Part 1 General

1.1 PRECEDENCE

.1 For Federal Government projects, Division 01 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.2 TAXES

.1 Pay taxes properly levied by law (including Federal, Provincial and Municipal).

1.3 FEES, PERMITS, AND CERTIFICATES

.1 Obtain and pay for building permit, certificates, licenses and other permits as required by municipal, provincial and federal authorities.

.2 Provide authorities with plans and information for acceptance certificates.

.3 Provide inspection certificates as evidence that Work conforms to requirements of authority having jurisdiction.

.4 Submit to Departmental Representative, copy of application submissions and approval documents received for authority having jurisdiction.

1.4 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

.1 Execute work with least possible interference or disturbance to building operations or occupants and normal use of premises by facility users. Arrange with Engineer to facilitate execution of work.

.2 Provide temporary means to maintain security if it has been reduced because of Work of this project.

1.5 EXISTING SERVICES

.1 Where works involves breaking into or connecting to existing services, carry out work at times directed by governing authorities, with minimum disturbance to tenant operations.

.2 Establish location and extent of service lines in area of work before starting Work and notify Departmental Representative & Consultant of findings.

.3 Submit schedule to and obtain approval from Departmental Representative & Consultant for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.

.4 Provide temporary services when directed by Departmental Representative to maintain critical building and occupant systems.

.5 Where unknown services are encountered, immediately advise Departmental Representative & Consultant and confirm findings in writing.

1.6 OTHER CONTRACTS

.1 Further contracts may be awarded while this contract is in progress.

.2 Co-operate with other Contractors in carrying out their respective works and carry out instructions from Departmental Representative & Consultant.

.3 Co-ordinate work with that of other Contractors. If any part of work under this Contract depends for its proper execution or result upon work of another Contractor, report promptly to Departmental Representative & Consultant, in writing, any defects which may interfere with proper execution of Work.

1.7 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 municipal, provincial and other regulations.

1.8 USE OF SITE AND FACILITIES

.1 Maintain existing services to building and provide for personnel and vehicle access.

.2 Departmental Representative will assign sanitary facilities for use by Contractor's personnel. Sanitary facilities are to be cleaned by the contractor at the end of each work shift.

.3 Closures: protect work temporarily until permanent enclosures are completed.

1.9 REMOVED MATERIALS

.1 Unless otherwise specified, materials for removal become Contractor's property. Remove materials promptly.

.2 Contractor to dispose material as per the code, acts and rules in force.

1.10 MEASUREMENT FOR PAYMENT

.1 Notify Consultant sufficiently in advance of operations to permit required measurements for payment.

1.11 COST BREAKDOWN

.1 Before submitting first progress claim submit breakdown of Contract price in detail as directed by Departmental representative and aggregating contract price. After approval by Consultant, cost breakdown will be used as the basis of progress payments.

.2 Departmental Representative will provide required forms for application of progress payment.

.3 List items of work by division number used in contract documents and subdivide into major component or systems as directed by Consultant.

1.12 DOCUMENTS REQUIRED

.1 Maintain at job site, one copy each document as follows:

.1 Contract Drawings.
.2 Specifications.
.3 Addendum.
.4 Reviewed Shop Drawings.
.5 List of outstanding shop drawings.
.6 Change Orders.
.7 Other modifications to Contract.
.8 Field Test Reports.
.9 Copy of Approved Work Schedule.
.10 Health and Safety Plan and other safety related documents. See section 01 35 29
.11 Other documents as specified.

1.13 FAMILIARIZATION WITH SITE

.1 Contractor may visit site prior to submitting Tender to examine site conditions and assess risks and requirements for completing Work. No allowance is made on account of error or negligence to properly observe and determine existing conditions.

.2 Obtain prior permission from Departmental Representative before carrying out site inspection.

1.14 PROJECT MEETINGS

.1 Departmental Representative will arrange project meetings and assume responsibility for setting times and consultant will record minutes.

1.15 SCHEDULING

.1 On award of contract submit construction schedule for work, indicating anticipated progress stages within time of completion. When schedule has been reviewed by Departmental Representative & Consultant, take necessary measures to complete work within scheduled time.

.2 Do not change schedule without notifying Departmental Representative & Consultant.

.3 Carry out work after "regular hours" during weekends and holidays.

.4 Give Departmental Representative 48 hours notice for work to be carried out during "off hours".

.5 Submit schedule updates weekly and, when requested by Departmental Representative or Consultant, due to changing project conditions. Provide a narrative explanation of necessary changes and schedule revisions at each update.

1.16 FIRE SAFETY REQUIREMENTS

.1 Comply with the National Building Code of Canada 2005 (NBC) for fire safety in construction and the National Fire Code of Canada 2005 (NFC) for fire prevention, fire fighting and life safety in building in use.

.2 Comply with Human Resources & Skills Development Canada (HRSDC), Fire Commissioner of Canada (FCC) standards available from Fire Protection Engineering Services, Labour Program, HRSDC or following internet site: http://info.load-otea.hrdc-drhc.gc.ca/fire_prevention/standards/commissioner.shtml.

.1 No. 301: Standard for Construction Operations.

.2 No. 302: Standard for Welding and Cutting.

.3 No. 374: Fire Protection Standard for General Storage (Indoor and Outdoor).

.4 Retain fire safety documents and standards on site.

.3 Welding and cutting:

.1 At least 48 hours prior to commencing cutting, welding or soldering procedure, provide to Departmental Representative:

.1 Notice of intent, indicating devices affected, time and duration of isolation or bypass.

.2 Completed welding permit as defined in FC 302.

.3 Return welding permit to Departmental Representative immediately upon completion of procedures for which permit was issued.

.2 Before welding, soldering, grinding and/or cutting work, obtain a permit from the Project Manager as directed by Departmental Representative or Consultant.

.3 Store flammable liquids in approved CSA containers inspected by the Fire Prevention Unit. Only use open flame when authorized by Fire Prevention Unit.

.4 Provide fire watcher as described in FC 302 when welding or cutting operations are carried out in areas where combustible materials within 10 m may be ignited by conduction or radiation.

.5 When work requires interruption of fire alarms or fire suppression, extinguishing or protection systems:

.1 Provide watchman service as described in FC 301; In general, watchman service is defined as an individual conversant with Fire Emergency Procedures, performing fire picket duty within an unprotected and unoccupied (no workers) area once per hour.

.2 Retain services of manufacturer for fire protection systems on daily basis, to isolate and protect devices relating to:

.1 Modification of fire alarms, fire suppression, extinguishing or protection systems;

.2 Cutting, welding, soldering or other construction activities which might activate fire protection systems.

.6 Immediately upon completion of work, restore fire protection systems to normal operation and verify that devices are fully operational.

.7 Inform fire alarm system monitoring agency and local Fire Department immediately prior to isolation and immediately upon restoration of normal operation.

.8 Contractors are to supply their own fire extinguishers at each work station throughout the length of the project, and are not to rely on the building's existing fire extinguisher inventory.

1.17 SUBMITTALS

.1 Refer to Section 01 33 00 – Submittal Procedures.

1.18 SECURITY CLEARANCES

.1 Personnel employed on this project will be subject to security check. Obtain requisite security clearance, as instructed, for each worker required to enter premises. Minimum security clearance required for all workers is Reliability Status.

.2 Personnel will be checked daily at start of work shift and provided with pass which must be worn at all times. Pass must be returned at end of work shift and personnel checked out.

1.19 SECURITY ESCORT

.1 Personnel employed on this project must be escorted when executing work in designated non-public areas during normal working hours.

.2 Submit an escort request to Departmental Representative at least 48 hours before service is needed. For requests submitted within time mentioned above, costs of security escort will be paid for by Departmental Representative. Cost incurred by late request will be Contractor's responsibility.

.3 Any escort request may be cancelled free of charge if notification of cancellation is given at least 24 hours before scheduled time of escort. Cost incurred by late request will be Contractor's responsibility.

.4 Calculation of costs will be based on average hourly rate of security officer for minimum of 4 hours per day for late service request and of four hours for late cancellations.

1.20 CODES AND STANDARDS

.1 Perform work in accordance with National Building Code of Canada (NBC) 2005 and other applicable code of provincial, territorial or local application including amendments up to project tender closing date provided that in case of conflict or discrepancy, more stringent requirements apply.

.2 Quality of materials and work must meet or exceed requirements of specified standards, codes and referenced documents.

1.21 BUILDING SMOKING ENVIRONMENT

.1 Comply with smoking restrictions.

1.22 FIELD QUALITY CONTROL

.1 See section 01 45 00 Quality Control.

1.23 INSPECTION AND TESTING

.1 Tests on materials and equipment, as specified within trade sections, is responsibility of Contractor except where specified.

.2 Provide necessary instruments, equipment and qualified personnel to perform tests.

.3 At completion of tests, turn over two sets of fully documented tests reports to Consultant.

.4 Unspecified tests may be made at Departmental Representative's or Consultant's request. Costs of tests will be paid for by Departmental Representative.

.5 Where tests or inspections reveal work not in accordance with Contract, bear cost of tests and additional tests as Departmental Representative & Consultant requires to verify acceptability of corrected work.

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

1.24 TEMPORARY UTILITIES

.1 Existing services required for work, excluding power required for space heating and, may be used by Contractor without charge. Ensure capacity is adequate prior to imposing additional loads. Connect and disconnect at own expense and responsibility.

.2 Contractor to provide electrical services as required when building services need to be shut down during the works.

.3 Notify Departmental Representative & Consultant and utility companies of intended interruption of services, obtain requisite permission.

.4 Give Departmental Representative & Consultant 48 hours notice related to each necessary interruption of any mechanical or electrical service throughout course of work. Minimize duration and frequency of interruptions. Carry out interruptions after normal working hours of occupants, preferably on weekends.

1.25 SCAFFOLDS AND WORK PLATFORMS

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

.2 Provide design drawings, signed and sealed by qualified Professional Engineer licensed in Province of Quebec.

.3 Additions or modifications to scaffolding must be approved in writing by Professional Engineer licensed in Province of Quebec.

1.26 SIGNS

.1 Provide common use signs related to traffic control, information, instruction, use of equipment, public safety devices, and other signs as directed by Departmental Representative in both official languages or by use of commonly understood graphic symbols to approval of Departmental Representative.

.2 No advertising is permitted on this project.

.3 Departmental Representative will provide a sign describing project for information of building users. Install sign as directed by Departmental Representative.

1.27 DUST CONTROL

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

.2 Filters are to be installed over all return air ducts and grills from the start of construction until project completion. Failure to comply will result in the cost of duct cleaning and maintenance to be borne by Contractor.

.3 Maintain and relocate protection until such work is complete.

.4 Protect furnishings within work area with 6mm thick polyethylene film during construction. Remove film during non-construction hours and leave premises in clean, unencumbered and safe manner for normal daytime function.

1.28 WORK CO-ORDINATION

.1 Co-ordinate work of sub-trades.

.1 Designate one person to be responsible for review of contract documents, shop drawings, and planning and managing co-ordination of Work.

.2 Convene meetings between subcontractors whose work interfaces and ensure awareness of areas and extent of interface required.

.1 Provide each subcontractor with complete plans and specifications for Contract, to assist them in planning and carrying out their respective work. Ensure sub-contractors receive Division 01.

.2 Develop co-ordination drawings when required, illustrating potential interference between work of various trades and distribute to affected parties.

.1 Pay particularly close attention to overhead work above ceilings and within or near building structural elements.

.2 Identify on co-ordination drawings, building elements, services lines, rough-in points and indicate location of services' entrance to site.

.3 Facilitate meeting and review coordination drawings. Ensure sub-contractors agree and sign-off on drawings.

.4 Publish minutes of each meeting.

.5 Plan and co-ordinate work to minimize number of service line offsets.

.6 Submit copy of coordination drawings and meeting minutes to Departmental Representative or Consultant for information purposes.

.3 Submit shop drawings and order prefabricated equipment or prebuilt components only after co-ordination meeting for such items has taken place.

.4 Work Co-operation:

.1 Ensure co-operation between trades in order to facilitate general progress of Work and avoid situations of spatial interference.

.2 Ensure that each trade provides other trades reasonable opportunity for completion of Work to prevent unnecessary delays, cutting, patching and removal or replacement of completed work.

.5 Departmental Representative & Consultant are not responsible for, or accountable for extra costs incurred as a result of Contractor's failure to co-ordinate Work.

.1 Resolve disputes between subcontractors.

1.29 BILINGUAL NOTATIONS

.1 Any items supplied and installed under this contract which have operating instructions on them and which can be expected to be used by building users and maintainers, must have operating instructions in French and English. French will always precede English on all signage.

.2 Factory embossed or recessed symbols illustrating equipment operation is an acceptable alternative to lettering.

.3 Items supplied with factory embossed or recessed lettering in one official language with an applied sticker or decal representing second official language is not acceptable without approval from Departmental Representative or Consultant before items are ordered.

.4 Internationally recognized colour coding such as red and blue centre pieces for plumbing brass is acceptable.

.5 Contractor is responsible for costs incurred for re-stocking or re-ordering as a result of failure to ensure bilingual designation on items.

1.30 SITE STORAGE

.1 Contractor will equip and maintain storage space assigned by Departmental Representative.

.2 Do not unreasonably encumber site with materials or equipment.

.3 Move stored products or equipment which interfere with operations of other contractors.

.4 Obtain and pay for use of additional storage or work areas needed for operations.

1.31 PROTECTION

.1 Protect finished work against damage.

.2 Protect adjacent work against spread of dust and dirt beyond work areas.

.3 Protect operatives and other users of site from hazards.

1.32 EXAMINATION

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

.2 Provide photographs of surrounding properties, objects and structures liable to be damaged or be subject of subsequent claims.

1.33 SETTING OUT WORK

.1 Assume full responsibility for, and execute complete layout of work to locations, lines and elevations indicated.

.2 Provide devices, stakes and survey markers required to layout and construct work.

.3 Supply such devices as straight edges and templates required to facilitate Consultant’s inspection of work.

1.34 ROUGHING-IN

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

1.35 LOCATION OF FIXTURES

.1 Location of equipment, fixtures and outlets, shown or specified is approximate. Determine actual location as required to suit conditions at time of installation.

.2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space in accordance with manufacturer's recommendations for safety, access and maintenance.

.3 Inform Consultant when impending installation conflicts with other components. Follow directives for actual location.

.4 Submit field drawings to indicate relative position of various services and equipment when required by Consultant.

1.36 CUT, PATCH AND MAKE GOOD

.1 Cut existing surfaces as required to accommodate new work.

.2 Remove items shown or specified.

.3 Do not cut, bore, or sleeve load-bearing members.

.4 Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly.

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

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

.7 Install firestops and smoke seals in accordance with ULC-S115, around pipe, ductwork, cables, and other objects penetrating fire separations to provide fire resistance not less than the fire resistance rating of surrounding floor, ceiling, and wall assembly.

1.37 CLEAN UP

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

.2 Upon completion remove scaffolding, temporary protection and surplus materials. Make good defects noted at this stage.

.3 Clean areas under contract to condition at least equal to that previously existing and to approval of Departmental Representative.

1.38 HAZARDOUS MATERIALS

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

.2 For work in occupied buildings give Departmental Representative 48 hours notice for work involving designated substances, hazardous substances (Canada Labour Code Part II Section 10), and before painting, caulking, installing carpet or using adhesives.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 All sections of division 26.

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 municipal, provincial and other regulations.

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.

.4 Departmental Representative will assign sanitary facilities for use by Contractor's personnel. Keep facilities clean.

.5 Use only elevators, dumbwaiters or escalators existing in building for moving workers and material.

.1 Protect walls of passenger elevators, to approval of Departmental Representative prior to use.

.2 Accept liability for damage, safety of equipment and overloading of existing equipment.

.6 Closures: protect work temporarily until permanent enclosures are completed.

1.4 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

.1 Execute work with least possible interference or disturbance to building operations occupants, public and normal use of premises. 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 14 days of notice for necessary interruption of 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.

.3 Provide for personnel pedestrian and vehicular traffic.

1.6 SPECIAL REQUIREMENTS

.1 Carry out noise generating Work Monday to Friday from 18:00 to 07:00 hours and on Saturdays, Sundays, and statutory holidays.

.2 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.

.3 Keep within limits of work and avenues of ingress and egress.

.4 Ingress and egress of Contractor vehicles at site is limited to works area.

.5 Deliver materials outside of peak traffic hours 17:00 to 07:00 and 13:00 to 15:00 unless otherwise approved by Departmental Representative.

1.7 SECURITY

.1 Refer to section 01 00 10 General instructions.

1.8 BUILDING SMOKING ENVIRONMENT

.1 Comply with smoking restrictions. Smoking is not permitted.

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 REGULATORY REQUIREMENTS

.1 An investigation into the presence of designated substances for the Medium Size Breaker Replacement Project at Les Terrasses de La Chaudière Complex (LTDLC) located at 15 and 25 Eddy Street, Gatineau, Quebec was performed in order to help meet the requirements of the Canada Labour Code under Part II, Section 124 that every employer shall ensure that the health and safety at work of every person employed by the employer is protected. Furthermore, Section 125(1)(z.14) of the Canada Labour Code stipulates that the employer, to the extent that he controls the activity, will take all reasonable care to ensure that all persons granted access to the work place, other than the employer's employees, are informed of every known or foreseeable health and safety hazard to which they are likely to be exposed in the work place. Also, it was performed to meet the requirements of the Province of Québec's An Act Respecting Occupational Health and Safety Section 51, as applicable, whereby, "Every employer must take the necessary measures to protect and ensure the safety and physical well-being of his worker. He must, in particular, subsection (5) use methods and techniques intended for the identification, control and elimination of risks to the safety or health of the worker, subsection (8) see that no contaminant emitted or dangerous substance used adversely affects the health or safety of any person at a workplace; and subsection (13) give, to the workers, the health and safety committee, the certified association, the public health director and the Commission, the list of dangerous substances used in the establishment and of the contaminants that may be emitted". In addition, section 300 (a) of the Québec Regulation Respecting Occupational Health and Safety also states that before any work or task is carried out in an enclosed area, that the categories of contaminants likely to be present in the area need to be made available in writing. By having a DSR conducted, the Departmental Representative will be able to inform his or her employees, contractors, and tenants of any designated substances that may be present and possibly disturbed throughout the duration of the project. The informed Departmental Representative will then be able to impose appropriate health and safety precautions for all applicable personnel as required.

.2 Applicable regulations are as follows. Where there is an absence of applicable legislation and/or guidelines in the Province of Québec, some Ontario regulations/guidelines have been referenced.

1. Acrylonitrile: "Designated Substances" O. Reg 490/09, as amended.
2. Arsenic: "Designated Substances" O. Reg 490/09, as amended.
3. Asbestos
   - .1 s. 3.23.7, 3.23.8, 3.23.9, 3.23.10, 3.23.11, 3.23.13, 3.23.14, 3.23.15, and 3.23.16 of the Québec *Safety Code for the Construction Industry* .
   - .2 PWGSC Departmental Policy DP 057 – "Asbestos Management"
4. Benzene: "Designated Substances" O. Reg 490/09, as amended.

5. Coke Oven Emissions: "Designated Substances" O. Reg 490/09, as amended.
6. Ethylene Oxide: "Designated Substances" O. Reg 490/09, as amended.
7. Isocyanates: "Designated Substances" O. Reg 490/09, as amended.
8. Lead:
   .1 "Designated Substances" *O. Reg 490/09,* as amended.
   .2 Hazardous Products Act's *Surface Coating Materials Regulations SOR/2005-109*
   .3 *Regulation Respecting Hazardous Materials (O.C. 1310-97),* under the *Environmental Quality Act, R.S.Q., c. Q-2 - (21)*
9. Mercury:
   .1 "Designated Substances" *O. Reg 490/09,* as amended.
   .2 *Regulation Respecting Hazardous Materials (O.C. 1310-97),* under the *Environmental Quality Act, R.S.Q., c. Q-2 - (21)*
10. Silica:
   .1 "Designated Substances" *O. Reg 490/09,* as amended.
   .2 *An Act Respecting Occupational Health and Safety* under *Schedule A Permissible Exposure Values for Gases, Dusts, Fumes, Vapours or Mists in the Work Environment*
11. Vinyl Chloride: "Designated Substance – Vinyl Chloride" O.Reg 846 (as amended by O.Reg 490/09)

.3 Québec occupational exposure limits for specific contaminants are listed in An Act Respecting Occupational Health and Safety under Schedule A - Permissible Exposure Values for Gases, Dusts, Fumes, Vapours or Mists in the Work Environment

.4 All contractors requesting tenders from subcontractors shall furnish this report to subcontractors.

1.2 VALIDITY DATE

.1 El Houcine Faouzi from Environmental Services Directorate of the Real Property Branch, PWGSC, conducted the on-site survey for this report on 2013/10/11.

.2 The work area is located at Les Terrasses de La Chaudière Complex in Gatineau. The scope of the proposed work consists of replacing the main 25 kilovolt (Kv) breakers located in the electrical vault on the 1st floor of 15 and 25 Eddy Street.

1. The scope of work for this report involved a visual inspection of building materials and contents for the presence of suspected designated substances and hazardous materials in the project area outlined above.
2. The visual inspection was limited to readily accessible areas in the project area.
3. A reasonable effort was made to capture all potential designated substances, and hazardous materials deemed pertinent. Note, however, that no scope of work, no matter how exhaustive, can identify all potential contaminants. Should any designated substance (or potential hazardous materials) not apparent from the survey be encountered in the course of demolition or renovation work, work shall be stopped,

preventative measures taken, and the Departmental Representative notified immediately. Do not proceed until written instructions have been received.

4. Prior to beginning work, it must be confirmed with the Departmental Representative that no additional designated substances have been brought to the project area.
5. In addition, the survey refers to Polychlorinated Biphenyls (PCBs) and halocarbons, however, it does not refer to other substances that may be present in the day-to-day usage for specialized equipment or areas in buildings.
6. There is a possibility that materials, which could not be reasonably identified within the scope of this assessment or which were not apparent during previous site visits may exist. Should any designated substance be encountered in the course of demolition, work must be stopped, preventative measures taken, and the Departmental Representative must be notified immediately. Do not proceed until written instructions have been received.

PART 2 DESIGNATED SUBSTANCES

2.1 SURVEY RESULTS

.1 ACRYLONITRILE: Not Identified

.2 ARSENIC: Not Identified

.3 ASBESTOS: Not Identified

.4 BENZENE: Not Identified

.5 COKE OVEN EMISSIONS: Not Identified

.6 ETHYLENE OXIDE: Not Identified

.7 ISOCYANATES: Not Identified

.8 LEAD: Not Identified

.9 MERCURY: Not Identified

.10 SILICA: Identified

Free crystalline silica is present in concrete and concrete blocks throughout the project area.

.11 VINYL CHLORIDE MONOMER: Not Identified

.12 Polychlorinated Biphenyls (PCBs): Suspected

1. PCBs are hazardous chemicals which were used in the manufacturing of a variety of equipment, such as electrical equipment, heat exchangers, hydraulic systems, and for several other specialized applications.

2. PCBs were suspected to be present in the dielectric fluid associated with the 25 Kv breakers that will be replaced. These breakers should be considered as PCB-containing equipments unless proven otherwise by laboratory analysis of the dielectric fluid.

3. . HALOCARBONS: Not Identified

2.2 RECOMMENDATIONS

.1 SILICA

1. The Québec Regulation Respecting Occupational Health and Safety defines crystalline silica in the form of respirable dust as a suspected carcinogen.

2. Silica dust can be generated through such processes as blasting, grinding, crushing, and sandblasting silica-containing material. Since silica is presumed present in concrete and concrete block within the project area, appropriate respiratory protection and ventilation must be donned during the demolition and modifications of these structures, as per the “Guide des appareils de protection respiratoire utilisés au Québec”, published by the Institut de recherche Robert-Sauvé en santé et en sécurité du travail. Personal protective equipment shall be selected, adjusted, used and cared for in accordance with the CSA Standard Z94.4-93 entitled “Selection, Use and Care of Respirators”.

3. The exposure of workers to silica should be reduced to a minimum as defined under Schedule 1 of the Québec Regulation Respecting Occupational Health and Safety.

.2 POLYCHLORINATED BIPHENYLS (PCBs) (NOT RECOGNIZED AS A DESIGNATED SUBSTANCE)

1. The dielectric fluid in the 25 Kv breakers that will be replaced are suspected of containing PCBs.

2. PCB-containing/contaminated equipment must be handled and disposed of in accordance with:

3. Canadian Environmental Protection Act’s (CEPA) PCB Regulations.

4. Canadian Council of Ministers of the Environment’s “Guidelines for the Management of Wastes Containing Polychlorinated Biphenyls.

5. All PCB-containing equipment that is removed from the site or placed into storage shall be appropriately reported in accordance with the requirements of the CEPA PCB Regulations.

.3 CONTRACTORS DUTIES

1. The contractor must review the designated substance report and take the necessary precautions to protect the health and safety of the workers and the environment. As per the Province of Québec's An Act Respecting Occupational Health and Safety Section 51 whereby, "Every employer must take the necessary measures to protect and ensure the safety and physical well-being of his worker. He must, in particular, (5) use methods and techniques intended for the identification, control and elimination of risks to the safety or health of the worker, (8) see that no contaminant emitted or dangerous substance used adversely affects the health or safety of any person at a workplace; and (13) give, to the workers, the health and safety committee, the certified association, the public health director and the Commission, the list of dangerous substances used in the establishment and of the contaminants that may be emitted." In addition, section 300 (a) of the Québec Regulation respecting occupational health and safety, also states that before any work or task is carried out in an enclosed area, that the categories of contaminants likely to be present in the area need to be made available in writing. The party hiring the contractor (i.e., The Departmental Representative) shall ensure that the contractor and subcontractor (if any) for the project has received a copy of the designated substance report prior to entering a binding contract for the supply of work on the project. If you have any questions about the designated substance report, please contact the Departmental Representative.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Sections of division 01.

1.2 ADMINISTRATIVE

.1 Meetings to be scheduled as required by Departmental Representative.

.2 Meetings will be notified by consultant 4 days in advance.

.3 Meetings to be chair by consultant.

.4 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

1.3 PRECONSTRUCTION MEETING

.1 Within 15 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.

.2 Departmental Representative, Consultant, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.

.3 Agenda to include:

- .1 Appointment of official representative of participants in the Work.
- .2 Proposed Schedule of Work.
- .3 Schedule of submission of shop drawings.
- .4 Delivery schedule of equipment and materials.
- .5 Proposed changes, change orders, procedures, approvals required, administrative procedures.
- .6 Health & Safety.
- .7 Record drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .8 Appointment of inspection and testing agencies or firms.
- .9 Insurances, transcript of policies.

1.4 PROGRESS MEETINGS

.1 A meeting schedule will be establish as needed after the reception of the work schedule.

.2 Contractor, major Subcontractors involved in Work and Departmental Representative, Consultant and Owner are to be in attendance.

.3 Meeting agenda to include the following:

- .1 Review, approval of minutes of previous meeting.
- .2 Review of Work progress since previous meeting.
- .3 Field observations, problems, conflicts.

.4 Problems which impede construction schedule.

.5 Review of off-site fabrication delivery schedules.

.6 Corrective measures and procedures to regain projected schedule.

.7 Revision to construction schedule.

.8 Progress schedule, during succeeding work period.

.9 Review submittal schedules: expedite as required.

.10 Maintenance of quality standards.

.11 Review proposed changes for effect on construction schedule and on completion date.

.12 Other business.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Sections of division 26

1.2 ADMINISTRATIVE

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

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

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

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

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

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

.7 Verify field measurements and affected adjacent Work are co-ordinated.

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

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

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

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 Refer to CCDC 2 GC 3.11.

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

.3 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Québec.

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

.5 Allow 7 days for Departmental Representative's review of each submission.

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

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

.8 Accompany submissions with transmittal letter, 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.

.9 Submissions include:

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

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

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

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

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

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

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

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

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

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

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

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

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

.17 Delete information not applicable to project.

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

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

.20 The review of shop drawings by Public Works and Government Services Canada (PWGSC) is for sole purpose of ascertaining conformance with general concept.

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

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

1.4 CERTIFICATES AND TRANSCRIPTS

.1 Immediately after award of Contract, submit Workers' Compensation Board status.

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 SECTION INCLUDES

.1 Health and safety considerations required to ensure that PWGSC shows due diligence towards health and safety on construction sites, and meets the requirements laid out in PWGSC/RPB Departmental Policy DP 073 - Occupational Health and Safety - Construction.

1.2 RELATED SECTIONS

.1 Sections of division 26

1.3 REFERENCES

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

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

.1 Material Safety Data Sheets (MSDS).

.3 Province of Quebec

.1 An Act Respecting Occupational Health and Safety, R.S.Q. 1997 (updated 26 July 2005).

1.4 SUBMITTALS

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

.2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:

.1 Results of site specific safety hazard assessment.

.2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.

.3 See annex C Section 01 45 25 Designated substance report

.3 Submit copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative every week.

.4 Submit copies of incident and accident reports.

.5 Submit WHMIS MSDS - Material Safety Data Sheets.

.6 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 7 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 7 days after receipt of comments from Departmental Representative.

.7 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

.8 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.

.9 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

1.5 FILING OF NOTICE

.1 File Notice of Project with Provincial authorities prior to beginning of Work.

1.6 SAFETY ASSESSMENT

.1 Perform site specific safety hazard assessment related to project.

1.7 MEETINGS

.1 Schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of Work.

1.8 REGULATORY REQUIREMENTS

.1 Do Work in accordance with Section 01 41 00 - Regulatory Requirements.

1.9 PROJECT/SITE CONDITIONS

.1 Work at site will involve contact with:

.1 See section 01 14 25 Designated Substances Report.

1.10 GENERAL REQUIREMENTS

.1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.

.2 Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

1.11 RESPONSIBILITY

.1 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.

.2 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.

1.12 COMPLIANCE REQUIREMENTS

.1 Comply with regulatory requirements described in section 01 14 25 Designated Substances Report.

.2 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.13 UNFORSEEN HAZARDS

.1 When unforeseen or peculiar safety related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Québec Province and advise Departmental Representative verbally and in writing.

1.14 HEALTH AND SAFETY CO-ORDINATOR

.1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:

.1 Have site related working experience specific to activities associated with substances described in section 01 14 25 Designated Substances Report.

.2 Have working knowledge of occupational safety and health regulations.

.3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.

.4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.

1.15 POSTING OF DOCUMENTS

.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Québec province, and in consultation with Departmental Representative.

1.16 CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.

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

.3 Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

1.17 WORK STOPPAGE

.1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Sections of division 26.

.2 Section 01 14 25 Designated Substances Report.

1.2 REFERENCES AND CODES

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

.2 Meet or exceed requirements of:

.1 Contract documents.

.2 Specified standards, codes and referenced documents.

1.3 HAZARDOUS MATERIAL DISCOVERY

.1 PCB: Polychlorinated Biphenyl: See section 01 14 25 Designated Substances Report.

1.4 BUILDING SMOKING ENVIRONMENT

.1 Comply with smoking restrictions and municipal by-laws.

1.5 NATIONAL PARKS ACT

.1 Perform Work in accordance with National Parks Act when projects are located within boundaries of National Park.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Sections de la division 26.

1.2 REFERENCES

.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-94, Stipulated Price Contract.

1.3 INSPECTION

.1 Refer to CCDC 2, GC 2.3.

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

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

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

1.4 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.

1.5 PROCEDURES

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

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

.3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.6 REJECTED WORK

.1 Refer to CCDC 2, GC 2.4.

.2 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

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

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

1.7 REPORTS

.1 Submit 4 copies of inspection and test reports to Departmental Representative.

1.8 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as requested.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 26 10 00 – 25 kV Breakers.

.2 Section 26 33 16 – Battery Racks.

1.2 REFERENCES

.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-94, Stipulated Price Contract.

.2 Within text of each specifications section, reference may be made to reference standards. List of standards reference writing organizations is contained in Section.

.3 Conform to these reference standards, in whole or in part as specifically requested in specifications.

.4 If there is question as to whether products or systems are in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.

.5 Cost for such testing will be born by Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.

1.3 QUALITY

.1 Refer to CCDC 2.

.2 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.

.3 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.

.4 Should disputes arise as to quality or fitness of products, 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.

1.4 STORAGE, HANDLING AND PROTECTION

.1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.

.2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.

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

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

.5 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.5 TRANSPORTATION

.1 Pay costs of transportation of products required in performance of Work.

1.6 MANUFACTURER'S INSTRUCTIONS

.1 Unless otherwise indicated in specifications install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.

.2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative will 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 Contract Price or Contract Time.

1.7 QUALITY OF WORK

.1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.

.2 Do not employ anyone unskilled in their required duties. Departmental Representative reserves right to require dismissal from site, workers deemed incompetent or careless.

.3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative, whose decision is final.

1.8 CO-ORDINATION

.1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.

.2 Be responsible for coordination and placement of openings, sleeves and accessories.

1.9 REMEDIAL WORK

.1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.

.2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.10 LOCATION OF FIXTURES

.1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.

.2 Inform Departmental Representative of conflicting installation. Install as directed.

1.11 FASTENINGS

.1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.

.2 Prevent electrolytic action between dissimilar metals and materials.

.3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.

.4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.

.5 Keep exposed fastenings to a minimum, space evenly and install neatly.

.6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.12 FASTENINGS - EQUIPMENT

.1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

.2 Use heavy hexagon heads, semi finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.

.3 Bolts may not project more than one diameter beyond nuts.

.4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

1.13 PROTECTION OF WORK IN PROGRESS

.1 Prevent overloading of parts of building. Do not cut, drill or sleeve load bearing structural member, unless specifically indicated without written approval of Departmental Representative.

1.14 EXISTING UTILITIES

.1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, and/or building occupants and pedestrian and vehicular traffic.

.2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Sections of division 26

1.2 REFERENCES

.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-94, Stipulated Price Contract.

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

1.3 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris.

.2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Departmental Representative.

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

.4 Provide on-site containers for collection of waste materials and debris.

.5 Provide and use marked separate bins for recycling.

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

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

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

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

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

1.4 FINAL CLEANING

.1 Refer to CCDC 2, GC 3.14.

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

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

.4 Remove waste products and debris

.5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative.

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

.7 Vacuum clean and dust interior of switchgear.

.8 Remove dirt and other disfiguration from exterior surfaces.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling.

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:

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

.2 Related Sections:

.1 Section 26 10 00 25kV Breakers Replacement.

.3 Acronyms:

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

1.2 GENERAL

.1 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 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.

.3 Design Criteria: as per client's requirements or determined by designer. To meet Project functional and operational requirements.

1.3 COMMISSIONING OVERVIEW

.1 Cx to be a line item of Contractor's cost breakdown.

.2 Cx activities supplement field quality and testing procedures described in relevant technical sections.

.3 Cx is conducted in concert with activities performed during stage of project delivery. Cx identifies issues in Planning and Design stages which are addressed during Construction and Cx stages 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 Departmental Representative will issue Interim Acceptance Certificate 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.

1.4 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 non functional system, including related systems as deemed required by 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 Contractor. Above costs to be in form of progress payment reductions or hold-back assessments.

1.5 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 Ensure "As-Built" system schematics are available.

.4 Inform Departmental Representative in writing of discrepancies and deficiencies on finished works.

1.6 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.

1.7 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.

1.8 COMMISSIONING DOCUMENTATION

.1 Refer to Section 26 10 00 25kV breakers replacement for mandatory test and commissioning/ installation of equipment.

.2 Departmental Representative to review and approve Cx documentation.

.3 Provide completed and approved Cx documentation to Departmental Representative.

1.9 COMMISSIONING SCHEDULE

.1 Provide detailed Cx schedule as part of construction schedule.

.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.

1.10 COMMISSIONING MEETINGS

.1 Convene Cx meetings following project meetings.:

.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 Meeting will be chaired by Departmental Representative, who will record and distribute minutes.

.5 Ensure subcontractors and relevant manufacturer representatives are present at 100% Cx meetings and as required.

1.11 STARTING AND TESTING

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

1.12 WITNESSING OF STARTING AND TESTING

.1 Provide 14 days notice prior to commencement.

.2 Departmental Representative to witness of start-up and testing.

.3 Contractor's Cx Agent to be present at tests performed and documented by sub-trades, suppliers and equipment manufacturers.

1.13 MANUFACTURER'S INVOLVEMENT

.1 Factory testing: manufacturer to:

- .1 Coordinate time and location of testing.
- .2 Provide testing documentation for approval by Departmental Representative.
- .3 Obtain written approval of test results and documentation from Departmental Representative before delivery to site.

.2 Obtain manufacturers installation, start-up and operations instructions prior to start-up of components, equipment and systems and review with Departmental Representative.

- .1 Compare completed installation with manufacturer's published data, record discrepancies, and review with manufacturer.
- .2 Modify procedures detrimental to equipment performance and review same with manufacturer before start-up.

.3 Integrity of warranties:

.1 Use manufacturer's trained start-up personnel where specified elsewhere in other divisions or required to maintain integrity of warranty.

.2 Verify with manufacturer that testing as specified will not void warranties.

.4 Qualifications of manufacturer's personnel:

.1 Experienced 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 testing in following distinct phases:

.1 Included in delivery and installation:

.1 Verification of conformity to specification, approved shop drawings and completion of PI report forms.

.2 Visual inspection of quality of installation.

.2 Start-up: follow accepted start-up procedures.

.3 Operational testing: document equipment performance.

.4 System PV: include repetition of tests after correcting deficiencies.

.5 Post-substantial performance verification: to include fine-tuning.

.3 Correct deficiencies and obtain approval from Departmental Representative after distinct phases have been completed and before commencing next phase.

.4 Document require tests on approved PV forms.

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 Departmental Representative for approval before implementation.

.3 Operate and maintain systems for length of time required for commissioning to be completed.

.4 After completion of commissioning, operate and maintain systems until issuance of certificate of interim acceptance.

1.17 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 14 days 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 actual 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.

1.21 WITNESSING COMMISSIONING

.1 Departmental Representative to witness activities and verify results.

1.22 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.

1.23 COMPLETION OF COMMISSIONING

.1 Upon completion of Cx leave systems in normal operating mode.

.2 Except for warranty and seasonal verification activities specified in Cx specifications, complete Cx prior to issuance of Interim Certificate of Completion.

.3 Cx to be considered complete when contract Cx deliverables have been submitted and accepted by Departmental Representative.

1.24 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.

1.25 TRAINING

.1 In accordance with Section 01 91 41 - Commissioning (Cx) - Training.

1.26 MAINTENANCE MATERIALS, SPARE PARTS, SPECIAL TOOLS

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

1.27 OCCUPANCY

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

1.28 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.

1.29 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 +/- 5 % 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.

1.30 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.

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:

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

.2 Related Sections:

.1 Section 26 10 00 25kV Breakers Replacement.

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's approval.

1.5 SAMPLES OF COMMISSIONING FORMS

.1 Consultant will develop and provide to Contractor required project-specific Commissioning forms in electronic format complete with specification data.

.1 See Annex A Circuit Breakers Test & Calibration.

.2 Revise items on Commissioning forms to suit project requirements.

1.6 COMMISSIONING FORMS

.1 Use Commissioning forms to verify installation and record performance when starting equipment and systems.

.2 Strategy for Use:

.1 Consultant provides Contractor 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 Verify reported results.

.7 Form to bear signatures of recording technician and reviewed and signed off by Departmental Representative.

.8 Submit immediately after tests are performed.

.9 Reported results in true measured SI unit values.

.10 Provide Departmental Representative with originals of completed forms.

.11 Maintain copy on site during start-up, testing and commissioning period.

1.7 LANGUAGE

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

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:

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

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 Departmental Representative 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.

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

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

.5 Supplement training materials:

.1 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 4 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 Departmental Representative will evaluate training and materials.

.3 Upon completion of training, provide written report, signed by Instructors, witnessed by Departmental Representative.

1.8 TRAINING CONTENT

.1 Training to include demonstrations by Instructors using the installed equipment and systems.

.2 Content includes:

.1 Review of facility and occupancy profile.

.2 Functional requirements.

.3 System philosophy, limitations of systems and emergency procedures.

.4 Review of system layout, equipment, components and controls.

.5 Equipment and system start-up, operation, monitoring, servicing, maintenance and shut-down procedures.

.6 System operating sequences, including step-by-step directions for starting up, shut-down, operation of valves, dampers, switches, adjustment of control settings and emergency procedures.

.7 Maintenance and servicing.

.8 Trouble-shooting diagnosis.

.9 Inter-Action among systems during integrated operation.

.10 Review of O&M documentation.

.3 Provide specialized training as specified in relevant Technical Sections of the construction specifications.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Sections of division 01 and 26 of technical specifications.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA C22.10-10, Canadian Electrical Code, and Québec modifications.

.2 CSA C22.2 current version.

.3 CAN3-C235-83(R2000), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.

.2 Electrical and Electronic Manufacturer's Association of Canada (EEMAC)

.1 EEMAC 2Y-1-1958, Light Gray Colour for Indoor Switch Gear.

.3 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)

.1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

1.3 DEFINITIONS

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

1.4 DESIGN REQUIREMENTS

.1 Operating voltages: to CAN3-C235.

.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 and French.

.4 Use one nameplate or label for both languages.

1.5 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 Québec, Canada.

.2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.

.3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.

.4 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.

.5 If changes are required, notify 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 equipment and material is not available, submit such equipment and material to inspection authorities for special approval.

.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.

1.6 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.

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

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

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

.3 Site Meetings:

.1 Site Meetings: as part of Manufacturer's Field Services described in appropriate NMS Section, schedule site visits, to review Work, at stages listed.

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

.4 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Material Delivery Schedule: provide Departmental Representative with schedule within 2 weeks after award of Contract.

.2 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling.

1.8 SYSTEM STARTUP

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

.2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.

.3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant will aspects of its care and operation.

1.9 OPERATING INSTRUCTIONS

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

.2 Operating instructions to include following:

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

.2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.

.3 Safety precautions.

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

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

.3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.

.4 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.

.5 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

Part 2 Products

2.1 WARNING SIGNS

.1 Warning Signs: in accordance with requirements of Departmental Representative.

.2 Decal signs, minimum size 175 x 250 mm.

2.2 WIRING TERMINATIONS

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

2.3 EQUIPMENT IDENTIFICATION

.1 Identify electrical equipment with nameplates and labels as follows:

.1 Nameplates: lamicoid 3 mm thick melamine, black face, white core, lettering accurately aligned and engraved into core mechanically attached with self tapping screws.

.2 Sizes as follows:

NAMEPLATE SIZES

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

.2 Labels: embossed plastic labels with 6mm high letters unless specified otherwise.

.3 Wording on nameplates 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.

2.4 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.

2.5 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 15 kV	Yellow	Red
Other Communication Systems	Green	Blue

2.6 FINISHES

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

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

Part 3 Execution

3.1 INSTALLATION

.1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.

3.2 NAMEPLATES AND LABELS

.1 Ensure 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 MOUNTING HEIGHTS

.1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.

.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

3.5 CO-ORDINATION OF PROTECTIVE DEVICES

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

.2 Provide a coordination study and setup appropriate protection relay’s parameters of provided equipment.

3.6 FIELD QUALITY CONTROL

.1 Conduct following tests in accordance with Section 01 45 00 - Quality Control.

.1 Insulation resistance testing:

.1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.

.2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.

.3 Check resistance to ground before energizing.

.2 Carry out tests in presence of Departmental Representative.

.3 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

.4 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports 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 RELATED REQUIREMENTS

.1 Sections of division 26.

1.2 REFERENCES

.1 CSA International

.1 CAN/CSA-C22.2 No.18-98(R2003), Outlet Boxes, Conduit Boxes and Fittings.

.2 CAN/CSA-C22.2 No.65-03(R2008), Wire Connectors (Tri-National Standard with UL 486A-486B and NMX-J-543-ANCE-03).

.2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)

.1 EEMAC 1Y-2-1961, Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).

.3 National Electrical Manufacturers Association (NEMA)

1.3 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 wire and box connectors and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store materials indoors, in clean, dry, well-ventilated area in accordance with manufacturer's recommendations.

.2 Store and protect wire and box connectors from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

.1 Pressure type wire connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper sized to fit copper conductors as required.

.2 Bushing stud connectors: to NEMA to consist of:

.1 Connector body and stud clamp for stranded copper conductors.

.2 Clamp for stranded copper conductors.

.3 Stud clamp bolts.

.4 Bolts for copper conductors.

.5 Sized for conductors as indicated.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for wire and box connectors installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

3.2 INSTALLATION

.1 Remove insulation carefully from ends of conductors and cables and:

.1 Apply coat of zinc joint compound on aluminum conductors prior to installation of connectors.

.2 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CAN/CSA-C22.2 No.65.

.3 Install fixture type connectors and tighten to CAN/CSA-C22.2 No.65. Replace insulating cap.

.4 Install bushing stud connectors in accordance with EEMAC 1Y-2..

3.3 CLEANING

.1 Progress Cleaning: 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.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Sections de la division 26.

1.2 PRODUCT DATA

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

1.3 DELIVERY, STORAGE AND HANDLING

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

Part 2 Products

2.1 BUILDING WIRES

.1 Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG.

.2 Copper conductors: size as indicated, with 1000 V insulation of cross-linked thermosetting polyethylene material rated RW90 XLPE.

2.2 TECK 90 CABLE

.1 Cable: in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Conductors:

.1 Grounding conductor: copper.

.2 Circuit conductors: copper, size as indicated.

.3 Insulation:

.1 Cross-linked polyethylene XLPE.

.2 Rating: , 1000 V.

.4 Inner jacket: polyvinyl chloride material.

.5 Armour: interlocking aluminum.

.6 Overall covering: thermoplastic polyvinyl chloride, compliant to applicable Building Code classification for this project.

.7 Fastenings:

.1 One hole aluminum straps to secure surface cables 50 mm and smaller. Two hole steel straps for cables larger than 50 mm.

.2 Channel type supports for two or more cables at 1000 mm centers.

.3 Threaded rods: 6 mm diameter to support suspended channels.

.8 Waterproof connectors:

2.3 CONTROL CABLES

.1 Type: LVT: 2 soft annealed copper conductors, sized as indicated:

.1 Insulation: thermoplastic.

.2 Sheath : thermoplastic jacket.

.2 Type: low energy 300 V control cable: stranded annealed copper conductors sized as indicated LVT: 2 soft annealed copper conductors, sized as indicated:

.1 Insulation: PVC.

.2 Shielding: metallized tapes over group.

.3 Overall covering: polyethylene jackets.

.3 Type: 600 V stranded copper conductors, sizes as indicated:

.1 Insulation: PVC.

.2 Overall covering: thermoplastic jacket.

Part 3 Execution

3.1 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Perform tests using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation.

.3 Perform tests before energizing electrical system.

3.2 GENERAL CABLE INSTALLATION

.1 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors - (0-1000 V).

.2 Cable Colour Coding: to Section 26 05 00 - Common Work Results for Electrical.

.3 Conductor length for parallel feeders to be identical.

.4 Provide numbered wire collars for control wiring. Numbers to correspond to control shop drawing legend. Obtain wiring diagram for control wiring.

3.3 INSTALLATION OF BUILDING WIRES

.1 Install wiring as follows:

.1 In conduit systems in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

3.4 INSTALLATION OF TECK90 CABLE (0 -1000 V)

.1 Group cables wherever possible on channels.

.2 Install cable exposed, securely supported by straps and hangers.

3.5 INSTALLATION OF CONTROL CABLES

.1 Install control cables in conduit.

.2 Ground control cable shield.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Materials and installation for connectors and terminations.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

1.3 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA C22.2

.2 CSA C22.2 No.41-M1987(R1999), Grounding and Bonding Equipment.

1.4 PRODUCT DATA

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

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

.2 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

Part 2 Products

2.1 CONNECTORS AND TERMINATIONS

.1 Copper long barrel compression connectors to CSA C22.2No., as required sized for conductors.

Part 3 Execution

3.1 INSTALLATION

.1 Install terminations in accordance with manufacturer's instructions.

.2 Bond and ground as required to CSA C22.2No.41.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Sections de la division 26

1.2 WASTE MANAGEMENT AND DISPOSAL

.1 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

.2 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.3 Fold up metal banding, flatten and place in designated area for recycling.

Part 2 Products

2.1 SUPPORT CHANNELS

.1 U shape, size 41 x 41 mm, 2.5 mm thick, suspended.

.2 Toggle bolts with carbon steel anchors

Part 3 Execution

3.1 INSTALLATION

.1 Secure equipment to solid masonry, tile and plaster surfaces with lead anchors.

.2 Secure equipment to poured concrete with expandable inserts.

.3 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.

.4 Secure surface mounted equipment with twist clip fasteners to inverted T bar ceilings. Ensure that T bars are adequately supported to carry weight of equipment specified before installation.

.5 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.

.6 Fasten exposed conduit or cables to building construction or support system using straps.

- .1 One-hole steel straps to secure surface conduits and cables 50 mm and smaller.
- .2 Two-hole steel straps for conduits and cables larger than 50 mm.
- .3 Beam clamps to secure conduit to exposed steel work.

.7 Suspended support systems.

.1 Support individual cable or conduit runs with 6 mm dia threaded rods and spring clips.

.2 Support 2 or more cables or conduits on channels supported by 6 mm dia threaded rod hangers where direct fastening to building construction is impractical.

.8 For surface mounting of two or more conduits use channels spaced as per code requirements.-.

.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 RELATED REQUIREMENTS

.1 Section 26 05 00 Common Work Results for Electrical.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA C22.1-06, Canadian Electrical Code, Part 1, 20th Edition.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Provide shop drawings: in accordance with Section 01 33 00 - Submittal Procedures.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling.

Part 2 Products

2.1 JUNCTION AND PULL BOXES

.1 Construction: welded steel enclosure.

.2 Covers Surface Mounted: screw-on flat covers.

2.2 CABINETS

.1 Construction: welded sheet steel hinged door, handle, lock 2 keys and catch Type E Empty: surface return flange mounting as indicated.

Part 3 Execution

3.1 JUNCTION, PULL BOXES AND CABINETS INSTALLATION

.1 Install pull boxes in inconspicuous but accessible locations.

.2 Mount cabinets with top not higher than 2 m above finished floor except where indicated otherwise.

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

3.2 IDENTIFICATION

.1 Equipment Identification: to Section 26 05 00 - Common Work Results for Electrical.

.2 Identification Labels: size 2 indicating system name voltage and phase or as indicated.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 Common Works Results for Electrical

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA C22.2 No. 18-98(R2003), Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.

.2 CSA C22.2 No. 45-M1981(R2003), Rigid Metal Conduit.

.3 CSA C22.2 No. 56-04, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.

.4 CSA C22.2 No. 83-M1985(R2003), Electrical Metallic Tubing.

1.3 SUBMITTALS

.1 Submit documents and samples required in accordance with section 01 33 00 – Submittals Procedures.

.2 Product data: submit manufacturer's printed product literature, specifications and datasheets.

.1 Submit cable manufacturing data.

.3 Quality assurance submittals:

.1 Test reports: submit certified test reports.

.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.3 Instructions: submit manufacturer's installation instructions.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling.

.2 Place materials defined as hazardous or toxic waste in designated containers.

.3 Ensure emptied containers are sealed and stored safely for disposal away from children.

Part 2 Products

2.1 CABLES AND REELS

.1 Provide cables on reels or coils.

.1 Mark or tag each cable and outside of each reel or coil, to indicate cable length, voltage rating, conductor size, and manufacturer's lot number and reel number.

.2 Each coil or reel of cable to contain only one continuous cable without splices.

.3 Identify cables for exclusively dc applications.

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

2.2 CONDUITS

.1 Rigid metal conduit: to CSA C22.2 No. 45, hot dipped galvanized steel.

.2 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings.

.3 Flexible metal conduit: to CSA C22.2 No. 56, aluminum liquid-tight flexible metal.

.4 Flexible pvc conduit: to CAN/CSA-C22.2 No. 227.3.

2.3 CONDUIT FASTENINGS

.1 One hole steel straps to secure surface conduits 50 mm and smaller.

.1 Two hole steel straps for conduits larger than 50 mm.

.2 Beam clamps to secure conduits to exposed steel work.

.3 Channel type supports for two or more conduits as per code prescription.

.4 Threaded rods, 6 mm diameter, to support suspended channels.

2.4 CONDUIT FITTINGS

.1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified. Coating: same as conduit.

.2 Ensure factory "ells" where 90 degrees bends for 25 mm and larger conduits.

.3 Watertight connectors and couplings for EMT.

.1 Set-screws are not acceptable.

2.5 EXPANSION FITTINGS FOR RIGID CONDUIT

.1 Weatherproof expansion fittings with internal bonding assembly suitable for 100 mm linear expansion.

.2 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19 mm deflection.

.3 Weatherproof expansion fittings for linear expansion at entry to panel.

2.6 FISH CORD

.1 Polypropylene.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.2 Conceal conduits except in mechanical and electrical service rooms in unfinished areas.

.3 Surface mount conduits.

.4 Use electrical metallic tubing (EMT).

.5 Use flexible metal conduit for connection to motors in dry areas work in movable metal partitions.

.6 Minimum conduit size for lighting and power circuits: 19 mm.

.7 Bend conduit cold:

.1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.8 Mechanically bend steel conduit over 19 mm diameter.

.9 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

.10 Install fish cord in empty conduits.

.11 Remove and replace blocked conduit sections.

.1 Do not use liquids to clean out conduits.

.12 Dry conduits out before installing wire.

3.3 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.

.3 Run conduits in flanged portion of structural steel.

.4 Group conduits wherever possible on suspended channels.

.5 Do not pass conduits through structural members except as indicated.

.6 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

3.4 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

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

END OF SECTION

Part 1 General

1.1 SCOPE OF WORKS

.1 This section specifies the modifications to the existing medium voltage switchgear and the retrofit or addition of new components as:

- .1 Circuit Breakers
- .2 Protection relays
- .3 Breakers remote control
- .4 New continuous current source

1.2 RELATED REQUIREMENTS

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

1.3 REFERENCES

.1 Design, construction, materials and arrangement of all the equipment, components and accessories shall conform to standard practice and to the requirements of the latest edition or revisions of the following organization standards:

- .1 Federal and Provincial Governments;
- .2 Canadian Standard Associations (CSA);
- .3 Electrical and Electronic Manufacturers Association of Canada (EEMAC);
- .4 National Electrical Manufacturers Association (NEMA);
- .5 Institute of Electrical and Electronic Engineers (IEEE);
- .6 American National Standards Institute (ANSI);
- .7 Commission électrotechnique internationale (CEI);
- .8 The utility company.
- .9 The applicable standards are not limited to the following:
  - .1 CSA C22.2 no. 31 "Switchgear Assemblies";
  - .2 CSA C22.2 no 14-95;
  - .3 EEMAC G8-2, G8-3.2, G8-3.3;
  - .4 NEMA SG3, SG4, SG5, SG6;
  - .5 ANSI C37.17, C37.20, C37.20.3, C37.20.4, C37.90, C39.1.

.2 The manufacturer shall conform to the latest edition of the most stringent standards

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit shop drawings and technical data regarding Section 26 05 00 - Common Works Result for Electrical.

.2 Submit shop drawings of :

- .1 Medium voltage circuit breakers and protective relays;
- .2 Metering instruments;
- .3 Potential and current transformers;

.4 Medium voltage circuit breaker ramp;

.5 D.C. power supply.

.3 Supply coordination time-current curves and coordination calculations for the following equipment:

.1 Medium voltage circuit breakers and relays;

.2 Medium voltage fuses.

.4 Submit shop drawings to the utility for its approval.

.5 Operation and maintenance manuals

.1 Supply all data and shop drawings, which are required to be included in the operation and maintenance manuals as stated in the article "Operation and Maintenance manuals" of the specifications.

.2 In particular, without being limited to, supply operation and maintenance instruction for:

.1 Medium Voltage circuit breakers and protective relays;

.2 Metering instruments;

.3 D.C. power supply.

.6 Manufacturing requirements.

.1 All equipment must bear the CSA label.

.2 Units shall be designed to reduce installation, dismantling and maintenance costs to a minimum.

1.5 FACTORY TESTS TO PERFORM

.1 The Engineer shall be witness to the final factory tests on the following equipment:

.1 Medium voltage circuit breakers.

Part 2 Products

2.1 MEDIUM VOLTAGE SUBSTATION (MODIFICATION)

.1 Modify existing switchgear to install new components specified in this section.

.2 Existing switchgear

.1 FPE, Federal Pioneer 3phases 4 fils

.2 Voltage : 25kV

.3 Capacité de cour circuit : 25kA.

.4 BIL=150kV.

.5 See shop drawings of existing switchgear.

.3 Electrical characteristics applicable to all components.

.1 Operating voltage

.1 Nominal voltage: 24.94 kV

.2 Maximum voltage: 27.6 kV

.2 Frequency: 60 Hz

.3 Minimum insulation levels

.1 Nominal operating voltage: 24.94 kV

.2 Designated nominal: 25.0 kV

.3 Designated maximum: 27.0 kV

.4 Withstand (60 sec.): 60 kV

.5 B.I.L. (1.2 – 50 MS): 125 kV

.4 Structure

.1 Breaker cubicle to be modified to fit new breaker.

.2 Relays cubicle door to be replaced as shown on drawings.

.3 Provide new breakers cradle.

.4 Assembly to be certified CSA

.5 Finish: ASA 61 light grey.

.5 Bus Bars

.1 Modify existing buss bar to fit new breakers.

.2 Insulated supports having the solidity and in sufficient quantity to support the magnetic and mechanical stresses, which could affect the bus bars, without permanent deformation.

.3 Capacities as indicated and based on a 65 oC temperature rise for a 40 °C average ambient.

.4 Arrange bus bars and lugs to facilitate connection of cables or bus ducts according to compartment in each cell.

.6 Control Wiring

.1 TBS or SIS type, no. 14 AWG stranded minimum, 600 V isolation.

.2 Both ends shall be identified. Red for current carrying circuits and white for the others.

.3 Rail mounted terminals bearing same identification as the connected wires. Provide 20% spare terminals for future.

.7 Medium Voltage circuit breaker cell

.1 SF6 or vacuum type breaker.

.2 The circuit breaker shall have the following nominal values and/or characteristics:

	24.94	kV
Nominal designated voltage:	25.0	kV
Maximum designated voltage:	27.0	kV
Frequency:	60	Hz
Number of poles, wires:	3	
Continuous amperage:	1200	A
Maximum rupturing amperage (RMS, symmetrical):	25	kA
Admissible short time amperage (3 sec.) (RMS, symmetrical):	25	kA
Closing and latching amperage (RMS, asymmetrical):	68	kA

.3 Circuit breaker control mechanism and lever

.4 Red and green lights indicating that the circuit breaker is "open" or "close".

.5 Manually operated from an energy storage mechanism and electrically actuated from a green trip push button and a red close push button with motorized spring charging mechanism. This mechanism is entirely contained in a separate housing showing the following indications:

.1 Circuit breaker "closed";

.2 Circuit breaker "open";

.3 Springs "charged";

.4 Springs "discharged".

.6 The circuit breaker closing springs are charged with an electric motor. However a manually operated device with removable lever shall permit spring loading of the breaker closing mechanism. The circuit breaker may be closed with a push button and by a shunt closing coil.

.7 The circuit breaker tripping springs are charged by the closing movement of the breaker. The circuit breaker is locked in the tripped position if the closing springs are not fully charged.

.8 Tripping of the breaker is done by a push button and a tripping coil which also is activated by the overload and short circuit relays [and by the voltage relays] [and by an unacceptable power transformer temperature alarm contact].

.9 The circuit breaker is of the draw out type with the following characteristics:

.1 The circuit breaker may be in any of the following positions:

- Connected;
- Test;
- Disconnected.

.2 A set of fixed primary contacts is secured to the cell for the connection of the draw out breaker. Safety shutters cover these contacts when the breaker is in the disconnected position;

.3 Mechanical interlocks will prevent the extraction or insertion of the breaker when in the closed position;

.4 Cell mounted auxiliary contacts to indicate that the breaker is "connected" or "disconnected":

- Four (4) N.O.;
- Four (4) N.C.

.10 Accessories:

.1 One (1) N.O. auxiliary contact to indicate that the springs are charged;

.2 Cell mounted auxiliary contacts to indicate that the circuit breaker is "open" or "closed":

- Four (4) N.O.;
- Four (4) N.C.

.3 All auxiliary contact terminals shall be connected to a unique terminal block mounted in an accessible compartment;

.4 Plug terminated control cable;

.5 Grounding contact;

.6 Number of operations mechanical counter.

.11 Possibility to lock the breaker out of its compartment

.12 Circuit breaker control power supply

.1 The power supply for the closing/tripping coils, the pilot lamps, the spring loading motor, etc., shall be at 125 Vc.c from a "DC power supply" as described under the sub-article entitled "DC Power Supply";

.8 Potential and Current Transformers

.1 Potential and current transformers to conform to CSA C13 standard.

.2 Nominal voltage, thermal, mechanical, dielectric and BIL characteristics of current and potential transformers shall be equal to or greater than those of the main bus bars.

.3 Medium voltage transformers are to be reused

.4 Medium voltage current transformers having the following characteristics:

.1 Insulation: 25 kV;

.2 Ratio: as shown;

.3 Accuracy: 0.3B2.0for metering; 2.5 L100 for protection;

.5 Medium voltage current transformers having the following characteristics

.1 Ratio: Use the feeder circuit breaker current setting divided by five (5) and round to next highest value;

.2 Accuracy: 0.3B0.5 for metering; 2.5L50 for protection.

.6 Supply potential and current transformers

.9 Overcurrent relays with the following characteristics:

.1 Microprocessor driven;

.2 Mounted in a compact housing. Frontal IP52 and rear IP20

.3 60 Hz;

.4 Supply source: 24 to 250 Vdc.;

.5 Protection functions:

.1 Maximum phase current instant/delay (ANSI 50/51)

.2 Maximum ground current instant/ delay (ANSI 50/51N);

.3 Breaker fault (ANSI 79) ;

.4 Maximum inverse current (ANSI 46);

.5 Minuimum voltage (ANSI 27/27S) ;

.6 Maximum voltage (ANSI 59) ;

.7 maximum/minimum frequency (ANSI 81H/81L);

.8 Selection of inverse time curves (inverse standard, inverse et extreme inverse) ;

.9 Definite time settings (2 sec, 4sec etc.);

.6 Meter functions

.1 Phase current RMS;

.2 Voltage and frequence;

.3 Phase rotation;

.4 Active, reactive and apparent power;

.7 Four (4) type C command contacts of 8A at 125Vcc

.8 Power supervision circuit;

.9 Non volatile memory.;

.10 LEDs fault indicators;

.11 Unit test button;

.12 Communications:

.1 E-LAN connection

.2 Protocol Modbus TCP//IP

.3 Port RS-485;

.13 Three (3) medium voltage current protection transformers, as described in sub-article "Potential and current transformers".

.10 Mimic bus

.1 The front of the assembly shall bear a mimic bus showing energy flow and component symbols. It shall be made from glued and screwed plastic material.

.2 Modify mimic bus to the new configuration.

.11 D.C. Power Supply

.1 Electrically operated low voltage circuit breakers, control relays, pilot lamps, etc. shall be supplied by a battery-charger unit described hereunder.

.2 Furthermore, controls for the medium voltage circuit breakers, all associated relays, pilot lamps, etc. and a remote command station shall also be supplied from the same unit.

.3 Batteries as specified in section 26 33 16.

.4 Battery charger as specified in section 26 33 43.:

.5 Provide a DC panel to feed switch gear as shown on drawings.

.12 Interlocks

.1 The existing interlock system for load switches will remain.

.2 Electrical interlocks between two medium voltage circuit breakers is required to prevent the closing of one breaker if the other is closed or under a fault condition. These interlocks are applicable to the electric manual operation or the automatic operation of the circuit breakers. The mechanical closing mechanism for the circuit breaker shall not be operational.

.13 General Cell Layout

.1 Existing Cell layout have to be respected. Replacement breakers will be installed in existing cells

.2 Cells layout as shown on drawings

Part 3 Execution

3.1 MEDIUM VOLTAGE SUBSTATION

.1 Installation

.1 Unload, move, unpack, inspect and locate the equipment at the expected location and install according to instructions shown on the drawings and as recommended by the Manufacturer.

.2 Immediately perform a visual inspection of all equipment during its reception in order to expose any fault.

.3 Verify shut down of power from Hydro-Québec before start any works.

.4 Remove existing breakers.

.5 Modify switchgear cubicle to fit new breakers;

.6 Install circuit breakers and execute all connections.

.7 Verify the mechanical resistance of manufactured connections and their electrical resistance.

.8 Once the installation of the apparatus is completed, remove all foreign matter and dust from the equipment before energizing.

.9 Install and connect required wiring and conduits between power transformer, medium voltage compartments, low voltage compartments and control and monitoring equipment for the complete operation of the system.

.10 Install and connect auxiliary equipment such as D.C. power supply, circuit breaker test cabinets etc. and demonstrate its proper operation.

.11 Hand over to the Engineer all duly completed certificates (test conditions, meter readings etc.). Sign them with the Engineer as a witness and complete them under the Owner's supervision.

.12 Correct all deficiencies and defects without cost to the Owner.

.2 Tests

.1 Execute on site tests according to article 7.5 of EEMAC standard G8.2 for tests on the existing installation.

.2 Execute start up tests as required by the utility.

.3 Insure manufacturer's services for the execution of tests required by him.

.4 In addition to the tests required by the manufacturer, execute all complete tests of all the installed equipment as described in the present article together with the final installation check before the final acceptance test.

.5 Inform the Engineer in advance of the test to insure his presence.

.6 Supply qualified personnel, the equipment, instruments etc. in order to execute tests on the different electric systems to the Engineer's satisfaction.

.7 Insure the good general operation of the installation and the operation, in particular, concerning the following:

.1 Security;

.2 Phase to phase and phase to neutral insulation level;

.3 Ground continuity;

.4 Resistance to ground.

.8 Potential and current transformer tests.

.1 Insure that all potential transformer are correctly installed and connected, clean, undamaged and of the approved voltage class.

.2 Insure that current transformers are correctly installed and connected. Insure that shorting links are removed once the wiring is completed and tested for continuity (no open circuit) before energizing.

.3 Insure that wires to the metering relays and instruments are connected to the specified transformation ratio tap.

.9 Metering relays and instruments testing.

.1 Insure that all relays are clean, correctly connected, undamaged and equipped with a test block.

.2 Adjust and calibrate overload relays according to approved coordination study.

.3 Verify all metering instruments to make sure they are in good working order and correctly installed and connected.

.10 Verification and testing of the apparatus.

.1 Verify the alignment of circuit breaker contacts, the proper operation of its mechanism, controls and make adjustments. Fill in the " FIELD CIRCUIT BREAKER TEST REPORT” .

.2 Verify that the circuit breaker arc chambers, arc-quenching coils and main contacts are clean, undamaged and that the line and load connections, the adjustment taps are free moving.

.3 Verify all insulating supports and bus bar joints.

.4 Verify all tap connections to insure that they are firm and well executed.

.5 Verify the interlock system, auxiliary mechanism and the circuit breaker operation jointly with the operation of the protective relays.

.6 Verify that the 1,000 V megger resistance value of the bus bar, circuit breaker/switch assembly is greater than 3 megohms. Note all values.

.7 Perform calibration and tests on circuit breakers.

.11 Grounding tests

.1 Inspect all means through which the electrical installation is grounded including conductors, cable clamps, ground connections and rods.

.2 Insure that all circuits, equipment and conductor sheath grounds are continuous and permanent.

.3 Note the resistance to ground of all system grounding connections measured with a megger.

.12 Circuit breaker test report

.1 Fill in the attached FIELD CIRCUIT BREAKER TEST REPORT

FIELD CIRCUIT BREAKER TEST REPORT Section 26 20 00

SUBSTATION _____ BREAKER NO.: _____ BRAND: _____

TYPE: _____ SERIAL NO.: _____ NOMINAL VOLTAGE: _____

INSTRUCTIONS: - Check off each verified item in "VERIF." colum
- Fill all blank spaces and enter results
- Sign one copy and give it to the engineer

1. VISUAL INSPECTION

ITEM	VERIF.
CONTACTS	
ARC CHUTES	
LUBRICATION	

2. OPERATION VERIFICATION

ITEM	VERIF.
ON-OFF TEST POSITION	
ELECT.-MECHAN. OPERATION	
ELECT.-MECHAN. INTERLOCK	

3. INSULATION RESISTANCE TEST

ITEM	VERIF.
BETWEEN POLES (AA', BB', CC')	
PHASE TO GROUND (A, B & C)	
PHASE TO PHASE (AB, BC, CA)	
TRIPPING CIRCUIT	

4. COMPONENT CHARACTERISTICS

ITEM	TYPE	RATING
FUSES		
PHASE SENSOR		
GROUND SENSOR		
CURRENT TRANSF		

5. MAIN CONTACTS RESISTANCE (DRAW-OUT AND BREAKER POLES)

A: ____ , ____ , ____ Micro-ohms; B: ____ , ____ , ____ Micro-ohms; C: ____ , ____ , ____ Micro-ohms.

6. VERIFICATION OF PROTECTION DEVICES TRIPPING WITH CURRENT INJECTION

ADJUSTMENTS	TYPE OF RELAY	ADJ. BAND	SPECIF. ADJUST	ADJ. AT	VERIF.
LONG DELAY	TAP				
	DELAY				
SHORT DELAY	TAP				
	DELAY				
INST.	TAP				
GROUND	TAP				
	DELAY				
UNBAL.	TAP				

7. REMARKS AND RESULTS

VERIFICATION DONE BY: _____ COMPANY: _____

(SIGNATURE): _____

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Materials and installation for storage batteries and racks.

.2 Related Sections:

.1 Section 01 33 00 - Submittal Procedures.
.2 Section 01 35 29.06 - Health and Safety Requirements.
.3 Section 26 33 43 Battery Chargers
.4 Section 26 10 00 25kV Breakers

1.2 REFERENCES

.1 American National Standards Institute (ANSI)/Underwriters Laboratories (UL).

.1 ANSI/UL 96, Tests for Flammability of Plastic Materials for Parts in Devices and Appliances (ANSI Approved November 21, 2003).

.2 Canadian Standards Association (CSA International).

.1 CAN3-Z299.3-85 (R2002), Quality Assurance Program - Category 3.
.2 AN/CSA-G40.20/G40.21-98 (R2003), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.3 Department of Justice Canada (Jus).

.1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.

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

.1 Material Safety Data Sheets (MSDS).

.5 Transport Canada (TC).

.1 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.

1.3 SUBMITTALS

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

.2 Submit shop drawings and product data to include:

.1 Dimensioned sketch showing battery rack, individual battery cells, recommended aisle space, headroom, assembly and anchoring of rack.
.2 Shipping weights.
.3 Individual battery cells, type, size, A.h capacity at 8 hours discharge rate, electrolyte, materials for container, cover, separators, retainers, posts and inter-cell connectors.
.4 Specific gravity at full charge and 25 degrees C.
.5 Cell charge and discharge curves of voltage, current, time and capacity.
.6 Derating factor for temperature range (minus 10 degrees C to minus 30 degreesC).

.7 Maximum short circuit current.

.8 Maximum charging current recommended for fully discharged condition.

.9 Full charge voltage per cell.

.10 Fully discharged voltage per cell.

.11 Hydrogen generation and ventilation requirements.

.3 Closeout Submittals:

.1 Operation and maintenance instructions concerning design elements, construction features, component functions and maintenance requirements to permit effective operation, maintenance and repair.

.2 Installation details of battery rack, individual cells, inter-cell connectors.

.3 Replacement instructions for individual cells.

.4 Electrolyte handling.

.5 Parts lists with catalogue numbers, and names and addresses of suppliers.

.6 Factory test records.

1.4 QUALITY ASSURANCE

.1 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.5 DELIVERY STORAGE AND DISPOSAL

.1 Waste Management and Disposal:

.1 Separate waste materials for recycling.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Place materials defined as hazardous or toxic waste in designated containers.

.4 Handle and dispose of hazardous materials in accordance with Regional and Municipal regulations.

.5 Ensure emptied containers are sealed and stored safely.

1.6 WARRANTY

.1 For storage batteries, 12 months warranty period prescribed in General Conditions is extended to 24 months.

Part 2 Products

2.1 MATERIALS

.1 Steel for battery racks: to CAN/CSA-G40.20.

2.2 BATTERY CHARACTERISTICS

.1 Nominal battery voltage, full charge, 1.35 V.

.2 The battery shall be built up of nickel-cadmium cells with alkaline pocket-plates, and having sufficient capacity to supply power to 11 MV breakers (2New + 9 Future), associated relays and status lamps for a period of five (5) hours, during a power failure, and for 10 circuit breaker close-open operations. The voltage at the end of the period shall be 105 Vd.c. at 20oC.

.3 Minimum end voltage: 1.15 V per cell after discharge at rated load for period specified.

.4 Capable of being recharged in period of 8 hours to not less than 95% full charge after supplying rated load for period specified, with no harmful effects on battery, including leaking or foaming of electrolyte.

.5 Battery to deliver specified output at 25 degrees C, in ambient temperature from 20 degrees C to 40 degrees C.

2.3 NICKEL CADMIUM BATTERIES

.1 Plates: perforated sheet steel, pocket type.

.2 Cell containers: impact resistant translucent plastic.

.3 Electrolyte: 20% solution of potassium hydroxide in water with special additives.

.4 Vents: spring loaded flap type.

.5 Inter-cell and inter-tier connectors: removable bolted type, plated copper, sized to carry battery maximum discharge current and clearance in fit to facilitate replacement of cells.

.6 Cells: of identical construction and from same production run.

.7 Cells and battery parts in clean state, with no evidence of electrolyte on cell cases or crystallization at vents.

.1 Clean cells prior to assembly into crates, and apply coating of vaseline to cell tops.

2.4 ACCESSORIES

.1 Accessories: thermometer, hydrometer, torque wrenches for connector bolts and nuts, self-adhesive numbers for cell identification, lifting straps, no-oxide grease and heat sensing tape.

.2 Two (2) spare inter-cell connectors, nuts and bolts.

.3 Two (2) spare inter-tier connectors, nuts and bolts.

2.5 BATTERY RACK

.1 2 tier 2 step,. Bottom tier minimum 120 mm above floor, top of battery cells on highest tier not more than 2 m above floor.

.2 Frames: angle iron with welded joints ground smooth.

.3 Rails: steel channels, bolted to frames.

.4 Rubber strips to insulate rails from cells.

.5 Insulated from ground and floor.

.6 Free standing with anti-seismic protection.

.7 Primed and epoxy painted to prevent corrosion.

.8 Corrosion resistant bolts and hardware.

.9 Configuration permitting any one cell to be removed without removing any other cell.

.10 Dimensions of space available as indicated.

2.6 SOURCE QUALITY CONTROL

.1 To CAN3-Z299.3.

.2 Connect load designed to fully discharge battery to rated end voltage in 60 min.

.3 Install dc indicating voltmeter and ammeter.

.4 Charge battery to ensure cells fully charged. When voltage reaches steady state, record: ambient temperature, temperature of each cell, voltage of each cell, voltage of battery.

.5 Discharge battery by applying load for 60 min, and record at 85%, 90%, 95% and 100% of rated discharge time: voltage of battery, load current, voltage of each cell, ambient temperature and battery temperature.

.6 At completion of discharge test, recharge battery at maximum specified rate, and record at 15 min intervals: battery voltage, charging current.

.7 At start and finish of charging cycle record ambient and battery temperatures, and specific gravity of each cell (lead acid only).

.8 Submit copy of test results to Departmental Representative.

Part 3 Execution

3.1 INSTALLATION

.1 Locate and erect battery rack.

.2 Install battery cells on rack.

.3 For nickel cadmium batteries, arrange vent flaps to open away from access side when cells placed in battery rack.

.4 Clean posts and connectors and apply no-oxide grease.

.5 Install inter-cell and inter-tier connectors, and hand tighten nuts in accordance with manufacturer's instructions.

.6 Using torque wrenches, tighten nuts in accordance with manufacturer's recommended value.

.7 Connect battery to load circuit.

3.2 FIELD QUALITY CONTROL

.1 Check battery voltage and voltage of each cell in accordance with manufacturer's instructions.

.2 Float charge battery for 8 hours to ensure battery fully charged and in stable condition.

.3 Discharge battery at rated load for 5 hours.

.4 Check battery voltage at terminals and voltage of each cell.

.5 Recharge battery to full charge.

.6 Check battery voltage and voltage of each cell.

.7 Leave battery in fully charged state.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 26 05 00 Common works result for electrical

.2 Section 26 10 00 25kV Breakers.

.3 Section 26 33 16 Battery racks

1.2 REFERENCES

.1 CSA International

.1 CAN/CSA C22.2 No.107.2-01(R2007), Battery Chargers.

1.3 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 battery chargers and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Charger data: type and capacity, battery charging sequence, current time data for Silicon Controlled Rectifier (SCR) protective devices, estimated noise level, metering, alarms, controls and efficiency.

.3 Battery product literature

.3 Shop Drawings:

.1 Include outline schematic diagrams with dimensions showing arrangement of cubicle, components, meters and controls.

.4 Operation and Maintenance Data:

.1 submit operation and maintenance data for battery chargers for incorporation into manual.

.2 Submit operation and maintenance data for batteries

.5 Operation and maintenance instructions covering design elements, construction features, component functions and maintenance requirements to permit effective operation, maintenance and repair.

.6 Copy of approved shop drawings.

.7 Technical description of components.

.8 Parts lists with catalogue numbers and names and addresses of suppliers.

1.4 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect battery chargers & Batteries from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 PERFORMANCE REQUIREMENTS

.1 Automatically maintain battery in fully charged state while mains power available. Maintain DC float voltage within plus or minus 1% of setting.

.2 Equalize charging rate such that after battery has provided full power output for specified duration, charger returns battery to 95% of fully charged state in 8 hours.

.3 Manually initiated equalize charging feature with automatic timer adjustable from 8 to 72 hours, to return unit to float charge.

.4 Manual adjustment of float charge voltage with range plus or minus 5%.

.5 Manual adjustment of equalizing charge voltage.

.6 Automatic current limiting adjustable between 80 and 120% of normal rating.

.7 Audible noise level not to exceed 65 dBA at 1.5 m.

.8 Battery charger capacity to be calculated to feed two (2) MV new breakers plus nine (9) future MV breakers and recharge batteries (total 11 breakers & associated protecting relaying, status lamps and battery recharge).

2.2 CHARGER CHARACTERISTICS

.1 Battery charger: to CAN/CSA C22.2 No.107.2.

.2 Input: 208V Vac, 3 phase, 3 wire, 60Hz.

.3 Output: DC at 125 V, DC, ripple voltage less than 2 %.

2.3 ACCESSORIES

.1 Digital DC V&A meter , 1% accuracy switch selectable

.2 General failure alarm, LED , dry contacts

.3 AC failure alarm LED, dry contacts.

.4 Low DC voltage alarm to indicate over discharge, red LED, dry contact set to 105V.

.5 High DC voltage alarm and high DC voltage automatic shutdown.

.6 Ground detector relay and alarm.

.7 Equalizing timer: automatic reset type for unattended stations.

.8 Filter to reduce ripple voltage in rectifier output from 2% to 100 mV.

.9 LEDs mounted on front to indicate: failure AC power, low DC voltage, high DC voltage, no rectifier output.

.10 Alarms: audible alarm when any LED indicates trouble. Silence pushbutton not to extinguish trouble light.

.11 Common LED test switch and one common Form C alarm contact.

.12 Cables and clips.

.13 Temperature compensation system for voltage output, including remote, battery mounted, temperature sensor.

2.4 ENCLOSURE

.1 CSA Enclosure Type 1, 2.5mm minimum thick..

.2 Access from front.

.3 Convection ventilated.

.4 Meters, indicating lamps and controls group mounted on front panel.

.5 Allow for handling by forklift or sling.

.6 Apply finish in accordance with Section 26 05 00 - Common Work Results for Electrical.

2.5 EQUIPMENT IDENTIFICATION

.1 Identify equipment in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Use size4 nameplates for major components such as input breakers, output breaker.

.3 Use size2 nameplates for mode lights alarms, meters.

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 battery charger 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 Locate and install battery charger as indicated.

.2 Connect input terminals to AC mains.

.3 Connect output terminals to battery.

3.3 TESTS

.1 Energize battery charger and operate until battery shows full charge.

.2 Discharge battery to full discharge condition.

.3 Recharge battery, recording DC voltage and current once per hour for 8 hours. Test battery to ensure it has reached at least 95% full charge.

.4 Continue charging to ensure charger changes from bulk rate to float charge rate.

.5 Demonstrate that automatic timer controls charging and correctly transfers from equalize to float charge after selected period.

.6 Simulate faults to demonstrate that alarm lights and audible alarms are performing as designed.

.7 At end of tests, with battery in fully charged condition, operate charger on "float" for minimum period of 24 hours to ensure stable condition is reached and held.

3.4 CLEANING

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

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

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

.3 Waste Management: separate waste materials for reuse and recycling.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by battery installation.

END OF SECTION