



SPECIFICATION FOR THE REPLACEMENT OF SUMP PUMPS AND TELECOMMUNICATION NETWORK INSTALLATION

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BPR-POWER

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CARILLON NAVIGATION LOCK

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O/Ref. : 25608B

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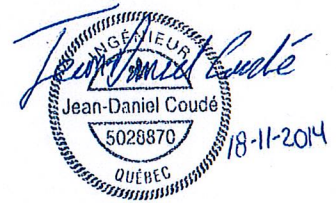
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END OF SECTION

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END OF SECTION

1 GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

- .1 Work covered by this Contract comprises the upgrade of mechanical and electrical aspects of the Carillon navigation lock located on the Carillon canal national historic site in St-André-d'Argenteuil.

1.02 MECHANICAL WORK

- .1 Demolition work
 - .1 Supply labour, supervision, waste disposal, tools, equipment, machinery, scaffolding, materials, transportation, handling, devices and equipment to work in confined spaces and all other accessories required to perform the demolition work as described on drawings and in technical specifications issued for construction.
 - .2 Demolition work in confined spaces by the Contractor includes, among others, the following activities :
 - 1. Dismantling of pump systems, suction and discharge piping as well as strainers.
 - 2. Dismantling of pump bases.
 - 3. Cleaning of work area before starting replacement work.
- .2 Work to be performed
 - .1 The Contractor shall have an agreement with and access rights by Hydro-Quebec to work on their site during the work period.
 - .2 The Contractor shall supply labour, supervision, tools, equipment, machinery, scaffolding, materials, transportation, handling, devices and equipment required to work in confined spaces, as well as all other accessories required for the execution of the work as described on drawings and in the technical specification issued for construction.
 - .3 All dimensions indicated on drawings and in the technical specification are for information purposes only. It is the Contractor's responsibility to confirm them during the construction period (at no extra cost).
 - .4 The Contractor shall supply shop drawings for approval, as well as « As-built » drawings to client following work acceptance.
 - .5 The Contractor shall supply all materials and perform all work related to transportation and installation. Note that materials shall be transported to the jobsite by truck. The Contractor is responsible for the transportation, reception and unloading of materials on site.

- .6 Dismantling work in confined spaces by the Contractor includes :
 1. Supply and installation of a temporary pump for the work period.
 2. Fabrication and installation of new bases anchored in concrete for new pumps.
 3. Purchase and installation of new pumps, strainers, and new suction and discharge piping.
 4. Proceed with pre-operational verifications.
 5. Perform start-up and ensure proper operation.

1.03 ELECTRICAL WORK

- .1 The Contractor shall have an agreement with and access rights by Hydro-Quebec to work on their site during the work period.
- .2 The Contractor shall supply labour, supervision, tools, equipment, machinery, scaffolding, materials, transportation, handling, devices and equipment required to work in confined spaces, as well as all other accessories required for the execution of the work as described on drawings and in the technical specification issued for construction.
- .3 All dimensions indicated on drawings and in the technical specification are for information purposes only. It is the Contractor's responsibility to confirm them during the construction period (at no extra cost).
- .4 The Contractor shall supply shop drawings for approval, as well as « As-built » drawings to client following work acceptance.
- .5 The Contractor shall supply all materials and perform all work related to transportation and installation. Note that materials shall be transported to the jobsite by truck. The Contractor is responsible for the transportation, reception and unloading of materials on site.
- .6 Without limitations, dismantling work for the pump system includes the following :
 - .1 Dismantling work in confined spaces by the Contractor includes :
 1. Dismantling of pump systems such as starter panels, junction box, level switches (floats), and the disconnection of pump motors.
 2. Dismantling of the system's cables.
 3. Cleaning of work area before starting replacement work.
- .7 Without limitations, work to be performed related to the pump system includes the following :
 - .1 The Contractor shall supply, install and connect a new motor control centre (MCC) column with two (2) size 1 starters in the electrical room on the existing MCC, as specified on drawings.
 - .2 The Contractor shall install and connect the two (2) new starters to the existing DeviceNet network, as specified on drawings.

- .3 The Contractor shall supply, install and connect a 1 pole, 120V, 15A circuit breaker in the kiosque's electric panel for the supply of the control panel in the drainage pump room, as specified on drawings.
- .4 Without limitation, work to be performed in confined spaces by the Contractor includes the following :
 1. The Contractor shall supply, install and connect two (2) 30A local disconnect switches, as specified on drawings.
 2. The Contractor shall supply, install and connect a control panel for the pump system, as specified on drawings.
 3. The Contractor shall supply, install and connect two (2) level switches (floats), as specified on drawings.
 4. The Contractor shall supply, install and connect a level transmitter, as specified on drawings.
 5. The Contractor shall connect a temporary pump for the duration of the work by re-using the 600V source and one of the two (2) existing cables of the dismantled pumps (pump c/w starter and floats to be supplied by the mechanical division).
 6. The Contractor shall connect two (2) new pumps, as specified on drawings (pump systems supplied by the mechanical division).
 7. The Contractor shall connect some existing equipment, such as three (3) push-button stations and an alarm cable for Hydro-Quebec, as specified on drawings.
- .5 The Contractor shall supply, install and connect cables and connectors, as specified on drawings and on the cable list.
- .6 The Contractor shall proceed with the start-up and ensure the proper operation of the pump system.
- .8 Without limitations, work to be performed related to the communication network includes the following :
 - .1 Work to be performed at the collector's house includes :
 1. The Contractor shall supply, install and connect two (2) Ethernet switches and patch boards, as specified on drawings.
 2. The Contractor shall supply, install and connect a programming, history and visualization server, as specified on drawings.
 3. The Contractor shall supply, install and connect an emergency power supply system, as specified on drawings.
 4. The Contractor shall supply, install and connect a cabinet for the installation of communication equipment, as specified on drawings.
 5. The Contractor shall supply, install and connect an « RF » antenna for the communication with the navigation lock, as specified on drawings.
 6. The Contractor shall connect existing equipment to the new network, as specified on drawings.
 - .2 Work to be performed in the electrical room includes the following :
 1. The Contractor shall supply, install and connect an Ethernet switch and patch board, as specified on drawings.
 2. The Contractor shall supply, install and connect a programming and visualization station complete with screen, keyboard and mouse, as specified on drawings.
 3. The Contractor shall supply, install and connect an emergency power supply

- system, as specified on drawings.
4. The Contractor shall supply, install and connect a cabinet for the installation of communication equipment, as specified on drawings.
 5. The Contractor shall supply, install and connect an « RF » antenna for the communication with the navigation lock, as specified on drawings.
 6. The Contractor shall connect existing equipment to the new network, as specified on drawings.
- .3 The Contractor shall supply, install and connect cables and connectors, as specified on drawings.
 - .4 The Contractor shall perform the pre-operational verification of the communication network.
 - .5 The Contractor shall perform the configuration, programming, start-up and ensure the proper operation of the communication network components.

1.04 CONTRACT METHOD

- .1 Employ qualified suppliers and subcontractors assigned by Owner for:
 - .1 Work described in Section 27 10 05 – Structured cabling for telecommunication networks.

1.05 WORK SEQUENCE

- .1 Coordinate Progress Schedule in order to complete the Work by March 15, 2015.
- .2 Maintain access to bridge located upstream from the navigation lock to Hydro-Quebec staff at all times during the Work period.
- .3 Maintain access to navigation lock for fire protection purposes; also, fire-fighting facilities shall be provided.
- .4 Plan for the equipment lock-out/tag-out procedure and safe working conditions at all times.
- .5 Communicate with Parks Canada Representative before the beginning of the Work to schedule a visit for required surveys.

1.06 CONTRACTOR'S USE OF PREMISES

- .1 Limited use of premises for Work, for storage and for access to allow:
 - .1 Safe working conditions.
 - .2 Access to the bridge located upstream from the navigation lock to Hydro-Quebec staff.
- .2 Coordinate use of premises as indicated by Parks Canada Representative.
- .3 Prevent damage to existing structures.
- .4 Once Work is completed, existing structure shall be in a condition equivalent or superior to initial condition at the beginning of Work.

1.07 PARTIAL OCCUPANCY OF PREMISES BY OWNER

- .1 The Parks Representative shall have access to the Work area at all times.

1.08 DOCUMENTS REQUIRED

- .1 Maintain at job site, one copy of each of the following documents :
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Reviewed Shop Drawings.
 - .5 List of Outstanding Shop Drawings.
 - .6 Change Orders.
 - .7 Other Modifications to Contract.
 - .8 Field Test Reports.
 - .9 Copy of Approved Work Schedule.
 - .10 Health and Safety Plan and Other Safety Related Documents.
 - .11 Other documents as specified.

2 PRODUCTS

2.01 NOT USED

- .1 Not used.

3 EXECUTION

3.01 NOT USED

- .1 Not used.

END OF SECTION

1 GENERAL

1.01 ADMINISTRATIVE PROCEDURES

- .1 Submit to Parks Canada Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Do not proceed with Work affected by submittal until review is complete.
- .3 Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .4 Where items or information is not produced in SI Metric units converted values are acceptable.
- .5 Review submittals prior to submission to Parks Canada Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .6 Notify Parks Canada Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .7 Verify field measurements and affected adjacent Work are coordinated.
- .8 Contractor's responsibility for errors and omissions in submission is not relieved by Parks Canada Representative's review of submittals.
- .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Parks Canada Representative's review.
- .10 Keep one reviewed copy of each submission on site.

1.02 SHOP DRAWINGS AND PRODUCT DATA

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Quebec.
- .3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. When there are items or equipment attached or connected to other items or equipment, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references on design drawings and specifications.
- .4 Allow five (5) days for the Parks Canada Representative to review each bid.

- .5 Adjustments made on shop drawings by Parks Canada Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Parks Canada Representative prior to proceeding with Work.
- .6 Make changes in shop drawings as Parks Canada Representative may require, consistent with Contract Documents. When resubmitting, notify Parks Canada Representative in writing of revisions other than those requested.
- .7 Submissions include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Wiring diagrams.
 - .8 Single line and schematic diagrams.
- .8 After Parks Canada Representative's review, distribute copies.
- .9 Submit electronic copy of shop drawings for each requirement requested in specification Sections and as Parks Canada Representative may reasonably request.
- .10 Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Parks Canada Representative where shop drawings will not be prepared due to standardized manufacture of product.
- .11 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Parks Canada Representative.
 - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 - .2 Testing must have been within 3 years of date of contract award for project.
- .12 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Parks Canada Representative.
 - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material

- meets specification requirements.
- .2 Certificates must be dated after award of project contract complete with project name.
- .13 Submit electronic copies of manufacturer's instructions for requirements requested in specification Sections and as requested by Parks Canada Representative.
 - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
- .14 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Parks Canada Representative.
- .15 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .16 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Parks Canada Representative.
- .17 Delete information not applicable to project.
- .18 Supplement standard information to provide details applicable to project.
- .19 If upon review by Parks Canada Representative, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .20 The review of shop drawings by the Parks Canada Representative is for sole purpose of ascertaining conformance with general concept.
 - .1 This review shall not mean that Parks Canada approves detail design inherent in shop drawings; this responsibility shall remain with the Contractor. Also, this review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.
 - .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for coordination of Work of sub-trades.

1.03 PHOTOGRAPHIC DOCUMENTATION

- .1 Submit electronic copy of colour digital photography in jpg format, standard resolution monthly with progress statement and as directed by Parks Canada Representative.
- .2 Project identification: name and number of project and date of exposure indicated.
- .3 Frequency of photographic documentation: as directed by Parks Canada Representative.

1.04 CERTIFICATES AND TRANSCRIPTS

- .1 Submit documents required by the relevant authority having jurisdiction on health and safety at the workplace immediately following Contract award.

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

3 EXECUTION

3.01 NOT USED

- .1 Not Used.

END OF SECTION

1 GENERAL

1.01 REFERENCES

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .3 Province of Quebec
 - .1 An Act Respecting Occupational Health and Safety, R.S.Q.

1.02 DOCUMENTS TO BE SUBMITTED FOR ACTION AND INFORMATION

- .1 Submit documents in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
 - .1 Results of site specific safety hazard assessment.
 - .2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.
 - .3 Plan to reduce and control safety hazards specific to the jobsite.
- .3 Submit copies of Contractor's authorized representative's work site health and safety inspection reports to Parks Canada Representative every week.
- .4 Submit copies of reports or directions issued by Federal and Provincial health and safety inspectors.
- .5 Submit copies of incident and accident reports.
- .6 Parks Canada Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 5 days after receipt of plan. Revise plan as appropriate and resubmit plan to Parks Canada Representative within 5 days after receipt of comments from Parks Canada Representative.
- .7 Parks Canada Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.
- .8 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Parks Canada Representative.
- .9 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.
 - .1 Confined space procedure.
 - .2 Work at height procedure.
 - .3 Hot work procedure.

- .4 Lock-out/tag-out procedure (“0 Energy”).

1.03 SAFETY ASSESSMENT

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

1.04 MEETINGS

- .1 Schedule and administer Health and Safety meeting with Parks Canada Representative prior to commencement of Work.

1.05 GENERAL REQUIREMENTS

- .1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.
- .2 Parks Canada Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

1.06 RESPONSIBILITY

- .1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work. Provide personal protective equipment and other equipment required to ensure the safety of employees.
- .2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.07 COMPLIANCE REQUIREMENTS

- .10 Comply with Occupational Health and Safety Act, Industrial and Commercial Establishments Regulation, R.R.Q.
- .13 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.08 UNFORESEEN HAZARDS

- .1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province of Quebec having jurisdiction and notify Parks Canada Representative verbally and in writing.

1.09 POSTING OF DOCUMENTS

- .1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Quebec having jurisdiction, and in consultation with Parks Canada Representative.

1.10 CORRECTION OF NON-COMPLIANCE

- .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Parks Canada Representative.
- .2 Provide Parks Canada Representative with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 Parks Canada Representative may stop Work if non-compliance of health and safety regulations is not corrected.

1.11 WORK STOPPAGE

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

2 PRODUCTS

2.01 NOT USED

- .1 Not used.

3 EXECUTION

3.01 NOT USED

- .1 Not used.

END OF SECTION

1 GENERAL

1.01 INSPECTION

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

1.02 PROCEDURES

- .1 Notify appropriate agency Parks Canada 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.

1.03 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 Parks Canada Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- .2 If, in the opinion of the Parks Canada Representative, it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner shall deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Parks Canada Representative.

1.04 REPORTS

- .1 Submit one copy of inspection and test reports to Parks Canada Representative.

1.05 EQUIPMENT AND SYSTEMS

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

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.01 REFERENCES

- .1 Canadian General Standards Board (CGSB)
 - .1 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.
- .2 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-S269.2-M1987 (R2003), Access Scaffolding for Construction Purposes.
 - .2 CAN/CSA-Z321-96 (R2006), Signs and Symbols for the Occupational Environment.

1.02 DOCUMENTS TO BE SUBMITTED FOR ACTION AND INFORMATION

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

1.03 MATERIAL INSTALLATION AND REMOVAL

- .1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, access roads to fenced area and details of fence installation.
- .2 Plan for the power supply of trailers on the navigation lock's distribution network
- .3 Indicate use of additional or other transit areas.
- .4 Provide construction facilities in order to execute work expeditiously.
- .5 Remove material from site when no longer used.

1.04 SCAFFOLDING

- .1 Scaffolding in accordance with CAN/CSA-S269.2.
- .2 Provide and maintain scaffolding, platforms and temporary stairs.

1.05 HOISTING EQUIPMENT

- .1 Provide, operate and maintain hoists and cranes required for the moving of workers, materials and equipment.
- .2 Hoists cranes to be operated by qualified operator.
- .3 Submit lifting plans for approval by the Parks Canada Representative; however, approval by the Ministry does not relieve the Contractor of his responsibility.

1.06 SITE STORAGE/LOADING

- .1 Restrict work and operations of employees within Contract Documents boundaries. 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.

1.07 SECURITY

- .1 Provide and pay for responsible security personnel to guard site and contents of site after working hours and during holidays.

1.08 OFFICES

- .1 Provide office heated to 22 degrees C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with a table large enough to review drawings.
- .2 Provide marked and fully stocked first-aid case and fire extinguisher in a readily available location.

1.09 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 SANITARY FACILITIES

- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
- .2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.11 CONSTRUCTION SIGNAGE

- .1 Provide and erect project sign, within three weeks of signing Contract, in a location designated by Parks Canada Representative.
- .2 No other signs or advertisements, other than warning signs, are permitted on site.
- .3 Direct requests for approval to erect Consultant/Contractor signboard to Parks Canada Representative. The overall appearance of Consultant/Contractor's signboard must conform to project identification site sign. Wording in both official languages.
- .4 Signs and notices for safety and instruction in both official languages Graphic symbols to CAN/CSA-Z321.
- .5 Maintain approved signs and notices in good condition for the duration of project, and dispose of off site upon completion of project.

1.12 TRAFFIC PROTECTION AND FLOW

- .1 Provide access and temporary relocated roads as necessary to ensure traffic flow.
- .2 Protect pedestrian traffic and ensure traffic flow on deck during the construction period except as otherwise specifically directed by the Parks Canada Representative. Provide snow removal during period of Work to allow deck access. Maintenance of navigation lock access road will be ensured by Parks Canada Agency. Note that it is forbidden to pour salt on deck, but the pouring of sand is acceptable.
- .3 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with traffic on temporary bridge upstream of lock.
- .4 Verify adequacy of existing roads and allowable load limit on these roads. Contractor is responsible for repair of damage to roads caused by construction operations.
- .5 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of pedestrian traffic.

1.13 CLEAN-UP

- .1 Remove construction debris, waste materials, packaging material from work site daily.
- .2 Store materials resulting from demolition activities that are salvageable.
- .3 Stack stored new or salvaged material not in construction facilities.

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

3 EXECUTION

3.01 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- .1 Not Used.

END OF SECTION

1 GENERAL

1.01 REFERENCES

- .1 Within text of each specifications section, reference may be made to reference standards.
- .2 Conform to these reference standards, in whole or in part as specifically requested in specifications.
- .3 If there is question as to whether products or systems are in conformance with applicable standards, Parks Canada Representative reserves right to have such products or systems tested to prove or disprove conformance.
- .4 Costs for such testing will be borne by Parks Canada in event of conformance with Contract Documents or by Contractor in event of non-conformance.

1.02 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, supply 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 Parks Canada Representative 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.

1.03 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 Parks Canada Representative 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 Parks Canada Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Parks Canada Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.04 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 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.
- .5 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.
- .6 Remove and replace damaged products at own expense and to satisfaction of Parks Canada Representative.
- .7 Touch-up damaged factory finished surfaces to Parks Canada Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.05 TRANSPORTATION

- .1 Pay costs of transportation of products required in performance of Work.
- .2 Transportation cost of products supplied by Owner will be paid for by Parks Canada Representative. Unload, handle and store such products.

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

1.07 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 Parks Canada Representative if required Work is such as to make it impractical to produce required results.
- .2 Do not employ anyone unskilled in their required duties. Parks Canada Representative reserves right to require dismissal from site, workers deemed incompetent or careless.
- .3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Parks

Canada Representative, whose decision is final.

1.08 COORDINATION

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

1.09 REMEDIAL WORK

- .1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Coordinate adjacent affected Work as required.
- .2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.10 LOCATION OF DEVICES

- .1 Consider equipment's dimensions and location indicated as approximate. Contractor is responsible to make sure dimensions and location are adequate.
- .2 Inform Parks Canada Representative of conflicting installations. Install as directed by Parks Canada Representative.

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.

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

3 EXECUTION

3.01 NOT USED

- .1 Not Used.

END OF SECTION

1 GENERAL

1.01 DOCUMENTS TO BE SUBMITTED FOR ACTION AND INFORMATION

- .1 Submit documents in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit written request in advance of cutting or alteration which affects:
 - .1 Structural integrity of elements of project.
 - .2 Integrity of weather-exposed elements.
 - .3 Efficiency, maintenance, or safety of operational elements.
 - .4 Visual qualities of sight-exposed elements.
 - .5 Work of Owner or separate contractor.
- .3 Include in request:
 - .1 Identification of project.
 - .2 Location and description of affected Work.
 - .3 Statement on necessity for cutting or alteration.
 - .4 Description of proposed Work, and products to be used.
 - .5 Alternatives to cutting and patching.
 - .6 Effect on Work of Owner or separate contractor.
 - .7 Written permission of affected separate contractor.
 - .8 Date and time work will be executed.

1.02 MATERIALS

- .1 According to section 05 50 00.

1.03 PREPARATION

- .1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.
- .2 After uncovering, inspect conditions affecting performance of Work.
- .3 Provide supports to ensure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.
- .4 Provide protection from elements for areas which are to be exposed by uncovering work.

1.04 EXECUTION

- .1 Execute cutting, fitting, and welding to complete Work.
- .2 Fit several parts together, to integrate with other Work.
- .3 Remove and replace defective and non-conforming Work following Parks Canada Representative's approval.

1.05 WASTE MANAGEMENT AND DISPOSAL

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

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

3 EXECUTION

3.01 NOT USED

- .1 Not Used.

END OF SECTION

1 GENERAL

1.01 JOBSITE CLEANLINESS

- .1 Keep work area in tidy condition, free from accumulation of waste products and debris.
- .2 Dispose of waste materials and debris off site. Do not burn waste materials on site.
- .3 Clear snow and ice from deck, 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 the collection of waste materials and debris.
- .6 Provide and use marked separate bins for recycling. Refer to Section 01 74 21 - Construction/ Demolition Waste Management and Disposal.
- .7 Store volatile waste in covered metallic containers.
- .8 Provide adequate ventilation when using volatile or toxic substances.
- .9 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces.

1.02 FINAL CLEANING

- .1 When Work is near completion, remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2 Remove waste products and debris and leave Work area clean.
- .3 Prior to final inspection, remove surplus products, tools, construction machinery and equipment.
- .4 Remove waste materials from site at regularly scheduled times. Do not burn waste materials on site.
- .5 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .6 Broom clean and wash exterior sidewalks, steps and surfaces; rake clean other ground surfaces.

1.03 WASTE MANAGEMENT AND DISPOSAL

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

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.01 WASTE MANAGEMENT GOALS

- .1 Prior to starting the Work, meet with the Parks Canada Representative to review PCA's plan and objectives with regard to waste management.
- .2 Accomplish maximum control of solid construction waste.
- .3 Preserve environment and prevent pollution and environment damage.

1.02 DEFINITIONS

- .1 Class III: non-hazardous waste - construction renovation and demolition waste.
- .2 Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.
- .3 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
- .4 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- .5 Separate Condition: refers to waste sorted into individual types.
- .6 Source Separation: acts of keeping different types of waste materials separate beginning from first time they became waste.

1.03 STORAGE, HANDLING AND PROTECTION

- .1 Unless specified otherwise, materials for removal do not become Contractor's property.

1.04 DISPOSAL OF WASTES

- .1 Do not bury rubbish or waste materials.
- .2 Do not dispose of waste into waterways, storm, or sanitary sewers.

1.05 USE OF SITE AND FACILITIES

- .1 Execute work and leave free access to navigation lock's upstream bridge.
- .2 Provide temporary security measures approved by the Parks Canada Representative.

1.06 SCHEDULING

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

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

3 EXECUTION

3.02 APPLICATION

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

3.03 CLEANING

- .1 Refer to section 01 74 11 - Cleaning.

1 GENERAL

1.01 ADMINISTRATIVE REQUIREMENTS

- .1 Acceptance of Work Procedures:
 - .1 Contractor's Inspection: Contractor: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
 - .1 Notify Parks Canada Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
 - .2 Request Parks Canada Representative's inspection.
 - .2 Parks Canada Representative's Inspection:
 - .1 Parks Canada 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 English or French 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 and balanced and fully operational.
 - .5 Operation of systems: demonstrated to Owner's personnel.
 - .6 Commissioning of mechanical systems: completed according to requirements in Section 01 91 13 – General Commissioning Requirements, and copies of final Commissioning Report submitted to the Parks Canada Representative.
 - .7 Work: complete and ready for final inspection.
 - .4 Final Inspection:
 - .1 When completion tasks are done, request final inspection of Work by Parks Canada Representative, and Contractor.
 - .2 When Work incomplete according to Parks Canada Representative, complete outstanding items and request re-inspection.

1.02 FINAL CLEANING

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

2 PRODUCTS

2.01 NOT USED

- .1 Not Used.

3 EXECUTION

3.01 NOT USED

- .1 Not Used.

**PARKS CANADA
REPLACEMENT OF SUMP PUMPS AND TELECOM SYSTEM
CARILLON NAVIGATION LOCK**

**SECTION 01 77 00
WORK COMPLETION
PAGE 2**

END OF SECTION

1 GENERAL

1.01 SUMMARY

- .1 Section Includes:
 - .1 General requirements relating to commissioning of project's components and systems, including those related to performance control (PC) of components, equipment, sub-systems, systems, and integrated systems.
- .2 Acronyms:
 - .1 Cx - Commissioning.
 - .2 O&M - Operation and Maintenance.
 - .3 PI - Product Information.
 - .4 PC - Performance Control.
 - .5 TAB - Testing, Adjusting and Balancing.

1.02 GENERAL

- .1 Cx is a planned program of tests, procedures and checks carried out systematically on systems and integrated systems of the finished Project. Cx is performed after systems and integrated systems are completely installed, functional and Contractor's Performance Verification responsibilities have been completed and approved. Objectives:
 - .1 Verify installed equipment, systems and integrated systems operate in accordance with contract documents and design criteria and intent.
 - .2 Effectively train O&M staff.
- .2 Contractor assists in Cx process, operating equipment and systems, troubleshooting and making adjustments as required.
 - .1 Systems to be operated at full capacity under various modes to determine if they function correctly and consistently at peak efficiency. Systems to be interactively with each other as intended in accordance with Contract Documents and design criteria.
 - .2 During these checks, adjustments to be made to enhance performance to meet environmental or user requirements.
- .3 Design Criteria: as per client's requirements or determined by designer. To meet Project functional and operational requirements.

1.03 COMMISSIONING OVERVIEW

- .1 Testing shall take place in the presence of the Parks Canada Representative, be certified by him/her, and reports shall be submitted to him/her.
- .2 Cx to be a line item of Contractor's cost breakdown.
- .3 Cx activities supplement field quality and testing procedures described in relevant technical sections.

- .4 Cx is conducted in concert with activities performed during stage of project delivery. Cx identifies issues in Planning and Design stages which are addressed during Construction and Cx stages to ensure the work is constructed and proven to operate satisfactorily under weather, environmental and occupancy conditions to meet functional and operational requirements. Cx activities includes transfer of critical knowledge to facility operational personnel.
- .5 Parks Canada Representative will issue Interim Acceptance Certificate when:
 - .1 Completed Cx documentation has been received, reviewed for suitability and approved by Parks Canada Representative.
 - .2 Equipment, components and systems have been commissioned.
 - .3 O&M training has been completed.

1.04 NON-CONFORMANCE TO PERFORMANCE VERIFICATION REQUIREMENTS

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

1.05 PRE-CX REVIEW

- .1 Before Construction:
 - .1 Review contract documents, confirm by writing to Parks Canada Representative.
 - .1 Adequacy of provisions for Cx.
 - .2 Aspects of design and installation pertinent to success of Cx.
- .2 During Construction:
 - .1 Co-ordinate provision, location and installation of provisions for Cx.
- .3 Before start of Cx:
 - .1 Have completed Cx Plan up-to-date.
 - .2 Ensure installation of related components, equipment, sub-systems, systems is complete.
 - .3 Fully understand Cx requirements and procedures.
 - .4 Have Cx documentation shelf-ready.
 - .5 Understand completely design criteria and intent and special features.
 - .6 Submit complete start-up documentation to Parks Canada Representative.
 - .7 Have Cx schedules up-to-date.
 - .8 Ensure systems have been cleaned thoroughly.
 - .9 Complete TAB procedures on systems, submit TAB reports to Parks Canada Representative for review and approval.
 - .10 Ensure "As-Built" system schematics are available.
- .4 Inform Parks Canada Representative in writing of discrepancies and deficiencies on finished works.

1.06 CONFLICTS

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

1.07 DOCUMENTS TO BE SUBMITTED FOR ACTION AND INFORMATION

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Submit no later than 4 weeks after award of Contract:
 - .1 Draft Cx documentation.
 - .2 Preliminary Cx schedule.
 - .2 Request in writing to Parks Canada Representative for changes to submittals and obtain written approval at least 4 weeks prior to start of Cx.
 - .3 Submit proposed Cx procedures to Parks Canada Representative where not specified and obtain written approval at least 4 weeks prior to start of Cx.
 - .4 Provide additional documentation relating to Cx process required by Parks Canada Representative.

1.08 COMMISSIONING DOCUMENTATION

- .1 Parks Canada Representative to review and approve Cx documentation.
- .2 Provide completed and approved Cx documentation to Parks Canada Representative.

1.09 COMMISSIONING SCHEDULE

- .1 Provide adequate time for Cx activities prescribed in technical sections and commissioning sections including:
 - .1 Approval of Cx reports.
 - .2 Verification of reported results.
 - .3 Repairs, retesting, re-commissioning, re-verification.
 - .4 Training.

1.10 COMMISSIONING MEETINGS

- .1 Purpose: to resolve issues, monitor progress, identify deficiencies, relating to Cx.
- .2 Continue Cx meetings on regular basis until commissioning deliverables have been addressed.
- .3 Thereafter Cx meetings to be held until project completion and as required during equipment start-up and functional testing period.
- .4 Meeting will be chaired by Parks Canada Representative, who will record and distribute minutes.
- .5 Ensure subcontractors and relevant manufacturer representatives are present at Cx meetings and as required.

1.11 STARTING AND TESTING

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

1.12 WITNESSING OF STARTING AND TESTING

- .1 Provide a 10-days notice prior to commencement.
- .2 Parks Canada Representative to witness start-up and testing.
- .3 Contractor's Cx Agent to be present at tests performed and documented by sub-trades, suppliers and equipment manufacturers.

1.13 MANUFACTURER'S INVOLVEMENT

- .1 Factory testing: Contractor to:
 - .1 Coordinate time and location of testing.
 - .2 Provide testing documentation for approval by Parks Canada Representative.
 - .3 Arrange for Parks Canada Representative to witness tests.
 - .4 Obtain written approval of test results and documentation from Parks Canada Representative before delivery to site.
- .2 Obtain manufacturers installation, start-up and operations instructions prior to start-up of components, equipment and systems and review with Parks Canada Representative
 - .1 Compare completed installation with manufacturer's published data, record discrepancies, and review with manufacturer.
 - .2 Modify procedures detrimental to equipment performance and review same with manufacturer before start-up.
- .3 Integrity of warranties:
 - .1 Use manufacturer's trained start-up personnel where specified elsewhere in other divisions or required to maintain integrity of warranty.
 - .2 Verify with manufacturer that testing as specified will not void warranties.

1.14 PROCEDURES

- .1 Verify that equipment and systems are complete, clean, and operating in normal and safe manner prior to conducting start-up, testing and Cx.
- .2 Conduct start-up and testing in following distinct phases:
 - .1 Included in delivery and installation:
 - .1 Verification of conformity to specification, approved shop drawings and completion of PI report forms.
 - .2 Visual inspection of quality of installation.
 - .2 Start-up: follow accepted start-up procedures.
 - .3 Operational testing: document equipment performance.
 - .4 Performance control (PC): when required, perform new tests once deficiencies have been corrected.
 - .5 Near-completion performance control (PC) : to include fine-tuning.

- .3 Correct deficiencies and obtain approval from Parks Canada Representative after distinct phases have been completed and before commencing next phase.
- .4 Document require tests on approved PC forms.
- .5 Failure to follow accepted start-up procedures will result in re-evaluation of equipment by an independent testing agency selected by Parks Canada Representative. If results reveal that equipment start-up was not in accordance with requirements, and resulted in damage to equipment, implement following:
 - .1 Minor equipment/systems: implement corrective measures approved by Parks Canada Representative.
 - .2 Major equipment/systems: if evaluation report concludes that damage is minor, implement corrective measures approved by Parks Canada Representative.
 - .3 If evaluation report concludes that major damage has occurred, Parks Canada Representative shall reject equipment.
 - .1 Rejected equipment to be remove from site and replace with new.
 - .2 Subject new equipment/systems to specified start-up procedures.

1.15 START-UP DOCUMENTATION

- .1 Assemble start-up documentation and submit to Parks Canada Representative for approval before commencement of commissioning.
- .2 Start-up documentation to include:
 - .1 Factory and on-site test certificates for specified equipment.
 - .2 Pre-start-up inspection reports.
 - .3 Signed installation/start-up check lists.
 - .4 Start-up reports,

1.16 TEST RESULTS

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

1.17 START OF COMMISSIONING

- .1 Notify Parks Canada Representative at least 10 days prior to start of Cx.

1.18 INSTRUMENTS / EQUIPMENT

- .1 Submit to Parks Canada Representative for review and approval:
 - .1 Complete list of instruments proposed to be used.
 - .2 Listed data including, serial number, current calibration certificate, calibration date, calibration expiry date and calibration accuracy.

1.19 COMMISSIONING PERFORMANCE VERIFICATION

- .1 Carry out Cx:
 - .1 Under actual operating conditions, over entire operating range, in all modes.

- .2 On independent systems and interacting systems.
- .2 Cx procedures to be repeatable and reported results are to be verifiable.
- .3 Follow equipment manufacturer's operating instructions.
- .4 EMCS trending to be available as supporting documentation for performance verification.

1.20 WITNESSING COMMISSIONING

- .1 Parks Canada Representative to witness activities and verify results.

1.21 AUTHORITIES HAVING JURISDICTION

- .1 Where specified start-up, testing or commissioning procedures duplicate verification requirements of authority having jurisdiction, arrange for authority to witness procedures so as to avoid duplication of tests and to facilitate expedient acceptance of facility.
- .2 Obtain certificates of approval, acceptance and compliance with rules and regulation of authority having jurisdiction.
- .3 Provide copies to Parks Canada Representative within 5 days of test and with Cx report.

1.22 DEFICIENCIES, FAULTS, DEFECTS

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

1.23 COMPLETION OF COMMISSIONING

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

1.24 ACTIVITIES UPON COMPLETION OF COMMISSIONING

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

1.25 TRAINING

- .1 Ensure that training on new equipment is given to maintenance personnel.

1.26 MAINTENANCE MATERIALS, SPARE PARTS, SPECIAL TOOLS

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

1.27 OWNER'S PERFORMANCE TESTING

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

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.01 REFERENCES

- .1 ASTM International
 - .1 ASTM A 53/A 53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 - .2 ASTM A 269-14e1, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
 - .3 ASTM A 325-10e1, Standard Specification for Carbon Steel Bolts and Studs, 120,000 PSI Tensile Strength.

- .3 CSA International
 - .1 CSA G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CAN/CSA G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .3 CSA S16-14, Design of Steel Structures.
 - .4 CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
 - .5 CSA W59-13, Welded Steel Construction (Metal Arc Welding).

- .5 Green Seal Environmental Standards (GS)
 - .1 GS-11-2008, 2nd Edition, Paints and Coatings.

- .6 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).

- .7 The Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual - current edition.

1.02 DOCUMENTS TO BE SUBMITTED FOR ACTION AND INFORMATION

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

- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for pieces of equipment and material. Include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.
 - .1 For finishes, coatings, primers, and paints applied on site: indicate VOC concentration in g/L.

- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Quebec, Canada.
 - .2 Indicate materials, core thicknesses, finishes, connections, joints, welds, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.03 QUALITY ASSURANCE

- .1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certifications: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.04 DELIVERY, STORAGE AND HANDLING

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

2 PRODUCTS

2.01 MATERIALS

- .1 Steel sections and plates: to CSA G40.20/G40.21, Grade 300W or 350W according to drawings.
- .2 Welding materials: to CSA W59.
- .3 Welding electrodes: to CSA W48 Series.
- .4 Bolts and anchor bolts: to ASTM A 325.
- .5 Aluminum sheet: proprietary utility sheet.
- .6 Aluminum tubing, plate and shapes: 6061-T6.

2.02 FABRICATION

- .1 Fabricate work square, true, straight and accurate to required size, with bolts closely fitted.
- .2 Where possible, fit and shop assemble work, ready for erection.
- .3 Ensure exposed welds are continuous for length of each joint.

2.03 FINISHES

- .1 Galvanizing: hot dipped galvanizing with zinc coating 600 g/m² to CAN/CSA-G164.
- .2 Shop coat primer: MPI- EXT 5.1H in accordance with chemical component limits and restrictions requirements and VOC limits of GS-11 (DFT: 125 microns).

- .3 Zinc primer: zinc rich, ready mix to MPI-EXT 5.2C in accordance with chemical component limits and restrictions requirements and VOC limits of GS-11.
- .4 Two coats of semi-gloss finish paint (G5), in compliance with CAN/CGSB-1.118 (DFT: 125 microns), same colour as existing steel support.
- .5 Machined or polished surfaces should not be painted and must be protected by anti-corrosion materials prior to shipment to the site.

2.04 ISOLATION COATING

- .1 Isolate aluminum from following components, by means of bituminous paint:
 - .1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.
 - .2 Concrete, mortar and masonry.

2.05 SHOP PAINTING

- .1 Rough welds and sharp edges should be smoothed by grinding. Burrs must be removed.
- .2 Steel surfaces should be polished without being skinned, with mechanical tool in accordance with SSPC- SP3 standard and cleaned according to SSPC -SP1 before applying paint.
- .3 Apply one shop coat of primer to metal items, with exception of galvanized or concrete encased items.
- .4 Use unadulterated paint, as indicated by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 degrees C.
- .5 Clean surfaces to be field welded; do not paint.

3 EXECUTION

3.01 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for metal fabrications installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Parks Canada Representative.
 - .2 Inform Parks Canada Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied.

3.02 ERECTION

- .1 Do welding work in accordance with CSA W59 unless specified otherwise.
- .2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight bolts.
- .3 Exposed fastening devices to match finish and be compatible with material through which they pass.
- .4 Supply components for work by other trades in accordance with shop drawings and schedule.

- .5 Make field connections with bolts to CSA S16 or weld field connection.
- .6 Deliver items over for casting into concrete and building into masonry together with setting templates to appropriate location and construction personnel.
- .7 Touch-up field welds, bolts and burnt or scratched surfaces with primer after completion of:
 - .1 REX 5.1H.
- .8 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

3.03 CLEANING

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

3.09 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by metal fabrications installation.

END OF SECTION

1 GENERAL

1.01 SUMMARY

- .1 Section Includes:
 - .1 Materials and installation for piping and pumps.

1.02 REFERENCES

- .1 MSS-SP-58 - Manufacturers, Standardization Society – Pipe Hangers and Supports – Material Design and Manufacture
- .2 MSS-SP-69 - Manufacturers, Standardization Society – Pipe Hangers and Supports – Selection and Application
- .3 MSS-SP-89 - Manufacturers, Standardization Society – Pipe Hangers and Supports – Fabrication and installation Practices
- .4 ANSI B16.1 - Cast Iron Pipe Flanges and Flanged Fittings, class 25, 125, 250 and 800.
- .5 ANSI B16.5 - Pipe Flanges and Flanged Fittings
- .6 CSA W47.1 – Certification of Companies for Fusion Welding of Steel Structures
- .7 CSA W59-13, Welded steel construction (metal arc welding)

1.03 DOCUMENTS TO BE SUBMITTED FOR ACTION AND INFORMATION

- .1 Submit documents in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and data sheet for fixtures and equipment.
- .3 Shop Drawings.
 - .1 Submit shop drawings to indicate:
 - .1 Equipment, including connections, fittings, control assemblies and ancillaries. Identify whether factory or field assembled.
 - .2 Wiring and schematic diagrams.
 - .3 Dimensions and recommended installation.
 - .4 Pump performance and efficiency curves.
- .4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .5 Instructions: submit manufacturer's installation instructions.
- .6 Manufacturers' Field Reports: manufacturers' field reports specified.
- .7 Health and Safety:
 - .1 Take necessary measures in terms of Health and Safety on construction sites in accordance with Section 01 35 29.06 – Health and Safety Requirements.

1.04 WARRANTY

- .1 For each equipment, a warranty period of 24 months from commissioning time shall apply.
- .2 Manufacturer's warranty : Submit to the Parks Canada Representative, for review, the manufacturer's warranty document duly completed by the company's authorized agent.

1.05 DELIVERY, STORAGE AND HANDLING

- .1 Packaging, transportation, handling: Deliver materials in original packaging, sealed, undamaged and with identification tags.
- .2 Storage and Protection: Store materials in enclosures that are tempered and protected from bad weather.
- .3 In order to ensure that all piping is mechanically cleaned for shipment and/or storage, seal all openings as follows:
 - With a plywood lid, bolt at least 50 % of the holes.
- .4 Disposal management
 - .1 Separate waste materials for recycling in accordance with Section 01 74 21 - Management and disposal of construction/demolition.
 - .2 Remove from site all packing materials and deliver them to the appropriate recycling facilities .

2 PRODUCTS

2.01 PIPING

- .1 Check valve: Flanged, Class 150 #, 6 in. diameter.
- .2 Gate valve : Flanged , Class 150 #, 6 in. diameter.
- .3 Tee, elbow and pipe : 6 in. or 8 in. diameter, STD schedule, according to drawings.

2.02 PAINT

- .1 Primer applied at workshop complies with MPI -EXT 5.1H, according to GS- 11 in terms of chemical composition and VOC content.

2.03 SUMP PUMP VERTICAL SHAFT

- .1 There are two (2) drainage pumps to be supplied :
 - .1 Flow rate: 18.9 L/s (300 USGPM) at a pressure head of 155 kPa (15.85 m).
 - .2 Vertical turbine pump, in cast iron, and wheel shaft in stainless steel.

- .3 Motor power: 7.5 HP, 1200 RPM, 3 phase and 575V power for continuous operation, with integrated protection against overloads, mounted vertically in line with the pump, enclosed.
- .4 Shaft sleeve and cast iron components coated with an epoxy paint.
- .5 Lower bearing bronze, self-lubricated.
- .6 Vertical column with a length of 10.8 m (from below the strainer until the discharge line) made of steel and covered with paint, 6 in. diameter, flanged.
- .7 Assembly discharge head: 6 in. diameter, flanged, Class: 125 #.
- .8 Strainer, stainless steel.

2.04 FLOATS

- .1 Models as specified on drawings. Provided by the Contractor in charge of electricity/instrumentation.

3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

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

3.02 PAINT APPLIED IN SHOP

- .1 Rough welds and sharp edges should be smoothed by grinding, burrs must be removed.
- .2 Steel surfaces must be skinned without being polished using mechanical tools in accordance with SSPC- SP3 standard and cleaned according to SSPC- SP1 before applying paint.
- .3 Paint primer should be used as supplied by the manufacturer, without any modification. It must be applied to dry surfaces, free of rust, grease at a temperature of at least 7 Celsius degrees.
- .4 Surfaces to be welded should be cleaned on site and should not be coated with paint.

3.03 INSTALLATION

- .1 When replacing pumps, provide a temporary pump to ensure adequate emptying of the well.
- .2 In each case, make the electrical and mechanical connections between the pump, motor and control devices as indicated.
- .3 Install pump bases and make sure of proper alignment with the existing piping. Connections to equipment shall be made so that pipes do not induce stresses or vibration at the pump due to a misalignment. Pipes must be supported according to MSS-SP-58 and MSS-SP-69 standard.
- .4 All welding of the pipe shall conform to the requirements of ANSI / ASME B31.1 standards. If the workpiece is less than 10 °C, preheat the welding area of W59.

- .5 Remove mill scale, sand and dust from inside the pipe. Perform cleaning and removing of all dirt and foreign matter from materials, equipment, piping and other components before installing them or incorporate them into the work.

3.04 FIELD QUALITY CONTROL

- .1 Site Tests/Inspection:
 - .1 Check power supply.
 - .2 Check starter protective devices.
 - .3 Make a penetrant test on every weld.
- .2 Start-up, check for proper and safe operation.
- .3 Check settings and operation of hand-off-auto selector switch, operating, safety and limit controls, audible and visual alarms, over-temperature and other protective devices.

3.05 START-UP

- .1 General:
 - .1 In accordance with Section 01 91 13 - General Commissioning (Cx) Requirements: General Requirements, supplemented as specified herein.
 - .2 Procedures:
 - .1 Check power supply.
 - .2 Check starter O/L heater sizes.
 - .3 Start pumps, check impeller rotation.
 - .4 Check for safe and proper operation.
 - .5 Check settings, operation of operating, limit, safety controls, over-temperature, audible/visual alarms, other protective devices.
 - .6 Test operation of hands-on-auto switch (MANUAL-STOP-AUTO).
 - .7 Test operation of alternator.
 - .8 Adjust leakage through water-cooled bearings.
 - .9 Adjust shaft stuffing boxes.
 - .10 Adjust leakage flow rate from pump shaft stuffing boxes to manufacturer's recommendations.
 - .11 Check base for free-floating, no obstructions under base.
 - .12 Check installation, operation of mechanical seals, packing gland type seals. Adjust as necessary.
 - .13 Adjust alignment of piping and conduit to ensure full flexibility.
 - .14 Eliminate causes of cavitation, flashing, air entrainment.
 - .15 Measure pressure drop across strainer when clean and with flow rates as finally set.
 - .16 Verify lubricating oil levels.
 - .17 Run-in pumps for 12 continuous hours.
 - .18 Fill up the well to the point where first pump starts (14.81m/48'6"). Make sure the pump is activated automatically and stops at low level (13.57m/44'6").
 - .19 Fill up the well to the point where two (2) pumps operate (16.00m/52'6"). Make sure that the pumps operate automatically and stop at low level.

3.06 REPORTS

- .1 In accordance with Section 01 91 13 - General Commissioning (Cx) Requirements: reports, supplemented as specified.
- .2 Include:
 - .1 PC results on approved PC Report Forms.
 - .2 Product Information report forms.
 - .3 Pump performance curves (family of curves) with final point of actual performance.

3.07 TRAINING

- .1 In accordance with Section 01 91 13 - General Commissioning (Cx) Requirements: Training of O&M Personnel, supplemented as specified.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

- .1 The general conditions of contract apply to this section, including general and specific clauses and specification sections in PART 1.

1.02 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CSA C22.1, Canadian Electrical Code, Part 1 (20th Edition), Safety Standard for Electrical Installations.
 - .2 CSA C22.2 No. 0.4 - Grounding of Electrical Equipment.
 - .3 CAN/CSA-C22.2 No. 0, General requirements - Canadian electrical code, part II
 - .4 CAN/CSA Z462-08 – Workplace Electrical Safety
 - .5 CAN3-C235-83(R2000), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.
- .2 Electrical and Electronic Manufacturer's Association of Canada (EEMAC)
 - .1 EEMAC 2Y-1, Light Gray Colour for Indoor Switch Gear.
- .3 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)
 - .1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

1.03 DEFINITIONS

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

1.04 DESIGN REQUIREMENTS

- .1 Operating voltages: to CAN3-C235.
- .2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.
 - .1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.
- .3 Language operating requirements: provide identification nameplates and labels for control items in English and French.
- .4 Elements that have the same functions shall be interchangeable. All electrical devices and accessories with the same functions must come from a single manufacturer.
- .5 Materials and equipment must be CSA certified. In cases where it is not possible to get CSA certified equipment, submit replacement materials and equipment to Supervisor or his representative before delivery to the site.

1.05 DOCUMENTS TO BE SUBMITTED FOR ACTION AND INFORMATION

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Quebec, Canada.
 - .2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure coordinated installation.
 - .3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.
 - .4 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.
 - .5 Submit copies of drawings and product data to Parks Canada Representative.
 - .6 If changes are required, notify Parks Canada Representative of these changes before they are made.
- .3 Quality Control: in accordance with Section 01 45 00 - Quality Control.
 - .1 Provide CSA certified equipment and material.
 - .2 Where CSA certified equipment and material is not available, submit such equipment and material to Parks Canada Representative for special approval before delivery to site.
 - .3 Submit test results of installed electrical systems and instrumentation.
 - .4 Permits and fees: in accordance with General Conditions of contract.
 - .5 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Parks Canada Representative.
- .4 Manufacturer's Field Reports: submit to Parks Canada Representative manufacturer's written report, within 3 days of review, verifying compliance of Work and electrical system and instrumentation testing, as described in PART 3 - FIELD QUALITY CONTROL.

1.06 QUALITY ASSURANCE

- .1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.
- .2 Qualifications: electrical Work to be carried out by qualified, licensed electricians who hold valid Master Electrical Contractor license or apprentices in accordance with authorities having jurisdiction as per the conditions of Provincial Act respecting manpower vocational training and qualification.
 - .1 Employees registered in provincial apprentices program: permitted, under direct supervision of qualified licensed electrician, to perform specific tasks.
 - .2 Permitted activities: determined based on training level attained and demonstration of ability to perform specific duties.
- .3 Site Meetings:
 - .1 Meetings at the request of Parks Canada Representative.
 - .2 Take necessary measures in terms of occupational health and safety on construction sites in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.07 DELIVERY, STORAGE AND HANDLING

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

1.08 SYSTEM START-UP

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

1.09 OPERATING INSTRUCTIONS

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

2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- .1 Provide material and equipment in accordance with Section 01 61 00 - General Product Requirements.

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- .2 Material and equipment to be CSA certified. Where CSA certified material and equipment is not available, obtain special approval from Parks Canada Representative before delivery to site and submit such approval as described in PART 1 - SUBMITTALS.
- .3 Factory assemble control panels and component assemblies.

2.02 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS

- .1 Verify installation and co-ordination responsibilities related to motors, equipment and controls, as indicated.
- .2 Control wiring and conduit: in accordance with Section 26 29 03 - Control Devices, except for conduits, wiring and connections below 50 V which are related to control systems specified in mechanical sections and as shown on mechanical drawings.

2.03 WARNING SIGNS

- .1 Warning Signs: in accordance with requirements of Parks Canada Representative.

2.04 WIRING TERMINATIONS

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

2.05 EQUIPMENT IDENTIFICATION

- .1 Identify electrical equipment with nameplates and labels as follows:
 - .1 Nameplates: lamicoid 3 mm thick plastic engraving sheet, matt white finish face, black core, lettering accurately aligned and engraved into core mechanically attached with self-tapping screws.
 - .2 Sizes as follows, or according to Parks Canada standards :

NAMEPLATE SIZES

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

- .2 Labels: embossed plastic labels with 6 mm high letters unless specified otherwise.
- .3 Wording on nameplates and labels to be approved by Parks Canada Representative prior to manufacture.
- .4 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.

2.06 WIRING IDENTIFICATION

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

2.07 FINISHES

- .1 Envelopes metal surfaces must be finished in the workshop and be coated with a rust finish, inside and outside, and at least two layers of enamel finishing.
- .2 Switchgear cabinets and distribution installed inside must be painted light gray according to EEMAC 2Y -1 standard.

3 EXECUTION

3.01 INSTALLATION

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

3.02 NAMEPLATES AND LABELS

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

3.03 MOUNTING HEIGHTS

- .1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.
- .2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

3.04 CO-ORDINATION OF PROTECTIVE DEVICES

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

3.05 FIELD QUALITY CONTROL

- .1 Perform tests in the presence of a Parks Canada Representative.
- .2 Provide measuring instruments, indicators, equipment and personnel required for carrying out the tests during the execution of works and completion thereof.

- .3 Checks on site by the manufacturer
 - 1. Obtain written report from manufacturer verifying compliance of Work specified criteria in regard to handling, implementation, application products, and report to the protection and cleaning of work and submit this report in accordance with the article “DOCUMENTS / ITEMS TO BE SUBMITTED”, PART 1.
 - 2. The manufacturer shall make recommendations regarding the use of the product, and make periodic visits to check if the implementation was performed according to the recommendations.

- .4 Schedule site visits in accordance with the article “QUALITY ASSURANCE”, PART 1.

3.06 CLEANING

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

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

- .1 The general conditions of contract apply to this section, including general and specific clauses and specification sections in PART 1.

1.02 REFERENCES

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

1.03 ITEMS TO BE SUBMITTED FOR ACTION

- .1 In accordance with requirements described in PART 1.
- .2 Technical Product Data: For each type of indicated product.

2 PRODUCTS

2.01 MATERIALS

- .1 Pressure type wire connectors to: with current carrying parts of copper sized to fit copper conductors as required.
- .3 Bushing stud connectors: to EEMAC 1Y-2 to consist of:
 - .1 Connector body and stud clamp for stranded copper conductors.
 - .2 Clamp for stranded copper conductors.
 - .3 Clamp for stranded aluminum ACSR conductors.
 - .4 Stud clamp bolts.
 - .5 Bolts for copper conductors.
 - .6 Sized for conductors as indicated.
- .4 Clamps or connectors for armoured cable, aluminum sheathed cable, mineral insulated cable, flexible conduit, non-metallic sheathed cable as required.

3 EXECUTION

3.01 INSTALLATION

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

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

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

- .1 The general conditions of contract apply to this section, including general and specific clauses and specification sections in PART 1.

1.02 REFERENCES

- .1 CSA C22.2 N° 3, Electrical Features of Fuel-Burning Equipment.
- .2 CSA C22.2 N° 131 et 174, TECK90 type cables.

1.03 ITEMS TO BE SUBMITTED FOR ACTION

- .1 In accordance with PART 1.
- .2 Technical Product Data: For each type of indicated product.

2 PRODUCTS

2.01 TECK 90 CABLE

- .1 Insulated copper twisted conductor, required size. Thermosetting polyethylene, cross-threads, RW90 and designed for a voltage of 300V, 600V and 1000V, as specified on drawings.
- .2 Incorporated grounding conductors.
- .3 Inner PVC jacket.
- .4 Protective metal armor protection in interlocked aluminum tape.
- .5 Overall covering: thermoplastic polyvinyl chloride, fireproof.
- .6 Fastenings:
 - .1 One hole aluminum straps to secure surface cables 50 mm and smaller. Two hole steel straps for cables larger than 50 mm.
 - .2 Channel type supports for two or more cables at 915 mm centers.
 - .3 Threaded rods: 6 mm diameter to support suspended channels.
- .7 Connectors:
 - .1 Watertight approved for TECK cables.

3 EXECUTION

3.01 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 - General Electrical Requirements.

- .2 Perform tests using method appropriate to site conditions and to approval of Parks Canada Representative.
- .3 Perform tests before energizing electrical system.

3.02 GENERAL CABLE INSTALLATION

- .1 When required, remove the cables in existing cable trays.
- .2 When required, remove the cables in existing cable tunnels around the navigation lock , making sure to place them so that they are not damaged by tunnel covers or other elements.
- .3 Perform cable terminations in accordance with Section 26 05 20 – Wires and Box Connectors (0-1000 V).
- .4 Use color coded wires in accordance with Section 26 05 00 - General Electrical Requirements.

3.04 INSTALLATION OF TECK90 CABLE (0 -1000 V)

- .1 Group cables wherever possible on channels.
- .2 Install cable exposed, securely supported by staples, straps or hangers.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

- .1 The general conditions of contract apply to this section, including general and specific clauses and specification sections in PART 1.

1.02 REFERENCES

- .1 American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE)
 - .1 ANSI/IEEE 837-1989(R1996), Qualifying Permanent Connections Used in Substation Grounding.
- .2 Canadian Standards Association, (CSA International)

2 PRODUCTS

2.01 EQUIPMENT

- .1 Ground clamps : size as indicated, to connect conductors to an electrically conductive underground water pipe.
- .2 Grounding conductors: bare stranded copper, tinned, soft annealed, suitably sized.
- .3 Insulated grounding conductors: green, RW90 type, suitably sized.
- .4 Ground bus: copper, size as indicated, complete with insulated supports, fastenings, connectors.
- .5 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 Thermit welded type conductor connectors.
 - .5 Bonding jumpers, straps.
 - .6 Pressure wire connectors.

3 EXECUTION

3.01 INSTALLATION GENERAL

- .1 Install complete permanent, continuous grounding system including, electrodes, conductors, connectors and accessories.
- .2 Install connectors in accordance with manufacturer's instructions.
- .3 Protect exposed grounding conductors from being damaged.

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- .4 Make buried connections, and connections to conductive water main, electrodes, using copper welding by thermit process permanent mechanical connectors or inspectable wrought copper compression connectors to ANSI/IEEE 837.
- .5 Use mechanical connectors for grounding connections to equipment provided with lugs.
- .6 Soldered joints not permitted.
- .7 Install bonding wire for flexible conduit, connected at both ends to grounding bushing, solderless 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 Bond single conductor, metallic armoured cables to cabinet at supply end, and provide non-metallic entry plate at load end and load end.
- .10 Ground secondary service pedestals.

3.02 SYSTEM AND CIRCUIT GROUNDING

- .1 Install system and circuit grounding connections to neutral of primary 600V system, secondary 120/240V systems.

3.03 EQUIPMENT GROUNDING

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

3.04 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 2/0AWG.

3.10 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 - General Electrical Requirements.
- .2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Parks Canada Representative and local authority having jurisdiction over installation.
- .3 Perform tests before energizing electrical system.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

- .1 The general conditions of contract apply to this section, including general and specific clauses and specification sections in PART 1.

1.02 ITEMS TO BE SUBMITTED FOR ACTION

- .1 In accordance with requirements described in PART 1.
- .2 Technical Product Data: For each type of indicated product.

1.03 PRODUCT DATA

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

2 PRODUCTS

2.01 U-BEND CHANNELS

- .1 U-bend channel, hot dip galvanized, surface mounted or suspended, complete with accessories and hardware.
- .2 Acceptable products:
 - .1 Superstrut, by Thomas and Betts or equivalent approved by Parks Canada Representative.

3 EXECUTION

3.01 INSTALLATION

- .1 Secure equipment to poured concrete with expandable inserts.
- .2 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.
- .3 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.
- .4 For surface mounting of two or more conduits use channels at 1500 mm on centre spacing.
- .5 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.
- .6 Ensure adequate support for raceways and cables dropped vertically to equipment where there is

no wall support.

- .7 Do not use wire lashing or perforated strap to support or secure raceways or cables.
- .12 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Parks Canada Representative.
- .13 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

- .1 The general conditions of contract apply to this section, including general and specific clauses and specification sections in PART 1.

1.02 REFERENCES

- .1 Boxes and fittings in accordance with CSA Standard C22.2 No. 18.

1.03 ITEMS TO BE SUBMITTED FOR ACTION

- .1 In accordance with requirements described in PART 1.
- .2 Technical Product Data: For each type of indicated product.

2 PRODUCTS

2.01 DIVIDING BOXES

- .1 Construction: sheet metal enclosure, welded corners and formed hinged cover suitable for locking in closed position.
- .2 Terminations: connection blocks to match required size and number of incoming and outgoing conductors as indicated.
- .3 Spare Terminals: minimum three spare terminals on each connection or lug block sized less than 400 A.

2.02 JUNCTION AND PULL BOXES

- .1 Steel boxes, welded, with flat screwed lids, free of sharp edges, for surface mounting as indicated on the drawings.
- .2 Covers with a rim of 25 mm (1 inch) at least, adaptable to flush-mounted pull and junction boxes.

2.03 ACCEPTABLE PRODUCTS

- .1 Hoffman, Hammond or as indicated on electrical drawings or equivalent approved by Parks Canada Representative.

3 EXECUTION

3.01 DIVIDING BOX INSTALLATION

- .1 Mount plumb, true and square to building lines.
- .2 Extend dividing boxes on the entire length of equipment arrangement except where indicated

otherwise.

3.02 CABINETS, JUNCTION AND PULL BOXES INSTALLATION

- .1 Install pull boxes in inconspicuous but accessible locations.
- .2 Mount cabinets with top no higher than 2 m above finished floor except where indicated otherwise.
- .3 Only main junction and pull boxes are indicated. Install additional pull boxes as required by CSA C22.1.

3.03 IDENTIFICATION

- .1 Equipment Identification: in accordance to Section 26 05 00- General Electrical Requirements.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

- .1 The general conditions of contract apply to this section, including general and specific clauses and specification sections in PART 1.

1.02 DOCUMENTS TO BE SUBMITTED FOR APPROVAL/ INFORMATION

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit product data sheets for channels, busbars and compartments. Include product characteristics, overall dimensions and finish.
- .3 Provide manufacturer's instructions to indicate special handling criteria, installation sequence and cleaning procedures.
- .4 Submit shop drawings and indicate:
 - .1 Overall size.
 - .2 Configuration of identified compartments.
 - .3 Floor anchoring method and dimensioned foundation template.
 - .4 Cable entry and exit locations.
 - .5 Dimensioned position and size of busbars and details of provision for future extension.
 - .6 Schematic and wiring diagrams.

1.03 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Collect, package and store existing busbars, wireways, sills, copper ground straps and other associated components for recycling and reuse.

1.04 QUALITY ASSURANCE

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

2 PRODUCTS

2.01 GENERAL DESCRIPTION

- .1 One (1) motor control center column with two (2) size 1 starters, according to standards already established by Parks Canada for installation on existing MCCs.

2.02 VERTICAL UNITS

- .1 According to standards already established by Parks Canada for installation on existing MCCs.

2.03 BUSBARS

- .1 According to standards already established by Parks Canada for installation on existing MCCs.

2.04 GROUND BUS

- .1 According to the standards already established by Parks Canada for installation on existing MCCs.

2.05 MOTOR STARTERS AND OTHER DEVICES

- .1 Two (2) size 1 starters for the supply of sump pumps in accordance with existing on site standards. Without limitations, the system shall allow the reading of phase current, insulation resistance (ground fault), the counting of operation hours and allow remote reading (via existing programmable controller).

2.06 STARTER UNIT COMPARTMENTS

- .1 According to standards already established by Parks Canada.

2.07 WIRING IDENTIFICATION

- .1 Provide wiring identification in accordance with Section 26 05 00 - General Electrical Requirements.

2.08 EQUIPMENT IDENTIFICATION

- .1 Provide equipment identification in accordance with Section 26 05 00 – General Electrical Requirements.
 - .1 Main motor control centre nameplate: size No. 7, engraved according to standards already established by Parks Canada.
 - .2 Individual compartment nameplates: size No. 5, engraved as indicated or according to Parks Canada standards.

2.9 FINISHES

- .1 Apply finishes in accordance with Section 26 05 00 - Common Work Results - For Electrical.
- .2 Paint motor control centre exterior surfaces in light gray and interior surfaces in white.

2.10 SOURCE QUALITY CONTROL

- .1 Provide manufacturer's type test certificates including short circuit fault damage certification up to short circuit values specified under bus bracing.
- .2 Parks Canada Representative to witness standard factory testing of complete motor control centre including operation of switches, circuit breakers, starters and controls.

3 EXECUTION

3.01 INSTALLATION

- .1 Set and secure motor control centre in place on channel bases, rigid, plumb and square to building floor and wall.
- .2 Make field power and control connections as indicated.
- .3 Install and wire starters and control devices as indicated.
- .4 Ensure fuses have the appropriate size.
- .5 Ensure correct overload heater elements are installed.

3.02 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 - General Electrical Requirements.
- .2 Ensure moving and working parts are lubricated where required.
- .3 Activate switches and contactors to make sure they are in good operating condition.
- .4 Ensure that sequence controls, material and all control devices operate as indicated.
- .5 Operate starters in sequence to prove satisfactory performance of motor control centre for a period of eight (8) hours.

3.03 CLEANING

- .1 Clean Work area in accordance with Section 01 74 11 - Cleaning.
 - .1 Remove surplus materials, waste, tools and equipment from site.
- .2 Waste management: Separate waste materials for recycling/re-use in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

- .1 The general conditions of contract apply to this section, including general and specific clauses and specification sections in PART 1.

1.02 REFERENCES

- .1 Canadian Standards Association (CSA)/ CSA International.
 - .1 Airbreak switches, manually operable, enclosed, for use in nonhazardous locations and sudden power failure in accordance with CSA C22.2 No. 4 - M89 requirements.
 - .2 Fuse holders in accordance with CSA Standard C22.2 No. 39 M1987 c1992 requirements.

1.03 ITEMS TO BE SUBMITTED FOR ACTION

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

2 PRODUCTS

2.01 DISCONNECT SWITCHES

- .1 All switches shall be supplied by the same manufacturer.
- .2 Switch size as indicated.
- .3 Lockable in "closed" or "open" position using three (3) padlocks.
- .4 Mechanical interlock door that can be open only when the lever is in "closed" position.
- .5 Fuses: size as indicated.
- .6 The fuse holders of disconnect switch must be suitable, without an adapter, to the determined fuse category, as indicated .
- .7 Snap closing and sudden power failure mechanism.
- .8 Identify "OPEN" and "CLOSED" positions on the box cover.

2.02 EQUIPMENT IDENTIFICATION

- .1 Provide equipment identification in accordance with Section 26 05 00 - General Electrical Requirements.

2.03 ACCEPTABLE PRODUCTS

- .1 Schneider or approved equivalent by Parks Canada Representative.

3 EXECUTION

3.01 INSTALLATION

- .1 Install disconnect switches, and, when applicable, fuses, according to the manufacturer's instructions and according to drawings.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

- .1 The general conditions of contract apply to this section, including general and specific clauses and specification sections in PART 1.

1.02 SUMMARY

- .1 This section comprises the following elements: materials for industrial control equipment, including push-button stations, HMIs, level switches, level transmitters, and the installation of all those elements.

1.03 REFERENCES

- .1 Canadian Standards Association / CSA International
 - .1 CSA C22.2 No.14-F95 (C2001), Industrial Control Equipment.
- .2 National Electrical Manufacturers Association (NEMA)
 - .1 NEMA ICS 1-2001, Industrial Control and Systems: General Requirements.

1.04 ELEMENTS TO BE SUBMITTED FOR ACTION

- .1 In accordance with requirements described in PART 1.
- .2 Technical Product Data: For each type of indicated product.

2 PRODUCTS

2.01 AC CONTROL RELAYS

- .1 See drawings for technical specifications.

2.02 RELAY ACCESSORIES

- .1 See drawings for technical specifications.

2.03 HUMAN MACHINE INTERFACE

- .1 See drawings for technical specifications.

2.04 LEVEL SWITCHES (FLOATS)

- .1 See drawings for technical specifications.

2.05 LEVEL TRANSMITTERS

- .1 See drawings for technical specifications.

2.06 CONTROL STATIONS

- .1 See drawings for technical specifications.

2.07 PUSH-BUTTON STATIONS

- .1 See drawings for technical specifications.

2.08 SELECTOR SWITCHES

- .1 See drawings for technical specifications.

2.09 DEPORTED PROGRAMMABLE CONTROLLER

- .1 See drawings for technical specifications.

3 EXECUTION

3.01 INSTALLATION

- .1 Install control devices as specified in drawings or according to manufacturer's recommendations.

3.02 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 - General Electrical Requirements.
- .2 Depending upon magnitude and complexity, divide control system into convenient sections, energize one section at a time and check out operation of section.
- .3 Upon completion of sectional test, undertake group testing.
- .4 Check out complete system for operational sequencing.

END OF SECTION

1 GENERAL

1.01 REFERENCES

- .1 American National Standards Institute
 - .1 ANSI J-STD-607-A-2002, Joint Standard - Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.
- .2 Telecommunications Industries Association (TIA)/Electronic Industries Alliance (EIA)
 - .1 TIA/EIA-606-2002, Administration Standard for the Commercial Telecommunications Infrastructure.
- .3 U.S. Department of Labor/Occupational Safety and Health Administration (OSHA)
 - .1 Nationally Recognized Testing Laboratory (NRTL) (Laboratoire d'essais reconnu à l'échelle nationale).
- .4 Association canadienne de normalisation (CSA)/CSA International
 - .1 CSA-C22.2 numéro 214-F02, Câbles de télécommunications (norme binationale avec UL 444).
 - .2 CSA-C22.2 numéro 232-FM1988 (C2004), Câbles optiques.
- .5 Telecommunications Industry Association (TIA)/Electronic Industries Alliance (EIA)
 - .1 TIA/EIA-568-B.1-(2001), Commercial Building Telecommunications Cabling Standard, Part 1: General Requirements.
 - .2 TIA/EIA-568-B.2-(2001), Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted-Pair Cabling Components.
 - .3 TIA/EIA-568-B.3-(2000), Optical Fiber Cabling Components Standard.
 - .4 TIA/EIA-606-A-(2002), Administration Standard for the Commercial Telecommunications Infrastructure.
 - .5 TIA TSB-140-2004, Telecommunications Systems Bulletin - Additional Guidelines for Field-Testing Length, Loss and Polarity of Optical Fiber Cabling Systems.
 - .6 TIA-598-C-(2005), Optical Fiber Cable Color Coding.1.03

1.02 SYSTEM DESCRIPTION

- .1 General

The network infrastructure which will be implemented will provide the visualization and saving of data required by Parks Canada Representative for a better monitoring of events related to the Carillon navigation lock activities. It will also be possible to monitor these activities in a remote mode via a secured VPN remote connection. All new equipment will meet the safety standards required by the Parks Canada Representative.

.2 Navigation lock electrical room

A programming and visualization station for the control system will be installed in the electrical room with remote control via a connection to the Internet planned in the collector's house and via the RF network. This station will be connected to the Ethernet link of the electrical room's "Industrial" network.

A rack will also be installed in the electrical room, with the following equipment :

- One (1) Ethernet switch;
- One (1) uninterruptible power supply system (UPS);
- One spare space for the connection of future video cameras.

.3 Main navigation lock station

The main station will be re-used and connected to the Ethernet link of the electrical room's « Industrial » network.

.4 Navigation lock kiosk station

The kiosk station will be re-used and connected to the Ethernet link of the electrical room's « Industrial » network.

.5 Potable water treatment station in the collector's house

The local potable water treatment station network in the collector's house will also be re-used and linked via an RF network to the electrical room's "Industrial" network.

A rack will be installed in the collector's house, with the following equipment :

- One (1) Ethernet switch;
- One (1) uninterruptible power supply system (UPS);
- One (1) programming server, history and visualization;
- One spare space for a future server for the acquisition of video recordings;
- A system with KVM to control the server from the water treatment control station's screen.

1.03 DEFINITIONS

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

1.04 DESIGN REQUIREMENTS

- .1 Operating voltages: to CAN3-C235.
- .3 Language operating requirements: provide identification nameplates and labels for control items

- in English and French.
- .4 Elements that have the same functions shall be interchangeable. All electrical devices and accessories with the same functions must come from a single manufacturer.
- .5 Materials and equipment must be CSA certified. In cases where it is not possible to get CSA certified equipment, submit replacement materials and equipment to the Ministry Representative before delivery to the site.

1.05 DOCUMENTS TO BE SUBMITTED FOR ACTION AND INFORMATION

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Quebec, Canada.
 - .2 Submit connection diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure coordinated installation.
 - .3 Identify on connection diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.
 - .4 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.
 - .5 Submit copies of drawings and product data to the Ministry Representative.
 - .6 If changes are required, the Ministry Representative of these changes before they are made.
- .3 Quality Control:
 - .1 Provide CSA certified equipment and material.
 - .2 Where CSA certified equipment and material is not available, submit such equipment and material to the Ministry Representative for special approval before delivery to site.
 - .3 Submit test results of installed electrical systems and telecommunication instruments as well as all network connections made on site.
 - .4 Permits and fees: in accordance with General Conditions of contract.
 - .5 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Ministry Representative.
- .4 Manufacturer's Field Reports: submit to Parks Canada Representative manufacturer's written report, within 3 days of review, verifying compliance of Work and electrical system and instrumentation testing, as described in PART 3 - FIELD QUALITY CONTROL.

1.06 QUALITY ASSURANCE

- .1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.
- .2 Permitted activities: determined based on training level attained and demonstration of ability to perform specific duties.

- .3 Site Meetings:
 - .1 Meetings at the request of Ministry Representative.
 - .2 Take necessary measures in terms of occupational health and safety on construction sites in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.07 DELIVERY, STORAGE AND HANDLING

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

1.08 SYSTEM STARTUP

- .1 Instruct Ministry Representative and operating personnel in operation, care and maintenance of systems, system equipment and components.
- .2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.
- .3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with aspects of its care and operation.
- .4 Provide a list of all the software installed on the operating stations as well as all required licence number and passwords if applicable.
- .5 Provide all the required software for the configuration as well as the maintenance of the telecommunication equipment's provided.

1.09 OPERATING INSTRUCTIONS

- .1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.
- .2 Operating instructions to include following:
 - .1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
 - .2 Start up, proper adjustment, operating, and shutdown procedures.
 - .3 Safety precautions.
 - .4 Procedures to be followed in event of equipment failure.
 - .5 Other items of instruction as recommended by manufacturer of each system or item of equipment.
- .3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.
- .4 Post instructions where directed.

2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- .1 Provide material and equipment in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Material and equipment to be CSA certified. Where CSA certified material and equipment is not available, obtain special approval from Ministry Representative before delivery to site and submit such approval as described in section 01 33 00.
- .3 Factory assemble control panels and component assemblies.

2.02 POLYETHYLENE INSULATED CABLES

- .1 Conductors 26 AWG soft copper made into cables as follows:
 - .1 Number of pairs: 4.
 - .2 Polyethylene, electric grade insulation.
 - .3 Non-hygroscopic coloured binders.
 - .4 Sheath:
 - .1 Flat aluminum tape formed longitudinally and lapped with outer jacket of extruded polyethylene.
 - .2 Inner polyethylene jacket, flat aluminum tape and outer polyethylene jacket.
 - .3 Inner polyethylene jacket, corrugated aluminum tape not overlapped, and soldered, with covering of thermoplastic compound and jacket of polyethylene.
 - .4 Inner polyethylene jacket, layer of spirally wound paper tape and extruded lead sheath.

2.03 TELECOMMUNICATIONS GROUNDING BUSBAR (TGB)

- .1 Predrilled copper busbar, with holes 8 mm diameter for use with standard-sized lugs to: ANSI J-STD-607-A.
- .2 Dimensions 6 mm thick, 50 mm wide as required by: ANSI J-STD-607-A.

2.04 BONDING CONDUCTOR FOR TELECOMMUNICATIONS

- .1 Copper conductor, green as required by: ANSI J-STD-607-A.

2.05 WARNING SIGNS

- .1 Warning Signs: in accordance with requirements of Ministry Representative.

2.06 PATHWAYS FOR COMMUNICATION

- .1 Cable Teck 90 type, in accordance with Section 26 05 21 – Cables and wiring (0 – 1000V).

2.07 EQUIPMENT IDENTIFICATION

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

- .2 Sizes as follows, or according to Parks Canada standards :

NAMEPLATE SIZES

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

- .2 Labels: embossed plastic labels with 6 mm high letters unless specified otherwise.
 - .3 Wording on nameplates and labels to be approved by Ministry Representative prior to manufacture.
 - .4 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.

2.08 WIRING IDENTIFICATION

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

2.09 FINISHES

- .1 Envelopes metal surfaces must be finished in the workshop and be coated with a rust finish, inside and outside, and at least two layers of enamel finishing.
- .2 Switchgear cabinets and distribution installed inside must be painted light gray according to EEMAC 2Y -1 standard.

3 EXECUTION

3.01 INSTALLATION

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

3.02 TELECOMMUNICATIONS GROUNDING BUSBAR (TGB)

- .1 Install TGB in main terminal/equipment room and each telecommunications room.

- .2 Install copper bonding conductor from TGB to enclosure of serving electrical power panel (panelboard).

3.03 BONDING CONDUCTORS GENERAL

- .1 When placed in ferrous metallic conduit or EMT longer than 1 m, bond to each end of conduit or EMT.

3.04 BONDING CONDUCTOR FOR TELECOMMUNICATIONS

- .1 Install bonding conductor for telecommunications from TGB to service equipment (power) ground.
- .2 Use exothermic welding, approved 2 hole compression lugs for connection to TGB.

3.05 PATHWAYS FOR COMMUNICATION

- .1 Install empty raceway system, including distribution system, fish wire, terminal cabinets, outlet boxes, floor boxes, pull boxes, cover plates, conduit, sleeves and caps, cabletroughs, service poles, miscellaneous and positioning material to constitute complete system.

3.06 NAMEPLATES AND LABELS

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

3.07 MOUNTING HEIGHTS

- .1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.
- .2 If mounting height of equipment is not specified or indicated, verify with the ministry representative before proceeding with installation.

3.08 CO-ORDINATION OF PROTECTIVE DEVICES

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

3.09 FIELD QUALITY CONTROL

- .1 Perform tests in the presence of the Ministry Representative.
- .2 Provide measuring instruments, indicators, equipment and personnel required for carrying out the tests during the execution of works and completion thereof.

3.10 CLEANING

- .1 At the workshop, clean and touch up painted surfaces that were scratched or damaged during transportation and installation; use paint of the same type and identical colour as the original paint.
- .2 Clean hooks, supports, fastenings and other apparent non-galvanized fastening devices, and apply

primer to prevent rust.

- .3 Checks on site by the manufacturer
 - Obtain written report from manufacturer verifying compliance of Work specified criteria in regard to handling, implementation, application products, and report to the protection and cleaning of work and submit this report in accordance with the article “DOCUMENTS / ITEMS TO BE SUBMITTED”, PART 1.
 - The manufacturer shall make recommendations regarding the use of the product, and make periodic visits to check if the implementation was performed according to the recommendations.
- .4 Schedule site visits in accordance with the article “QUALITY ASSURANCE”, PART 1.

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.

END OF SECTION

1 GENERAL

1.01 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CSA-C22.2 No. 214-02, Communications Cables (Bi-National standard with UL 444).
 - .2 CSA-C22.2 No. 232-M1988(R2004), Optical Fiber Cables.
- .2 Telecommunications Industry Association (TIA)/Electronic Industries Alliance (EIA)
 - .1 TIA/EIA-568-B.1-(2001), Commercial Building Telecommunications Cabling Standard, Part 1: General Requirements.
 - .2 TIA/EIA-568-B.2-(2001), Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted-Pair Cabling Components.
 - .3 TIA/EIA-568-B.3-(2000), Optical Fiber Cabling Components Standard.
 - .4 TIA/EIA-606-A-(2002), Administration Standard for the Commercial Telecommunications Infrastructure.
 - .5 TIA TSB-140-2004, Telecommunications Systems Bulletin - Additional Guidelines for Field-Testing Length, Loss and Polarity of Optical Fiber Cabling Systems.
 - .6 TIA-598-C-(2005), Optical Fiber Cable Color Coding.

1.02 DEFINITIONS

- .1 Refer to TIA/EIA-598-C, Annex A for definitions of terms: optical-fiber interconnect, distribution, and breakout cables.

1.03 SYSTEM DESCRIPTION

- .1 The structured telecommunications wiring system consists of unshielded-twisted-pair and optical fiber cables, terminations, connectors, cross-connection hardware and related equipment installed inside the building for occupant's telecommunications systems, including voice (telephone), data, and image.

1.04 DOCUMENTS TO BE SUBMITTED FOR ACTION AND INFORMATION

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 As-built records and drawings.

1.05 QUALITY ASSURANCE

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

1.06 DELIVERY, STORAGE AND HANDLING

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

2 PRODUCTS

2.01 FOUR-PAIR 100 Ω BALANCED TWISTED PAIR CABLE

- .1 Four-pair, 100 ohm balanced unshielded-twisted-pair (UTP) cable category 6 (Cat 6) enhanced to: TIA/EIA-568-B.2.

2.02 WORK AREA UTP 4-PAIR MODULAR JACK

- .1 Eight-position modular jack ("RJ-45"), category 6 to: TIA/EIA-568- B.2:
 - .1 In self-contained surface-mount box, one (1) jack per box.
 - .2 Mounted in compatible single jack position per faceplate.

2.03 UTP CROSS-CONNECT WIRE

- .1 Category 6, 4-pair cable to: TIA/EIA-568-B.2.

2.04 UTP PATCH CORDS

- .1 With factory-installed male plug at one end to mate with terminal strip and with factory-installed male plug at other end to mate with terminal strip Category 6, 4-pair to: TIA/EIA-568-B.2.

2.05 UTP EQUIPMENT CABLE

- .1 4-pair "pigtail", with factory-installed male plug on one end to mate with "RJ-45" jack and other end equipped with factory-installed male plug to mate with terminal strip category 6 to: TIA/EIA-568-B.2.

2.06 UTP WORK AREA CORDS

- .1 3 metre long, each end equipped with "RJ-45" plug category 6 to: TIA/EIA-568-B.2.

2.07 OPTICAL-FIBER CABLE

- .1 Distribution, without conductive members, multi-mode 50/125, 500 MHz km capacity 62.5/125 micron strands to: CSA-C22.2 No. 232 and TIA/EIA-568- B.3, one end terminated with duplex SC connector and the other end terminated with duplex LC.

3 EXECUTION

3.01 INSTALLATION OF TERMINATION AND CROSS-CONNECT HARDWARE

- .1 Install termination and cross-connect hardware as indicated and according to manufacturers' instructions. Identify and label as indicated to: TIA/EIA-606-A.

3.02 INSTALLATION OF HORIZONTAL DISTRIBUTION CABLES

- .1 Install horizontal cables as indicated in cable trays from telecommunication rooms to individual work-area jacks. Identify and label as indicated to: TIA/EIA-606-A.
- .2 Support horizontal cables at intervals not exceeding two (2) metres.

- .3 Install horizontal cables from consolidation point to individual work-area jacks.
 - .1 Provide supplementary "J" hooks to support cables at intervals not exceeding two (2) metres.
 - .2 Identify and label as indicated to: TIA/EIA-606-A.
- .4 Terminate horizontal cables in telecommunications room and at individual work-area jacks.
 - .1 Identify and label as indicated to: TIA/EIA-606-A.
- .5 Harness slack cable in cabinets, racks, and wall-mounted termination and cross-connection hardware.

3.03 INSTALLATION OF EQUIPMENT CABLES

- .1 Install equipment cables from equipment patch panel as indicated.
 - .1 Identify and label as indicated to: TIA/EIA-606-A.

3.04 IMPLEMENT CROSS-CONNECTIONS

- .1 Implement cross-connections using patch cords as specified.

3.05 FIELD QUALITY CONTROL

- .1 Test horizontal UTP cables as specified below and correct deficiencies provide record of results as hard copy.
 - .1 Perform tests for Permanent Link on installed cables, including spares:
 - .1 Category 6 using certified level III tester to: TIA/EIA-568-B.2.
- .2 Test Optical-fiber strands for attenuation to: TIA/EIA-568-B.1 and correct deficiencies: provide record of results as hard copy.
 - .1 Test horizontal links need at only one wavelength (850 nm or 1300 nm) and in one direction.
 - .1 Attenuation to be less than 2.0 dB, unless consolidation point is used.
 - .2 If consolidation point is used, attenuation test result to be less than 2.75 dB when testing between horizontal cross-connect and telecommunications outlet/connector.
 - .2 Test backbone links in both directions. Backbone links:
 - .1 Test multi-mode fiber at both applicable wavelengths (850 nm and 1300 nm).
 - .2 Test single-mode fiber at both applicable wavelengths (1550 nm and 1310 m).
 - .3 Maximum attenuation: Cable attenuation + Connector loss + Splice loss.
 - .1 Multi-mode-fiber attenuation coefficients:
 - .1 3.5 db/km @ 850 nm; and
 - .2 1.5 db km @ 1300 nm
 - .2 Single-mode fiber attenuation coefficients at both 1310 nm and 1550 nm:
 - .1 1.0 db/km for inside plant cable; and
 - .2 0.5 db/km for outside plant cables.
 - .3 Maximum connector insertion loss: 0.75 db per pair and maximum splice insertion loss: 0.3 db.

END OF SECTION