



## Public Works and Government Services Canada

### Baie-Sainte-Catherine's wharf

Replacement of the wastewater treatment system

Project R.063880.001

Tender specifications

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**FIN DE LA SECTION**

Eric Dumont, eng.
FOR TENDER

PART 1 - GENERAL

- 1.1 RELATED REQUIREMENTS.1 This section applies to electric heaters and control devices/control methods and associated installation
- 1.2 SEISMIC MOUNTING .1 Supply and install all necessary equipment for seismic mounting as described in section 26 10 00.
- 1.3 REFERENCES .1 Canadian Standards Association (CSA International)  
CSA C22.2 No.46, Electric Air-Heaters.
- 1.4 SHOP DRAWINGS AND DATA SHEETS .1 Submit shop drawings and data sheets in accordance with Section 01 33 00 - Submittal Procedures and 26 05 00 – Common Work Results For Electrical
- .2 Submit product data sheets for unit heaters. Include:
- .1 Product characteristics.
- .2 Performance criteria.
- .3 Mounting methods.
- .4 Physical size.
- .5 kW rating, voltage, phase.
- .6 Cabinet material thicknesses.
- .7 Limitations.
- .8 Color and finish.
- .3 N/A
- .4 Manufacturer's Instructions: Provide to indicate special handling criteria, installation sequence, cleaning procedures.
- 1.5 CLOSEOUT SUBMITTALS .1 Provide operation and maintenance data for unit heaters for incorporation into manual specified in 26 05 00 - Common Work Results For Electrical.
- 1.6 WASTE MANAGEMENT AND DISPOSAL .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal, and with Waste Reduction Work plan.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 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.

- .4 Divert unused metal and wiring materials from landfill to metal recycling facility approved by the department's Representative.
- .5 Collect, package and store existing unit heaters for either reuse, recycling or rebuilding and return to recycler in accordance with Waste Management Plan.

## PART 2 - PRODUCTS

- 2.1 MANUFACTURERS .1 Ouellet Canada, Dimplex/Chromalox, Stelpro Design.
- 2.2 UNIT HEATERS .1 Unit heater with adjustable louvers finished to match cabinet as indicated.
  - .2 Fan type unit heaters with built-in high-heat limit protection, fan-delay switches.
  - .3 Fan motor permanently lubricated ball bearing type with resilient mount and built-in fan motor thermal overload protection.
  - .4 Hangers: as indicated.
  - .5 Elements mineral insulated copper coated stainless steel sheath with continuous helical brazed fins.
  - .6 Cabinet: steel at 1,6 mm thick, treated with phosphate and finished with 2 coats baked enamel paint in beige color or the architect's choice. Fitted with 4 brackets for rod or wall mounting.
- 2.3 CONTROLS DEVICES, REGULATIONS .1 As indicated, provide remote-controlled thermostats or wall-mounted thermostats
  - .2 Built in thermostat and support controls.
  - .3 Wall mounted thermostats following divisions 23 and 25.

## PART 3 - EXECUTION

- 3.1 INSTALLATION .1 Suspend unit heaters from ceiling or mount on wall as indicated.
  - .2 Install thermostats in locations [indicated].
  - .3 Make power and control connections.
  - 4. For the heating system to work efficiently and conserve energy, it is important to mount thermostats at appropriate locations. The thermostat will respond to the temperature of the wall and

surrounding air and it should not be placed in the following areas: on an outside wall, a wall exposed to direct sunlight, near a window or door or near internal heat sources.

- 3.2 FIELD QUALITY CONTROL.1 Perform tests in accordance with Section 26 05 00 - Common Work Results - Electrical.
- .2 Test cut-out protection when air movement is obstructed.
  - .3 Test fan delay switch to assure dissipation of heat after element shut down.
  - .4 Test unit cut-off when fan motor overload protection has operated.
  - .5 Ensure heaters and controls operate correctly.

**END OF SECTION**

PART 1 - GENERAL

- 1.1 RELATED REQUIREMENTS.1 This section includes requirements common to the various section of the Electrical specifications
- .2 The list given in this document is not limited and all devices or accessories needed to complete installation must be provided and installed by the contractor even if they are not specifically described.
- .3 In case of disagreement or inconsistency between documents, the most restrictive clause will be given priority.
- 1.2 REFERENCES .1 Unless otherwise stated, wherever there is mention of a code or standard of the tender documents, use the latest edition at the moment more recent to amendments
- .2 Provincial Labor Standards codes and regulations.
- .3 Building regulations, zoning and provincial codes.
- .4 Applicable regulations for Environmental Protection Services of the Ministry of Municipal Affairs.
- .5 Perform all the installation according to the Quebec Construction code – Chapter V – Standards of Electricity and Hydro Québec
- .6 All equipment, installation and testing must comply with standards, codes or regulations of the Federal, Municipal and Provincial Government.
- .7 All equipment, testing and quality assurance must comply with standards and codes of the following associations:
- Canadian Standards Association (CSA International)
- .1 CSA C22.1, Canadian Electrical Code, Part 1 (current Edition), Safety Standard for Electrical Installations.
- .2 CSA C22.2.
- .3 CAN/CSA-C22.3 no.1 Overhead Systems.
- .4 CAN3-C235, Preferred Voltage Levels for AC Systems, 0 to 50,000 V.
- .5 CSA C22.10-10, Québec Construction Code Chapter V- Electricity.
- .6 CSA-B651-04, Accessible design for the built environment.
- And all Québec Regulations and Recommendations
- AMEEC:** Electrical and Electronic Manufacturer's Association of

Canada (EEMAC)

**EEMAC 2Y-1**, Light Gray Color for Indoor Switch Gear.

**ANSI**: American Electrical Manufacturer's Association

**IEEE**: Institute of Electrical and Electronics (IEEE) /National Electrical Safety Code Product Line (NESC)

.1 IEEE SP1122, The Authoritative Dictionary of IEEE Standards Terms

**ICEA**: insulated Power Cable Engineers Association.

1.3 DEFINITIONS .1

Specific terms:

A verb in the infinitive form, beginning a sentence or a proposition to imply words (contractor shall provide, install and connect...) ex: provide and install or provide and place... means (contractor shall provide, install and connect all material.

« **ELECTRICITY** » in the header for plans and specs relates to the field of « Electricity ».

« **PROVIDE** » means to supply install and connect.

« **ACCORDING TO INSTRUCTIONS** » means indicated on the plans and specifications as part of the contract.

« **SPECIFICATIONS** » means collectively all the latest revisions attached to this specification and the revised or additional drawings that will be provided later.

« **IN THIS SPECIFICATION** » means the contents or a section or division in which this term appears.

The terms « **CONTRACTOR** » or « **CURRENT CONTRACTOR** » or « **SPECIALIZED CONTRACTOR** », mentioned in different sections of the specs and plans in the Electrical section, means the contractor in charge of or responsible for the specs and plans in which they appear.

.2 Electric and Electronic Terms:

Unless otherwise indicated, the terminology used in the section of the specs and plans is based on that defined in the standard IEEE SP1122.

1.4 REVIEW OF PLANS, SPECIFICATIONS AND LOCATIONS .1

Before delivering its bid, the bidder must visit the site and surrounding areas, to become familiar with everything that could affect the work in any way whatsoever. No claim due to ignorance

of local conditions will be recognized by the owner

- .2 The bidder shall carefully study the plans and specifications for structural, architectural and other specialties to ensure that the work of this contract may be executed in a satisfactory manner, as shown on the plans. Before starting work, review the work of other specialties and report to the department's representative of any defects or impede the execution of the work described in this specification or affecting the security required.
- .3 These reviews by the Contractor shall be made in order to coordinate the execution of its work. The Contractor shall interpret the documents in line with the strictest requirements.
- .4 No allowance will be granted to the contractor for the consequences of his failure to make such examinations.

1.5 PLANS AND SPECIFICATIONS

- .1 All contract documents complement each other and any instructions found in one of them is enforceable as if it is found in all documents.
- .2 The plans serve only to guide the contractor and subcontractors on the number and approximate location of the conduits, receptacles, lighting or other.
- .3 For purposes of enforcement in the event and an obstacle to overcome, the location of pipes, cables, lighting fixture or other equipment can be moved within (3) meters from the location indicated without additional charge.

1.6 DESIGN REQUIREMENTS

- .1 The operating voltages shall conform to CAN3-C235
- .2 Motors, electric heaters, devices command / control / regulation and distribution must operate in a satisfactory manner at a frequency of 60 Hz and within the limits established in this standard.
  - .1 Equipment must be able to operate without sustaining damage under extreme conditions identified in this standard.
- .3 All electrical equipment must also operate within the conditions of supply of electricity from the power company.
- .4 In any event, the equipment must operate normally with minimal variation of voltages 15% and 10% of the nominal voltage of equipment.
- .5 Operating language and display: provide identification and display of signs and tags in French for control devices / control.
- .6 All electrical equipment located in an electrical equipment room, protected by sprinklers, must conform to with Article 26-008 "Apparatus protected by sprinklers" of the Quebec Construction



Code, Chapter V - Electricity.

List limited to major appliances covered by this article:

- Connection Center.
- Distribution Panel.
- Transformers.
- Motor Control Centers.
- Main distribution centers (substation).
- Control Relay.
- Isolating switches.
- Starter motors and variable frequency drive.
- Two control.
- Centre for power factor correction.
- Generator and transfer switch.

1.7 MATERIAL  
REQUIREMENTS FOR  
ESTABLISHMENTS

- .1 To maintain consistency, use only products from one manufacturer when it comes of material or equipment of the same type or class and, unless otherwise indicated.
- .2 Follow manufacturer's recommendations in regard to security, opportunities, access, maintenance and repairs.
- .3 Ensure maintenance and dismounting can be done without injury to the elements of the building or other facilities.
- .4 Provide means to access the hardware, for maintenance purposes.
- .5 Where possible, align the edges of pieces of equipment with the building walls.

1.8 RESPONSIBILITY FOR  
THE TRIAL TESTING

- .1 Protect the work against loss or damage until its acceptance.
- .2 During the temporary use, the warranty period will not be affected.
- .3 The owner can use the facilities and equipment for testing before they have accepted. Provide labor, equipment and instruments required for testing.
- .4 Clean and refurbish and leave in good working the facilities and

- equipment used before their acceptance and isolate equipment that could be damaged.
- .5 Prevent dust, dirt and other foreign matter from entering openings of facilities and equipment during installation and temporary use.
- 1.9 CONCEALED WORK .1 No work shall be concealed without approval.
- .2 In the event that the specialty contractor breaches this clause, this one may be forced to discover the concealed work. The costs incurred will be the responsibility of offender, that the work is well executed or not.
- 1.10 DOCUMENTS AND SAMPLES .1 Submit documents and samples in accordance with this section and section 01 33 00 – Submittal Procedures.
- .2 N/A
- .3 Submit, for review, the single line diagrams framed under glass or Plexiglas, and place in areas below:
- .1 Electrical Distribution network: at the main electrical installations.
- .2 Network production and distribution of electricity: in the local generators.
- .4 Provide, for review, a vertical distribution plan of the fire alarm system that show plan and zoning of the building, framed under glass or Plexiglas, and place it near the control panel and fire alarm annunciation panel.
- .5 Shop drawings
- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data that must be provided to show in detail a portion of the work
- .2 The drawings submitted, where required, must be signed by an authorized qualified engineer or entitled to practice in Canada, in the province of Quebec.
- .3 The Contractor shall make the necessary steps for the preparation of shop drawings as required by the contract documents or the department's representative may reasonably request. These drawings must, show only the devices, materials, systems, etc., Project-specific. Drawings should be arranged to release a minimum clearance of 75 mm x 75 mm (3 in. x 3 in.) to allow the department's representative to affix

the stamp of review.

- .4 Wiring diagrams and installation details of equipment must indicate the location, layout, capacity, weight, route and proposed layout, control panels, accessories, piping, ducts, details of stands, brackets, bolts and all other elements that must be displayed to ensure that we can achieve a coordinated installation.
- .5 Wiring diagrams shall indicate the circuit terminals, the internal wiring of each unit as well as interconnections between devices, and structures within other disciplines.
- .6 The drawings shall indicate clearances required for the operation, maintenance and replacement of equipment.
- .7 Before placing orders for materials, submit to the department's representative, for verification, one (1) electronic copy (PDF file) of the shop drawing of the equipment chosen. An electronic copy will be returned to the contractor. Other copies required will be prepared and distributed by the Contractor from the copy reviewed by the department's representative.
- .8 Do not undertake work until you receive written notice from the department's representative certifying the review of the submitted drawings.
- .9 Include all drawings of any chart, graph, detail, description, sample (if required by the department's representative), to check the appearance, quality, performance, durability of the equipment chosen.
- .10 The drawings submitted must be identified for this specific project. They must indicate the project name, the name of the department's representative, contractor, date and refer to an item number of the specs or a detail in the plans.
- .11 Check in advance these drawings prior to submission to the department's representative. Check dimensions on site. Ensure the installation criteria and catalogue numbers. If changes are required, inform the department's representative before they are made.
- .12 The review of the department's representative is limited to monitoring compliance with shop drawings and conceptual studies the general layout. This review does not absolve the Contractor from responsibility for errors or omissions in shop drawings or his responsibility to comply with all requirements of contract documents and site conditions, unless exemption clearly indicated on shop drawings have

- been approved in writing by the department's representative.
- .13 The Contractor shall provide shop drawings with all corrections and modifications as the department's representative requires in accordance with the Contract Documents and resubmit unless the department's representative in the exemption.
- When re-submitting shop drawings, the contractor must inform the department's representative in writing revisions, other than those requested by the department's representative, which have been made.
- .14 Do not distribute copies of the drawings submitted until receipt of written notice of revision from the department's representative.
- .15 The study of coordination, where required, must be issued simultaneously with shop drawings. Any issue will delay even more the review of drawings by the department's representative.
- .16 Shop drawings must be in French.
- .6 Quality Assurance: in accordance with Section [01 45 00 - Quality Control].
- .1 Provide equipment and materials that are CSA approved.
- .2 In cases where we can get equipment and materials CSA certified, submit the proposed equipment and materials to the competent authority and the inspection authorities, for approval, before delivering them to the site and to defray costs.
- .3 Submit the test results of electrical systems and instruments installed in the form of a written report.
- .4 Permits and fees: under the general conditions of contract, and this section.
- .5 Once completed, submit a report of load balancing in accordance with article "Quality control on site" in Part 3 of this section.
- .6 Once completed, submit to the department's representative the certificate of approval issued by the competent authority.
- .7 Molded Case Circuit Breakers
- .1 The contractor, electrical subcontractor must deliver to the department's representative a certification of

the authenticity of all molded case circuit breakers used in the project and before any installation thereof to the site.

- .2 The certificate must indicate at least the following information:
- Name of the electrical contractor
  - Project identification and address of site installation
  - The brand, the electrical characteristics of circuit breakers for circuit breakers and 60A and the serial number.
  - The name and signature of the authorized distributor for the manufacturer who supplied the circuit breakers.
  - The number of circuit-breakers at licensed dealer.
  - The signature of the local representative of the manufacturer.

- .7 In case reports of controls must be made by the manufacturer to the department's representative : within three days after the checks and tests the installation and electric instruments prescribed in Article FIELD QUALITY CONTROL, PART 3 of this section, a written report of the manufacturer showing that the research meets the criteria specified.

1.11 INTERFERENCE  
SCHEMATICS

- .1 If necessary, prepare schemes to ensure that electrical equipment can be mounted in space and where indicated without disturbing the other sections and equipment while leaving space for the proper maintenance of these equipment.
- .2 If a department's representative considers that there may be interference in a particular location; they may require the Contractor to prepare plans of interference of these places.

1.12 SPECIFIC PRODUCTS

- .1 When more than one brand of product is specified in the plans and specifications, we will strictly stick to these brands for the submission and delivery. The bidder will be chosen on the assumption that its bid is based on the products specified in plans and specifications.
- .2 In the case where there is only one brand of product indicated in the plans and specifications; this brand becomes the only brand to the specified product. No other acceptable product will be accepted.

- .3 Analysis by the department's Representative
  - .1 Among the brands of products specified in plans and specifications, any application for equivalence submitted to the department's representative of the contractor will be considered taking into account the following criteria: construction, performance, capacity, dimensions, weight, size, minimum standards, availability of spare parts, maintenance problems, delivery times, existence of similar equipment and proven in service.
  - .2 When such a request is made, it is incumbent upon the contractor to demonstrate in tabular form confirming the parallel between the specified product and proposed product from other brands. Without limitation, it will confirm among others: the size, weight, clearances required for maintenance, operating voltage, power consumption, the starting current, operating conditions, performance the list of accessories, etc.
    - .1 In the case of lighting, the Contractor shall provide, in addition, photometric calculations AGI32 format and the IES file used for calculations.
  - .3 Upon verification of the evidence, the department's representative will make recommendations to the owner and any required control equipment or piece of equipment will be placed prior to obtaining authorization.
  - .4 If the components and / or characteristics of products offered other brands specified differ from each other, the contractor will be liable to and shall, at its expense, pay the cost of alterations and additions of equipment or materials and additional, for all trades so that we find for each of them the same functions.
  - .5 Following the refusal of his first proposal, if the contractor had to submit other proposals for the same equipment or material, he shall pay directly to the department's representative of the additional fees incurred for these additional checks at its own expense and bear the costs of delays in the work entailed for these additional checks.

1.13 QUALITY ASSURANCE

- .1 The Contractor shall have full control of his own work including those of the subcontractors.
- .2 The Contractor shall direct and supervise the work adequately in order to ensure compliance with plans and specifications.
- .3 The Contractor shall be solely responsible for the methods, techniques and sequences for carrying out the work.

- .4 The contractor must have a site supervisor that can represent him in his absence. Any notice, order, direction, etc. given to the supervisor shall be construed as given to the contractor himself.
- .5 The Contractor shall ensure that its work will be done promptly before pouring concrete or performing other similar work. Supply and install sleeves required. If it is necessary to cut or repair work completed or not, to use his own expense, a specialist in the part of the work involved making cuts and repairs.
- .6 If the materials supplied by the Contractor must be incorporated into the work of other contractors such as masonry, carpentry or plastering, the contractor will be responsible for providing the equipment and to incorporate measures for necessary openings to develop.
- .7 If the Contractor covers or permits to cover work before tests and inspections have been made, the Contractor shall, upon request, uncover the work in question, to complete the inspections and tests in a satisfactory manner and deliver such part of the work in the condition at the contractor's own cost.
- .8 The Contractor shall protect his own work, finished or unfinished, and that of other contractors against any damages resulting from the execution of his own work. Cover floors, etc., as needed with heavy fabric. Repair, without cost and to the satisfaction of the department's representative, all damages on floors or other parts of the building resulting from the execution of his own work.
- .9 When the work is completed, all tools, surplus materials or waste will be removed and the premises will be left perfectly clean.
- .10 Quality Assurance: according to Section 01 45 00 - Quality Control.
- .11 Qualification: electrical work must be performed by authorized, qualified by a master electrician or an electrical contractor holding a license issued by the province in which the work will be performed or by apprentices in accordance with the relevant authorities and in accordance with the terms of provincial legislation concerning territorial vocational training and qualification of the workforce.
  - .1 Employees enrolled in a provincial apprenticeship program can perform specific tasks if they are under the direct supervision of a qualified licensed electrician.
  - .2 Tasks permitted: depending on the degree of training and according to the demonstrated ability to perform specific tasks.
- .12 Site meetings
  - .1 in the case where site meeting are made by the manufacturer

as part of Manufacturer's Field Services described in Part 3 - FIELD QUALITY CONTROL, in appropriate NMS Section , schedule site visits, to review Work, at stages listed.

- .1 After delivery and storage of products, and when preparatory Work is complete but before installation begins.
- .2 Twice during progress of Work at 25% and 60% complete.
- .3 Upon completion of Work, after cleaning is carried out.

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

1.14 DELIVERY, STORAGE  
AND HANDLING

- .1 Material Delivery Schedule: provide the department's Representative with schedule within [2] weeks after award of Contract.
- .2 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .3 Materials must be delivered and stored according to manufacturer's instructions and ensure that their labels and seals are intact.
- .4 Ship and store in a standing position, the equipment to assemble.
- .5 Ship sections and assembly anchoring patterns before hardware.
- .6 Close the doors of the equipment and keep them locked. Protect equipment against damage and dust.
- .7 If necessary, shim moving parts to avoid damage when moving or shipping the material. The guidelines for the removal of wedges before commissioning should be displayed in French clearly and prominently.
- .8 Store electrical equipment inside unless otherwise indicated.

1.15 SYSTEM STARTUP

- .1 In accordance with section 01 91 13.
- .2 Instruct the department's Representative and operating personnel in operation, care and maintenance of systems, system equipment and components.
- .3 Provide written notice of 5 working days of the date of testing.
- .4 All equipment as well as the various systems, must be turned on,



adjusted and calibrated by the contractor so as to provide the capacity and performance required of plans and specifications.

- .5 perform startup tests in the presence of the people responsible and the owner's representative.
- .6 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.
- .7 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with aspects of its care and operation.

1.16 OPERATING INSTRUCTIONS

- .1 Submit three (3) copies (unless otherwise indicated) of the operations manual and maintenance in binders identified for this purpose. These manuals will consist of a hardcover three-ring and identified with "P-Touch" on the front cover and the vertical side.
- .2 Operating instructions to include following:
  - .1 The details of the components, construction features, function and maintenance requirements of the various components to facilitate the starting, operation, maintenance, repair, alteration, extension and expansion of or any part characteristic of the installation.
  - .2 Technical data and product characteristics must be accompanied by supplementary information such as newsletters, illustrations and exploded views of component parts, technical descriptions and parts lists. The flyers advertising or brochures are not accepted.
  - .3 Wiring diagrams, circuit diagrams, control sequence for each main system and for each device, the principle diagrams and yield curves, startup procedures, adjusting, adjustment, lubrication, operation and stop, security measures, procedures to follow in case of failure, and other instructions, as recommended by the manufacturer of each body system.
  - .4 The names and addresses of the local suppliers of products mentioned in manuals.
  - .5 A copy of each shop drawings revised with comments made to them for approval and changes during construction.
  - .6 Warranties, factory test reports, verification certificates, certificates of circuit breakers, etc.
  - .7 Data sheets must be in French.

- .8 The entire manual should be in electronic (Autocad (latest version), Word, Excel or Acrobat (PDF)).
  - .9 All drawings and / or drawings types used in the Autocad format will also be provided in electronic DWG format.
  - .3 Provide tools, equipment and services of qualified instructors for the training of operating personnel and maintenance for the operation, the control, adjustment, diagnosis of problems and maintenance of all systems and equipment, during normal hours of work and before acceptance and delivery of systems and equipment.
  - .4 When other additional requirements specifies this, manufacturers must carry out demonstrations and train staff according to the requirements for training hours specified in each relevant section.
  - .5 Training courses should be based on the contents of the operations manual and maintenance and as-built drawings.
- 1.17 SOFTWARE AND COMPUTER DATA
- .1 With all equipment provided with a processor whose parameters are programmable, the Contractor shall provide the owner of software programming and settings stored in the memory of the equipment. Training on the equipment in question should also cover how the software works.
- 1.18 RIGHTS, PERMITS AND INSPECTION
- .1 Submit to the authorities concerned, the required number of copies of drawings and specifications to enable them to study and approve before work begins.
  - .2 Pay all related costs.
  - .3 The contractor is responsible to apply for connection to the electricity distributor.
  - .4 If applicable, drawings and specifications required by the authorities will be provided directly by the department's representative to cost to the contractor.
  - .5 At the end of the work, provide the required certificates, including a copy to the department's representative. Pay all charges for additional copies required by the authorities concerned.
- 1.19 SPECIFIC REQUIREMENTS – COMMISSIONING
- .1 In addition to the requirements mentioned in sections of the discipline "Electricity", the Contractor shall collaborate with the department's representative to meet the requirements of the commissioning plan, Section 01 91 13

PART 2 - PRODUCTS

2.1 MATERIALS AND  
EQUIPMENT

- .1 Provide material and equipment in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Material and equipment to be CSA certified. Where CSA certified material and equipment are not available, obtain special approval from authority having jurisdiction before delivery to site and submit such approval as described in PART 1 - SUBMITTALS.
- .3 Control panels and component should be factory assembled.
- .4 Provide materials, equipment and new sets of design and of known quality, recent model, whose characteristics are known and which replacement parts are available upon request.
- .5 Control panels and components shall be factory assembled.
- .6 Unless otherwise specified, to maintain consistency, use only products from one manufacturer when it comes to material or equipment of the same type or class.
- .7 Follow manufacturer's recommendations in regard to safety, inspection doors, maintenance and repairs.
- .8 Ensure the maintenance and dismantling may be done without hindering to the elements of the construction or other installations.
- .9 Provide means for accessing material, for maintenance purpose.
- .10 Wherever possible, align the edges of pieces of equipment as well as other items with walls of the building.
- .11 Check the joints made in the factory and tighten if necessary to ensure continuity of installation.
- .12 Identify and comply with manufacturers' recommendations regarding storage and hardware installation.

2.2 ELECTRIC  
MOTORS, EQUIPMENT  
AND CONTROLS

- .1 Check responsibilities regarding installation and coordination with regard to motors, equipment and command / control, as indicated. Unless otherwise specified, starters and starter centers are supplied and installed by the discipline "Electricity". Section of mechanics, supplies and installs engines and equipment under its discipline.
- .2 Unless otherwise specified in the plans, the control wiring and conduit will be provided related discipline under "Electricity", with the exception of ducts, wiring and connections operating at voltages below 120 V and related systems control prescribed in sections for

mechanical systems and on the drawings of mechanical systems.

- .3 Ensure that the phase sequence is adequate for the driving forces and have a direction of rotation in the clockwise direction.
- 2.3 WARNING SIGNS .1 Warning Signs: in accordance with requirements of inspection authorities and the department's Representative.
- 2.4 WIRING TERMINATIONS .1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.
- 2.5 EQUIPMENT IDENTIFICATION .1 Identify electrical equipment with nameplates and labels as follows:
  - .1 Nameplates: Unless otherwise specified, use plates made of plastic lamicaid 3 mm (1/8 inch) thick, mechanically fastened using self-tapping screws with engraved inscription in white on black for the normal network, in white on red for emergency panels and equipment connected to the emergency equipment and for fire alarm, white on orange panels for computer and related equipment and white on blue for uninterruptible power supplies (UPS), signs and any other equipment serviced by UPS.
  - .2 Sizes as follows:
 

<u>NAMEPLATE SIZES</u>			
Size 1	10 x 50 mm	1 line	3 mm high letters
Size 2	12 x 70 mm	1 line	5 mm high letters
Size 3	12 x 70 mm	2 lines	3 mm high letters
Size 4	20 x 90 mm	1 line	8 mm high letters
Size 5	20 x 90 mm	2 lines	5 mm high letters
Size 6	25 x 100 mm	1 line	12 mm high letters
Size 7	25 x 100 mm	2 lines	6 mm high letters
  - .3 Labels: embossed plastic labels with 6 mm high letters unless specified otherwise.
  - .4 Wording on nameplates and labels to be approved by the department's Representative prior to manufacture.
  - .5 Allow for minimum of twenty-five 25 letters per nameplate and label.
  - .6 The nameplates of terminal boxes and junction boxes must indicate the characteristics of the network and / or voltage, identification, and the circuit panel from which the supply and indicate what is being fed downstream (after).

- .7 Instructions must be in French.
- .8 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
- .9 The nameplates of terminal boxes and junction boxes must indicate the characteristics of the network and / or voltage, identification, and the circuit panel from which it is fed and indicate what is fed downstream (after).
- .10 The transformer nameplates shall indicate the identification, the panel and the circuit from which the power is supplied, numbers of circuits and the panel which is supplied by the transformer.
- .11 Nameplates on junction box and fire alarm should indicate network characteristics: fire alarm detection.
- .12 Side panels 120/208 V and 120/240 V and 347/600 V:
  - .1 For new projects, the contractor must identify the circuit breakers used in referring to the numbers on the doors of the premises. Panels on the cards, identification of the file should appear (name of panel-year-month-day.XLS), each panel must have a Excel file. At the end of the project, the Contractor shall deliver them to the department's identified the computer files.
  - .2 For existing panels, the contractor should note that each sheet panels affected will be updated either by computer or legible handwriting.
- .13 Electrical Appliances
  - .1 All panels, disconnects, fuses, junction boxes and pull, starters, center starters, contactors, each circuit of the main panels and other equipment provided by this division will all wear a name plate engraved in white lamincoid on black or red background for emergency, according to the formats given in section 2.6.1.2 of this section. This identification will correspond to the date shown on the plans.
- .14 Fire alarm equipment
  - .1 All junction cabinets and fire alarm pulling cabinets will all wear a name plate engraved in red white lamincoid according the formats given in section 2.6.1.2 of this section. This identification will correspond to the date shown on the plans or as described in section 2.6.10 of this section.
  - .2 Identify all elements of detection, triggers, modules as described in Section 28 31 00.01 - Addressable Fire Alarm

System.

- .15 List of formats nameplates to use:
  - .1 Main service chart: 7
  - .2 Junction box, pulling box: 5
  - .3 Automatic diverter: 7
  - .4 Meter, alarm: 5 / fusible: 2
  - .5 Switch: 5
  - .6 Magnetic starters: 5
  - .7 Manual starters: 5
  - .8 Main breaker: 5
  - .9 Generator: 7
  - .10 Pilot-light: 5
  - .11 Control panel: 7
  - .12 Motor control center: 7
  - .13 Breakers: 5
  - .14 Transformers: 5
  - .15 Junction cabinets and fire alarm pulling cabinets : 2
  - .16 Panel board
  - .17 Switch gear 25 kV:7
  - .18 UPS (uninterrupted power supply): 7
  - .19 Unit 125 V DC: 7
  - .20 Control panel and electrical management: 7
  - .21 Motors: 5
- .16 Control Panel
  - .1 Within each of the main panel and on the gutters, the identification phase "A", "B", "C", "N", will be affixed with letters of 50 mm (2 in.) high minimum.
- .17 Motors
  - .1 For each motor, make marking on the motor identifying the

- isolating device and its location and the starter or the engine controller.
- .18 Boxes
- .1 All junction and pulling boxes used for branch circuits shall be identified as follows: number of electrical panel and circuit numbers. Registration shall be enforced by an adhesive tape-type P-Touch.
- .19 Systems
- .1 All boxes of the different systems must carry the name of the system (eg telephone, computer).
- .20 Sockets and switches
- .1 Each outlet and switch shall bear the following identification: no. panel and no. circuit.
- .2 The low voltage switch must bear the following identification: No. of panel relay, No. Relay on another line and have no. panel and no. circuit.
- .3 The identification will be as follows: P-Touch (electronic lettering machine type P-Touch) c / w self adhesive strip under pressure effect of 12 mm wide No. TC-201.
- The adhesive tape will do the complete opposite of the plate and part of the back so that the band does not come off. Before sticking the tape, clean the plates of all impurities.
- .4 The colors will be as followed:
- Normal: Black letters with clear background
- Urgency: Red letters with clear background
- U.P.S.: blue letters on clear background
- .5 In addition, the Contractor shall install an identification P Touch adhesive on the device itself, but in the back of the plate and fold behind the ear devices outlets and switches. This identification will be the same as on the plate (No. panel and No. circuit).
- .21 Emergency lighting, exit sign, battery lighting, fire alarm, etc.
- .1 All appliances must carry the following markings: No. panel and No. circuit, the text will be white on red.

2.6 WIRING

IDENTIFICATION

- .1 Identify wiring with permanent indelible identifying markings, numbered and colored plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.
- .2 Maintain phase sequence and color coding throughout.
- .3 Color coding: in compliance with Code de Construction du Québec, chapter V- Electrical.
- .4 Use color coded wires in communication cables, matched throughout system.
- .5 In each panel, in all junction boxes, each conductor (including neutral) will be identified by the (No. panel and No. circuit) or its function (alarm circuits 1, 2, 3, etc..) by using ring-marks *Thomas Betts* brand.

2.7 CONDUIT AND

CABLE IDENTIFICATION

- .1 Color 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 Colors: 25 mm wide prime color and 50 mm wide auxiliary color. These bands will be brand "*Thomas & Betts*" EZ series strips of identification Code

	<u>Prime</u>	<u>Auxiliary</u>
up to 250 V	Yellow	
up to 600 V	Yellow	Green
up to 5 kV	Yellow	Blue
up to 15 kV	Yellow	Red
Telephone	Green	
	<u>Prime</u>	<u>Auxiliary</u>
Other communication systems	Green	Blue
Fire Alarm	Red	
Emergency Voice	Red	Blue
Other Security Systems	Red	Yellow



- .4 In addition to the color code, each main distribution systems, main roads, secondary electrical distribution, telephone distribution line, will be given an identification vinyl (plastic) attached by stainless steel fasteners at every 15 m and at points of cross walls, ceilings and floors.
- Entries will be according to the designations given to plans.
- .5 Plastic cards of 50 mm x 150 mm perforated around and fastened with "TY-RAP" fasteners.
- 2.8 FINISHES
- .1 Comply with the requirements of the architect. The color of all electromechanical equipment is apparent in the choice of the architect in the range of all standard colors and non-manufacturer standards, including special colors.
- .2 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel. Paint outdoor and indoor electrical equipment switchgear and distribution enclosures light gray ASA-61 to EEMAC 2Y-1.
- .3 Clean and touch up the painted surfaces in the workshop that were scratched or damaged during shipping and installation. Use a paint that matches the original painting.
- .4 Clean and prime the hooks, brackets, fasteners and other devices visible, not galvanized to protect against rust.

### PART 3 - EXECUTION

- 3.1 INSTALLATION
- .1 Do complete installation in accordance with Code de Construction du Québec, chapter V- Electrical.
- 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 OPENING AND CROSSING OF ARCHITECTURAL AND STRUCTURAL ELEMENTS
- .1 Make the necessary arrangements for openings in the roof and exterior walls are equipped with flashing and protected against the elements. Coordinate the requirements of this section with those of the Division 07 - Thermal and Moisture.
- .2 All work described below for the installation of sleeves, openings or closing of openings in an existing building and new construction will be implemented by:

- The electrical contractor, except openings indicated on the plans of structure and / or architecture.
- .3 The work of opening foundations includes any drilling, casing, floors and interior walls as well as all drilling required for installation of equipment, piping and their supports, inserts, bolts, etc.
  - .4 As recommended by the architect, not all existing openings reused must be sealed, made watertight and / or flame retardant composition to make them equivalent to the element passed through.
  - .5 Place the sleeves where pipes go through masonry or concrete, or structures listed for their fire resistance.
  - .6 All sleeves, inserts, bolts, etc., Will be installed before the walls and floors are constructed and the concrete is poured.
  - .7 Use as sleeves of steel pipe, Schedule 40 with anchors set in the center, Ø 12 mm above the pipes. Steel sleeves welded 16 gauge, may be used only when the required internal diameter of the sleeve will not match a standard diameter schedule 40 pipe. Apply prior to installation, a coat of paint dry zinc (product accepted: Sico "Corrostop").
  - .8 When using plastic sleeves for penetrations of walls or floors with a degree of fire resistance, remove them before installing the ducts.
  - .9 Install cables, conduits and fittings to be embedded or plastered neatly against the building structure so as to minimize the thickness of fur.
  - .10 Openings and materials must be of sufficient size for the installation of thermal and acoustical insulation and should allow for thermal movement. Openings and sleeves shall be completely independent ducts to be subsequently installed.
  - .11 If an additional piercing is required, it may occur after it has requested and obtained written permission from the owner and / or his representative and / or consultant in structure.
  - .12 The piercing of the holes by air hammer or electric vibratory action as well as the drilling by hand and any other means by mechanical shocks are prohibited. The holes should be drilled using a rotary drill with water or other device approved by the consultant structure.
  - .13 For crossings of the exterior walls and watertight basins, using sleeves with flange secured to the center by continuous welding.
  - .14 Dimensions: leave an annular gap of at least 12mm between the sleeve and the pipe without insulation or between the sleeve and the insulation.
  - .15 Lay the sleeves so they are flush with the surfaces of concrete and

masonry and concrete floors poured directly on the ground that they exceed 50 mm all other types of floors.

- .16 The Contractor shall fill all the gaps around ducts using prefabricated seals when the sleeves pass through foundation walls, exterior walls, concrete walls, the walls of watertight basins and slabs with waterproof membrane. Acceptable products are of the type "link seal".
- .17 In the case of passing through walls or floors rated for fire resistance; see item 3.4 in the present section.
- .18 Any piercing of the enclosure of the building floors or interior walls should be sealed as directed by the architect to maintain quality of the soundproofing, insulation and / or fireproofing. The architect may apply to products other than those proposed in the previous subsections. The specialist contractor shall comply with the approval and the final decision of the architect.
- .19 Any piercing in steel beams must be coordinated between the contractor and the contractor specialized in structure and final details will be specified on shop drawings in structure according to specific needs.
- 3.4 FIREPROOFING .1 Where cables or conduits pass through floors and firewalls. The fire stop materials will be branded "INSTANT FIRESTOP INC". (I.F.S.) or other acceptable product. The Contractor shall require the supplier of fire stop materials, technical bulletins corresponding to fire stop materials for use with the ULC listing number (SP) corresponding to the assembly which will be performed on site.
- 3.5 SOUNDPROOFING .1 Unless otherwise indicated in accordance with the requirements in Section 07 92 10 - Joint Sealing, fill all the spaces left free between the sleeves and / or conduits and walls and / or floors with wool acoustic low density and seal the periphery of each side with an acoustic sealer silicone.
- .2 Once all conductors are installed and for all empty conduits, seal on each side of openings of the conduits with low density acoustic wool to a depth of 50 mm. Install the latter so as to remove for the passage of other drivers.
- 3.6 LOCATION OF OUTLETS .1 Locate outlets in accordance with Section [26 05 32 - Outlet Boxes, Conduit Boxes and Fittings].
- .2 Do not install outlets back-to-back in wall; allow minimum [150] mm horizontal clearance between boxes.
- .3 Change location of outlets at no extra cost or credit, providing distance does not exceed [3000] mm, and information is given before installation.

- .4 Locate light switches on latch side of doors.
- .1 Locate disconnect devices in mechanical and elevator machine rooms on latch side of floor.
- 3.7 MOUNTING HEIGHTS
  - .1 Mounting height of equipment is from finished floor to centerline of equipment unless specified or indicated otherwise.
  - .2 If mounting height of equipment is not specified or indicated, verify with the department's Representative before proceeding with installation.
  - .3 Install electrical equipment at following heights unless indicated otherwise.
    - .1 Local switches: 1 200 mm.
    - .2 Wall receptacles:
      - .1 General: 450 mm.
      - .2 Above top of counters or counter splash backs: 175 mm.
      - .3 In mechanical rooms: 1 200 mm.
    - .3 Panel boards: as required by Code or as indicated.
    - .4 Telephone and interphone outlets: 450 mm unless otherwise indicated under cabinets.
    - .5 Wall mounted telephone and interphone outlets: 1 200 mm.
    - .6 Fire alarm stations: 1 200 mm.
    - .7 Fire alarm bells: 2 300 mm and at least 150 mm from the ceiling.
    - .8 Television outlets: 450 mm.
    - .9 Wall mounted speakers: 2 100 mm.
    - .10 Clocks: 2 100 mm.
    - .11 Door bell pushbuttons: 1 200 mm.
  - .4 The height of installation must comply, throughout a path without obstacles served by an elevator or elevating device platform for passengers from the entrance to any area of a floor of a public building, to the following premises except for any local technical and other listed NBC (2 3.8.2.1). The locations will coordinate before any work with the architect.
    - .1 Switches and dimmers: 1 200 mm.

- .2 Doorbell buttons: 1 200 mm.
  - .3 Intercoms: 1200 mm.
  - .4 Fire alarms stations: 1 200 mm.
  - .5 Wall outlets (telephone, power, etc.): 540 mm.
- 3.8 PROTECTION .1 During construction, protect the exposed and live material to ensure staff safety.
- .2 Enclose and mark live (energized) parts by the inscription "live circuit 120 volts" (or the appropriate voltage), in French.
  - .3 Provide for the installation of temporary doors to close the rooms containing electrical distribution equipment. Keep these doors locked except when the electrician provides direct supervision.
- 3.9 COORDINATION OF PROTECTIVE DEVICES .1 The Contractor shall conduct a study of coordination. Note that the study should be sent to the department's representative along with shop drawings. This study must include all the curves on logarithmic paper showing coordination between existing protections at connections between devices and protection of electrical installations covered by this estimate.
- .2 The Contractor shall obtain approval for the study of coordination by the department's representative.
  - .3 When the study is approved, the contractor must make the adjustment and installation of all protective devices such as triggers overcurrent relays and fuses. The Contractor shall recheck and make sure that all these adjustments are set to values required before powering various devices.
- 3.10 FIELD QUALITY CONTROL .1 Make the following tests and pay all costs
- .1 Load Balance:
    - .1 Measure phase current to panel boards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.
    - .2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.
    - .3 Provide upon completion of work, load balance report as directed in PART 1 - SUBMITTALS: phase

and neutral currents on panel boards, dry-core transformers and motor control centers, operating under normal load, as well as hour and date on which each load was measured, and voltage at time of test.

- .2 Conduct following tests in accordance with Section 01 45 00 - Quality Control.
  - .1 Power generation and distribution system including phasing, voltage, grounding and load balancing.
  - .2 Circuits originating from branch distribution panels.
  - .3 Lighting and its control.
  - .4 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.
  - .5 Any other system: Fire alarm system, communication network, monitoring of doors, intrusion, etc. by specialized firms.
  - .6 Insulation resistance testing:
    - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
    - .2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
    - .3 Check resistance to ground before energizing.
- .3 Carry out tests in presence of the department's Representative.
- .4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
- .5 Submit the test results to the department's representative in the form of a written report.
- .6 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.

- .7 Tests
  - .1 Make tests to check that no wires or circuit does not contain a ground. Also do with the acting the department's representative, tests to prove that connections are made everywhere and offer no resistance, such a voltage drop exceeding 3% when all appliances are in use.  
  
Finally, balance the lighting circuits on the tables and side tables so that the main phases of the building are perfectly balanced.
- 3.11 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.
  - .3 Clean all duct systems and their boxes before pulling conductors.
  - .4 Clean the inside of all boxes of wiring devices and lighting fixtures and heating systems special.
  - .5 Prior to commissioning, clean all equipment, panels, transformers, starters, etc., Their control panel and accessories.
  - .6 When the final cleaning, cleaning of the reflectors, diffusers, globes and other lighting products that have been exposed to dust and dirt.
- 3.12 PLANS «WITH CONSTRUCTION ANNOTATIONS»
  - .1 During the execution of the work, to record all changes on a copy of site in red.
  - .2 At the end of the work, transcribe all the changes in red color legibly on a clean copy. Identify each plan in the lower right corner in letters at least 12 mm high, as follows: "CERTIFIED AS BUILT" THIS PLAN HAS BEEN REVISED AND SHOWS SYSTEMS / ELECTRICAL EQUIPMENT AS THEY HAVE BEEN INSTALLED (Signature of Contractor) (Date).
- 3.13 RESPONSIBILITES DURING TEMPORARY TRIAL TESTING
  - .1 Protect the work against loss or damage until its acceptance.
  - .2 During the temporary use, the warranty period will not be affected.
  - .3 The owner can use the facilities and equipment for testing before they have accepted. Provide labor, materials and necessary instruments for testing.
  - .4 Facility and equipment should be cleaned, refurbished and in good

working condition before their acceptance and isolate equipment that could be damaged.

- .5 Prevent dust, dirt and other foreign matter from entering openings of facilities and equipment for temporary use.

3.14 RECEPTION OF WORK  
DISCIPLINARY  
"ELECTRICITY"

- .1 This procedure of acceptance of work does not prevent the taking possession of the building by the owner and if the occupation is conducted prior to approval of work, the systems must be put in operation and kept in service until at the time of receipt of the work.

- .2 Acceptance of the work will be required by the general contractor when the work under will be fully completed. The general contractor will make a joint written request with its subcontractor identifying the work of the subcontractor of the discipline "Electricity" are fully completed and ready for the reception. In the event that certain works are not completed, they must be clearly identified by the Contractor's request and justification to be appended.

The department's representative will then determine whether the acceptance of work. Upon receipt of the request of the Contractor General, the department's representative will, on schedule with the general conditions, a site visit and prepare a list of deficiencies. If it happened that there remains work to be completed or that the list of deficiencies is too great to justify the reception of the work (more than 0.5% of the value of work covered), the Contractor shall complete and / or correct its work before a list of deficiencies is issued.

- .3 Whichever occurs first, either under clause turnaround or from the date the Contractor General has asked the reception of the work and confirmed that these are completed, it will reimburse the owner of all fees and additional costs it must pay to the department's representative in relation to extended services including surveillance, without limitation, all costs incurred for monitoring (in the office and on site) and travel expenses, subsistence and accommodation, for all additional visits to the scheduled visit to make a list of deficiencies and to that provided to ensure that all deficiencies have been corrected. The pace of site visits will be maintained as during the execution of works if the original schedule is exceeded.

- .4 The visit to check if all deficiencies are corrected will be done one month after issuing the list of deficiencies, in order to allow a reasonable time to correct deficiencies.

3.15 ELECTRICAL EQUIPMENT  
SUPPORT

- .1 In the general purpose areas, all electrical devices (switch, gutter, distribution panel, starter, box measuring, etc.) Must be installed on a plywood 19 mm thick, fireproof, painted gray, or media profiles. Use



- a fireproof paint.
- .2 In fire resistant areas, use metal supports such as galvanized steel profiles for mounting electrical appliances.
- .3 All wall-mounted plates are to be supplied and installed by general contractor.
- 3.16 EXCAVATION, FILLING AND CONCRETE
- .1 Ensure that the excavation for electrical services is buried along the outline and depth indicated. Install protective materials around and over electrical services at the scene, and at all times during excavation and backfill.
- .2 The work must comply with Section 12 of the Quebec Construction Code, Chapter V, Electricity.
- .3 The excavation, backfilling are under the responsibility from other disciplines.
- 3.17 EXTENDED FUTURE PLANS
- .1 In any place where a space was left free for future use, the Contractor shall see that this space is free, but must also install conduit and other equipment relating to its work so that future connections of equipment can be added without having to redo some of the facilities of electricity.
- 3.18 ACCESS DOORS
- .1 The Contractor shall provide access panels as they are manufactured by a recognized manufacturer either located on floors, walls or ceilings. Each device is identified and its function will be described on a framed picture.
- .2 These accesses, wall and ceiling, will be made of steel with a base paint finishing and with doors and frames. The hatch can be mounted with concealed hinges and lock and key and barrel mark ILCO 575 (a common key for all hatches for electricity). These traps will be 30 cm x 30 cm or more as minimum access to reach.
- .3 These access panels will be installed by the general contractor at the places indicated by the contractor of this field.
- .4 In places where suspended ceilings are provided in removable tiles, these will then be used as access hatches.
- .5 Access panels that are installed in walls and ceilings will have the same fire resistance as the wall or ceiling where they are installed.
- .6 Access panels must comply with the Building Code of Quebec, Chapter 1, Building and NBC, latest edition.

3.19 UNIFORMITY AND  
CONSISTENCY

- .1 The Contractor shall comply perfect uniformity between the different systems for each specialty.
  - .2 The department's representative may at any time, prior to installation, if deemed necessary, move within 3 m any equipment such as equipment of ancillary services, fans, lights, switches, sockets, breakers circuits, transformers, lighting, etc.. at no additional cost. It is incumbent upon the contractor to coordinate with other trades and contractors representative and get the necessary approvals from the departments.
  - .3 No light fixture shall be placed above the pipes, ducts or other obstructions.
  - .4 All fittings used as pull boxes and junction boxes must be selected according to the requirements of the Building Code of Québec, chapter V, latest edition taking into account the number and the conductor and conduit involved.
  - .5 Pull boxes and junction boxes must be located in protected areas and easily accessible.
  - .6 Contractors should note that the plans provided to him as a guide and are sometimes on a smaller scale and do not always have Dimension. He must use his judgment and ensure that the accessories of these systems integrate well with the structure and architecture of the building.
  - .7 For the same specialty or same trade, the equipment of the same type (eg, fluorescent fixtures, incandescent, starters, etc.) must come from a single manufacturer.
- 3.20 GLASS PARTITIONS .1 Be careful not get any vertical path of ducts where a glass partition is shown on architectural drawings. Where applicable, ducts or wiring BX will be located in the mullions.

**END OF SECTION**

- PART 1 - GENERAL
- .1 Generally, the plans and specifications are intended to describe the work required such as the establishment, installation, testing, material requirements, etc. to ensure full implementation of the work. Run all in accordance with standards, laws and regulations
  - .2 The contractor is responsible for the proper execution of all work described in plans and specifications.
  - .3 The general contractor is responsible to supply temporary services for electricity and telephone services for himself and the sub-contractors during the time of construction.
  - .4 The contractor is responsible to ensure adequate coordination with subcontractors.
  - .5 The equipment and specified materials establish minimum requirements of quality and performance.
  - .6 Not limited to, the work is summarized in section 26 05 05.
- 1.1 RELATIONS BETWEEN ARCHITECTURAL, STRUCTURAL, MECHANICAL AND ELECTRICAL DOCUMENTS
- .1 Plans, specifications and addenda of architectural, structural, mechanical or electricity complement each other and must be consulted and studied together to be aware of how this may affect the particular work of each trade. No additional amount will be paid to the contractor for not foreseeing the cost of all the work, travel and other similar work, etc. which are necessitated by the structure of the building or equipment, pipes and conduits, accessories or other items or work required.
- 1.2 ORGANISATION OF THE SPECIFICATIONS
- .1 This document covers the description and installation of all equipment which are generally used for making all types of electrical work.
  - .2 The scope of work relating to these works is outlined in the plans and section 26 05 05 of the specifications.

**END OF SECTION**

PART 1 - GENERAL

- 1.1 GENERAL .1 This section covers electrical works to perform.
- .2 Contractor to provide necessary labor, equipments, cables, electrical conductors and ducts, documentation, devices, machinery, scaffolding supports, services, testing equipments, materials and all related components for building, delivery, installation, connection, testing, commissioning and warranty of equipments and materials for all works described in this section.
- .3 Conductors for each power supply of required caliber and disconnection for a steady state voltage drop under 3% between its corresponding transformer and all equipments powered by said transformer.
- .4 Contractor to perform works in accordance with any and all contractual requirements and must examine worksite and gather all details pertaining to existing conditions and limitations. Contractor to know of problems that may arise during works; in no case will any claims be accepted if conditions are not respected due to negligence.
- .5 Contractor to verify all plans of every discipline of current project to fully know every connections of which contractor is responsible. Should any electrical equipment become faulty after bad connections, electrical contractor will be held responsible along with contractor who provided said equipment.
- .6 Contractor to start all connected equipments in presence of contractor who provided said equipments, to prevent defects or failures.
- 1.2 SCOPE OF WORK .1 Works as described hereunder are not exhaustive. Works are described more specifically in documents, plans and drawings. All components or accessories necessary for a full and complete installation must be provided and installed, even if not specifically described to on documents.
- .1 Provide, install and connect all necessary equipment to perform the following works:
- Dismantling of existing facilities (pumping well))
  - Fuse switch
  - Cable and conduit buried
  - 120/240V distribution panel
  - 600-120/240V transformer

- Outlet
- Indoor and Outdoor Lighting
- Ventilation control
- Heating
- Connection of special charges (mechanical)
- Grounding

- 1.3 GENERAL CONTRACTOR .1 General contractor is responsible for providing materials and completing the following works:
- .1 Installation of required concrete for electrical equipment bases;
  - .2 Excavation, backfilling, compaction and concreting;
  - .3 Concrete molds.
- 1.4 SHOP DRAWINGS FOR SUBMITTAL .1 List of shop drawings to submit included as appendice to section 01 33 00 – Submittals.

## PART 2 - PRODUCTS

- 2.1 LIST OF MATERIALS TO SUBMIT TO OWNER .1 N/A

## PART 3 - EXECUTION

- 3.1 NEUTRAL CONDUCTOR .1 Connect neutral conductors to common neutral omnibus bar. Identify each neutral conductor appropriately.
- .2 Fit every 120ACV circuit with own neutral conductor. Do not use a common neutral conductor for multiple circuits. Branches may be fitted with common neutral in accordance with Code de Construction du Québec.
- 3.2 CIRCUIT BREAKERS RUPTURE CAPACITY .1 Rupture capacity of circuit breakers to meet the following:
- A) To full nominal value.

- B) To nominal value of integrated protection of equipments with upstream protection device (serial protection). Should manufacturer go with second choice, manufacturer to provide laboratory tests certifying proper operation of system and indicate, on equipment using a name plate, test voltages, upstream protection device, admissible branching devices, panel designation and voltages.
- .2 No integrated protection (serial) accepted for loads over 400 A.
  - .3 No integrated protection (serial) accepted for emergency network.
  - .4 No integrated protection (serial) accepted if total of motors nominal voltage serially connected is above 1% of downstream breaker nominal breaking capacity.
  - .5 All documentation to be provided with shop drawings (at same time). Any delays in submitting documentation will delay shop drawing review.

**END OF SECTION**



PART 1 - GENERAL

- 1.1 RELATED REQUIREMENTS .1 Wire and Box connectors, materials, related materials and their installations
- 1.2 REFERENCES .1 Canadian Standards Association (CSA International)
- .1 CAN/CSA-C22.2 No.18, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.
- .2 CSA C22.2 No.65-Wire Connectors.
- .2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)
- .1 EEMAC 1Y-2, 1961 Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).
- .3 National Electrical Manufacturers Association (NEMA)
- 1.3 WASTE MANAGEMENT AND DISPOSAL .1 Separate and recycle waste materials in accordance with Section [01 74 21 - Construction/Demolition Waste Management And Disposal].
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Divert unused wiring materials from landfill to metal recycling facility as approved by the department's Representative.

PART 2 - PRODUCTS

- 2.1 MATERIALS .1 Pressure type wire connectors to: with current carrying parts of copper sized to fit copper conductors as required.
- .2 Fixture type splicing connectors with current carrying parts of copper sized to fit copper conductors 10 AWG or less.
- .3 Bushing stud connectors: to EEMAC 1Y-2 NEMA to consist of:
- .1 Connector body and stud clamp for copper
- .2 Clamp for stranded copper conductors.
- .3 Clamp for stranded aluminum ACSR conductors



- .4 Stud clamp bolts.
- .5 Bolts for copper conductor or bar.
- .6 Bolts for aluminum conductor bar.
- .7 Sized for conductors and bars as indicated.
- .4 Clamps or connectors for armored cable, aluminum sheathed cable, mineral insulated cable, flexible conduit, non-metallic sheathed cable as required
- .5 Watertight approved for TECK Cable
- .6 All connectors and clamps are to be "Thomas & Betts" or "Burndy.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- .1 Install the connectors as per manufacturer's recommendations for bar connection.
- .2 Remove insulation carefully from ends of conductors and:
  - .1 Apply coat of zinc joint compound on aluminum conductors prior to installation of connectors.
  - .2 Install mechanical pressure type connectors and tighten screws [with appropriate compression tool recommended by manufacturer]. Installation shall meet secureness tests in accordance with CSA C22.2 No.65.
  - .3 Install fixture type connectors and tighten. Replace insulating cap.
  - .4 Install bushing stud connectors in accordance with EEMAC 1Y-2, NEMA.
  - .5 Contractor must prove that each screw has been tightened as per manufacturer's recommendation.

**END OF SECTION**

PART 1 - GENERAL

- 1.1 RELATED REQUIREMENTS.1 This section applies to copper conductors, ACM Alloy conductors and aluminum conductors designed for nominal voltages from 0 to 1000 volts, and the ducts and most common electrical insulators.
- 1.2 REFERENCES .1 Québec Construction Code, Chapter V, Electrical.  
.2 CSA C22.2 no 0.3, Testing methods for Electrical Cables and Wires.
- 1.3 PRODUCT DATA .1 Provide product data in accordance with Section 01 33 00 - Submittal Procedures et 26 05 00 – Electrical General Requirements.  
.2 Perform electrical test methods in accordance with section 26 05 00 – Electrical General Requirements.
- 1.4 DELIVERY, STORAGE AND HANDLING .1 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding and packaging materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

- 2.1 BUILDING WIRES .1 Where cables assemblies are specified to have a PVC overall covering it may be required to comply to the Vertical Tray Fire Test of CSA C22.2 No.0.3 for the applicable Building Code classification of the project as it relates to the actual installed location.  
.2 Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG.  
.3 Copper conductors: size as indicated, with 600 or 1000V insulation of cross-linked thermosetting polyethylene material rated RW90 XLPE or RWU90 XLPE.  
.4 Use insulated wiring of 1000 V for motors controlled by variable frequency.  
.5 An insulated GREEN conductor of minimum size 12 AWG is required.  
.6 Neutral supported cable: 1, 2, 3 phase insulated conductors of Copper or Aluminum and one neutral conductor of Copper or Aluminum steel reinforced, size as indicated. Type: NS75 or NS90 Insulation: Type NS-1 rated 300 V and Type NSF-2 flame

retardant rated 600 V.

- 2.2 TECK 90 CABLE NS-1, for rate voltage of 300 V and NSF-2, Fireproof for rate voltage of 600 V.
- .1 Cable: in accordance with Section 26 05 00 - Common Work Results for Electrical.
    - .1 Grounding conductor: copper.
  - .2 Circuit conductors: copper size as indicated.
  - .3 Insulation: Cross-linked polyethylene XLPE. Rating: 600 V. Inner jacket: polyvinyl chloride material. Armor: galvanized steel.
  - .4 Teck Cables used for control and communication not exceeding 300 V should be isolated at 600 V and should be of metal armor with galvanized steel tape. The conductors should be copper 12 gauge minimum or a gauge superior considering charges and voltage drop and the number of conductors per cable.
  - .5 All Teck Cables will be of type 90 with exterior PVC sheathing. Comply with CAN/CSA-C22.2 no 131 and 174 for hazardous locations (HL) and Fire retardant (FT-4).
  - .6 Teck Cables, when installed in cable trays, must meet the Québec Standards Building Code, Chapter V – *Electricity section* 4 and 12, as well as adjustment factors relevant to tables 5A and 5D.
  - .7 Overall covering: thermoplastic polyvinyl chloride, [compliant to applicable Building Code classification for this project].
  - .8 Fastenings:
    - .1 One-hole steel straps to secure surface cables 50 mm and smaller. Two-hole steel straps for cables larger than 50 mm.
    - .2 Channel type supports for two or more cables at 1.5 mm centers.
    - .3 Threaded rods: 6 mm diameter to support suspended channels.
  - .9 Connectors:
    - .1 Watertight, explosion-proof approved for TECK cable.
- 2.3 ARMOURED CABLES
- .1 Conductors: insulated, copper size as indicated.
  - .2 Type: AC90
  - .3 Armor: interlocking type fabricated from galvanized steel

- aluminum strip.
- .4 Type: ACWU90, PVC, flame retardant jacket over armor and compliant to applicable Québec Building Code classification for this project - wet locations.
- .5 Connectors: anti short connectors.
- 2.4 CONDUCTORS EXPOSED TO SUNLIGHT
  - .1 Insulated wires and power cables directly exposed to sunlight have to be protected specifically approved for such use and be labeled accordingly.

### 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 the department's 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 Color Coding: to Section 26 05 00 Common Work Results for Electrical.
  - .3 Conductor length for parallel feeders to be identical.
  - .4 Lace or clip groups of feeder cables at distribution centers, pull boxes, and termination points.
  - .5 Wiring in walls: typically drop or loop vertically from above to better facilitate future renovations. Generally wiring from below and horizontal wiring in walls to be avoided unless indicated.
  - .6 Provide numbered wire collars for control wiring. Numbers to correspond to control shop drawing legend. Obtain wiring diagram for control wiring.
  - .7 Drop cables in trenches in accordance with section 33 71 73.02 – Underground electrical service.
  - .8 Drop cables in cable trays in accordance with section 26 05 36 – Cable Trays for Electrical Systems

- .9 Branch circuit wiring for surge suppression receptacles and permanently wired computer and electronic equipment to be 2-wire circuits only, i.e. common neutrals not permitted.
- 3.3 INSTALLATION OF BUILDING WIRES
- .1 Unless otherwise stated, all wiring must be under conduit.
- .2 Use the types of conduits or pipe in accordance to the requirements of the respective section.
- 3.4 INSTALLATION OF TECK 90 CABLE (0-1000 V)
- .1 Install cable as indicated securely supported by staples, straps or hangers.
- .2 when there are 2 cables in the same course, bind them in a «U».
- .3 When there are two cables on the same path in the building, Teck cables must be installed in cable shelves.
- .4 Cable terminations in accordance with section 26 05 20 - Wire and Box Connectors 0 - 1000V.
- 3.5 INSTALLATION OF ARMOURED CABLES
- .1 In ceilings and drywall, the contractor may use armored cables AC-90 between light fixtures so that the length between fixtures and junction boxes do not exceed 3000mm.
- .2 In the ceilings and drywall, the contractor may use armored cables AC-90 between plugs on the same circuit so that the length of cable used between two plugs or between two junction boxes does not exceed 6000mm.
- .3 A maximum of groups of 3 cables wherever possible. Support at each 1.5 meters. Cables should follow structural lines of the building. No horizontal cables in the wall will be accepted.
- .5 Use of armored cable AC-90, apparent on the surface is prohibited.
- .6 Terminate cables in accordance with section 26 05 20- Wire and Box Connectors 0-1000V.

**END OF SECTION**

## PART 1 - GENERAL

- 1.1 REFERENCES .1 Canadian Standards Association, (CSA International)
- .2 Grounding equipment based on CSA C22.2 No. 41.
- .3 CAN/CSA Z32, Electrical Safety and Essential Electrical Systems in Health Care Facilities.
- 1.2 WASTE MANAGEMENT AND DISPOSAL .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic polystyrene, corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal materials from landfill to metal recycling facility as approved by the department's Representative.
- .5 Fold up metal banding, flatten and place in designated area for recycling.

## PART 2 - PRODUCTS

- 2.1 EQUIPMENT .1 Clamps for grounding of conductor: size as required to electrically conductive underground water pipe.
- .2 Copper conductor: minimum 6 m long for each concrete encased electrode, bare, stranded, tinned, soft annealed, size as indicated.
- .3 Rod electrodes: copper clad steel 19 mm diameter by 3 m long.
- .4 Plate electrodes: copper, surface area 0.2 m<sup>2</sup>, 1.6 mm thick.
- .5 Grounding conductors: bare stranded copper, tinned, soft annealed size as indicated.
- .6 Insulated grounding conductors: green, type RWU-90 when ground or surroundings are humid and type RW-90 in other areas, size as indicated.
- .7 Ground bus: copper, size as indicated, complete with insulated supports, fastenings, connectors.
- .8 Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:

- .1 Grounding and bonding bushings.
- .2 Protective type clamps.
- .3 Bolted type conductor connectors.
- .4 Thermite welded type conductor connectors.
- .5 Bonding jumpers, straps.
- .6 Pressure wire connectors.
- .7 Compression connectors
- .9 Junction box (access) brand name «SYNERTECH» or approved equivalent.

- 2.2 MANUFACTURER .1 Accepted Manufacturers: Thomas & Betts for mechanical joints and Cadwell or Thermoweld for welded joints by aluminothermy or Burndy

### PART 3 - EXECUTION

- 3.1 INSTALLATION GENERAL .1 Install complete permanent, continuous grounding system including, electrodes (minimum 3 per site), conductors, connectors, as indicated, to satisfy the requirements of the representative of CDC and local authorities.
- .2 Install connectors in accordance with manufacturer's instructions.
  - .3 Protect exposed grounding conductors from mechanical injury.
  - .4 Make buried connections, and connections to conductive water main, electrodes, using copper welding by thermite process.
  - .5 Use mechanical connectors for grounding connections to equipment provided with lugs.
  - .6 Soldered joints not permitted unless they complete the installation of a compression joint.
  - .7 Install bonding wire for flexible conduit, connected at both ends to grounding bushing, solder less lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit.
  - .8 Install flexible ground straps for bus duct enclosure joints, where such bonding is not inherently provided with equipment.
  - .9 Install separate ground conductor to outdoor lighting standards.
  - .10 Install grounding resistance bank.
  - .11 Install zigzag grounding transformer [on line side of main

- interrupter].
- .12 Make grounding connections in radial configuration only, with connections terminating at street side of water pipe. Avoid loop connections.
  - .13 Bond single conductor, metallic armored cables to cabinet at supply end, and provide non-metallic entry plate at load end.
  - .14 Ground secondary service pedestals.
- 3.2 MANHOLES
- .1 Install conveniently located grounding stud, electrode, stranded copper conductor in each manhole.
  - .2 Install ground rod in each manhole so that top projects through bottom of manhole. Provide with lug to which grounding connection can be made.
- 3.3 ELECTRODES
- .1 Make ground connections to continuously conductive underground water pipe on street side of water meter.
  - .2 Install water meter shunt.
  - .3 Make the connection for continuity of mass with at minimum a 6 AWG conductor at the nearest point of entry from the connection of all metallic network of water when it is not used as a ground.
  - .4 Also ensure that continuity of all gas distributing metal piping under pressure and make connection to conductors of the main ground.
  - .5 Install electrode embedded in concrete footings of the foundation of the building, and connect the terminals to the grounding network.
  - .6 Install the electrode plates or rods and make connections to ground as indicated. Coordinate with the general contractor of the rock drilling rods for installation.
  - .7 Bond separate, multiple electrodes together.
  - .8 Use copper conductors for connections to electrodes, size as indicated.
  - .9 Make special provision for installing electrodes that will give acceptable resistance to ground value where rock or sand terrain prevail as per Quebec Construction Code. Make connections as indicated.
  - .10 Install a junction box (access) bottomless fiber on each rod in order to simplify the location in the soil The box must not exceed 150 mm, finished grade.
- 3.4 SYSTEM AND CIRCUIT GROUNDING
- .1 Install system and circuit grounding connections to neutral of primary 347/600 V system, secondary 120/208 V, 120/240 V



system.

- 3.5 EQUIPMENT GROUNDING .1 Install grounding connections to typical equipment included in, but not necessarily limited to following list. Service equipment, transformers, switchgear, duct systems, frames of motors, motor control centers, starters, control panels, building steel work, generators, elevators and escalators, distribution panels, outdoor lighting.
- 3.6 GROUNDING BUS .1 Install copper grounding bus mounted on insulated supports on wall of electrical room.
- .2 Ground items of electrical equipment in electrical room to ground bus with individual bare stranded copper connections, size as indicated.
- 3.7 COMMUNICATION SYSTEMS .1 Install grounding connections for telephone, sound, fire alarm, intercommunication systems as follows:
- .1 Telephones: make telephone grounding system in accordance with telephone company's requirements or manufacturer.
- .2 Sound System and Intercom: ground all lines and cable tray under the guidance and direction of manufacturer.
- .3 Sound, fire alarm, intercommunication systems as indicated by manufacturer.
- 3.8 FIELD QUALITY CONTROL .1 Perform tests in accordance with Section 26 05 00 - Common Work Results - Electrical.
- .2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of the department's Representative and local authority having jurisdiction over installation. Give a copy of the results to the representative of CDC. Tests should be performed by a specialized firm and signed by an engineer.
- .3 Perform tests before energizing electrical system.
- .4 Disconnect ground fault indicator during tests.

**END OF SECTION**

## PART 1 - GENERAL

- 1.1 RELATED REQUIREMENTS.1 This Section specifies U shape support channels either surface mounted, suspended or set in poured concrete walls and ceilings
- 1.2 WASTE MANAGEMENT AND DISPOSAL .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard and packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal materials from landfill to metal recycling facility as approved by the department's Representative.
- .5 Fold up metal banding, flatten and place in designated area for recycling.

## PART 2 - PRODUCTS

- 2.1 SUPPORT CHANNELS .1 U shape, size 41 x 41 mm, 2.5 mm thick, surface mounted, suspended, or set in poured concrete walls and ceilings.
- .2 Installation accessories such as threaded rods, bolts, washers, nuts, spring nuts, etc., or steel plated, chrome or zinc.
- .3 Galvanized products according to CAN/CSA-G164 standards.
- .4 Fasteners used outdoors or in wet areas must be stainless steel.
- .5 Fasteners, brackets and installation accessories must conform to the requirements of section 26 10 00 – Seismic Mountings.

## PART 3 - EXECUTION

- 3.1 INSTALLATION .1 Refer to Section 01 61 00 - Common Product Requirements for fastenings and supports.
- .2 Secure equipment to hollow, solid, masonry, tile and plaster surfaces with lead anchors or nylon shields.
- .3 Secure equipment to poured concrete with expandable inserts.
- .4 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.
- .5 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.
- .6 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.
  - .7 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.
  - .8 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.
  - .9 For surface mounting of two or more conduits uses channels at 1 m on centre spacing.
  - .10 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.
  - .11 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.
  - .12 Do not use wire lashing or perforated strap to support or secure raceways or cables.
  - .13 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of the department's Representative.
  - .14 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.
  - .15 Coat with galvanized parts all surfaces that are scratched, altered or cut.

**END OF SECTION**

PART 1 - GENERAL

- 1.1 REFERENCES .1 Canadian Standards Association (CSA International)
- .1 CSA C22.1-[06], Canadian Electrical Code, Part 1, current edition.
- .2 Splitters are referenced to comply with CSA C22.2 No. 76.
- .3 Junction and pull boxes are referenced to comply with CSA C22.2 No. 40.
- 1.2 ACTION AND INFORMATIONAL SUBMITTALS .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures and 26 05 00 – Common Work Results For Electrical.
- .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 26 05 00 - Common Work Results For Electrical.
- 1.3 DELIVERY, STORAGE AND HANDLING .1 Waste Management and Disposal:
- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/ Demolition Waste Management and Disposal.
- 1.4 ELECTRICAL EQUIPMENT PROTECTED BY SPRINKLERS .1 Supply and install the equipment in accordance with section 26 05 00 - Common Work Results For Electrical.

PART 2 - PRODUCTS

- 2.1 SPLITTERS .1 Construction: sheet metal enclosure, welded corners and formed hinged cover suitable for locking in closed position.
- .2 Terminations: main and branch lugs, connection blocks to match required size and number of incoming and outgoing conductors as indicated.

- .3 Spare Terminals: minimum three spare terminals or lugs on each connection or lug block sized less than 400 A.
  
- 2.2 JUNCTION AND PULL BOXES
  - .1 Construction: welded steel enclosure.
  - .2 Covers Flush Mounted: 25 mm minimum extension all around.
  - .3 Covers Surface Mounted: 150 x 150, must be fitted with hinges.
  
- 2.3 CABINETS
  - .1 Type E Empty: Sheet steel enclosure for surface mounting with sides and folded edges overlapping fitted with hinged door, handle, lock and a latch.
  - .2 Type T Terminal: surface return flange, flush overlapping sides mounting as indicated containing 19 mm thick, sheet steel backboard.
  - .3 Construction: welded [sheet steel] [aluminum] [as indicated] hinged door, [handle], [latch] [lock 2 keys] and catch
  
- 2.4 CONNECTIONS
  - .1 Insulated metal bushings and connectors with nylon insulated groove, size no. 8 AWG or more.
  - .2 Pressure pads to prevent debris to penetrate the outlets.
  - .3 Access fittings for pipes up to 35 mm in diameter and pull boxes for larger conduits.
  - .4 Locking nuts and insulated metal bushings on sheet metal box.

### PART 3 - EXECUTION

- 3.1 SPLITTER INSTALLATION
  - .1 Mount plumb, true and square to building lines.
  - .2 Extend splitters full length of equipment arrangement except where indicated otherwise.
  
- 3.2 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 Install terminal block as indicated in Type T cabinets.
  - .4 Only main junction and pull boxes are indicated. Install additional pull boxes so as not to exceed 30 m of conduit run between pull

boxes or 4-90 degree elbows.

.5 supply thermal blocks in the junction boxes containing more than 4 joints.

3.3 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 REFERENCES .1 Canadian Standards Association (CSA International)
- .1 CSA C22.1, Canadian Electrical Code, Part 1, 20th Edition.
- .2 Outlet boxes, conduit boxes and fittings are based on CSA C22.2 No. 18.
- 1.2 ACTION AND INFORMATIONAL SUBMITTALS .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures and Section 26 05 00 – Common work results for electrical
- .2 Submit samples for floor box in accordance with Section 01 33 00 - Submittal Procedures and Section 26 05 00 – Common work result for electrical.
- 1.3 DELIVERY, STORAGE AND HANDLING .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Waste Management and Disposal:
- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

- 2.1 OUTLET AND CONDUIT BOXES GENERAL .1 Size boxes in accordance with the Quebec construction code, chapter V, Electrical.
- .2 102 mm square or larger outlet boxes as required.
- .3 Gang boxes where wiring devices are grouped.
- .4 Blank cover plates for boxes without wiring devices.
- .5 347 V outlet boxes for 347 V switching devices.
- .6 Combination boxes with barriers where outlets for more than one system are grouped.

- 2.2 GALVANIZED STEEL OUTLET BOXES .1 One-piece electro-galvanized construction. Single and multi gang flush device boxes for flush installation, minimum size 76 x 50 x 38 mm or as indicated. 102 mm square outlet boxes when more than one conduit enters one side with extension and plaster rings as required.
- .2 Utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102 x 54 x 48 mm.
- .3 102 mm square or octagonal outlet boxes for lighting fixture outlets.
- .4 102 mm extension and plaster rings for flush mounting devices in finished plaster or tile walls.
- 2.3 MASONRY BOXES .1 Electro-galvanized steel masonry single and multi gang boxes for devices flush mounted in exposed block walls.
- 2.4 CONCRETE BOXES .1 Electro-galvanized sheet steel concrete type boxes for flush mount in concrete with matching extension and plaster rings as required.
- 2.5 FLOOR BOXES .1 Concrete tight electro-galvanized sheet steel floor boxes with adjustable finishing rings to suit floor finish with brass brushed aluminum faceplate. Device mounting plate to accommodate short or long ear duplex single receptacles. Minimum depth: 73 mm for receptacles and communication outlets.
- .2 Adjustable, watertight, concrete tight, cast floor boxes with openings drilled and tapped for [16, 21 and 27] mm conduit. Minimum size: 73 mm deep.
- 2.6 CONDUIT BOXES .1 Cast FS or FD aluminum boxes with factory-threaded hubs and mounting feet for surface wiring of devices.
- 2.7 OUTLET BOXES FOR NON-METALLIC SHEATHED CABLE .1 Electro-galvanized, sectional, screw ganging steel boxes, minimum size 76 x 50 x 63 mm with two double clamps to take non-metallic sheathed cables.
- 2.8 FITTINGS - GENERAL .1 Bushing and connectors with nylon insulated throats for n° 8 AWG caliber and up.
- .2 Knock-out fillers to prevent entry of debris.
- .3 Conduit outlet bodies for conduit up to 35 mm and pull boxes for larger conduits.
- .4 Double locknuts and insulated bushings on sheet metal boxes.



- 2.9 SERVICE FITTINGS .1 'High tension' receptacle fitting made of 2 piece stainless steel or die-cast aluminum with brushed aluminum or satin aluminum housing finish for 1 single, 1 duplex or two duplex receptacles. Bottom plate with two knockouts for centered or offset installation. 12 x 102 mm extension piece as indicated.
- .2 Pedestal type 'low tension' fitting made of 2 piece stainless steel or die cast aluminum with brushed aluminum or satin aluminum housing finish to accommodate one or two Amphenol jack connectors.

### PART 3 - EXECUTION

- 3.1 INSTALLATION .1 Support boxes independently of connecting conduits.
- .2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.
- .3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.
- .4 Provide correct size of openings in boxes for conduit, mineral insulated and armored cable connections. Do not install reducing washers.
- .5 Vacuum clean interior of outlet boxes before installation of wiring devices.
- .6 Identify systems for outlet boxes as required.

**END OF SECTION**

PART 1 – GENERAL

1.1	<u>SECTION CONTENTS</u>		This section specifies rigid and flexible fasteners, fittings and installation.
1.2	DUCTS		
	<u>LOCATION</u>	.1	All ducts are not shown on the drawings. Those who are represented are on a schematic form.
1.3	SEISMIC		
	<u>FASTENERS</u>	.1	Supply and install all necessary equipment for seismic mountings as indicated in Section 26 10 00 – Seismic Fasteners.
1.4	ELECTRICAL		
	APPARATUS		
	PROTECTED BY		
	<u>SPRAY NOZZLES</u>	.1	Provide and install material in accordance with Section 26 05 00 – General Requirements.
1.5	<u>REFERENCES</u>	.1	Canadian Standards Association (CSA International).
		.1	CAN/CSA-C22.2 No. 18, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, a National Standard of Canada.
		.2	CSA C22.2 No. 45, Rigid Metal Conduit.
		.3	CSA C22.2 No. 56, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
		.4	CSA C22.2 No. 83, Electrical Metallic Tubing.
		.5	CSA C22.2 No. 211.2, Rigid PVC Unplasticized Conduit.
		.6	CAN/CSA-C22.2 No. 227.3, Nonmetallic Mechanical Protection Tubing (NMPT), A National Standard of Canada.
		.2	Construction Code of Quebec, Chapter V, Electrical.
1.6	ACTION AND		
	INFORMATIONAL		
	<u>SUBMITTALS</u>	.1	Submit required samples and documents in accordance with Sections 01 33 00 – Submittal Procedures and 26 05 00 – General Requirements.
		.2	Product data: submit manufacturer's printed product literature, specifications and datasheets.

1.7 WASTE MANAGEMENT  
AND DISPOSAL

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

PART 2 – PRODUCTS

2.1 CONDUITS

- .1 Rigid metallic conduits: in accordance with standard CSA C22.2 no 45, threaded galvanized steel.
- .2 Epoxy coated conduits: in accordance with standard CSA C22.2 no 45, with zinc coating and anti-corrosive finishing coat with an epoxy based resin, inside and outside.
- .3 Electrical metallic tubing (EMT): in accordance with standard CSA C22.2 no 83, equipped with “Raintight” connectors.
- .4 Rigid PVC conduits: in accordance with standard CSA C22.2 no 211.2.
- .5 Flexible metal conduit: to CSA C22.2 no 56, liquid-tight flexible metal.
- .6 FRE conduit: CSA C22.2
- .7 Flexible PVC conduit: to CAN/CSA-C22.2 no 227.3.

2.2 CONDUIT FASTENINGS

- .1 One hole steel straps to secure surface conduits 50mm and smaller.  
  
Two hole steel straps for conduits larger than 50mm.  
  
Use stainless steel fasteners when installed outside or in damp locations.
- .2 Beam clamps to secure conduits to exposed steel work.
- .3 Channel type supports for two or more conduits at 2m on centre.
- .4 Threaded rods, 6mm diameter, to support suspended channels.
- .5 Quantities and dimensions mentioned above for various fasteners are a minimum and must meet the requirements of the section on seismic fasteners.

- 2.3 CONDUIT FITTINGS – GENERAL
- .1 Connectors: 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 25mm and larger conduits.
  - .3 Watertight connectors and couplings for EMT.
    - .1 Set-screws are not acceptable.
  - .4 Ferrules for fittings in boxes, when required, to Construction Code of Quebec, Chapter V - Electricity, metal type and nylon isolated.
- 2.4 EXPANSION FITTINGS
- .1 Provide expansion fittings required for all conduits:
    - embedded in concrete and crossing expansion joints through the building;
    - apparent and undergoing significant changes in temperature;
    - exceeds the limit allowed by the manufacturers.
  - .2 Weatherproof expansion fittings with internal bonding assembly suitable for 200mm linear expansion.
  - .3 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19mm deflection.
  - .4 Weatherproof expansion fittings for linear expansion at entry of panel.
- 2.5 FISH CORD
- .1 Polypropylene 6mm.
- 2.6 BONDING
- .1 IN all conduits other than those mentioned in 2.1.1, a green insulated conductor with a minimum calibre of 12 AWG must be installed.
- 2.7 CONDUITS EXPOSED TO SUN LIGHT
- .1 Non-metallic pipes that are entirely exposed to sunlight have to be specifically approved for this usage and be marked in accordance.
- 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 the visible conduits so as to diminish the part's head-way and by using the least amount of space possible.
- .2 Conceal conduits except those which are installed in mechanical and electrical facility rooms.
- .3 Use electrical metallic tubes (EMT) with tight connectors in technical rooms, warehouses, service garages etc. and standard fittings for ordinary locations.
- .4 Use rigid PVC conduits in underground facilities.
- .5 Use rigid threaded galvanized steel conduit in places classified explosion proof, in tunnels and wetlands.
- .6 Use epoxy coated conduit in corrosive or saline installations.
- .7 Use over a maximum length of 3m flexible metallic conduits when connecting to motors, transformers and equipment capable of vibration located in dry areas, incandescent bulbs, built-in and without pre-threaded outlet box, mounted fluorescent light fixture connection, projecting or built-in, works or elements in movable metal partitions.
- .8 Use flexible metal conduit and liquid-tight connections when connecting to motors and / or equipment which may vibrate or transformers located in damp or wet or corrosive environments.
- .9 Use explosion proof flexible connections for connection to explosion proof motors.
- .10 Install waterproof connections on conduits installed in dangerous locations. Fill them with sealing compound.
- .11 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10<sup>th</sup> of its original diameter.
- .12 Mechanically bend steel conduit over 21mm diameter.
- .13 Use conduits of at least 21 mm for lighting and power circuits.
- .14 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.
- .15 Install fish cord in empty conduits.
- .16 Remove and replace blocked conduit sections. Do not use liquids to clean out conduits.
- .17 Dry conduits out before installing wire.

- .18 For every flush-mounted panel, install three Ø 27 mm conduits from panel into ceiling space and three Ø 27 mm conduits from panel into the lower floor ceiling space (if applicable) . If no ceiling was provided for in these parts, install conduits as high as possible between the floor and the structure or provide an access door 300 x 600 mm to 300 mm above the panel.
- 3.3 VISIBLE CONDUITS
- .1 Unless indicated otherwise, installs the conduits parallel or perpendicular to the building's layout lines.
- .2 Behind infrared or gas radiators, install conduits by leaving a space of 1.5m.
- .3 Make the conduits pass through the wings of the steel framework elements, if needed.
- .4 In locations where this is not possible, group the conduits into U-bend stirrups.
- .5 Unless otherwise specified, the conduits should not cross through framework elements.
- .6 In the case of conduits placed parallel to steam or hot water pipes, make provisions for a lateral space of at least 75mm; also make provisions for a space of at least 25mm in the case of crossings.
- .7 Install PVC expansion joints on conduit when installed in places where the temperature varies from 10 degrees and more. It must have an expansion joint for each length of 7.5m and 15m between each joint.
- 3.4 CONCEALED CONDUITS
- .1 Install conduits parallel or perpendicular to the building's layout lines.
- .2 It is forbidden to install horizontal conduits in masonry walls.
- .3 It is forbidden to embed the conduits into terrazzo works and concrete toppings.
- .4 No horizontal conduits will be accepted in drywall. Only vertical conduits will be tolerated.
- 3.5 CONDUITS IN CAST-IN-PLACE CONCRETE
- .1 Do not install conduits in concrete structures unless otherwise specified in the shop drawings and specifications.
- .2 Locate to suit reinforcing steel. Install in centre one third of slab.
- .3 Protect conduits at their exit points from a concrete work.
- .4 Install sleeves where conduits pass through slab or wall.
- .5 Before covering a concrete work with a water repellent membrane, install oversized joints in the locations where conduits have to pass

through the latter. Apply a cold compound between the joints and conduits.

- .6 Conduits in slabs: minimum slab thickness 4 times conduit diameter.
- .7 Encase conduits completely in concrete with minimum 25mm concrete cover.
- .8 Organize conduits in slab to minimize cross-overs.
- .9 Aluminum conduits shall not be concealed in concrete structures.

3.6 CONDUITS  
UNDERGROUND

- .1 Slope conduits to provide drainage.
- .2 Waterproof the joints using a thick layer of bituminous paint.
- .3 Install conduit at 1m from the surface or as directed.
- .4 The underground conduits shall be of rigid PVC 41mm minimum.
- .5 The underground conduits must be surrounded by a 150mm layer of fine sand unless otherwise stated.

3.7 FIREWALL CROSSING  
CONDUITS

- .1 Caulk all gaps between the firewall and the conduit. Fire resistance shall be equal to surface crossing. The product manufacturer shall make an inspection of the work and issue a certificate stating that the facilities are inspected and comply with its recommendations and meet the requirements of ULC fire resistance characteristics.

**END OF SECTION**

PART 1 - GENERAL

1.1	<u>DESCRIPTION</u>	.1	This Section specifies the installation of direct buried cables and cables in ducts including protection, markers and testing.
1.2	<u>REFERENCES</u>	.1	Canadian Standards Association, (CSA International)
		.2	Insulated Cable Engineers Association, Inc. (ICEA)
1.3	<u>WASTE MANAGEMENT AND DISPOSAL</u>	.1	Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
		.2	Remove from site and dispose of all packaging materials at appropriate recycling facilities.
		.3	Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
		.4	Unused sealant material must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.
		.5	Divert unused metal and wiring materials from landfill to metal recycling facility as approved by a the department's Representative.
		.6	Do not dispose of preservative treated wood through incineration.
		.7	Do not dispose of preservative treated wood with other materials destined for recycling or reuse.
		.8	Dispose of treated wood, end pieces, wood scraps and sawdust at sanitary landfill approved by a department's Representative.
		.9	Fold up metal banding, flatten and place in designated area for recycling.

PART 2 - PRODUCTS

2.1	<u>CABLE PROTECTION</u>	.1	38 x 140 mm planks pressure treated with clear copper naphthenate or 5% pentachlorophenol solution, water repellent preservative.
		.2	Plastic caution and identification tape marked Danger Electricity.
2.2	<u>MARKERS</u>	.1	Concrete type cable markers: 600 x 600 x 100 mm with words: cable, joint or conduit impressed in top surface, with arrows to



indicate change in direction of cable and duct runs.

- .2 Cedar post type markers: 89 x 89] mm, 1.5 m long, pressure treated with clear copper naphenate or 5% pentachlorophenol solution, water repellent preservative, with nameplate fastened near post top, on side facing cable or conduit to indicate depth and direction of duct and cable runs.
  - .1 Nameplate: aluminum anodized 89 x 125 mm, 1.5 mm thick mounted on cedar post with Mylar label 0.125 mm thick with words Cable, Joint or Conduit with arrows to indicate change in direction.

### PART 3 - EXECUTION

#### 3.1 DIRECT BURIAL OF CABLES

- .1 After sand bed specified in Section 31 23 33.01 - Excavating, Trenching and Backfilling, is in place, lay cables maintaining 75 mm clearance from each side of trench to nearest cable. Do not pull cable into trench.
- .2 Provide offsets for thermal action and minor earth movements. Offset cables 150 mm for each 60 m run, maintaining minimum cable separation and bending radius requirements.
- .3 Underground cable splices not acceptable.
- .4 Minimum permitted radius at cable bends for rubber, plastic or lead covered cables, 8 times diameter of cable; for metallic armored cables, 12 times diameter of cables or in accordance with manufacturer's instructions.
- .5 Cable separation:
  - .1 Maintain 75 mm minimum separation between cables of different circuits.
  - .2 Maintain 300 mm horizontal separation between low and high voltage cables.
  - .3 When low voltage cables cross high voltage cables maintain 300 mm vertical separation with low voltage cables in upper position.
  - .4 At crossover, maintain 75 mm minimum vertical separation between low voltage cables and 150 mm between high voltage cables.
  - .5 Maintain 300 mm minimum lateral and vertical separation for fire alarm and control cables when crossing other cables, with fire alarm and control cables in upper

- position.
- .6 Install treated planks on lower cables 0.6 m in each direction at crossings.
- .6 After sand protective cover specified in Section 31 23 33.01 - Excavating, Trenching and Backfilling, is in place, install caution tape as indicated to cover length of run.
- 3.2 CABLE INSTALLATION IN DUCTS
- .1 Install cables as indicated in ducts.
- .2 Do not pull spliced cables inside ducts.
- .3 Install multiple cables in duct simultaneously.
- .4 Use ACNOR approved lubricants of type compatible with cable jacket to reduce pulling tension.
- .5 To facilitate matching of color coded multiconductor control cables reel off in same direction during installation.
- .6 Before pulling cable into ducts and until cables are properly terminated, seal ends of lead covered cables with wiping solder; seal ends of non-leaded cables with moisture seal tape.
- .7 After installation of cables, seal duct ends with duct sealing compound.
- 3.3 MARKERS
- .1 Mark cable every 150 m along cable duct runs and changes in direction.
- .2 Where markers are removed to permit installation of additional cables, reinstall existing markers.
- .3 Install concrete cable markers within 180 m from each side of runway centerline; 45 m from each side of taxi way centerline; 50 m from edge of taxi ramps or aprons.
- .4 Install cedar post type markers.
- .5 Lay concrete markers flat and centered over cable with top flush with finish grade.
- 3.4 CABLE INSTALLATION IN CABLE TROUGH
- .1 Install cables separately in cable trough or as indicated.
- .2 Splices are not acceptable in cable trough unless indicated otherwise. If spliced, joints and fittings must isolated and accessible in cable trough.

- .3 Cables must be installed in cable trough as much as possible.
- .4 Use proper pulley to fish cables.
- .5 Radii of cables must not be less than three times the diameter of cables or as directed by manufacturer. Radii of pulleys and cables must me these requirements.
- .6 When fishing cables, use socks simultaneously around both ducts and eyelets fixed to conductors.
- .7 Identify cables after installment as indicated in Section 26 05 00 – Common Work Results - Electrical.
- .8 Fasten the cables with nylon ties every 6 meters in the horizontal cable trays.
- .9 Fasten cables with the appropriate metal fasteners for cables / cable trays, every 1.5 meters in the vertical cable trays.
- .10 Install metal separators between different voltage cables.
- .11 Protect cables with appropriate cover over cable trays in areas subject to mechanical damage and as indicated.

3.5 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results - Electrical.
- .2 Perform tests using qualified personnel. Provide necessary instruments and equipment.
- .3 For three-phase circuits, verify and establish a phase sequence A-B-C from left to right, from top to bottom and front to back and keep it for the entire system with the exception of the equipment installed in reverse and electrically connected.
- .4 Check phase rotation and identify each phase conductor of each feeder.
- .5 Check each feeder for continuity, short circuits and grounds. Ensure resistance to ground of circuits is not less than 50 megohms.
- .6 Pre-acceptance tests.
  - .1 After installing cable but before splicing and terminating, perform insulation resistance test with 1000 V megger on each phase conductor.
  - .2 Check insulation resistance after each splice and/or termination to ensure that cable system is ready for

acceptance testing.

- .7 Acceptance Tests
  - .1 Ensure that terminations and accessory equipment are disconnected.
  - .2 Ground shields, ground wires, metallic armor and conductors not under test.
  - .3 High Potential (Hipot) Testing.
    - .1 Conduct hipot testing at original factory test voltage in accordance with manufacturer's recommendations.
  - .4 Leakage Current Testing.
    - .1 Raise voltage in steps from zero to maximum values as specified by manufacturer for type of cable being tested.
    - .2 Hold maximum voltage for specified time period by manufacturer.
    - .3 Record leakage current at each step.
- .8 Provide the department's Representative with list of test results showing location at which each test was made, circuit tested and result of each test.
- .9 Remove and replace entire length of cable if cable fails to meet any of test criteria.

**END OF SECTION**

PART 1 – GENERAL

- 1.1 REFERENCES .1 Seismic protection measures must meet the requirements of the Building Code of Quebec.
- .2 The design must comply with the following documents:
- SMACNA, Seismic Restraint Manual Guidelines for Mechanical Systems.
  - Seismic Data project area.
  - NBC 2010
- 1.2 SCOPE OF WORK .1 Supply and install a complete seismic fasteners against vibration isolated or not isolated as required for electrical equipment and related systems as indicated in the drawings and specifications of the Annex to this section on "Devis d'exécution fixations parasismiques. Électricité "
- 1.3 QUALIFICATION OF THE MANUFACTURER .1 Providing antivibration devices including seismic dampers, seismic shocks separated, mounting hardware and cables relaxed other fastening systems from manufacturers that regularly produce the same hardware.
- .2 The entire seismic fastening system shall be provided by one supplier.
- 1.4 SHOP DRAWINGS .1 Present shop drawings in accordance with Section 26 05 00 - General Requirements.
- .2 Provide shop drawings and data sheets for each of the separate systems and fixing devices for seismic equipment.
- .3 Shop drawings shall be sealed by an engineer specializing in earthquake fasteners and current member of the Order of Engineers of Quebec.
- .4 Once construction is completed, the Contractor shall deliver to the department's representative the full set of original construction documents, revised to reflect conditions of the system as built.
- .5 Certificates: submit certificates signed by manufacturer certifying that products, materials and equipment meet the requirements as to the physical characteristics and performance criteria.
- .6 Instructions: Submit installation instructions provided by the manufacturer.
- .7 Documents / Items to give on completion of work

- .1 Provide reports with signature checks done on site by the engineer in the design of seismic restraint systems for the oversight of the installation.
- .2 Provide the required documents, which should include instructions to control devices and systems for seismic protection, and into manual specified in Section 26 05 00 - Electrical - General Requirements.

## PART 2 - PRODUCTS

### 2.1 GENERAL

- .1 The products must be installed in accordance with the Annex to this section on " Devis d'exécution fixations parasismiques. Électricité »
- .2 The size and shape of the bases and the performance characteristics of anti-vibration devices must comply with manufacturer's recommendations and instructions.
- .3 Performs fabrication and installation of protective devices against earthquakes as recommended by the Quebec Construction Code, current edition.
- .4 Fasteners installed seismic networks of pipes, bars and sheathed cable shelves must be compatible with the requirements guide anchor these networks.
- .5 The use of cast iron supports made of threaded pipe or other materials a brittle is prohibited.
- .6 The seismic devices placed on networks of conduits, bus ducts, cable shelves and other related fasteners attached to the equipment must be compatible with the vibration and seismic devices for the component.
- .7 The seismic protection devices must not interfere with some firewall devices or compromising their integrity.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- .1 According to articles and details of the Annex to this section on " Devis d'exécution fixations parasismiques. Électricité »

### 3.2 INSPECTION

- .1 At the end of the work, the engineer will inspect seismic systems. It will issue a report or a signed letter certifying compliance of facilities with regard to seismic standards specified and to the various manufacturers' recommendations.

**END OF SECTION**

PART 1 – GENERAL

- 1.1 SECTION CONTENTS This section specifies the materials and components for dry type transformers up to 600 V primary, equipment identification and transformer installation.
- It does not include isolation transformers, boosters and transformers equipped with a special envelope.
- 1.2 REFERENCES
- .1 Canadian Standard Association (CSA International).
    - .1 CAN/CSA-C22.2 No.47, Air-Cooled Transformers (Dry Type).
    - .2 CSA C9, Dry-Type Transformers.
    - .3 When available, transformers will be required to comply with energy efficiency standard CSA C802.2 current edition, and bear the certification label CSA verified on the transformer.
  - .2 National Electrical Manufacturers Association (NEMA).
- 1.3 SHOP DRAWINGS AND PRODUCT DATA
- .1 Submit shop drawings and product data in accordance with Sections 01 33 00 – Submittal Procedures and 26 05 00 – General Requirements.
- 1.4 WASTE MANAGEMENT AND DISPOSAL
- .1 Separate waste materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
  - .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
  - .3 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
  - .4 Divert unused wiring materials from landfill to metal recycling facility as approved by the department's Representative.
  - .5 Fold up banding, flatten and place in designated area for recycling.
- 1.5 SEISMIC FASTENERS
- .1 Supply and install all necessary equipment for seismic mountings as described in Section 26 10 00 – Seismic Fasteners.

PART 2 – PRODUCTS

- 2.1 TRANSFORMERS
- .1 Use transformers of one manufacturer throughout project.
  - .2 Description:
    - .1 Type: ANN.
    - .2 3 phase, power as indicated, input voltage of 600V delta connected, output voltage of 120/208 V star connected, frequency of 60 Hz.
    - .3 Single phase, power as indicated, input voltage of 600 V and output voltage of 120/240 V, 60 Hz frequency
    - .4 Insulation Class H, temperature elevation of 150°C. and 30-40°C speaker, ventilated steel, isomode vibration damper up to 1 200 V, 25 kV for more than 1 200 V.
    - .5 Voltage impulse: 10 kV.
    - .6 Standard electric strength.
    - .7 Average sound level:
      - .1 Three-phase:  
45 dB(A) maximum for 10 kVA to 50 kVA ;  
50 dB(A) maximum for 51 kVA to 150 kVA ;  
55 dB(A) for 151 kVA to 300 kVA.
      - .2 Single phase:  
50 dB(A) maximum for 10 kVA to 50 kVA ;  
55 dB(A) maximum for 51 kVA to 100 kVA ;  
60 dB(A) for 101 kVA to 167 kVA.
    - .8 Impedance at 150°C of heating of the coil in a room temperature between 30-40 ° C
      - .1 Three-phase transformers of 150 kVA and less:  
4,0 % min. to 6,5 % max.
      - .2 The impedance described above is based on Delta transformers.
    - .9 35% efficiency of 75°C load:
      - .1 For transformers up to 50 kVA : 97 % minimum.



- .2 For transformers from 75 kVA to 300 kVA : 98 % minimum.
- .10 Enclosure: NEMA 2, removable metal front panel, waterproof.
- .11 Mounting: floor or wall, as indicated. Wall mounting is recommended.
- .12 Light gray finish ASA n° 61, as indicated in Section 26 05 00 – General Requirements.
- .13 Center tap 2FCAN and 2FCBN, 4 x 2,5 %.
- .14 Winding: copper or aluminum. The copper winding is prioritized (design plan). The aluminum coil is accepted if it meets the installation requirements. The contractor will be responsible of validating on site the required spacing with the other components in accordance with codes and standards.
- .15 Testing: in accordance with Chapter 7, ACNOR C9 standard, current edition, dry type transformers.
- .16 Zigzag type 0 ° and 30 ° for harmonics cancellation, as indicated.
- .17 K-13 factor to support harmonics, as indicated.
- .18 10 year prorated warranty.
- .19 Simple electrostatic shield.
- .20 Secondary treatment of harmonics 3 °, 9 °, 15 ° and 5 °, 7 °, 17 °, 19 ° with 30 ° phase shift on common primary circuit.
- .21 Neutral ability at 200 % of nominal secondary phase current.
- .22 Voltage distortion tested on a test bench for nonlinear loads and certified performance tested on a test bench for nonlinear loads.
- .23 The coils and core of all transformers must be mounted on vibration dampers.

2.2 EQUIPMENT IDENTIFICATION

- .1 Provide equipment identification in accordance with Section 26 05 00 – General Requirements.
- .2 Label: format 7 with identification as indicated.

- 2.3 MANUFACTURERS .1 Accepted products: Delta, Square-D, Hammond, Marcus, Siemens.

### PART 3 – EXECUTION

- 3.1 INSTALLATION
- .1 Mount dry type transformers up to 75 kVA as indicated.
  - .2 Mount dry type transformers above 75 kVA on floor.
  - .3 The mounted transformers base must not exceed 3 meters above the finished floor
  - .4 Ensure adequate clearance around transformer for ventilation in accordance with Construction Code of Québec, Chapter V – Electricity (current edition).
  - .5 Install transformers in level upright position.
  - .6 Remove shipping supports only after transformer is installed and just before putting into service.
  - .7 Loosen isolation pad bolts until no compression is visible.
  - .8 Install transformers on anti-vibration pads.
- 3.2 TERMINATIONS
- .1 Make connections using flexible metal conduit in primary and secondary as indicated on wiring diagram.
  - .2 If possible, switch transformers on immediately after installation.

**END OF SECTION**

PART 1 – GENERAL

- 1.1 SECTION CONTENTS This section specifies standard and custom panelboards and their installation.
- 1.2 REFERENCES .1 Canadian Standard Association (CSA International).  
.1 CSA C22.2 No 29, Panelboards and Enclosed Panelboards.
- 1.3 SHOP DRAWINGS AND PRODUCT DATA .1 Submit shop drawings and product data in accordance with Sections 26 05 00 – General Requirements and 01 33 00 – Submittal Procedures.  
.2 Drawings to include electrical detail of panel, branch breaker type, quantity, ampacity and enclosure dimensions.
- 1.4 PANELBOARDS DESCRIPTION .1 To see panelboards description, refer to Section 26 05 05 – Scope of work, Specific Clauses, Descriptions and Lists.
- 1.5 SEISMIC FASTENERS .1 Provide and install all necessary seismic fasteners in accordance with Section 26 10 00.
- 1.6 ELECTRIC GEAR PROTECTED BY SPRINKLERS .1 Provide and install materials in accordance with Section 26 05 00 – General Requirements.
- 1.7 WASTE MANAGEMENT AND DISPOSAL .1 Separate and recycle waste materials in accordance with Section 01 74 00 – Construction/Demolition Waste Management and Disposal.  
.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.  
.3 Collect and separate for disposal paper, plastic, polystyrene, and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.  
.4 Divert unused metal and wiring materials from landfill to metal recycling facility approved by the department's Representative.

PART 2 – PRODUCTS

- 2.1 PANELBOARDS .1 Panelboards of one manufacturer.  
.1 Install circuit breakers in panelboards before shipment.  
.2 In addition to CSA requirements, manufacturer's nameplate must show fault current that panel including breakers has been built to withstand.  
.2 250V and 600V Panelboards: bus and breakers rated as indicated on shop drawings. A symmetrical interrupting capacity 22 000 A or as indicated.

- .3 Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number and phase.
  - .4 Panelboards: mains, number of circuits, and number and size of branch circuit breakers as indicated.
  - .5 Two keys for each panelboards and key panelboards alike.
  - .6 Copper or aluminum bus with neutral of same ampere rating as mains.
  - .7 All tables must have bar grounding.
  - .8 Mains: suitable for bolt-on breakers.
  - .9 Trim with concealed front bolts and hinges.
  - .10 The front panel must be fitted with hinged left and right retaining bolts (door in door) to facilitate access for maintenance personnel.
  - .11 Trim and door finish: baked grey enamel.
  - .12 For all unused spaces, install devices for adding breakers later.
- 2.2 SERIAL PROTECTION
- .1 The panels must be downstream full value or integrated protective equipment value with protection upstream. If the manufacturer decides to go with the second option, he must provide proof from testing laboratory certifying the proper functioning of equipment and indicate on a nameplate the testing current (kA rms. Bal.) of protection device equipment with specific upstream bypass arrangements eligible, the designation of the panel and voltage, as mentioned in section 14-014 of the Building Code of Quebec, Chapter V, Electricity.
  - .2 No integral protection (series) will be accepted for capacity of more than 400A.
  - .3 No integral protection (serial) will be accepted on the network emergency.
  - .4 No integral protection (series) will be accepted if the sum of the rated currents of motors connected directly between the devices connected in series is greater than 1% of rated breaking capacity of the downstream circuit breaker.
- 2.3 CUSTOM BUILT  
PANELBOARDS  
ASSEMBLIES
- .1 125 mm relay section on one or both sides of panels as indicated for installation of low voltage remote control switching components.
  - .2 Double stack panels as indicated.
  - .3 Contactors in mains as indicated.
  - .4 Feed through lugs as indicated.
  - .5 Isolated ground bus.
- 2.4 BREAKERS
- .1 Breakers: to Section 26 28 21 – Moulded Case Circuit Breakers.

- .2 Breakers with thermal and magnetic stripping in panelboards except as indicated otherwise.
  - .3 Main breaker: separately mounted on top or bottom of panel to suit cable entry. When mounted vertically, down position should open breaker.
  - .4 Lock-on devices for receptacles, fire alarm clock outlet, emergency, door supervisory, intercom, stairway, exit and night light circuits.
- 2.5 EQUIPEMENT IDENTIFICATION
- .1 Provide equipment identification in accordance with Section 26 05 00 – Common Work Results – Electrical.
  - .2 Nameplate for each panelboard size 4 engraved as indicated.
  - .3 Nameplate for each circuit in distribution panelboards size 2 as indicated.
  - .4 Complete circuit directory with typewritten legend showing location and load of each circuit.
- 2.6 MANUFACTURERS
- .1 Accepted products: Cutler-Hammer Siemens, Square D or GE.

### PART 3 – EXECUTION

- 3.1 INSTALLATION
- .1 Locate panelboards as indicated and mount securely, plumb, true and square, to adjoining surfaces.
  - .2 Install surface mounted on panelboards on plywood backboards. Where practical, group panelboards on common backboards.
  - .3 Mount panelboards to height specified in Section 26 05 00 – Common Work Results – Electrical or as indicated.
  - .4 Connect all circuits to load elements.
  - .5 Connect neutral conductors to common neutral bus with respective neutral identified.
  - .6 When there are distribution panels installed side by side, boxes must be welded together and be of same size, lids must be separated, doors of the same size and must be perfectly aligned.
  - .7 Provide each circuit taken at 120 VAC and services of its own neutral conductor and do not use common neutral multi-circuit. The derivations of lighting can be provided with a common neutral with the Code of Construction of Québec, chapter V, electricity.
  - .8 Each time the panel will be installed flush, install three Ø 27 mm empty ducts into the ceiling space and three Ø 27 mm ducts into the ceiling space of the lower floor (if applicable). If no ceiling was provided, finish the ducts as high as possible between the floor structures or provide an access door 300 x 600 mm to 300 mm above the panel.
  - .9 The connection of branch lines to the panel should be made on the sides of the distribution panels. Only the supply conduits can be connected to the top or bottom.

**END OF SECTION**

PART 1 – GENERAL

- 1.1 SECTION CONTENT .1 Switches, outlets, cover plates and other wiring devices and their installation.
- 1.2 REFERENCES .1 Canadian Standards Association (CSA International).
- .1 CSA-C22.2 No. 42, General Use Receptacles, Attachment Plugs and Similar Devices.
- .2 CSA-C22.2 No. 42.1, Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).
- .3 CSA-C22.2 No. 55, Special Use Switches.
- .4 CSA-C22.2 No. 111, General-Use Snap Switches (National standard, with UL 20, current edition).
- 1.3 SHOP DRAWINGS AND PRODUCT DATA .1 Submit shop drawings and product data in accordance with Sections 01 33 00 – Submittal Procedures and 26 05 00 – General Requirements.
- .2 Submit a set of drawings for each model of electrical outlets and switches specified.
- .3 The drawings shall clearly identify the following:
- Manufacturer
  - Model
  - Description
  - Amperage and voltage
  - Nema Configuration
  - Catalog Number
  - Color
  - Performance:
    - . Electrical
    - . Mechanical
    - . Environmental
  - Material:
    - . Front
    - . Rear body
    - . Contact
  - Dimensions

1.4 WASTE MANAGEMENT  
 AND DISPOSAL

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

PART 2 – PRODUCTS

2.1 SWITCHES

- .1 Switches: single pole, double pole, three-way or four-way switches, 15 or 20 amp, 120-277 V ac or 347 V ac as indicated.
- .2 Manually-operated general purpose ac switches with following features:
  - .1 Terminal holes approved for No. 10 AWG wire.
  - .2 Silver alloy contacts.
  - .3 Urea or melamine moulding for parts subject to carbon tracking.
  - .4 Suitable for back and side wiring.
  - .5 Toggles: in white or as indicated by the Architect.
- .3 Toggles operated fully rated for tungsten filament and fluorescent lamps, and up to 120% of rated capacity for motor loads.
- .4 For all of the installation, use only switches manufactured by a single manufacturer.

.5 Accepted products:

	Hubbell	Leviton	Seymour
.1 120V 15A 1 pole	HBL1201W	1201-2W	PS15AC1W
.2 120V 20A 1 pole	HBL1221W	1221-2W	PS20AC1W
.3 347V 15A 1 pole	HBL18201WCN	18201-W	PS371510W

2.2 DIMMERS FOR  
 INCANDESCENT BULBS

- .1 Dimmer compliant with CSA C22.2 n° 184.1, allowing to vary the brightness on a palm between 0 % and 100 % following a quadratic curve consistent and continuous, and with following characteristics:
  - .1 For installation in a single switch box.
  - .2 Can be mounted without the need for bulk removal of side walls or decommissioning of electrical power to 1000 watts.
  - .3 Circuit advanced semiconductors, providing a sinewave AC ballast low voltage magnetic shunt.
  - .4 Two mobile parts:
    - .1 Single pole or three-way switch, as indicated.
    - .2 Long life potentiometer.
  - .5 Controlled by switching on and off button without changing the preset light intensity.
  - .6 Rated for 120 V AC, as indicated.
  - .7 Providing a regulated voltage accuracy of ± 5% lumen for a voltage variation of ± 10%.
  - .8 No perceptible flicker at any point of adjustment range, and no perceptible hum.
  - .9 RFI filter (audio, radio and television).
  - .10 For operation at an ambient temperature of 0 ° C to 40 ° C.

2.3 OUTLETS

- .1 Outlets to 125 VAC, depending on the following accepted manufacturers:

	<u>Hubbell</u>	<u>Leviton</u>	<u>Pass &amp; Seymour</u>
.1 Single 15 A Conf. 5-15R	HBL5251	5251-W	5261
.2 Double 15 A Conf. 5-15R	HBL5262W	5262-W	5262AW
.3 Double 15 A Conf. 5-15R Emergency	HBL5262R	5262-R	5262ARED
.4 Double 15 A Conf. 5-15R Computer Room	IG5262	5262-IG	IG5262



		<u>Hubbell</u>	<u>Leviton</u>	<u>Pass &amp; Seymour</u>
.5	Double 20 A Conf. 5-20R	HBL5362W	5362-W	5362AW
.6	Single 30 A Conf. 5-30R	HBL9308	5371	3802
.7	Single 15 A Lockable Conf. L5-15R	HBL4710	4710	4710
.8	Double 15 A Lockable Conf. L5-15R	HBL4700	4700	4700
.9	Single 20 A Lockable Conf. L5-20R	HBL2310	2310	L520-R
.10	Double 15 A DDFT Conf. 5-15R	GF5262WA	7599-W	N/A
.11	Double 20 A DDFT Conf. 5-20R	GF5362WA	7899-W	N/A
.12	Double 15 A Hospital Grade Conf. 5-15R	HBL8200W	8200-W	8200W
.13	Double 20 A Hospital Grade Conf. 5-20R	HBL8300W	8300-W	8300W
.14	Double 15 A DDFT (Hospital Grade) Conf. 5-15R	GF8200WA	7599-HGW	1595-HGW
.15	Double 20 A DDFT (Hospital Grade) Conf. 5-20R	GF8300WA	7899-HGW	2095-HGW

		120/240 V ac outlets:		
		<u>Hubbell</u>	<u>Leviton</u>	<u>Pass &amp; Seymour</u>
.1	Single 30 A Conf. 14-30R	HBL9430A	278	3864
.2	Single 50 A Conf. 14-50R	HBL9450A	279	3894
.3	Outlets: white, or as indicated by the Architect (except emergency network UPS, computer).			
.4	Special network outlets:			
	<ul style="list-style-type: none"> <li>- Red : Emergency network</li> <li>- Blue: UPS network</li> <li>- Orange (with isolated grounding) : Computer</li> </ul>			

2.4 SPECIAL WIRING DEVICES

- .1 Special wiring devices
  - .1 Clock hanger outlets, 15 A, 125 V, 3 wire, grounding type, suitable for No. 10 AWG for installation in flush outlet box.
  - .2 Lamps: as indicated, equipped with an LED lamp or neon of 0,04 W, 125 V red plastic, built-in.
  - .3 Motion Detectors: as indicated, infrared and/or ultrasound for wall or ceiling complete with all necessary accessories for a complete assembly.
  - .4 Tape clear plastic identification, typed in black, as indicated. Manufacturer accepted: E-Z-CODE Thomas & Betts.

2.5 COVER PLATES

- .1 Cover all devices and wiring boxes for telephone, cable and computer conduit systems with cover plates.
- .2 For the entire system, use only cover plates made by a single manufacturer: Hubbell, Leviton or Pass & Seymour.
- .3 Plate lids galvanized steel junction boxes for surface-mounted.
- .4 Plate covers nonmagnetic stainless steel (# 302) brushed vertically 1 mm thick for wiring devices hospital grade type mounted in outlet boxes or recessed surface.
- .5 Stainless steel cover plate (# 430) brushed vertically 1 mm thick for wiring devices mounted in outlet boxes or recessed surface.

- .6 Cover plate moulded aluminum, weatherproof, double-leaf spring with gaskets for electrical outlets doubles, as indicated.
  - .7 Cast aluminum cover plate, spring, weather-resistant, with gaskets for electrical outlets and switches simple, as indicated.
  - .8 Nylon or plastic plates, as indicated, the same color as the device wiring for homes.
- 2.6 JIFFY POLES
- .1 Service pin aluminum profile Satin gray finish with two 5-15R duplex receptacles wired at the factory for a tour that ends in between the ceilings by a flexible cord with plug and grounding the column exceeding 6 m, and two knockouts for telecommunication closed by a plate.
  - .2 Pillars with two separate compartments for electricity and telecommunications are all accessible by a removable cover.
  - .3 Outlets and telecommunications outlets shall be located on the same side of the column.
  - .4 Attachment devices for suspended ceiling adjustable bar "T" or inverted concrete slab (as applicable) and low slip to the floor.
  - .5 Dimensions: 2 1 / 8 in. x 2 1 / 8 x 9 '6"(height necessary to change depending on the height of the ceiling or slab as applicable).
  - .6 Positioning of the outputs (the center axis of the device):
    - .1 Outlets: 533 mm and 635 mm.
    - .2 Telecommunication outlets: 278 mm and 381 mm.

### PART 3 – EXECUTION

- 3.1 INSTALLATION
- .1 Switches and dimmers:
    - .1 Install single throw switches with handle in “UP” position when switch closed.
    - .2 Install switches in gang type outlet box when more than one switch is required in one location.
    - .3 Mount toggle switches and dimmers at height in accordance with Section 26 05 00 – Common Work Results – Electrical.
  - .2 Outlets:
    - .1 Install outlets in gang type outlet box when more than one outlet is required in one location.

- .2 Mount outlets at height, in accordance with Section 26 05 00 – Common Work Results – Electrical.
- .3 Where split outlets has one portion switched, mount vertically and switch upper portion.
- .3 Cover plates:
  - .1 Protect stainless steel cover plates finish with paper or plastic film until painting and other work is finished.
  - .2 Install suitable common cover plates where wiring devices are grouped.
  - .3 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.
  - .4 Identify the panel number and circuit number corresponding to all devices and wiring junction boxes, using an adhesive tape white plastic type P-Touch. The adhesive tape shall exceed the width of the plate, 10 mm on each side, to return and paste in the back.

Lettering color:

Normal type network: black

Emergency type network: red

Other networks: to coordinate.
- .4 Jiffy poles:
  - .1 Install the poles as indicated in the plan. Coordinate with the final development positions and orientations.
  - .2 If necessary, change the height on site depending on the type of ceiling and its composition. The amendment will be made on the upper end of the column.
- .5 FS and FD box types:
  - .1 Coordinate with the general contractor install recessed cans so that the surface of the box is flush with the wall surface. Provide a seal around the box before installing the cover plate.
- .6 General:
  - .1 Outputs and dimmers location in accordance with Section 26 05 00 – General requirements, or as indicated.

**FIN DE LA SECTION**

PART 1 – GENERAL

- 1.1 REFERENCES .1 Canadian Standard Association (CSA International)
- .1 HRC fuses with high breaking capacity, type specified below, according to the standard C22.1 and C22.2 106.
  - .2 Low-voltage fuses conform to CSA C22.2 No. 248.
  - .3 Plug and cartridge fuses in accordance with CSA C.22.2 No. 59.
- 1.2 ACTION AND INFORMATIONAL SUBMITTALS .1 Provide submittals in accordance with Sections 01 33 00 – Submittal Procedures and 26 05 00 – Common Work Results for Electrical.
- 1.3 SHOP DRAWINGS AND PRODUCT DATA .1 Submit shop drawings and product data in accordance with Sections 01 33 00 – Submittal Procedures and 26 05 00 – Common Work Results for Electrical.
- .2 Submit specifications for each type of fuses of size greater than 5 A. The characteristics should include: the average time to fusion given current intensity, the value  $I^2t$  (to establish the coordination of fuses) and the peak current eligible.
    - .1 Shop drawings submitted must, where required, bear the seal and signature of a qualified engineer authorized or entitled to practice in Quebec.
- 1.4 DELIVERY, STORAGE, AND HANDLING .1 Ship fuses in original containers.
- .2 Do not ship fuses installed in switchboards.
  - .3 Store fuses in original containers in a storage cabinet in a moisture free location.
  - .4 Waste management and disposal:
    - .1 Separate and recycle waste materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

PART 2 – PRODUCTS

- 2.1 FUSES – GENERAL .1 Fuses: product of one manufacturer.
- 2.2 FUSE TYPES .1 Main, by-pass, and distribution switch:
- .1 Circuits 601 to 6000A will be protected by current-limiting fuses Class L-timer. The fuses can withstand a current corresponding to 500% it's rated current for at least four seconds and be CSA certified with a capacity of 200 kA rms interruption of sym.
- Such as Mersen fuses: A4BQ, A4BY, A4BT (equivalent accepted: refer to article 2.3.1)
- .2 Circuits 600A and less will be protected by current-limiting fuses. The fuses can withstand a current corresponding to 500% it's rated current for at least 10 seconds and will be CSA certified with a capacity of 200 kA rms interruption of sym.
- Such as Mersen fuses: AJT, A6D-R (600V), A2D-R (250V), TRS-R (600V), TR-R (250V) (accepted equivalent: refer to article 2.3.1)
- .2 Motor Protection:
- .1 All individual circuits for motors will be protected with delayed action fuses: Class J, Class RK1, Class RK5, Class CC, Class L or Class C.
- Such as Mersen fuses: (accepted equivalent: refer to article 2.3.1) :
- Class RK1: A2D-R (250V) or A6D-R (600V)  
Class J: AJT  
Class L: A4BQ, A4BY, A4BT  
Class RK5: TR-R (250V) or TRS-R (600V)  
Class CC: ATDR  
Class C: FES, FESF, FESC
- .3 Lightning and control circuits:
- .1 The circuits will be protected with delayed action fuses Class CC.
- Such as Mersen fuses (accepted equivalent: refer to article 2.3.1) :
- Class CC – ATDR, ATQR
- .4 Variable frequency drives:
- .1 The circuits will be protected by fast acting Class J

fuses.

Such as Mersen fuses (accepted equivalent: refer to article 2.3.1) :  
Class J – HSJ

- 2.3 MANUFACTURERS .1 Accepted Manufacturers: Mersen (Ferraz Shawmut), Cooper Bussmann, Little Fuse, Fusetek.
- 2.4 FUSE STORAGE CABINET .1 Fuse storage cabinet, manufactured from 2.0 mm thick aluminum, 750 mm high, 600 mm wide, 300 mm deep, hinged, lockable front access door finished in accordance with Section 26 05 00 – Common Work Results for Electrical.

### PART 3 – EXECUTION

- 3.1 INSTALLATION .1 Install fuses in mounting devices immediately before energizing circuit.
- .2 Ensure correct fuses fitted to physically match mounting devices.
- .1 All equipment to fuse a current rating of 600A or less will be equipped with clamp removal in the case of classes R and J.
- .3 Ensure correct fuses fitted to assigned electrical circuit.
- .4 When Class R fuses are prescribed; ask about the equipment warning labels marked "Use only replacement fuses of the class R".
- .5 Use fast acting fuses for resistive loads.
- .6 Use of delayed action fuses for other types of load.
- .7 Select the fuse capacity according to the current measured load of each driving force.
- .8 Install the storage cabinet at the place designated by the electricity representative and the CDC representative.
- .9 Install spare fuses in fuse storage cabinet.
- .10 Install inside the door of each piece of equipment with a fuse plate "lamicoid" indicating the classes and types and the fuse rating to use.

**END OF SECTION**



PART 1 – GENERAL

- 1.1 SECTION CONTENTS .1 Moulded case circuit breakers materials, circuit breakers and protection against ground fault, circuit breakers, fuse and protective accessories against the high fault currents.
- 1.2 REFERENCES .1 Canadian Standards Association (CSA International)
- .1 CSA-C22.2 No. 5-02, Moulded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, current edition).
- 1.3 SHOP DRAWINGS AND PRODUCT DATA .1 Submit shop drawings and product data in accordance with Sections 26 05 00 – General Requirements, and 01 33 00 – Submittal Procedures.
- .2 Include the characteristic curves established according to the constant time-current for circuit breakers with a capacity of 100 A or more, or with a breaking capacity of 22 000 A symmetrical and over, to the line voltage.
- .3 Provide all available data regarding the values of the capacity of power failure and short circuit  $I^2t$  maximum allowable values for all circuit breakers.
- .4 Provide the certificate of authenticity and fabrication of the circuit breaker.
- 1.4 AUTHENTICATION .1 Before proceeding with any installation of circuit breakers in a new or existing installation, the electrical contractor must submit three (3) copies of a certificate of authenticity from the manufacturer, in French, signed by the factory and the local representative of that manufacturer certifying that all circuit breakers are new and that they meet the standards and regulations. These certificates must be submitted to the CDC representative for acceptance.
- .2 A delay in the production of the certificate of authentication will not justify an extension of the contract and no additional compensation.
- .3 Any work of manufacturing, assembly or installation should begin only after acceptance of the certificate of authentication by the representative of CDC. Failure to comply with this requirement, the representative of CDC and / or the client user has the right to mandate the manufacturer listed on the circuit breakers to authenticate all new circuit breakers under the contract, and that, at the expense of contractor electrician.
- .4 In general, the certificate of authentication must contain:
- .1 The name and address of the manufacturer and the person

responsible for the authentication. The responsible person must sign and date the certificate;

- .2 The name and address of the licensed dealer and distributor of the person responsible for the count of the contractor.
- .3 The name and address of the contractor and the person in charge of the project.
- .4 The name and address of the building where the circuit breakers will be installed:
  - .1 Project title (title of the specifications or plans);
  - .2 Client's reference number;
  - .3 List of circuit breakers in tabular form when required.

1.5 WASTE MANAGEMENT  
AND DISPOSAL

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

PART 2 – PRODUCTS

2.1 GENERAL  
REQUIREMENTS

- .1 Moulded case circuit breakers, switches, and devices for protection against ground fault, circuit breakers, fuse and protective accessories against the high fault currents.
- .2 Moulded Case Circuit Breakers, bolted or plug to the bus bars, quick-closing type and snap-action, manually operated and automatic, with compensation for an ambient temperature of 40°C.
- .3 Common-trip circuit breakers, equipped with a single handle for multi-pole circuits.
- .4 Breakers equipped with magnetic snap-action trips, designed to act only when the current value reaches the setting value.

- .5 Circuit breakers equipped with interchangeable trips, as indicated.
- 2.2 OPTIONAL FEATURES .1 Include:
  - .1 Shunt trip.
  - .2 Auxiliary switch.
  - .3 Motor-operated mechanism.
  - .4 Under-voltage release.
  - .5 On-off locking devices.
  - .6 Handle mechanism.
- 2.8 MANUFACTURERS .1 Accepted products: Cutler-Hammer, Siemens, Scheider Electric, GE.

### PART 3 – EXECUTION

- 3.1 INSTALLATION .1 Install circuit breakers as indicated.
- .2 Install locking devices on circuits listed in Section 26 24 16.01 – Panelboards Breaker Type.
- .3 The order in which circuit breakers should be installed in the panels must meet the one shown in the plans.

**FIN DE LA SECTION**

PART 1 – GENERAL

- 1.1 SECTION CONTENTS .1 Materials, hardware for switches fused and non-fused, and their installation.
- 1.2 REFERENCES .1 Canadian Standards Association (CSA International).
- .1 CAN/CSA C22.2 No. 4, Enclosed Switches.
- .2 CSA C22.2 No. 39, Fuseholder Assemblies.
- 1.3 SHOP DRAWINGS AND PRODUCT DATA .1 Submit shop drawings and product data in accordance with Sections 26 05 00 – General Requirements and 01 33 00 – Submittal Procedures.
- 1.4 HEALTH AND SAFETY .1 Do construction occupational health and safety.
- 1.5 WASTE MANAGEMENT AND DISPOSAL .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Separate for reuse and recycling and place in designated containers steel, metal, and plastic waste in accordance with Waste Management Plan.
- .5 Fold up metal banding, flatten and place in designated area for recycling.
- 1.6 ELECTRICAL EQUIPEMENT PROTECTED BY SPRINKLERS .1 Provide and install materials in accordance with Section 26 05 00 – General Requirements.

PART 2 – PRODUCTS

- 2.1 DISCONNECT SWITCHES .1 Fused and non-fused switches, in CSA enclosure:
- .1 Type 1 for indoor use in ordinary locations.
- .2 Type 2 for outdoor use, where the envelope is exposed to fluid leaking.

- .3 Type 3R for outdoor use.
  - .4 Type 4 for use where the envelope is exposed to direct water.
  - .5 Type 5 for indoor use in locations where dust, lint, or particles are not dangerous, or are likely to be deposited or suspended in the atmosphere.
  - .2 Possibility to lock in “closed” or “open” positions, with three locks.
  - .3 Mechanical door with interlock, prohibiting the opening when the lever is in "closed" position.
  - .4 Bypass mechanism allowing opening the enclosure when the switch is "ON".
  - .5 Closing and abrupt cut-off mechanism.
  - .6 “Open” and “Closed” indication on the enclosure lid.
  - .7 Fuses: rating in accordance with Section 26 28 13.01.
  - .8 Fuse holders: movable and suitable, without an adapter, to the type and fuse rating indicated.
  - .9 A set of auxiliary contacts CSA certified is required when used for elevators, escalators, hoists, engine stairwell pressurization of a fire alarm or via a variable frequency drive. All auxiliary contacts shall be of type "open advanced”.
  - .10 At 120/240 V, single phase, three cords, to 120/208 V, three phase, four cords and 347/600 V, three phase, four cords, the switches will be equipped with a solid neutral.
  - .11 All switches must be provided by the same manufacturer.
- 2.2 EQUIPEMENT IDENTIFICATION
- .1 Nameplates provided and installed in accordance with Section 26 05 00 – General Requirements.
  - .2 Indicate name of load controlled on size 4 nameplates.
- 2.3 MANUFACTURER
- .1 Accepted products: Cutler-Hammer, Siemens, Square D, GE.
  - .2 The switches manufacturer must be the same as the electrical distribution panels unless stated otherwise.

PART 3 – EXECUTION

- 3.1 INSTALLATION \_\_\_\_\_
- .1 Install disconnect switches complete with fuses if applicable, as indicated.
  - .2 Install contacts sets required by 2.1.9 and the necessary wiring (although not shown in plans) between the switches and the variable frequency drive upstream (connection in series with the termination of the variable frequency drive).

**FIN DE LA SECTION**

PART 1 – GENERAL

- 1.1 REFERENCES .1 American National Standards Institute (ANSI)
- .1 ANSI C82.1, Lamp Ballasts-Line Frequency Fluorescent Lamp Ballast.
  - .2 ANSI C82.4, Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps Multi Supply Type.
- .2 American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE)
- .1 ANSI/IEEE C62.41, Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits.
- .3 ASTM International Inc.
- .1 ASTM F 1137, Standard Specification for Phosphate/ Oil and Phosphate/Organic Corrosion Protective Coatings for Fasteners.
- .4 Canadian Standards Association (CSA International)
- .1 ACNOR C22.2 n° 9, for lighting.
  - .2 ACNOR C22.2 n° 43, cap screwed sockets.
  - .3 ACNOR C22.2 n° 74, discharge lamp sockets.
  - .4 ACNOR C22.2 n° 4, incandescent lamps.
  - .5 ACNOR C22.2 n° 141, emergency lighting.
- .5 ICES-005, Radio Frequency Lighting Devices.
- .6 Underwriters' Laboratories of Canada (ULC)
- .7 All lighting must comply with the Building Code of Quebec, Electricity.
- 1.2 ACTION AND INFORMATIONAL SUBMITTALS .1 Provide submittals in accordance with Sections 01 33 00 – Submittal Procedures and 26 05 00 – General Requirements.
- .2 Quality assurance submittals: provide following in accordance with Section 01 45 00 – Quality Control
- .1 Manufacturer's instructions: provide manufacturer's written installation instructions and special handling criteria, installation sequence, cleaning procedures, etc.

1.3 SHOP DRAWINGS

AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with Sections 26 05 00 – General Requirements and 01 33 00 – Submittal Procedures.
- .2 The drawings must come from the company that makes devices and include, in the same shipment, the drawings of lamps and ballasts with their characteristics.
- .3 During the presentation of shop drawings, submit data sheets indicating the mercury content of products used and calculations show the ratio of mercury per lumen hour (hg / lm-hr) for all the lamps used the project.
- .4 Product Data:
  - .1 Provide manufacturer's printer product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 The photometric data must be established by an independent testing laboratory, and must include: the total power consumption (in watts), the light intensity (in candelas), the spectral distribution, the luminous flux (lumens), the performance standard the luminaire, the utilization factor, the type of lamp, ballast type and description of the company.
- .5 This data must include the following, if applicable: table showing CVP rate and aircraft separation criteria.
- .6 For any product covered by the equity method agreed with this estimate; provide point by point calculation of local and external spaces.

1.4 DELIVERY, STORAGE AND  
HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.
- .2 Deliver materials to sit in original factory packaging, labelled with manufacturer's name and address.
- .3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding and packaging materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management Disposal.
- .4 Divert unused metal materials from landfill to metal recycling facility.
- .5 Disposal and recycling of fluorescent lamps as per local



regulations.

.6 Disposal of old PCB filled ballasts.

1.5 EARTHQUAKE RESISTANT  
FIXING .1

Supply and install all necessary equipment for earthquake resistant fixing in accordance with Section 26 10 00 – Earthquake Resistant Fixing.

PART 2 – PRODUCTS

2.1 MATERIALS .1

Provide lighting interior and exterior devices described in Section 26 05 05, complete with all accessories required for installation and operation, such as ballasts, plaster frames, suspensions, gaskets, insulation, lamps, etc. Fluorescent lamp sockets coated with a silver plating to ensure positive contact of the lamps for a full installation.

.2 All lamp and ballast must be from the same manufacturer. A minimum guarantee of three years for the whole must be provided by the manufacturer.

.3 Accepted products:

.1 Fluorescent light fixtures: Williams, Cooper (Metalux), Peerless, Canlyte-CFI, Hubbell, Thomas et Day-Brite.

.2 Incandescent light fixtures: Lightolier, Halo, Prescolite, Hubbell.

.3 LED lighting fixtures: CFI, Thomas, Cooper.

.4 HID lighting fixtures: Ruud, Lumec, Keene, Widelite, Prescolite, Hubbell et Day-Brite.

.5 Explosion-proof and corrosive devices: Appleton, Thomas & Betts, Crouse-Hinds, IpeX, Hubbell.

2.2 LAMPS .1

The lamps capacity shall not exceed the recommendations of the manufacturer of the device.

.2 All lamps must be in place and in good condition at the date of provisional acceptance.

.3 All incandescent lamps and tungsten halide that have burned in the three (3) months from the date of provisional acceptance will be replaced.

.4 All fluorescent lamps and high intensity discharge bulbs burned in the 12 months from the date of provisional acceptance will be replaced.

.5 Provide 5% of the total number of each type of lamps installed as

spares (minimum one (1) lamp).

- .6 All chosen lamps must have a general average grade of 70 pictograms of mercury per lumen hour.
- .7 The lamps should be non-cycling at the end of life.
- .8 Supply and install all the lights required for each fixture. All lamps must come from the same manufacturer
- .9 Accepted products: Philips (ALTO I/II), G.E. (Ecolux), Osram-Sylvania (Ecologic).
- .10 Incandescent and tungsten halogen lamps:

Bulb shape and power, in watts	Base	Initial lumens (approx.)	Life length, in hours	Description	Volts
A19-100	medium	1270	6000	Frosted inside	120-125
Par20-50	medium	600	2500(5000)	Tungsten halogen	130
Par20-75	medium	1100	2500(5000)	Tungsten halogen	130

- .11 Fluorescent lamps, of ecological type, with appropriate marking:

Bulb shape and power, in watts	Base	Initial lumens (approx.)	Life length, in hours	Color temperature (approx.)	Minimum Color Rendering
T5-28	Miniature 2 pins	2900	20000	4100° K	85
T5-54	Miniature 2 pins	5000	25000	4100° K	85
T8-28	Miniature 2 pins	2725	24000	4100° K	85
T8-32	Miniature 2 pins	3000	24000	4100° K	85

Unless indicated otherwise, fluorescent tubes will be of T-8 type, 32 W, 4100 ° K in general, 24 000 hours and a color rendering (CRI) of minimum 85 at low mercury content (green).

.12 Compact fluorescent lamps, of ecological type, with appropriate marking:

Bulb shape and power, in watts	Base	Initial lumens (approx.)	Life length, in hours	Color temperature (approx.)	Minimum Color Rendering
PL-T-17	4 pins	1200	10000	4100° K	82
PL-T-26	4 pins	1800	10000	4100° K	82
PL-T-32	4 pins	2400	12000	4100° K	82
PL-T-42	4 pins	3200	10000	4100° K	82

.13 Metal halide lamps:

Bulb shape and power, in watts	Base	Initial lumens (approx.)	Life length, in hours	Color temperature (approx.)	Minimum Color Rendering
BT37-400	Goliath	36000 V 32000 H	15000	4000° k	85
BT28-250	Goliath	22000 V 20000 H	10000	4000° k	85
BT28-175	Goliath	15000 V 12900 H	7500	4000° k	85
ED17-150	Medium	13000	10000	4000° k	85
ED17-100	Medium	8500	10000	4000° k	85
ED17-70	Medium	5200	10000	4000° k	85
MP70-100	Medium	3200/5600	7500	3200° k	75
MP150	Medium	8800	5000	3200° k	75

.14 High pressure sodium vapour lamps:

Bulb shape and power, in watts	Base	Initial lumens (approx.)	Life length, in hours	Temperature Color (approx.)	Minimum Color Rendering
E25-1000	Goliath	140000	24000	≥2000	22
ED18-400	Goliath	50000	24000	≥2000	22
ED18-250	Goliath	29000	24000	≥2000	22
ED18-200	Goliath	22000	24000	≥2000	22
ED17-150	Medium	16000	24000	≥2000	22
ED17-100	Medium	9500	24000	≥2000	22
ED17-170	Medium	6300	24000	≥2000	22
ED17-50	Medium	4000	24000	≥2000	22
ED17-35	Medium	2250	24000	≥2000	22

2.3 BALLASTS

- .1 Use instant start lamps and ballasts for areas where light fixtures are on most of the time. And in areas where the switches are frequent, use quick start lamps and ballasts.
- .2 All ballasts must be equipped with removable connectors.
- .3 Fluorescent Lamp Ballasts: CBM and CSA certified, low power consumption, integrated circuit or integrated circuit graduation.
  - .1 Rated voltage: 60 Hz, as indicated, designed for rapid start or instant.
  - .2 Electronic type.
  - .3 Fully boxed and designed for use at an ambient temperature of 40 ° C.
  - .4 Power factor of at least 98% of the nominal luminous flux of lamps.
  - .5 Current crest factor: 1.7 max.
  - .6 Harmonic: overall harmonic distortion of less than 10%.
  - .7 Electronic ballasts operating frequency: 20 kHz minimum.
  - .8 Noise level: Class A.
  - .9 Installation: remote or integrated to luminaire.

- .10 Ballast factor: 88% minimum.
- .11 Capacitor: thermal protection, free of PCB.
- .12 Thermal protection: self-healing of the coil.
- .13 Efficiency greater than 84 Lum / Watt.
- .14 Electronic ballasts should be of Class 3. Accepted products: Philips (Advance series Centium), GE, ULT (HP series) or equivalent Osram (QT series).
- .4 Metal halide ballasts:
  - .1 Rated voltage: 60 Hz and as directed, designed for metal halide lamp, quartz burner circuit to reboot.
  - .2 Fully boxed and designed for use at an ambient temperature of 40 °C.
  - .3 Power factor: at least 95%, 95% of the nominal luminous lamps flux.
  - .4 Type: Constant wattage autotransformer, with isolated secondary winding or semiconductors.
  - .5 Capacitor: free of PCB.
  - .6 Supply voltage range:  $\pm 5\%$  of rated voltage.
  - .7 Minimum temperature boot:  $-34\text{ }^{\circ}\text{C}$ , 90% of the rated supply voltage.
  - .8 Installation: inside, outside, remote, or integrated to luminaire, as indicated.
  - .9 Crest Factor: 1.7 or less.
  - .10 Accepted products: Advance, Philips, G.E., Osram.
- .5 High pressure sodium vapor ballasts: according to ANSI C82.4.
  - .1 Rated voltage: 60 Hz and as directed, designed for high pressure sodium vapor lamp.
  - .2 Fully boxed and designed for use at an ambient temperature of 40 °C.
  - .3 Power factor: 95% minimum, 95% of the nominal luminous lamps flux.
  - .4 Type: inductive, capacitive, controlled magnetic semiconductor. Choose the appropriate boot device, recommended by the manufacturer.

- .5 Capacitor: free of PCB.
  - .6 Supply voltage range:  $\pm 10\%$  of rated voltage.
  - .7 Minimum temperature of initiation:  $40^{\circ}\text{C}$ , 90% of the rated supply voltage.
  - .8 Installation: inside, outside, remote, or integrated to luminaire.
  - .9 Crest Factor: 1.7 or less.
  - .10 Accepted products: Philips, G.E., Advance or equivalent Osram.
- 2.4 FINISHES
- .1 The finish and construction of fixtures must be UL listed and CSA certified to be the type of installation planned.
  - .2 Unless otherwise indicated in the list of fixtures, box and reflectors must be 20 gauge cold-rolled steel. Metal surfaces of the box and the reflector should be covered with a layer of baked enamel finish free of pitting or defects.
  - .3 Baked powder coating polyester:
    - .1 Reflectors and metal surfaces of the housing must have a high gloss finish coating in polyester powder paint and with a smooth, uniform and free of pinholes or other imperfections.
    - .2 The finish reflectors and other interior surfaces shall be as follows:
      - .1 Color: white, with 85% reflectance.
      - .2 Color fastness: yellowness index of 0.02 at the origin, and not more than 0.05 after exposure for 250 hours in an accelerated aging device "Atlas Fade-Ometer."
      - .3 Thickness of the paint film: average of at least 0.03 mm, and at no point less than 0.025 mm.
      - .4 Gloss: at least 80 units, measures taken to 60o at gloss meter Gardner.
      - .5 Flexibility: the coating shall withstand a bend test around a mandrel 12 mm, and show no signs of cracking or flaking when viewed under a microscope at a magnification of about 10.
      - .6 Adherence: a grid of 24 mm square, a square of 3 mm side is marked by a sharp razor blade embedded in the paint film to the substrate metal, cellulose adhesive tape is then applied to the grid and then departed:

adhesion is considered satisfactory if the paint coating is not taking off.

- .4 Alzak finish:
  - .1 Type of finish obtained on an aluminum sheet made from special alloys, high-gloss anodized and chemically in accordance with the requirements of Alcoa, in order to submit, as appropriate, the following characteristics:
    - .1 Type of finish designed for light commercial service: coating having a weight of at least 7.8 g/m<sup>2</sup>; reflectance of at least 83% in the case of specular surfaces, 80.5% in the case of semi specular surfaces and 75% in the case of diffuse surfaces;
    - .2 Type of finish designed for normal industrial service: coating having a weight of at least 14.8 g/m<sup>2</sup>; reflectance of at least 82% in the case of specular surfaces, and at least 73% for diffuse surfaces;
    - .3 Type of finish designed for heavy duty: coating having a weight of at least 21.8 g/m<sup>2</sup>; reflectance of at least 85% in the case of specular surfaces, and at least 65% in the case of diffuse surfaces.

2.5 OPTICAL CONTROL DEVICES

- .1 The louvers and lenses of fluorescent fixtures must be constructed of non-combustible materials such as acrylic (polymer of styrene derivatives are not accepted).

2.6 SAFETY SHUT-OFF

- .1 The fluorescent light fixtures that are powered at a voltage of 150 V or more must include:
  - .1 an isolating device integrated into the luminaire.
  - .2 a prominent and permanent identification, specifying the use of the isolating device, and the voltage rating of the luminaire.

PART 3 – EXECUTION

3.1 INSTALLATION

- .1 Mounting height as shown in the drawings or determined by the CDC representative on site.
- .2 Install fixtures until all work that are likely to damage or soiling are completed. The Contractor shall obtain approval from the CDC representative prior to installation.
- .3 The lighting location is determined according to the reflected ceiling plans. Plans should not be interpreted to scale. The exact

location of lighting should be coordinated with the CDC representative.

- .4 In the boiler, mechanical, refrigeration, ventilation, air and conditioning rooms, sub-stations and other places where there are pipes on the ceiling or ventilation ducts, install lights on rods of appropriate length so that the light beam is not obstructed by piping. No lighting shall be installed before the installation of all equipment and piping.
- .5 Aluminum luminaires in direct contact with concrete must be coated with tar to contact points. Those installed outside must be "anodized aluminum" or stainless steel.
- .6 In a continuous row of fluorescent fixtures, all fixtures in the same row must be the same type. The fluorescent fixtures boxes installed in continuous rows are held together by the two 8-32 bolts and nuts.
- .7 Use all frames or hoops to cast even if not specifically requested in the list of luminaries.
- .8 Install lighting fixtures and supports and / or poles as indicated.
  - .1 Fixtures must be adequately supported for the type of ceiling system in which they are mounted.
  - .2 Install monitoring equipment as indicated.
  - .3 Install exterior lights in accordance with the manufacturer's instructions. As indicated, and in the presence of CDC representative, in darkness, turn the lights on and fix them in a permanent position.
- .9 Upon request of the CDC representative, before ordering lighting fixtures, the contractor shall supply and install on site a sample of each device and obtain approval from the CDC representative.

### 3.2 WIRING

- .1 Connect luminaires to lighting circuits:

- .1 Install flexible or rigid conduit for luminaires as indicated in Sections 26 05 34 – Conduits, conduit fastenings and conduit fittings and 26 05 21 – Wires and cables.

### 3.3 LUMINAIRE SUPPORTS

- .1 The ceiling-mounted light fixtures must be supported independently of the backbone of the suspended ceiling as required by the local inspection agency.
- .2 The fluorescent fixtures mounted light strips must be supported at intervals of 1.2 m.



3.4 FLUORESCENT FIXTURES  
ANCHORS AND  
SUSPENSIONS

- .1 The fluorescent lights placed directly under the surface of concrete slabs are held with bolts envelope self-drilling of 13 mm.
- .2 The fluorescent fixtures are suspended from ceilings using suspension rods.
- .3 The spacing between the rods supports shall be as recommended by different manufacturers.
- .4 On the plans, the outputs for lighting are shown in the center of the fixture for the purpose of drawing. It is understood that the output power must be located on top of a media fixture.
- .5 The fluorescent fixtures mounted light strips (butt) must be supported at intervals of 1.20 m.
- .6 All fixtures installed at more than 4 m above the floor must be retained with a steel cable.

3.5 LUMINAIRE ALIGNMENT

- .1 Luminaires mounted light strips must be properly aligned so as to form a continuous straight band.
- .2 Individually mounted fixtures should be parallel or perpendicular to the lines of implantation of the building.

3.6 CLEANING

- .1 Clean in accordance with Section 01 74 11 – Cleaning.
- .2 Remove surplus materials, excess materials, rubbish, tools and equipment.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 – Construction/ Demolition Waste Management and Disposal.

3.7 TESTING

- .1 Perform tests in accordance with Section 26 05 00 – General Requirements.
- .2 Ensure good operation of all devices.

**END OF SECTION**

PART 1 – GENERAL

- 1.1 SECTION CONTENTS .1 This section covers PVC and fibreglass conduits, polyethylene pipes used as underground electrical conduits, terminals, and their installation.
- 1.2 RÉFÉRENCES .1 Canadian Standards Association (CSA International).
- 1.3 ACTION AND INFORMATIONAL SUBMITTALS .1 Provide submittals in accordance with Sections 01 33 00 – Submittal Procedures and 26 05 00 – General Requirements.
- .2 Product data:
- .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 N/A
- .3 Quality Assurance Control: submit following in accordance with Section 01 45 00 – Quality Control.
- .1 Certificates: signed by manufacturer certifying materials comply with specified performance characteristics and physical properties.
- .2 Manufacturer's instructions: when required, submit the manufacturer's instructions, including indications for specific methods of handling, implementation and cleaning.
- 1.4 DELIVERY, STORAGE AND HANDLING .1 Packaging, transportation, handling and unloading:
- .1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.
- .2 Transport, store and handle materials and equipment in accordance with manufacturer's written instructions.
- .2 Packaging Waste Management:
- .1 Separate waste materials for reuse / recycling and reuse, in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- .2 Do not burn wood that has been treated with a preservative.

- .3 Wood treated with a preservative must be separated from materials and equipment to be recycled or reused. Remove the ends, waste and sawdust from treated wood to a landfill proposed by the contractor, but approved by the department's representative.
- .4 Move unused wood preservation products to an approved hazardous materials collection site.
- .5 It is forbidden to pour unused preservatives in sewers, rivers, lakes, on the ground or at any other location where it may risk health or the environment.
- .6 Send the unused solvent cement to an approved hazardous materials collection site proposed by the contractor but approved by the department's representative.
- .7 It is forbidden to discharge unused solvent cement in sewers, rivers, lakes, on the ground or at any other location where it may risk health or the environment.

PART 2 – PRODUCTS

- 2.1 SUSTAINABLE REQUIREMENTS
  - .1 N/A
  - .2 N/A
- 2.2 PVC DUCTS AND FITTINGS.1 Rigid PVC conducts, DB2/ES2 type, flared ends with prefabricated and molded fittings, for direct burial, size as indicated. Note that it is forbidden to use PVC conduit in soils that may contain harmful substances (oils or solvents) or some polymers. Consult the manufacturer for other chemicals that could be harmful. Use fibreglass conducts or other suitable ducts types, when the soil contains such substances.
  - .2 Rigid PVC fittings, opaque, flared fittings, solvent welded elbows, couplings, reducers, plugs, caps and adapters needed to complete installation.
  - .3 Expansion joints according to manufacturer's recommendations and as indicated.
  - .4 90 degrees elbows and 45 degrees couplings with 5° angle, in rigid PVC, as required.
- 2.3 ADHESIVE SOLVENT .1 Solvent adhesive for the assembly of PVC tubing.
- 2.4 FIBERGLASS DUCTS .1 Thermoset ducts reinforced with fibreglass: AG or BG type, sealed, self-extinguishing, immersing and size as indicated. Note

that the type AG can be used for both aboveground facilities to underground facilities. BG type is only suitable for underground installations. AG type has a higher compressive strength than the type BG.

- .2 All necessary couplings, reducers, plugs, caps, adapters and brackets to complete installation.
  - .3 Expansion joints according to manufacturer's recommendations and as indicated.
- 2.5 POLYETHYLENE PIPE .1 Rigid polyethylene pipe, with couplings and fittings approved and required to complete installation, with water removal that may lie inside the ducts.
- 2.6 CABLE PULLING EQUIPMENT .1 Nylon or polypropylene draw cord, stranded 6 mm, 5 kN tensile strength, single length in each duct, with more than 3 m in each end.
- 2.7 MARKERS .1 As indicated, supply and install markers. If several types of markers are prescribed, indicate or specify the places where each type should be installed.
- .1 Work performed by Transport Canada: a copy of the standard markers is required.
  - .2 Markers locating cables, concrete 600mm x 600mm x 100mm, with appropriate inscriptions "cable", "joint" or "conduit" engraved on the top, and arrows indicating a change of directions in the course of these feeders and/or ducts.
- .2 Cedar posts: 89 mm x 89 mm x 1.5m posts, pressure treated with a water repellent preservative consisting of a transparent solution of copper naphthenate or pentachlorophenol at 5%, with a nameplate attached near the top of the post, side pipe.
    - .1 Nameplate: anodized aluminum, 89 mm x 125 mm and 1.5 mm thick, to attach to the cedar post, covered with a Mylar label 0125 mm range, as appropriate, the inscriptions "cable ", " junction" or "conduit ", and arrows indicating the direction changes.

### PART 3 – EXECUTION

- 3.1 MANUFACTURER'S INSTRUCTIONS .1 Compliance: comply with the requirements, recommendations and manufacturer's written specifications, including all technical bulletin available, instructions on handling, storage and

installation of products, and technical information sheets.

### 3.2 INSTALLATION

- .1 Group underground conduits or pipes as indicated and in accordance with the manufacturer's requirements.
- .2 Install groups of pipes on a 150mm thick layer of sand compacted to 95% of Proctor maximum dry density.
- .3 Dig the trench across the whole distance between two points before your start laying pipes and make sure no obstructions is present that could cause a change in the level of the conduits.
- .4 In case of sustainable soils (clay), pour a 75mm thick concrete slab at the bottom of the trench before placing conduits.
- .5 Install conduits levelled and/or sloped as indicated, giving them a minimum slope of 1:400.
- .6 Maintain conduits spacing as indicated.
  - .1 To ensure required vertical separation where ducts are installed in several horizontal layers superimposed, install plastic pipes spacers so that they are securely supported at 15 m intervals and that all transitions are progressive over the entire length of the ducts.
- .7 Proceed to transpositions, deviations and changes of direction using 5 degrees elbows; the total deviation should not exceed 20 degrees.
- .8 Use conduits adapters to connect non-metallic conduits to steel conduits.
- .9 Terminate the very end of each pipe network by a connection cap flush with the end (wall and/or floor), in anticipation of a possible extension.
- .10 When cutting, boring and facing the end of the conduits during construction, obtain the Engineer's authorization and follow the manufacturer's recommendations so that the ends are identical to factory-prepared ends.
- .11 Clean the inside of the conduits before installation. Plug the ends with PVC caps to prevent foreign matter from entering, during and after installation.
- .12 Immediately after installation, run a 300mm long and 6mm smaller than the inside diameter of the conduit wood chuck, followed by a stiff bristle brush to remove sand, dirt or other foreign material. Brush with a stiff bristle brush in each conduit immediately before cable pulling.

- .13 In each pipe, install a single length cord, full length of the conduit and 3m beyond the two ends of the conduit.
  - .14 Before backfilling the trench, place the continuous warning tape.
  - .15 Install markers as required.
- 3.3 MARKER LOCATION
- .1 Install concrete tracking marker above the ends of these groups of conduits. Install these markers flush with the finished ground level.
  - .2 Install markers at 50mm intervals along the straight conduits groups and at each change of direction.
  - .3 When necessary to remove the tracking markers for other work, reinstall the markers once the work is completed.
  - .4 Lay concrete tracking markers flat and 25mm above the finished ground surface, while centered over the conduits.
  - .5 Provide drawings showing the location of the tracking markers.
- 3.4 CLEANING
- .1 Perform cleanup in accordance with Section 01 74 11 – Cleaning.
  - .2 Remove excess construction material and equipment, waste, tools and equipment once the installation work and performance monitoring are completed.
    - .1 Separate waste materials for recycling in accordance with Sections 01 74 21 – Construction/Demolition Waste Management and Disposal.
- 3.5 INSPECTIONS
- .1 Once the installation of direct buried underground cable ducts is completed, and before backfilling trenches, notify the department's representative to inspect on-site installation, for work acceptance.

**END OF SECTION**

## **PART 1 - GENERAL**

- 1.1 SCOPE OF WORK
1. The work described in this section include the design, delivery, installation, site services, commissioning, mechanical testing and guarantees for the supply of treated submersible centrifugal water pumps and accessories.
- 1.2 SYSTEME DESCRIPTION
1. Design for the submerged installation:
1. Pumps must be submersible model and dedicated to pumping unfilled water;
  2. Must operate over an extended periods when fully submerged.
2. Operating Conditions:
- 1 Nature of the water pumped:
  2. Treated wastewater without solid particles;
  3. Water temperature between 5 ° C and 25 ° C.
3. Design parameters:
1. Each pump / motor should be one-piece design with direct drive.
  2. Each pump with its accessories and cables must be capable of continuous submersion at least 5 meters deep without leakage.
4. Pumps control
1. A duplex control panel shall be provided with pumps;
  2. The alternation of the pumps must be effective;
  3. A manual operation must be individually or simultaneously possible;
  4. Hours of operation of each displayable pumps;
  5. High level alarms and malfunctions.
- 1.3 DOCUMENTS TO BE PROVIDED
1. 1. Layout drawings:
1. Provide shop drawings of pumps.
2. Certification :
1. The pump / motor unit must bear the CSA certification.
  2. The proof of this certification and the accompanying drawings should be provided on request by the pump manufacturer.
  3. The certification "engine" part only cannot be accepted.
- 1.4 WARRANTY
1. Pump / motor:
1. The manufacturer of the pump must ensure the units to the General Contractor in writing against defects in workmanship and materials, covering parts and labor for a period of one (1) year after final acceptance of the work.

**PART 2 – PRODUCTS**

2.1 MANUFACTURERS

1. The pumps are as manufactured by Goulds or approved equivalent.

2.2 LIST OF EQUIPMENT AND DATA SHEETS

1. Equipment Description:

<b>Identification</b>	<b>Model</b>	<b>Wheel</b>	<b>Capacity (L/s)</b>	<b>Head (m)</b>
Goulds	WE0312 L	5,38''	2,4	6,0
<b>Motor (HP)</b>	<b>Voltage</b>	<b>Phase</b>	<b>HERTZ</b>	<b>RPM</b>
0,33	230	1	60	1750

2.3 MAIN COMPONENTS

1. Each pump shall comprise the following components without limitation:
2. Preassembled components :
  1. Motor;
  2. Shaft;
  3. Volute casing;
  4. Impeller;
  5. Oil chamber;
  6. Discharge elbow;
  7. Mechanical joint.
3. Accessories:
  1. The accessories used in the current pumping wells will (valve fleets level control valves) be replaced by equivalent equipment. Present the shop drawings of each equipment for approval by the Project manager

2.4 MATERIALS

1. Manufacturing - General:
  1. The main parts of the pump shall be of gray cast iron, ASTM A-48, Class 35B, with smooth surfaces devoid of blow holes or other irregularities. All nuts and bolts shall be made of stainless steel AISI type 304. Every surface of metal other than stainless steel and brass having contact with the pumpage must be protected by an approved coating that is resistant wastewater.



2. The sealing device shall include a metal/metal contact between machined surfaces. The Critical mating surfaces where water tightness is required shall be machined and fitted with O-rings in Viton or Nitrile rubber. The adjustment resulting from the compression of rubber O-rings in two (2) plans and O-ring contact of four (4) sides without the requirement to limit the specific torque
  3. The gaskets rectangular section requiring specific torque limits to achieve compression cannot be considered as adequate or equal. Or secondary seal or O-ring elliptical, grease or any other device product cannot be used.
2. Accessories:
    1. Lifting system:
      1. Each pump shall be equipped with a lifting system designed for normal load exceeding the weight of the pumping unit of at least 50%.
      2. The lift system includes:
        1. A short chain attached to the pump handle.
        2. Nylon rope attached to the chain.
        3. An eye claw compatible with the hoist hook to be used to remove the pump.
      3. The toothed grommet that is placed in the hook of the hoist down on the nylon cord and automatically grabs the chain.
  3. Protections :
    1. The stator shall incorporate thermal switches in series to stop the engine and generate an alarm when the winding temperature exceeds 125 ° C or 140 ° C for engines class H.
    2. A leak detector must be included to stop the engine and generating an alarm when there is presence of water in the stator chamber.
    3. Protection relay pump (temperature and humidity).

### **PART 3 – EXECUTION**

#### **3.1 INSTALLATION**

1. Installer les pompes conformément aux exigences du Manufacturier.
2. The cconnections of the cables to the motor of the pump and the sealing must be made in the factory to ensure sealing.

#### **3.2 ELECTRICAL CONNECTION**

1. The Contractor shall connect the pumps and fleet level control panel provided and installed in the technical building;
2. The connection must be made by a qualified electrician;
3. Coordination must be made between the various stakeholders.

## **PART 4 – FACTORY AND FIELD TESTS**

### 4.1 FACTORY TESTED

1. Hydraulic testing:
  1. All pumps supplied shall be subjected to hydraulic tests demonstrating their ability in terms of flow, pressure and power consumption.
  2. The tests shall be performed using clean water temperature below 30 ° C in accordance with the indications of the latest version of December 2011 "Hydraulic Institute Standards for Centrifugal, Rotary and Reciprocating Pumps" (HIS).
  3. If such tests are impossible to achieve because of the size of the pumps or for any other reasons, they can be performed after the installation of the pumps on the work site. However, this procedure is subject to the approval of the Project Manager or his representative before construction.

### 4.2 FIELD TESTS

1. Preparation:
  1. Isolate the wet well whenever possible.
  2. Switch off the SYSTEM control water levels (SYSTEM to fleets or other).
  3. Operate pumps in manual mode.
2. Description of tests:
  1. Basic Principle:
    1. For each pump, measures flow, pressure, voltage and amperage levels should be carried out simultaneously.
  2. Methodology:
    1. The pumping rate is equal to the volume between them and "departure" of the pump (or pumps) plus the volume of water that may have entered the wet well during the pumping time "off" levels, divided by pumping time.
    2. For results to be valid, always measure the flow pumps using their normal operating levels.
    3. Retesting three (3) times for each of the pumps so as to obtain results with a maximum deviation of  $\pm 5\%$ .
3. Calibration results:
  1. For calibration of each pumps and group of pumps, provide all possible combinations of pumps in the performance test report, the following information:
    1. The calibration of the pumping station used on the sketch area and height calibration.
    2. A plan that includes the size of wet wells and the location of equipment in the calibration area.

3. The calculations of total volumes, useful and useless for each wet well. Explain the peculiarities of each well, if applicable.
  4. Static and dynamic pressures at the time of calibration gauge and the distance between the gauge and the level of water.
  5. The amperage measured during calibration.
  6. The voltage for the benchmarking exercise.
  7. Calibration and inspection of the pumping station cards.
4. Additional tests:
1. When the pump calibration is completed, the pumping system must be operated in automatic mode.
  2. When stopping and starting of pumps for each sequence pumping pressure data must be taken to observe the hydraulic transients.
  3. Simultaneously, the behavior of the air vent (if required) and the valve should be noted.

#### 4.3 RAPPORT

1. Provide the Project Manager test report carried out on site, all data must be transferred to the theoretical curve of the pump.
2. The report of the manufacturer must be provided to Project Manager before shipping pumps on site.

**END OF SECTION**

## **PART 1 GENERAL**

### **1.1 SCOPE OF WORK**

1. The work described in this section include the design, delivery, installation, site services, commissioning, mechanical testing and guarantees for the provision of special traps and accessories.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

1. Special access doors should be branded as manufactured by PRETAL INC. or certified equivalent approved by the Departmental Representative.

For equivalent, the Contractor shall verify that all the structural integrity of the concrete slab is kept.

### **2.2 LIST OF EQUIPMENT**

<b>Type (example only)</b>	<b>Free dimension (mm)</b>
PTL-2050-AL-11180-LZ-NB-IT-BM-VA	1115 x 800

### **2.3 EQUIPEMENT DESCRIPTION**

1. General :
  - a. The product is guaranteed to work well and to be free from defects in material and workmanship for a period of one (1) year from the date of purchase. Any part that fails or breaks in normal operation during this period shall be replaced free.
2. Access doors (PRÉTAL) :
  - a. The main components of these access doors are:
    1. The main components of these traps are:
    2. Aluminum frame.
    3. Anchoring flange to the periphery of the frame.
    4. Completes made of aluminum plate with a reinforced grip reinforcements, consists of a "U" profile.
    5. Stainless steel hinges.
    6. Damper cylinder charged with nitrogen and oil.
    7. Stainless steel self-blocking anchor arm
    8. Removable stainless steel handle.
    9. Retaining chain between the doors.
    10. Drain placed in the frame (model 2000).
    11. Rubber pad and of neoprene between the frame and the door
  - b. For each of the access doors with hasps, provide a lock ABLOY No. PL 231 with three (3) master keys, or approved equivalent.

## 2.4 MANUFACTURE OF ACCESS DOORS

1. The manufacturing plant must be performed according to the information specified in this specification and those shown on the plans.
2. Respect the opening and location of handles direction indicated on the plans.
3. Coordinate the position of drains with plans.

## **PART 3 EXECUTION**

### 3.1 IMPLEMENTATION

1. All access door frames must be set up before pouring concrete.

## **PART 4 FIELD TESTS**

### 4.1 FIELD TESTS

1. Perform tests in accordance with Section 13010.
2. Clean frames.
3. Verify proper operation of all doors, opening and closing mechanisms, sealing, etc.

**END OF SECTION**

## **PART 1 - GENERAL**

### 1.1 CONTEXT

1. In the current context, of traffic becoming increasingly important at Quai Baie-Sainte-Catherine, the system of wastewater treatment currently in place does not have the necessary capacity support of organic pollution produced daily. It was therefore opted for its replacement.

Given that no manufacturer name or specific technologies may be prescribed in the tender, the replacement of the existing system will ask that a review of recognized standard level by the Ministry of "Développement durable, de l'Environnement, de la Faune et des Parcs (MDDEFP)" is carried out by the tenderer

### 1.2 DESCRIPTION

1. Each system shall be provided so as to meet environmental discharge objectives (OER) issued by the Ministry of "Développement durable, de l'Environnement, de la Faune et des Parcs (MDDEFP)". These standards are:

- BOD5:  $\leq 25$  mg / L;
- SS:  $\leq 25$  mg / L;
- Fecal Coliforms: 200 CFU/100mL

2. The treatment system must meet the following requirements
  - Must be independent and have minimal maintenance;
  - Must be installed in the lagoon present in the dock;
  - The equipment processing system which will be installed in the existing pool of concrete must be resistant to corrosion;
  - Must be able to treat wastewater to meet the discharge requirements set out above, and preferably be able to meet the performance of rejection of 15 mg / L and less BOD5 and TSS;
  - Must have a data sheet standard recognized by the MDDEFP

## **PART 2 – PRODUCTS**

### 2.1 EQUIPMENT LIST AND SPECIFICATIONS

1. The Contractor shall ensure that all equipment, one or the other of the two technologies is provided so that treatment can help to meet the standard requirements of the respective data sheets. All missing equipment will be borne by the supplier of the technology;
2. A prefilter brand name Polylok PL-525 model, should be installed in the septic tank on the outlet pipe must be provided with advanced secondary treatment system;

3. A disinfection system preassembled ultraviolet rays, including three (3) units of lamps producing 40 mJ/cm<sup>2</sup> each, must be one of the processing equipment. A control panel shall be provided with the disinfection system;
4. A magnetic flow meter is to be installed immediately upstream of the disinfection system. The minimum distances connecting upstream and downstream of the device must be respected;
5. The Contractor shall provide the necessary pipes to connect equipment that are not part of the pipe supplier
6. An emissary of 100 mm diameter pipe must be installed between the building and the technical ballast wharf passing through the concrete wall.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

1. For the implementation of the processing system, the Contractor shall refer to plans issued for construction, as well as how to install the supplier for the various details;
2. The Contractor shall agree with the supplier to the terms related to the provision of equipment and its installation. It must ensure that all equipment, piping, electrical and other wiring that will be an integral part of the components that the provider includes in its list of equipment;
3. The Contractor shall ensure, in coordination with the supplier or his representative, that all equipment is installed and connected properly;
4. The installation of disinfection system will be inside the technical building. The installation must be supervised by a representative of the supplier. Adjusting the flow of water entering the system will be carried out according to the supplier's.

#### **3.2 WATER COMMISSIONING AND FINAL VERIFICATION**

1. Once all the equipment has been set up and connected, the Contractor shall verify the operation of the entire treatment process. To do this, the tests must be carried out with clean water. A compliance report should be provided to the Departmental Representative and engineer.

2. The tests will help to ensure the following:
  - Operation of trap doors;
  - Connecting vents;
  - Sealing tanks;
  - Position of the various equipment;
  - Proper operation of all equipment installed treatment (aeration and various pumping equipment);
  - Sealing of different water and air pipes;
  - Runoff between the different points of transfer between the entrance to the septic tank and the outlet;
  - Position and function of the magnetic flowmeter;
  - Disinfection system.

### 3.1 COMMISSIONING

1. The Contractor shall schedule the commissioning of the new waste treatment and inform the owner, the Departmental Representative and the engineer as soon as possible;
2. An inspection of the entire treatment process will be carried out by the various stakeholders involved in the design of the treatment system;
3. Deficiencies will be noted and will be corrected by the Contractor as soon as possible.

**END OF SECTION**



# DRAWINGS TO BE SUBMITTED

## SECTIONS 02, 10 and 13

<b>CONTRACTOR :</b>	<b>PROJECT:</b> Baie-Sainte-Catherine's wharf Replacement of the wastewater treatment system
	<b>PROJECT MANAGER :</b> Denis Paquin, ing.
<b>SPECIALTIES :</b> Civil	<b>PROJECT N° :</b> R.063880.001

DESCRIPTION	N° SECTION	REVISED		REVISED AND ANNOTATED		REVIEW AND SUBMIT		REFUSED	
		BY	DATE	BY	DATE	BY	DATE	BY	DATE
Treatment equipment	02 10 21								
UV system	02 10 21								
Technical building									
Prefilter	02 10 21								
Special traps	10 27 40								
Submersible pumps	13 60 50								
Boitier de vidange des bateaux									

**Note :** All shop drawings must be received in a single shipment.

Prepared by : Claude Talbot, ing.  
Date: September 2013

## **PART 1 - GENERAL**

### **1.1 DESCRIPTION OF WORK**

The work under this contract is divided into two distinct parts. The first part is to replace the existing septic system (Ecoflo) present in the dock, adjacent to the waiting booth. The second part is to connect a gravity transfer pipe from the boat's wastewater discharge to the new treatment system.

All work covered by this contract include, but are not limited to:

#### Part 1 : Treatment system

- .1 Dismantling of treated wood floor in the area of the treatment system;
- .2 Dismantling of the lagoon ceiling. Consists of remove the soil cover of the basin, as well as the looks of access to the pool;
- .3 Dismantling of the septic tank located within the lagoon. Consists in undo two (2) walls adjacent to the lagoon walls, and the separator present inside the septic tank wall;
- .4 Cleaning the lagoon;
- .5 Implementation of poured concrete walls inside the lagoon for the formation of the septic tank and the biological reactor;
- .6 Implementation of the concrete slab covering the lagoon;
- .7 Replacement of pumps from the pumping station present in the lagoon;
- .8 Dismantling of three (3) boxes Ecoflo treatment system present in the dock, and available in a designated location to receive contaminated by sewage from domestic sources;
- .9 Installation of pipes to transfer water, including the conduct of outfall of treated water to the river;
- .10 Drilling of concrete retaining wall (north side of the dock) for the passage of the pipe outfall;
- .11 Filling pipes and the space left after the dismantling of the Ecoflo boxes;
- .12 Recovery of the treatment basin (basin renowned stabilization) using earth fill removed during decommissioning;
- .13 Replacing the treated wood floor, as well as adding and moving cover treated wood giving access to different views of the treatment tank;
- .14 Installation of equipment for biological treatment;
- .15 Installation of a new building that will receive certain technical processing equipment;
- .16 Installing an additional vent connected to the processing system and emerging on the roof;
- .17 Electrical connection of the treatment system equipment to the reception booth electrical power, including the technical building;
- .18 Connecting the treated water discharge to the technical building and the outfall pipe;
- .19 Correction of asphalt and concrete curb removed for the need for the work;
- .20 Start-up and training.

Part 2 : Cruise ship transfer pipe

- .1 Dismantling of treated wood floor located along the booth between the sector 'wastewater treatment', and the paved section of the dock, boat dock side section;
- .2 Installation of a transfer case that allow emptying boat's wastewater tanks;
- .3 Excavation of a trench for the passage of the sewage pipe gravity from the boat's wastewater discharge to the wastewater treatment system (between the transfer case and the treatment system);
- .4 Installation of the boat's wastewater gravity transfer pipe;
- .5 Connecting the transfer pipe to the septic tank;
- .6 Recovery of the transfer pipe;
- .7 Replacing the treated wood floor.

**1.2 REFERENCES**

Plans and specifications.

**1.3 USE OF PREMISES BY CONTRACTOR**

- .1 Coordinate the use of the premises as directed by the Engineer;
- .2 Find the storage areas needed to carry out the work under this contract, and pay the cost if required;
- .3 The Contractor shall ensure, to the federal authorities, spaces that can be attributed to him for purposes of the work;
- .4 The contractor will work with a work schedule set for the 2013 season. Refer to Section 01 32 16.07 - Construction Progress Schedule - for more details.

**END OF SECTION**

**Part 1 General**

**1.1 DEFINITIONS**

- .1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.
- .2 Bar Chart (GANTT Chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally Bar Chart should be derived from commercially available computerized project management system.
- .3 Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.
- .4 Construction Work Week: Monday to Friday, inclusive, will provide five day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.
- .5 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.
- .6 Master Plan: summary-level schedule that identifies major activities and key milestones.
- .7 Milestone: significant event in project, usually completion of major deliverable.
- .8 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.
- .9 Project Planning, Monitoring and Control System: overall system operated by the Departmental Representative to enable monitoring of project work in relation to established milestones.

**1.2 REQUIREMENTS**

- .1 Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.
- .2 Plan to complete Work in accordance with prescribed milestones and time frame.
- .3 Limit activity durations to maximum of approximately 10 working days, to allow for progress reporting.
- .4 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

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

- .2 Submit to the Departmental Representative 5 days within working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.
- .3 Submit Project Schedule to the Departmental Representative within 5 working days of receipt of acceptance of Master Plan.

#### **1.4 PROJECT MILESTONES**

- .1 Project must be achieved 1month following contract award.

#### **1.5 MASTER PLAN**

- .1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).
- .2 The Departmental Representative will review and return revised schedules within 5 working days.
- .3 Revise impractical schedule and resubmit within 5 working days.
- .4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

#### **1.6 PROJECT SCHEDULE**

- .1 Develop detailed Project Schedule derived from Master Plan.
- .2 The detailed implementation schedule must cover the entire duration of the project, from contract award to the final demobilization.  
  
Important to include more elements of construction activities, it must have the dates for the production of shop drawings, data sheets, certificates of compliance, permits, delivery of different materials.

#### **1.7 PROJECT SCHEDULE REPORTING**

- .1 Update Project Schedule on weekly basis reflecting activity changes and completions, as well as activities in progress.
- .2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

#### **1.8 PROJECT MEETINGS**

- .1 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.
- .2 Weather related delays with their remedial measures will be discussed and negotiated.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 CONTENT OF THE SECTION**

- .1 Shop drawings and data sheets.
- .2 Product samples
- .3 Certificates.

### **1.2 RELATED SECTIONS**

- .1 Section 01 45 00 - Quality Control.

### **1.3 REFERENCES**

- .1 S/O

### **1.4 CONSIDERATIONS FOR ADMINISTRATIVE NATURE**

- .1 In the shortest possible time and in a predetermined order so as not to delay the execution of the work, submit the required documents to the approval of the Engineer. A delay in this regard cannot constitute a sufficient reason for an extension of time for completion of the work and no such request will be accepted.
- .2 The work for which the filing is required should not be undertaken until the verification of all the documents submitted is complete.
- .3 The data shown on the shop drawings, specifications, data sheets and samples of products must be expressed in metric units.
- .4 When items are not produced or manufactured in metric units or that the characteristics are not given in SI units, the converted values can be accepted.
- .5 Review documents and samples before deliver to the Engineer. Through this diligence, the Contractor confirms that apply to the work requirements have been or will be determined and verified, and that each of the documents and submitted samples was examined and found to comply with the requirements of work and contract documents. Documents and samples will not be stamped, signed, dated and identified in connection with the specific project will be returned without being examined and shall be considered rejected.
- .6 Notify the Engineer in writing at the time of filing and samples, differences that they have with the requirements of the contract documents, and explain the reasons.
- .7 Ensure the accuracy of the measurements taken on site from adjacent structures affected by the work.
- .8 The fact that the documents and samples submitted are reviewed by the Engineer does not release the Contractor from its responsibility to provide complete and accurate and in accordance with the contract documents parts.
- .9 Keep a copy on site of each check document submitted.

## 1.5 SHOP DRAWINGS AND DATA SHEETS

- .1 The term "shop drawings" means drawings, diagrams, illustrations, tables, graphics performance, leaflets and other documentation to be provided by the Contractor to show in detail some of the work in question.
- .2 The shop drawings must indicate the materials to be used and methods of construction, fixing or anchor to use, and they must contain the assembly drawings, details of connections, the relevant explanatory notes and other information necessary to complete the work. When structures or elements are connected to other structures or elements, indicate on the drawings that there have been coordination requirements, regardless of the section under which the works or adjacent elements will be provided and installed. Make references to specifications and plans.
- .3 Allow five days to the Engineer to examine each batch of documents submitted.
- .4 Changes to shop drawings by the Engineer are not supposed to vary the contract price. If this is the case, however, notify the Engineer in writing before beginning work.
- .5 Make changes to shop drawings that are requested by the Engineer, in accordance with the requirements of the contract documents. When submitting the drawings again, notify the Engineer in writing of the changes that were made in addition to those required.
- .6 Documents must carry or indicate the following:
  - .1 The date of preparation and revision dates;
  - .2 The name and number of the project;
  - .3 The name and address of:
    - .1 The subcontractor;
    - .2 The supplier;
    - .3 The manufacturer.
  - .4 The stamp of the Contractor, signed by the authorized representative, stating that the documents submitted are approved, the measures taken on site were tested and complies with all requirements of the contract documents;
  - .5 Relevant details to the relevant portions of work:
    - .1 Materials and manufacturing details;
    - .2 The layout or configuration, with dimensions, including those made locally, as well clearances;
    - .3 Details on installing or adjusting;
    - .4 Characteristics such as power, flow or capacity;
    - .5 Performance characteristics;
    - .6 Reference standards;
    - .7 Operating weight;
    - .8 Links with the adjacent works.
- .7 Distribute copies of shop drawings and data sheets once the Engineer has completed the verification.

- .8 It's possible that the Engineer requires that certain shop drawings are sealed by an engineer member of the Order of Engineers of Quebec.
- .9 Submit three copies of shop drawings specified in the specification sections and according to the reasonable requirements of the Engineer.
- .10 If no shop drawing is required due to the use of a standard product manufacturing, submit 3 copies of the data sheet or the manufacturer's documentation prescribed in the specification sections and as required by the Engineer.
- .11 Remove information that does not apply to the work.
- .12 In addition to current information, provide any additional details that apply to work.
- .13 When the shop drawings have been checked by the Engineer and no error or omission was detected or they contain only minor corrections, a copy is returned, and the work of shaping and installation can then be undertaken. If shop drawings are rejected, the annotated copies are returned and corrected shop drawings must be submitted again before work shaping and installation can be undertaken.
- .14 Review of shop drawings by the Engineer is intended only to verify compliance with the general concept of drawing's data. This review does not mean that the Engineer approves the workshop drawings that the responsibility rests with the Contractor who submits the drawings and does not relieve the Contractor of the obligation to submit complete and accurate drawings and workshops to comply with all the requirements of work and contract documents. Without restricting the generality from the foregoing to be restricted, it's important to note that the Contractor is responsible for the accuracy of dimensions confirmed on site, the supply of information to the techniques of construction and installation and coordination of work done everyone.

## **1.6 PRODUCTS SAMPLES**

- .1 Submit three samples of products for verification, as specified by the specification sections. Label the samples indicating their origin and destination.
- .2 Ship samples (Shipping paid) to the Engineer office site.
- .3 Notify the Engineer in writing at the time of submission of product samples, differences they have with respect to the requirements of the contract documents.
- .4 When the color, pattern or texture been a prescription, submit full range of samples required.
- .5 Changes to the samples by the Engineer are not supposed to vary the contract price. If this is the case, however, notify the Engineer in writing before beginning work.
- .6 Bring changes to samples that may be requested by the Engineer while respecting the requirements of the contract documents.
- .7 Examined and approved samples will become the standard from which the quality of materials and workmanship of the finished and installed work will be evaluated.



**1.7 MATRIEL SAMPLING**

- .1 Carry out the works samples in accordance with Section 01 45 00 - Quality Control.

**1.8 CERTIFICATES**

- .1 Submit the required documents by the Committee on Health and Safety immediately after the contract is awarded.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 CONTENT OF THE SECTION**

- .1 The Contractor shall manage its activities so that the health and safety of the public and site personnel and protection of the environment has always precedence over issues related to cost and schedule.

### **1.2 REFERENCES**

- .1 Canada Labour Code, part II, Canada Occupational Health and Safety Regulations
- .2 Canadian Standards Association (CSA).
- .3 Workplace Hazardous Material Information System (WHMIS) / Health Canada.
  - .1 Datasheets.
- .4 "Loi sur la santé et la sécurité du travail, L.R.Q. Chapitre S-2.1."
- .5 "Code de sécurité pour les travaux de construction, S-2.1, r.6."

### **1.3 DOCUMENTS/SAMPLES TO SUBMIT**

- .1 Submit documents and samples in accordance with Section 01 33 00.
- .2 Submit to the Departmental Representative and CSST the specific prevention program for construction, as described in section 1.8, at least 10 days before the work begins. The Contractor must then update its prevention program if the work differs from its original forecast. The Departmental Representative may, after receiving the program and at any time during the works, require that the program be amended or supplemented to reflect the reality of the site. The Contractor must then provide corrections before the works begin.
- .3 Submit to the Departmental Representative the inspection site grid duly completed to the frequency specified in Article 1.13.1.
- .4 Submit to the Departmental Representative, within 24 hours, a copy of any inspection report, correction notice or recommendations issued by the federal or provincial inspectors.
- .5 Submit to the Departmental Representative, within 24 hours, an investigation report for any accident resulting in injury and any incident that highlights a potential risk.
- .6 Submit to the Departmental Representative, all datasheets for controlled products used on the construction site, and at least three days prior to their use on site.
- .7 Submit to the Departmental Representative, copies of training certificates that are required for the implementation of prevention program, including:
  - .1 Health and general safety courses for construction sites;
  - .2 First Aid in workplace and CPR;
  - .3 Port and adjustment of personal protective equipment;
  - .4 Forklift safety driving;

- .5 Elevating work platforms;
- .6 And any other training required by regulation or by the prevention program.
- .8 Medical examination: Where medical examinations are required, under a law, a regulation, a directive, a specification or a prevention program, the contractor must:
  - .1 Before mobilization, submit to Departmental Representative the medical exam of its supervisory staff and all employees covered by the first paragraph of this article who will be present at the start of the construction site.
  - .2 Thereafter, submit progressively and without delay medical exam for all new arrivals to the site which are covered by the first paragraph of this article people.
- .9 Emergency plan: the emergency plan, as described in section 1.8.3, shall be forwarded to the Departmental Representative at the same time as the prevention program.
- .10 Construction site opening notice: the notice of construction site opening must be submitted to the "commission de la santé et de la sécurité du travail (CSST)" before the work begins, with a copy to the Departmental Representative. A copy of the notice shall also be prominently displayed on the site. During demobilization, the closure notice must be sent to the CSST, with a copy to the Departmental Representative.
- .11 Engineering plans and certification requirements: The Contractor shall forward to the CSST and the Departmental Representative a signed and sealed copy by an engineer of all plans and certificates of compliance that are required under the "Code de sécurité pour les travaux de construction (S-2.1, r. 6)" Code of Safety for copy jobs Construction (S-2.1, r. 6), another law, another regulation or other provision of the estimate or contract. A copy of these documents must be available at all times on site.
- .12 Certificate of conformity issued by the CSST: certificate of conformity is a document issued by the CSST confirming that the contractor is in good standing with the CSST, that is to say, he paid him all sums due in respect to a particular contract. This document must be provided to the Departmental Representative at the completion of the work

#### **1.4 RISK EVALUATION**

- .1 The Contractor shall conduct a hazard identification relating to each of the tasks performed on the job.
- .2 The Contractor shall plan and organize work so as to help eliminate the source of danger or collective protection and thus minimizing the use of personal protective equipment. When personal protection against falls is required, workers must use a safety harness in accordance with the standard CAN/CSA-Z-259.10. The seat belt must not be used as protection against falling.
- .3 Equipment, tool, or a means of protection that cannot be installed or used without compromising the health and safety of workers or the public is deemed to be inadequate for the job.
- .4 All mechanical equipment must be inspected prior to delivery on site. Before the use of mechanical equipment the Contractor shall transmit to the Departmental Representative a certificate of compliance signed by a competent mechanic. Departmental Representative may

at any time, if he suspects a malfunction or an accident risk, order the immediate cessation of equipment and require a second inspection by a specialist of his choice.

- .5 For use of equipment for lifting persons or materials, to ensure that the inspections required by the standards are made and being able to provide a copy of the inspection certificate on request of the Departmental Representative.

## **1.5 MEETINGS**

- .1 A decision contractor's representative shall attend all meetings and when it comes to health and safety on site.
- .2 The contractor shall establish a site committee and hold meetings as required by the Safety Code for the construction.

## **1.6 REGULATORY REQUIREMENTS**

- .1 Comply with all laws, all regulations and all the standards that are applicable to the works.
- .2 Observe the standards and regulations prescribed to ensure a normal workflow on land contaminated with hazardous or toxic materials.
- .3 Notwithstanding the date of publication of the standards specified in the security code for construction, one should always use the current version when it applies.

## **1.7 CONDITIONS OF LAND/IMPLEMENTATION**

- .1 On this construction site, the Contractor shall take into account the specific characteristics of the site:
  - .1 Presence of many vehicles around the site;
  - .2 Presence of bird droppings;
  - .3 Constant presence of employees and the public around the site.

## **1.8 MANAGEMENT OF HEALTH AND SAFETY**

- .1 Accept and assume all the duties and responsibilities normally assigned to the prime contractor under "Loi sur la santé et la sécurité du travail (L.R.Q., chapitre S-2.1) et du Code de sécurité pour les travaux de construction (S-2.1, r.6)".
- .2 Develop a program of specific prevention project that is based on the identification of risk and implement this program at the beginning of the project until the last stage of demobilization. The prevention program should take into account information that appears in section 1.7. It must be sent to all concerned, in accordance with Article 1.3. The prevention program must include at least:
  - .1 The company's policy on health and safety;
  - .2 The description of the work, the total cost of the work, the schedule and the enrollment projected curve;
  - .3 The organizational responsibility for health and safety;
  - .4 The physical and material organization of the site;

- .5 The first aid standards;
  - .6 The identification of risks in relation to the site;
  - .7 The identification of risks in relation to the work performed, including preventive measures and methods of implementation;
  - .8 The training required;
  - .9 The procedure in case of accident / injury;
  - .10 The written commitment of all stakeholders to respect this prevention program;
  - .11 A site inspection grid based on preventive measures.
- .3 The Contractor must develop an effective emergency plan in relation to the characteristics and constraints of the site and its environment. The emergency plan must be sent to all concerned, in accordance with Article 1.3. The emergency plan must contain in particular:
- .1 The evacuation procedure;
  - .2 The identification of resources (police, fire, ambulance etc.);
  - .3 The identification of those responsible for the site;
  - .4 The identification of rescuers;
  - .5 The training required for those responsible for its implementation;
  - .6 And any other information that would be necessary, given the characteristics of the site.

## **1.9 RESPONSIBILITIES**

- .1 Regardless of the size of the site or the number of workers present, name a competent person as supervisor and responsible for health and safety. Take all necessary measures to ensure the health and safety of persons and property at work and in the immediate environment of the site which could be affected by the workflow.
- .2 Take all necessary measures to ensure the implementation and compliance with the requirements of health and safety information contained in the contract documents, the federal and provincial regulations, standards that are applicable and the specific prevention program for the site and comply promptly with any order or correction notice issued by the "Commission de la santé et sécurité au travail (CSST)".
- .3 Take all necessary measures to keep the site clean and tidy throughout the work.

## **1.10 COMMUNICATION AND DISPLAY**

- .1 Take all necessary steps to ensure effective communication of information on health and safety on site. Upon arrival at the site, all workers must be informed of special prevention program, their obligations and their rights. The Contractor shall insist on the right of workers to refuse work if they believe that this work can jeopardize their health, safety, physical integrity or that of other people on the site. He shall keep onsite and update a register with the information provided and the signature of all the workers who have received such information.

- .2 The following information and documents must be posted in an easily accessible place for workers:
  - .1 Document "Avis d'ouverture du chantier";
  - .2 Identification of the project manager;
  - .3 Company's policy on health and safety at work;
  - .4 Site prevention specific program;
  - .5 Emergency plan;
  - .6 Safety Data Sheet for all controlled products used in construction
  - .7 Minutes of site's committee meetings;
  - .8 Names of site's committee representatives;
  - .9 Name of rescuers;
  - .10 Intervention and correction reports issued by the CSST.

#### **1.11 CONTINGENCY**

- .1 When a source of danger not specified in the specifications and not identified during the preliminary site inspection appears out of or in the works, the Contractor shall stop work immediately, implement temporary protective measures for workers and the public and prevent the Departmental Representative verbally and in writing. The Contractor shall thereafter make the necessary changes to the prevention program for that work can resume safely.

#### **1.12 WORKPLACE INSPECTION AND CORRECTION OF DANGEROUS SITUATIONS**

- .1 Inspect the workplace and complete the site inspection grid at least once a week.
- .2 Immediately take all necessary steps to correct the exceptions to laws and regulations and dangerous situations which are identified by a government inspector, by the Departmental Representative, the health and safety coordinator, construction, or during periodic inspections.
- .3 Submit to the Departmental Representative a written confirmation of all actions taken to correct deviations and dangerous situations.
- .4 Work stopping: Grant the security officer or, if there is no security guard, the person appointed to take care of health and safety, the authority to order the stop and resumes when it is deemed necessary or desirable for reasons of health and safety. It will ensure that the health and safety of the public and site personnel and protection of the environment have always precedence over issues related to cost and schedule.
- .5 Without limiting the scope of sections 1.8 and 1.9, the Departmental Representative may at any time order the stop work if, in his perception, there is a danger or risk to the health or safety of site personnel, the public or environment.

#### **1.13 BLASTING**

- .1 Blasting and any other use of explosives is prohibited.

## **1.14 PROTECTIVE MEASURES IN CLEANING OF BIRDS DROPPINGS**

- .1 Respiratory protection
  - .1 As infectious agents potentially present in bird droppings are transmitted to humans by air, the use of a respirator is mandatory because of the risk of damage to health by inhalation of this pollutant.
  - .2 The type of respiratory protection should be based on the levels of exposure to feces, that is to say, among other things, the activity of the individual, the workplace, but also the amount of manure present and the duration of exposure. Regardless of the model chosen, the device must be minimally a cartridges filter mask with high-efficiency (HEPA or N100), meet Canadian standards and be NIOSH (National Institute for Occupational Safety and Health) certified and can be used by personnel who have received prior training on the proper handling of masks.
  - .3 In addition to respiratory protection to guard against infectious agents, protection against chemical vapors is necessary whenever there is use of bleach. A suitable gas filter (white with a yellow band for chlorine) is then added to mask or half mask in addition to the particulate filter. Disposable coveralls as well as combinations of overshoes must be worn by all workers in order to avoid contamination by pathogens of their clothes. Workers should also wear gloves to prevent cuts and contamination of skin wounds.
  - .4 After working in a contaminated environment, workers must, before removing the protector respirator device remove the disposable dress, gloves and shoe covers, place them in a heavy plastic bag that will be removed with the manure to a landfill site or incinerator in accordance with all requirements for the disposal of these wastes.
  - .5 Sinks with disposable towels must be available to workers. Workers should at least wash their hands and face every time they leave the contaminated area.

## **1.15 SEALING GUNS AND OTHER CARTRIDGES DEVICES**

- .1 The use of sealing guns or other cartridges devices must be authorized by the Departmental Representative.
- .2 Anyone who uses a sealing gun must have a training certificate and meet all the requirements of section 7 of the Code of Safety for Construction (S-2.1, r. 6).
- .3 Any other cartridge device must be used according to the manufacturer's indications and the standards and regulations.

## **PART 2 - SPECIAL REQUIREMENTS**

### **2.1 GENERAL**

- .1 The Contractor shall ensure that any person who performs work exposing to risk of falling more than 2.4 m has a protection against falls.
- .2 Plan and organize work so as to help eliminate the source of danger or collective protection and thus minimizing the use of personal protective equipment. When personal protection

against falls is required, workers must use a safety harness according to CAN-CSA Z-259.10-M90 standard. The seat belt must not be used as protection against falling.

- .4 The wearing of safety harness is mandatory in all aerial platforms telescopic mast, articulated or rotatable.
- .5 Delimit a danger zone at any place where equipment is used for working at height.

## 2.2 SCAFFOLDING

### .1 Foundations:

- .1 Scaffolding must be installed on a solid foundation so that they cannot slip or tip.
- .2 The Contractor who wants to install a scaffold on a roof, a roof overhang, canopy or attic shall submit to the Departmental Representative calculations and loads and obtain authorization before starting the installation.

### .2 Assemblies, bracing and securing:

- .1 All scaffolds must be assembled, braced and secured in accordance with manufacturer's instructions and the requirements of the *Safety Code for the construction*.
- .2 In any situation where it is necessary to remove some elements of the scaffold (eg braces), the Contractor shall submit an assembly procedure signed and sealed by a professional engineer attesting that the scaffolding assembled will perform work safely, taking into account the loads that will be applied.
- .3 For scaffolding which span between two supports is greater than 3m, the Contractor shall provide an assembly plan signed and sealed by an engineer.

### .3 Protections against falls during assembly:

- .1 Before starting work, the Contractor shall submit to the Departmental Representative procedure specifying the means of protection used and, where applicable, the anchors for the emergency cables or restraint links. This procedure must comply with the provisions of sections 3.9.4.5, 2.9.1 and 2.10.12 of the *Code of Safety for Construction* (amended on 2 August 2001).

### .4 Floors:

- .1 Scaffolding decks must be designed and installed in accordance with the *Safety Code for construction*.
- .2 If planks are used, they must be approved and stamped in accordance with Article 3.9.8 of the *Code of Safety for Construction* (effective January 1st 2002).
- .3 The floor must cover the entire protected area with railings.
- .4 Notwithstanding the foregoing, the scaffolding sections 4 and up (or 6m) in height should have a solid floor covering the entire surface of the bearers to all 3m or part 3m and elements of the floor shall at any time be moved to create intermediate levels.

### .5 Guardrails:

- .1 A guardrail should be installed at all levels of work.



- .2 The cross bracing should not be considered railings.
- .3 In the case of scaffolding four sections (or 6m) or more in height where solid floors are required, guardrails must be installed at each of these levels at the beginning of the work and remain in place until the end of the work.
- .6 Means of access:
  - .1 The Contractor shall ensure that access to the scaffold means does not compromise the safety of workers.
  - .2 When the floors are made of scaffolding planks, ladders should be installed so that the planks that exceed not impede the ascent or descent.
  - .3 Notwithstanding the provisions of the *Safety Code for Construction*, we must install stairs on all scaffolds with 6 rows upright and more and 6 sections and more (or 9m) in height.
- .7 Protection of the public and occupants:
  - .1 The Contractor shall define and barricade the work area so as to limit access to only authorized workers.
  - .2 The Contractor shall install walkways, nets or other devices of the same kind to protect the public or the occupants against falling objects.
- .8 Using public roads:
  - .1 When it is necessary to infringe on the public highway, the Contractor shall obtain, at its own expense all licenses and permits required by the competent authority.
  - .2 The Contractor shall install at its own expense, all signs, barricades and other devices required to ensure the safety of the public and its own facilities.

## 2.3 PROTECTION AGAINST FALLS FROM HEIGHT

- .1 Guardrails:
  - .1 The installation of guardrail is required. PWGSC may indicate some restrictions on anchoring, in which case the Contractor shall ensure that the railings still meet all the requirements of Section 3.8 of the *Safety Code for construction* industry (RSQ, S-2.1, r.6).
  - .2 The Contractor agrees that the guards remain in place until the end of the project. The Departmental Representative permit dismantling when can confirm that all work, all inspections and the necessary corrections were made.
- .2 Harness:
  - .1 The wearing of safety harness is mandatory for installation of guardrails.
  - .2 The wearing of safety harness is mandatory for the installation and modification of parapets or flashing, and if it is necessary to temporarily move the guardrail.
  - .3 The wearing of safety harness is mandatory for receiving equipment and signals to the crane on the edge of a hole.
  - .4 The wearing of safety harness is mandatory for all work along the empty where collective protection does not provide adequate security.

- .5 The Contractor shall submit a fastening method and system emergency cables according to Section 2.10.12 of the *Safety Code for the Construction* industry (RSQ, S-2.1, r. 6) for each sector or different workplace.
- .3 Ladders:
  - .1 All ladders must be of sufficient length to exceed the level of access of at least three levels.
  - .2 All ladders must be attached at the top so as not to slide sideways. The Contractor shall implement a system to comply with this rule during finishing works.
- .4 Scaffolding:
  - .1 All scaffolding must be inspected and assembled in accordance with the *Safety Code for the construction industry* (RSQ, S-2.1, r. 6).
  - .2 When assembling scaffolding, the Contractor shall ensure that all workers are constantly protected against falls in accordance with Article 3.9.4.5 of the *Safety Code for the construction industry* (RSQ, S-2.1, r. 6).
- .5 Lifting materials:
  - .3 For all lifting equipment, the Contractor must submit to the Departmental Representative a mechanical inspection certificate made just before the delivery of the equipment on site.
  - .4 When installing a winch, the contractor must submit to the Departmental Representative the installation process recommended by the manufacturer or, failing that, a method of installing signed and sealed by an engineer. The installation process should take into account the maximum loads, number, weight and the location of the counterweight and any other details that may affect the capacity and stability of the device.
  - .5 In addition to the certificate of mechanical inspection, all cranes and truck cranes must have in the cabin the annual inspection certificate and crane logbook.
  - .6 Lifting devices should be positioned so that the loads are not carried over the heads of workers, occupants and the public.
  - .7 Any lift area should be barricaded to prevent unauthorized persons to enter.
  - .8 The Contractor shall obtain all permits and pay fees, if it's necessary to temporarily block the street to respect the previous paragraph or any other matter relating to the safety of workers, occupants or the public.
  - .9 The Contractor shall carefully inspect all slings and lifting gear and ensure that those who are in poor condition are destroyed and discarded.
  - .10 The lifting of compressed gas cylinders must be done using a cart specially designed for this purpose.
- .6 Protections against burns:
  - .1 People who work with kettle must wear long sleeves, safety goggles and face shield when changing the kettle.
  - .2 People who work of bitumen or other hot liquids must wear gloves, long sleeves and safety glasses.

- .7 Protection against fire:
- .1 Work on construction sites must be made in accordance with the standard of the "*Commissaire des incendies CI 301 sur les travaux de construction, juin 1982*"
  - .2 At the beginning of each shift and for each sector, the Contractor must obtain a "Hot Work Permit" issued by the head of the workplace (or his nominee).  
Au début de chaque quart de travail et pour chaque secteur, l'Entrepreneur doit obtenir un "Permis de travail à chaud" émis par le responsable du lieu de travail (ou la personne qu'il désigne).
  - .3 A functional and adequate portable fire extinguisher must be available and easily accessible within 5 m from flame and sparks or intense heat.
  - .4 The Contractor must designate a person to make a round (fire) for a period of two hours after the end of the shift. This person countersign the license and give it to the manager of the workplace (or his nominee) after the period of two hours.
  - .5 The storage of propane cylinders must be made in accordance of the CAN/CSA-B149.2-F00 standard (code on the storage and handling of propane), in addition of meeting the specific conditions set out in this document. Cylinders must be stored outdoors in a safe place, protected from unauthorized manipulation in a storage cabinet designed for this purpose, held securely upright and locked at all times, in a place where there are no moving vehicles unless they are protected by barriers or equivalent.
  - .6 Tanks or containers of fuel gas or fuel must be stored at least 10m from any building.
  - .7 The amount of propane tanks on the roof shall not exceed the necessary for a working day and the bottles shall at all times be attached in a standing position or used vertically in a cart designed for that purpose.
  - .8 All bottles used or stored on construction sites shall be provided with a collar designed to protect the valve.
  - .9 Filling bottles on the site is prohibited, unless a procedure in accordance with CAN / CSA B149.2 standard is approved and authorized by the Departmental Representative.
- .8 Materials and waste management:
- .1 On the roof, lightweight materials and sheet materials should be kept in containers or securely attached. In case of exemption, however minor it may be, the Departmental Representative may prohibit the storage of materials on the roof.
  - .2 The preceding paragraph also applies to waste.
  - .3 Waste must be disposed as long as the work goes in a garbage chute or a suitable containers.
  - .4 All waste must be removed from the roof at the end of the shift.
  - .5 Unless special permission of the Departmental Representative, any waste bin must be located at least 3m from any structure or building.
- .9 General protection and site organization:
- .1 Regardless of the circumstances and nature of work, people with access to the site must wear shoes and a safety helmet. The Contractor shall provide workers who will crouch or bend the chin or ratchet suspension helmet.

- .2 Covered walkways must be designed to protect all entrances and exits.
- .3 A security perimeter area shall be arranged in the work area to protect the public and occupants.
- .4 The work area on the ground, the materials handling area and the area where the kettle is installed must be clearly barricaded so that the occupants and the public cannot access.
- .5 Before installing any device capable of transmitting gases or vapors, the Contractor must obtain the permission of the head of the workplace. This will ensure that there is no risk of leakage in the ventilation systems of the building.
- .6 The Contractor shall ensure that the site is kept clean and tidy throughout the work.
- .7 Copies of data sheet for all controlled products must be submitted to the Departmental Representative and the head of the workplace before work begins.
- .8 The Contractor shall provide sanitary facilities and rest areas meet the requirements of the Safety Code for the construction.

### **PART 3 - EXECUTION**

3.1 N/A

**END OF SECTION**

## **PART 1 GENERAL**

### **1.1 SCOPE OF WORK**

- .1 This section applies to all work required to ensure the protection of the environment at the work site and particularly the shores and in the aquatic environment.
- .2 The Contractor shall provide labor, materials, construction equipment, handling and transportation and supervision required for the proper execution of all work to protect and restore the environment; as described in this section and shown on the plans.

### **1.2 MAIN REFERENCE STANDARDS**

- .1 The Contractor shall take into account, in particular, standards, laws, regulations and subsequent references in force in the execution of its work:
  - .1 “Loi sur la qualité de l’environnement L.R.Q.”, chapter Q-2 – Government of Quebec.
  - .2 “Règlement sur les déchets solides R.R.Q.”, 1981, chapter Q-2, r.14.
  - .3 “Guide environnemental des travaux relatifs au programme d’assainissement des eaux du Québec”.

### **1.3 DISPOSAL OF OBJECTS, MATERIALS, PRODUCTS OR OTHER**

- .1 The Contractor must dispose the execution materials accordance with the requirements of this section, if no other method or guideline is presented in the specifications.
- .2 All objects, materials, and other products from excavation or demolition, which the Contractor does not need to work should be disposed of at the expense of the Contractor unless otherwise specified in Section 01 35 70.
- .3 The Contractor becomes the owner of these materials and should be disposed off site and out of water bodies and their respective banks. The materials must be transported by the Contractor to or places of their choice for which one (s) he has previously obtained approval of the Project Manager. The Contractor is solely responsible for the consequences of filling one or more fields and possible claims owners concerned about the grading, the quality of spoil materials, damage to trees, terraces, etc.
  - .1 Disposal of dry materials:
    - .1 The definition of "dry material" is that of “Règlement sur les déchets solides de la Loi sur la qualité de l’environnement”.
    - .2 The Contractor is, unless otherwise specified in the contract, the owner of the dry materials and should be disposed off-site work and expense, all in accordance with the provisions of “Règlement sur les déchets solides (Q-2, r.14)”. For this purpose, the Contractor shall obtain the approved list for the elimination of dry materials to the appropriate regional office sites “ministère du Développement durable, de l’Environnement et des Parcs”.
  - .2 Disposal of surplus of excavation :
    - .1 All (excluding any surplus excavation waste, non-reusable materials, with the exception of dry materials) storage and disposal activities proposed site for the completion of this contract must be approved by Contracting Agency or the project

Manager no later than the first site meeting. No disposal of these materials may be made without obtaining the approval.

- .2 All excavated surplus disposal sites will be a leveling and appropriate revegetation, to the satisfaction of the owner and the project manager.
- .3 Any provision of materials, objects, products or other materials referred to in this section shall be made out of any body of water and their respective bank.

#### **1.4 CLEANLINESS OF THE SITES**

- .1 To minimize inconvenience to residents and motorists, the Contractor shall, without delay, clean soiled areas on the periphery of the site. Sectors borrowed by trucks will be monitored and maintained to prevent the accumulation of dirt deposits. At the end of the work, the site and its surroundings must be in a clean condition to the satisfaction of the Project Manager. Failure to meet these obligations, the owner will clean at the Contractor expense.

### **PART 2 GENERAL PRECAUTIONS AND MITIGATION**

#### **2.1 GENERAL**

- .1 At the completion of the work, mitigation measures will be the responsibility of the contractor, under the supervision of the promoter (PWGSC) or its consultant. The developer (or consultant) who will monitor the site to ensure that the environmental monitoring program is presented and discussed with the contractor during the kick-off meeting of the site and that this item appears on all meetings subsequent site. The monitoring form must be completed by the site supervisor and placed on file at the end of the work.

#### **2.2 MACHINERY**

- .1 Uses of vehicles and machinery in good working condition and free of leaks. Any machinery (excavator, crane, etc.) Must be inspected by qualified personnel before work begins to ensure that there is no mechanical breakage that can result in a loss of oil and other contaminants.
- .2 Maintain construction equipment in good working condition.
- .3 Leave machinery outside the zone of influence of waves during storms.
- .4 Perform general maintenances and fueling of equipment and vehicles in the spaces provided for this purpose and where there is no risk of contamination of the aquatic environment. Never clean the equipment in the rack. Handling fuel, oil or other contaminants must be performed under constant surveillance and more than 30 meters from the normal high water mark (OHWM) to avoid spillage.
- .5 Store fuel or other hazardous materials at more than 30 meters from the water or flowing ditch. Install, if necessary, fuel depots, oil or other petroleum products where there is no risk of contamination of the aquatic environment.
- 6 Contaminants accidentally released into the environment will be recovered immediately and disposed of according to regulations.
- .7 Have and how to use emergency equipment in case of a spill. In the event of an oil spill or other hazardous materials, the Contractor shall notify the Departmental Representative and the proper authority. Collect oil and contaminated soil and dispose of immediately in accordance with the legislation in force.

- .8 Report any spills that impact on the environment to the responsible authorities of the Canadian Coast Guard, maritime pollution 1-800-363-4735 at Emergency Service Environment (MDDEP) at 1-866-694-5454 and Environment Canada 1-866-283-2333; recover contaminated, if material and dispose with an accredited company.

### **2.3 MATERIALS AND WASTE**

- .1 Do no work in difficult weather conditions (heavy rain, strong wind and rough seas).
- .2 Wet down dry materials and cover the waste in difficult weather conditions to avoid the resulting wind raising dust or debris.
- .3 Avoid to leave bare excavated soils and implement needed a temporary restraint of the soil system (membranes, geotextile fabric, etc.) to prevent inclusion of suspended solids in the water during the work.
- .4 Borrowing materials must be free of contamination.
- .5 Borrowing materials must be stored at least 30 m of water and any water course (outside the area of influence of waves during storms) and they should be covered with a tarpaulin when it is prolonged storage. Granular materials will be stored to avoid intake of fine particles in water.
- .6 It is forbidden to store, deposit or dispose of any material or debris in the aquatic environment.
- .7 Always encourage the recycling of waste and scrap and demolition uncontaminated building where the facilities are existing in the area. Materials that will not be recovered either on site or on other sites will be sent preferably to a recycling center where these materials can be reused or be routed to a dry disposal. These places are authorized to receive such materials.
- .8 Clean up the site and dispose of liquid and solid waste regularly according to the rules and procedures.
- .9 Concrete mixers and equipment used to transport and pouring concrete should be washed at a distance of at least thirty (30) meters from the shore and in places where there is no risk of contamination of the aquatic environment. If this is not possible, take appropriate precautions to avoid contamination of the aquatic environment.
- .10 Store if possible granular materials containing fine more than 30 meters from the shore and as far as possible and ensure that they are not exposed to the weather. These granular materials can be made available on the work site, but must be used within 48 hours of delivery and covered in inclement weather so not to be exposed. Otherwise, the Contractor shall provide a method to prevent dispersal in the environment.
- .11 Provide the site all the necessary equipment (chemical toilets, bins, tanks, etc.) To prevent release of waste into the environment. They must be placed more than 30 meters of water, if applicable.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 SCOPE OF WORK**

- .1 The work described in this section includes the supply, labor and equipment required to carry out the dismantling works.

### **1.2 PROTECTION OF WORKS**

- .1 Protect existing works and equipment to remain in place during and after dismantling.
- .2 If the work, equipment or materials are damaged during dismantling, the Contractor must replace or repair damages immediately to the satisfaction of the Project Owner.

### **1.3 CLEANING THE SITE DURING DISMANTLING WORKS**

- .1 Keep the site clean and free from accumulation of debris and waste materials.
- .2 Provide on-site, containers for the disposal of debris and waste materials.
- .3 Provide and use, for recycling, separate containers clearly identified.
- .4 Remove debris and waste materials from the site at predetermined intervals or eliminate as directed by the Project Manager.

### **1.4 FINAL CLEANING AFTER DISMANTLING WORKS**

- .1 After the dismantling, remove surplus materials, tools as well as equipment and construction materials that are no longer needed to carry out the remaining work.
- .2 Remove and dispose of debris and waste materials generated during the dismantling by the Contractor and all its subcontractors.
- .3 Sweep paved areas and rake the remaining land not to hinder the execution of subsequent work.

### **1.5 REFERENCE STANDARDS**

- .1 Dismantling work must comply with the code "Practice for Safety in Demolition of Structures" (CSA S350-M1980, the most recent version).

## **PART 2 – PRODUCTS**

### **2.1 N/A**

## **PART 3 – EXECUTION**

### **3.1 PREPARATION**

- .1 Inspect the site and identify works and equipment to be dismantled and not returned to the Project Owner, as well as those that must be dismantled and handed back to the Project Owner, and those who must remain in place, be protected and remain functional.
- .2 Confirm with the Project Manager and Project Owner:
  - .1 The list of works and equipment mentioned in the previous point;



- .2 The discipline (subcontractor) responsible for the dismantling of all equipment or works identified to be dismantled;
  - .3 The dismantling sequence;
  - .4 Temporary works required to keep in service equipment or works that must not be dismantled.
- .3 No dismantling shall be done before validation by the Project Manager and Project Owner has been carried out.
  - .4 Follow up and coordinate, with the various subcontractors concerned before the dismantling, to keep in service at any time the equipment that must not be dismantled.
  - .5 All equipment to be dismantled that has not been identified as having to be handed back to the Project Owner will be the property of the Contractor. He must dispose of the equipment in compliance with all current environmental guidelines.
  - .6 The Contractor should take all necessary precautions to prevent damage to the equipment to be handed back to the Project Owner during its dismantling and transportation (if applicable) so that they can, if necessary, be relocated and given in service later.
  - .7 All the equipment with electric or electronic components must be carefully protected during dismantling or transport in a sealed and weatherproof enclosure.

### **3.2 DISMANTLING OF WORKS**

- .1 Take all necessary precautions to prevent damage and to maintain functional all the equipment, materials, accessories, etc., to remain in place.
- .2 Fill in and seal any opening or hole created by the removal of existing equipment (roof, wall, floor, pipe, basin, manhole, etc.) in a clean manner, in accordance with materials in place and architectural features and style in place.

## **PART 4 – PLANT AND FIELD TESTS**

### **4.1 N/A**

**END OF SECTION**

**Part 1            General**

**1.1                RELATED SECTION**

- .1            Section 01 33 00 – Documentation and samples

**1.2                REFERENCES**

- .1            Canadian Construction Documents Committee (CCDC)

**1.3                INSPECTION**

- .1            Allow Departmental representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
- .2            Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental representative instructions.
- .3            If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
- .4            The 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, the contractor must correct such Work and pay cost of examination and correction.

**1.4                INDEPENDENT INSPECTION AGENCIES**

- .1            Independent Inspection/Testing Agencies will be engaged by the Departmental representative for purpose of inspecting and/or testing portions of Work. Costs of such services will be borne by the Departmental representative.
- .2            Provide equipment required for executing inspection and testing by appointed agencies.
- .3            Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .4            If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. The Contractor will have to correct defect and irregularities as advised by the Departmental representative at no cost to the Departmental representative. The Contractor will pay costs for retesting and reinspection.

**1.5                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.

**1.6                PROCEDURES**

- .1            Notify appropriate agency and the 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.

#### **1.7 REJECTED WORK**

- .1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by the Departmental representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- .2 Make good other Contractor's work damaged by such removals or replacements promptly.
- .3 If in opinion of the Departmental representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, 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 the Departmental representative.

#### **1.8 TESTS AND MIX DESIGNS**

- .1 Furnish test results and mix designs as requested.

#### **1.9 MOCK-UPS**

- .1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.
- .2 Construct in locations [as specified in specific Section] [acceptable to the Departmental representative.
- .3 Prepare mock-ups for Departmental representative's review with reasonable promptness and in orderly sequence, to not cause delays in Work.
- .4 Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .5 If requested the Departmental representative will assist in preparing schedule fixing dates for preparation.
- .6 Specification section identifies whether mock-up may remain as part of Work or if it is to be removed and when.

#### **1.10 MILL TESTS**

- .1 Submit mill test certificates as requested in the specific sections.

#### **1.11 EQUIPMENT AND SYSTEMS**

- .1 Submit adjustment and balancing reports for mechanical and electrical systems.

END OF SECTION

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1            Section 01 56 00 – Temporary barriers and enclosures

**1.2                INSTALLATION AND REMOVAL**

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

**1.3                DEWATERING**

- .1            Provide temporary drainage and pumping facilities to keep excavations and site free from standing water.

**1.4                TEMPORARY VENTILATION**

- .1            Ventilating:
  - .1            Ventilate work spaces containing hazardous or volatile materials.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1        Section 01 51 00 – Temporary utilities
- .2        Section 01 56 00 – Temporary barriers and enclosures
- .3        Section 01 74 11 – Cleaning

**1.2                REFERENCES**

- .1        Canadian Standards Association (CSA International)
  - .1        CSA-A23.1/A23.2-[04], Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
  - .2        CAN/CSA-Z321-[96(R2001)], Signs and Symbols for the Occupational Environment.
- .2        U.S. Environmental Protection Agency (EPA) / Office of Water
  - .1        EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

**1.3                ACTION AND INFORMATIONAL SUBMITTALS**

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

**1.4                INSTALLATION AND REMOVAL**

- .1        Provide construction facilities in order to execute work expeditiously.
- .2        Remove from site all such work after use.

**1.5                HOISTING**

- .1        Provide, operate and maintain hoists [cranes] required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for their use of hoists.
- .2        Hoists [cranes] must be operated by qualified operator.

**1.6                SITE STORAGE/LOADING**

- .1        Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.
- .2        Do not load or permit to load any part of Work with weight or force that will endanger Work.

**1.7                CONSTRUCTION PARKING**

- .1        Parking will be permitted on site.
- .2        Provide and maintain adequate access to project site.
- .3        Clean runways and taxi areas where used by Contractor's equipment.

**1.8 OFFICES**

- .1 Provide office heated to 22 degrees C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.
- .2 Provide marked and fully stocked first-aid case in a readily available location.
- .3 Subcontractors can provide their own offices as necessary. Indicate location of these offices on site.

**1.9 EQUIPMENT, TOOL AND MATERIALS STORAGE**

- .1 Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.
- .2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

**1.10 PROTECTION AND MAINTENANCE OF TRAFFIC**

- .1 Protect travelling public from damage to person and property.
- .2 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.

**1.11 CLEAN-UP**

- .1 Remove construction debris, waste materials, packaging material from work site daily.
- .2 Clean dirt or mud tracked onto paved or surfaced roadways.
- .3 Store materials resulting from demolition activities that are salvageable.
- .4 Stack stored new or salvaged material not in construction facilities.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED SECTIONS**

- .1        Section 01 51 00 – Temporary utilities
- .2        Section 01 52 00 – Construction facilities

**1.2                REFERENCES**

- .1        Canadian General Standards Board (CGSB)
- .2        Canadian Standards Association (CSA International)

**1.3                INSTALLATION AND REMOVAL**

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

**1.4                GUARD RAILS AND BARRICADES**

- .1        Provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stair wells, open edges of floors and roofs.

**1.5                ACCESS TO SITE**

- .1        A barrier must be erected around the work area to limit the access of non authorised persons.

**1.6                PUBLIC TRAFFIC FLOW**

- .1        Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect public.

**1.7                PROTECTION OF BUILDING FINISHES**

- .1        Provide protection for finished and partially finished building finishes and equipment during performance of Work.
- .2        Provide necessary screens, covers, and hoardings.
- .3        Be responsible for damage incurred due to lack of or improper protection.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1            Section 01 33 00 – Documents and samples

**1.2                REFERENCES**

- .1            Conform to the reference standards in whole or in part as specifically requested in specifications.
- .2            If there is question as to whether products or systems are in conformance with applicable standards, the Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.
- .3            Cost for such testing will be born by the Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.

**1.3                QUALITY**

- .1            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.
- .2            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.
- .3            Should disputes arise as to quality or fitness of products, decision rests strictly with Consultant based upon requirements of Contract Documents.
- .4            Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
- .5            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                AVAILABILITY**

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



## **1.5 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 Store cementitious products clear of earth or concrete floors, and away from walls.
- .5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.
- .6 Store sheet materials, lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.
- .8 Remove and replace damaged products at own expense and to satisfaction of Consultant.
- .9 Touch-up damaged factory finished surfaces to Consultant's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

## **1.6 TRANSPORTATION**

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

## **1.7 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 Consultant in writing, of conflicts between specifications and manufacturer's instructions, so that Consultant will establish course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, Consultant to require removal and re-installation at no increase in Contract Price or Contract Time.

## **1.8 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 Consultant if required Work is such as to make it impractical to produce required results.
- .2 Do not employ anyone unskilled in their required duties. Consultant 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 Consultant, whose decision is final.

**1.9 COORDINATION**

- .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.

**1.10 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.

**1.11 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 Contractor must verify, prior to any excavation, the presence of water piping, electrical wiring or any other equipment being potentially present. any correction will be borne by the Contractor

**1.14            EXISTING UTILITIES**

- .1        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 REQUIREMENTS**

- .1            Section 01 74 21 – Waste management and disposal

**1.2                REFERENCES**

- .1            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, including that caused by Owner or other Contractors.
- .2            Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.
- .3            Clear snow and ice from access to building, [bank/pile snow in designated areas only] [remove from site].
- .4            Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5            Provide on-site containers for collection of waste materials and debris.
- .6            Dispose of waste materials and debris as directed by the Departmental representative.
- .7            Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.
- .8            Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .9            Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .10           Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .11           Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

**1.4                FINAL CLEANING**

- .1            When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2            Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
- .3            Prior to final review remove surplus products, tools, construction machinery and equipment.

- .4 Remove waste products and debris including that caused by Owner or other Contractors.
- .5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.
- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .7 Clean lighting reflectors, lenses, and other lighting surfaces.
- .8 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .9 Remove dirt and other disfiguration from exterior surfaces.
- .10 Sweep and wash clean paved areas.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1            Section 01 74 21 – Waste management and disposal

**1.2                REFERENCES**

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- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .7 Clean lighting reflectors, lenses, and other lighting surfaces.
- .8 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .9 Remove dirt and other disfiguration from exterior surfaces.
- .10 Sweep and wash clean paved areas.

**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 CONTENT OF THE SECTION**

- .1 This section specifies the requirements for management and disposal of waste.

### **1.2 WASTE DISPOSAL PLAN**

- .1 Prepare plan for waste disposal before the work begins.
- .2 The waste disposal plan must include the following, without limitation:
  - .1 The nature of the demolition and excavation materials constituting waste to be dispose of.
  - .2 The destination of waste materials;
  - .3 Techniques and sequence of demolition and dismantling;
  - .4 The timetable of demolition and dismantling;
  - .5 The location;
  - .6 Security measures;
  - .7 Protective measures;
  - .8 The clear indication of storage areas;
  - .9 Details related to the handling and removal of waste materials;
  - .10 The quantities of waste material to be recovered for reuse.

### **1.3 PROGRAM FOR SORTING SOURCE MATERIALS**

- .1 Provide onsite facilities to collect, handle and store the anticipated amounts of waste.
- .2 Take the necessary measures not to cause contamination of soil and the aquatic environment. The Engineer reserves the right to verify the quality of the soil after construction. Any resulting decontamination work will be performed at the Contractor's expense.
- .3 Provide different locations for each type of waste, according to disposal site.
- .4 Provide places where it is easy to deposit materials without affecting the activities of the site or the users.
- .5 Place sorted materials in a place where they will undergo the least possible damage.
- .6 Waste must be shipped to a site operated under a Certificate of Approval from the *MDDEFP*.
- .7 Products contaminated with domestic sewage should be disposed in a site recommended by the *MDDEFP*. The handling of these products must be performed by a qualified workforce. The Contractor shall ensure that no residues or wastes contaminate accessible surfaces. The Contractor shall, at its expense, decontaminate all contaminated surfaces after removal of residues.



#### **1.4 STORAGE, HANDLING AND MATERIALS PROTECTION**

- .1 Store in the location indicated by the Engineer the materials to be removed from the site.
- .2 Unless otherwise specified, the materials that must be removed does not become property of the Contractor.
- .3 Items left in place, not demolished, should be left up to the satisfaction of the Engineer.
- .4 Support the structure affected by the work. If the safety of the structure may be compromised, stop work immediately and notify the Engineer.
- .5 Protect electrical and mechanical systems that will be kept.
- .6 Sort and store in designated waste materials generated by the demolition areas.
- .7 Store treated wood with creosote temporarily onsite in a suitable containment structure so that runoff does not reach the aquatic environment or soil.

#### **1.5 WASTE DISPOSAL**

- .1 It's forbidden to bury rubbish and waste.
- .2 It's forbidden to throw waste into rivers, sanitary sewer and storm sewer.
- .3 Collect waste materials as the progress of demolition goes.
- .4 It's forbidden to burn waste on site.

#### **1.6 WORK TIMETABLE**

- .1 Coordinate the management of waste with other activities in order to ensure the orderly conduct of the work.

### **PART 2 – PRODUCTS**

N/A.

### **PART 3 - EXECUTION**

#### **3.1 GENERAL**

- .1 Handle waste in accordance with applicable codes and regulations, and according to their level of contamination.

#### **3.2 CLEANING**

- .1 Once completed, remove the tools and waste; leave the premises clean and tidy.
- .2 Clean the work area as you go.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1            Section 01 33 00 – Documents and samples to be submitted

**1.2                REFERENCES**

- .1            Canadian Environmental Protection Act (CEPA)
  - .1            SOR/2008-197, Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations.

**1.3                ADMINISTRATIVE REQUIREMENTS**

- .1            Acceptance of Work Procedures:
  - .1            Contractor's Inspection: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
    - .1            Notify Departmental Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
    - .2            Request Departmental Representative inspection.
  - .2            Departmental Representative inspection:
    - .1            Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.
    - .2            Contractor to correct Work as directed.
  - .3            Completion Tasks: submit written certificates in that tasks have been performed as follows:
    - .1            Work: completed and inspected for compliance with Contract Documents.
    - .2            Defects: corrected and deficiencies completed.
    - .3            Equipment and systems: tested, adjusted balanced and fully operational.
    - .4            Certificates required by Utility companies: submitted.
    - .5            Operation of systems: demonstrated to Owner's personnel.
    - .6            Work: complete and ready for final inspection.
  - .4            Final Inspection:
    - .1            When completion tasks are done, request final inspection of Work by Departmental Representative and Contractor.
    - .2            When Work is considered incomplete according to Departmental Representative, complete outstanding items and request re-inspection.
  - .5            Declaration of Substantial Performance: when Departmental Representative considers deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.

- .6 Commencement of Lien and Warranty Periods: date of Owner's acceptance of submitted declaration of Substantial Performance to be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.
- .7 Final Payment:
  - .1 When Departmental Representative considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.
  - .2 When Work deemed incomplete by Departmental Representative, complete outstanding items and request re-inspection.
- .8 Payment of Holdback: after issuance of Certificate of Substantial Performance of Work, submit application for payment of holdback amount in accordance with contractual agreement.

**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 GENERAL**

- .1 This section specifies the general requirements and procedures for testing and commissioning of equipment for civil engineering, process engineering, electrical, architectural, plumbing, ventilation and automation. This section covers all sections of the specifications.

### **1.2 GENERAL CONDITIONS OF ACHIEVEMENT**

- .1 The Contractor shall, in the presence of the supplier and / or its subcontractors, the Project Manager and the representative of the client, perform the verification, calibration and commissioning of all installed equipment, perform tests, performance tests and checks specified in this specification or required by laws and regulations and provide all service manuals required.
- .2 This work can be broadly described as but not limited to the following:
  - .1 Dry verification all structures of works and equipment;
  - .2 Commissioning and trial operation of mechanical equipment, mechanical process, power and control under real conditions;
  - .3 Commissioning, calibration and equipment operating testing with their devices under real conditions units;
  - .4 Calibration of all measuring devices;
  - .5 Testing and performance reports;
  - .6 Continuous testing;
  - .7 Assistance during commissioning of equipment, testing and instructions to operation staff.
- .3 A job scheduling program of the commissioning that must be prepared in conjunction with the Project Manager prior to commissioning work
- .4 For all types of tests to be done (dry, operation and performance), the Contractor shall submit to the Project Manager, for approval, realization protocols
- .5 With the exception of test protocols to achieve for the work that is performed during the construction period, a comprehensive work plan including all testing protocols to achieve before provisional acceptance must be presented to the Project Manager . These protocols must be submitted no later than three (3) weeks before the date of completion of testing. The Contractor is not allowed to start testing without advance that the protocol implementation has been submitted and approved by the Project Manager and representatives of the manufacturers of the equipment under test

- .6 Each protocol must clearly indicate
  - .1 title of the test;
  - .2 list of resource persons who will be present;
  - .3 measuring equipment used;
  - .4 implementation methodology;
  - .5 data tables to complete.
- .7 Unless otherwise stated, the Contractor shall perform performance tests for all equipment and structures identified quotes and plans. For some equipment, the Project Manager requires a methodology of implementation. For others, the methodology should be proposed by the Contractor and accepted by the Project Manager
- .8 Dry operation Tests and performance are made by the Contractor in collaboration with subcontractors and representatives of manufacturers. All deficiencies within these tests must be corrected prior to continuous testing
- .9 If there is an equipment failure during the tests (dry, operation and performance), they are interrupted to repair the faulty equipment. The test results obtained before the break are still valid. After repair, testing must be completed in accordance with all step of implementation Protocol
- .10 The Project Manager may reject the equipment and instruments used for the tests if it considers inadequate to obtain representative results. The Contractor shall replace at his own expense the equipment or instruments rejected by the Project Manager
- .11 The Contractor shall assume all costs associated with the preparation and execution of tests
- .12 A successful testing of performance is available only if the system operates within the conditions prescribed for carrying each processing step. Thus, if the conditions for carrying out a process subject to performance tests are different from those specified, the Contractor shall immediately notify the Project Manager of this fact. If there is any dispute between the parties as to the compliance requirements for performance testing, the Project Manager may request an independent firm to conduct an evaluation of these conditions. The evaluation report will determine the compliance or non-performance conditions. The cost of the audit will be assumed by the defaulting party.
- .13 If the conditions of implementation are compliant, the Contractor shall carry out performance tests described in the specifications. Otherwise, a meeting should be held between the Contractor and the Project Manager to determine (if applicable), the measures to ensure the tests. Possible measures may include, for example, a change in the test procedure, a method of alternative measures, a reassessment of the expected performance, a simulation of conditions recommended or deferred testing for a period of 60 days.
- .14 If changes in performance tests involve additional implementation costs for the Contractor, the necessary adjustments will be made in accordance with the requirements of the general administrative clauses.
- .15 Each trial conducted without the presence of representatives of equipment manufacturers will be considered unrealized.

### **1.3 INSTRUCTIONS TO THE OPERATING STAFF**

- .1 During commissioning, the Contractor shall explain the process of operation, operation and maintenance of equipment provided to representatives of the client and / or operating personnel. These explanations should be included in each of the maintenance and operation manuals must be available before commissioning.
- .2 These explanations should be provided by qualified staff and vendor representatives must be present at trial and put into operation. Representatives of each device must spend a minimum of four hours, in addition to testing and commissioning periods for review, with staff operating, service manuals and equipment operation.
- .3 Appropriate representatives of suppliers of equipment must be available on demand to make the detection of defects during commissioning and operation during the warranty period.

### **1.4 OPERATIONAL TESTS**

- .1 The Contractor shall provide and install equipment that are compatible with the use and installation conditions and operating equipment and materials for which it was collected or submitted.
- .2 The Contractor shall carry out commissioning, calibrate and adjust all equipment and check the points of compliance with plans and the present specifications.
- .3 The Contractor shall proceed with the help of its suppliers and subcontractors with a dry test run or support as appropriate, on all equipment and materials as requested and directed by the Project Manager, in order to verify that the specific conditions of use and operation are met. The Contractor shall, at its own expense, all skilled labor, equipment and all that is required for the tests described in this specification.
- .4 As soon as the test runs are completed by the Contractor to the satisfaction of the Project Manager, it must proceed in the presence of the Project Manager to the commissioning.

### **1.5 COMMISSIONING**

- .1 The Contractor shall perform the commissioning of each equipment system. It should take the usual precautions such as: oiling, greasing, checking to detect if there is no obstruction, etc.. It must ensure that the manufacturer's instructions are followed and respected.
- .2 Equipment and premises must be cleaned beforehand. Must provide written notice to the effect that all the devices have been put into service, all checks have been made and that all equipment supplied is free of defects in design and manufacturing.
- .3 In addition for the drinking water facilities, the Contractor shall perform disinfection according to prescribed standards of all equipment, tank, hoses, etc.. likely to come into contact with the water flowing through his works before allowing the water to be discharged into reservoirs, pipes or equipment used in the drinking water distribution.
- .4 As soon as the commissioning and corrective work (if required) is completed, the Contractor shall conduct performance testing.

## 1.6 CONTINUOUS TESTS

- .1 Before getting started, the Contractor shall notify the Project Manager that all checks, simulations, testing and calibration as well as those made by its subcontractors have been made and that all equipment and installation are functional and close to the start under its responsibility.
- .2 The Contractor shall operate and run continuously (ie nonstop 24 hours a day) for a period of 15 consecutive days the whole system subject to the contract, after the commissioning of all equipment (including all pumps).
- .3 If the operating conditions encountered during these continuous tests are not representative of actual operating conditions, the Contractor shall take, to the extent possible, the provisions required to simulate actual conditions of operation. During these tests continuously, the Contractor is fully responsible for the operation and maintenance of the works in accordance with all operating conditions defined in operating manuals and standards.
- .4 The Contractor shall provide all personnel and specialists needed to meet the demands described above. The City staff will be present during the test and should be informed of any changes and / or fix the process for its future and necessary for the operation and maintenance system operation.
- .5 If during the 15-day trial, a major component of the process has an interruption of operation, continuous testing on this piece should be resumed when this piece is restarted after repair.
- .6 If it is impossible to simulate the real conditions of operation of certain equipment forming a sub-system, lack of raw materials, the provisional approval for the equipment is automatically extended until the continuous testing for these facilities were made.
- .7 The provisional acceptance of the works will not be realized until the continuous testing has not been completed.

## 1.7 PRODUCTS

- .1 The Contractor shall proceed in the presence of Engineer and with the help of its suppliers and / or subcontractors in performance tests to verify if the required performance criteria are met. These tests are performed when the previous test runs and patches if any, are made. In some cases, functional testing and performance can be conducted simultaneously. The full performance of the tests with the performance ratio is at the expense of the Contractor. Test protocols must be submitted to Project Manager for approval 20 days before the start of the tests, the tests may be carried out without approved protocols. The tests to be described in different sections of this specification

- .2 For each performance test, a full report must be submitted containing the results. Three (3) summary report copies.
  - .1 The test protocol used;
  - .2 Conditions during the tests;
  - .3 Instrumentation schemes;
  - .4 Interpretation and discussion of the results;
  - .5 Conclusions and recommendations.
- .3 The ratio of performance testing at the manufacturer's plant must be provided separately from the tests conducted at the site
- .4 With the exception of equipment whose performance is judged on the basis of tests carried out at the factory of the manufacturer and / or supplier's works, if the results of an initial performance test to the site does not meet the specified and the conditions in which comply with the requirements of this specification requirements, the Contractor shall provide, at its expense, necessary to obtain the specified performance modifications. These changes may involve, for example, addition of equipment, calibration or adjustment of certain systems, etc.. The Contractor shall provide the Project Manager, for approval, corrective actions it intends to make. Following the completion of the appropriate patches, a second performance test must take place within a maximum period of 60 days.

**END OF SECTION**



## **PART 1 - GENERAL**

### **1.1 GENERAL**

- .1 This section specifies the general requirements and procedures for the preparation of manuals assembly, performance, operation, maintenance and drawings in accordance with the works that are explicitly requested in the contract or that the Project Manager considers necessary for the operation and maintenance of such works.
- .2 This section covers all sections of the specifications.

### **1.2 SERVICE MANUAL AND MAINTENANCE**

- .1 Provide operation and maintenance records and incorporate them in the manual.
- .2 The forms provided must be identified with the project. They must refer to the number of the equipment shown on the plans and specifications or a detail plans.
- .3 Operating and maintenance records must be approved prior to final inspection by the Project Manager who will retain final copies.
- .4 Operating records must include the following:
  - .1 The diagrams;
  - .2 A description of each system / installation and operating controls / regulation;
  - .3 A description of how each system with program setpoints changes;
  - .4 Instructions for each operating system / installation of each element;
  - .5 A description of measures to be taken in the event of equipment failure;
  - .6 A chart of devices and a flow diagram;
  - .7 A color code.
- .5 Maintenance records must include the following:
  - .1 Instructions on maintenance, repair, operation, and how to identify defects for each piece of equipment;
  - .2 Information regarding the frequency of tasks, as well as tools and time required for all of these tasks.
- .6 The performance records must include the following:
  - .1 The performance data provided by the equipment manufacturer stating the point of use of the equipment once the commissioning is complete;
  - .2 The results of performance tests of the equipment;
  - .3 All other data specific performance specified elsewhere in the contract documents;
  - .4 Test reports, adjusting and balancing systems, in accordance with the requirements of sections;
  - .5 When a new submission of documents or samples, notify the Project Manager in writing of the changes made other than those required by the latter.
- .7 Introduction:
  - .1 The manual must consist of flip books (size 215 x 280) and connected with a three (3) rings rigid vinyl cover. These books are specifically for all equipment sold by suppliers to the Contractor and installed by the Contractor. A PDF version on a CD must also be provided.

- .2 The Contractor must provide a manual for work, and/or building, and for each structure and/or building the Contractor shall provide a manual by discipline.
- .3 Each manual delivered to the Project Manager must be written in English. Upon delivery of the equipment to the site, the Contractor must ensure that the supplier gets the assembly manual operation, operation and maintenance even if the manual is in English and any document in English unilingual be translated and written in French before being issued.
- .4 The manual should be divided into sections as indicated below and each section must be clearly identified by a tab labeled coated celluloid attached to the sheet division rigid paper. A comprehensive manual must be prepared by the Contractor including each piece of equipment delivered and installed on the project.
- .5 The drawings in line with execution of the works concerned are placed in pouches attached to the assembly manuals, operation, operation and maintenance.
- .6 The contents of each manual must include:
  - .1 One page identifying each stakeholders:
    - .1 the owner names with the complete address and contact person;
    - .2 the name of the general contractor with complete address and contact person;
    - .3 subcontractor with the complete address and contact person;
    - .4 the name of the supplier of each product with the complete address and contact person.
  - .2 A page where there are:
    - .1 a table of contents describing the equipment manual with the identification of the equipment described on plans.
  - .3 A section for each piece of equipment including all the following information:
    - .1 identification of the equipment;
    - .2 identification number described on plans;
    - .3 make and model;
    - .4 location of the equipment: specific building;
    - .5 order number of the supplier;
    - .6 model number;
    - .7 serial number;
    - .8 date of delivery;
    - .9 supplier;
    - .10 general (brochure describing the equipment supplier);
    - .11 procedure in case of damage during shipping, gaps, errors;
    - .12 storage of equipment, whether or not assembled;
    - .13 Installation drawings with detailed dimensions;
    - .14 general guidelines recommended for installation;
    - .15 anchoring drawings where applicable;
    - .16 electrical connections with appropriate drawings;
    - .17 mechanical connections and plumbing with appropriate drawings;
    - .18 relationship between the relevant equipment and related equipment;
    - .19 general and specific safety;
    - .20 drawings of the control system, the control box components and description of the front of the case;
    - .21 starting and stopping;
    - .22 automatic manual: normal operation;
    - .23 abnormal operation: troubleshooting, emergency instructions;

- .24 subjection to other equipment;
  - .25 thermal and other protection;
  - .26 adjustments and calibration;
  - .27 signals, alarms and telemetry;
  - .28 operating hours counter;
  - .29 timer operation;
  - .30 heating and ventilation;
  - .31 cleaning frequency, method, products;
  - .32 lubrication frequency, method, products;
  - .33 adjustment frequency, method, products;
  - .34 list of things to check;
  - .35 guide solutions to problems;
  - .36 procedures in case of damage or major repairs;
  - .37 complete parts list with exploded view of the equipment and numbered for positive identification documents;
  - .38 list of common wear parts with name, address and telephone number of the suppliers;
  - .39 list of local experts to consult for repair (eg. electrician, plumber, etc.) with name, address and telephone number;
  - .40 inventory of parts and finished products;
  - .41 report signed and dated;
  - .42 calibration values;
  - .43 method of calibration and / or verification;
  - .44 start date of the warranty period of each device;
  - .45 specific guarantee exceeding the general security;
  - .46 Plans "as-built" including amendments, addenda and notices of changes replicated to own the building plans provided for signed and dated;
  - .47 storage equipment, whether or not assembled;
  - .48 Installation dimensions with detailed drawings;
  - .49 general guidelines recommended for installation;
  - .50 anchoring drawings where applicable;
  - .51 electrical connections with appropriate drawings;
  - .52 mechanical connections and plumbing with appropriate drawings;
  - .53 relationship between the relevant equipment and related equipment;
  - .54 general and specific safety;
  - .55 drawings of the control system, the control box components and description of the front of the case;
  - .56 starting and stopping;
  - .57 normal operation: manual, automatic.
- Note: The manual included in the drawings can be derived in part or in whole of shop drawings provided that they are free of annotations.
- .7 The contents of each manual must be adjusted with works or equipment specified in "Technical Terms". However, the requirements of this section must be complied by the Contractor with respect to sections, principle and manual format.
  - .8 Verification:
    - .1 All documents must be submitted to the Project Manager in one (1) copy for verification and approval. After review and acceptance of the documents submitted in the original form, the Contractor shall produce and provide two (2) additional copies. Textbooks must be customized by building and/or

work, and, for each discipline and/or for all municipal equipment (fire hydrant, pipe, valve, etc.). To the extent that the first review of the documents reveal that they are incomplete and/or inconsistent with this section, the Contractor must make corrections to the copies that will be returned to him. After correction, the Project Manager conducts a second examination which may be required again if the documents do not prove to be compliant. Once the document is corrected and accepted, the Contractor must submit to the Project Manager two (2) additional copies. The final approved version of each manual should also be submitted as PDF files burned onto a DVD. All costs associated with audits and comments made from the second review of the documents are the responsibility of the Contractor.

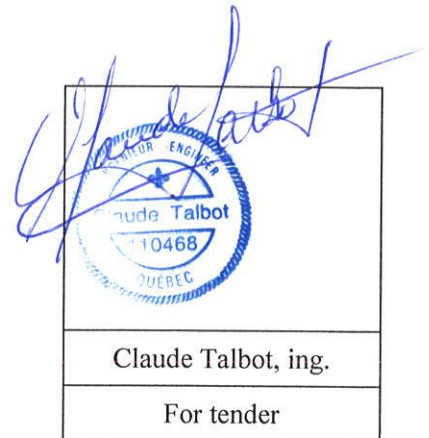
### **1.3 STAFF TRAINING, OPERATION AND MAINTENANCE**

- .1 Provide tools, equipment and service personnel of manufacturers to provide training in French, operating and maintenance personnel in the operation, the control, adjustment, diagnosis of problems and maintenance all systems and equipment during normal working hours and before acceptance and delivery of systems and equipment.
- .2 Unless otherwise specified in the particular technical specifications, representatives of each device must spend a minimum of four (4) hours in addition to the periods of testing and commissioning for the training of staff of the project owner. Consequently, considering that the training will be held at a date different from the tests and that in this case a visit to the site for specific training is required.
- .3 When other requirements to different sections are specified, manufacturers must conduct demonstrations and train staff.
- .4 The training should be based on the contents of the Operations and Maintenance Manual, drawings "as built" and other audiovisual materials. The training must be provided and presented in the form of PowerPoint.
- .5 When necessary, the Project Manager can record these demonstrations on video tape for future reference.
- .6 For all courses, the Contractor must provide a certificate signed by the representatives of the Contracting Agency.

**END OF SECTION**

<u>NUMBER</u>	<u>TITLE</u>	<u>PAGES</u>
<u>Division 01</u>		
01 11 00	WORK SUMMARY	2
01 32 16.07	CONSTRUCTION PROGRESS SCHEDULE	2
01 33 00	DOCUMENTATION AND SAMPLES	4
01 35 29	HEALTH AND SAFETY	11
01 35 43	ENVIRONMENT PROTECTION	3
01 35 70	DISMANTLING WORK	2
01 45 00	QUALITY CONTROL	2
01 51 00	TEMPORARY UTILITIES	1
01 52 00	CONSTRUCTION FACILITIES	2
01 56 00	TEMPORARY BARRIERS AND ENCLOSURES	1
01 61 00	COMMON PRODUCT REQUIREMENTS	4
01 74 11	CLEANING	2
01 71 11	CLEANING 2	2
01 74 21	WASTE MANAGEMENT AND DISPOSAL	2
01 77 00	CLOSEOUT PROCEDURES	2
01 91 13	TESTING AND COMMISSIONING	5
01 91 51	SERVICE MANUALS – MAINTENANCE AND STAFF TRAINING	4
<u>Division 02</u>		
02 10 21	ADVANCED SECONDARY TREATMENT TERTIARY TREATMENT	3
<u>Division 10</u>		
10 27 40	SPECIAL TRAPS	2
<u>Division 13</u>		
13 60 50	SUMERSIBLE PUMPS	5

END OF SECTION





**Public Works and Government Services Canada**

**Baie-Sainte-Catherine's wharf**

Replacement of the wastewater treatment system

Project R.063880.001

Tender specifications

Préparé par :

  
Claude Talbot, ing. (OIQ110468)

September 2013

# TENDER FORM

## BAIE SAINTE-CATHERINE'S WHARF Replacement of the wastewater treatment system

Project no : R.063880.001

Note : All prices include include furniture, transport, installation, tests and disposal as the case,  
; and the administration and profit of the Contractor

	<u>Qty</u>	<u>Unit</u>	<u>Unit price</u>		<u>Total amount</u>
A. Site organization: should not exceed 10% of the total amount of the bid.					_____
B. Civil					
B.1 Evacuation system for boats					
Stainless steel drainage housing and installation	2	-			
Dismantling and replacing the wood floor (along the kiosk, west side only)	15	m <sup>2</sup>			
Trenching up to treatment + pipe installation	35	m			
PVC pipe, 100 mm DR-35, and fittings	35	m			
Asphalt replacement	25	m <sup>2</sup>			
Installation and connection to the treatment system	Lump sum				
	Sub-total (B.1) :				_____
B.2 Wastewater treatment					
Dismantling of the wooden floor, and replace	35	m <sup>2</sup>			
Dismantling of the three Ecoflo units and accessories and disposal	Lump sum				
and	15	m <sup>3</sup>			
Plastic manhole access of the upper slab (treatment)	6	-			
Access door pumping wells (aluminum)	1	-			
Cleaning of the treatment basin	Lump sum				
Correction of the existing vent, and implementation of the new vent	Lump sum				
Nonslip strip on access ramp (supply and installation)	Lump sum				
	Sub-total (B.2) :				_____

C. Process

System equipment of the advanced secondary treatment  
 Equipment installation of the treatment system  
 (including equipment inside the technical building)  
 Submersible pumps of the pumping wells and accessories  
 (including control panel and wiring)  
 Installation of the submersible pumps  
 UV treatment system (3 units) preassembled  
 Installation of the disinfection system  
 Connecting pipes to the new technical building  
 Supply of electrical wiring, installation and connection  
 Startup of the treatment system  
 Operation and Maintenance Manual

1	-		
Lump sum			
2	un.		
Lump sum			
1	un.		
Lump sum			
Lump sum			
Lump sum			
Lump sum			

Sub-total (C) : \_\_\_\_\_

D. Technical building prefabricated (8 'x 10')

1	un.		
---	-----	--	--

E. Electricity

Lump sum			
----------	--	--	--

F. Ventilation

Lump sum			
----------	--	--	--

G. Effluent piping (+ Link Seal + installation)

1	un.		
---	-----	--	--

H. Struture

Demolition of the slab and edges  
 Demolition of interior walls  
 Formwork for new concrete walls  
 Slab formwork  
 Frame  
 Chemical anchors  
 Concrete walls and slab  
 Slab finishes  
 BFL Bands  
 Conformance testing of concrete and asphalt

1	-		
10	m.l.		
30	m <sup>2</sup>		
45	m <sup>2</sup>		
500	kg		
250	un.		
18	m <sup>3</sup>		
45	m <sup>2</sup>		
25	m.l.		
Lump sum			

Sub-total (H) : \_\_\_\_\_

I. Related work

Cost of sanitary services to be provided during construction

Lump sum			
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J. Contingencies (10%)

**Total :** \_\_\_\_\_