contractor to enforce no smoking except in areas designated by the Project Manager.
	8.11	Do not use flammable liquids as a manual cleaning solvent.	√	S	5.32	Flammable fumes can collect on clothes and result in the worker being engulfed in flames should ignition occur. Also, these substances are often hazardous to health and can be absorbed through the skin. Contractor to reinforce with workers and monitor for compliance.
	8.12	Hot Work Permits issued and posted?	√	*		Obtain permit from Project Manager before starting any cutting, welding, brazing, soldering, grinding, heat-treating or other hot work like roof tarring, thawing pipe, hot riveting or using powder-driven fasteners.
	8.13	Fire Alarms explained?	√	*		To be covered at pre-startup meeting and worker orientation session.



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LADDERS/SCAFFOLDS & TEMP WORK PLATFORMS	9.0	Is work off ladders/scaffolds etc planned? Note new guidelines Nov/08 re suitable ladders, work platforms, and scaffoldings, and to specify that the top plate of interior or exterior walls, the top plate/top whalers used in concrete formwork, or other elevated surfaces narrower than 50 cm (20 in) are not considered suitable work platforms or acceptable as elevated walkways.	√	S		Work off ladders/scaffolds foreseen.
	9.1a	Workers trained and authorized to use temporary work platform?	√	S	COSH 3.5	Ensure all workers trained before authorizing use.
	9.1b	Weather conditions likely to be hazardous to use of temporary structure?	√	S	COSH 3.3	No work in rain, snow, hail or electrical/wind storm likely to be hazardous to worker safety
	9.2	Has Qualified Person inspected temporary structure before use each shift?	√	S	COSH 3.6	If defect found, do not use until remedied.
	9.3	Could temporary structure be contacted by person or vehicle?	√	S	COSH 3.7	Install hi-viz barricade around base or post a person.
	9.4	Ladder type and condition? Meet specifications per WORKSAFEBC?	√	S	PART 13	Contractor to ensure all ladders are in good condition and meet WORKSAFEBC requirements for the application. Ensure portable ladders are marked with grade of material and use for which ladder constructed.
	9.5	Ladder Inclination, Footing and Support and use according to WORKSAFEBC regulations	√	S	PART 13 COSH 3.11	Check for minimum ¼ maximum 1/3 inclination, solid footing and support. Projects at least 1m(3ft.) above upper landing to which it supplies access. Check extension overlap. Tie off if possible for stability during use.
	9.6	Contractor to ensure work off ladders meets regulations. If work cannot be done safely from a ladder provide work platform.	√	O	13.6	Follow safe ladder work practices
	9.7	Heavy/bulky objects or others that may make ascent or descent unsafe not to be carried up ladders	√	O	13.6	Use an assist to raise & lower tools.
	9.8	Scaffold or other work platforms to be designed and approved by a P.Eng.?	√	S	Check WORKS AFEBC PART 13 13.11	Contractor to provide P.Eng. certified scaffolding plan where required by regulation 13.11. Follow instructions including fall protection during erection/ dismantling and use of the system. Signed copy to be available on site.



9.9	Employer must ensure scaffold is in a safe condition regardless of who erected it. Ensure scaffold manufacturer's technical data & instructions for erection available on site.	√	O	13.13, 13.15 COSH 3.10	Ensure manufacturer's documentation is on site or follow P.Eng. instructions. Contractor ensure compatibility if different manufacturers of components used. Ensure qualified Person supervises erection, use and dismantling and scaffold capable of holding 4 times load likely to be imposed. (COSH)
9.10	Guardrails and toe boards installed at every open edge of platform?	√	S	4.55-4.60 COSH 3.8	Ensure guardrails and toeboards installed.
9.11	Tools/equipment/materials arranged to prevent being accidentally knocked off platform?	√	S	COSH 3.4	Ensure safe arrangement on platform
9.12	Check Scaffold Stability, Bracing, Access and all connections secure.	√	S	13.17 13.18	Ensure scaffold is stable, plumb and level and WORKSAFEBC requirements are met. If height 3 times min. base dimension or other circumstance requiring stability- bldg ties/guys required. Inspection item.
9.13	Plank type & condition inspection. Planks secured?	√	S	13.14 13.16	Contractor Inspect planks regularly and secure to scaffold frame. Dimensions and guardrails meet requirements?
9.14	Scaffold grounded if near high voltage or hazardous level of voltage likely to be induced in scaffold?	√	S	13.19	Ensure grounding. Inspection item
9.15	Safe access provided to work platform?	√	S	13.7 COSH 3.9	Provide safe access. Temporary stairs have uniform steps, slope not exceeding 1.2 in 1; hand-rail between 90 and 110cm above stair level. Ensure temporary ramps securely fastened; safe footing, braced if necessary; slope 1 in 3 except in stairwells check COSH Inspection item
9.16	Work platform strength sufficient for load and secured against separation from supporting equipment, structure or surface?	√	S	13.8	Ensure scaffold can support 4 times load likely to be imposed on it (COSH 3.10)
9.17	Work platform subjected to sudden drop, contact with electrical conductors or showing signs of mechanical damage/wear?	√	S	13.12	Remove from service until certified safe by manufacturer or P.Eng.
9.18	Ensure movable work platforms are clearly marked with rated capacity	√	S	13.20	Also check for marking on components (e.g. rigging capacity, counterweight, etc.) as required by regulations
9.19	For elevating work platforms ensure operation manual, maintenance instructions, replacement parts information are reasonably available to workers.	√	S	13.21	If information is not available, equipment must not be used until obtained or written instructions provided by P.Eng.



9.20	Employer must keep records regarding inspection, maintenance, repair or modification for each elevating work platform, swing stage, and permanent powered platform	√	S	13.22	If inspection and maintenance records other than pre-shift inspections not available, do not use until certified safe by manufacturer or P.Eng.
9.21	Vehicle-mounted and self-propelled boom-supported elevating work platforms tested?	√	S	13.23	Inspect and certified by manufacturer or P.Eng. every 12 months. In 10 th year after manufacture & every 5 years thereafter include structural inspection to verify integrity and stability. Dielectric test insulated units at least annually- certified by testing agency.
9.22	If a movable work platform is not designed to be moved while a worker is on it, ensure it is secured before being accessed by the worker. Move platforms designed to be moved while occupied only as specified by the manufacturer.	√	S	13.24	Exceptions: If the height of the work platform of a rolling scaffold is: (a) not more than 1 1/2 times the least base dimension of the scaffold, the scaffold may be moved by the effort of the person occupying the platform or a person on the floor or other supporting surface, (b) more than 1 1/2 times the least base dimension of the scaffold, the scaffold must be moved only by the effort of a person on the floor. (c) more than 2 times the least base dimension of the scaffold, the scaffold must not be moved while the person is occupying the platform.
9.23	Elevating work platform meets requirements for warning devices and controls?			13.25 13.26	Ensure intermittent horn or flashing light and warning system for deviation from level are provided as required by regulation. Ensure controls including STOP are clearly marked. Clearly mark overriding lowering control to be used in emergency.
9.24	Guardrails installed? Ensure temporary guardrails meet specs.	√	S	4.58	Contractor to ensure guardrails are installed and meet regulations. Inspection item.
9.25	Forklift mounted work platform not to be used except as defined by WorkSafeBC regulation.	√	S	13.30	Check revised regulations 1 Feb/08. Inform Project Manager before using a forklift mounted platform.
9.26	Work platforms suspended from a crane or hoist must be certified and loaded weight including rigging not over 50% of crane/hoist rated capacity at the working radius or configuration.	√	S	13.27-	Boom must be powered or fixed. No platform suspended from articulating boom crane unless approved by manufacturer. Secondary hoisting line must not be used when workers are on platform suspended from a crane.

	9.28	Hoisting and lowering work platforms done according to safe practices?			13.29	Operate as slowly as practicable. Lower under power if device powered. May not be controlled only by brakes. Ensure lower travel limit device is used where required. Carry out a trial lift before platform is occupied.
	9.29	Portable powered platform capable of raising/lowering by 2 or more separately controlled hoists?			13.31	Ensure controls located so one person can operate all hoists simultaneously.
	9.30	Ensure fall protection meeting WORKSAFEBC requirements is in place for suspended or elevating work platforms	√	S	13.33	Include in fall protection plan. Each person on a work platform attached to a crane boom must use a personal fall arrest system secured to an anchor on the boom or on the platform that is designated by the manufacturer, or a professional engineer.
	9.31	WORKSAFEBC approval obtained for high risk situations?	√	S	13.32	A swing stage, boatswain's chair and portable powered platform must not be used without prior permission of the Board if (a) one work platform will be used above or below any portion of another work platform, (b) a deck or planking will be used to span a gap between two independent work platforms, (c) the work platform will exceed 10 m (32 ft) in length, or (d) the suspension height will exceed 91 m (300 ft).
PROTECTIVE EQUIPMENT	10.1	Hard Hats Worn at all times. Chinstraps available for high wind/ bending over?	√	*	8.11-8.13	Contractor to monitor and enforce hardhat and chinstrap usage.
	10.2	High Visibility Clothes, correct type for the job.	√	O	8.24-8.25	Wear high viz vests when required. Traffic Control Persons will have special requirements.
	10.4	Safety Footwear	√	*	8.22-8.33	Approved steel-toed footwear in good repair, required at all times meeting WORKSAFEBC requirements for the work to be performed.
	10.5	Approved Safety Eyewear/ Face Shields. Note new guidelines re acceptable standards Nov/08	√	O	8.14-8.18	Eye protection required when energizing and de-energizing breakers. Also when doing any other work where flying objects may be encountered. Also may be required when using hazardous substances (TBD).
	10.6	Wear Hearing Protection when required by WORKSAFEBC regulations.	√	O	7.1-7.9	Hearing protection required when in high noise situations exceeding WORKSAFEBC noise exposure limits. Implement and provide evidence of noise control and hearing conservation program where required by regulation. Post warning signs in high noise areas.



	10.7	Respiratory Protection & Fit	√	O	8.32-8.37	Wear approved respiratory protection considering the respirator protection factor and maximum use concentration, MSD Sheets, exposure to oxygen deficient atmosphere when selecting respirators for workers that may be exposed to dusts or hazardous fumes/mists above exposure limits.
	10.71	Respirator fit tests conducted?	√	O	8.38-8.41 8.44	Ensure proper fit tests per regulations and keep records. Workers must perform a positive or negative pressure user seal check in accordance with <i>CSA Standard</i> before each use.
	10.72	Worker's ability to use a respirator in doubt for medical reasons?	√	O	8.42	Ensure worker examined by a physician, and advice obtained re the ability of the worker to wear a respirator.
	10.8	Gloves, Aprons, leg protection	√	O	8.19-8.21	Wear protective clothing when performing work that could result in cuts, slivers, abrasions, etc. Check added requirements from MSD Sheets.
	10.12	Vibration Reduction	√	O	7.10-7.16; 5.54	Provide written exposure control plan where required by regulation and inform worker of hazards. Employer ensure equipment is labelled to identify hazard. Ensure hands and arms not exposed to cold if also exposed to vibration.
	10.14	Personal clothing, rings, hair etc. OK	√	O	8.10	Ensure workers do not have loose clothing, long hair or rings which could become entangled if operating rotating power tools.
	10.15	Apply Sunscreen, to protect against sunburn on exposed skin.	√	O		Wear sunscreen when working outdoors.
	10.16	Safety belts, harnesses, lanyards & shock absorbers	√	O		Follow fall protection plan and use prescribed equipment.
	10.17	Employees must wear suitable personal clothing for the work they are doing to reduce risk of injury.	√	S		Contractor to ensure workers wear suitable clothing.
		Note: Check all protective equipment for proper fit and condition.	√	S		Contractor responsible for ensuring proper fit and care of all protective equipment and documentation thereof.
HEAT STRESS	11.1	Heat Stress Control Required? Followed?	√	S	7.27	To be determined by Contractor's Superintendent based on section 7 WORKSAFEBC regulations (Jan/05), weather conditions, and worker proximity to heat sources and clothing worn.
	11.2	Check for heat stress if temp warrants.	√	S	7.28- 7.30	Contractor to monitor environmental conditions and take action accordingly if ACGIH standard requires. If required, conduct assessment and develop exposure control plan. Provide engineering controls if practicable, otherwise reduce exposure or provide admin controls or PPE.



	11.3	Potable drinking water nearby?	√	O	7.31	Contractor to supply adequate drinking water for Workers
	11.4	Workers & Supervisors trained to recognize?	√	O	7.32	Contractor to ensure Workers and Supervisor recognize symptoms and know proper response. Contractor's F.A. attendant to be instructed to monitor workers for signs. Remove workers exhibiting stress from exposure and provide First Aid or physician treatment.
COLD STRESS	12.1	Cold Stress Control Required? Followed?	√	S	7.33	Cold stress not likely to be a factor during summer months. Contractor to be aware of conditions under which cold stress could be a concern based on ACGIH standard (Jan /05)
	12.2	Check Table 7-4 for conditions	√	S	7.34- 7.37	Contractor to monitor for cold stress risk conditions and take appropriate action. if ACGIH standard requires. If required, conduct assessment and develop exposure control plan. Provide engineering controls if practicable, otherwise reduce exposure or provide admin controls or PPE.
	12.3	Workers & Supervisors trained to recognize?	√	O	7.38	Ensure workers trained. First Aid attendant may be asked to monitor for cold stress. Remove workers exhibiting stress from exposure and provide First Aid or physician treatment
CRANES, HOISTS & RIGGING	13.1	Note WorkSafeBC definitions for "critical lift" "duty cycle work", "load bearing component", "sign truck" and "tandem lift"	√	S		Changes effective 1 Feb./08 to add clarity.
	13.1a	Only EGD Operators operate EGD Cranes/hoists or other equipment.	√	*		No plans to use any EGD equipment. Contractor to reinforce that only EGD workers are to operate EGD equipment.
	13.1b	Contractor supplied crane meets specifications and has required labelling etc per WORKSAFEBC regulation?	√	S	14.2-14.8	Ensure crane is marked with: a) Manufacturer, model, sr# b) rated capacity or load chart. c) boom angle, boom extension and load measure (where applicable) d) any modifications to the crane or components
	13.1c	Crane Hoist documentation available?	√	S	14.12	Ensure manufacturer's crane/hoist manual, including instructions for assembly/disassembly, maintenance, and safe operation are readily available on site.

13.1d	Inspection and maintenance carried out and documented including any modifications? Operator to carry out start of shift inspection and document.	√	S	14.13 to 14.16 14.35	(1) Each crane and hoist must be inspected and maintained at a frequency and to the extent required to ensure that every component is capable of carrying out its original design function with an adequate margin of safety. (2) A crane or hoist must not be used until any condition that could endanger workers is remedied. (3) Any repair to load bearing components of a crane or hoist must be certified by a professional engineer or the original equipment manufacturer.
13.1e	Crane properly equipped?	√	S	14.17 to 14.33	Ensure crane/hoist meets all WORKSAFEBC requirements for stops, audible warnings, guards, controls, operator protection, etc. as per WORKSAFEBC regulations
13.2	Weight lifted determined and communicated to operator and all others involved in lift?	√	O	14.36 14.38	Contractor to ensure that load weights are accurately determined and communicated to the crane operator and others involved. Crane operators must not lift if there is any doubt about the safety of the lift.
13.3	Ensure crane operators meet the trade qualification specified by WORKSAFEBC	√	S	14.34	Provide proof of qualification to Project Manager before starting work.
13.4	Ensure workers stay clear of swinging loads and equipment when swinging creates a hazard	√	O	14.40 14.41	Position equipment to ensure 2 ft. clearance or more between crane parts etc. and obstructions in any area accessible to workers.
13.5	Multiple Crane lift? Follow WORKSAFEBC regs	NA	S	14.42	No multiple crane lifts planned.
13.6	Travel with load? Follow WORKSAFEBC regs.	√	S	14.43	Follow safe practices.
13.7	Prevent passing over workers with load	√	O	14.44	Contractor to ensure loads do not pass over workers.
13.8	Load left suspended and unattended?	√	O	14.45	Do not leave loads suspended & unattended.
13.9	Hook position over load to prevent side loading?	√	O	14.46	Ensure straight lifts are used. If lifts on an angle are necessary observe working load limit (WLL) reduction.
13.10	Designated signalman? Use std signals? Use radio if possible.	√	O	14.47 to 14.49	Ensure trained workers use standard signals when communicating with crane operator. Use dedicated 2-way radio communication on UHF at power assigned and coordinated by the WORKSAFEBC whenever possible.
13.11	High voltage in vicinity? Risk of induced charge? Review and follow WORKSAFEBC requirements.	√	O	14.51- 14.52	No lifts planned near high voltage.
13.12	Up-travel limit tested for bridge, gantry & OH traveling cranes? (crane operator daily check)	√	O	14.55	If crane/hoist is not EGD operated equipment, Contractor to ensure operator has tested limits.



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13.13 a	Ensure mobile cranes are on surface capable of supporting the load	√	S	14.69	Contractor to check before lift.
13.13 b	Mobile cranes or boom trucks inspected at least annually?	√	S	14.71	Ensure mobile cranes or boom trucks are inspected at least annually. Provide proof to Project Manager.
13.14	Rigging/slinging work done by or under direct supervision of qualified workers familiar with the rigging to be used.	√	S	15.2	Contractor to use trained riggers following accepted good practices when performing lifts and provide a list of trained individuals to the Project Manager.
13.15	Ensure rigging is identified with the manufacturer and Working Load Limit (WLL) as well as any other information required by WORKSAFEBC and meets the WORKSAFEBC requirements for the work to be performed.	√	O	15.5 15.42 15.46 15.55 15.59	Do not use rigging without proper permanent identification. DO NOT EXCEED the designated WLL; also applies to below-the-hook lifting devices.
13.16	Use only rigging permanently marked with an adequate working load limit considering the angle of lift, termination efficiencies, numbers of legs used, conditions for the lift, temperature restrictions and good rigging practices.	√	S	15.9	Follow good rigging practices. Ensure design factors comply with changes Jan/05.
13.17	Ensure any attachments (rings, shackles, couplings etc) are designed for use with the rigging to which they are fastened.	√	S		Contractor to ensure compatibility in design.
13.18	Slings & attachments must conform with specifications and be visually inspected before use on each shift.	√	S	15.30 15.31	Remove defective equipment from service immediately.
13.19	Do not subject the rigging to dynamic loading.	√	S		Apply the load slowly & smoothly.
13.20	Do not use rope/slides with evidence of wear or distortion, broken strands, kinking, bird-caging, corrosion, heat or arc damage that meets the rejection criteria specified by WORKSAFEBC.	√	S	15.25- 15.27 15.48-.49	Remove equipment from service immediately if it meets rejection criteria.
13.21	Do not use worn or damaged hooks that fail to meet WORKSAFEBC regulations.	√	S	15.29	Remove rejected hooks from service immediately.
13.22	Protect slings from damage if passing over a sharp edge and store properly.	√	S	15.37 15.39	
13.23	Follow WORKSAFEBC rules for slinging to prevent slipping or overstressing the sling and when lifting multiple piece lifts.	√	S	15.40 15.41	
13.24	Hooks must have safety latches unless meeting the exemption of WORKSAFEBC 15.10(2)	√	S	15.10	



	13.25	Consider effect of wind on loads	√	S		Crane operator to use judgement and consider wind velocity in determining if lift can be safely made. Crane operator has final decision on making any lift.
MOBILE EQUIPMENT & TRANSPORT OF WORKERS	14.1	Does the contractor intend to use any mobile equipment on site other than trucks for transporting workers?	TBD	S	PART 16	To be determined. Define equipment to be used and any special requirements.
	14.2	Are contractor's vehicles safe for transport of worker's?	√	S	16.3	Contractor to ensure vehicles are properly equipped and maintained.
	14.3	Are workers obeying speed limits? Max speed 20kph	√	*	PART 16	Cover at start up orientation meeting.
	14.4	Are vehicles properly parked?	√	*	PART 16	Workers will be shown the designated parking areas. Do not park in areas where crane travels, Fire Lanes, blocking fire hydrants, fire/emergency alarm pull stations or fire extinguishers.
	14.5	Elevating work platform(s) operations manual and inspection certificate on site? Daily inspection log available?	√	S	PART 16	Requirements depend on contractor use of this type of equipment. TBD in final JHA
	14.7	Suspended work platforms/chairs used? Conform to specifications? Verify engineering design. Support structures in place?	NA	S	PART 16	Generally, not planned to be used. Check WORKSAFEBC regulations if suspended platforms to be used.
	14.8	Do not leave delivery vehicles unattended for extended periods.	√	*		
	14.9	Do not hitch a ride on forklifts unless proper seats exist for this purpose.	√	*		Contractor to enforce.
	14.10	Ensure volatile, flammable, or hazardous materials transported in isolated compartment accessible only from outside & properly ventilated & drained	√	S	17.6	Contractor to ensure vehicles meet WORKSAFEBC requirements.
	14.11	Ensure tools/materials/ equipment are carried in separate designated area for that purpose.	√	S	17.5	Contractor to ensure workers cannot be injured by unsecured items in the vehicle.
	14.12	Equipment properly secured if elevated? No use of hydraulic or pneumatic lifts as blocks unless collapse not possible.	√	S	16.37	Ensure workers do not leave equipment parts unattended in an elevated condition or work under equipment unless properly secured.
	14.13	Loads secured according to regulations? Loads do not interfere with lift truck operation?	√	S	16.44-16.46	Contractor to ensure loads are properly secured.
	14.14	Workers have procedures, equipment and training for tire repairs?	√	S	16.47 16.48	Contractor to ensure workers have training & equipment if they will change tires.



TRAFFIC CONTROL	15.1	Is there any blocking of roadways, or aisles during the project? If so install signs, barricades etc.	√	S&O		Define road blocking and traffic control requirements. Contractor to ensure proper traffic control if temporary road blocking is required to deliver materials etc. Contractor to ensure non-project personnel are kept out of the work area as agreed with the P.M. before starting work.
	15.2	Will gantry crane travel through the work area? Coordinate with the crane supervisor.	√	*		Workers to be instructed regarding crane travel and alarms during pre-startup meeting as they may encounter them enroute to work location. Ensure work is planned and communicated to crane supervisor before start.
	15.3	Is there operations activity near the project site? Ensure coordination and minimize impact.	√	S&O		The Engineer will ensure all supervisors and contractors on site are aware of the work and schedule.
	15.4	Is there a defined inspection program for traffic control devices to ensure they are well maintained and effective under all weather and light conditions? Documentation of inspections & repairs made kept?	√	S&O		Contractor to define an inspection program including repair/replacement procedures, inventory of devices, Contractor to ensure documentation is maintained including follow-up to ensure work has been done.
	15.10	Are there risks to workers due to vehicles/equipment operating on the construction work site?	√	S&O		Contractor to define risks to workers on the construction site due to vehicles and measures to minimize risks of injury. Risks to employees of other companies to be acknowledged, minimized and communicated to appropriate supervisors.
EVACUATION & RESCUE	16.1	Written procedures developed?	√	S&O	4.13	Contractor to ensure need for emergency rescue assessed and procedures for rescue documented. Call 911. Rescue will be by DND/Esquimalt Fire Dept. Ensure all workers understand process to call for assistance and have emergency numbers. Review emergency procedures at orientation session.

CONSTRUCTION, EXCAVATION & DEMOLITION	18.1	Protection from falling materials	√	S	20.9	Requirements to be determined in final JHA based on detailed construction plans.
	18.2	Safe access/ egress to worksite? Ramps at least 20" wide with guardrails & cleats.	√	S		Requirements to be determined in final JHA based on detailed construction plans.
	18.8	Temporary support of partially assembled components adequate?	√	S	20.14	Requirements to be determined in final JHA based on detailed construction plans. Ensure partially assembled components are properly supported and braced including for possible wind loading.
	18.9	All construction details available on site including drawings, erection procedures, temp. bracing, falsework	√	O	20.15	All drawings and specifications will be available on site at the project office. Contractor will also ensure his Superintendent has latest copies on site.
	18.10	Walkways /runways provided on structural members to prevent tripping?	√	S	20.16	Requirements to be determined in final JHA based on detailed construction plans.
	18.13	Erection drawings, design responsibility, continuity of engineering complies?	√	S	20.19-20.21	PWGSC will ensure continuity of design services.
	19.21a	Roof edge guarded?	√	S	20.76	The roof edge about a chute, bitumen spout and material hoist must have guardrails meeting the requirements of Part 4 (General Conditions) or barriers of at least equivalent strength to at least 2 m (6.5 ft) on each side of such a work area.
	18.22	Mechanical or powered equipment that has the potential to push or pull a worker over an unguarded roof edge, must not be used unless operated according to procedures acceptable to the Board.	√	S	20.77	Secure WORKSAFEBC approval of procedures if using this equipment.
	18.23	Loose insulation, polyethylene, roofs with smooth surfaces, asphalt and surfaces with water, snow, ice or frost increase the risk of losing footing.	√	S		Work under severe weather conditions will be under the control and advisement of their supervisor
	18.24	Avoid walking backwards on roofs.	√	S		Contractor's Supervisor will advise all workers of safe working practices



EXCAVATION / DEMOLITION	19.0	Excavation work to be carried out?	√	S		Shallow excavation for load cell concrete base required
	19.2	All utilities accurately located & danger determined?	√	S&O	20.79	Contractor to get details on utility location and necessary approvals before digging.
	19.3	Utilities instructions followed regarding excavation?	√	S	20.79	Obtain necessary approvals and instructions.
	19.11	Are there soil contaminants expected or chance of encountering archeological materials?	√	O		Workers to be shown sample of archeological materials and instructed to stop excavating if they encounter possible archeological materials. Also provide workers with details of soil contaminants and potential risks. Stop work and immediately report to P.M. if anything is encountered including suspected soil contaminants.
	19.12	All Workers must be aware that soils on the site may contain hydrocarbons and metals such as arsenic, zinc, copper, lead.	√	O		All excavation and management of soils must be in compliance with the Interim Soil Management Plan for Munroe Head, Esquimalt Graving Dock and North Naden - stored fully contained and disposed in designated area on site. Project Manager to provide guidance. See Specification 013533.
	19.14	Ensure hazardous materials are identified before beginning demolition or salvage of machinery, equipment, buildings or structures.	√	S	20.112	Hazardous substances will be defined in the Environmental Assessment as well as by inspection with the Contractor. Details will be available at the site and procedures identified for safe containment and removal.
	19.15	Stop all work if hazardous materials are discovered during demolition and not previously identified.	√	O		Report to Project Manager immediately.
	19.16	Ensure all electric, gas, water and other services are disconnected	√	O	20.113	Contractor to ensure all services are properly disconnected before starting work.
HOUSEKEEPING; MATERIALS STORAGE	20.1	Refuse spills and waste materials not allowed to accumulate and create a hazard	√	O	4.41	Cover at start up orientation meeting.
	20.2	No use of compressed air to clean clothing of any potentially hazardous dusts etc.	√	O	4.42	Compressed air can penetrate skin, enter bloodstream and result in death. Do not use compressed air to clean work surfaces. Cover at start up orientation meeting.
	20.3	Check state of repair of floors, ramps, stairs and free of tripping and slipping hazards	√	O	4.39	Cover at start up orientation meeting.
	20.4	Material stacked securely and stable?	√	S	4.43	Check plans for stacking materials. Also Inspection item.
	20.5	Are areas free of risk of entrapment or falling materials? If not take appropriate measures per 4.44 and 4.45	√	S	4.44-4.45	Evaluate risks. Also Inspection item.



	20.6	Use metal containers with tight fitting lids for oily or painting rags & empty daily.	√	O		Oily or paint soaked rags can ignite through spontaneous combustion. Store properly. Also Inspection item
	20.7	Use proper containers for refuse.	√	O		Inspection item
	20.8	Are work areas free of protruding nails?	√	O		Ensure nails are either removed or bent over to eliminate the hazard of stepping on them.
	20.9	Are nuts/bolts etc. stored in containers to reduce tripping hazards?	√	O		Clean up components frequently to reduce risks.
	20.10	Returned tools to proper place after use.	√	O		Ensure tools are properly stored.
EQUIPMENT MAINTENANCE & USE	21.1	Equipment operator's manuals at site?	√	S		Keep manuals on site with equipment. Includes equipment like concrete pumping trucks
	21.2	Equipment operated by qualified persons?	√	S		Contractor to provide proof of qualification of equipment operators.
	21.3	Equipment maintained according to manufacturer's instructions?	√	S		Maintain equipment as specified by manufacturer and maintain a record of maintenance.
	21.4	Equipment inspection before use carried out?	√	S	16.34	Operators inspect equipment before use, record results (where required by WORKSAFEBC) and report any defects to Supervisor. Do not use defective equipment until defect is remedied.
	21.5	Explosive operated tools maintained, and used properly? Operator's trained? Equipment & shots stored in restricted area?	√	S		Provide proof of training to Project Manager for users of this equipment before starting work. Check with P.M. for Hot Work permit requirement also.
	21.6	Air operated nailing guns trigger mechanism working properly?	√	S		Ensure safety mechanisms working properly.
	22.0	Follow safe lifting practices. Use mechanical lifting assist wherever feasible or get assistance.	√	S		Contractor to train all workers in safe lifting practices and monitor for compliance.
ASBESTOS	25.1	Workers possibly exposed to potentially hazardous levels of asbestos? E.g. - workplace has asbestos-containing materials present or used - operation involves abatement of asbestos-containing materials - exposure to asbestos fibre in excess of 50% of exposure limits may occur	√	O	PART 6 6.2	No Asbestos contact is expected. Should the Contractor encounter any questionable situation involving asbestos, lead paints or other potentially hazardous substance, immediately stop work and report to Project Manager for direction.



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PWGSC ESQUIMALT GRAVING DOCK (EGD)

Electrical Safety Repairs (Arc Flash Mitigation)

APPENDIX B

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MUSCULOSKELETAL INJURY	30.1	Is there a risk of musculoskeletal injury?	TBD	S	4.47	Contractor to eliminate or control risk
	30.2	Are controls required?	TBD	S	4.50-4.52	Contractor to define control measures and train workers in risks and safe work procedures, use of PPE etc. Contractor to monitor for compliance and effectiveness.

Contractor's Superintendent: _____ Date: _____.

Distribution:

EGD Operations Manager

EGD Supervisors

Engineer-of Record

Resident Engineer/Construction Coordinator

Project File