PROJECT TITLE — LIQUID FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS – GEORGIAN BAY ISLANDS NATIONAL PARK OF CANADA AND BRUCE PENNINSULA NATIONAL PARK OF CANADA

PROJECT NUMBER — R.079639.001

PROJECT DATE — 2016-10-14

END OF SECTION

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 78 00 - Closeout Submittals.

.2 Section 23 11 13 - Facility Fuel-Oil Piping.

.3 Section 26 05 00 - Electrical Common Work Results.

.4 Section 33 56 13 - Aboveground Fuel Storage Tank.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract includes the removal of existing aboveground liquid fuel storage and dispensing systems and installation of replacement aboveground liquid petroleum storage tank and dispensing systems at the following National Park sites:

.1 Georgian Bay Islands National Park of Canada, 2611 Muskoka Road 5, Honey Harbour, Ontario,

.2 Bruce Peninsula National Park of Canada, Cyprus Lake Maintenance Yard, 469 Cyprus Lake Road near Tobermory, Ontario, and

.3 Bruce Peninsula National Park of Canada, Marine Operations Base/Rescue Station, 248 Big Tub Road, near Tobermory, Ontario.

.2 Contractor shall obtain applicable permits and utility locates for the Work.

.3 Contractor shall be qualified to conduct fuel storage tank removal and installation work as a Liquid Fuels Contractor licensed by the Ontario Technical Standards and Safety Authority (TSSA).

.4 For Georgian Bay Islands National Park of Canada, 2611 Muskoka Road 5, Honey Harbour, Ontario, the contractor shall perform the following fuel tank system removal works:

.1 Remove and dispose two (2) aboveground fuel tanks (7,600 litre and 3,800 litre “Convault” tanks),

.2 Remove and dispose underground product piping connected to one of the aboveground tanks, and

.3 Remove and dispose all existing storage tank appurtenances, including hose reels, high-hose retrievers, and associated concrete islands.

.5 For Bruce Peninsula National Park of Canada, Cyprus Lake Maintenance Yard, 469 Cyprus Lake Road near Tobermory, Ontario,

the contractor shall perform the following fuel tank system removal works:

.1 Remove and dispose one (1) aboveground split product fuel tank (1,900 litre and 5,700 litre “Convault” tank),

.2 Demolish and dispose of existing concrete tank pads and concrete fueling apron, and

.3 Remove and dispose all existing storage tank appurtenances, including high-hose retrievers.

.6 For Bruce Peninsula National Park of Canada, Marine Operations Base/Rescue Station, 248 Big Tub Road, near Tobermory, Ontario, the contractor shall perform the following fuel tank system removal works:

.1 Remove and dispose one (1) aboveground split product fuel tank (1,900 litre and 5,700 litre “Convault” tank), and

.2 Remove and dispose all existing storage tank appurtenances, including hose reels and cardlock consoles.

.7 The following identifies the mechanical work required relating to the petroleum storage tank systems for all three sites. The work must be completed in accordance with these specifications, drawings and the Federal petroleum storage tank regulations with supporting documentation:

.1 Install two (2) new double walled steel storage tanks at each site with capacities not less than the following:

.1 Georgian Bay Islands National Park of Canada, 2611 Muskoka Road 5, Honey Harbour, Ontario: one (1) 10,000 litre gasoline tank and one (1) 4,500 litre diesel tank,

.2 Bruce Peninsula National Park of Canada, Cyprus Lake Maintenance Yard, 469 Cyprus Lake Road near Tobermory, Ontario: one (1) 4,500 litre gasoline tank and one (1) 4,500 litre diesel tank,

.3 Bruce Peninsula National Park of Canada, Marine Operations Base/Rescue Station, 248 Big Tub Road, near Tobermory, Ontario: one (1) 4,500 litre gasoline tank and one (1) 4,500 litre diesel tank,

.2 All tanks are required to be constructed to CAN/ULC standard S601 and be double walled equipped with vacuum monitoring. The tanks shall equipped from the manufacturer with adequately sized emergency vents. The tanks must come equipped with spill containment devices for fuel containment during refueling activities. Each tank shall be equipped with a galvanized steel staircase to access the fill connection, complete with handrails and non-slip, treaded, galvanized steel steps and landing.

.3 Inside the spill containment manhole there shall be two (2)

connection points, one for dipping the tank with manufacturer supplied dipstick, and the other for attaching the delivery hose via liquid-tight fitting. The liquid tight fill connections must be capped with liquid-tight fittings when not in use. Tags and labels are required to be provided on the new spill containers.

.4 Install a ULC-approved mechanical overfill prevention valve on each tank fill pipe. Install each overfill valve such that it will prevent the tank compartment from being filled past 95% of its maximum storage capacity as per CPPI recommended practices.

.5 Install new normal and emergency vents on each tank, sized to meet the requirements as governed by the CAN/ULC S601 standard.

.6 Install new UL-listed, float-type manual tank level gauges on each tank complete with drop tubes. Each manual tank level gauge shall read in cm.

.7 For all three sites, install new steel dispenser sump manufactured to ULC/ORD C107.21 standard with integral shear valve bracket mounting rails. All openings in sump for piping and electrical shall use petroleum rated flexible entry boots sized according to the associated pipe, conduit or cable.

.8 For each tank, install a new normally-closed solenoid valve on each product line above the top of the tank. Both solenoid valves are to be controlled by the dispenser.

.9 Install a new inline vertical check valve with shear groove on each product line inside the new steel dispenser sump. Each shear valve is to be mounted using manufacturer approved shear valve bracket kits.

.10 Any air elimination components on the new dispenser shall be plumbed back to the tank using stainless steel tubing and swage type stainless steel fittings supported from the new product piping.

.11 For all three sites, install one (1) new dual-product dispenser at the new fuel dispensing location, complete with two (2) pumps to dispense diesel and gasoline products. The dispenser shall be equipped with two (2) ULC-listed non-scuff marine hoses certified for use with petroleum products and intended for cold temperature applications. Gasoline hose and associated hardware shall be NPS 3/4, and diesel associated hardware shall be NPS 1. Install a new re-attachable breakaway coupling on each dispenser hose. Each dispenser nozzle shall be interlocked such that only one product can be dispensed at one time.

.12 For each product hose, install hose storage devices as follows:

.1 Georgian Bay Islands National Park of Canada, 2611 Muskoka Road 5, Honey Harbour, Ontario: supply motor-actuated hose-reel for each hose, with a hose capacity of up to 30 metres,

.2 Bruce Peninsula National Park of Canada, Cyprus Lake Maintenance Yard, 469 Cyprus Lake Road near Tobermory, Ontario: supply high-hose retraction mechanisms for each hose,

.3 Bruce Peninsula National Park of Canada, Marine Operations Base/Rescue Station, 248 Big Tub Road, near Tobermory, Ontario: supply motor-actuated hose-reel for each hose, with a hose capacity of up to 30 metres.

.13 Install a flow limiter device on each product hose to restrict the dispensing flow rate to 38 litres per minute.

.14 Provide and install all control wiring, including terminations and programming, to satisfy the intent of and the requirements of the design.

.15 Provide fire extinguishers, safety signage, labels and tags for equipment as indicated.

.16 Install a new fuel storage tank monitoring system, including tank monitoring panel, probes, sensors, and ancillary devices (overfill alarm, emergency stop button, etc). Wiring and conduit installation shall be completed by Division 26.

.17 Install a new Fuel Management System (“Cardlock”).

.18 Provide all required fittings, flex hoses, supports, devices, products and equipment to satisfy the intent of the design.

.19 The Contractor is to fill each new fuel storage tank with diesel and gasoline as appropriate to 85% maximum capacity prior to turning over the system to the Owner.

.5 The following identifies the civil work required:

.1 Install new traffic protection bollards.

.2 Install new concrete tank pad, concrete containment curbing around the tank pad, and concrete fueling apron as shown in the appended drawings for each site.

.6 The following identifies the electrical work required:

.1 Conduct the necessary electrical requirements for the installation of suction pumps and sensors for each dispenser.

.2 Supply and install all conduits and wiring between existing power panels and new fuel storage, dispensing, monitoring and fuel management equipment.

.3 Supply and install conduits and wiring between existing power panel and new tank monitoring panels in buildings.

.4 Supply and install all interconnecting conduit and wiring between the fuel monitoring system panel and the fuel storage system probes, sensors and ancillary devices (overfill alarm, emergency stop button, etc).

.5 Supply and install all interconnecting conduit and wiring between the fuel management system ("cardlock"), fuel dispensers, and tank monitoring panel.

.6 Provide necessary grounding for all equipment.

.7 Provide all necessary conduit, boxes, and seals.

.8 Complete work identified in the electrical drawings.

.7 Install all equipment as specified in the specifications and drawings to satisfy the intent of the design.

.8 Provide all fittings, valves and equipment necessary to complete the work described in the specifications and design drawings, whether explicitly shown or not.

.9 Provide system commissioning, complete with manufacturer's involvement. Commissioning forms must be reviewed by the Departmental Representative and feedback implemented before any final system commissioning occurs.

.10 Assist Departmental Representative with training on-site staff in new system operation after commissioning is complete.

.11 Provide redline markup drawings to the Departmental Representative for development of as-built drawings. As-built drawings must be developed before any amount of fuel is placed inside the new fuel storage tank system.

.12 Provide all documents requested by Departmental Representative to assist with producing Operation and Maintenance manuals and closeout documentation after construction work is substantially complete.

.13 Refer to appendices for the design drawing set for further details.

1.3 CONTRACT METHOD

.1 Construct Work under stipulated price contract.

1.4 WORK BY OTHERS

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

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

1.5 WORK SEQUENCE

.1 Georgian Bay Islands National Park of Canada, Cyprus Lake Maintenance Yard:

.1 Complete all Work in these specifications before March 31, 2017.

.2 Do not decommission existing aboveground fuel tanks and tank-mounted pumps until new fuel system has been installed and successfully commissioned.

.2 Bruce Peninsula National Park of Canada, Cyprus Lake Maintenance Yard and Marine Operations Base/Rescue Station:

.1 Do not commence Work in these specifications before April 01, 2017.

.3 Bruce Peninsula National Park of Canada, Marine Operations Base/Rescue Station:

.1 Do not decommission existing aboveground fuel tanks and pump system until new fuel system has been installed and successfully commissioned.

.4 Construct Work in stages to accommodate continued use of existing fuel systems during construction.

.1 Contractor is not required to provide temporary fuel source during construction.

.5 Co-ordinate Progress Schedule and co-ordinate with Operations Manager on site during construction. Updates during construction must occur at least bi-weekly.

1.6 CONTRACTOR USE OF PREMISES

.1 Limit use of premises Work to allow:

.1 Operations Manager use and occupancy.

.2 Work by other contractors.

.3 Access for fuel delivery operators.

.2 Co-ordinate use of premises under direction of the Operations Manager on site and Departmental Representative.

.3 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

.4 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.

.5 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by Operations Manager on site.

.6 At completion of operations condition of existing work: equal

to or better than that which existed before new work started.

1.7 OPERATIONS MANAGER OCCUPANCY

.1 Operations Manager will occupy premises during entire construction period for execution of normal operations.

.2 Co-operate with Operations Manager in scheduling operations to minimize conflict and to facilitate Operations Manager usage.

1.8 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDINGS

.1 Execute work with least possible interference or disturbance to building operations and normal use of premises. Arrange with Departmental Representative and Operations Manager on site to facilitate execution of work.

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

1.9 EXISTING SERVICES

.1 Notify the Operations Manager and utility companies of intended interruption of services and obtain required permissions.

.2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 72 hours' notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by the Departmental Representative, and within the requirements of the Operations Manager on site, with minimum disturbance to site operations.

.3 Provide alternative routes for personnel and vehicular traffic as required by the Departmental Representative and Operations Manager on site.

.4 Establish location and extent of service lines in area of work before starting Work. Notify Departmental Representative of findings.

.5 Submit schedule to and obtain approval from Departmental Representative for any shut-down or closure of active service or facility including power and communications services, upon contract award. Adhere to approved schedule and provide notice to affected parties.

.6 Provide temporary services when directed by Departmental Representative or Operations Manager on site to maintain critical building systems.

.7 Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.

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

.9 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction and advise the Departmental Representative immediately.

.10 Record locations of maintained, re-routed and abandoned service lines.

.11 Construct barriers and erect temporary chain-link fencing in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.10 DOCUMENTS REQUIRED

.1 Maintain at job site, one copy each document as follows:
- .1 Contract Documents.
- .2 Specifications and Drawings.
- .3 Permit Application/Approval.
- .4 Addenda.
- .5 Reviewed Shop Drawings.
- .6 List of Outstanding Shop Drawings.
- .7 Change Orders.
- .8 Other Modifications to Contract.
- .9 Field Test Reports.
- .10 Copy of Approved Work Schedule.
- .11 Health and Safety Plan and Other Safety Related Documents.
- .12 Other documents as specified.
- .13 Underground service utility locates.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

1 GENERAL

1.01 MINIMUM STANDARDS

.1 Execute work to meet or exceed:

.1 National Building Code of Canada 2015, National Fire Code of Canada 2015, Ontario Building Code 2012 and any other code of provincial or local application, including all amendments up to project date, provided that in any case of conflict or discrepancy, the more stringent requirements shall apply.

.2 Rules and regulations of authorities having jurisdiction.

.3 Observe and enforce construction safety measures required by National Building Code 2015, Part 8 Safety Measures at Construction and Demolition Sites, Occupational Health and Safety Act and Regulations for Construction Projects, Revised Statutes of Ontario 1990, Chapter O.1 as amended, O. Reg. 213/91 as amended, Workplace Safety and Insurance Board and municipal statutes and authorities.

.4 Environmental Protection Act, O. Reg. 102/94 and O. Reg. 103/94.

.5 Technical Standards and Safety Act 2000, S.O. 2000, c.16.

1.02 AUTHORITIES HAVING JURISDICTION

.1 The PWGSC Fire Protection Engineer is the sole authority having jurisdiction over this project with regards fire standards.

.2 Fire Testing requirements are for ULC or WHI listed and labelled products.

.3 Submit 3 copies of test reports under the letterhead of the accredited organization to the Departmental Representative.

1.03 TAXES

.1 Pay applicable Federal, Provincial and Municipal taxes.

1.04 FEES, PERMITS, CERTIFICATES AND LETTERS

.1 Provide authorities having jurisdiction with information requested.

.2 Pay fees and obtain certificates, permits and letters required.

.3 Furnish certificates, permits and letters when requested.

1.05 EXAMINATION

.1 Examine existing conditions and determine conditions affecting work.

1.06 DOCUMENTS

.1 Keep one copy of contract documents on the site.

1.07 ELECTRONIC SUBMITTALS

.1 Submit number of hard copies specified for each type and format of submittal and also submit in electronic format as pdf files. Forward pdf, NMSEdit

Professional spp, MS Word, MS Excel, [MS Project] and Autocad dwg files on USB compatible with PWGSC encryption requirements or through email or alternate electronic file sharing service such as ftp, as directed by Departmental Representative.

1.08 CONTRACTOR'S AS-BUILT DRAWINGS AND SPECIFICATIONS

.1 As work progresses, neatly record significant deviations from the Contract drawings and specifications using fine, red marker on full size white prints and specifications.

.2 Neatly print lettering and numbers in size to match original. Lines may be drawn free-hand but shall be neat and accurate. Add at each title block note: "AS BUILT". Also circle on List of Drawings each title and number of drawing marked with "AS-BUILT" information. Circle on Table of Contents each specification section number and title of specification sections marked with "AS-BUILT" information.

.3 Record following significant deviations:
- .1 Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvement.
- .2 Location of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of structure.
- .3 Field changes of dimension.
- .4 Other significant deviations which are concealed in construction and can not be identified by visual inspection.
- .5 Alternative materials and systems installed replacing original materials and systems specified by trade name.

.4 Turn one set, paper copy, of AS-BUILT drawings and specifications over to Departmental Representative on completion of work.

.5 If project is completed without significant deviations from Contract drawings and specifications submit to Departmental Representative one set of drawings and specifications marked "AS-BUILT".

1.09 PRODUCT DATA

.1 Prior to submission check and certify as correct, shop drawings and product data sheets. Issue to Departmental Representative each submission at least 14 days before dates reviewed submission will be needed.

.2 Submit 3 prints and 1 electronic copy of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.

.3 Responsibility for errors, omissions or deviations from requirements of Contract Documents is not relieved by Departmental Representative's review of submittals.

1.10 CONSTRUCTION PHOTOGRAPHS

.1 Submit electronic and hard copy of colour digital photography in jpg format, fine resolution.

.2 Identification: name and number of project and date of exposure indicated.

.3 Number of viewpoints and location of viewpoints determined by Departmental Representative.

.4 Frequency: as directed by Departmental Representative.

1.11 ADDITIONAL DRAWINGS

.1 Departmental Representative may furnish additional drawings to clarify work.

.2 Such drawings become part of Contract Documents.

1.12 PROTECTION

.1 Protect existing work from damage.

.2 Replace damaged existing work with material and finish to match original.

.3 Protect existing trees and plants on site and adjacent properties.

1.13 EXISTING SERVICES

.1 Establish location, protect and maintain existing utility lines.

.2 Maintain existing services in occupied areas.

.3 Provide temporary potable water, pumps and accessories to meet the Institution's requirements for potable water including fire fighting. Connect water supply to fire hydrant adjacent to property as indicated on draiwngs.

.4 Use designated existing sanitary facilities.

.5 Use existing water and electrical services at no cost. Connect in accordance with applicable provincial regulations and municipal bylaws.

1.14 TEMPORARY FACILITIES AND SERVICES

.1 Provide and maintain temporary facilities and services required to carry out work.

.2 Remove temporary facilities and services on completion of work.

.3 Provide and maintain temperature and enclosure required to prevent frost damage to work.

1.15 MATERIAL AND EQUIPMENT

.1 Use new products unless otherwise specified.

.2 Deliver and store material and equipment to manufacturer's instructions with manufacturer's labels and seals intact.

.3 When material or equipment is specified by standard or performance specifications, upon request of Departmental Representative, obtain from

manufacturer an independent testing laboratory report, stating that material or equipment meets or exceeds specified requirements.

1.16 CUTTING AND REMEDIAL WORK

.1 Co-ordinate work to keep cutting and remedial work to a minimum.

.2 Execute cutting and remedial work required. Notify Departmental Representative before cutting, boring or sleeving structural members.

.3 Use specialists in affected material to execute cutting and remedial work.

.4 Match work to adjoining construction and finishes.

.5 Fit components tight to adjoining surfaces.

.6 Make good surfaces exposed or disturbed by work with material and finish to match existing adjoining surfaces.

1.17 FASTENINGS

.1 Provide fastenings of type, size and spacing required to assure secure anchorage.

.2 Obtain Departmental Representative's permission before using explosive actuated fasteners.

1.18 CO-ORDINATION AND CO-OPERATION

.1 Site will be occupied during execution of work.

.2 Work area will be occupied during execution of work by operating staff and Departmental Representative.

.3 Execute work with minimum disturbance to occupants and normal use of site.

1.19 INSPECTION AND TESTING

.1 When initial tests and inspections reveal work not to contract requirements, pay for tests and inspections required by Departmental Representative on corrected work.

1.20 COST BREAKDOWN

.1 Within 48 hours of bid acceptance submit a list of subcontractors.

1.21 SCHEDULING

.1 On award of contract submit bar chart construction schedule for work, indicating anticipated progress stages within time of completion. When schedule has been reviewed by the Departmental Representative take necessary measures to complete work within scheduled time. Do not change schedule without notifying Departmental Representative.

1.22 CLEANING

.1 Maintain project free of accumulated waste and rubbish.

.2 Final cleaning:
- .1 Remove temporary protection.
- .2 Remove dust, dirt and foreign matter from surfaces.
- .3 Broom clean paved exterior surfaces, rake clean other exterior surfaces.

1.23 CONSTRUCTION & DEMOLITION WASTE

.1 Carefully source separate materials/equipment and divert from D&C waste destined for landfill to maximum extent possible. Reuse, recycle or sell material off site for reuse except where indicated otherwise. On site sales are not permitted.

.2 Submit a waste reduction workplan indicating the materials and quantities of material that will be recycled and diverted from landfill.
- .1 Indicate how material being removed from the site will be reused or recycled.

.3 Submit proof that all waste is being disposed of at a licensed land fill site or waste transfer site. A copy of the disposal/waste transfer site's license and a letter verifying that said landfill site will accept the waste must be supplied to Departmental Representative prior to removal of waste from the demolition site.

1.24 DESIGNATED SUBSTANCES

.1 The work area has not been surveyed for the presence of designated substances referred to in the Occupational Health and Safety Act and Regulations for Construction Projects, O.Reg. 213/91 as amended.

.2 If during alteration work existing asbestos, lead, PCBs, or other designated or hazardous material is discovered (e.g. fireproofing, acoustic or thermal insulation, pipe or tank covering) stop work and immediately notify Departmental Representative. Do not remove any existing material containing asbestos fibres.

1.25 SPECIAL PROTECTION AND PRECAUTIONS

.1 Comply with the requirements of the Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and the provision of material safety data sheets acceptable to HRSDC - Labour Program.

1.26 POLLUTION CONTROL

.1 Spills of deleterious substances:

.1 Immediately contain, limit spread and clean up in accordance with provincial regulatory requirements.

.2 Report immediately to Ontario Spills Action Centre: 1-800-268-6060.

.3 Further information on dangerous goods emergency cleanup and precautions including a list of companies performing this work can be obtained from the Transport Canada 24-hour number (613) 996-6666 collect.

2 PRODUCTS

2.01 NOT USED

.1 Not used.

3 EXECUTION

3.01 NOT USED

.1 Not used.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 78 00 - Closeout Submittals.

.2 Section 01 79 00 - Demonstration and Training.

.3 Section 01 91 13 - General Commissioning (Cx) Requirements.

1.2 ADMINISTRATIVE

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

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

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

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

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

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

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

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

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

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

.11 Submit number of hard copies specified for each type and format of submittal and also submit in electronic format as pdf files. Forward

pdf, NMSEdit Professional spp, MS Word, MS Excel, [MS Project] and Autocad dwg files on USB compatible with PWGSC encryption requirements or through email or alternate electronic file sharing service such as ftp, as directed by Departmental Representative.

1.3 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 Province of Ontario of Canada.

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

.4 Allow [3] [5] working days for Departmental Representative's review of each submission.

.5 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract [Amount][Price]. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

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

.7 Accompany submissions with transmittal letter, in duplicate, containing:
- .1 Date.
- .2 Project title and number.
- .3 Contractor's name and address.
- .4 Identification and quantity of each shop drawing, product data and sample.
- .5 Other pertinent data.

.8 Submissions shall include:
- .1 Date and revision dates.
- .2 Project title and number.
- .3 Name and address of:
  - .1 Subcontractor.
  - .2 Supplier.
  - .3 Manufacturer.

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

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

.10 Submit [one transparency] [on plastic film] three hard copies and one electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.

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

.12 Submit three hard copies and one electronic copy of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
.1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
.2 Testing must have been within 3 years of date of contract award for project.

.13 Submit three hard copies and one electronic copy of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
.1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
.2 Certificates must be dated after award of project contract complete with project name.

.14 Submit three hard copies and one electronic copy of manufacturers instructions for requirements requested in specification Sections and as requested by Departmental Representative.
.1 Pre-printed material describing installation of product, system

or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

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

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

.17 Submit three hard copies and one electronic copy of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.

.18 Delete information not applicable to project.

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

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

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

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

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

1.4 CERTIFICATES AND TRANSCRIPTS

.1 Immediately after award of Contract, submit Workers' Compensation and Insurance Board Clearance Certificate.

.2 Immediately after award of Contract, submit an electronic copy of all employees licensed as Petroleum Equipment Mechanics under the Ontario Technical Standards and Safety Act 2000 who will be conducting

the fuel system removal and installation works.

.3 Submit Certificate of Insurance immediately after award of Contract.

1.5 FEES, PERMITS AND CERTIFICATES

.1 Provide authorities having jurisdiction with information requested.

.2 Pay fees and obtain certificates and permits required.

.3 Furnish certificates and permits.

.4 Submit acceptable certificate stating that suspended ceiling systems provide adequate support for electrical fixtures, as required by current bulletin of Electrical Safety Authority (ESA) .

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.01 REFERENCES

.1 Province of Ontario:
- .1 Occupational Health and Safety Act Revised Statutes of Ontario 1990, Chapter O.1 as amended, and Regulations for Construction Projects, O. Reg. 213/91 as amended.
- .2 Workplace Safety and Insurance Act, 1997.
- .3 Municipal statutes and authorities.

1.02 SUBMITTALS

.1 Make submittals in accordance with Sections 01 11 01 and 01 33 00.

.2 Submit site-specific Health and Safety Plan: Within 1 day 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 operations found in work plan.
- .3 Provide a Fire Safety Plan, specific to the work location, in accordance with NBC and NFC, prior to commencement of work. The plan shall be coordinated with, and integrated into, the existing Emergency Procedures and Evacuation Plan in place at the site. Departmental Representative will provide Emergency Procedures and Evacuation Plan. Deliver two copies of the Fire Safety Plan to the Departmental Representative not later than 14 days before commencing work.
- .4 Contractor's and Sub-contractors' Safety Communication Plan.
- .5 Contingency and Emergency Response Plan addressing standard operating procedures specific to the project site to be implemented during emergency situations. Coordinate plan with existing Emergency Response requirements and procedures provided by Departmental Representative.

.3 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 1 day after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 1 day after receipt of comments from Departmental Representative.

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

.5 Submit records of Contractor's Health and Safety meetings when requested.

.6 Submit 2 copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative, daily.

.7 Submit copies of orders, directions or reports issued by health and safety inspectors of the authorities having jurisdiction.

.8 Submit copies of incident and accident reports.

.9 Submit Material Safety Data Sheets (MSDS).

1.03 FILING OF NOTICE

.1 File Notice of Project with Ontario Ministry of Labour prior to commencement of Work.

1.04 WORK PERMIT

.1 If required, obtain building permit related to project prior to commencement of Work.

1.05 SAFETY ASSESSMENT

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

1.06 MEETINGS

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

1.07 REGULATORY REQUIREMENTS

.1 Comply with the Acts and regulations of the Province of Ontario.

.2 Comply with specified standards and regulations to ensure safe operations at site.

1.08 PROJECT/SITE CONDITIONS

.1 Work at site will involve contact with:
- .1 Silica in concrete.
- .2 Polynuclear aromaric hydrocarbons in asphalt, and
- .2 Benzene in refined petroleum hydrocarbon products.

1.09 GENERAL REQUIREMENTS

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

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

.3 Relief from or substitution for any portion or provision of minimum Health and Safety standards specified herein or reviewed site-specific Health and Safety Plan shall be submitted to Departmental Representative in writing.

1.10 COMPLIANCE REQUIREMENTS

.1 Comply with Ontario Occupational Health and Safety Act, R.S.O. 1990 Chapter 0.1, as amended.

1.11 RESPONSIBILITY

.1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.

.2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

.3 Where applicable the Contractor shall be designated "Constructor", as defined by Occupational Health and Safety Act for the Province of Ontario.

1.12 UNFORSEEN HAZARDS

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

.2 Follow procedures in place for Employees Right to Refuse Work as specified in the Occupational Health and Safety Act for the Province of Ontario.

1.13 HEALTH AND SAFETY CO-ORDINATOR

.1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:
- .1 Have site-related working experience specific to activities associated with pumping and decontamination of potable water tanks, pumps and associated piping.
- .2 Have working knowledge of occupational safety and health regulations.
- .3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.
- .4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.
- .5 Be on site during execution of Work and report directly to and be under direction of site supervisor.

1.14 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 Province of Ontario, and in consultation with Departmental Representative.
- .1 Contractor's Safety Policy.
- .2 Constructor's Name.
- .3 Notice of Project.
- .4 Name, trade, and employer of Health and Safety Representative or Joint Health and Safety Committee members (if applicable).
- .5 Ministry of Labour Orders and reports.
- .6 Occupational Health and Safety Act and Regulations for Construction Projects for Province of Ontario.
- .7 Address and phone number of nearest Ministry of Labour office.
- .8 Material Safety Data Sheets.
- .9 Written emeregency Response Plan.
- .10 Site Specific Safety Plan.

.11 Valid certificate of first aider on
.12 WSIB "In Case of Injury At Work" poster.
.13 Location of toilet and cleanup facilities.

1.15 CORRECTION OF NON-COMPLIANCE

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

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

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

1.16 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 Assign responsibility and obligation to Competent Supervisor to stop or start Work when, at Competent Supervisor's discretion, it is necessary or advisable for reasons of health or safety. Departmental Representative may also stop Work for health and safety considerations.

1.17 ELECTRICAL SAFETY REQUIREMENTS

.1 Comply with authorities and ensure that, when installing new facilities or modifying existing facilities, all electrical personnel are completely familiar with existing and new electrical circuits and equipment and their operation.

.2 Before undertaking any work, coordinate required energizing and de-energizing of new and existing circuits with Departmental Representative.

.3 Maintain electrical safety procedures and take necessary precautions to ensure safety of all personnel working under this Contract, as well as safety of other personnel on site.

1.18 ELECTRICAL LOCKOUT

.1 Develop, implement and enforce use of established procedures to provide electrical lockout and to ensure the health and safety of workers for every event where work must be done on any electrical circuit or facility.

.2 Prepare the lockout procedures in writing, listing step-by-step processes to be followed by workers, including how to prepare and issue the request/authorization form. Have procedures available for review upon request by the Departmental Representative.

.3 Keep the documents and lockout tags at the site and list in a log

book for the full duration of the Contract. Upon request, make such data available for viewing by Departmental Representative or by any authorized safety representative.

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 DEFINITIONS

.1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade environment aesthetically, culturally and/or historically.

.2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

.3 Green Remediation: the application of technologies and approaches that enhance a cleanup project's environmental, social, and economic footprints, as defined by the California Department of Toxic Substances Control.

1.02 SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00.

.2 Prior to commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Departmental Representative Environmental Protection Plan is to present comprehensive overview of known or potential environmental issues, including Green Remediation, which must be addressed during construction.

.3 Address topics at level of detail commensurate with environmental issue and required construction tasks.

.4 Environmental protection plan: include:
- .1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.
- .2 Names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.
- .3 Names and qualifications of persons responsible for training site personnel.
- .4 Descriptions of environmental protection personnel training program.
- .5 Erosion and sediment control plan which identifies type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.
- .6 Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.
- .7 Traffic control plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet

weather. Plans include measures to minimize amount of mud transported onto paved public roads by vehicles or runoff.

.8 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use. Plan to include measures for marking limits of use areas including methods for protection of features to be preserved within authorized work areas.

.9 Spill Control Plan: including procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.

.10 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.

.11 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, do not become air borne and travel off project site.

.12 Contaminant prevention plan that: identifies potentially hazardous substances to be used on job site; identifies intended actions to prevent introduction of such materials into air, water, or ground; and details provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.

.13 Waste water management plan that identifies methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.

.14 Historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.

.15 Pesticide treatment plan: to be included and updated, as required.

.16 Green Remediation Plan: to the extent practicable, explore and implement green remediation strategies and applications in the performance of the requirements of this work assignment to maximize sustainability, including Energy, Water, Air & Atmosphere, Materials & Waste, and Land & Ecosystems:

- .1 Energy management strategies to increase energy efficiency and use of renewable energy.
- .2 Water management strategies to reduce water consumption, reuse treated water, and use efficient techniques to manage and protect surface water and groundwater.
- .3 Air emission strategies to decrease emissions of harmful air pollutants from treatment processes, operation of heavy machinery, and transportation of vehicles.
- .4 Solid and liquid waste management strategies to reduce Contractor and Project materials consumption and waste generation.
- .5 Land and ecosystems management strategies to protect ecosystems during site cleanup.

1.03 FIRES

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

1.04 DISPOSAL OF WASTES

.1 Do not bury rubbish and waste materials on site unless approved by Departmental Representative.

.2 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.

.3 Do not discharge wastes into streams or water ways.

.4 Separate and dispose of accumulated waste materials off-site in accordance with R.R.O. 1990, Reg. 347 General Waste Management, to MOE approved disposal facilities or approved transfer stations, including, but no limited to, the following:

.1 Debris including excess construction material.
.2 Non-contaminated litter and rubbish.
.3 Disposable PPE worn during final cleaning.
.4 Wastewater removed from wastewater storage tank.
.5 Wastewater generated from final decontamination operations including wastewater storage tank cleaning.
.6 Lumber from decontamination pads.

.5 Appropriate procedures shall be implemented for handling, temporary storage, transport and disposal of impacted soils during all phases of the project. Refer to Land Disposal Restrictions in O.Reg. 347 - General Waste Disposal under Ontario EPA and MOE Fact Sheet "Summary of Land Disposal Restrictions, Treatment and Notification Requirements for Waste Generators". Off-site disposal will be by licensed haulers to a MOE-approved disposal facility.

.6 Disposal/recycling of other waste generated during the project shall be done in compliance with Ontario Waste Regulations and the facilities used will be approved by the Departmental Representative.

1.05 VEHICULAR ACCESS AND PARKING

.1 Maintenance and Use:

.1 Prevent contamination of access roads. Immediately scrape up debris or material on access roads which is suspected to be contaminated as determined by Departmental Representative; transport and place into designated area approved by Departmental Representative. Clean access roads at least once per shift.
.2 Departmental Representative may collect soil samples for chemical analyses from traveling surfaces of constructed and existing access routes prior to, during, and upon completion of Work. Excavate and dispose of clean soil contaminated by Contractor's activities at no additional cost to Departmental Representative.

.2 Vehicles/equipment shall be in good working order and not be leaking any fuel or fluids.

.3 Restrict access of vehicles from creek banks to protect slope stability.

.4 During construction designated fuelling area(s) will be established.

.5 Refuelling of vehicles and equipment shall not be conducted near watercourses.

.6 Traffic management measures (such as 'flag man') shall be implemented if required at site access points to direct traffic.

1.06 EQUIPMENT DECONTAMINATION

.1 Commence Work involving equipment contact with potentially contaminated material only after Equipment Decontamination Pads are operational.

.2 Decontaminate equipment after working in potentially contaminated work areas and prior to subsequent work or travel on clean areas.

.3 Perform equipment decontamination on Contractor-constructed equipment decontamination pad to prevent cross contaminating unimpacted areas.

.4 Equipment Decontamination Pads to include pad, potable wash water system, and a lined, dyked containment area with a water collection sump. Equipment decontamination pads shall be removed prior to conclusion of the project.

.5 At minimum, perform following steps during equipment decontamination: mechanically remove packed dirt, grit, and debris by scraping and brushing without using steam or high-pressure water to reduce amount of water needed and to reduce amount of contaminated rinsate generated. Use high-pressure, low-volume, hot water or steam supplemented by detergents or solvents as appropriate and as approved by Departmental Representative. Pay particular attention to tire treads, equipment tracks, springs, joints, sprockets, and undercarriages. Scrub surfaces with long handle scrub brushes and cleaning agent. Rinse off and collect cleaning agent. Air dry equipment in Clean Zone before removing from site or travelling on clean areas. Perform assessment as directed by Departmental Representative to determine effectiveness of decontamination.

.6 Each piece of equipment will be inspected by Departmental Representative after decontamination and prior to removal from site and/or travel on clean areas. Departmental Representative will have right to require additional decontamination to be completed if deemed necessary.

.7 Take appropriate measures necessary to minimize drift of mist and spray during decontamination including provision of wind screens.

.8 Collect decontamination wastewaters and sediments which accumulate on equipment decontamination pad. Transfer wastewaters to designated wastewater storage tank.

.9 Transfer sediments to a designated area approved by the Departmental Representative.

.10 Furnish and equip personnel engaged in equipment decontamination with protective equipment including suitable disposable clothing, respiratory protection, and face shields.

.11 Provide sufficient pumping equipment, of adequate pumping capacity and associated machinery and piping in good working condition for ordinary emergencies, including power outage, and competent workers for operation of pumping equipment. Maintain piping and connections in good condition and leak-free.

1.07 DRAINAGE

.1 Provide erosion and sediment control plan that identifies type and location of erosion and sediment controls to be provided. Plan: include monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.

.2 Storm Water Pollution Prevention Plan (SWPPP) to be substituted for erosion and sedimentations control plan.

.3 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.

.4 Do not allow water containing suspended materials to enter into waterways, sewer or drainage systems.

.5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

.6 Do not direct water flow in a manner which would cause erosion to existing areas.

1.08 SURFACE WATER AND GROUNDWATER QUALITY

.1 Materials and equipment shall be operated and stored in a manner that prevents deleterious substances (e.g., petroleum products, silt, etc.) as defined by the Fisheries Act from entering surface water.

.2 Impacted groundwater entering excavations shall be collected and disposed of at an MOE-approved facility.

1.09 SITE CLEARING AND PLANT PROTECTION

.1 Protect trees and plants on site and adjacent properties where indicated or as directed by the Departmental Representative.

.2 Wrap in burlap, trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2 m.

.3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.

.4 Minimize stripping of topsoil and vegetation.

.5 Restrict tree removal to areas indicated or designated by Departmental Representative.

.6 Minimize clearing of vegetation to only those areas necessary for construction and operation.

.7 Minimize the removal of terrestrial habitat to the extent possible during clearing.

.8 All trees planned for removal must be removed by a certified tree removal

company. Trees removed as a result of physical projects will be assessed for salvageable value by the Canadian Forestry Service (CFS) and removed from the site under CFS authority.

.9 Trees removed, that are greater than 25 centimeters in diameter at breast height, will be replaced following a policy of 'for every tree removed two are planted.' Compensation planting should occur as close to the original site as possible.

1.10 VEGETATION

.1 Protect vegetation that does not have to be removed by fencing/ delineating construction working and/or storage areas.

.2 Operated construction machinery in a manner that minimizes damage to adjacent vegetation.

1.11 WORK ADJACENT TO WATERWAYS

.1 Do not operate construction equipment in waterways.

.2 Do not use waterway beds for borrow material without Departmental Representative's approval.

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

.4 Design and construct temporary crossings to minimize erosion to waterways.

.5 Do not skid logs or construction materials across waterways.

.6 Avoid indicated spawning beds when constructing temporary crossings of waterways.

.7 Do not blast under water or within 100 m of indicated spawning beds.

.8 Do not use water from waterways.

.9 Special care shall be exercised while working near water's edge including site-specific erosion and sediment control measures. Silt fences shall be used to minimize sediment transport as well as limit access to watercourses by site personnel.

1.12 POLLUTION CONTROL

.1 Maintain temporary erosion and pollution control features installed under this contract.

.2 Vehicles and equipment must be maintained in good working condition, equipped with emission controls as applicable to local authorities' emission requirements.

.3 Implement dust abatement measures, as required to control dust.

.4 Control emissions from equipment and plant to local authorities' emission requirements.

.5 Prevent sandblasting[, lead paint removal] and other extraneous materials

from contaminating air and waterways beyond [removal/]application area, by providing temporary enclosures.

.6 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

.7 Ensure hazardous substances (including fuel) are stored, handled and applied in a manner to prevent release to the environment and in a legal manner in accordance with hazardous waste regulations.

.8 Secure all materials at non-productive times (night and shut-down).

.9 Vehicles shall be shut off when not in use. No vehicle idling on-site.

.10 Store hazardous or toxic substances in a designated area.

.11 Comply with requirements of WHMIS regarding use, handling, storage and disposal of hazardous materials; and regarding labelling and provision of MSDS acceptable to Labour Canada.

1.13 SPILLS OR RELEASE OF DELETERIOUS SUBSTANCES

.1 Immediately contain, limit spread and clean up in accordance with provincial regulatory requirements.

.2 All workers shall be fully aware of the spill prevention and response procedures including notification of Departmental Representative.

.3 The Ontario Ministry of Environment Spills Action Centre must be notified immediately by law at 1-800-268-6060.

.4 The Departmental Representative shall be immediately informed of all spills that occur onsite.

.5 Further information on dangerous goods emergency cleanup and precautions including a list of companies performing this work can be obtained from the Transport Canada 24-hour number (613) 996-6666 collect.

.6 Spill kits will be kept on-site during all project phases.

.7 Contractor shall take due care to ensure no deleterious materials including sediment-laden runoff leave the worksite, or enter any: surface water, storm water, or sanitary sewers at or near the worksite.

.8 Equipment fuelling or lubricating shall occur in a designated area with proper controls to prevent the release of deleterious substances, and shall be conducted away from any surface water drains or collection points.

.9 In accordance with the Fisheries Act, approval must be obtained from DFO for use of any paints, corrosion protective coatings, wood preservatives or any other hazardous material that will be applied to surfaces that will have contact with the marine environment.

.10 Any equipment remaining on site overnight shall have appropriately placed drip pans.

.11 The rinse, cleaning water or solvents for glues, wood preservatives and other potentially harmful or toxic substances should be controlled so as

to prevent leakage, loss or discharge into the storm drain system or into the marine environment.

.12 Protect the roadways from tracking of mud, soil, and debris throughout the work.

.13 Prevent discharges containing asphalt, grout, concrete or other waste materials from reaching storm drains or the marine environment. This includes, but is not limited to:
- .1 Minimizing the washing of sand or gravel from new asphalt, debris from drilling or cutting or other materials into storm drains and the marine environment by sweeping.
- .2 Application of fog seals, tack coats or other coatings, if required, during periods when rainfall is unlikely to occur during application.
- .3 Cleaning equipment off site.
- .4 Protection of drainage structures with filter fences if required.

.14 Concrete wash water or concrete from trucks shall not enter any surface water or storm water system. Concrete pour or grouting should not be performed if significant precipitation are expected within 72 hours. If concrete leachate is generated within 72 hours of concrete pouring or grouting, measures shall be taken to ensure the leachate does not enter the surface or storm water systems.

.15 During the purging of tanks and associated lines, procedures must prevent the release of any fuels to the surface, surface water, catch basins or soils within or surrounding the worksite.

1.14 NOISE CONTROL

.1 All construction equipment shall be operated with exhaust systems in good repair to minimize noise.

.2 Construction activities that could create excessive noise shall be restricted to daylight hours and adhere to the municipal noise by-law.

.3 If work is to be undertaken outside the specified period in the local noise by-law, then approval for an exemption to the by-law shall be obtained by the Contractor from the municipality.

.4 Ensure that noise control devices (i.e. mufflers, silencers) on construction equipment are properly maintained.

1.15 HISTORICAL/ ARCHAEOLOGICAL CONTROL

.1 Provide historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands known to be on project site: and/or identifies procedures to be followed if historical archaeological, cultural resources, biological resources and wetlands not previously known to be onsite or in area are discovered during construction.

.2 Plan: include methods to assure protection of known or discovered resources and identify lines of communication between Contractor personnel and Departmental Representative.

.3 If archaeological deposits are discovered during the project work shall stop immediately and the Departmental Representative shall immediately be notified.

.4 Archaeologically significant material, if found on the property, remains the property of the Crown and shall not be removed from the site.

.5 Management of the archaeological materials will be coordinated through Departmental Representative.

1.16 NOTIFICATION

.1 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.

.2 Contractor: after receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.

.3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.

.4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

1.17 SPECIES AT RISK

.1 Should a species or its critical habitat be encountered, measures are to be implemented to avoid destruction, injury or interference with the species, its residence and/or its habitat (e.g., through siting, timing or design changes). If the foregoing cannot be avoided Contractor should cease work and contact Departmental Representative for advice regarding mitigation measures.

.2 In the event that it is determined that the project likely may have unexpected adverse effects on species at risk (SAR), the Contractor shall notify the Department Representative immediately.

1.18 MIGRATORY BIRDS/WILDLIFE HABITAT

.1 Disturbance and destruction of habitat should be timed outside of breeding season of mid-April to end of July.

.2 Ensure all works are in compliance with the Migratory Birds Convention Act.

.3 Restrict vehicle movements to construction areas and access roads and avoid harassment of animals.

1.19 FISH/ FISH HABITAT

.1 All materials and equipment used will be operated and stored in a manner that prevents any deleterious substance (e.g., petroleum products, silt, etc.) as defined by the Fisheries Act from entering the surface water.

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 SECTION INCLUDES

.1 Construction aids.

.2 Office and sheds.

.3 Parking.

.4 Project identification.

1.02 REFERENCES

.1 Canadian Construction Documents Committee (CCDC)
  .1 CCDC 2-2008, Stipulated Price Contract.

.2 Canadian Green Building Council (CaGBC)
  .1 LEED Canada For New Construction and Major Renovations 2009.
  .2 LEED Canada For Core and Shell 2009.

.3 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB-1.189-2000, Exterior Alkyd Primer for Wood.
  .2 CAN/CGSB-1.59-97, Alkyd Exterior Gloss Enamel.

.4 Canadian Standards Association (CSA International)
  .1 CSA A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
  .2 CSA 0121-08(R2013), Douglas Fir Plywood.
  .3 CSA Z797-09(R2014), Code of practice for Access Scaffold.
  .4 CAN/CSA-Z321-[96(R2006)], Signs and Symbols for the Occupational Environment, withdrawn but still available from CSA, CCOHS and Techstreet.

.5 U.S. Environmental Protection Agency (EPA)/ Office of Water
  .1 EPA 833-R-06-004, May 2007, Developing Your Stormwater Pollution Prevention Plan - A Guide for Construction Sites.

1.03 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

1.04 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, avenues of ingress/egress to fenced area and details of fence installation.

.2 Identify areas which have to be gravelled to prevent tracking of mud.

.3 Indicate use of supplemental or other staging area.

.4 Provide construction facilities in order to execute work expeditiously.

.5 Remove from site all such work after use.

1.05 SITE STORAGE/LOADING

.1 Confine work and operations of employees to areas defined by Contract Documents. Do not unreasonably encumber premises with products.

.2 Do not load or permit to load any part of Work with a weight or force that will endanger the Work.

1.06 CONSTRUCTION PARKING

.1 Parking will be permitted on site provided it does not disrupt performance of Work.

.2 Provide and maintain adequate access to project site.

.3 If authorized to use existing roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractors' use of roads.

.4 Clean construction runways and taxi areas where used by Contractor's equipment.

1.07 EQUIPMENT, TOOL AND MATERIALS STORAGE

.1 Provide and maintain, in a 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 a manner to cause least interference with work activities.

1.08 SANITARY FACILITIES

.1 Existing sanitary facilities are available for use at all three sites.

1.09 PROTECTION AND MAINTENANCE OF TRAFFIC

.1 Provide access and temporary relocated roads as necessary to maintain traffic.

.2 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by [Departmental Representative] [Consultant].

.3 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs

.4 Protect travelling public from damage to person and property.

.5 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.

.6 Verify adequacy of existing roads and allowable load limit on these roads.

Contractor: responsible for repair of damage to roads caused by construction operations.

.7 Construct access and haul roads necessary.

.8 Haul roads: constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided.

.9 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.

.10 Dust control: adequate to ensure safe operation at all times.

.11 Location, grade, width, and alignment of construction and hauling roads: subject to approval by Departmental Representative.

.12 Lighting: to assure full and clear visibility for full width of haul road and work areas during night work operations.

.13 Provide snow removal during period of Work.

.14 Remove, upon completion of work, haul roads designated by Departmental Representative.

1.10 CLEAN-UP

.1 Remove construction debris, waste materials, packaging material from work site daily.

.2 Clean dirt or mud tracked onto paved or surfaced roadways.

.3 Store materials resulting from demolition activities that are salvageable.

.4 Stack stored new or salvaged material.

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 TEMPORARY EROSION AND SEDIMENTATION CONTROL

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties, watercourses and walkways.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

END OF SECTION

1 GENERAL

1.01 SECTION INCLUDES

.1 Barriers.

.2 Environmental Controls.

.3 Traffic Controls.

.4 Fire Routes.

1.02 REFERENCES

.1 Canadian General Standards Board (CGSB):
  .1 CAN/CGSB-1.189-2000, Exterior Alkyd Primer for Wood.
  .2 CAN/CGSB-1.59-97, Alkyd Exterior Gloss Enamel.

.2 Canadian Standards Association (CSA):
  .1 CSA O121-08, Douglas Fir Plywood.

.3 Ontario Occupational Health and Safety Act, R.S.O. 1990, c,O.1 (OHSA).

1.03 INSTALLATION AND REMOVAL

.1 Provide temporary controls in order to execute Work expeditiously.

.2 Remove from site all such work after use.

.3 Erect temporary site enclosure using modular freestanding fencing: galvanized, minimum 1.8 m high, chain link or welded steel mesh, pipe rail. Provide two lockable truck entrance gates and at least one pedestrian door as directed and conforming to applicable traffic restrictions on adjacent streets. Equip gates with locks and keys. Maintain fence in good repair.

.4 Provide barriers around trees and plants that may be damaged by the Work. Protect from damage by equipment and construction procedures. Make good any damage at no cost to the Departmental Representative.

1.04 GUARD RAILS AND BARRICADES

.1 Provide secure, rigid guard rails and barricades around the underground tank excavation in accordance with OHSA regulations.

.2 Provide as required by governing authorities.

1.05 ACCESS TO SITE

.1 Maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.

1.06 PUBLIC TRAFFIC FLOW

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

1.07 FIRE AND EMERGENCY ROUTES

.1 Maintain access to property including overhead clearances for use by emergency response vehicles.

1.08 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

.1 Protect surrounding private and public property from damage during performance of Work.

.2 Be responsible for damage incurred.

1.09 PROTECTION OF FINISHES

.1 Provide protection for building finishes, site furnishings, and equipment during performance of Work.

.2 Provide necessary screens, covers and hoardings.

.3 Confirm with Departmental Representative locations and installation schedule 3 days prior to installation.

.4 Be responsible for damage incurred due to lack of or improper protection.

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 SECTION INCLUDES

.1 Product quality, availability, storage, handling, protection, and transportation.

.2 Manufacturer's instructions.

.3 Quality of Work, coordination and fastenings.

.4 Existing facilities.

1.02 REFERENCES

.1 Within text of specifications, reference may be made to reference standards.

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

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

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

.5 Conform to latest date of issue of referenced standards in effect on date of submission of Bids, except where specific date or issue is specifically noted.

.6 OPSS Ontario Provincial Standard Specifications and OPSD Ontario Provincial Standard Drawings quoted in these specifications are available online at http://www.raqsa.mto.gov.on.ca/ techpubs/ops.nsf/OPSHomepage.

1.03 QUALITY

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

.2 Defective products, 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 any dispute arise as to quality or fitness of products, decision rests strictly with Departmental 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.

1.04 AVAILABILITY

.1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for any items. If delays in supply of products are foreseeable, notify Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

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

1.05 METRIC SIZED MATERIALS

.1 SI metric units of measurement are used exclusively on the drawings and in the specifications for this project.

.2 The Contractor is required to provide metric products in the sizes called for in the Contract Documents except where a valid claim can be made that a particular product is not available on the Canadian market.

.3 Claims for exemptions from use of metric sized products shall be in writing and fully substantiated with supportive documentation. Promptly submit application to Departmental Representative for consideration and ruling. Non-metric sized products may not be used unless Contractor's application has been approved in writing by the Departmental Representative.

.4 Difficulties caused by the Contractor's lack of planning and effort to obtain modular metric sized products which are available on the Canadian market will not be considered sufficient reasons for claiming that they cannot be provided.

.5 Claims for additional costs due to provision of specified modular metric sized products will not be considered.

1.06 STORAGE, HANDLING AND PROTECTION

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

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

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

.4 Store cementitious products clear of earth or concrete floors, and away

from walls.

.5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.

.6 Store sheet materials and lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.

.7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.

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

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

1.07 TRANSPORTATION

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

1.08 MANUFACTURER'S INSTRUCTIONS

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

.2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative may establish course of action.

.3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract Time.

1.09 QUALITY OF WORK

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

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

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

1.10 CO-ORDINATION

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

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

1.11 CONCEALMENT

.1 In finished areas, conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.

.2 Before installation, inform Departmental Representative if there is interference. Install as directed by Departmental Representative.

1.12 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.

1.13 LOCATION OF FIXTURES

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

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

1.14 FASTENINGS

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

.2 Prevent electrolytic action between dissimilar metals and materials.

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

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

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

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

1.15 FASTENINGS - EQUIPMENT

.1 Use fastenings of standard commercial sizes and patterns with material and

finish suitable for service.

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

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

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

1.16 PROTECTION OF WORK IN PROGRESS

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

1.17 EXISTING UTILITIES

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

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

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 56 00 - Temporary Barriers and Enclosures.
.2 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

1.2 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris, other than that caused by Owner or other Contractors.

.2 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.

.3 Clear snow and ice from access to building and as needed to perform the Work. Bank/pile snow in designated areas only.

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

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

.6 Provide and use clearly marked separate bins for recycling. Refer to Section 01 74 21.

.7 Remove waste material and debris from site at end of each working day.

.8 Dispose of waste materials and debris off site.

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

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

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

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

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

1.3 FINAL CLEANING

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

.2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.

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

.4 Remove waste products and debris other than that caused by Owner or other Contractors.

.5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.

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

.7 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.

.8 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, floors.

.9 Clean lighting reflectors, lenses, and other lighting surfaces.

.10 HEPA vacuum clean and dust building interiors, behind grilles, louvres and screens.

.11 Wax, seal, shampoo or prepare floor finishes, as recommended by manufacturer.

.12 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.

.13 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.

.14 Remove dirt and other disfiguration from exterior surfaces.

.15 Clean and sweep roofs, gutters, areaways, and sunken wells.

.16 Sweep and wash clean paved areas.

.17 Clean equipment and fixtures to a sanitary condition; clean or replace filters of mechanical equipment.

.18 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

.19 Remove snow and ice from access to building.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.
.2 Section 01 74 11 - Cleaning.

1.2 DEFINITIONS

.1 Demolition Waste Audit (DWA): Relates to actual waste generated from project.

.2 Materials Source Separation Program (MSSP): Consists of series of ongoing activities to separate reusable and recyclable waste material into material categories from other types of waste at point of generation.

.3 Recyclable: Ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse by others.

.4 Recycle: Process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.

.5 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.

.6 Reuse: Repeated use of product in same form but not necessarily for same purpose. Reuse includes:
.1 Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.
.2 Returning reusable items including pallets or unused products to vendors.

.7 Salvage: Removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.

.8 Separate Condition: Refers to waste sorted into individual types.

.9 Source Separation: Acts of keeping different types of waste materials separate beginning from first time they became waste.

.10 Waste Audit (WA): Detailed inventory of materials in building. Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project. Indicates quantities of reuse, recycling and landfill. Refer

to Schedule A. Target for this project is [50] [75] [95]% diversion from landfill.

.11 Waste Management Coordinator (WMC) : Contractor representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.

.12 Waste Reduction Workplan (WRW): Written report which addresses opportunities for reduction, reuse, or recycling of materials. Refer to Schedule B. WRW is based on information acquired from WA (Schedule A).

1.3 ACTION AND INFORMATION SUBMITTALS

.1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
.2 Before final payment, submit summary of waste materials salvaged for reuse, recycling or disposal by project using deconstruction/disassembly material audit form.
    .1 Failure to submit could result in hold back of final payment.
    .2 Provide receipts, scale tickets, waybills, and show quantities and types of materials reused, recycled, or disposed of.
        .1 Materials include but are not limited to:
            .1 All soil removed off-site, contaminated and uncontaminated (as applicable).
            .2 All liquid removed off-site, contaminated and uncontaminated (as applicable).
            .3 Petroleum products removed off-site (as applicable).
        .2 Copies of all documentation are to be provided to the Departmental Representative.
.3 For each material reused, sold or recycled from project, include amount in tonnes and the destination.
.4 For each material land filled or incinerated from project, include amount in tonnes of material and identity of landfill, incinerator or transfer station.

1.4 WASTE PROCESSING SITES

.1 Contractor to use approved waste and recycling processing sites to dispose of project waste.

1.5 STORAGE, HANDLING AND PROTECTION

.1 Store materials to be reused, recycled and salvaged in locations as directed by the Departmental Representative or Operations Manager on site.
.2 Unless specified otherwise, materials for removal become Contractor's property.
.3 Protect structural components not removed for demolition from movement or damage.

.4 Support affected structures. If safety of building is endangered, cease operations and immediately notify the Departmental Representative.
.5 Protect surface drainage, mechanical and electrical from damage and blockage.
.6 Separate and store materials produced during dismantling of structures in designated areas.
.7 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.
    .1 On-site source separation is recommended
    .2 Remove co-mingled materials to off-site processing facility for separation.
    .3 Provide weighbills for separated materials.

1.6 DISPOSAL OF WASTES

.1 Do not bury waste materials.
.2 Do not dispose of waste, volatile materials, mineral spirits, oil, or paint thinner, into waterways, storm, or sanitary sewers.
.3 Keep records of construction waste including:
    .1 Number and size of bins.
    .2 Waste type of each bin.
    .3 Total tonnage generated.
    .4 Tonnage reused or recycled.
    .5 Reused or recycled waste destination.
.4 Remove materials from deconstruction as deconstruction/disassembly Work progresses.
.5 Prepare project summary to verify destination and quantities on a material-by- material basis as identified in pre-demolition material audit.

1.7 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises.
.2 Maintain security measures established by existing facility.

1.8 SCHEDULING

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

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

2.1 CLEANING

.1 Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.
.2 Clean-up work area as work progresses.
.3 Source separate materials to be reused/recycled into specified sort areas.

2.2 DIVERSION OF MATERIALS

.1 Separate materials from general waste stream and stockpile in separate piles or containers, and consistent with applicable fire regulations.
  .1 Mark containers or stockpile areas.
  .2 Provide instruction on disposal practices.
.2 On-site sale of salvaged material is not permitted.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

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

.3 Section 01 91 13 - General Commissioning (Cx) Requirements.

.4 Section 33 56 13 - Aboveground Fuel Storage Tank.

1.2 REFERENCES

.1 Canadian Environmental Protection Act (CEPA)

.1 SOR/2008-197, Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations.

.2 National Research Council Canada

.1 National Fire Code of Canada.

.3 Canadian Council of Ministers of the Environment.

.1 PN 1326 - Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products.

.4 All reference documents, regulations and codes shall be to the latest versions for the duration of the project.

1.3 ACTION AND INFORMATION SUBMITTALS

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

.2 Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, two draft copies of operating and maintenance manuals in English.

.3 A reviewed copy will be returned after final inspection, with Departmental Representative's comments.

.4 Revise content of documents as required prior to final submittal. At Final Completion of the Work, submit to the Departmental Representative, three (3) final copies of operating and maintenance manuals in English only.

.5 Furnish evidence, if requested, for type, source and quality of products supplied.

.6 Contractor to provide the following documentation:

.1 Letter with Contractor letterhead stating that all new aboveground piping has successfully completed a leak detection (pressure) test, including the test date, the start and end time, the approximate outside ambient temperature at start and end time, the duration of the test, the test pressure and the testing medium.

.2 Letter with Contractor letterhead stating that the dispenser containment sump has successfully completed a hydrostatic leak detection test, including the test date, the start and end time, the approximate outside ambient temperature at start and end time, the duration of the test, and the testing medium.

.3 Red-line mark-up drawings are to be submitted to the Departmental Representative prior to transferring any petroleum product into the new fuel storage tanks. The Contractor must provide the Departmental Representative with mark-up drawings for the production of as-built drawings. As-built drawings must be developed prior to any fuel transfer into the new storage tank (as-built drawings to be completed by others). Transferring fuel into the storage tank prior to the production of as-built drawings is a contravention of CEPA SOR/2008-197, section 34.(2). Under no circumstances will the new storage tank systems be filled with petroleum product prior to the completion of as-built drawings. Damages associated with filling of the new systems without appropriate notification to the Departmental Representative or the completion of as-built drawings will be the sole responsibility of the Contractor.

.4 Letter with Contractor letterhead stating the systems passed successful commissioning, including the verification that all pumps, monitoring equipment, probes, sensors, lighting, valves, devices, and other project related items are working as intended and satisfy the intent of the design. Letter to be submitted to the Departmental Representative upon successful commissioning of the systems.

.7 Provide copies of all waste manifests to the Departmental Representative.

.8 Take photographs at key milestones during the construction period and submit electronic copies in .jpeg format to the Departmental Representative, including but not limited to:

.1 Concealed work (buried conduit, concrete reinforcing bars before concrete pouring, among others);

.2 Leak detection tests.

.3 Final installation.

.9 Contractor to provide copies of all materials removed from site, including but not limited to: all waste manifests, receipts, and weigh bills.

.10 Submit all warranties and work guarantees to the Departmental Representative or Operations Manager on site upon completion of the work.

.11 Pay cost of transportation of submittals.

1.4 FORMAT

.1 Organize data as instructional manual.

.2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.

.3 When multiple binders are used correlate data into related consistent groupings.

.1 Identify contents of each binder on spine.

.4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

.5 Arrange content by systems, under Section numbers and sequence of Table of Contents.

.6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

.7 Text: manufacturer's printed data, or typewritten data.

.8 Drawings: provide with reinforced punched binder tab.

.1 Bind in with text; fold larger drawings to size of text pages.

1.5 CONTENTS - PROJECT RECORD DOCUMENTS

.1 Table of Contents for Each Volume: provide title of project;

.1 Date of submission; names.
.2 Addresses, and telephone numbers of Departmental Representative and Contractor with name of responsible parties.
.3 Schedule of products and systems, indexed to content of volume.

.2 For each product or system:

.1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.

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

.5 Typewritten Text: as required to supplement product data.

.1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

.6 Training: refer to Section 01 79 00 - Demonstration and Training.

1.6 AS-BUILT DOCUMENTS AND SAMPLES

.1 Maintain, in addition to requirements in General Conditions, at site for the Departmental Representative and the Operations Manager one record copy of:

.1 Contract.
.2 Specifications and Drawings.
.3 Addenda.
.4 Change Orders and other modifications to Contract.
.5 Reviewed shop drawings, product data, and samples.
.6 Field test records.
.7 Inspection certificates.
.8 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction.

.1 Provide files, racks, and secure storage.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.

.1 Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition.

.1 Do not use record documents for construction purposes.

.5 Keep record documents and samples available for inspection by the Departmental Representative.

1.7 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

.1 Record information on set of black line opaque drawings, provided by the Departmental Representative.

.2 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.

.3 Record information concurrently with construction progress.

.1 Do not conceal Work until required information is recorded.

.4 Contract Drawings and shop drawings: mark each item to record actual construction, including:

.1 Measured depths of elements of foundation in relation to finish first floor datum.
.2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
.3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
.4 Field changes of dimension and detail.
.5 Changes made by change orders.
.6 Details not on original Contract Drawings.
.7 References to related shop drawings and modifications.

.5 Specifications: mark each item to record actual construction, including:

.1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
.2 Changes made by Addenda and change orders.

.6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

.7 O&M manuals for project equipment to be compiled and submitted to Departmental Representative.

.8 Provide digital photos, if requested, for site records.

1.8 FINAL SURVEY

.1 Submit final site survey certificate certifying that elevations and locations of completed Work are in conformance, or non-conformance with Contract Documents.

1.9 EQUIPMENT AND SYSTEMS

.1 Each Item of Equipment and Each System: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

.2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.

.3 Include installed colour coded wiring diagrams.

.4 Operating Procedures: include start-up, break-in, and routine normal

operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

.5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

.6 Provide servicing and lubrication schedule, and list of lubricants required.

.7 Include manufacturer's printed operation and maintenance instructions.

.8 Include sequence of operation by controls manufacturer.

.9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.10 Provide installed control diagrams by controls manufacturer.

.11 Provide Contractor's coordination drawings, with installed colour coded piping diagrams.

.12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

.13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

.14 Include test and balancing reports as specified in Section 01 91 13.

.15 Additional requirements: As specified in individual specification sections.

.16 Aboveground storage tank inspection documentation, registration, forms, decommissioning and removal records in accordance with CEPA SOR/2008-197.

1.10 MATERIALS AND FINISHES

.1 Building Products, Applied Materials, and Finishes: include product data, with catalogue number, size, composition, and colour and texture designations. [Provide information for re-ordering custom manufactured products.]

.2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.3 Moisture-protection and Weather-exposed Products: include manufacturer's recommendations for cleaning agents and methods,

precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.4 Additional Requirements: as specified in individual specifications sections.

1.11 DELIVERY, STORAGE AND HANDLING

.1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration, sheltered from precipitation.

.2 Store in original and undamaged condition with manufacturer's seal and labels intact.

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

.4 Store paints and freezable materials in a heated and ventilated room, as directed by Operations Manager on site.

.5 Remove and replace damaged products at own expense and for review by the Departmental Representative.

1.12 WARRANTIES AND BONDS

.1 Develop warranty management plan to contain information relevant to Warranties.

.2 Submit warranty management plan, thirty (30) days before planned pre-warranty conference, to the Departmental Representative and Operations Manager on sites approval.

.3 Warranty management plan to include required actions and documents to assure that the Operations Manager receives warranties to which they are entitled.

.4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.

.5 Submit, warranty information made available during construction phase, to the Departmental Representative for approval prior to each monthly pay estimate.

.6 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:

.1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.
.4 Verify that documents are in proper form, contain full information, and are notarized.
.5 Co-execute submittals when required.
.6 Retain warranties and bonds until time specified for submittal.

.7 Except for items put into use with Operations Manager's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.

.8 Conduct joint 11 month warranty inspection, measured from time of acceptance, by the Departmental Representative and Operations Manager.

.9 Include information contained in warranty management plan as follows:

.1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.
.2 Listing and status of delivery of Certificates of Warranty for extended warranty items, to include pumps, motors, and commissioned systems such as fire protection, alarm systems, and fuel transfer system.
.3 Provide list for each warranted equipment, item, feature of construction or system indicating:
.1 Name of item.
.2 Model and serial numbers.
.3 Location where installed.
.4 Name and phone numbers of manufacturers or suppliers.
.5 Names, addresses and telephone numbers of sources of spare parts.
.6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.
.7 Cross-reference to warranty certificates as applicable.
.8 Starting point and duration of warranty period.
.9 Summary of maintenance procedures required to continue warranty in force.
.10 Cross-Reference to specific pertinent Operation and Maintenance manuals.
.11 Organization, names and phone numbers of persons to call for warranty service.
.12 Typical response time and repair time expected for various warranted equipment.
.4 Contractor's plans for attendance at eleven (11) month post-construction warranty inspections.
.5 Procedure and status of tagging of equipment covered by extended warranties.

.6 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

.10 Respond in timely manner to oral or written notification of required construction warranty repair work.

.11 Written verification to follow oral instructions.

.1 Failure to respond will be cause for the Operations Manager to proceed with action against Contractor.

1.13 WARRANTY TAGS

.1 Tag, at time of installation, each warranted item. Provide durable, oil and water resistant tag approved by the Departmental Representative.

.2 Attach tags with copper wire and spray with waterproof silicone coating.

.3 Leave date of acceptance until project is accepted for occupancy.

.4 Indicate following information on tags:

.1 Type of product/material.

.2 Model number.

.3 Serial number.

.4 Contract number.

.5 Warranty period.

.6 Inspector's signature.

.7 Construction Contractor.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Procedures for demonstration and instruction of equipment and systems to Owner's O&M personnel.

.2 O&M personnel includes property facility manager, building operators, maintenenace staff, security staff and technical specialists, as applicable.

1.2 RELATED SECTIONS

.1 Section 33 56 13 - Aboveground Fuel Storage Tank.

.2 Section 28 11 13 - Facility Fuel Piping

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Demonstrate operation and maintenance of equipment and systems to Operations Manager's personnel within one (1) week of successful completion of system commissioning to the satisfaction of the Departmental Representative.

.2 Operations Manager: provide list of personnel to receive instructions, and co- ordinate their attendance at agreed-upon times.

.3 Preparation:

.1 Verify conditions for demonstration and instructions comply with requirements.

.2 Verify designated personnel are present.

.3 Ensure equipment has been inspected and put into operation.

.4 Ensure testing, adjusting, and balancing has been performed in accordance with Section 01 91 13 - General Commissioning (Cx) Requirements and equipment and systems are fully operational.

.5 Provide Departmental Representative a minimum of two (2) weeks' notice of scheduled system demonstration and training.

.4 Demonstration and Instructions:

.1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at scheduled times, at the equipment location.

.2 Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.

.3 Review contents of manual in detail to explain aspects of

operation and maintenance.

.4 Prepare and insert additional data in operations and maintenance manuals when needed during instructions.

.5 Time Allocated for Instructions: ensure amount of time required for instruction of each item of equipment or system as follows:

.1 For new fuel storage, distribution and control system a minimum of 8 hours of instruction for all building operation staff. Multiple training sessions may be required.

1.4 ACTION AND INFORMATION SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

.2 Submit schedule of time and date for demonstration of each item of equipment and each system two (2) weeks prior to designated dates, for the Operations Manager’s approval.

.3 Submit reports within one (1) week after completion of demonstration, that demonstration and instructions have been satisfactorily completed, complete with names of Owner’s representatives who attended.

.4 Give time and date of each demonstration, with list of persons present.

.5 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

1.4 QUALITY ASSURANCE

.1 When specified in individual Sections requiring manufacturer to provide authorized representative to demonstrate operation of equipment and systems:

.1 Instruct Operations Manager's personnel.

.2 Provide written report that demonstration and instructions have been completed.

1.4 CONDITIONS FOR DEMONSTRATIONS

.1 Equipment has been inspected and put into operation in accordance with manufacturer’s instructions and this specification.

.2 Testing, adjusting, and balancing have been performed in accordance with Section 01 91 13 - General Commissioning (Cx) Requirements and equipment and systems are fully operational as deemed by the Departmental Representative.

.3 Proper notification (minimum two [2] weeks’ notice) must be given to the Departmental Representative such that site operators are available to attend scheduled training session.

END OF SECTION

PART 1 - GENERAL

1.1 SPECIAL WARNING

.1 This project requires a special enhanced commissioning. The General Contractor must read and fully understand the special requirements specified in this Section prior to bidding this project.

1.2 RELATED SECTIONS

.1 Section 01 91 33: Commissioning (Cx) Forms.

1.3 GENERAL

.1 The "Commissioning" for this project is defined as a planned program of activities which enhance quality management and information transfer that extends throughout all stages of project delivery.

.2 The commissioning activities shall include the standard activities and the enhanced activities which are traditionally not provided by the design and construction industry and which are defined in this document.

1.4 REFERENCE STANDARDS

.1 The most stringent requirements of the following commissioning standards and guidelines shall apply:

.1 Associated Air Balance Council (AABC): National Standards for Field Measurements and Instrumentation, Total Systems Balance, Air Distribution - Hydronics Systems, 2002.

.2 ASHRAE Guideline 1.1-2007, the HVAC Commissioning Process.

.3 ASHRAE Guideline 4-2008, Preparation of Operating and Maintenance Documentation for Building System.

.4 NEBB Procedural Standards for Building Systems Commissioning (1999).

.5 NETA Standard for Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems 2009.

1.5 ROLES AND RESPONSIBILITIES

.1 The key members of the commissioning team include the Contractor, the Consultant, and the PWGSC Departmental Representative.

.1 It is the Contractor's responsibility to designate an experienced personnel on commissioning to represent the Contractor including the Sub-Contractors. The designated personnel shall be responsible for carrying out the Contractor's commissioning activities under the direction of the Consultant.

.2 The PWGSC Departmental Representative will be assisted by the Consultant and other project team members for overview of the

commissioning activities on behalf of the PWGSC Project Manager. The PWGSC Commissioning Manager is the Commissioning Authority for this project.

.2 The Contractor is responsible for the following standard commissioning activities and enhanced commissioning activities during project construction, commissioning and operation phases.

.1 Construction Phase:

.1 Designate an experienced personnel on commissioning as single point of contact for all matters relating to commissioning (enhanced activity).

.2 Conduct commissioning meetings and prepare meeting minutes.

.3 Submit shop drawings (standard activity).

.4 Conduct equipment installation and startup tests, and submit test reports (standard activity).

.5 Perform TAB and submit TAB report (standard activity).

.6 Conduct System Startup Verification Testing and complete Startup Checklists and PI Report forms (enhanced activity).

.2 Commissioning Phase:

.1 Conduct commissioning meetings and prepare meeting minutes.

.2 Conduct Functional Performance Testing and complete PV Report forms (enhanced activity).

.3 Demonstrate system operation (standard activity).

.4 Submit manufacturer’s documentation, specifications, and other information required by the Consultant to produce Maintenance Manuals (formerly called O&M Manuals) (standard activity).

.5 Submit "As-Built" drawings and specifications (standard activity).

.6 Conduct O&M training (standard activity).

.3 Operation Phase:

.1 Conduct commissioning meetings and prepare meeting minutes.

.2 Conduct deferred Functional Performance Testing and complete PV Report forms (enhanced activity).

.3 Provide fine-tuning (standard activity).

.4 Provide specified inspection and maintenance services during warranty period (standard activity).

.3 The Consultant will carry out the following commissioning activities related to the Contractor:

.1 Prepare Startup Checklists, PI and PV Report Forms and Functional Performance Test Forms (enhanced activity).

.2 Prepare Standard Operation Procedures (SOP) Manual (formerly called Systems Manual)(enhanced activity).

.3 Review and approve shop drawings (standard activity).

.4 Review and inspect installation, and prepare construction deficiencies report (standard activity).

.5 Review and approve TAB report (standard activity).

.6 Direct and approve System Startup Verification Testing (enhanced activity).

.7 Direct and approve Functional Performance Testing (enhanced

activity).
.8 Review and approve information submitted by Contractor for inclusion in Maintenance Manuals (standard activity).
.9 Review and approve "As-Built" drawings and specifications (standard activity).
.10 Update Standard Operating Procedures (SOP) Manual (enhanced activity).
.11 Review O&M training (standard activity).
.12 Prepare commissioning report (enhanced activity).
.13 Witness post-acceptance commissioning testing (enhanced activity).
.14 Direct and approve post-acceptance fine-tuning and review warranty services (standard activity).
.15 Update commissioning report (enhanced activity).

.4 The PWGSC Departmental Representative will carry out the following commissioning activities related to the Contractor and the Consultant:
.1 Review and approve Startup Checklists, PI and PV Report Forms prepared by the Consultant.
.2 Witness System Startup Verification Testing conducted by the Contractor and review test reports.
.3 Witness Functional Performance Testing conducted by the Contractor and review test reports.
.4 Review and approve O&M training conducted by the Contractor.
.5 Review commissioning documentation submitted by the Contractor and Consultant.
.6 Review and approved commissioning report prepared by the Consultant.
.7 Witness the post-acceptance commissioning testing conducted by the Contractor and review test reports.
.8 Review and approve updated commissioning report prepared by the Consultant.

1.6 SCHEDULING

.1 Within 15 working days of contract award, the Contractor shall submit bar chart commissioning schedules indicating anticipated date of start, duration, and date of completion for the following key activities for each of the three (3) Parks Canada sites:
.1 Commissioning meetings.
.2 Shop drawings.
.3 Pre-startup installation inspections and tests.
.4 System and Equipment Startup and Verification.
.5 TAB.
.6 Functional Performance Test.
.7 Maintenance Manuals.
.8 "As-Built" drawings and specifications.
.9 O&M Training.
.10 O&M Training report.

.2 Bar chart commissioning schedule shall be prepared for each component,

equipment, sub-system, system and integrated system to be commissioned as listed under paragraph 1.11.

.3 The Commissioning shall be carried out to meet the approved project schedule.

1.8 CONTRACTOR'S COMMISSIONING DOCUMENTATION

.1 The Contractor's Commissioning Documentation shall include the following:
.1 Commissioning Schedule.
.2 Minutes of Commissioning meetings.
.3 Shop drawings and product data.
.4 Installation inspection and test reports.
.5 TAB reports.
.6 Startup Checklists.
.7 Product Information (PI) Report forms.
.8 Performance Verification (PV) Report forms.
.9 "As-Built" drawings and specifications.
.10 Manufacturer Specifications and other information required to produce Maintenance Manuals.
.11 O&M Training Schedule
.12 O&M Training Report.

1.9 PRE- COMMISSIONING TESTING - STARTUPS

.1 Requirements of Pre-commissioning Verification: a full range of checks and tests to determine that all components, equipment, systems, and interfaces between systems (eg., emergency, fire, and life safety) operate in accordance with contact documents. This includes all operating modes, interlocks, control responses, and specific responses to abnormal or emergency conditions. Verification of the proper operation of the control system also includes verifying the interface of the control system with the TAB criteria and the response of EMCS controllers and sensors. Also, the Consultant may select, at random, 10 percent of the reported TAB and EMCS data for verification, and a failure of selected items may result in the rejection of the final TAB report or the report of system startup and testing.

.2 The Startup Checklists and PI Report forms shall be completed by the Contractor and verified by the Consultant.

1.10 COMMISSIONING TESTING

.1 Commissioning Testing shall include System Operation Demonstration and Functional Performance Testing of all systems to be commissioned. Test each system independently and then in unison with integrated systems.

.2 Requirements of Functional Performance Testing (FPT): FPT shall determine if the systems are providing the required services in accordance with the finalized design intent. If FPT cannot be completed due to seasonal reasons, lack of occupancy, deficiencies beyond the scope of the mechanical work, or any other reason, this shall be noted along with an indication of when tests will be rescheduled. If any identified performance deficiencies need to be corrected, the tests shall be repeated after corrective work is carried out, and this process shall continue until acceptable performance is achieved.

.3 The PV Report forms shall be completed by the Contractor and verified by the Consultant.

1.11 EXTENT OF COMMISSIONING

.1 Systems to be commissioned with the comprehensive commissioning to include:
- .1 Fuel tank overfill devices (electronic and mechanical).
- .2 Fuel tank monitoring console, probes, and alarms.
- .3 Fuel pump operation.
- .4 Emergency stop switches.
- .5 Cardlock system.
- .6 Tank-mounted solenoid valves.
- .7 Product Transfer Area drainage.

1.12 O&M TRAINING

.1 The Contractor shall provide qualified training instructors to conduct O&M training.

.2 Four weeks prior to commencement of O&M training, the Contractor shall submit training schedule with course outline, agenda and a copy of training manual in accordance with the training plan for review by the Consultant and the PWGSC Commissioning Manager.

.3 Training shall include hands-on instruction.

.4 Training shall include: review of Maintenance Manuals, Standard Operating Procedures (SOP) Manual, System Operational Procedures for all modes of operation, acceptable tolerances for system adjustments and procedures for dealing with abnormal and emergency situations.

1.13 UNFINISHED COMMISSIONING WORK

.1 Prior to the "Interim Certificate of Completion" a total of 4% of the construction price will be held back by PWGSC Project Manager until the acceptable Functional Performance Testing, O&M Training, and commissioning documentation have been completed.

1.14 COMMISSIONING REPORT AND POST-ACCEPTANCE COMMISSIONING

.1 When the acceptable Functional Performance Testing, O&M Training, and commissioning documentation have been completed, the Consultant shall prepare a commissioning report. The report will identify the completed functional performance tests, the deferred functional performance tests, construction deficiencies, design deficiencies, user's changes of requirement, and outstanding commissioning issues. The report will provide review comments on test results, O&M training and commissioning documentation, and will recommend follow-up actions to be taken during post-acceptance commissioning.

.2 The Project Manager will not issue the "Interim Certificate of Completion" until the commissioning report with a recommendation of acceptance is submitted by the PWGSC Commissioning Manager.

1.15 ADDITIONAL COMMISSIONING REQUIREMENTS

.1 Refer to other specifications sections for additional commissioning requirements.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

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

.2 Related Sections:
.1 Section 01 91 13 - General Commissioning (Cx) Requirements.
.2 Section 01 33 00 - Submittal Procedures.

1.2 INSTALLATION/START- UP CHECK LISTS

.1 Include the following data:
.1 Product manufacturer's installation instructions and recommended checks.
.2 Special procedures as specified in relevant technical sections.
.3 Items considered good installation and engineering industry practices deemed appropriate for proper and efficient operation.

.2 Equipment manufacturer's installation/start-up check lists are acceptable for use. As deemed necessary by Departmental Representative supplemental additional data lists will be required for specific project conditions.

.3 Use check lists for equipment installation. Document check list verifying checks have been made, indicate deficiencies and corrective action taken.

.4 Installer to sign check lists upon completion, certifying stated checks and inspections have been performed. Return completed check lists to Departmental Representative. Check lists will be required during Commissioning and will be included in Building Maintenance Manual (BMM) at completion of project.

.5 Use of check lists will not be considered part of commissioning process but will be stringently used for equipment pre-start and start-up procedures.

.6 Retain the manufacturer’s contact personnel recommended by the Departmental Representative for commissioning of the fuel storage tank monitoring system and fleet vehicle management system.

1.3 PRODUCT INFORMATION (PI) REPORT FORMS

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

.2 Prior to Performance Verification (PV) of systems complete items on PI forms related to systems and obtain Departmental Representative's approval.

1.4 PERFORMANCE VERIFICATION (PV) FORMS

.1 PV forms to be used for checks, running dynamic tests and adjustments carried out on equipment and systems to ensure correct operation, efficiently and function independently and interactively with other systems as intended with project requirements.

.2 PV report forms include those developed by Contractor records measured data and readings taken during functional testing and Performance Verification procedures.

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

1.5 COMMISSIONING FORMS

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

.2 Provide commissioning forms to the Departmental Representative four (4) weeks prior to scheduled Cx for review and comments. Do not proceed with final system commissioning until forms have been updated based on input from Departmental Representative.

.3 Strategy for Use:

.1 Contractor will provide required shop drawings information and verify correct installation and operation of items indicated on these forms.
.2 Confirm operation as per design criteria and intent.
.3 Identify variances between design and operation and reasons for variances.
.4 Verify operation in specified normal and emergency modes and under specified conditions.
.5 Verify reported results.
.6 Form to bear signatures of recording technician and reviewed and signed off by the Departmental Representative.
.7 Submit immediately after tests are performed.

.8 Reported results in true measured SI unit values.
.9 Provide the Departmental Representative with originals of completed forms.
.10 Maintain copy on site during start-up, testing and commissioning period.

1.6 LANGUAGE

.1 All documents shall be in English.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.01 MEASUREMENT AND PAYMENT

.1 Removal of existing asphalt pavement will be measured in square metres of surface actually removed [regardless of depth removed] [or number of operations required].

.2 Payment under this item will include operations involved in removing, hauling and stockpiling designated pavement [and cleaning of remaining pavement surface].

1.02 REFERENCES

.1 Canada Green Building Council (CaGBC)
- .1 LEED Canada-NC Version 1.0-[2004], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum [2007]).

.2 U.S. Environmental Protection Agency (EPA) / Office of Water
- .1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.03 ACTION AND INFORMATIONAL SUBMITTALS

.1 Sustainable Design Submittals:
- .1 LEED Canada-[NC] Submittals: in accordance with [Section 01 35 21 - LEED Requirements].
- .2 Erosion and Sedimentation Control: submit copy of erosion and sedimentation control plan in accordance with [EPA 832/R-92-2005] [authorities having jurisdiction] [and] [Section 01 35 21].
- .3 Construction Waste Management:
  - .1 Submit project [Waste Management Plan] [Waste Reduction Workplan] highlighting recycling and salvage requirements.
  - .2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that [50] [60] [75]% of construction wastes were recycled or salvaged.

2 PRODUCTS

2.01 EQUIPMENT

.1 Use cold milling, planning or grinding equipment with automatic grade controls capable of operating from stringline, and capable of removing part of pavement surface to depths or grades indicated.

3 EXECUTION

3.01 SEQUENCING

. Sequence Work per Section 02 41 99.

3.02 PREPARATION

.1 Temporary Erosion and Sedimentation Control:
- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties, watercourses and walkways.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

.2 Prior to beginning removal operation, inspect and verify with Departmental Representative areas, depths and lines of asphalt pavement to be removed.

.3 Protection: protect existing pavement not designated for removal, light units and structures from damage. In event of damage, immediately replace or make repairs to approval of Departmental Representative at no additional cost.

3.03 REMOVAL

.1 Remove existing asphalt pavement to lines and grades as shown in the appended drawings and as verified in the field by the Departmental Representative.

.1 Remove asphalt from Georgian Bay Islands National Park Site as indicated on the drawings.

.2 Remove asphalt from Bruce Penninsula National Park – Marine Base Operations as indicated on the drawings.

.3 No asphalt removal is required for Bruce Penninsula National Park – Cyprus Lake Maintenance Yard.

.2 Use equipment and methods of removal and hauling which do not damage or disturb underlying pavement.

.3 Prevent contamination of removed asphalt pavement by topsoil, underlying gravel or other materials.

.4 Suppress dust generated by removal process.

3.04 FINISH TOLERANCES

.1 Finished surfaces in areas where asphalt pavement has been removed to be within +/-[5] mm of grade specified but not uniformly high or low.

3.05 CLEANING

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

.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.

.3 Sweep remaining asphalt pavement surfaces clean of debris resulting from removal operations using rotary power brooms and hand brooming as required.

.4 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21.

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

.2 Removed asphalt pavement which is to be recycled in hot mix asphalt concrete under this contract may be stockpiled at designated asphalt plant site.

END OF SECTION

1 GENERAL

1.01 RELATED SECTIONS

.1 Section 01 10 00 – Summary of Work.

.2 Section 01 11 01 – General Instructions – Minor Works.

.3 Section 01 35 29 – Health and Safety Requirements

.4 Section 01 56 00 – Temporary Barriers and Enclosures

1.02 REFERENCES

.1 Canada Green Building Council (CaGBC)
- .1 LEED Canada-NC Version 1.0-[2004], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum [2007]).
- .2 LEED Canada-CI Version 1.0-[2007], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide For Commercial Interiors.

.2 CSA International
- .1 CSA S350-[M1980(R2003)], Code of Practice for Safety in Demolition of Structures.

.3 U.S. Environmental Protection Agency (EPA)/Office of Water
- .1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.03 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 11 01, 01 33 00and 01 74 21.

.2 Submit demolition drawings:
- .1 Submit for review and approval by Departmental Representative a shop drawing showing all materials to me removed and demolished from all three Parks Canada sites pursuant to the appended drawings.

.3 Sustainable Design Submittals:
- .1 Construction Waste Management:
  - .1 Submit project Waste Reduction Workplan highlighting recycling and salvage requirements.
  - .2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 50% of construction wastes were recycled or salvaged.
- .3 Erosion and Sedimentation Control: submit erosion and sedimentation control plan.

1.04 SITE CONDITIONS

.1 If material resembling spray or trowel-applied asbestos or other designated substance be encountered, stop work, take preventative measures, and notify Departmental Representative immediately.

.1 Proceed only after receipt of written instructions have been received from Departmental Representative.

.3 Notify Departmental Representative before disrupting building or services.

2 PRODUCTS

2.01 NOT USED

.1 Not used.

3 EXECUTION

3.01 EXAMINATION

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

.2 Locate and protect public and private utilities. Preserve active utilities traversing site in operating condition.

.3 Notify and obtain approval of utility companies before starting demolition.

.4 Disconnect, cap, plug or divert, as required, existing public utilities within the property where they interfere with the execution of the work, in conformity with the requirements of the authorities having jurisdiction. Mark the location of these and previously capped or plugged services on the site and indicate location (horizontal and vertical) on the record drawings. Support, shore up and maintain pipes and conduits encountered.

.1 Immediately notify Departmental Representative and utility company concerned in case of damage to any utility or service, designated to remain in place.

.2 Immediately notify the Departmental Representative should uncharted utility or service be encountered, and await instruction in writing regarding remedial action.

3.02 PROTECTION

.1 Prevent movement, settlement, or damage to adjacent structures, utilities and landscaping features to remain in place. Provide bracing and shoring as required.

.2 Keep noise, dust, and inconvenience to occupants to minimum.

.3 Protect building systems, services and equipment.

.4 Provide temporary dust screens, covers, railings, supports and other protection as required.

3.03 PREPARATION

.1 Temporary Erosion and Sedimentation Control:
- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during demolition.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal after completion of demolition work.

.2 Protection of In-Place Conditions:
- .1 Prevent movement, settlement, or damage to adjacent [structures,] [utilities,] [and landscaping features] [and parts of building] to remain in place. Provide bracing and shoring required.
- .2 Keep noise, dust, and inconvenience to occupants to minimum.
- .3 Protect building systems, services and equipment.
- .4 Provide temporary dust screens, covers, railings, supports and other protection as required.
- .5 Do Work in accordance with Section 01 11 01 and 01 35 29.

.3 Demolition/Removal:
- .1 Remove and dispose items as indicated on appended drawings.
- .2 Removal of Pavements, Curbs and Gutters:
  - .1 Square up adjacent surfaces to remain in place by saw cutting or other method approved by Departmental Representative.
  - .2 Protect adjacent joints and load transfer devices.
  - .3 Protect underlying and adjacent granular materials.
- .4 Trim edges of partially demolished building elements to tolerances as defined by Departmental Representative to suit future use.
- .5 Aboveground fuel storage tanks
  - .1 Render tanks unusable at the site and mark tanks in accordance with the federal storage tank regulation requirements.
- .6 Fuel-containing piping and hose
  - .1 Drain residual fuel from piping and hoses and dispose of residue in accordance with Ontario Regulation 347 (as amended).
- .7 Fuel, water and sludge remaining in aboveground fuel tanks and all piping
  - .1 Remove and dispose pursuant to O. Reg. 347 (as amended).

3.04 SEQUENCING

.1 Georgian Bay Islands National Park of Canada, Cyprus Lake Maintenance Yard:

- .1 Complete all demolition works and all other works in these specifications before March 31, 2017.
- .2 Do not decommission existing aboveground fuel tanks and tank-mounted pumps until new fuel system has been installed and successfully commissioned pursuant to Section 01 91 13.

.2 Bruce Peninsula National Park of Canada, Cyprus Lake Maintenance Yard and Marine Operations Base/Rescue Station:

- .1 Do not commence demolition works or any other works in these specifications before April 01, 2017.

.3 Bruce Peninsula National Park of Canada, Marine Operations Base/Rescue Station:

.1 Do not decommission existing aboveground fuel tanks and pump system until new fuel system has been installed and successfully commissioned pursuant to Section 01 91 13.

3.05 CLEANING

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

.3 Refer to demolition drawings and specifications for items to be salvaged for reuse.

.4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 11 01 and 01 74 21.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 03 30 00.01 Cast-in-Place Concrete - Short Form.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)
.1 CSA A23.1-14/A23.2-14, Concrete materials and methods of concrete construction/Test methods and standard practices for concrete.
.2 CSA O86-09, Consolidation-Engineering Design in Wood (Limit States Design).
.3 CSA O121-08(R2013), Douglas Fir Plywood.
.4 CSA O151-09(R2014), Canadian Softwood Plywood.
.5 CSA O153-13, Poplar Plywood.
.6 CAN3-O188.0-M78, Standard Test Methods for Mat-Formed Wood Particleboards and Waferboard.
.7 CSA O437 Series-93(R2011), Standards for OSB and Waferboard. NOT ON CSA WEB SITE
.8 CSA S269.1-1975(R2003), Falsework for Construction Purposes.
.9 CAN/CSA-S269.3-M92(R2013), Concrete Formwork.

.2 Council of Forest Industries of British Columbia (COFI)
.1 COFI Exterior Plywood for Concrete Formwork.

1.4 SHOP DRAWINGS

.1 Submit shop drawings for formwork in accordance with Section 01 33 00.

.2 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties, liners, and locations of temporary embedded parts. Comply with CAN/CSA-S269.3 for formwork drawings.

.3 Indicate formwork design data, such as permissible rate of concrete placement, and temperature of concrete, in forms.

.4 Indicate sequence of erection and removal of formwork to ensure sloping of concrete pad surfaces as shown on the drawings.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 11 01 and 01 74 21 and the Waste Reduction Workplan.

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

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

.4 Use sealers, form release and stripping agents that are non-toxic, biodegradable and have zero or low VOC's.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Formwork materials:
.1 Use wood and wood product formwork materials to CSA O121, CSA O86, CSA O437 Series, and/or CSA O153.
.2 Other formwork materials: obtain Departmental Representative permission prior to use.

.2 Form ties:
.1 Use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm dia. in concrete surface.

.3 Form liner:

.1 Plywood: Canadian Softwood Plywood to CSA O151.

PART 3 - EXECUTION

3.1 FABRICATION AND ERECTION

.1 Verify lines, levels, centres and elevations before proceeding with formwork and ensure dimensions and surface drainage plan agree with drawings.

.2 Obtain Departmental Representative's approval for use of earth forms framing openings not indicated on drawings.

.3 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.

.4 Do not place shores and mud sills on frozen ground.

.5 Provide site drainage to prevent washout of soil supporting mud sills and shores.

.6 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels as shown in the drawings and as indicated within tolerances required by CSA A23.1/A23.2.

.7 Align form joints and make watertight. Keep form joints to minimum.

.8 Use 25 mm chamfer strips on external corners and/or 25 mm fillets at interior corners, unless specified otherwise.

.9 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.

.10 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections. Assure that all anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.

.11 Clean formwork in accordance with CSA A23.1/ A23.2, before placing concrete.

3.2 REMOVAL AND RESHORING

.1 Leave formwork in place for minimum time period per CSA A23.1-14/A23.2-14 after placing concrete.

.2 Remove formwork when concrete has reached 95% of its design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.

.3 Provide all necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.

.4 Space reshoring in each principal direction at not more than 3000 mm apart.

.5 Re-use formwork and falsework subject to requirements of CSA A23.1/A23.2.

END OF SECTION

1 GENERAL

1.01 RELATED SECTIONS

.1 Section 03 30 00.01 Cast-in-Place Concrete - Short Form

.2 Section 01 11 01 General Instructions - Minor Works

.3 Section 01 33 00 Submittal Procedures

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

.5 Section 31 00 00.01 Earthwork - Short Form

1.02 PRICE AND PAYMENT PROCEDURES

.1 Measurement and Payment:
- .1 Measure reinforcing steel in kilograms of steel incorporated into Work, computed from theoretical unit mass specified in CSA G30.18 for lengths and sizes of bars as indicated or authorized in writing by Departmental Representative.
- .2 No measurement will be made under this Section.
  - .1 Include reinforcement costs in items of concrete work in Section 03 30 00.01.

1.03 REFERENCES

.1 American Concrete Institute (ACI)
- .1 ACI SP-66-[04], ACI Detailing Manual 2004.

.2 ASTM International
- .1 ASTM A123/A123M-13, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .2 ASTM A143/A143M-07(2014), Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.
- .3 ASTM A775/A775M-07b(2014), Standard Specification for Epoxy-Coated Reinforcing Steel Bars.
- .4 ASTM A1060/A1060M-14, Standard Specification for Zinc-Coated (Galvanized) Steel Welded Wire Reinforcement, Plain and Deformed, for Concrete.
- .5 ASTM A1064/A1064M-15, Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

.3 CSA International
- .1 CSA A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
- .2 CSA A23.3-14, Design of Concrete Structures.
- .3 CSA G30.18-09(R2014), Carbon Steel Bars for Concrete Reinforcement.
- .4 CSA G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .5 CSA W186-M1990(R2012), Welding of Reinforcing Bars in Reinforced Concrete Construction.

.4 Reinforcing Steel Institute of Canada (RSIC)
.1 RSIC-[2004], Reinforcing Steel Manual of Standard Practice.

1.04 ACTION AND INFORMATIONAL SUBMITTALS

.2 Prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice and SP-66.

.3 Shop Drawings:
.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
.1 Indicate placing of reinforcement and:
.1 Bar bending details.
.2 Lists.
.3 Quantities of reinforcement.
.4 Sizes, spacings, locations of reinforcement and mechanical splices if approved by Departmental Representative, with identifying code marks to permit correct placement without reference to structural drawings.
.5 Sizes, spacings and locations of chairs, spacers and hangers.
.2 Detail lap lengths and bar development lengths to CAN/CSA-A23.3.
.1 [Provide type A tension lap splices.

.4 When Chromate solution is used as replacement for galvanizing non-prestressed reinforcement, provide product description for review by Departmental Representative prior to its use.

.5 Submittals in accordance with Section 01 33 00.

1.05 QUALITY ASSURANCE

.1 Submit in accordance with Section 01 11 01 and as described in PART 2 - SOURCE QUALITY CONTROL.
.1 Mill Test Report: upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel.
.2 Upon request, submit in writing to Departmental Representative proposed source of reinforcement material to be supplied.

1.06 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 11 01, Section 01 61 00 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 and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Replace defective or damaged materials with new.

.4 Develop Waste Reduction Workplan related to Work of this Section and in

accordance with Section 01 11 01.

2 PRODUCTS

2.01 MATERIALS

.1 Substitute different size bars only if permitted in writing by Departmental Representative.

.2 Reinforcing steel: billet steel, grade 400 , deformed bars to CSA G30.18, unless indicated otherwise, minimum 30% recycled content.

.3 Reinforcing steel: weldable low alloy steel deformed bars to CSA G30.18, minimum 30% recycled content.

.4 Cold-drawn annealed steel wire ties: to ASTM A1060/A1060M, minimum 30% recycled content.

.5 Deformed steel wire for concrete reinforcement: to ASTM A1060/A1060M, minimum 30% recycled content.

.6 Welded steel wire fabric: to ASTM A1060/A1060M, minimum 30% recycled content.
.1 Provide in flat sheets only.

.7 Welded deformed steel wire fabric: to ASTM A1060/A1060M, minimum 30% recycled content.
.1 Provide in flat sheets only.

.8 Epoxy coating of non-prestressed reinforcement: to ASTM A775/A775M.

.9 Galvanizing of non-prestressed reinforcement: to ASTM A123/A123M, Coating Grade 85, minimum zinc coating 610 g/m^2.
.1 Protect galvanized reinforcing steel with chromate treatment to prevent reaction with Portland cement paste.
.2 If chromate treatment is carried out immediately after galvanizing, soak steel in aqueous solution containing minimum 0.2% by weight sodium dichromate or 0.2% chromic acid.
.1 Temperature of solution equal to or greater than 32 degrees and galvanized steels immersed for minimum 20 seconds.
.3 If galvanized steels are at ambient temperature, add sulphuric acid as bonding agent at concentration of 0.5% to 1%.
.1 In this case, no restriction applies to temperature of solution.
.4 Chromate solution sold for this purpose may replace solution described above, provided it is of equivalent effectiveness.
.1 Provide product description as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.10 Chairs, bolsters, bar supports, spacers: to CSA A23.1/A23.2.

.11 Mechanical splices: subject to approval of Departmental Representative.

.12 Plain round bars: to CSA G40.20/G40.21.

2.02 FABRICATION

.1 Fabricate reinforcing steel in accordance with Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada unless indicated otherwise.

.2 Obtain Departmental Representative's written approval for locations of reinforcement splices other than those shown on placing drawings.

.3 Upon approval of Departmental Representative, weld reinforcement in accordance with CSA W186.

.4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.
.1 Ship epoxy coated bars in accordance with ASTM A775A/A775M.

2.03 SOURCE QUALITY CONTROL

.1 On request, provide Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum [4] weeks prior to beginning reinforcing work.

.2 On request, inform Departmental Representative of proposed source of material to be supplied.

3 EXECUTION

3.01 PREPARATION

.1 Galvanizing to include chromate treatment.
.1 Duration of treatment: 1 hour per 25 mm of bar diameter.

.2 Conduct bending tests to verify galvanized bar fragility in accordance with ASTM A143/A143M.

3.02 FIELD BENDING

.1 Do not field bend or field weld reinforcement except where indicated or authorized by Departmental Representative.

.2 When field bending is authorized, bend without heat, applying slow and steady pressure.

.3 Replace bars, which develop cracks or splits.

3.03 PLACING REINFORCEMENT

.1 Place reinforcing steel as indicated on placing drawings and in accordance with CSA A23.1/A23.2.

.2 Use plain round bars as slip dowels in concrete.
.1 Paint portion of dowel intended to move within hardened concrete with one coat of asphalt paint.
.2 When paint is dry, apply thick even film of mineral lubricating grease.

.3 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.

.4 Ensure cover to reinforcement is maintained during concrete pour.

.5 Protect epoxy and paint-coated portions of bars with covering during transportation and handling.

3.04 FIELD TOUCH-UP

.1 Touch up damaged and cut ends of epoxy coated or galvanized reinforcing steel with compatible finish to provide continuous coating.

3.05 CLEANING

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

.3 Waste Management: separate waste materials for recycling in accordance with Section 01 11 01 and Section 01 74 21.

END OF SECTION

1 GENERAL

1.01 REFERENCES

.1 ASTM International
- .1 ASTM A497/A497M-07, Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.
- .2 ASTM A1060/A1060M-14, Standard Specification for Zinc-Coated (Galvanized) Steel Welded Wire Reinforcement, Plain and Deformed, for Concrete.
- .3 ASTM A1064/A1064M-15, Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
- .4 ASTM D260-86(2001), Standard Specification for Boiled Linseed Oil.
- .5 ASTM D1751-04(2013)e1, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non extruding and Resilient Bituminous Types).

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-19.24-M90, Multicomponent, Chemical-Curing Sealing Compound.

.3 Canada Green Building Council (CaGBC)
- .1 LEED Canada-NC Version 1.0-[2004], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum [2007]).
- .2 LEED Canada-CI Version 1.0-[2007], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide For Commercial Interiors.

.4 CSA International
- .1 CSA A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .2 CAN/CSA-A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
- .3 CSA G30.18-09(R2014), Carbon Steel Bars for Concrete Reinforcement.

1.02 ADMINISTRATIVE REQUIREMENTS

.1 Pre-installation Meetings: in accordance with Section 01 11 01, convene pre-installation meeting one week prior to beginning concrete works.
- .1 Ensure at a minimum that Departmental Representative and Site Supervisor attend.
- .2 Verify project requirements.

1.03 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 11 01 and Section 01 33 00.

.2 Shop Drawings:
- .1 Submit placing drawings prepared in accordance with plans to clearly show size, shape, location and necessary details of reinforcing.
- .2 Submit drawings showing formwork and falsework design to: CSA A23.1/A23.2.

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

.3 On request, at least 4 weeks prior to beginning Work, submit to Departmental Representative samples of following materials proposed for use: curing compound, joint filler, waterstops.

.4 Concrete hauling time: provide for review by Departmental Representative deviations exceeding maximum allowable time of 120 minutes for concrete to be delivered to site of Work and discharged after batching.

1.04 QUALITY ASSURANCE

.1 On request, provide to Departmental Representative, 4 weeks minimum prior to starting concrete work, valid and recognized certificate from plant delivering concrete.

.1 Quality Control Plan: provide written report to Departmental Representative verifying compliance that concrete in place meets performance requirements.

1.05 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements:

.1 Concrete hauling time: deliver to site of Work and discharged within 120 minutes maximum after batching.

.1 Do not modify maximum time limit without receipt of prior written agreement from Departmental Representative and concrete producer as described in CSA A23.1/A23.2.

.2 Deviations to be submitted for review by the Departmental Representative.

.2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

.3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials in accordance with Section 01 11 01 and Section 01 74 21.

2 PRODUCTS

2.01 DESIGN CRITERIA

.1 Alternative 1 - Performance : to CSA A23.1/A23.2, and as described in MIXES of PART 2 - PRODUCTS.

2.02 PERFORMANCE CRITERIA

.1 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established by Departmental Representative and provide verification of compliance as described in PART 1 - QUALITY ASSURANCE.

2.03 MATERIALS

.1 Cement: to CAN/CSA-A3001, Type HS.

.2 [Blended] hydraulic cement: Type HSb to CSA A3001.

.3 Water: to CSA A23.1/A23.2.

.4 Reinforcing bars: to CSA G30.18, Grade 400.

.5 Welded steel wire fabric: to ASTM A1060/A1060M or ASTM A497/A497M, flat sheets only.

.6 Premoulded joint filler:
.1 Bituminous impregnated fibreboard: to ASTM D1751.

.7 Joint sealer/filler: [grey] to CAN/CGSB-19.24, Type 1, Class B.

.8 Sealer: boiled linseed oil to ASTM D260, mixed with mineral spirits 1:1.

.9 Other concrete materials: to CSA A23.1/A23.2.

2.04 MIXES

.1 Performance Method for specifying concrete: to meet Departmental Representative performance criteria to CSA A23.1/A23.2.
.1 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as described in PART 3 - VERIFICATION.
.2 Contractor to submit concrete mix specifications for Departmental Representative approval:
.1 Uniformity per CAN/CSA-A23.1/A23.2.
.2 Workability per CAN/CSA-A23.1/A23.2.
.3 Finishability per CAN/CSA-A23.1/A23.2.
.4 Maximum set time per CAN/CSA-A23.1/A23.2.
.3 Provide concrete mix to meet following hard state requirements:
.1 Durability and class of exposure: C-1.
.2 Compressive strength at 28 days: 35 MPa minimum.
.3 Intended applications:
.1 Grade-level slabs, vehicle-loaded, adjacent to fresh water body, exposed to freeze-thaw.
.2 Traffic impact bollards, adjacent to fresh water body, exposed to freeze-thaw.
.4 Aggregate size 20 mm maximum.
.5 Volume stability: acceptable volume change range due to shrinkage, creep and freeze thaw cycle per CAN/CSA-A23.1/A23.2.
.6 Geometric requirements: mix to allow sloping of grade-level slabs for drainage as per drawings.
.4 Concrete supplier's certification.
.5 Provide quality management plan to ensure verification of concrete quality to specified performance.

3 EXECUTION

3.01 SEQUENCING

.1 Sequence Work in accordance with Section 02 41 99.

3.02 PREPARATION

.1 Provide Departmental Representative 24 hours notice before each concrete pour.

.2 Place concrete reinforcing per the drawings and in accordance with Section 03 20 00.

.3 During concreting operations:
- .1 Development of cold joints not allowed.
- .2 Ensure concrete delivery and handling facilitates placing with minimum of rehandling, and without damage to existing structure or Work.

.4 Protect previous Work from staining.

.5 Clean and remove stains prior to application of concrete finishes.

3.03 INSTALLATION/ APPLICATION

.1 Do cast-in-place concrete work in accordance with CSA A23.1/A23.2.

.2 Sleeves and inserts:
- .1 Cast in sleeves, ties, slots, anchors, reinforcement, frames, conduit, bolts, waterstops, joint fillers and other inserts required to be built-in.
- .2 Sleeves and openings greater than 100 mm x 100 mm not indicated, must be reviewed by Departmental Representative.

.3 Form concrete pads per drawings and in accordance with Section 03 10 00.

.4 Install vehicle impact bollard piping per drawings.

.5 Pour cast-in-place concrete slabs and bollards per Section 03 30 00.01. Slope concrete surfaces to drain concrete pads to Product Containment Areas as shown in drawings.

.6 Final cured slabs shall drain all surface liquids to the product containment valves as shown on the drawings.

.7 Form concrete curbing per drawings and in accordance with Section 03 10 11.

.8 Pour cast-in-place concrete curbing per Section 03 30 00.01.

3.04 FINISHES

.1 Formed surfaces exposed to view: in accordance with CSA A23.1/A23.2.

.2 Tank pads: provide smooth trowelled surface.

.3 Fuelling apron and Product Containment Area:
.1 Screed to plane surfaces and use magnesium floats.
.2 Provide round edges and joint spacings using standard tools.
.3 Trowel smooth to provide lightly brushed non-slip finish.
.4 Fuelling apron: saw cut per drawings and per CSA A23.1/A23.2

3.05 CONTROL JOINTS

.1 Cut and form control joints in slabs on grade at locations indicated, to CSA A23.1/A23.2 and install specified joint sealer/filler.

3.06 EXPANSION AND ISOLATION JOINTS

.1 Install premoulded joint filler in expansion and isolation joints full depth of slab flush with finished surface to CSA A23.1/A23.2.

3.07 CURING

.1 Use curing compounds compatible with applied finish on concrete surfaces free of bonding agents and to CSA A23.1/A23.2.

3.08 SEALING APPLICATION

.1 After curing is complete, [apply two even coats of linseed oil mixture to clean dry surfaces, each at 8 mý /L. Allow first coat to dry before applying second coat] [apply poly-siloxane resin blend sealer at 4 mý /L].

3.09 SITE TOLERANCES

.1 Concrete slab finishing tolerance to CSA A23.1/A23.2.

3.10 FIELD QUALITY CONTROL

.1 Concrete testing: to CSA A23.1/A23.2 by testing laboratory designated and paid for by Departmental Representative. [Accelerated test methods will apply].

3.11 CONCRETE PROTECTION

.1 General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Temperature related concrete provisions of CSA A23.1/A23.2 will apply when there is a probability that the air temperature will fall below 5 degrees C or when there is a probability of the air temperature rising above 20 degrees C.

.2 Protect freshly placed concrete from vehicle and foot traffic until fully cured. Be responsible for and repair at no additional cost all damage caused by vehicle and/or foot traffic prior to complete concrete curing.

.3 When experience or weather records indicate adverse temperatures are probable, a plan for protecting all concrete at early ages shall be established and the necessary special equipment and materials provided at the site before the adverse temperatures occur; verify requirements for cold and hot weather curing and protection are observed.

.4 Use portable heaters to permit proper curing of concrete where needed:

.1 Do not locate heaters within an enclosed space.

.2 Do not create localized hot spots.

.5 When the rate of surface moisture evaporation determined from Appendix D of CSA A23.1/A23.2 exceeds 0.75 kg/m²/hr, concrete slabs shall be protected as outlined in Article 21 of CSA A23.1/A23.2.

.6 Protect exposed concrete members from staining or becoming coated with concrete arising from form mortar leakage, concrete spillage, and corrosion of reinforcing, or fluid leakage from equipment.

.7 Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 1 kg/m2 x h (0.2 lb/ft2 x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

3.12 CLEANING

.1 Clean in accordance with Section 01 74 11.

.2 Use trigger operated spray nozzles for water hoses.

.3 Designate cleaning area for tools to limit water use and runoff.

.4 Cleaning of concrete equipment to be done in accordance with Section 01 35 43.

.5 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21.

.1 Materials and Resources Credit [MRc2.1 Construction Waste Management: Divert 50% From Landfill] [and MRc2.2 Construction Waste Management: Divert 75% From Landfill]: prepare Construction Waste Management plan in accordance with Section 01 74 21.

.2 Use excess concrete for: bollard footing anchorage.

.3 Divert unused concrete materials from landfill to local quarry or facility after receipt of written approval from Departmental Representative.

.4 Provide appropriate area on job site where concrete trucks will be safely washed.

.5 Divert admixtures and additive materials from landfill to approved official hazardous material collections site after receipt of written approval from Departmental Representative.

.6 Do not dispose of unused admixtures and additive materials into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.

END OF SECTION

1 GENERAL

1.01 REFERENCES

.1 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB-1.181-[99], Ready-Mixed Organic Zinc-Rich Coating.

.2 Canada Green Building Council (CaGBC)
  .1 LEED Canada-NC Version 1.0-[2004], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations.
  .2 Rating System Addenda for New Construction and Major Renovations LEED Canada-NC Version 1.0-[Addendum 2007].
  .3 LEED Canada-CI Version 1.0-[2007], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide For Commercial Interiors.

1.02 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

1.03 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle in accordance with Section 01 11 01.

.2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.3 Packaging Waste Management: remove and dispose in accordance with Section 01 74 21.

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 APPLICATION

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

3.02 CONNECTIONS TO EQUIPMENT

.1 In accordance with manufacturer's instructions unless otherwise indicated.

.2 Use valves and either unions or flanges for isolation and ease of maintenance and assembly.

.3 Use double swing joints when equipment mounted on vibration isolation and when piping subject to movement.

3.03 CLEARANCES

.1 Provide clearance around systems, equipment and components for observation of operation, inspection, servicing, maintenance and as recommended by manufacturer.

.2 Provide space for disassembly, removal of equipment and components as recommended by manufacturer or as indicated (whichever is greater) without interrupting operation of other system, equipment, components.

3.04 DRAINS

.1 Install piping with grade in direction of flow except as indicated.

.2 Install Product Containment Area drain valves at low point of Product Containment Area as shown on the drawings.

.3 Drain valves: NPS 2” ball valves unless indicated otherwise, with hose end male thread, cap and chain.

3.05 DIELECTRIC COUPLINGS

.1 General: compatible with system, to suit pressure rating of system.

.2 Locations: where dissimilar metals are joined.

.3 NPS 2 and under: isolating unions or bronze valves.

.4 Over NPS 2: isolating flanges.

3.06 PIPEWORK INSTALLATION

.1 Screwed fittings jointed with compound approved for use with refined petroleum hydrocarbons.

.2 Protect openings against entry of foreign material.

.3 Install to isolate equipment and allow removal without interrupting operation of other equipment or systems.

.4 Assemble piping using fittings manufactured to ANSI standards.

.5 Install exposed piping, equipment, rectangular cleanouts and similar items parallel or perpendicular to concrete pad lines.

.6 Slope piping, except where indicated, in direction of flow for positive drainage.

.7 Ream pipes, remove scale and other foreign material before assembly.

.8 Use eccentric reducers at pipe size changes to ensure positive drainage and venting.

.9 Provide for thermal expansion.

.10 Valves:
.1 Install in accessible locations.
.2 Install with stems above horizontal position unless otherwise indicated.
.3 Valves accessible for maintenance without removing adjacent piping.

3.08 SLEEVES

.1 General: install where pipes pass through masonry, concrete structures, fire rated assemblies, and elsewhere as indicated.

.2 Material: schedule 40 black steel pipe.

.3 Construction: foundation walls and where sleeves extend above finished floors to have annular fins continuously welded on at mid-point.

.4 Sizes: 6 mm minimum clearance between sleeve and uninsulated pipe or between sleeve and insulation.

.5 Installation:
.1 Concrete, masonry walls, concrete floors on grade: terminate flush with finished surface.
.2 Other floors: terminate 25 mm above finished floor.
.3 Before installation, paint exposed exterior surfaces with heavy application of zinc-rich paint to CAN/CGSB-1.181.

.6 Sealing:
.1 Foundation walls and below grade floors: fire retardant, waterproof non-hardening mastic.
.2 Elsewhere: Provide space for firestopping. Maintain fire rating integrity.
.3 Sleeves installed for future use: fill with lime plaster or other easily removable filler.
.4 Ensure no contact between copper pipe or tube and sleeve.

3.09 ESCUTCHEONS

.1 Install on pipes passing through walls, partitions, floors, and ceilings in finished areas.

.2 Construction: one piece type with set screws. Chrome or nickel plated brass or type 302 stainless steel.

.3 Sizes: outside diameter to cover opening or sleeve. Inside diameter to fit around pipe or outside of insulation if so provided.

3.10 PRESSURE TESTING OF EQUIPMENT AND PIPEWORK

.1 Advise Departmental Representative 48 hours minimum prior to performance of pressure tests.

.2 Pipework: test as specified in relevant sections of heating, ventilating and air conditioning work.

.3 Maintain specified test pressure without loss for [4] hours minimum unless specified for longer period of time in relevant mechanical sections.

.4 Prior to tests, isolate equipment and other parts which are not designed to withstand test pressure or media.

.5 Conduct tests in presence of Departmental Representative.

.6 Pay costs for repairs or replacement, retesting, and making good. Departmental Representative to determine whether repair or replacement is appropriate.

.7 Insulate or conceal work only after approval and certification of tests by Departmental Representative.

3.11 CLEANING

.1 Clean in accordance with Section 01 11 01 and Section 01 74 11.
  .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 11 01 and Section 01 74 21.

END OF SECTION

1 GENERAL

1.01 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures.

.2 Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

.3 Section 01 78 00 – Closeout Submittals.

.4 Section 33 56 13 – Aboveground Fuel Storage Tanks.

1.02 REFERENCES

.1 American Society of Mechanical Engineers (ASME)

.1 ASME–B16.3–2006, Malleable–Iron Threaded Fittings: Classes 150 and 300.

.2 ASME–B16.11, Socket Weld Fittings.

.3 ASME–B16.9–2007, Factory–Made Wrought Steel Buttwelding Fittings.

.4 ASME/ANSI B 36.10 Welded and Seamless Wrought Steel Pipe.

.5 ASME/ANSI B36.19 Stainless Steel Pipe.

.2 ASTM International

.1 ASTM A47/A47M–99(2004), Standard Specification for Ferritic Malleable Iron Castings.

.2 ASTM A53/A53M–07, Standard Specification for Pipe, Steel, Black and Hot–Dipped, Zinc Coated, Welded and Seamless.

.3 ASTM B61–08, Standard Specification for Steam or Valve Bronze Castings.

.4 ASTM A269/A269M, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing.

.5 ASTM A312/A312M–13b, Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.

.3 Canadian Council of Ministers of the Environment (CCME)

.1 PN 1326–2003, Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum Products and Allied Petroleum Products, with latest amendments.

.4 Canadian Environmental Protection Act (CEPA)

.1 SOR/2008–197, Storage Tanks for Petroleum Products and Allied Petroleum Products Regulation.

.5 Green Seal Environmental Standards (GSES)

.1 Standard GS-11-2008, 2nd Edition, Paints and Coatings.

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

.1 Material Safety Data Sheets (MSDS).

.7 Manufacturers Standardization Society of the Valve and Fitting Industry (MSS)

.1 MSS-SP-80-08, Bronze Gate, Globe, Angle and Check Valves.

.8 National Association of Corrosion Engineers (NACE)

.1 NACE SP0169-2007, Control of External Corrosion on Underground or Submerged Metallic Piping Systems.

.9 National Research Council Canada

.1 National Fire Code of Canada, 2010.

.10 Canadian Standards Association

.1 CSA B346-M Power-Operated Dispensing Devices for Flammable Liquids.

1.03 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Meeting:
.1 Convene pre-installation meeting one week prior to beginning work of this Section and on-site installations.
.1 Verify project requirements.
.2 Review installation and substrate conditions.
.3 Co-ordination with other building subtrades.
.4 Review [manufacturer's] installation instructions and warranty requirements.

1.04 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

.2 Product Data:
.1 Provide manufacturer's printed product literature, specifications and datasheets for piping, fittings and equipment and include product characteristics, performance criteria, physical size, finish and limitations.
.1 All products must be submitted to the Departmental Representative in one consolidated submittal and must allow for seven (7) working days for review. Product data sheets lacking model selection will be immediately rejected by the Departmental Representative. The Departmental Representative will notify the Contractor in writing of missing or rejected equipment upon completing the review. Contractor to resubmit to the Departmental Representative previously rejected or missed product data sheets.
.2 Provide two copies of WHMIS MSDS in accordance with Section

01 35 29.

.3 Indicate VOC's for adhesive and solvents during application and curing.

.4 Testing:

.1 Contractor to complete piping system leak detection test for all new aboveground piping. Test to be conducted at a minimum of 100psi for minimum 2 hours, unless otherwise specified by product manufacturer.

.2 Submit piping leak detection test results, signed by the Contractor, to Departmental Representative prior to filling the system with petroleum product. Testing medium shall be compressed nitrogen.

.5 Certificates:

.1 Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.6 Manufacturers' Instructions: provide manufacturer's installation instructions.

1.05 CLOSEOUT SUBMITTALS

.1 Submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00.

1.06 QUALITY ASSURANCE

.1 Sustainability Standards Certification:

.1 Low-Emitting Materials: [provide listing of [adhesives and sealants] [and] [paints and coatings] [and] [carpet] used in building, comply with VOC and chemical component limits or restriction requirements].

.2 Ensure piping is installed by [company] [individual] authorized by authority having jurisdiction.

1.07 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements:

.1 Deliver materials to each site in original factory packaging, labelled with manufacturer's name, address.

2 PRODUCTS

2.01 FILL AND VENT PIPES

.1 Materials as per CEPA SOR/2008-197, NFCC 2010, and CCME PN 1326.

.2 Stainless Steel: to ASTM A312 Type 304L, schedule 40, threaded.

2.02 DISPENSER SUCTION PIPES

.1 Materials as per CEPA SOR/2008-197 and NFCC 2010.

.2 Stainless Steel: to ASTM A312 Type 304L, schedule 40, continuous welded.

2.03 JOINTING MATERIAL

.1 Steel:

.1 Threaded fittings: Petroleum resistant seal required.

.2 Welded fittings: Socket weld as per ASTM Standards and Federal and Provincial fuel system regulations.

.3 Threaded and welded pipe connections and valves shall have a minimum rating of 1034 kPa (150 psi) and shall meet an approved standard, unless

.2 Joints are not permitted to be soldered.

.3 Copper tubing is not permitted.

.4 Stainless Steel:

.1 Welded fittings: Socket weld as per ASTM Standards and Federal and Provincial fuel system regulations.

.2 Flange fittings: minimum rating of 1034 kPa (150 psi), raised face, and shall meet an approved standard, unless otherwise indicated.

.3 Threaded and welded pipe connections and valves shall have a minimum rating of 1034 kPa (150 psi) and shall meet an approved standard, unless otherwise indicated.

.4 Tubing: to be installed for the dispenser pump air eliminator line back into the fuel storage tank only

.1 Connections to equipment: flared-type only.

2.04 FITTINGS

.1 Stainless Steel:

.1 Threaded fittings: banded, Class 150 to ASME-B16.3. Unless shown otherwise

.2 Flanged fittings: Class 150.

.3 Gasket material shall be petroleum-resistant. 2mm (1/16”) thick unless shown otherwise.

.4 Welding: butt-welding to ASME-B16.9.

.5 Unions: Class 300, ground seat, threaded.

.6 Nipples: Stainless steel, Schedule 40, 304L or 316

2.05 FUEL DISPENSING HOSE

.1 Gasoline: New braided, synthetic yarn with antistatic wire, low-temperature synthetic rubber cover: UL330 and ULC approved hose, NPS 3/4. Hoses shall be remain flexible for low-temperature applications (to -54°C).

.2 Diesel: New braided, synthetic yarn with antistatic wire, low-temperature synthetic rubber cover: UL330 and ULC approved hose, NPS 1. Hoses shall be remain flexible for low-temperature applications (to -54°C).

.3 Hose lengths:

.1 Installed on motor-driven mechanical hose reel: 30 metres or as approved by Departmental Representative.

.2 Installed on high-hose retraction assembly: 10 metres or as approved by Departmental Representative.

.4 Hoses installed on motor-driven mechanical hose reels shall be intended for marine use and shall be of the non-scuff type (non-marking).

2.06 FLEXIBLE METALLIC HOSE

.1 Provide flexible metallic hose upstream of dispenser sumps.

.2 Hoses shall be ULC-listed, constructed with 322 stainless steel hose and 304 stainless steel wire braid. Flanged connections.

.3 Maximum working pressure: 1000 kPa.

.4 Temperature rating: -195°C to 815°C.

2.07 BALL VALVES

.1 NPS 2 and under: stainless steel body, flanged ends, TFE seal, hard chrome ball, 4 MPa, WOG. To MSS-SP-110 and ANSI B16.34. Fire safe per API 607.

.1 Provide ball valves with lockable handles for locking in normal operating conditions. Contractor to provide locks for the ball valves.

2.08 SWING CHECK VALVES

.1 NPS 2 and under: Stainless steel body, flanged ends, swing disc, renewable composition disc suitable for oil service, screw in cap, regrindable seat.

2.10 Y-STRAINER

.1 NPS 2 and under: flanged, 304 stainless steel body and screen, 100 mesh,

in-line strainer, c/w bottom clean-out.

2.11 ELECTRIC SOLENOID VALVE

.1 NPS 2 and under: flanged, ULC-certified, two-way stainless steel body, packless, internal piston pilot operated safety solenoid valve for hazardous locations and petroleum-based products.

.1 Install solenoid valves on dispenser suction pipe close to exit of storage tank, downstream of manual shut-off ball valve, and provided with pressure-relief.

.2 Solenoid shall be controlled by the respective dispenser pump, kept normally closed and opened only when the pumps activate to dispense fuel. In the event of a power loss, the solenoid shall fail safe to the closed position.

.3 Voltage shall be compatible with new petroleum dispenser units.

.4 Install stainless steel, 100 mesh, y-type strainer c/w bottom clean-out directly upstream of the solenoid valve.

2.11 PRESSURE RELIEF VALVE

.1 ULC-listed, stainless steel. Pressure relief valve to be installed to relieve fuel from the suction line between dispenser and solenoid valve to the fuel tank.

.2 Valve to be set at 25psi.

2.12 VERTICAL CHECK VALVE C/W SHEAR GROOVE ("SHEAR VALVE")

.1 Cast iron body, M-19 Viton seal, equipped with thermal relief valve and built-in shear groove.

.2 Install on suction lines inside each dispenser sump prior to connecting to dispenser unit.

.3 Equipped with three (3) stabilizer mounting bosses for rigid mounting to stabilizer bar kit in dispenser sump.

.4 Provide stabilizer mounting kit to fasten to fuel dispenser sumps for adequate supporting.

2.13 FLOW LIMITER DEVICE

.1 ULC-listed, zinc/aluminum body, NPT ¾" to restrict dispensing flow rate to 38 liters per minute.

.2 Install between the dispenser unit and the breakaway device.

2.14 DISPENSER NOZZLES

.1 ULC-listed for use in gasoline, diesel, and up to 10% ethanol blends.

.2 Body: aluminum.

.3 Spout: aluminum.

.4 Equipped with:

.1 splash guard.

.2 Nozzle shut-off if falls out of a vehicle or is tipped up.

.5 Gasoline nozzles:

.1 For conventional/commercial petroleum fueling deliveries.

.2 NPT 3/4 female inlet.

.3 Colour: black.

.6 Diesel nozzles:

.1 For conventional/commercial petroleum fueling deliveries.

.2 NPT 1 female inlet.

.3 Colour: yellow.

2.15 ABOVEGROUND FUEL DISPENSER SUMPS

.1 Install aboveground ULC-listed stainless steel under-dispenser containment sumps for each dispenser unit.

.2 Equipped with:

.1 Lugs for anchoring sump to new concrete pad.

.2 Holes along top rim of sump to allow fastening to new dispensers.

.3 Shear valve support bracket c/w cross brace for installation of stabilizer kit.

.3 Ensure containment sump is appropriately sized for mounting onto new dispenser unit.

.4 Provide liquid-tight entry boot fittings for all equipment (piping, conduit, etc.) into sump.

.5 All penetrations into the dispenser sumps (piping, conduit, couplings, fittings, bolts, etc) shall be greater than 50mm from the sump bottom.

.6 ULC-label shall be affixed to exterior of all sumps.

.7 Equip each sump with one (1) new discriminating fuel-water liquid detection sensor for leak monitoring.

2.16 FUEL DISPENSERS

.1 For each of the three Parks Canada sites, supply and install one (1)

new dual-product fuel dispenser manufactured to CSA-B346-M, each dispenser complete with two (2) suction pumps and two (2) motors: one for diesel product, one for gasoline. Each dispenser shall be equipped with two (2) fuel dispensing hoses and related equipment as per the drawings and intent of the design.

.2 Capacity: 83 litres per minute (22 gallons per minute).

.3 Pump units: belt-driven, positive displacement rotary gear pumps with integral centrifugal air separator.

.4 Motors: 1 HP, continuous duty motors. 120VAC, 60 Hz, single phase with thermal overload. Adjustable v-link belt connects to the pump pulley. Approved for operation in Class 1, Division 1, GR. C&D. Temp Code T3C.

.5 Meter: 2-piston, positive displacement meter with integral intelligent pulser. Mechanical gauge, two per dispenser (one per dispensed product). Meter shall display in litres. Calibrate meter.

.6 Display: backlit 25mm six-digit volume display, two per dispenser (one for each product). Programmable gallons or liters (Contractor shall setup for litres).

.7 Totalizer: 7-digit electromechanical non-resettable totalizer per product.

.8 Inlet: 38mm male NPT.

.9 Outlet: 25mm female NPT. For gasoline product, include 19mm reducer bushing.

.10 Strainer: 120-mesh, removable strainer.

.11 Cabinet: Galvanealed metal. Hinged front and rear doors. Size to suit installation on new ULC-listed, aboveground dispenser sumps.

.12 Finish: silver powder coat finish with blue powder coated doors.

.13 Options: include pulse output interface.

2.17 FUEL FILTERS

.1 Provide new 30-micron water absorbing particulate spin-on filter canister inside each dispenser.

.2 Furnish spare filter cartridge for each dispenser.

2.18 DISPENSER HOSE RETRACTION AND STORAGE MECHANISMS

.1 For the dispenser installed at Bruce Peninsula National Park (Cyprus Lake Maintenance Yard):

.1 Pulley system installed with 50mm stainless steel

schedule 40 pipe, complete with square stainless steel base plate anchored to new concrete pad. One retraction mechanism required per dispenser hose. Include hood and hook.

.2 Each retraction mechanism to be equipped with hose bun for dispenser hose support.

.1 For the dispensers installed at Bruce Peninsula National Park (Marine Operations Base) and Georgian Bay Islands National Park:

.1 Approved motor-actuated stainless-steel mechanical hose reel, complete with square stainless steel base plate anchored to existing concrete pad. One hose reel required per dispenser hose. Hose reels shall be capable of storing 30 metres of product hose (gasoline and diesel). reel motors rated for Class 1, Division 1 environments.

2.19 FUEL METER

.1 Dispenser units to come equipped with mechanical meter for each dispensed product (2 per dispenser).

.2 Accuracy: tested and certified by manufacturer for accuracy within ±0.25%.

2.20 SWIVELS

.1 ULC-listed, aluminum swivels are required where the new dispenser hose connects to existing nozzle.

.1 Gasoline: to be NPT 3/4 female to NPT 3/4 male.

.2 Diesel: to be NPT 1 female to NPT 1 male.

2.21 BREAKAWAY COUPLERS

.1 Dry, re-connectable ULC-listed breakaway coupler, die-cast zinc body, impact resistant nylon protective sleeve. Disconnects upon pull force of 250 lbs. Double poppet design, compatible for cold weather applications.

.1 NPT 1 female to NPT 1 female. Breakaway coupler required for the diesel dispenser hoses.

.2 NPT 3/4 female to NPT 3/4 female. Breakaway coupler required for the gasoline dispenser hoses.

2.22 FIRE EXTINGUISHERS

.1 Two (2) new portable fire extinguishers required at the fuel dispenser locations, ratings not less than 80-B:C.

.2 Provide weather-tight enclosure with clear door for visibility of fire extinguisher.

2.23 EMERGENCY POWER DISPENSER PUMP SHUT-DOWN DEVICES

.1 For the Georgian Bay Islands National Park site:

.1 Install two (2) remote emergency power dispenser pump shut-down devices, complete with signage:

.1 One device on a vertical fuel pipe support in the fuel storage tank and fuel dispensing area.

.2 One device on the exterior of the Maintenance Building. Install at location directed by Departmental Representative and site operating staff.

.1 For both Bruce Peninsula National Park sites:

.1 Install one (1) remote emergency power dispenser pump shut-down devices, complete with signage on a vertical fuel pipe support in the fuel storage tank and fuel dispensing area.

.2 Connect shut-down device in series with existing shut-down devices mounted on the exterior building walls.

2.24 LABELING

.1 Piping to be labeled with product, flow direction and pipe purpose. Lettering to be black, minimum 13mm in height, on yellow background. Examples of pipe labels include: “DIESEL SUCTION PIPE”, “GASOLINE SUCTION PIPE”.

2.24 SIGNAGE

.1 All signage to be bilingual on aluminum or UV-proof plastic backing, fastened using screws, bolts or rivets.

.2 Sign indicating the remote emergency stop buttons within the tank dispending area and adjacent to building walls (where signs do not already exist).

.3 Fuel dispensing procedures to be posted in fuel dispensing area as depicted on the drawings.

.4 Safety signage to be posted in fuel dispensing area as depicted on the drawings.

3 EXECUTION

3.01 APPLICATION AND SEQUENCING

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

.2 Sequence Work in accordance with Section 02 41 99.

3.02 PIPING

.1 Install piping system as indicated in the appended drawings in accordance with CEPA SOR/2008-197, NFCC 2010 and CCME PN 1326.

.2 Slope piping down in direction of storage tank unless otherwise indicated.

.3 Above ground piping to be protected from physical/vehicular damage. Refer to drawings for details.

.4 Fill, vent, and suction piping:

.1 Stainless steel piping welded throughout except at tanks where electrically isolating fittings are used.

.2 Grading: slope piping at 1% minimum back to tanks.

.5 Piping at tanks:

.1 Main tank fill and suction pipes: terminate 150 mm from bottom of tank.

.2 Vent: extend into tank and terminate less than 25mm from top. Terminate as indicated.

.3 Fill connection and dip port: terminate as indicated with liquid-tight and vapour proof cover.

.6 Clearly label piping runs in legible form indicating;

.1 Piping product content.

.2 Direction of flow.

.3 Pipe function.

.4 Identify transfer points in piping systems to CPPI Colour-Symbol System.

3.03 VALVES

.1 Install valves with stems upright or horizontal unless approved otherwise by Departmental Representative.

.2 Install valves as indicated on drawings.

.3 Install swing check valves on inlet and discharge of fuel pumps and as indicated.

3.04 FILTERS

.1 Replace the fuel filter inside the dispenser on pump discharge as per manufacturer's specifications.

3.05 OVERFILL AND SPILL PROTECTION

.1 Shop-fabricated AST overfill protection.

.1 Spill container shall come equipped with the new storage tanks from the tank manufacturer. Spill container shall be equipped with drain valve, lockable lid, and minimum 50L capacity. If external spill container is installed, container shall meet CAN/ULC-S663 standard.

.2 Overfill protection device compatible with intended method of filling designed, built and certified to CAN/ULC-S661 with positive shut-off action. Pressure-rated overfill prevention valve to be installed on each fill pipe drop tube inside each respective tank compartment.

3.06 LEAK DETECTION

.1 Install piping to allow leaks to accumulate in dispenser sump for visual inspection.

.2 Install new ULC-certified discriminating liquid sensor for leak monitoring in each dispenser sump. Liquid sensors shall interlock pumps such that the dispenser or pump will not operate if the sensor detects petroleum product or a high liquid level.

.3 Storage tanks to have vacuum drawn on interstice complete with vacuum switch and be monitored by new fuel tank monitoring system/console.

3.08 FIELD QUALITY CONTROL

.1 Prior to testing, remove foreign matter, flush piping and equipment using same petroleum product as the one being dispensed.

.2 The piping will then be re-circulated through the piping systems to remove scale and debris, using the same petroleum product as the one to be dispensed. Flushing will continue to the satisfaction of the Departmental Representative.

.3 Dispose of flushing liquids to approval of authority having jurisdiction.

.4 Clean strainers prior to turnover to Owner.

.5 Repeat tests at Contractor's expense until successful results are achieved.

.6 Pipe leak detection test:

.1 Isolate the storage tanks from piping system pressure leak detection tests.

.2 The Contractor shall complete at the minimum a two (2) hour leak

detection (pressure) test in the field using compressed nitrogen gas at 100psi or manufacturer's recommended test pressure on the fuel piping. Testing shall be conducted after the installation is complete and prior to system commissioning.

.3 Should there be a loss of pressure, soap test all welds and threaded connections, or use a tracer gas with compressed gas as directed by the Departmental Representative.

.4 Produce and retain documented proof of successful pressure test, including date and time of the test, testing medium, pressure and outdoor temperature readings at indicated start and finish times. Documentation shall be signed off by the Contractor.

.5 Submit pipe leak detection test results to Departmental Representative prior to filling the system with petroleum product and in accordance with Section 01 78 00.

.7 Under-dispenser containment sump leak detection test:

.1 The Contractor shall complete at the minimum a two (2) hour leak detection (hydrostatic) test using water, or if freezing conditions are present use windshield washer fluid. Testing shall be conducted after the installation is complete and prior to system commissioning.

.2 Produce and retain documented proof of successful sump hydrostatic test, including date and time of the test, testing medium, outdoor temperature readings at indicated start and finish times. Documentation shall be signed off by the Contractor.

.3 Submit sump hydrostatic test results to Departmental Representative prior to filling the system with petroleum product and in accordance with Section 01 78 00.

3.09 CLEANING

.1 Ensure vents from regulators, control valves are terminated in approved location and are protected against blockage and damage.

.2 Ensure entire installation is approved by authority having jurisdiction.

.3 Clean in accordance with Section 01 74 11.

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

END OF SECTION

1 GENERAL

1.01 REFERENCES

.1 Canadian Standards Association (CSA International)
  .1 CSA-C22.1-12, Canadian Electrical Code, Part 1 (22nd Edition), Safety Standard for Electrical Installations.
  .2 CAN3-C235-83(R2010), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.

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

.3 The Ontario Electrical Safety Code 2012, and all bulletins (Ontario).

.4 Electrical Safety Authority (ESA) requirements and local applicable codes and regulations.

1.02 DESIGN REQUIREMENTS

.1 Operating voltages: to CAN3-C235.

.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.
  .1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

.3 Language operating requirements: provide identification nameplates and labels for control items in English.

1.03 SUBMITTALS

.1 Submittals: in accordance with Section 01 11 01.

.2 Product Data: submit WHMIS MSDS.

.3 Shop drawings:
  .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario.
  .2 Submit 6 number of copies of 600 x 600 mm minimum size drawings and product data to authority having jurisdiction.
  .3 If changes are required, notify Departmental Representative of these changes before they are made.
  .4 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co- ordinated installation.
  .5 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.
  .6 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.

.4 Quality Control: in accordance with Section 01 11 01.
.1 Provide CSA certified equipment and material.
.2 Where CSA certified equipment and material is not available, submit such equipment and material to authority having jurisdiction 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. Pay associated fees. Departmental Representative will provide drawings and specifications required by Electrical Inspection Department and Supply Authority at no cost.
.5 Submit, upon completion of Work, load balance report as described in PART 3 - Load Balance.
.6 Submit certificate of acceptance from Electrical Safety Authority having jurisdiction upon completion of Work to Departmental Representative.

1.04 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Section 01 11 01.

.2 Qualifications: electrical Work to be carried out by qualified, licensed electricians who hold valid Master Electrical Contractor license or apprentices as per the conditions of Provincial Act respecting manpower vocational training and qualification.
.1 Employees registered in provincial apprentices program: permitted, under direct supervision of qualified licensed electrician, to perform specific tasks.
.2 Permitted activities: determined based on training level attained and demonstration of ability to perform specific duties.

.3 Site Meetings:
.1 In accordance with Section 01 11 01 and Section 01 91 20.

.4 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.

1.05 DELIVERY, STORAGE AND HANDLING

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

.2 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 11 01.

1.06 SYSTEM STARTUP

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

2 PRODUCTS

2.01 SUSTAINABLE REQUIREMENTS

.1 Materials and products in accordance with Section 01 11 01.

2.02 MATERIALS AND EQUIPMENT

.1 Provide material and equipment in accordance with Section 01 11 01.

.2 Material and equipment to be CSA certified. Where CSA certified material and equipment are not available, obtain special approval from authority having jurisdiction before delivery to site and submit such approval as described in PART 1 – Submittals.

.3 Factory assemble control panels and component assemblies.

2.03 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: except for conduit, wiring and connections below 50 V which are related to control systems specified in mechanical sections and as shown on mechanical drawings.

2.04 WARNING SIGNS

.1 Warning signs: in accordance with requirements of authority having jurisdiction.

.2 Porcelain enamel signs: minimum size 175 x 250 mm.

2.05 WIRING TERMINATIONS

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

2.06 EQUIPMENT IDENTIFICATION

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

.1 Nameplates: plastic laminate 3 mm thick plastic engraving sheet, matt white finish face, black core, mechanically attached with self tapping screws.

.2 Sizes as follows:

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

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

otherwise.

.3 Wording on nameplates and labels to be approved by Departmental Representative prior to manufacture.

.4 Allow for minimum of twenty-five (25) letters per nameplate and label.

.5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.

.6 Identify equipment with Size 3 labels engraved "ASSET INVENTORY No. " as directed by Departmental Representative.

.7 Disconnects, starters and contactors: indicate equipment being controlled and voltage.

.8 Terminal cabinets and pull boxes: indicate system and voltage.

.9 Transformers: indicate capacity, primary and secondary voltages.

2.07 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.

2.08 CONDUIT AND CABLE IDENTIFICATION

.1 Colour code conduits, boxes and metallic sheathed cables.

.2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m intervals.

.3 Colours: 25 mm wide prime colour and 20mm wide auxiliary colour.

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

2.09 FINISHES

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

2.10 WIRING SYSTEM

.1 Power and lighting circuits in EMT with drawn-in conductors. 2 and EMT on SP3-5.

.2 Use heavy wall rigid conduit for service entrance and where required by codes.

.3 RW-90, XLPE insulated wire for panel feeder and branch circuits, GTF insulated wire for final fixture connection.

.4 #12 AWG minimum wire size, #10 AWG or larger shall be stranded.

.5 Copper conductors.

.6 Size branch circuits and panel feeders for maximum 2% voltage drop.

.7 Provide insulated green ground conductor in EMT conduits.

.8 Provide nylon insulated bushings on the ends of all conduits in junction boxes, pullboxes, panelboards, etc.

.9 Minimum size conduit for lighting and power circuits is 21 mm.

2.11 GROUNDING

.1 Ground service entrance and equipment with approved conductors and connectors.

.2 Make tests required by code and authorities having jurisdiction.

2.12 MOTOR AND CONTROL WIRING

.1 Provide wiring and connections for motors and electrical equipment supplied under other Divisions.

.2 Mechanical Divisions shall wire control circuits 50 volts and under.

2.15 PANELBOARD

.1 Use existing panelboard (circuit breaker type).

.2 Install branch circuit breakers shown on electrical schematic drawings.

.3 Breakers: toggle type, bolt-on, quick-make, quick-break, 40°C ambient temperature compensated and trip-free of operating handles on overloads.

.4 Lock-on handle devices for breakers not controlling lighting. 2P and 3P breakers to be with single handle common trip type.

.5 Fill in existing directory card showing load supplied by each

contractor-installed circuit.

2.16 OUTLET BOXES

.1 Light fixture outlet boxes: standard, octagonal or square as required.

.2 Switch outlet boxes: standard, single or ganged as required.

.3 Receptacle outlet boxes: standard.

.4 Steel construction.

.5 Masonry type in masonry construction.

.6 Standard FS conduit fittings for surface mounted outlets in exposed areas.

2.17 SWITCHES

.1 Specification grade, toggle type, 20 amps, 347 volts, back and side wired, chrome plated yoke, silver cadmium oxide contacts, switch mechanism on neoprene cushion.

.2 Locate switches on latch side of door, 1.4 m above finished floor unless noted otherwise.

2.18 RECEPTACLES

.1 Specification grade, 15 amp, 125 volt, AC, 'U' ground parallel blade slots, triple wiping contacts, double grounding terminals, break- off feature for separate feeds, built-in strap in plastic moulded body and back and side wiring terminals.

.2 Locate receptacles 400 mm above finished floor unless noted otherwise.

.3 Provide outlets with various configurations as indicated on electrical drawings.

2.19 COVER PLATES

.1 Common cover plate at ganged outlet boxes. Split plates not allowed.

2.20 MANUAL STARTERS

.1 Overload protection to suit motor size.

.2 Trip-free handle indicating open, closed and tripped position.

.3 Flush mounted in finished areas, EEMAC 1 enclosure elsewhere.

.4 Red pilot light indicating starter "on".

.5 Single phase starters rated 740W at 250 V AC.

2.21 FIXTURE MOUNTING

.1 Provide mounting and supports required for safe installation to Departmental

Representative's satisfaction.

2.22 LIGHTING FIXTURES

.1 Provide lighting fixtures with lamps as illustrated in electrical standard details.

.2 Shop drawings to consist of catalogue cuts and photometric data from an independent test lab.

2.23 FLUORESCENT FIXTURES

.1 Ballast: high power factor, energy saving type automatic resetting, thermal protection, pressure sensitive capacitor protection, lowest sound level available.

.2 Body: minimum 0.952 mm thick (20 gauge) steel, white baked enamel finish, reflectance value minimum 85%.

.3 Lens: 100% pure acrylic, low brightness, sparkling crystal prismatic pattern, maximum efficiency, and direct glare control. ULC certified.

.4 CSA rated for continuous row mounting.

2.24 LAMPS

.1 Fluorescent lamps: 1220 mm length unless specified otherwise, bi-pin, rapid start, premium grade, 18,000 hour life expectancy, 3,200 initial lumen output, cool/warm white.

.2 Incandescent lamps: medium base, 130 V, 2,000 hour life expectancy.

2.25 DISCONNECT SWITCHES

.1 Heavy duty, quick-make, quick-break.

.2 Enclosure EEMAC 1 for interiors, EEMAC 3 weatherproof for outdoors.

2.26 FUSES

.1 HRC, Class J dimension, time delay.

.2 Provide 1 spare set of fuses.

3 EXECUTION

3.1 SEQUENCING AND EXAMINATION

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

.1 Visually inspect substrate in presence of Departmental Representative.

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

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

.2 Sequence Work in accordance with Section 02 41 99.

3.2 INSTALLATION

.1 Do complete installation as shown in drawings and in accordance with CSA C22.1 except where specified otherwise.

.2 Do underground systems in accordance with CAN/CSA-C22.3 No.1 except where specified otherwise.

3.3 NAMEPLATES AND LABELS

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

3.4 CONDUIT AND CABLE INSTALLATION

.1 Install conduit and sleeves prior to pouring of concrete.

.1 Sleeves through concrete: schedule 40 steel pipe, sized for free passage of conduit, and protruding 50 mm.

.2 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.

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

3.5 MOUNTING HEIGHTS

.1 Verify equipment mounting heights above tank pad surface or building floor with Departmental Representative if not shown on the drawings or provided in these specifications.

3.9 SYSTEM STARTUP

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

.2 Participate in System Commissioning per Section 01 91 20.

.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.

3.10 CLEANING

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

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

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

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

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

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 26 05 01 - Common Work Results - Electrical Minor Works

1.02 REFERENCES

.1 Canada Green Building Council (CaGBC)
- .1 LEED Canada-NC-[2009], LEED (Leadership in Energy and Environmental Design): Green Building Rating Systemfor New Construction and Major Renovations 2009.
- .2 LEED Canada-CI Version 1.0-[2007], LEED (Leadership in Energy and Environmental Design): Green Building Rating System for Commercial Interiors.
- .3 LEED Canada-EB: O&M-[2009], LEED (Leadership in Energy and Environmental Design): Green Building Rating System for Existing Buildings: Operations and Maintenance 2009.

.2 CSA International
- .1 CSA C22.2 No.18.1-13, Metallic outlet boxes (Tri-national standard, with UL 514A and ANCE NMX- J-023/1).
- .2 CAN/CSA-C22.2 No.18.2-06(R2011), Nonmetallic Outlet Boxes.
- .3 CSA C22.2 No.18.3-12, Conduit, tubing, and cable fittings (Tri-national standard, with ANCE NMX-J-017 and UL 514B).
- .4 CAN/CSA-C22.2 No.18.4-15, Hardware for the Support of Conduit, Tubing, and Cable (Bi-National standard, with UL 2239).
- .5 CSA C22.2 No. 18.5-13, Positioning devices (Bi-national standard, with UL 1565).
- .6 CSA C22.2 NO. 65-13, Wire connectors (Tri- national standard, with UL 486A-486B and NMX-J-543-ANCE).

.3 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)
- .1 EEMAC 1Y-2-[1961], Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).

.4 National Electrical Manufacturers Association (NEMA)

1.03 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for [wire and box connectors] and include product characteristics, performance criteria, physical size, finish and limitations.

1.04 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00.

.2 Operation and Maintenance Data: submit operation and maintenance data for

incorporation into manual.

1.05 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 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 in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect wire and box connectors.
- .3 Replace defective or damaged materials with new.

.4 Develop Waste Reduction Workplan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding and packaging materials as specified in Waste Reduction Workplan in accordance with Section 01 74 21.

2 PRODUCTS

2.01 MATERIALS

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

.2 Fixture type splicing connectors to: CSA C22.2 No.65, with current carrying parts of copper sized to fit copper conductors 10 AWG or less.

.3 Clamps or connectors for armoured cable, flexible conduit, as required to: CAN/CSA-C22.2 No.18.

3 EXECUTION

3.01 EXAMINATION

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

3.02 INSTALLATION

.1 Remove insulation carefully from ends of conductors and:
  .1 Install mechanical pressure type connectors and tighten screws. Installation shall meet secureness tests in accordance with CSA C22.2 No.65.
  .2 Install fixture type connectors and tighten to CSA C22.2 No.65. Replace insulating cap.
  .4 Install bushing stud connectors in accordance with EEMAC 1Y-2.

3.03 CLEANING

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

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21.
  .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

1 GENERAL

1.01 PRODUCT DATA

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

1.02 DELIVERY, STORAGE AND HANDLING

.1 Packaging Waste Management: remove and dispose in accordance with Section 01 74 21.

2 PRODUCTS

2.01 WIRING AND CABLES

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

.2 Insulation to be 600 volt RW90XLPE (X link) for the general building wiring in conduit.

.3 Use RWU90XLPE for underground installations.

.4 Site services sub-circuits to be minimum #10 AWG for power and #12 for controls. Increase wiring size for lengthy and/or loaded circuits so that system will not exceed the maximum voltage drop as recommended by the CEC CSA 22.1.

.5 All branch circuits to be conduit and copper insulated wiring unless otherwise noted on drawings. Provide ground wiring for all conduits. Increase conduit size as required.

.6 Conductors to be colour-coded. Conductors No.10 gauge and smaller shall have colour impregnated into insulation at time of manufacture. Conductors size No.8 gauge and larger may be colour-coded with adhesive colour coding tape, but only black insulated conductors shall be used in this case, except for neutrals which shall be white wherever possible. Where colour-coding tape is used, it shall be applied for a minimum of 50 mm at terminations, junctions and pullboxes and conduit fittings. Conductors not to be painted.

.7 Non-metallic sheathed wiring shall not be used.

2.02 ARMOURED CABLES

.1 Conductors: insulated copper, size per Clause 2.01.

.2 Type: ACL90 - lead sheath over cable assembly and under armour.

.3 Armour: interlocking type fabricated from galvanized steel.

.4 Type: ACWU90 compliant to applicable Building Code classification for this project.

.5 Connectors: anti short connectors.

2.06 LOW VOLTAGE CONTROL CABLES

.1 Type LVT: soft annealed copper conductors, with thermoplastic insulation, outer covering of thermoplastic jacket. Minimum size #18 AWG or as indicated.

.2 Unless otherwise specified wiring to be multicore individually identified and colour coded with grey sheath enclosed in conduit.

.3 Review equipment shop drawings and confirm type of control cabling with equipment supplier prior to cable order. Follow manufacturer's recommendations on all control cabling and wiring requirements.

3 EXECUTION

3.01 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 01.

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

.3 Perform tests before energizing electrical system.

3.02 GENERAL CABLE INSTALLATION

.1 Install all cables and wiring in conduit per Section 26 05 34 - Conduits, Conduit fastenings and Conduit fittings.

.2 Install underground ducts per 26 05 34 - Conduits, Conduit fastenings and Conduit fittings.

.3 Provide intrinsically safe conduit, wiring, sealing and bonding for hazardous areas in accordance with CEC section 18 and 20.

.4 All grounding conductors and straps to be copper. All bonding conductors to have green insulation jacket.

.5 Provide sleeves where cables enter or exit cast concrete or masonry.

.6 Power wiring up to and including No.6 gauge shall be spliced with nylon-insulated expandable spring-type connectors. Large conductors shall be spliced using split-bolt or other compression type connectors wrapped with cambric tape then PVC tape.

.7 Wires shall be sized for 2% maximum voltage drop to farthest outlet on a loaded circuit. Increase home run cable size to meet these requirements.

.8 Provide numbered wire collars for all control wiring. Numbers to correspond to control drawing legend shown on electrical schematic drawing.

.9 Except where otherwise directed, connect all motors with flexible conduits. Ground the conduit system with a separate grounding conductor installed in the flexible conduit.

3.03 INSTALLATION OF BUILDING WIRES

.1 Install wiring in conduit systems in accordance with Section 26 05 34.

3.04 INSTALLATION OF ARMOURED CABLES

.1 Group cables wherever possible on channels.

3.05 INSTALLATION OF CONTROL CABLES

.1 Install control cables in conduit in accordance with Section 26 05 34.

.2 Ground control cable shield.

3.06 WIRE AND BOX CONNECTORS

.1 Remove insulation carefully from ends of conductors and:

.1 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.

.2 Install fixture type connectors and tighten. Replace insulating cap.

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

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 26 05 01 - Common Work Results - Electrical Minor Works.

1.02 REFERENCES

.1 American National Standards Institute /Institute of Electrical and Electronics Engineers (ANSI/IEEE)
  .1 ANSI/IEEE 837-[2002], IEEE Standard for Qualifying Permanent Connections Used in Substation Grounding.

.2 Canada Green Building Council (CaGBC)
  .1 LEED Canada-NC-[2009], LEED (Leadership in Energy and Environmental Design): Green Building Rating Systemfor New Construction and Major Renovations 2009.
  .2 LEED Canada-CI Version 1.0-[2007], LEED (Leadership in Energy and Environmental Design): Green Building Rating System for Commercial Interiors.
  .3 LEED Canada-EB: O&M-[2009], LEED (Leadership in Energy and Environmental Design): Green Building Rating System for Existing Buildings: Operations and Maintenance 2009.

.3 CSA International
  .1 CSA Z32-[15], Electrical Safety and Essential Electrical Systems in Health Care Facilities.
  .2 CSA C22.2 No.41-M87 (R99) Grounding and Bonding Equipment

1.03 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:
  .1 Submit manufacturer's instructions, printed product literature and data sheets for grounding equipment and include product characteristics, performance criteria, physical size, finish and limitations.

1.04 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00.

.2 Operation and Maintenance Data: submit operation and maintenance data for grounding equipment for incorporation into manual.

1.05 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 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 in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect grounding equipment.
.3 Replace defective or damaged materials with new.

.4 Develop Waste Reduction Workplan related to Work of this Section.

.5 Packaging Waste Management: remove for disposal as specified in Waste Reduction Workplan in accordance with Section 01 74 21.

2 PRODUCTS

2.01 EQUIPMENT

.1 Clamps for grounding of conductor: size as required.

.2 Copper conductor: minimum 6 m long for each concrete encased electrode, bare, stranded, soft annealed, size as required.

.3 Rod electrodes (fuel tank pad): copper clad steel, 19 mm diameter by minimum 3 m long.

.5 Grounding conductors: bare stranded copper, soft annealed, size as indicated.

.7 Ground bus (fuel tank pad): copper, size as required, complete with insulated supports, fastenings, connectors.

.8 Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:
.1 Grounding and bonding bushings.
.2 Protective type clamps.
.3 Bolted type conductor connectors.
.4 Thermit welded type conductor connectors.
.5 Bonding jumpers, straps.
.6 Pressure wire connectors.

3 EXECUTION

3.01 EXAMINATION

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

3.02 INSTALLATION GENERAL

.1 Install complete permanent, continuous grounding system including, electrodes, conductors, connectors, accessories.

.2 Install connectors in accordance with manufacturer's instructions.

.3 Protect exposed grounding conductors from mechanical injury.

.4 Make buried connections using copper welding by thermit process or approved permanent mechanical connectors.

.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 Make grounding connections in radial configuration only, with connections terminating at single grounding point. Avoid loop connections.

3.03 ELECTRODES

.1 Install rod Electrodes and make grounding connections as requied.

.2 Bond separate, multiple electrodes together.

.3 Use size 3/0 AWG copper conductors for connections to electrodes.

3.04 EQUIPMENT GROUNDING

.1 Install grounding connections to typical equipment included in, but not necessarily limited to following list. Service equipment, transformers, frames of motors, motor control centres, starters, control panels, distribution panels.

.2 Ground wires to be installed in all conduit serving motor feeder circuits and to extend to ground screws on junction and outlet boxes for bonding.

3.11 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 01.

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

.3 Perform tests before energizing electrical system.

.4 Disconnect ground fault indicator during tests.

3.12 CLEANING

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

.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.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 26 05 01 - Common Work Results - Electrical Minor Works.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 11 01.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for hangers and supports and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 11 01 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 in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect hangers and supports.
.3 Replace defective or damaged materials with new.

.4 Develop Waste Reduction Workplan related to Work of this Section.

.5 Packaging Waste Management: remove and dispose as specified in Waste Reduction Workplan in accordance with Section 01 74 21.

PART 2 - PRODUCTS

2.1 SUPPORT CHANNELS

.1 U shape, size 41 x 41 mm, 2.5 mm thick, surface mounted.

PART 3 - EXECUTION

3.1 EXAMINATION

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

.1 Visually inspect substrate in presence of Departmental Representative.

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

.3 Proceed with installation only after unacceptable conditions have been remedied.

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

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

.2 Two-hole steel straps for conduits and cables larger than 50 mm.

.3 Beam clamps to secure conduit to exposed steel work.

.4 Suspended support systems.

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

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

.5 For surface mounting of two or more conduits use channels at 1.5 m on centre spacing.

.6 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.

.7 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

.8 Do not use wire lashing or perforated strap to support or secure raceways or cables.

.9 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of Departmental Representative.

.13 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

3.3 CLEANING

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

.3 Waste Management: separate waste materials for disposal in accordance with Section 01 11 01 and Section 01 74 21.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)
.1 CSA C22.1-[15], Canadian Electrical Code, Part 1, 21st Edition.

1.2 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

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

.3 Provide shop drawings: in accordance with Section 01 11 01 and 01 33 00.
.1 Provide drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal:
.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21.

PART 2 - PRODUCTS

2.2 JUNCTION AND PULL BOXES

.1 Construction: welded steel enclosure.

.2 Covers Flush Mounted: 25 mm minimum extension all around.

.3 Covers Surface Mounted: screw-on, turned edge covers.

.4 Intrinsically safe for installation in Class 1 Division 1 environment.

PART 3 - EXECUTION

3.2 JUNCTION AND PULL BOXES INSTALLATION

.1 Install pull boxes as shown on drawings and ensure pull boxes are accessible.

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

3.3 IDENTIFICATION

.1 Equipment Identification: to Section 26 05 01.

.2 Identification Labels: size 2 indicating system name.

END OF SECTION

1 GENERAL

1.01 REFERENCES

.1 Canadian Standards Association (CSA International)
- .1 CSA C22.2 NO. 18.1-13, Metallic Outlet Boxes.
- .2 CAN/CSA-C22.2 NO. 18.2-06(R2011), Nonmetallic Outlet Boxes.
- .3 CSA C22.2 No. 18.3-12, Conduit, Tubing, and Cable Fittings (Tri-National standard, with ANCE NMX-J-017 and UL 514B).
- .4 CAN/CSA-C22.2 No. 18.4-15, Hardwa1re for the Support of Conduit, Tubing, and Cable.
- .5 CSA C22.2 No. 45.1-07(R2012), Electrical Rigid Metal Conduit - Steel (Tri-National standard, with UL 6 and NMX-J-534-ANCE-2007).
- .6 CSA C22.2 No. 56-13, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit
- .7 CSA C22.2 No. 83-M1985(R2013), Electrical Metallic Tubing.
- .8 CSA C22.2 No. 211.2-06(R2011), Rigid PVC (Unplasticized) Conduit.
- .9 CAN/CSA-C22.2 No. 227.3-15, Mechanical protection tubing (MPT) and fittings (Bi-national standard, with UL 1696)

1.02 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

.2 Product data: submit manufacturer's printed product literature, specifications and datasheets.
- .1 Submit cable manufacturing data.

.3 Quality assurance submittals:
- .1 Test reports: submit certified test reports.
- .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .3 Instructions: submit manufacturer's installation instructions.

1.03 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21.

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

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

1.04 SCOPE

.1 Drawings do not show all conduits. Those shown are in diagrammatic form only.

.2 Provide new conduits for all power and control cabling. Coordinate conduit size and routing with equipment supplier/installers for their exact

equipment location on site.

.3 Conceal all conduits where possible in finished areas. Conduits may be surface mounted either only where indicated or in service areas accessible only to authorized personnel.

.4 If a finished area is concrete (existing) or concealment is not practical, obtain ruling from the Departmental Representative where exposed wire mold may be substituted.

.5 Note particular requirements for routing of conduits where detailed.

2 PRODUCTS

2.01 CONDUITS

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

.2 Rigid pvc conduit: to CSA C22.2 No. 211.2.

2.02 CONDUIT FASTENINGS

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

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

.3 Channel type supports for two or more conduits.

.4 Threaded rods, 10 mm diameter, to support suspended channels.

2.03 CONDUIT FITTINGS

.1 Fittings manufactured for use with conduit specified. Coating: same as conduit.

.2 Ensure factory "ells" where 90 degree bends are required for 25mm and larger conduits.

2.04 EXPANSION FITTINGS FOR RIGID CONDUIT

.1 Weatherproof expansion fittings with internal bonding assembly suitable for 200 mm linear expansion.

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

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

2.05 FISH CORD

.1 Provide polypropylene cord for all empty conduit.

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 datasheets.

3.02 INSTALLATION

.1 Use rigid galvanized steel (RGS) threaded conduit inside buildings.

.2 Use rigid PVC conduit outside buildings and underground.

.3 Use explosion proof flexible connection for connection to explosion proof motors.

.4 Install conduit sealing fittings in hazardous areas.
.1 Fill with compound.

.5 Minimum conduit size for power circuits: NPS 3/4.

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

.7 Mechanically bend steel conduit over 19 mm diameter.

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

.9 Install fish cord in empty conduits.

.10 Remove and replace blocked conduit sections.
.1 Do not use liquids to clean out conduits.

.11 Dry conduits out before installing wire.

3.03 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines or concrete pad lines.

.2 Group conduits wherever possible on suspended and/or surface channels.

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

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

3.04 CONCEALED CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Do not install horizontal runs in masonry walls.

.3 Do not install conduits in terrazzo or concrete toppings.

3.05 CONDUITS IN CAST-IN-PLACE CONCRETE

.1 Locate to suit reinforcing steel.
  .1 Install in centre one third of slab.

.2 Protect conduits from damage where they stub out of concrete.

.3 Install sleeves where conduits pass through slab or wall.

.4 Conduits in slabs: minimum slab thickness 4 times conduit diameter.

.5 Encase conduits completely in concrete with minimum 25 mm concrete cover.

.6 Organize conduits in slab to minimize cross-overs.

3.06 CONDUITS UNDERGROUND

.1 Slope conduits to provide drainage.

.2 Waterproof joints (pvc excepted) with heavy coat of bituminous paint.

3.08 CLEANING

.1 Proceed in accordance with Section 01 74 11.

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

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 CSA International (CSA)
.1 CSA C22.2 No. 5-[09], Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, and NMX-J-266-ANCE-2010).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for circuit breakers and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 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 circuit breakers indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect circuit breakers.
.3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 BREAKERS GENERAL

.1 Circuit breakers to CSA C22.2 No. 5

.2 Bolt-on moulded case circuit breaker: quick- make, quick-break type, for manual and automatic operation [with temperature compensation for 40 degrees C ambient].

.3 Plug-in moulded case circuit breakers: quick- make, quick-break type, for manual and automatic operation with temperature compensation for 40 degrees C ambient.

.4 Common-trip breakers: with single handle for multi-pole applications.

.5 Circuit breakers to match symmetrical rms interrupting capacity rating of existing distribution panels.

2.6 OPTIONAL FEATURES

.1 Include:
.1 On-off locking device.

2.7 ENCLOSURE

.1 Existing 120/208 VAC distribution panels.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

.1 Install circuit breakers as indicated.

3.3 CLEANING

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

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

in accordance with Section 01 74 20.

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

END OF SECTION

1 GENERAL

1.01 WORK INCLUDED

.1 Excavation and backfilling for electrical work and concrete grade-level slab preparation is included in this Section. This work to be laid out and supervised by trade concerned.

1.02 REFERENCES

.1 ASTM International
- .1 ASTM A653/A653M-15, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 ASTM D698-12e2, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ftü) (600kN-m/mü).
- .3 ASTM D751-06(2011), Standard Test Methods for Coated Fabrics.

.2 Canada Green Building Council (CaGBC)
- .1 LEED Canada For New Construction and Major Renovations 2009.
- .2 LEED Canada For Core and Shell 2009.

.3 CSA International
- .1 CSA A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
- .2 CAN/CSA-A3000-13, Cementitious Materials Compendium.

.4 Ministère des Transports du Québec
- .1 CCDG 14.02, Cahier des charges et devis généraux.

.5 Ontario Provincial Standard Specifications (OPSS)/Ontario Ministry of Transportation
- .1 OPSS 401 November 2013 (formerly 514), Ontario Provincial Standard Specification, Construction Specification for Trenching, Backfilling, and Compacting.
- .2 OPSS.PROV 1004 November 2012, Ontario Provincial Standard Specification, Material Specification for Aggregates - Miscellaneous.
- .3 OPSS.PROV 1010 April 2013, Ontario Provincial Standard Specification, Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Material.

.6 U.S. Environmental Protection Agency (EPA)/Office of Water
- .1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.
- .2 EPA 833-R-06-004, May 2007, Developing Your Stormwater Pollution Prevention Plan - A Guide for Construction Sites.

1.03 ADMINISTRATIVE REQUIREMENTS

.1 Co-ordination: arrange with authority having jurisdiction for relocation of buried services that interfere with execution of work.
- .1 Pay costs of relocating services.

.2 Before commencing work establish location of buried services on and adjacent to site.
.3 Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.
.4 Remove obsolete buried services within 2 m of foundations: cap cut-offs.

1.04 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Site Quality Control Submittals: submit in accordance with Section [01 45 00].
.1 Submit condition survey of existing conditions as described in EXISTING CONDITIONS article.
.2 Submit testing results as described in PART 3 – FIELD QUALITY CONTROL.

2 PRODUCTS

2.01 MATERIALS

.1 Granular A to OPSS.PROV 1010.
.1 Granular A, maximum size [13.2] [19.0] mm.

.2 Sand: clean, washed, minimum 100% passing 4.75 mm sieve, maximum 5% passing 0.075 mm sieve to OPSS.PROV 1004.05.07.

.3 Drainage material: 19 mm crushed stone or 19 to 63 mm clean gravel to OPSS.PROV 1004.05.02.

.4 Unshrinkable fill: proportioned and mixed to provide:
.1 Maximum compressive strength of [0.4] MPa at 28 days.
.2 Maximum Portland cement content of [25] kg/mü.
.3 Minimum strength of [0.07] MPa at 24 hours.
.4 Concrete aggregates: to CSA A23.1/A23.2.
.5 Cement: to CAN/CSA-A3000, Type [GU].
.6 Slump: [160 to 200] mm.

3 EXECUTION

3.01 EXAMINATION

.1 Evaluation and Assessment:
.1 Before commencing work, establish locations of buried services on and adjacent to site.

3.02 PREPARATION

.1 Temporary erosion and sedimentation control:
.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to

requirements of authorities having jurisdiction.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

.2 Protection of in-place conditions:

.1 Protect excavations from freezing.

.2 Keep excavations clean, free of standing water, and loose soil.

.3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Departmental Representative's approval.

.4 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.

.5 Protect buried services that are required to remain undisturbed.

.3 Removal:

.1 Remove trees, stumps, logs, brush, shrubs, bushes, vines, undergrowth, rotten wood, dead plant material, exposed boulders and debris within areas designated on drawings.

.2 Remove stumps and tree roots below footings, slabs, and paving, and to 600 mm below finished grade elsewhere.

.3 Remove obsolete buried services within 2 m of foundations: cap cut-offs.

3.03 EXCAVATION

.1 Shore and brace excavations, protect slopes and banks and perform work in accordance with Provincial and Municipal regulations whichever is more stringent.

.2 Blasting is prohibited.

.3 Strip asphalt, topsoil, and/or gravel over areas to be covered by new construction, over areas where grade changes are required, and so that excavated material may be stockpiled without covering topsoil.

.4 Excavate as required to carry out work.

.1 Do not disturb soil or rock below bearing surfaces.

.2 Notify Departmental Representative when excavations are complete.

.3 If bearings are unsatisfactory, additional excavation will be authorized in writing and paid for as additional work.

.4 Excavation taken below depths shown without Departmental Representative's written authorization to be filled with concrete of same strength as for footings at Contractor's expense.

.5 Excavate trenches to provide uniform continuous bearing and support for 150 mm thickness of pipe bedding material on solid and undisturbed ground.

.1 Trench widths below point 150 mm above pipe not to exceed diameter of pipe plus 600 mm.

.6 Excavate for slabs and paving to subgrade levels.

.1 In addition, remove all topsoil, organic matter, debris and other loose and harmful matter encountered at subgrade level.

3.04 FIELD QUALITY CONTROL

.1 Testing of materials and compaction of backfill will be carried out by testing laboratory designated by Departmental Representative.

.2 Not later than [1] week minimum before backfilling or filling, submit to Departmental Representative the source(s) of all aggregate materials to be placed on the Site.

.3 Do not begin backfilling or filling operations until material has been approved for use by Departmental Representative.

.4 Not later than 48 hours before backfilling or filling with approved material, notify Departmental Representative to allow compaction tests to be carried out by designated testing agency.

3.05 BACKFILLING

.1 Inspection: do not commence backfilling until fill material and spaces to be filled have been inspected and approved by Departmental Representative.

.2 Remove snow, ice, construction debris, organic soil and standing water from spaces to be filled.

.3 Lateral support: maintain even levels of backfill around structures as work progresses, to equalize earth pressures. Backfill simultaneously each side of walls and other structures greater than 1.3 m deep to equalize soil pressures.

.4 Compaction of subgrade: compact existing subgrade under walks, paving, and slabs on grade, to same compaction as fill.
.1 Fill excavated areas with Granular A compacted as specified for fill.

.5 Placing:
.1 Place backfill in 150 mm lifts: add water as required to achieve specified density.

.6 Compaction: compact each layer of material to minimum 100% SPDD per ASTM D698

.7 Place 250 mm compacted thickness of Granular A sub-base material below asphalt paving.

.8 Place 150 mm compacted thickness of Granular A material below replacement concrete walks.

.9 Place 150 mm sand bed in trench to support services through their length. Following approval of conduit installation handfill with sand to 300 mm compacted thickness over condiot. Backfill remainder of trench with Granular A.

.10 Restore surface of excavation with material and finish to match existing adjoining surfaces.

3.06 GRADING

.1 Grade so that water will drain away from buildings, walls and paved areas, to catch basins and other disposal areas approved by Departmental Representative.
  .1 Grade to be gradual between finished spot elevations shown on drawings.

.2 Strip topsoil over areas to be covered by new construction, and so that excavated material may be stockpiled without covering topsoil.

.3 Fill and grade site to achieve elevations indicated.

.4 Place Granular A material in 300 mm lifts.

.5 Compact to minimum 100% Standard Proctor Dry Density.

.6 Grade to a uniform slope with a tolerance of 1:120.

3.07 SHORTAGE AND SURPLUS

.1 Supply necessary fill to meet backfilling and grading requirements and with minimum and maximum rough grade variance.

.2 Dispose of surplus material off site.

3.08 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11.
  .1 Leave Work area clean at end of each day.
  .2 Dispose of cleared and grubbed material off site daily.

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

.3 Waste Management: separate waste materials for reuse, recycling and organics in accordance with Section 01 74 21.

END OF SECTION

1 GENERAL

1.01 RELATED

.1 Section 01 10 00 – Summary of Work.

.2 Section 01 11 01 – General Instructions – Minor Works.

.3 Section 01 35 29 – Health and Safety Requirements

.4 Section 01 56 00 – Temporary Barriers and Enclosures

.5 Section 02 41 13 – Asphalt Paving Removal

.6 Section 03 30 00.01 – Cast-in-Place Concrete – Short Form

.7 Section 31 00 00.01 –0 Earthwork – Short Form

1.02 PROTECTION

.1 Protect buildings, landscaping, roads, driveways, sidewalks, trees and shrubs on site and adjacent property that may be damaged by paving machinery, equipment or personnel. Make good property damaged due to paving operations.

.2 Take necessary precautions to protect workers and public from hazards of paving operations.

.3 Keep vehicular traffic off newly paved areas until paving properly cured.
- .1 Supply and place temporary traffic cones (TC-51A or TC-51B per Ontario Traffic Manual “Book 7” (Temporary Conditions), January 2014) prior to beginning work.
- .2 Space temporary traffic cones as required to prevent access to the work area by vehicular traffic, or as directed by the Departmental Representative.

.4 Provide access to buildings at all times. Maintain emergency vehicle access to building at all times. Arrange paving schedule to minimize interference with normal use of premises.

2 PRODUCTS

2.01 MATERIALS

.1 Asphalt base course: to Ontario Provincial Standard Specification OPSS 1150, November 2010 for type HL 8. Maximum size aggregate 19mm.

.2 Asphalt surface course: to Ontario Provincial Standard Specification OPSS 1150, November 2010 for type HL 3. Maximum size aggregate 13.2mm.

.3 Primer: emulsified asphalt to Ontario Provincial Standard Specification OPSS 1103, November 2007 for rapid setting type.

.4 Granular base: to Ontario Provincial Standard Specification OPSS 1010, April

2004 for Granular A. Maximum size 19.0mm.

.5 Granular sub-base: to Ontario Provincial Standard Specification OPSS 1010, April 2004 for Granular B. Maximum size 26.5mm.

3 EXECUTION

3.01 TIMING

.1 Work in this Section shall not commence until the Spring of 2017, or as directed by the Departmental Representative.

.2 Obtain written approval from Departmental Representative prior to executing the work in this Section.

3.02 CLEANING

.1 Remove dust, contaminants, loose and foreign materials, oil and grease in designated areas.

.2 Use rotary power brooms supplemented by hand-brooming as required.

.3 Where directed, remove to existing pavement level, sealing compound which has protruded excessively and dispose of removed material as directed.

.4 Keep drainage system clear of loose and waste materials.

3.03 GRANULAR BASE PREPARATION

.1 Excavate or backfill as required to provide for the specified replacement asphalt thickness (base course thickness plus surface course thickness) matched to the existing asphalt elevation.

.1 Where settling of excavation backfill material has occurred to a depth beyond the specified replacement asphalt thickness, backfill with Granular A and compact to 100% SPDD.

.2 Where settling of excavation has not occurred, or has not occurred to a depth beyond the specified replacement asphalt thickness, excavate, remove and dispose of excess backfill as required to place specified thickness of replacement asphalt while maintaining 100% SPDD compaction.

.2 Make excavation to clean lines to minimize quantity of fill material required.

.3 Earth bottoms of excavations to be dry undisturbed soil, reasonably level, free from loose or organic matter.

.4 Grade base to match existing asphalt cut with upper surface of new concrete fueling apron.

3.04 INSPECTION

.1 Check graded subgrade for conformity with elevations and cross-sections before placing granular sub-base and granular base material.

.2 Proof-roll subgrade sub-base and base surface with mass and type of roller approved by Departmental Representative.
.1 Check for unstable areas.
.2 Check for areas requiring additional compaction.

.3 Notify Departmental Representative of unsatisfactory conditions.

.4 Do not begin paving work until such conditions have been corrected and are ready to receive paving.

.5 When complete, have Departmental Representative inspect excavations to verify soil bearing capacity, depths and dimensions.

.6 Correct unauthorized excavations at no extra cost by filling with Granular A material and compacting per Section 32 12 17.

3.05 GRANULAR SUB-BASE AND GRANULAR BASE

.1 Place 300mm compacted thickness of granular sub-base over backfilled excavations.

.2 Place 150mm compacted thickness of granular base.

.3 Place in layers not exceeding 150 mm compacted thickness. Compact each layer to 100 % Standard Proctor Dry Density.

3.06 ASPHALT COURSE

.1 Apply primer at approximately 0.5 L/m^2.

.2 Place 50mm of compacted asphaltic concrete base course.

.3 Place 50mm of compacted asphaltic concrete surface course.

.4 Minimum 7°C air temperature when placing mixture.

.5 Minimum 118°C mixture temperature when spread.

.6 Maximum 149°C mixture temperature at any time.

.7 Compact each course with roller when it can support roller mass without undue cracking or displacement.

.8 Roller, power driven, minimum mass 9 tonnes, minimum wheel width 600 mm.

.9 Roll until roller marks are eliminated. Compact to 96 % laboratory density.

.10 Keep roller speed slow enough to avoid mixture displacement.

.11 Moisten roller wheels to prevent mixture adhesion.

.12 Compact mixture with hot tampers in areas inaccessible to roller.

.13 Finish surface true to grade and free from deviations exceeding 1:1000 when measured in any direction with a 3 m straight edge.

3.07 JOINTS

.1 Cut back bituminous course to full depth in straight or curved lines as required to expose fresh vertical surfaces. Remove any broken or loose material.

.2 Dispose cut, broke, and loose asphalt per Section 02 65 00.

.2 Paint exposed edge of asphaltic joints, edges of manholes and catch basin frames, curbs and similar items with asphalt primer prior to placing asphalt courses.

.3 Where paving comprises two courses overlap longitudinal joints not less than 600 mm.

.4 Carefully place and compact hot asphaltic material against joints.

3.08 PAVEMENT MARKING

.1 Do not mark pavement.

END OF SECTION

1 GENERAL

1.01 REFERENCES

.1 The Master Painters Institute (MPI)

.2 Maintenance Repainting Manual, 2012 edition.

.3 Architectural Painting Specification Manual, 2012 edition.

1.02 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Shop Drawings:
  .1 Submit shop drawings for spill kit and spill kit contents.

1.03 CLOSEOUT SUBMITTALS

.1 Submit spill kit material specifications for incorporation into manual specified in Section 01 78 00.

1.04 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 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 in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  .2 Store and protect from nicks, scratches, and blemishes.
  .3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove and dispose in accordance with Section 01 74 21.

2 PRODUCTS

2.01 PROTECTIVE BOLLARDS

.1 Schedule 40 hollow steel structural tubing.
  .1 Outer diameter: as shown on drawings.
  .2 Height: as shown on drawings.

.3 Number required: as shown on drawings.

.2 35 MPa concrete to Section 03 30 00.01.

.3 Pre-molded paper tube concrete form:
.1 Diameter: 508 mm.
.2 Height: 300 mm.

.4 Surface finish for structural tubing:
.1 Conform to latest MPI requirements for painting work including preparation and priming.
.2 Colour: yellow epoxy enamel exterior paint.

2.02 SIGNS, LABELS AND TAGS

.1 Acceptable Material for Signs:
.1 As shown on drawings unless specified in this paragraph.

.2 Typeface and font
.1 Typeface: Sans serif.
.2 Font (letter size):
.1 As shown on drawings.
.2 Where letter size is not indicated on drawings, maintain proportion between letter size and sign size as shown on drawings.

.3 Emergency stop device sign:
.1 Minimum dimensions: as shown on drawings.
.2 Sign background colour: white.
.3 Lettering colour: red.
.4 Sign messages to read:
.1 English: As shown on drawings
.2 French: As shown on drawings
.5 Number required: 2 per site (6 total).

.4 Warning sign on tank spill container lid.
.1 Minimum dimensions: as shown on drawings.
.2 Sign background colour: white
.3 Lettering colour: red
.4 Number required: 1 per tank per site (6 total).

.5 Tank fill pipe tags
.1 Material: aluminum or plastic.
.2 Size, background colour, lettering colour: per CPPI colour system.
.3 Number required: 1 per tank per site (6 total).

.6 Fuel pump signage
.1 Size and text : as shown on drawings.

.2 Number required: 1 per pump per site (3 total).

.7 Safety signage
- .1 Size and text : as shown on drawings.
- .2 Two (2) safety signs mounted on common post as shown on drawings.
- .3 Number required: 2 safety signs mounted on common post per site.

.8 TSSA Marina Signage
- .1 Size and text: as shown on drawings.
- .2 Two (2) safety signs mounted on common post as shown on drawings.
- .3 Number required: 2 safety signs mounted on common post for Georgian Bay Islands National Park site and for Bruce Peninsula National Park – Marine Base Operations site.

.9 Product Transfer Area Signage
- .1 Size and text: as shown on drawings.
- .2 Two (2) safety signs mounted on common post as shown on drawings.
- .3 Number required: 2 safety signs mounted on common post per site.

.10 Containment Valve Signage
- .1 Size and text: as shown on drawings.
- .2 Number required: 1 per site (3 total).

2.03 SIGN POST

.1 Does not apply to Product Transfer Area signs or Containment Valve signs (see Drawings for Product Transfer Area sign post detail and Containment Valve sign post detail).

.2 Acceptable Material: 12 gauge galvanized steel U-shaped channel.
- .1 Height: 2300 mm

.3 Sign post hardware:
- .1 Sign mounting:
  - .1 26 mm x 77 mm thread x 7.9 mm diameter corner bolt.
  - .2 7.9 mm self locking nut.
- .2 Anchor:
  - .1 40 mm x 30 mm thread x 7.9 mm diameter corner bolt.
  - .2 7.9 mm self locking nut.

2.04 SPILL KIT

.1 Empty, weather-tight, polypropylene spill cart with removable castors for outdoor use:
- .1 Volume: 416 L (110 imperial gallons).
- .2 Number required: 1 per site (3 total).

.2 Supply and place into each spill kit:
- .1 150 Petroleum Absorbent Pads (Oil, Gas & Diesel)
- .2 50 Universal Absorbent Pads (Antifreeze)
- .3 6 3” x 4’ Absorbent Socks (Oil, Gas & Diesel)
- .4 4 3” x 8’ Absorbent Socks (Oil, Gas & Diesel)
- .5 2 Sections of 5" x 10' Linkable Absorbent Boom
- .6 2 18" x 18" Oil Absorbent Pillows
- .7 1 36” x 36” Neoprene Drain Cover
- .8 10 HD Hazmat Disposal Bags
- .9 2 Pairs of heavy-duty nitrile gloves

3 EXECUTION

3.01 EXAMINATION AND SEQUENCING

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

.2 Sequence Work in accordance with Section 02 41 99.

3.02 PREPARATION

.1 Locate and protect utility lines.

.2 Notify and acquire written acknowledgment from utility authorities before beginning work involving excavations.

3.03 INSTALLATION

.1 Install protective bollards as shown on the drawings.

.2 Install sign posts, signs, tags and labels as shown on the drawings.

.3 Place spill containment kit in fuel pad near fuel dispenser.

.5 Touch-up damaged finishes to approval of Departmental Representative.

3.04 CLEANING

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

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21.

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

3.05 PROTECTION

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

.2 Repair damage to adjacent materials caused by site furnishings installation.

END OF SECTION

1 GENERAL

1.01 SECTION INCLUDES

.1 Materials and installation for aboveground liquid petroleum storage tanks.

1.02 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures.

.2 Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

.3 Section 01 78 00 – Closeout Submittals.

.4 Section 23 11 13 – Facility Liquid Fuel Piping.

.5 Section 26 05 00 – Electrical Common Work Results.

1.03 REFERENCES

.1 Canadian Council of Ministers of the Environment (CCME).

.1 CCME-PN1326-2003, Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products.

.2 Department of Justice Canada (Jus).

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

.1 SOR/2008-197 – Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations, June 12, 2008, last amended May 4, 2012.

.3 National Research Council Canada/Institute for Research in Construction.

.1 NRCC 47667, National Fire Code of Canada, 2010.

.4 Transport Canada (TC).

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

.5 Underwriters' Laboratories of Canada (ULC).

.1 ULC/ORD-C107.21-1992, Under Dispenser Sumps.

.2 ULC-S601-2014, Aboveground Horizontal Shop Fabricated Steel Tanks.

1.04 SUBMITTALS

.1 Submit shop drawings in accordance with Section 01 33 00.

.2 Indicate details of construction, appurtenances, installation and leakage detection system.

.3 Shop drawings to detail and indicate following as applicable to project requirements. Submit manufacturers product data to supplement shop drawings.
- .1 Size, materials and locations of tank fill access stairs.
- .2 Tanks capacity.
- .3 Size and location of fittings.
- .4 Environmental compliance package accessories.
- .5 Decals, type size and location.
- .6 Accessories: provide details and manufacturers product data.
- .7 Size, material and location of manholes.
- .8 Finishes.
- .9 Electronic accessories: provide details and manufacturers product data.
- .10 Piping, values and fittings: type, materials, sizes, piping connection details, valve shut-off type and location.
- .14 Spill containment: provide description of fill method and show sizes, materials and locations for collecting spills at connection point between storage tank system and delivery truck.
- .15 Anchors: description, material, size and locations.
- .16 Concrete: type, composition and strength.
- .17 Size and location of site pads.
- .18 Level gauging: type and locations, include:
  - .1 Reporting systems, types of reports and report frequency.
  - .2 Maximum number of tanks to be monitored.
  - .3 Number of probes required and sizes.
  - .4 Provide details and manufacturer's product data.
- .19 Ancillary devices: provide details and manufacturer's product data.
- .20 Leak detection system, type and locations, and alarm system.
- .21 Grounding and bonding: provide details of design, type, materials and locations.
- .22 Corrosion protection: provide details of design, type, materials and locations.
- .23 Containment system for spills, overfills and storm runoff water: provide details, materials used, and locations.

.4 Provide maintenance data for tank appurtenances and leakage detection system for incorporation into manual specified in Section 01 78 00.

1.05 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21.

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

.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, and packaging material for recycling.

.4 Separate for reuse and recycling and place in designated containers Steel, Metal and Plastic waste.

.5 Place materials defined as hazardous or toxic in designated containers.

.6 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA,

Regional and Municipal regulations.

.7 Clearly label location of salvaged material's storage areas and provide barriers and security devices.

.8 Ensure emptied containers are sealed and stored safely.

.9 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.

.10 Divert unused concrete materials from landfill to local facility as approved by Departmental Representative.

.11 Dispose of unused paint or coating material at an official hazardous material collections site as approved by Departmental Representative.

.12 Do not dispose unused paint material into onsite sewage treatment system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.

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

2 PRODUCTS

2.01 TANKS: CONVENTIONAL STEEL

.1 Install two (2) new double walled steel storage tanks at each site with capacities not less than the following:

.1 Georgian Bay Islands National Park of Canada, 2611 Muskoka Road 5, Honey Harbour, Ontario: one (1) 10,000 litre gasoline tank and one (1) 4,500 litre diesel tank,

.2 Bruce Peninsula National Park of Canada, Cyprus Lake Maintenance Yard, 469 Cyprus Lake Road near Tobermory, Ontario: one (1) 4,500 litre gasoline tank and one (1) 4,500 litre diesel tank,

.3 Bruce Peninsula National Park of Canada, Marine Operations Base/Rescue Station, 248 Big Tub Road, near Tobermory, Ontario: one (1) 4,500 litre gasoline tank and one (1) 4,500 litre diesel tank.

.2 Specifications common to all tanks:

.1 Double walled, horizontal, vacuum monitored (gauge and switch assembly) steel storage tank.

.2 Meets CAN/ULC-S601 standard, latest edition.

.3 External coat of oxide primer and top coat white paint as per manufacturer’s instructions.

.4 Tanks must fit within the footprint of the concrete fuel tank pad area shown in the appended drawings.

.4 Tank openings: minimum nine (9) and minimum two (2) 100mm spares. Sizes as required by tank manufacturer and indicated on design drawings.

.5 Staircase and platform landing assembly: to come equipped with tank from tank manufacturer. Stairs to be installed on tank end farthest from fueling area. Handrails/guardrails are required around entire assembly. Steps and platform shall be of galvanized steel construction with non-slip tread.

.6 Tank supports: skid-type or saddle-type (minimum 2). To come equipped with tank by tank manufacturer and be welded to the tank shell.

.7 Venting:

.1 Size: in accordance with tank manufacturer's recommendations and CAN/ULC-S601 requirements.

.2 Normal vent pipe shall be equipped with weather-proof and insect-proof aluminum updraft vent. Brass 40 mesh screen.

.3 Normal vent: minimum 3m above grade and minimum 1m above top of tank. Minimum 1.5m from any building opening.

.4 Emergency vent: extended a minimum of 150mm above top of spill containment lid of tank. Minimum 1.5m from any building opening.

.8 Finishes: as per manufacturer's instructions.

.9 Storage tanks to come equipped with grounding lugs.

.10 Storage tanks to come equipped with lifting lugs.

.11 Labels:

.1 All labels shall be bilingual and UV-resistant.

.2 Spill container lid to be equipped with label "WARNING: TANK TO BE TIGHT-FILLED ONLY". Lettering minimum 25mm in height, black on white background.

.3 Tank contents, capacity, and Environment Canada Registration Number on each tank. Lettering minimum 100mm in height, to be black on white background. To be posted on all 4 sides of each tank:

.1 "DIESEL - {capacity}L", "EC-########" (TBD upon tank registration).

.2 "GASOLINE - {capacity}L", "EC-########" (TBD upon tank registration).

2.02 ANCHORAGE

.1 Storage tanks to be anchored to new cast-in-place concrete pads with expansion-type bolts and be seismically restrained as recommended by the tank manufacturer in accordance with Ontario requirements.

2.03 PIPING, VALVES AND FITTINGS

.1 In accordance with Section 23 11 13.

.2 Fuel piping shall be ASTM A312, Type 304L welded stainless steel unless otherwise indicated. All fuel piping shall be installed above ground

.3 Fittings to be socket welded #150 unless otherwise indicated. Some joints to be threaded to facilitate future maintenance as indicated. Refer to design drawings for details.

.4 Buried fuel piping is not permitted.

.5 Suction piping to be equipped with a manual shut-off valve and normally-closed electrically-actuated solenoid valve complete with pressure-relief at each storage tank.

.6 Provide means for collecting spills at connection point between storage tank system and delivery truck.

2.04 INSTRUMENTATION AND CONTROL WIRING/CABLING

.1 Provide and install all control wiring/cabling for the instrumentation required under the Work, which includes but may not be limited to: the tank monitoring console, overfill alarm, and related design equipment. Install instrumentation and control wiring as per the manufacturer’s instructions.

2.05 LEVEL GAUGING

.1 Install UL-listed, powder-coated die cast-aluminum body mechanical liquid level gauge device for petroleum products on each fuel storage tank, complete with:

.1 Swivel adaptor base for rotation of gauge face.

.2 Angled face for display for improved visibility at ground level.

.3 Drop tube.

.4 Numerical display, measured in centimeters of liquid.

.5 Float: 304 stainless steel construction.

.6 Temperature rating: -40°C to 49°C.

.2 Tank gauging dip stick: to manufacturer's standard. Two (2) dipsticks shall be provided by tank manufacturers along with tank gauge charts. Container for dip stick shall be included and strapped to tank support saddles/skid frame.

.3 Tank level gauging, inventory and monitoring requirements as per “Fuel Storage Tank Monitoring System” article.

2.06 LEAKAGE DETECTION SYSTEM

.1 Tank interstice to be monitored using a tank-mounted vacuum gauge and vacuum switch combination. Vacuum switch to be monitored using new fuel tank system monitoring console. Vacuum switch must be compatible with new fuel tank system monitoring console.

.2 All fuel dispensers shall be equipped with leak detection in the form of a petroleum product and water discriminating leak sensor located in the dispenser sumps. Sensors shall be interlocked such that the dispensers will not operate upon detection of fuel product or high liquid.

.3 Each tank shall be equipped with continuous level monitoring using a magnetostrictive probe complete with water detection, compatible with new tank monitoring console.

2.07 GROUNDING AND BONDING

.1 Aboveground fuel storage tanks shall be grounded and bonded in accordance with Division 26.

2.08 CORROSION PROTECTION

.1 Steel storage tank systems.

.1 Tanks to arrive on-site primed and painted white by the tank manufacturer. Contractor responsible for repainting damaged/scratched areas as a result of the tank installation. Contractor to use touch up paint provided by the tank manufacturer only.

2.09 OVERFILL AND SPILL CONTAINMENT

.1 Shop-fabricated AST overfill protection.

.1 Spill container shall come equipped with the new storage tanks from the tank manufacturer. Spill container shall be equipped with drain valve, lockable lid, and minimum 50L capacity. If external spill container is installed, container shall meet CAN/ULC-S663 standard.

.2 Install ULC-approved overfill protection device compatible with intended method of filling designed, built and certified to CAN/ULC-S661 with positive shut-off action.

.2 Install fuel storage tank monitoring system as per section 2.10.

.3 Install remote tank electronic overfill alarm as per section 2.11.

.4 Contractor to provide a new spill kit for petroleum product-type spills up to 1,000L that includes, but is not limited to, the following materials:

.1 Absorbent pads.
.2 Absorbent booms.
.3 Absorbent socks.
.4 Rubber drain covers (two minimum).
.5 Waste disposable bags.

.6 Safety goggles.

.7 Nitrile gloves.

2.10 FUEL STORAGE TANK MONITORING SYSTEM

.1 For each of the three (3) Parks Canada sites, supply and install one (1) Tank Monitoring System/Console. Electronic solid state combination tank level sensor and leak detector. Electronic monitoring console with visual LED touchscreen display complete with printer. Algorithms to automatically compute required operations. System to be programmable for:

.1 Inventory reporting with following features:

.1 Litres of fuel remaining.

.2 Temperature of fuel.

.3 Millimeters of water in bottom of tank.

.4 Millimeters of fuel in tank.

.2 Fuel delivery report.

.3 Multiple tank installation, interstitial space leak detection.

.4 Visual and audible alarm: main monitoring console inside building closest to refueling area to monitor for (in units of litres and height in millimeters):

.1 Low liquid level.

.2 High bottom water level.

.3 Theft.

.4 Leaks.

.5 High liquid Level (overfill protection).

.5 Probe diagnostics.

.6 Leak tests.

.7 Probes and sensors for each tank:

.1 Inventory measurement probe, factory calibrated, installed in each storage tank. Probe length to suit diameter of each tank.

.8 Ancillary devices:

.1 Security key-lock system to select normal operation, setup to enter or change system and tank parameters or operation, or diagnostics to check systems hardware and software.

.9 Install console at location determined by the Departmental Representative.

.10 To tie-in with ancillary devices:

.1 Remote fuel storage tank remote electronic overfill alarm.

.2 Sump liquid sensors.

.3 ARI Fleet Card System.

2.11 FUEL STORAGE TANK OVEFILL ALARM

.1 Install one remote electronic overfill alarm for both pairs of tanks at each of the three Parks Canada sites. Alarm panel and all operator devices to be NEMA 4/12, ULC-listed, certified to CAN/CSA C22.2 No. 205 and confirm to ANSI/UL standard 464. Include the following:

.1 Provide overfill protection for all tanks. Alarm panel to accept two switch contact inputs to distinguish a high alarm between each tank.

.2 Provide both visual and audible alarm.

.3 Equipped with the following pilot lights:

.1 Power ON

.2 Tank #1 (Gasoline) Overfill

.3 Tank #2 (Diesel) Overfill

.4 Equipped with the following push buttons:

.1 Mute – depressing the button will mute the audible alarm, however the pilot light for the respective tank(s) overfilled will remain illuminated.

.2 Test – depressing the button will test the audible alarm.

.5 Trigger the audible alarm when the liquid level in either onsite storage tank reaches 90% of its maximum storage capacity. Depressing the Mute button will halt the alarm; however, the pilot light for the overfilled tank shall remain illuminated until the tank level has dropped below the alarm trigger setpoint.

.6 For each of the three Parks Canada sites, mount between the two fuel storage tanks on support system and facing the fuel delivery connection such that it is clearly visible to fuel delivery personnel for both tanks.

2.12 FUEL MANAGEMENT SYSTEM ("CARDLOCK")

.1 For each of the three (3) Parks Canada sites, supply and install one (1) Fuel management system consisting of:

.1 Freestanding, weather and flame-resistant box for outdoor use, class 1 Div.2, and CSA approved.
.2 Keypad.
.3 Operating voltage: 12V DC.
.4 Maximum current at pump relay outlet: 10 amps.
.5 Modem frequency: 433.92 MHz.
.6 Automatic authorization of refueling through:
.1 Numeric key pad.
.2 Magnetic strip card.
.3 Smart chip card.
.4 Number of magnetic/smart cards: seventy-five (75).
.7 System logging for, but not limited to:
.1 Date/time.
.2 Operator/vehicle identification number.
.3 Vehicle odometer kilometers and hours.
.4 Fuel type, pump number and description.

.5 Dispensed volume of each transaction.

.8 Hardware to consist of:

.1 Pump control unit for each fuel pump.

.2 Hose control unit (nozzle antenna) on each fuel nozzle.

.3 Vehicle identification unit for each authorized vehicle.

.4 Wi-Fi receiving and transmitting antenna.

.5 Number of vehicle identification units: seventy-five (75).

2.13 PRODUCT TRANSFER

.1 Install liquid- and vapour-tight aluminum Camlock connections on each remote fill pipe, NPS 2.

2.13 TANK BOTTOM WATER

.1 Disposed of in accordance with applicable Ontario regulations, guidelines and policies.

2.14 SPILLS, OVERFILLS AND STORM RUNOFF WATER

.1 Contained, treated and disposed of in accordance with applicable Ontario regulations, guidelines and policies.

3 EXECUTION

3.01 INSTALLATION

.1 The fuel storage tank system installations must be conducted by licensed Petroleum Equipment Mechanics pursuant to the Ontario Technical Standards and Safety Act 2000.

.2 Sequence Work in accordance with Section 02 41 99.

.3 Complete tank removal and installation in accordance with CEPA SOR/208-197, National Fire Code of Canada (2010), CCME PN 1326 standards, codes, regulations and manufacturer's recommendations. Provide documentation of tank installation in accordance with the requirements set in Section 01 78 00.

.4 Install all equipment in accordance with the manufacturer’s instructions.

.5 Provide the necessary materials to permit and facilitate the installation of all equipment.

.6 Install and provide final hook-up of all control wiring as required for the installation of the instrumentation, including monitoring console, fuel management system (cardlock), remote overfill alarm, solenoid valves, and associated probes and leak detection devices in accordance with the manufacturer’s instructions.

.7 At each of the three Parks Canada sites, install new fuel storage tank monitoring system console and fuel management system console in locations approved by the Departmental Representative and Site Supervisor.

.7 Position tank using lifting lugs and hooks, and where necessary use spreader bars. Do not use chains in contact with tank walls.

.8 Contractor to provide ten (10) working days' notice to Departmental Representative for tank installation activities.

.9 Provide redline drawings of the installation during construction to the Departmental Representative in PDF format for the production of as-built drawings by others. Refer to the requirements set in Section 01 78 00.

.10 Provide wiring diagrams to the Department Representative showing the final control wiring installation. Provide the wiring diagrams in accordance with the requirements set in Section 01 78 00.

.11 No fuel shall be added to the tanks until the tanks have been registered with Environment Canada, their registration numbers are posted on the tanks, the Emergency Response Plan is up to date and available on-site, and as-built drawings, stamped by a Professional Engineer, have been produced and are available on each Parks Canada site.

.12 Arrange and pay for delivery of fuel to each tank. Fill each tank to 90% of its working capacity.

.12 Provide certification of entire installation to the Departmental Representative.

3.02 FIELD QUALITY CONTROL

.1 Confirm storage tank is not leaking prior to entering the tank into service. Vacuum gauge reading on storage tank interstice to be a maximum of -20" Hg, otherwise Contractor is required to pull new vacuum at Contractor's expense.

.2 Contractor is responsible for repairing and/or replacing faulty tanks and components at Contractor's expense.

3.03 TOUCH-UP

.1 Where coating is damaged, touch-up with original coating material.

3.04 LEVEL GAUGE SYSTEM

.1 Provide leak and vapour proof caulking at connections.

.2 Shield capillary and tubing connections.

.3 Re-calibrate system upon reinstatement of level probe in tank.

3.05 LEAK DETECTION SYSTEM

.1 Install in accordance with manufacturer's recommendations.

3.06 COMMISSIONING

.1 For each of the three Parks Canada sites - Tank monitoring console, remote

overfill alarm panel, tank probes, leak detection, fuel dispensing and fuel management system devices:

.1 Retain manufacturer's representative to commission the tank monitoring console, overfill alarm panel, fuel management system and associated components.

.2 Test and confirm all alarm conditions and components are functional complete with commissioning forms, signed by authorized individuals/testing representatives, for documented proof.

.3 Retain manufacturer's technician to provide a certified commissioning test report to stipulate all monitoring-related equipment was tested, verified, and is fully functional.

.4 Allow programming to permit reporting to Owner Building Automation System by others.

.2 Fuel dispensers:

.1 Test and confirm the diesel and gasoline fuel dispensing pumps power off upon:

.1 Detection of high liquid in their respective dispenser sumps.

.2 Depressing the two (2) remote emergency pump shut-off buttons.

.2 Test and confirm the pump suction line normally-closed electric solenoid valves open only to allow dispensing of their respective petroleum product, and close upon completion.

.3 Document commissioning results per Sections 01 91 13 and 01 91 33 and submit results per Section 01 33 00.

END OF SECTION

Photo 1 – View looking north from end of fuelling dock. Existing fuel pump island, bollards, fuel pump, hose reel, light standard and shed to left of dock to be removed. Maintenance Building in background. Existing "Convault" fuel tanks to be removed are located to the right of the waste bins behind the wood fence.

Photo 2 – View looking southwest at existing fuel pump island, bollards, fuel pump, hose reel, light standard and shed to left of dock to be removed.

Photo 3 – View looking southeast at existing "Convault" fuel tanks to be removed. Underlying concrete tank dike and bollards to remain.

Photo 4 – View looking northwest at existing "Convault" fuel tanks and steel platform to be removed. Underlying concrete tank dike and bollards to remain. Concrete hose reel island and hose reel assembly in foreground to be removed.

Photo 5 – View looking southwest at existing fuel pump island, bollards, fuel pump, hose reel, light standard and shed to left of dock to be removed. Approximate location of new aboveground fuel tanks corresponds with the location of the two vehicles in the photo.

Photo 6 – View looking west at the rear of the Maintenance Building (north building wall) showing location of hydro meter. Building electrical room is located opposite the hydro meter.

Photo 7 – View inside Maintenance Building Electrical Room looking northeast. Normal power distribution panel is to the left and emergency distribution panel is to the right. Automatic transfer switch is between both panels. New fuel system power to be obtained from normal panel. Fuel tank monitoring system to be mounted on wall adjacent to panels or at a location selected by the Site Supervisor.

END OF APPENDIX A

Photo 1 – View looking southeast. Existing aboveground fuel tank system to be removed is to the right. Cyprus Lake Maintenance Building to the left.

Photo 2 – View looking south at existing aboveground fuel tank system to be removed and concrete fuelling apron/tank pad and bollards to be removed.

Photo 3 – View looking west at existing aboveground fuel tank system to be removed and concrete fuelling apron/tank pad and bollards to be removed. Concrete island and bollards in the foreground (to the left of the tank in the photo) are to be removed.

Photo 4 – View looking southwest at existing "Convault" split-product fuel tank, access stairs, pump, sump, high-hose retractor assemblies, and concrete tank pad/apron to be removed.

Photo 5 – View looking northeast at Maintenance Building from existing aboveground fuel tank system. Existing fuel pump E-Stop and sign mounted to the right of the white personnel door.

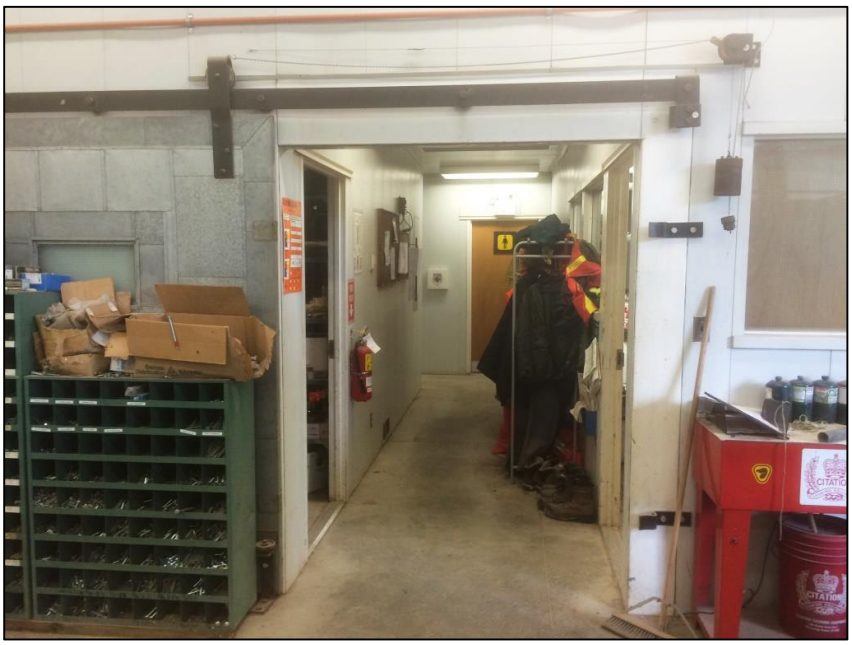

Photo 6 – View inside Maintenance Building looking southeast. Electrical distribution panel from which new fuel system power will be obtained is located on the left-side of the hallway (recessed into wall) just beyond the bulletin board. Existing tank overfill alarm to be removed is mounted on hallway wall just above bulletin board.

Photo 7 – View inside Maintenance Building above suspended ceiling looking southwest. The two electrical conduits shown in the photo are connected to the distribution panel shown in Photo 6.

END OF APPENDIX B

Photo 1 – View looking south towards the Marine Base Operations Storage Building. Existing aboveground fuel tank system to be removed is to the left of the black pickup truck in the photo.

Photo 2 – View looking southeast at existing aboveground fuel tank system to be removed. Existing concrete product transfer area dike in foreground to remain.

Photo 3 – View looking north at existing concrete product transfer area dike to remain. New aboveground fuel tank system to be installed in background, with approximate fuel tank locations corresponding with the two vehicles visible in the photo.

Photo 4 – View looking northeast at existing "Convault" split-product fuel tank, pump, sump, hose reel assembly and cardlock pedestal to be removed. Concrete tank dike and all other concrete visible in the photo to remain.

Photo 5 – View looking west at existing aboveground fuel tank system to be removed. Electrical distribution panel for watercraft battery system recharging is located inside grey electrical box to left of fuel tank. Maintenance Building visible in background behind fuel tank.

Photo 6 – View from existing product transfer area dike looking southwest towards Maintenance Building. Existing fuel pump E-Stop and sign visible on building outer wall. Electrical room is located opposite the E-Stop. Power for new fuel system to be obtained from existing distribution panel in electrical room.

END OF APPENDIX C

APPENDIX D

DRAWING SET

LIQUID FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS
GEORGIAN BAY ISLANDS NATIONAL PARK OF CANADA
2611 MUSKOKA ROAD 5, HONEY HARBOUR, ONTARIO

FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS - PARKS CANADA

Georgian Bay Islands National Park
2611 Muskoka Road 5, Honey Harbour, Ontario

LIST OF DRAWINGS

Drawing Number	Drawing Title
G1	Title Sheet
G2A	Notes (1 of 2)
G2B	Notes (2 of 2)
G3	Existing Conditions and Demolition Plan
G4	New Fuel System Layout
G5	Concrete Tank Pad and Apron
G6	Concrete Details
G7	Storage Tank and Fuel Pump Details
G8	Mechanical Details
G9	Signs and Tags
G10	New Product Transfer Area Signage
G11	Electrical Details
G12	Electrical Schematics

Public Works and Government Services Canada
Architectural and Engineering Services
Ontario Region

Travaux publics et Services gouvernementaux Canada
Services d'architecture et de génie
Région de l'Ontario

WSP

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- ST — STORM SEWER
- W — WATERMAIN
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- E — ELECTRICAL CONDUIT
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- APPROXIMATE PROPERTY BOUNDARY
- APPROXIMATE LIMIT OF ASPHALT SAW-CUT
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revision		date
04		
03	Issued for Tender	Nov 1
02	Issued for 99% Review	Oct 26
01	Issued for 75% Review	Oct 12

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project title / titre du projet
Ontario
FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS – PARKS CANADA
Georgian Bay Islands National Park
2611 Muskoka Rd 5, Honey Harbour, ON

drawing title / titre du dessin
TITLE SHEET

drawn by / dessine par: HET
designed by / conc par: JD
approved by / approuve par: JD
tender / soumission: Javier Banuelos
project manager / administrateur de projets
project date / date du projet: 2016/10/12
project no. / no. du projet: R.079639.001
drawing no. / dessine no.: G1

GENERAL NOTES:

1. SYSTEM IS TO BE INSTALLED AS PER:
   - NATIONAL FIRE CODE OF CANADA (2010);
   - CEPA SOR/2008-197 STORAGE TANK SYSTEMS FOR PETROLEUM PRODUCTS AND ALLIED PETROLEUM PRODUCTS REGULATIONS;
   - CANADIAN COUNCIL OF MINISTERS OF THE ENVIRONMENT, PN1326 ENVIRONMENTAL CODE OF PRACTICE FOR ABOVEGROUND AND UNDERGROUND STORAGE TANK SYSTEM CONTAINING PETROLEUM AND ALLIED PETROLEUM PRODUCTS;
   - CSA C22.1-2015 CANADIAN ELECTRICAL CODE, 22ND EDITION;
   - ALL MANUFACTURER'S INSTRUCTIONS AND SPECIFICATIONS; AND
   - OTHER LOCAL, PROVINCIAL, FEDERAL REGULATIONS, ALL LATEST EDITIONS.
2. A CONTRACTOR SUBMITTING A BID IS REQUIRED TO BE KNOWLEDGEABLE IN PETROLEUM STORAGE TANK SYSTEMS AND RELATED EQUIPMENT.
3. IF FURTHER CLARIFICATIONS ARE REQUIRED ON EQUIPMENT OR THE INSTALLATION OF EQUIPMENT, IT IS THE CONTRACTORS RESPONSIBILITY TO REQUEST CLARIFICATIONS FROM CONSULTANT/OWNER.
4. ALL PIPING, ELBOWS, TEES, REDUCERS, UNIONS AND FITTINGS TO BE SOCKET WELD STEEL ASTM A312. ALL FITTINGS TO BE WELDED UNLESS OTHERWISE SPECIFIED. THREADED FITTINGS MUST BE SEALED WITH PETROLEUM RESISTANT SEAL.
5. CONTRACTOR TO REINSTATE DISTURBED SITE CONDITIONS TO MATCH EXISTING TO THE SATISFACTION OF THE ENGINEER AND DEPARTMENTAL REPRESENTATIVE AND OPERATIONS MANAGER ON-SITE. THE CONTRACTOR IS RESPONSIBLE FOR DAILY CLEANING OF WORK AREA.
6. CONTRACTOR SHALL NOT UNDERMINE OR COMPROMISE ANY FOOTINGS OR FOUNDATION STRUCTURES. ALWAYS BE AWARE OF THE LOCATION OF EXISTING UTILITIES AND OVERHEAD POWER LINES.
7. SITE UTILITIES ARE NOT LOCATED ON THESE DRAWINGS. CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL UTILITY LOCATES, CLEARANCES AND PERMITS PRIOR TO COMMENCEMENT OF WORK.
8. PIPING LAYOUTS ILLUSTRATED ON DRAWINGS INDICATED THE GENERAL ROUTING OF PIPE WORK AND DOES NOT SHOW ALL THE FITTINGS AND OFFSETS REQUIRED FOR THE COMPLETE INSTALLATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL PIPING, FITTINGS & OFFSETS REQUIRED.
9. THE CONTRACTOR SHALL PROVIDE A TWELVE (12) MONTH WARRANTY ON ALL LABOUR, MATERIAL AND EQUIPMENT.
10. THE CONTRACTOR SHALL PROVIDE A PAPER COPY AND AN ELECTRONIC COPY OF THE OPERATION AND MAINTENANCE MANUALS PRIOR TO COMMISSIONING.
11. THE CONTRACTOR SHALL PROVIDE AS BUILT DRAWINGS IN PAPER AND ELECTRONIC COPIES PRIOR TO FIRST FILL OF THE SYSTEM.
12. THE CONTRACTOR SHALL TRAIN THE SYSTEM OPERATORS AFTER THE NEW SYSTEM HAS BEEN INSTALLED.
13. THE CONTRACTOR IS RESPONSIBLE FOR THE COST OF COMMISSIONING AND TESTING ALL NEW AND REINSTATED EQUIPMENT.
14. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL EXISTING PIPING, FITTINGS, TANKS, AND FUEL AS PER FEDERAL REGULATIONS.
15. ALL EQUIPMENT SHALL BE STORED AND INSTALLED AS PER THE MANUFACTURER'S INSTRUCTIONS.
16. CONTRACTOR SHALL POST THE EC LABEL PRIOR TO FIRST FILL

MECHANICAL NOTES:

1. ALL PIPE SIZES ARE SHOWN IN MILLIMETERS.
2. INSTALL EQUIPMENT AS PER MANUFACTURER'S RECOMMENDATIONS. CLEARANCES AROUND NEW EQUIPMENT TO BE AS PER MANUFACTURER'S RECOMMENDATIONS AND CODE REQUIREMENTS.
3. LAYOUT, ROUTING & LOCATIONS ARE INDICATIVE, CONTRACTOR TO VERIFY SITE CONDITIONS & COORDINATE INSTALLATION WITH ALL TRADES ON SITE CONTRACTOR TO ADAPT INSTALLATION TO SITE CONDITION.
4. PROVIDE NECESSARY EXPANSION LOOPS, COMPENSATORS, ANCHORS, GUIDES, SUPPORTS ETC. AND FIRESTOP FOR ALL AFFECTED SYSTEMS.
5. THE SPILL CONTAINMENT SHALL BE APPROVED TO CAN/ULC S663-11, SPILL CONTAINMENT DEVICES FOR ABOVE GROUND TANKS.
6. ALL PIPING TO BE SCH 40 ASTM A312, TYPE 304 STAINLESS STEEL. SOCKET WELDED FITTINGS TO BE ASTM A312.
7. PIPING AND TUBING SHALL BE RUN AS PRACTICAL AS POSSIBLE AND PROVISIONS SHALL BE MADE FOR EXPANSION, CONTRACTION, JARRING, VIBRATION AND SETTLING.
8. THE TANKS SHALL BE INSTALLED WITH GAUGES AND ULC LABEL THAT ARE ACCESSIBLE TO OPERATORS.
9. NEW TANKS SHALL BE DOUBLE WALLED AND EQUIPPED WITH VISUAL GAUGES, VACUUM GAUGE AND ACCESS TO INTERSTITIAL MONITORING.
10. THE MAIN SUPPLY TANKS SHALL BE CONSTRUCTED TO ULC S601 STANDARD.
11. ALL PIPING SHOULD BE CLEARLY LABELED WITH CONTENTS. FLOW DIRECTION AND PRODUCT (DIESEL SUPPLY, GASOLINE SUPPLY). ALL FUEL RELATED EQUIPMENT SHALL BE CLEARLY IDENTIFIED.
12. THE CONTRACTOR SHALL COMPLETE AT A MINIMUM A TWO HOUR PRESSURE TEST USING NITROGEN GAS AT 50psi ON THE FUEL PIPING. TESTING TO BE CONDUCTED AFTER THE INSTALLATION IS COMPLETE AND PRIOR TO SYSTEM COMMISSIONING.
13. ALL GASKETS TO BE RATED FOR A MINIMUM TEMPERATURE OF 1000°F (BUNA-N OR EQUIVALENT).

Public Works and Government Services Canada
Architectural and Engineering Services
Ontario Region

Travaux publics et Services gouvernementaux Canada
Services d'architecture et de génie
Région de l'Ontario

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NOTES (1 of 2)

drawn by / dessine par: HET
designed by / conc par: JD
approved by / approuve par: JD
tender / soumission: Javier Banuelos
project manager / administrateur de projets
project date / date du projet: 2016/10/25
project no. / no. du projet: R.079639.001
drawing no. / dessine no.: G2A

ELECTRICAL NOTES

1. GENERAL CONDITIONS
   a. PROVIDE ALL LABOUR, EQUIPMENT, MATERIALS & TOOLS NECESSARY TO COMPLETE ALL SYSTEMS SHOWN ON THE DRAWINGS, THUS RENDERING A COMPLETE INSTALLATION.
   b. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN OR INDICATED.
   c. CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS, DIMENSIONS, ELEVATIONS ETC. IN THE FIELD.
2. CODES, PERMITS AND INSPECTION
   a. PAY FOR & BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS AS REQUIRED BY AUTHORITIES HAVING JURISDICTION OVER THIS WORK. INCLUDE THESE COSTS IN THE TENDER PRICE. SUBMIT FINAL INSPECTION REPORT TO OWNER.
   b. INSTALLATION SHALL CONFORM TO THE REQUIREMENTS OF THE CANADIAN ELECTRICAL CODE, 2015 EDITION, PROVINCIAL & FEDERAL CODES AND LOCAL BYLAWS AND N.S. STANDARDS FOR CONSTRUCTION AND INSTALLATION FOR PETROLEUM STORAGE TANK SYSTEMS, 1997.
3. DRAWING
   a. PREPARE AND PAY FOR ANY LARGE SCALE WORKING DRAWINGS WHICH MAY BE REQUIRED BY THE EXAMINING AUTHORITIES, INCLUDE THIS COST IN THE TENDER PRICE.
4. RECORD DRAWINGS
   a. KEEP A SEPARATE, COMPLETE, SET OF DRAWINGS ON SITE AND NOTE ALL CHANGES AND DEVIATIONS FROM THE ORIGINAL DESIGN. ONE SET OF THESE PLANS SHOWING AS-BUILT CONDITIONS SHALL BE FORWARDED TO THE OWNER AT THE COMPLETION OF THIS CONTRACT & BEFORE APPLYING FOR FINAL PAYMENT.
5. EXAMINATION OF SITE
   a. ANY DEVIATIONS AND/OR CONFLICTS ON SITE SHALL BE REPORTED TO THE DEPARTMENTAL REPRESENTATIVE PRIOR TO SUBMITTING TENDER.
6. IDENTIFICATION
   a. COLOUR CODE ALL ELECTRICAL JUNCTION BOXES TO BUILDING STANDARD. IDENTIFY WITH BLACK MARKER ON BOX COVERS ALL CIRCUITS CONTAINED WITHIN.
7. REVISIONS AND EXTRAS
   a. NO ADDITIONAL MONEY OVER THE CONTRACT PRICE SHALL BE PAID UNLESS AN APPROVED CHANGE ORDER IS ISSUED BY THE OWNER. CLAIMS FOR EXTRAS SHALL BE SUBMITTED WITH A COMPLETE BREAKDOWN OF MATERIAL, LABOUR, HOURLY RATES, ETC.
8. CLEANUP
   a. ALL CUTTING, PATCHING, & PAINTING REQUIRED FOR THE WORK OF THIS TRADE TO BE PERFORMED BY THE CONTRACTOR'S FORCES AT THE CONTRACTOR'S EXPENSE. CLEAN UP ALL DEBRIS UPON COMPLETION OF CONTRACT, COOPERATE WITH ALL OTHER TRADES.
   b. MAINTAIN SITE IN TIDY CONDITION FREE FROM ACCUMULATION OF WASTE PRODUCTS AND DEBRIS. UPON OBTAINING SUBSTANTIAL PERFORMANCE OF THE WORK, REMOVE SURPLUS PRODUCTS, TOOLS, MACHINERY, AND EQUIPMENT FROM THE SITE. COMPLETION OF CLEANUP IS REQUIRED FOR TOTAL PERFORMANCE OF THE WORK. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO REPAIR ANY DAMAGE DONE TO EXISTING FEATURES AS A RESULT OF THIS WORK. DAMAGED OR DISTURBED ITEMS SHALL BE REPLACED IN KIND AND AT NO ADDITIONAL COST TO THE OWNER.
9. EQUIPMENT AND MATERIAL
   a. ALL EQUIPMENT AND MATERIAL, UNLESS SPECIFICALLY NOTED OTHERWISE, SHALL BE NEW AND WITHOUT BLEMISH OR DEFECT. ALL MATERIAL SHALL BEAR A CSA (CANADIAN STANDARDS ASSOCIATION) APPROVAL STAMP. ALL DEVICES SHALL BE SPECIFICATION GRADE.
10. TESTING
    a. PERFORM TESTING ON EACH SYSTEM TO THE SATISFACTION OF THE OWNER AND SUBMIT TEST RESULTS FOR APPROVAL PRIOR TO THE FINAL ACCEPTANCE OF THE WORK.
    b. PANELS SHALL BE BALANCED WITHIN 5% OF LOAD PER PHASE. GROUNDING SHALL BE AS REQUIRED BY ELECTRICAL CODE.
11. ACCESSIBILITY
    a. ALL WORK SHALL BE INSTALLED SO AS TO BE READILY ACCESSIBLE FOR OPERATION, MAINTENANCE AND REPAIRS.
12. RESPONSIBILITY
    a. MAINTAIN RESPONSIBILITY FOR THE WORK UNTIL COMPLETION & FINAL ACCEPTANCE. REPLACE ANY ITEM THAT MAY BE DEFECTIVE, DAMAGED, LOST OR STOLEN WITHOUT ADDITIONAL COST TO THE OWNER OR DELAY TO THE COMPLETION OF THE PROJECT.
    b. THE OWNER SHALL NOT BE RESPONSIBLE FOR THE ACTS OF OMISSION OF THE CONTRACTOR, SUBCONTRACTOR OR THEIR AGENTS OR EMPLOYEES OR ANY OTHER PERSON PERFORMING WORK.
    c. THE CONTRACTOR SHALL DESIGN AND PROVIDE ANY TEMPORARY SHORING, BRACING, ETC. AS NEEDED FOR THE WORK SO AS NOT TO ENDANGER THE STRUCTURAL INTEGRITY OF ANY EXISTING FEATURE.
13. WARRANTY
    a. WARRANT ALL WORK AND APPARATUS INSTALLED UNDER THIS CONTRACT AGAINST ALL DEFECTS IN WORKMANSHIP AND MATERIAL FOR A PERIOD OF ONE YEAR AFTER LETTER OF FINAL ACCEPTANCE.
14. SAFETY
    a. OBSERVE ALL APPLICABLE SAFETY REQUIREMENTS INCLUDING THE USE OF SAFETY GLASSES, HARD HATS AND PROTECTION OF AREA WHEN WORKING OVERHEAD. THE CONTRACTOR SHALL ASSUME RESPONSIBILITY FOR CONTRACTOR SAFETY.
15. WIRING
    a. RUN ALL WIRING IN RIGID CONDUIT. INSTALL RIGID CONDUIT PERPENDICULAR & PARALLEL TO BUILDING LINES. SUPPORT RIGID CONDUIT IN ACCORDANCE WITH THE CANADIAN ELECTRICAL CODE. USE FLEXIBLE METAL CONDUIT FOR FINAL CONNECTIONS TO MOTORS AND VIBRATING EQUIPMENT. BX WIRE SHALL NOT BE USED.
    b. ALL WIRING TO BE 600V MINIMUM RATED #12 COPPER RW90 XLPE UNLESS NOTED OTHERWISE.
16. LOAD DISTRIBUTION PANELS
    a. THE CONTRACTOR SHALL VERIFY CIRCUIT BREAKER TYPE AND INSTALL CIRCUIT BREAKERS AS REQUIRED.
    b. ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR BALANCING THE CIRCUITS AND VERIFYING LOADING CAPACITY.

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LEGEND

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- G — GAS PIPELINE
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- APPROXIMATE PROPERTY BOUNDARY
- APPROXIMATE LIMIT OF ASPHALT SAW-CUT
- CONTRACTOR SUPPLIED TEMPORARY CHAIN-LINK FENCE ENCLOSURE

revision		date
04		
03		
02	Issued for Tender	Nov 1
01	Issued for 99% Review	Oct 26

Do not scale drawings.
Verify all dimensions and conditions on site and immediately notify the engineer of all discrepancies.

A Detail No. / No. du détail
B drawing no. – where detail required / dessin no. – où détail exigé
C drawing no. – where detailed / dessin no. – où détaillé

project title / titre du projet

Ontario

FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS – PARKS CANADA

Georgian Bay Islands National Park
2611 Muskoka Rd 5, Honey Harbour, ON

drawing title / titre du dessin

NOTES (2 of 2)

drawn by / dessine par: HET

designed by / conc par: JD

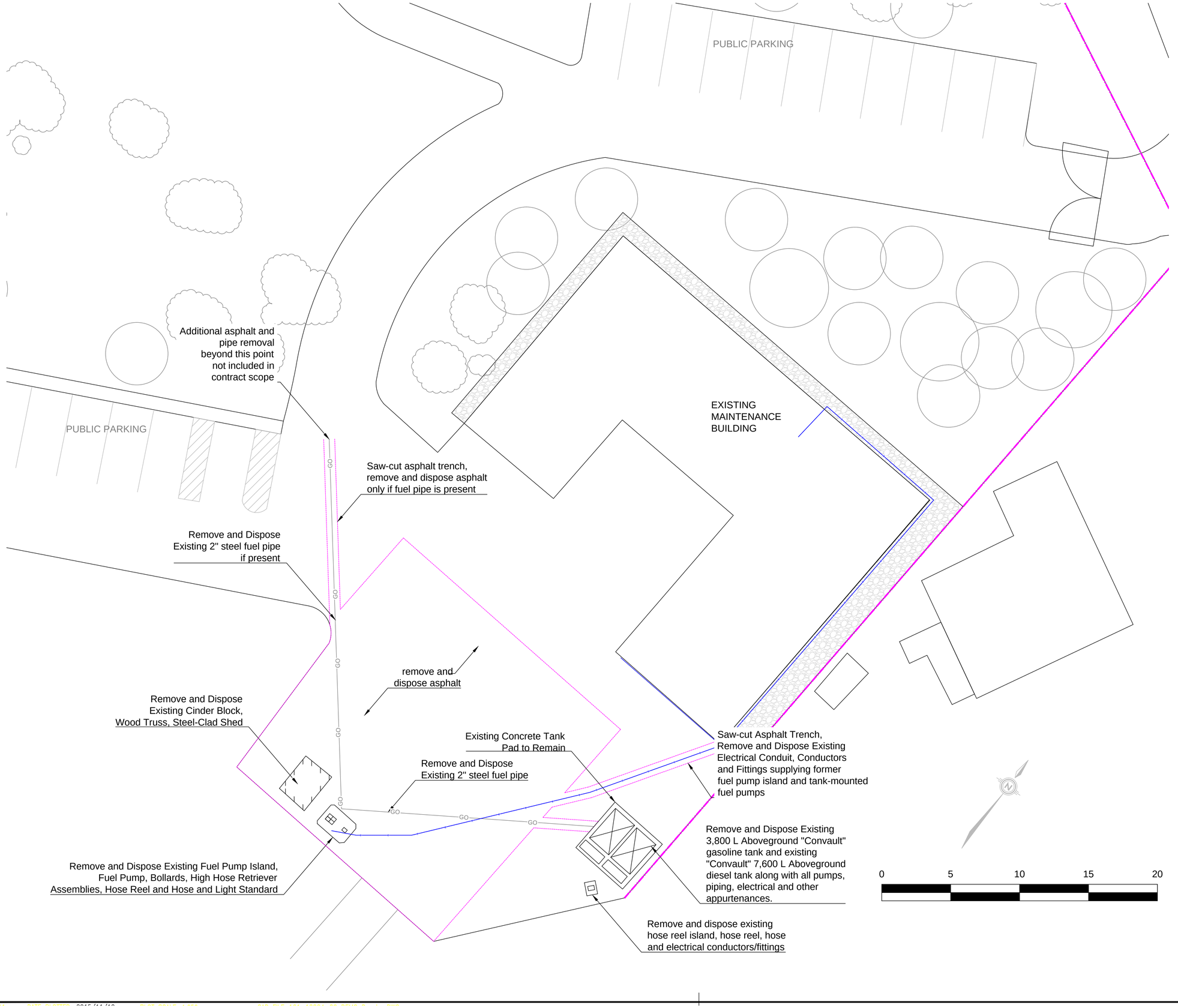
approved by / approuve par: JD

tender / soumission: Javier Banuelos — project manager / administrateur de projets

project date / date du projet: 2016/10/25

project no. / no. du projet: R.079639.001

drawing no. / dessine no.: G2B



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WSP

LICENSED PROFESSIONAL ENGINEER
J. M. DOLAN
90502741
PROVINCE OF ONTARIO

LEGEND

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project title / titre du projet

Ontario

FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS – PARKS CANADA

Georgian Bay Islands National Park
2611 Muskoka Rd 5, Honey Harbour, ON

drawing title / titre du dessin

EXISTING CONDITIONS AND DEMOLITION PLAN

drawn by / dessine par: HET

designed by / conc par: JD

approved by / approuve par: JD

tender / soumission: Javier Banuelos

project manager / administrateur de projets

project date / date du projet: 2016/10/14

project no. / no. du projet: R.079639.001

drawing no. / dessine no.: G3

PUBLIC PARKING

PUBLIC PARKING

EXISTING MAINTENANCE BUILDING

Route Conduit Through Building Wall into Electrical Room and Seal all openings

Connect Low-Voltage Conductors to tank monitoring console supplied and mounted by contractor on electrical room wall.

Connect Load Conductors to Existing Normal-Power Distribution Panel in Electrical Room

Replace asphalt

GO

Fuelling Apron and Product Transfer Area (Sloped Towards Fuel Tank Dike)
G5 | G4 G5

Product Transfer Area Sign
1 | G4 G10

Shallow Fuel Tank Dike – Contains Spilled Fuel From Fueling Apron (Part of Product Transfer Area)
G5 | G4 G5

Containment Valve Signage
2 | G4 G10

High Level Alarm
2 | G4 G11

10,000L Aboveground Double Wall Gasoline Tank and Stairs
1 | G4 G7 · 2 | G4 G7 · 3 | G4 G7

4,500L Aboveground Double Wall Diesel Tank and Stairs
1 | G4 G7 · 2 | G4 G7 · 3 | G4 G7

Electrical Conduit Stub-ups
1 | G4 G11

Dual Product Dual Hose Fuel Pump Mounted on Aboveground Stainless Steel Sump
4 | G4 G7

Tank Pad E-stop
4 | G4 G11

FUEL DELIVERY APRON

PRODUCT CONTAINMENT AREA

VEHICLE FUELING APRON

min.5.5m

min.5.5m

Slope New Asphalt from Fuel Delivery Apron to Match Existing asphalt

Remote E-stop Fasten conduit above grade to concrete building foundation
4 | G4 G11

Fasten conduit above grade to concrete building foundation

Electrical Conduit Stub-up
1 | G4 G11

Cardlock Pedestal
4 | G4 G7

Hose Reel (Gasoline)
4 | G4 G7

Hose Reel (Diesel)
4 | G4 G7

Replace asphalt

New Electrical Conductors and Rigid Conduit set in trench

TSSA Marina Signage Facing Water
5 | G4 G9 · 4 | G4 G9

Existing Dock

0 5 10 15 20

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PROVINCE OF ONTARIO

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Ontario

FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS – PARKS CANADA

Georgian Bay Islands National Park
2611 Muskoka Rd 5, Honey Harbour, ON

drawing title / titre du dessin

NEW ABOVEGROUND FUEL SYSTEM PLAN

drawn by / dessine par: HET

designed by / conc par: JD

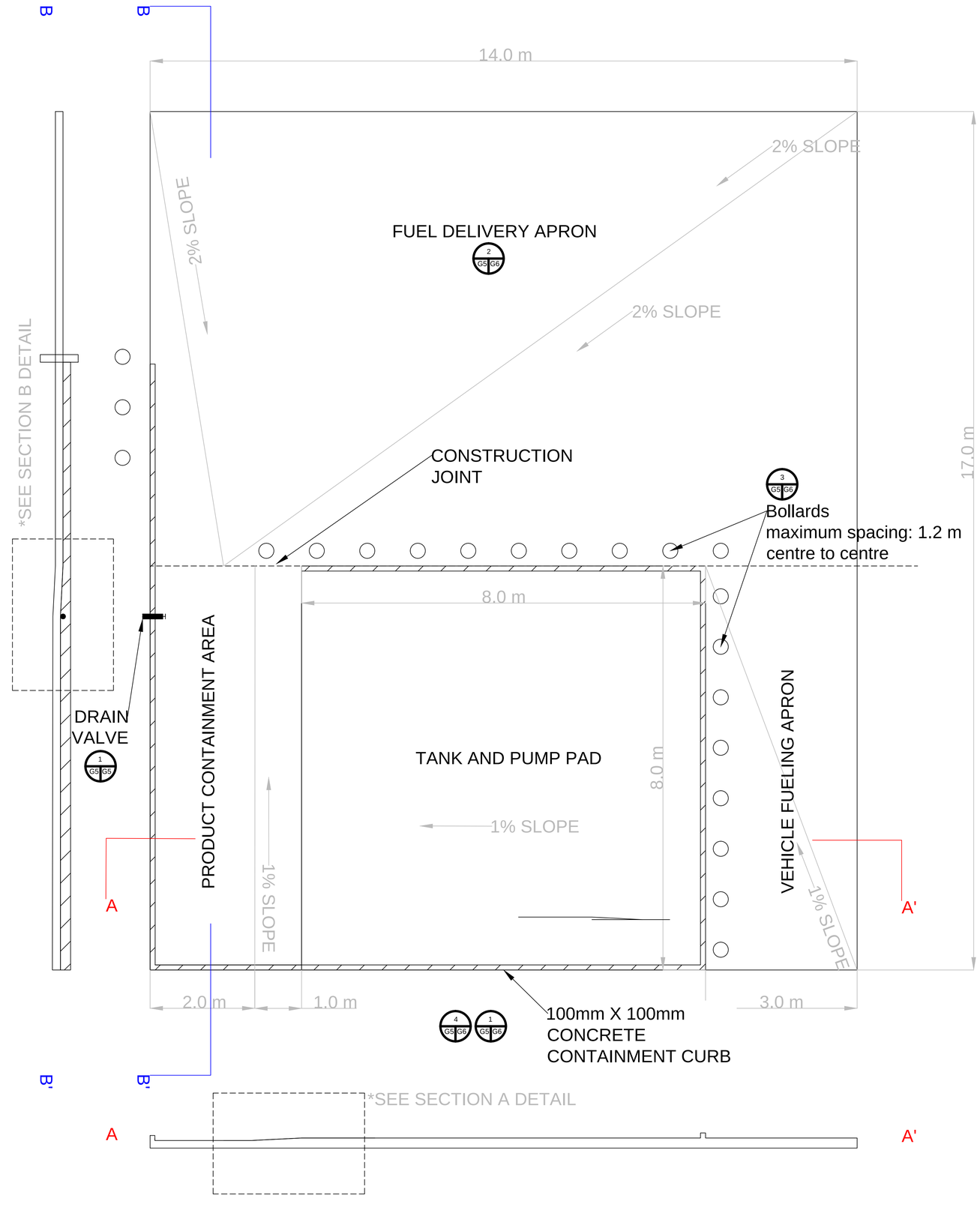
approved by / approuve par: JD

tender / soumission: Javier Banuelos — project manager / administrateur de projets

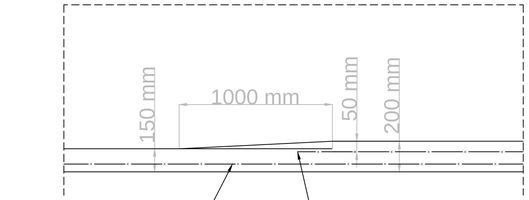
project date / date du projet: 2016/10/14

project no. / no. du projet: R.079639.001

drawing no. / dessine no.: G4



SECTION A DETAIL



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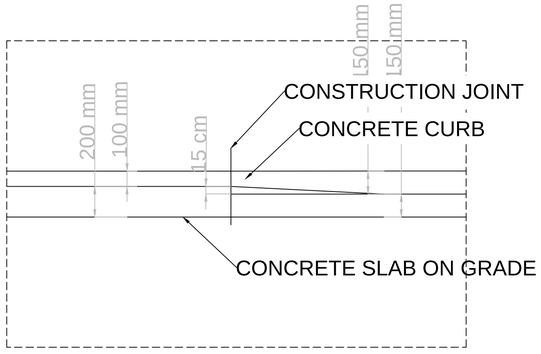

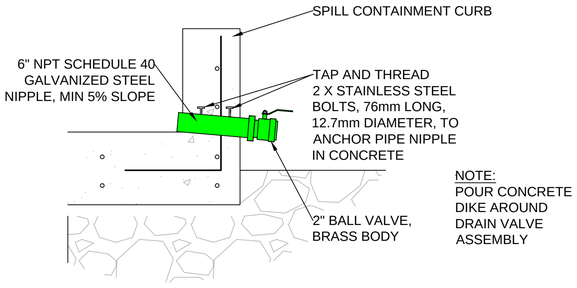

NOTE:
POUR CONCRETE DIKE AROUND DRAIN VALVE ASSEMBLY

DRAIN VALVE DETAIL

SCALE: NOT TO SCALE

1
G5 G5

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LICENCED PROFESSIONAL ENGINEER
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PROVINCE OF ONTARIO

LEGEND

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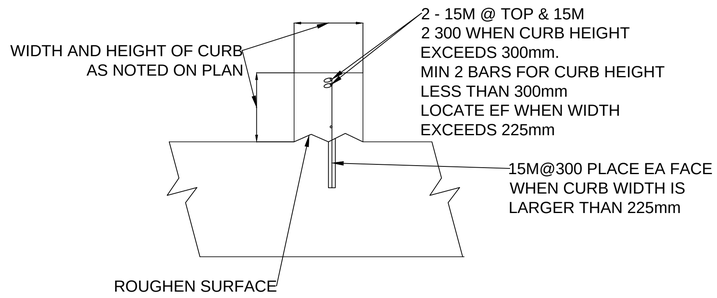
Ontario
FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS – PARKS CANADA

Georgian Bay Islands National Park
2611 Muskoka Rd 5, Honey Harbour, ON

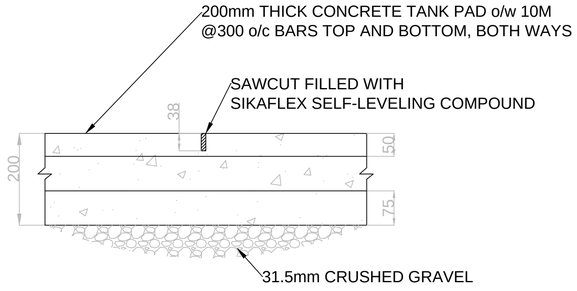
drawing title / titre du dessin
CONCRETE FUELING AREA

drawn by / dessine par: HET
designed by / conc par: JD
approved by / approuve par: JD
tender / soumission: Javier Banuelos
project manager / administrateur de projets
project date / date du projet: 2016/10/25
project no. / no. du projet: R.079639.001
drawing no. / dessine no.: G5



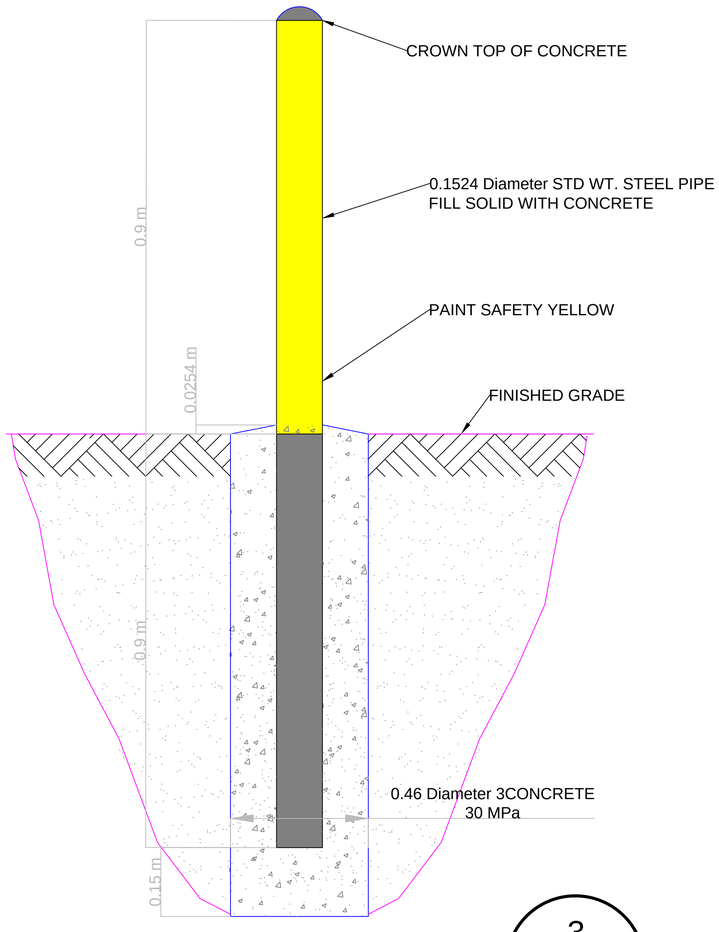
CURB DETAIL
SCALE: NOT TO SCALE

1 | G5 | G6



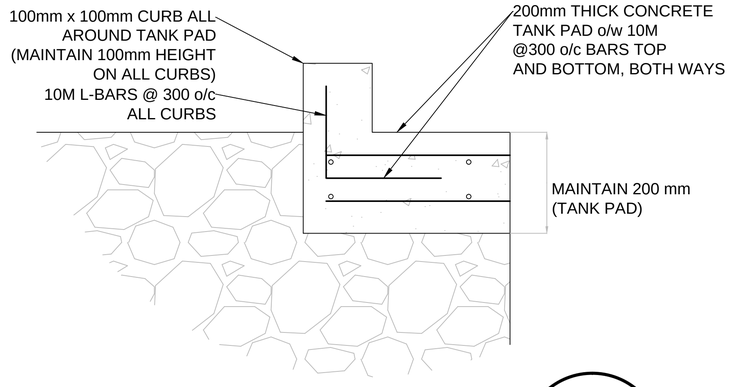
SAWCUT DETAIL
SCALE: NOT TO SCALE

2 | G5 | G6



BOLLARD DETAIL
SCALE: NOT TO SCALE

3 | G5 | G6



PAD AND CURB DETAIL
SCALE: NOT TO SCALE

4 | G5 | G6

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LICENSED PROFESSIONAL ENGINEER
J. M. DOLAN
90502741
PROVINCE OF ONTARIO

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A / B C
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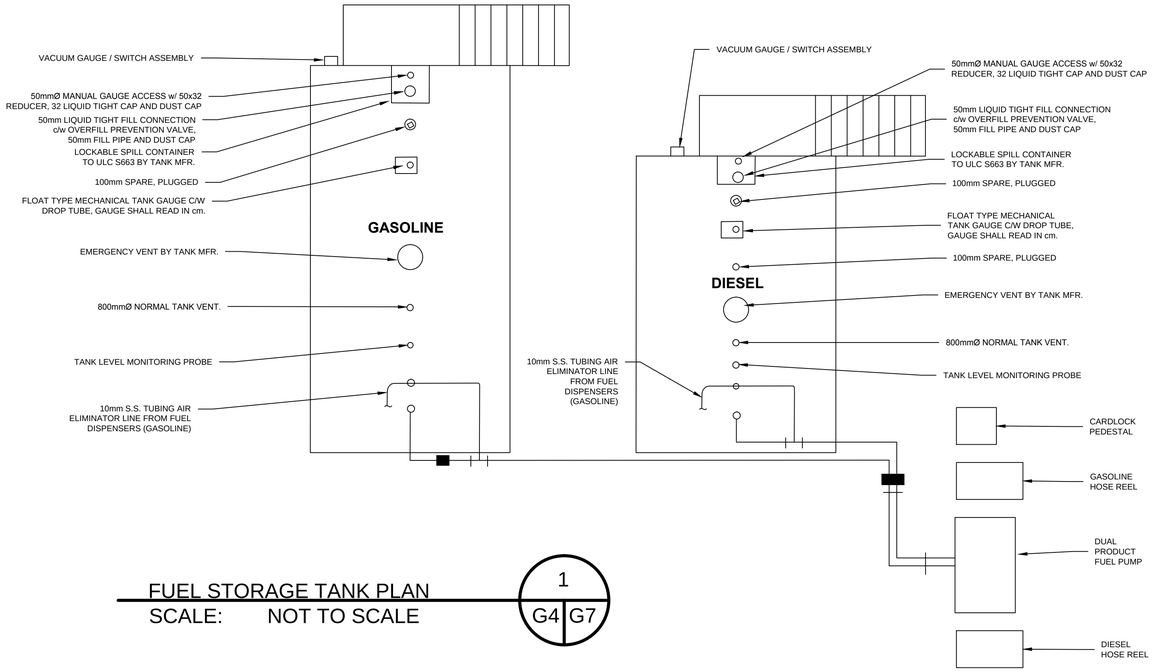
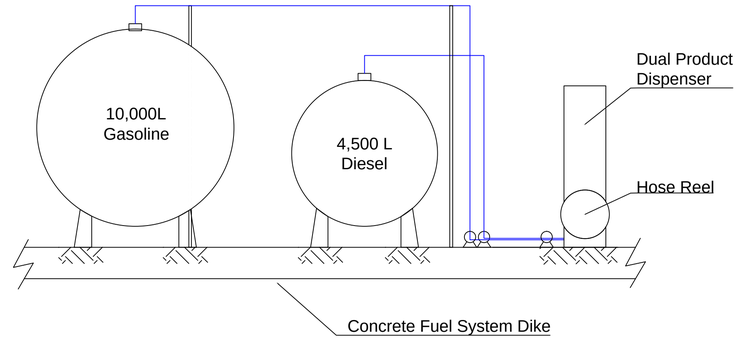
Ontario
FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS – PARKS CANADA
Georgian Bay Islands National Park
2611 Muskoka Rd 5, Honey Harbour, ON

drawing title / titre du dessin
CONCRETE DETAILS

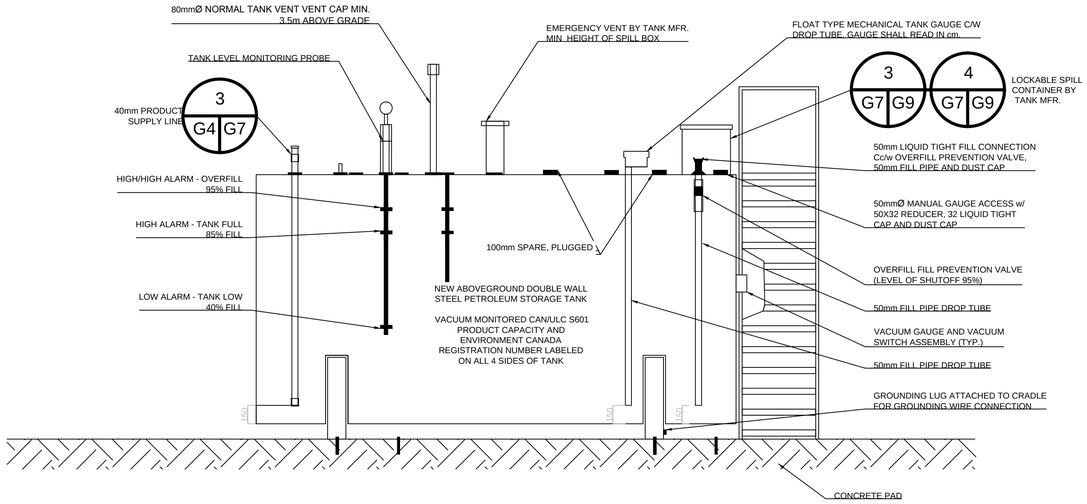
drawn by / dessine par: HET
designed by / conc par: JD
approved by / approuve par: JD
tender / soumission: Javier Banuelos
project manager / administrateur de projets
project date / date du projet: 2016/10/14
project no. / no. du projet: R.079639.001
drawing no. / dessine no.: G6



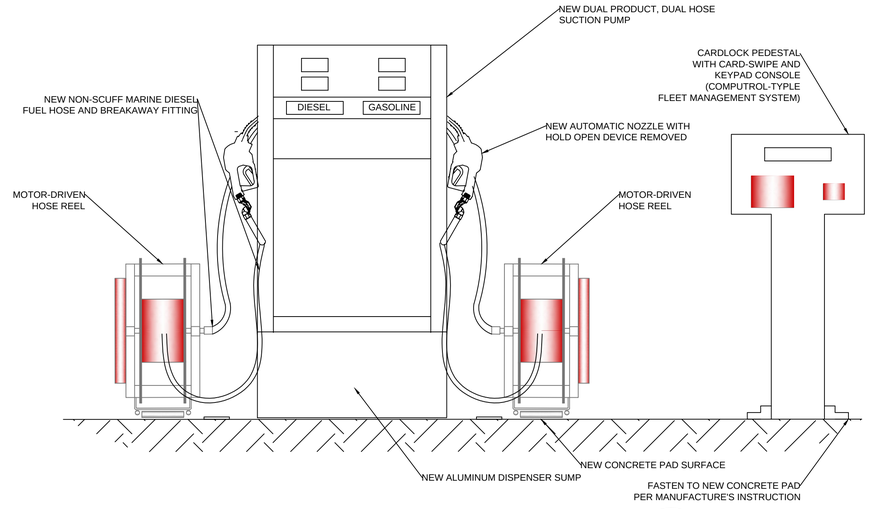
FUEL STORAGE TANK PLAN
SCALE: NOT TO SCALE
1 G4 G7



FUEL TANK CROSS SECTION
SCALE: NOT TO SCALE
2 G4 G7



FITTINGS AND CONTROLS
SCALE: NOT TO SCALE
3 G4 G7



PUMP AND HOSE REELS
SCALE: NOT TO SCALE
4 G4 G7

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90502741
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FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS – PARKS CANADA
Georgian Bay Islands National Park
2611 Muskoka Rd 5, Honey Harbour, ON

drawing title / titre du dessin
PRODUCT TRANSFER AREA SIGNAGE

drawn by / dessine par: HET
designed by / conc par: JD
approved by / approuve par: JD
tender / soumission: Javier Banuelos
project manager / administrateur de projets
project date / date du projet: 2016/10/25
project no. / no. du projet: R.079639.001
drawing no. / dessine no.: G7

04 11

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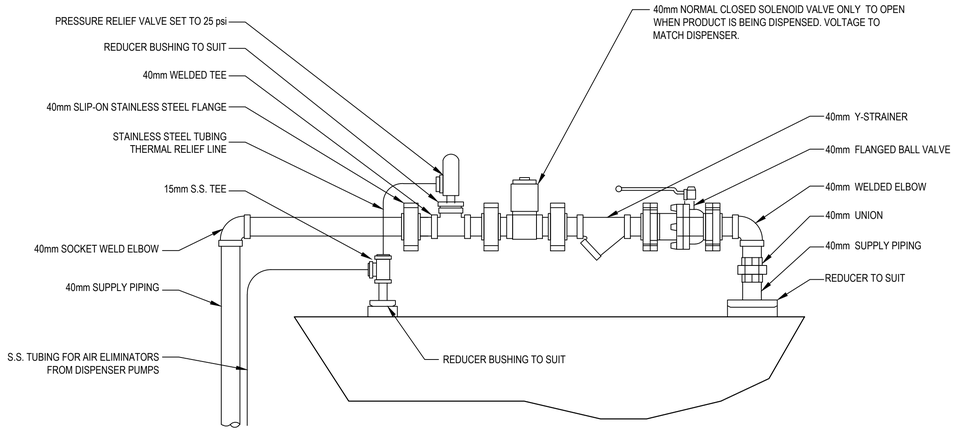

PRODUCT SUPPLY LINE DETAIL — 1 (G4 | G7)
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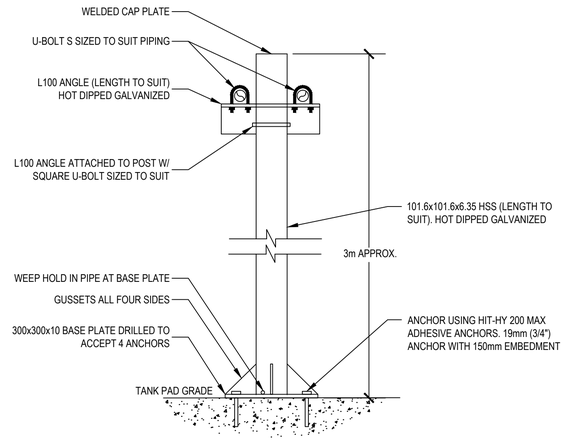

ELEVATED PIPE SUPPORT — 3 (G4 | G7)
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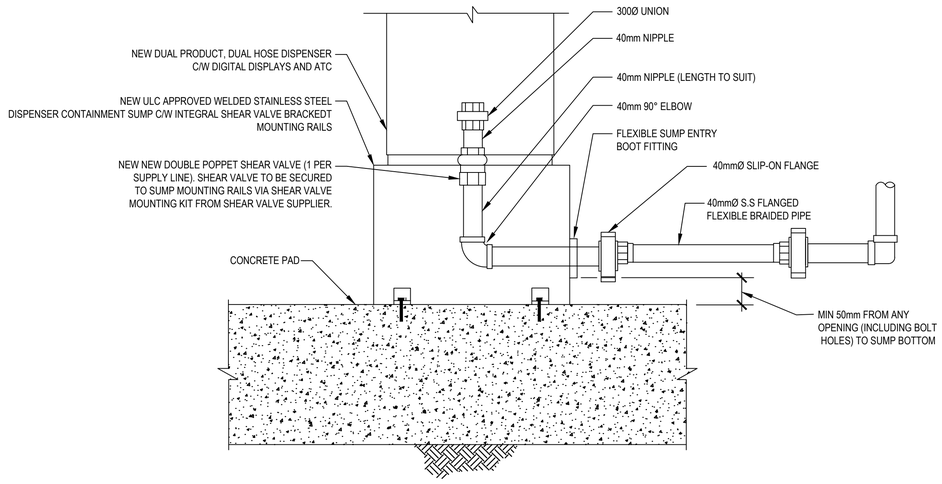
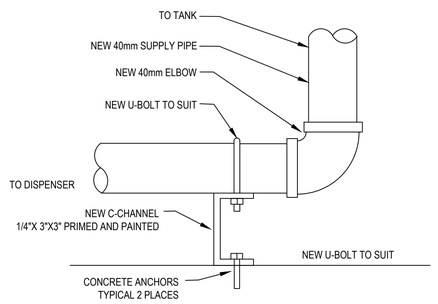


DISPENSER SUMP DETAIL — 2 (G7 | G8)
SCALE: NOT TO SCALE



PAD-LEVEL PIPE SUPPORT — 4 (G7 | G8)
SCALE: NOT TO SCALE

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LICENSED PROFESSIONAL ENGINEER
J. M. DOLAN
90502741
19 Nov 2015
PROVINCE OF ONTARIO

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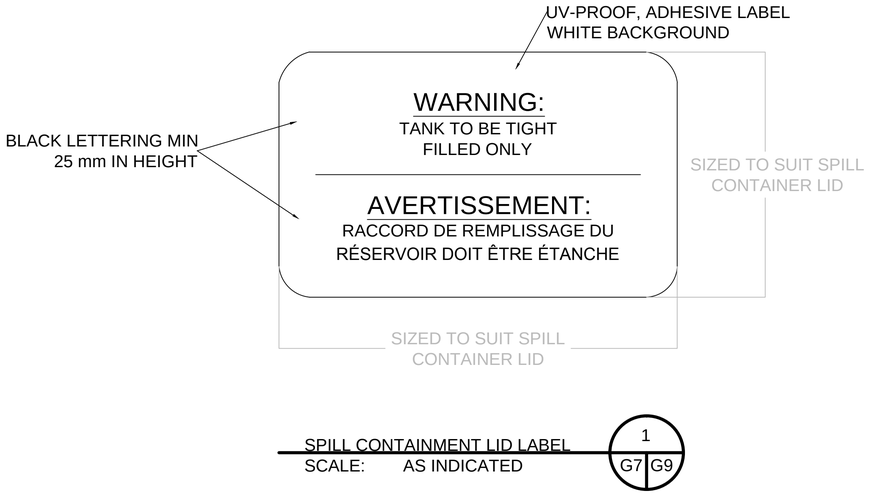
Ontario
FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS – PARKS CANADA

Georgian Bay Islands National Park
2611 Muskoka Rd 5, Honey Harbour, ON

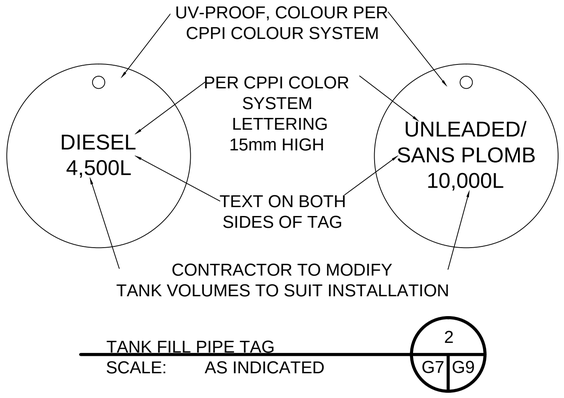
drawing title / titre du dessin
MECHANICAL DETAILS

drawn by / dessine par: JLK
designed by / conc par: JD
approved by / approuve par: JD
tender / soumission: Javier Banuelos
project manager / administrateur de projets
project date / date du projet: 2016/10/26
project no. / no. du projet: R.079639.001
drawing no. / dessine no.: G8

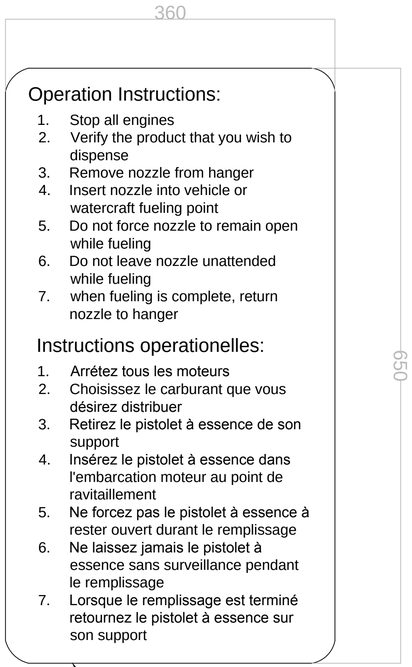
GSC-A1 DATE PLOTTED: 2015/11/10 PLOT SCALE: 1:250 CAD FILE: 161-12204-00 DEMO Drawing.DWG



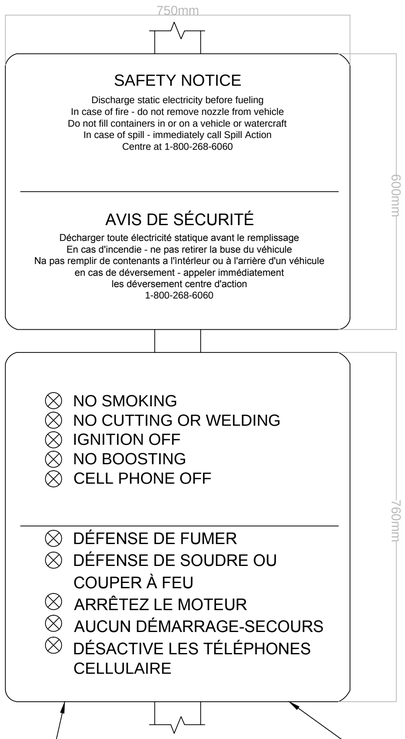
SPILL CONTAINMENT LID LABEL
SCALE: AS INDICATED — 1 / G7 G9



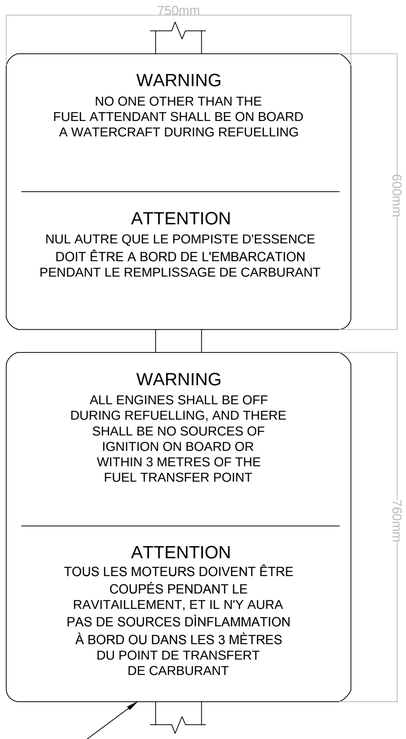
TANK FILL PIPE TAG
SCALE: AS INDICATED — 2 / G7 G9



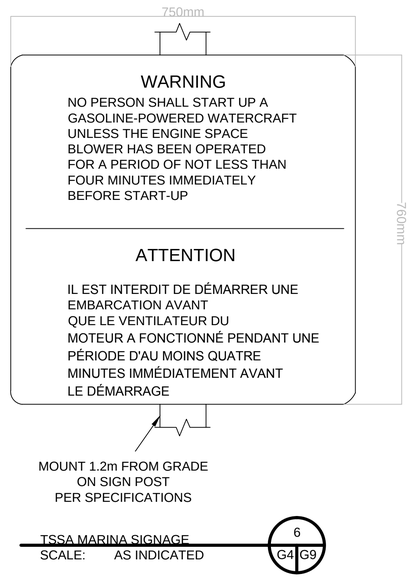
PUMP SIGNAGE
SCALE: AS INDICATED — 3 / G7 G9



SAFETY SIGNAGE
SCALE: AS INDICATED — 4 / G4 G9



TSSA MARINA SIGNAGE
SCALE: AS INDICATED — 5 / G4 G9



TSSA MARINA SIGNAGE
SCALE: AS INDICATED — 6 / G4 G9

Public Works and Government Services Canada
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Ontario Region
Travaux publics et Services gouvernementaux Canada
Services d'architecture et de génie
Région de l'Ontario

WSP

LICENCED PROFESSIONAL ENGINEER
J. M. DOLAN
90502741
2016/10/21
PROVINCE OF ONTARIO

LEGEND

- STORM SEWER
- WATERMAIN
- GAS PIPELINE
- PROPANE PIPE
- FUEL TANK PRODUCT PIPE
- ELECTRICAL CONDUIT
- FORCEMAIN
- IRON BAR
- APPROXIMATE PROPERTY BOUNDARY
- APPROXIMATE LIMIT OF ASPHALT SAW-CUT
- CONTRACTOR SUPPLIED TEMPORARY CHAIN-LINK FENCE ENCLOSURE

revision		date
04		
03		
02	Issued for Tender	Nov 1
01	Issued for 99% Review	Oct 26

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A Detail No. No. du détail
B drawing no. – where detail required dessin no. – où détail exigé
C drawing no. – where detailed dessin no. – où détaillé

project title / titre du projet
Ontario
FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS – PARKS CANADA
Georgian Bay Islands National Park
2611 Muskoka Rd 5, Honey Harbour, ON

drawing title / titre du dessin
SAFETY SIGNS AND TAGS

drawn by / dessine par: HET
designed by / conc par: JD
approved by / approuve par: JD
tender / soumission: Javier Banuelos
project manager / administrateur de projets
project date / date du projet: 2016/10/21
project no. / no. du projet: R.079639.001
drawing no. / dessine no.: G9

12mm GALVANIZED U-BOLT (typ.)

350mm

IN THE EVENT OF A SPILL OR EMERGENCY:

- IN THE EVENT OF A SPILL OR EMERGENCY:
- ENSURE PERSONAL AND PUBLIC SAFETY. NOTIFY PEOPLE IN IMMEDIATE AREA OF POTENTIAL DANGER AS REQUIRED.
- CLOSE CONTAINMENT CURB VALVE
- CONTAIN SPILL USING APPROPRIATE SPILL KITS AND SAFETY EQUIPMENT
- ISOLATE AND STOP LEAK, IF POSSIBLE PREVENT SPILLED PRODUCT FROM ENTERING INTO THE ENVIRONMENT
- COMPLETE CLEAN UP OF SPILLED PRODUCT USING APPROPRIATE SPILL KITS AND SAFETY EQUIPMENT
- CONTACT ENVIRONMENT CANADA ENVIRONMENT EMERGENCY 1-800-565-1633
- CONTACT ONTARIO SPILLS ACTION CENTRE AT 1-800-268-6060
- REFER TO SITE EMERGENCY RESPONSE PLAN FOR ADDITIONAL REQUIREMENTS.

EN CAS DE DÉVERSEMENT OU D`URGENCE:

- ASSUREZ VOTRE SÉCURITÉ ET CELLE DU PUBLIC. AU BESOIN, AVISEZ LES GENS DANS LES ENVIRONS IMMÉDIATS DES DANGERS POTENTIELS.
- FERMEZ LA VANNE DE CONFINEMENT.
- CONTENIR LE DÉVERSEMENT AVEC UNE TROUSSE ANTIDÉVERSEMENT ET L'ÉQUIPEMENT DE SÉCURITÉ APPROPRIÉ
- ISOLEZ ET ARRÊTEZ LA FUITE. SI POSSIBLE, EMPÊCHEZ LE PRODUIT DÉVERSÉ DE REJOINDRE L'ÉNVIRONNMENT ET LE PORT.
- NETTOYEZ LE PRODUIT DÉVERSÉ AVEC UNE TROUSSE ANTIDÉVERSEMENT ET L'ÉQUIPEMENT DE SÉCURITÉ APPROPRIÉS.
- CONTACTEZ LA LIGNE D'URGENCES ENVIRONNEMENTALES D`ENVIRONNEMENT CANADA AU 1-800-565-1633.
- CONTACTER LE CENTRE D'INTERVENTION AU CAS DE DÉVERSEMENTS DE L'ONTARIO 1-800-268-6060
- SE RÉFÉREZ AU PLAN D`INTERVENTION D'URGENCES POUR DES EXIGENCES SUPPLÉMENTAIRES.

500mm

FUEL DELIVERY STANDARD OPERATING PROCEDURES:

PRIOR TO PRODUCT TRANSFER:

1. ENSURE A SPILL KIT WITH SPILL RESPONSE MATERIAL IS PRESENT
   - SPILL RESPONSE MATERIALS TO INCLUDE:
     - ABSORBENT PADS
     - ABSORBENT/CONTAINMENT SOCKS
   - ENSURE THAT THE ENVIRONMENTAL PTA CONTAINMENT CURB AREA IS FREE OF SNOW/WATER ACCUMULATION
   - INSPECT DELIVERY HOSE AND FITTINGS
   - CONFIRM AVAILABLE TANK VOLUME
   - ENSURE DELIVERY TRUCK AND HOSE ARE ENTIRELY WITHIN CONCRETE PRODUCT TRANSFER AREA
   - CLOSE PRODUCT CONTAINMENT AREA VALVE
2. DURING PRODUCT TRANSFER:
   - ENSURE THE DELIVERY TRUCK OPERATOR USES A LIQUID AND VAPOUR TIGHT CONNECTION
   - REMAIN IN ATTENDANCE AT FILL CONNECTION AT ALL TIMES
   - WHEN TANK GAUGE READS 90% TANK CAPACITY, SLOW OR STOP DELIVERY, POSITIVE CLOSING SHUT-OFF VALVE IS SET TO STOP FLOW AT 95% TANK CAPACITY
3. AFTER PRODUCT TRANSFER
   - VERIFY NO SPILLS/RESIDUAL PRODUCT ARE PRESENT
   - IF SPILL OR RESDUAL PRODUCT, CLEAN WITH APPROPIATE MATERIALS
   - COMPLETE NECESSARY DOCUMENTATION
   - OPEN PRODUCT CONTAINMENT AREA VALVE

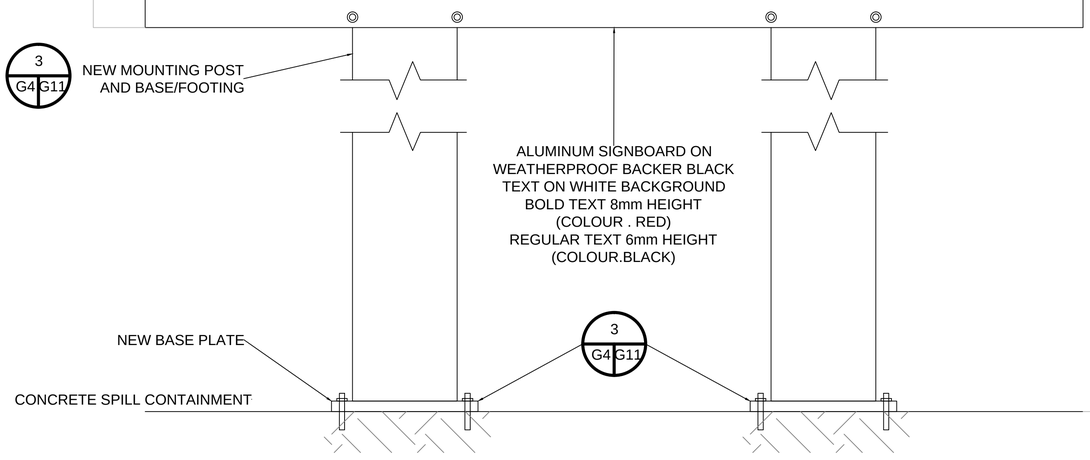
INCASE OF SPILL

CALL 1-800-268-6060

PROCÉDURES D`OPÉRATION NORMALISÉES POUR LA LIVRAISON DE CARBURANT:

1. AVANT LE TRANSFERT DU PRODUIT:
   - S'ASSUREZ QU'UNE TROUSSE ANTIDÉEVERSEMENT CONTENANT LE MATÉRIEL D'INTERVENTION AUCAS D'URGENCE SE TROUVE SUR PLACE
   - LE MATÉRIEL D'INTERVENTION D'URGENCE DOIT COMPRENDRE:
     - DES TAMPONS ABSORBANTS
     - DES BARRAGES DE RÉTENTION/ABSORBANTS
   - S'ASSUREZ QUE L'AIRE DE TRANSFERT ET DE RÉTENTION NE CONTIENT PAS DE NEIGE NI D'EAU
   - INSPECTEZ LE TUYAU DE LIVRAISON ET SES RACCORDS
   - VÉRIFIEZ LE VOLUME DU RÉSERVOIR
   - J'ASSUREZ QUE LE CAMION DE LIVRAISON ET LE TUYAU SONT ENTIÉREMENT A L'INTÉRIEUR DE LA ZONE DE TRANSFERT EN BÉTON
   - FERMEZ LA VANNE DE CONFINEMENT
2. PENDENT LE TRANSFER DU PRODUIT:
   - S'ASSUREZ QUE L'OPÉRATEUR DU CAMION DE LIVRAISON UTILISE UNE CONNEXION ÉTANCHE AUX LIQUIDES ET A LA VAPEUR
   - DEMEUREZ SUR PLACE AU POINT DE REMPLISSAGE PENDANT LE TRANSFERT
   - LORSQUE LA JAUGE DU RESERVOIR INDIQUE QUE LE RÉSERVOIR EST À 90% DE LA CAPACITÉ, RALENTISSEZ OU ARRÊTEZ LE TRANSFERT, UN DISPOSITIF D'ARRET EST RÉGLÉ POUR ARRÊTER L'ÉCOUCEMENT LORSQUE LE RÉSERVOIR EST REMPLI A 95% DE SA CAPACITÉ
3. APRÈS LE TRANSFERT DU PRODUIT:
   - VÉRIFIER QU'IL NY A PAS DE DÉVERSEMENT NI DE PRODUIT RÉSIDUEL
   - S'IL Y A UN DÉVERSEMENT OU DU PRODUIT RÉSIDUEL, NETTOYEZ AVEC LE MATÉRIEL APPROPRIÉ
   - REMPLISSEZ LA DOCUMENTATION REQUISE
   - OUVREZ LA VANNE CONFINEMENT

EN CAS DE DÉVERSEMENT
APPELER 1-800-268-6060

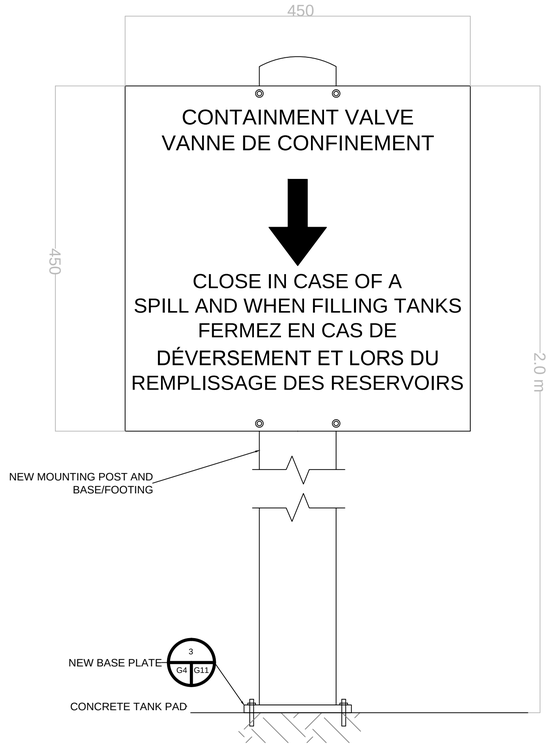


NEW PRODUCT TRANSFER AREA SIGNAGE
SCALE: AS INDICATED

1
G4 G11

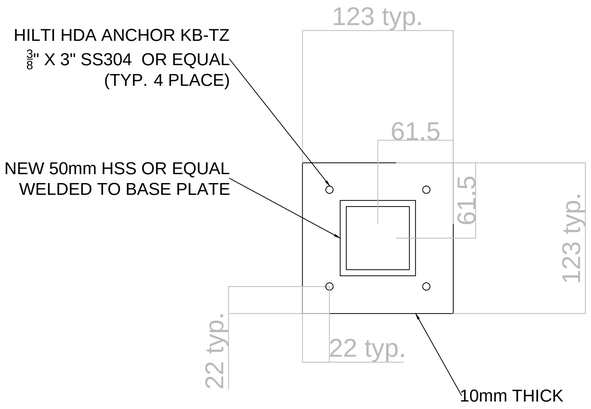
2.0 m

450



NEW CONTAINMENT VALVE SIGNAGE
SCALE: AS INDICATED

2
G4 G11



NEW BASE PLATE DETAIL
SCALE: AS INDICATE

3
G4 G11

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Region de l'Ontario

WSP

LICENSED PROFESSIONAL ENGINEER
J. M. DOLAN
90502741
PROVINCE OF ONTARIO

LEGEND

- ST — STORM SEWER
- W — WATERMAIN
- G — GAS PIPELINE
- P — PROPANE PIPE
- GO — FUEL TANK PRODUCT PIPE
- E — ELECTRICAL CONDUIT
- FM — FORCEMAIN
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project title / titre du projet
Ontario
FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS – PARKS CANADA
Georgian Bay Islands National Park
2611 Muskoka Rd 5, Honey Harbour, ON

drawing title / titre du dessin
NEW PRODUCT TRANSFER AREA SIGNAGE

drawn by / dessine par: HET
designed by / conc par: JD
approved by / approuve par: JD
tender / soumission: Javier Banuelos
project manager / administrateur de projets
project date / date du projet: 2016/10/21
project no. / no. du projet: R.079639.001
drawing no. / dessine no.: G10

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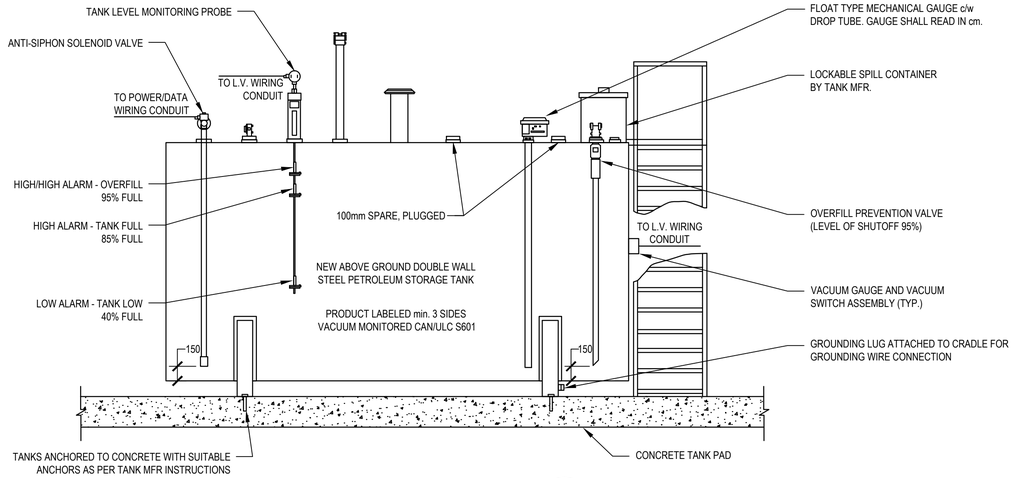
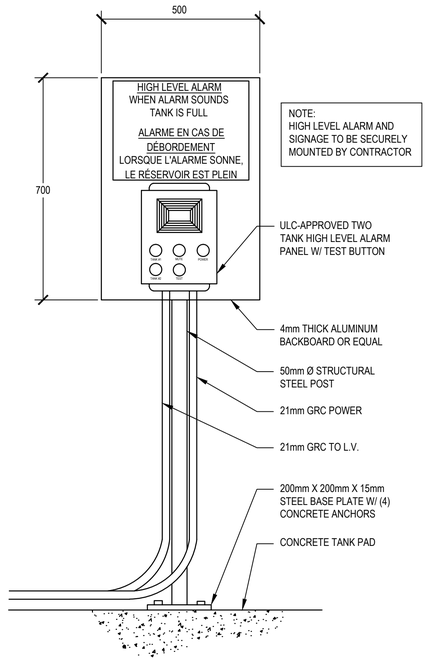
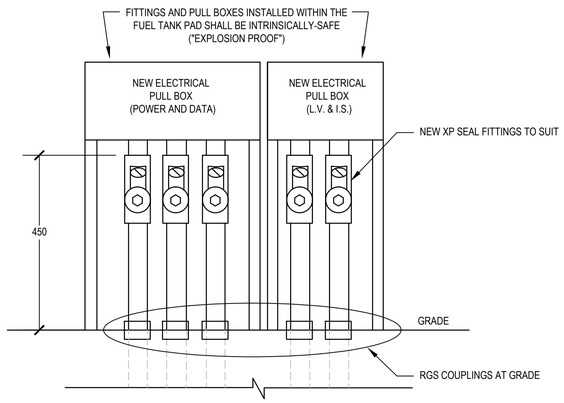


TANK MONITORING CONTROLS — 1 — G4 | G11
SCALE: NOT TO SCALE



TANK HIGH LEVEL ALARM — 2 — G4 | G11
SCALE: NOT TO SCALE



CONDUIT STUB-UPS — 3 — G4 | G11
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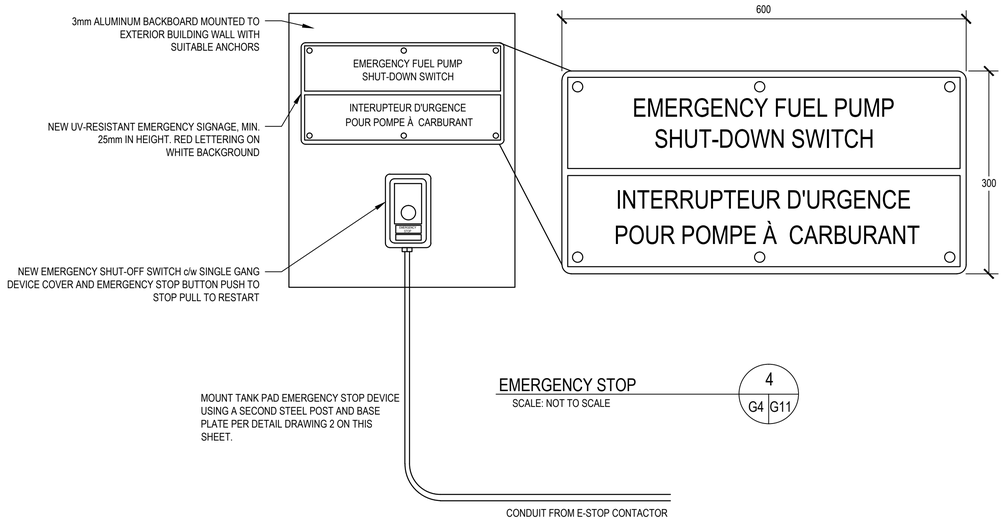

EMERGENCY STOP — 4 — G4 | G11
SCALE: NOT TO SCALE

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LICENSED PROFESSIONAL ENGINEER
J. M. DOLAN
90502741
19 NOV 2015
PROVINCE OF ONTARIO

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01	Issued for 99% Review	Oct 26
revision		date

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A B C
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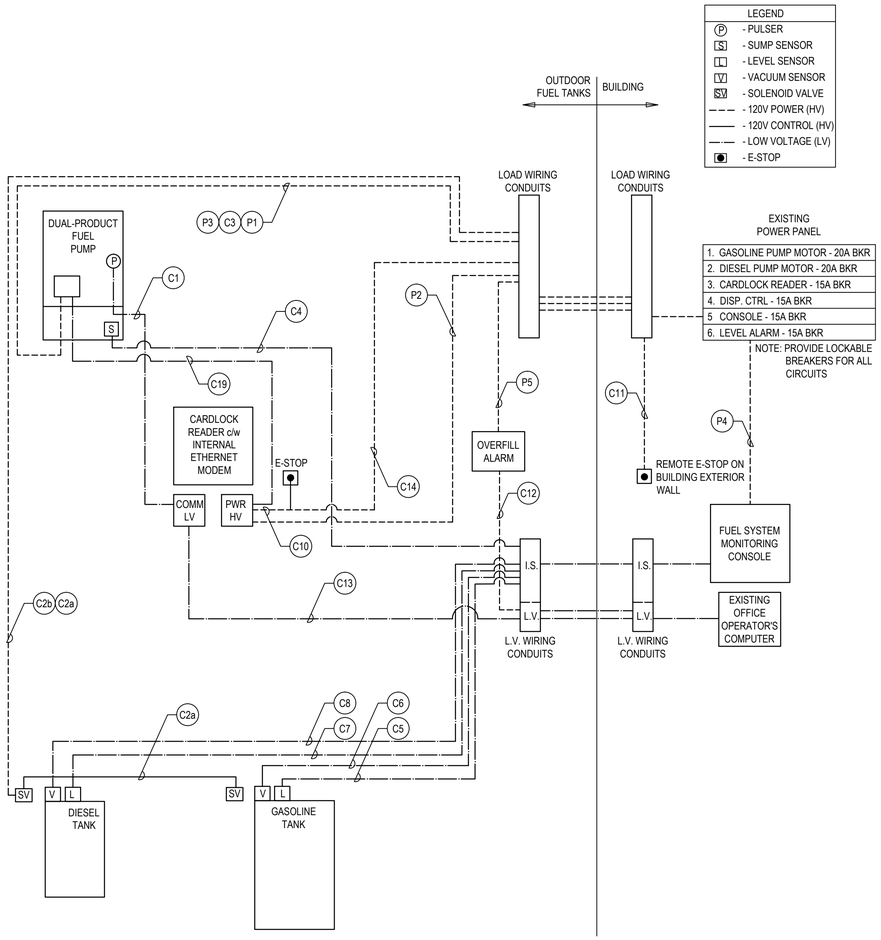
project title / titre du projet
Ontario
FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS – PARKS CANADA
Georgian Bay Islands National Park
2611 Muskoka Rd 5, Honey Harbour, ON

drawing title / titre du dessin
ELECTRICAL DETAILS

drawn by / dessine par: EJM
designed by / conc par: JD
approved by / approuve par: JD
tender / soumission: Javier Banuelos
project manager / administrateur de projets
project date / date du projet: 2016/10/26
project no. / no. du projet: R.079639.001
drawing no. / dessine no.: G11



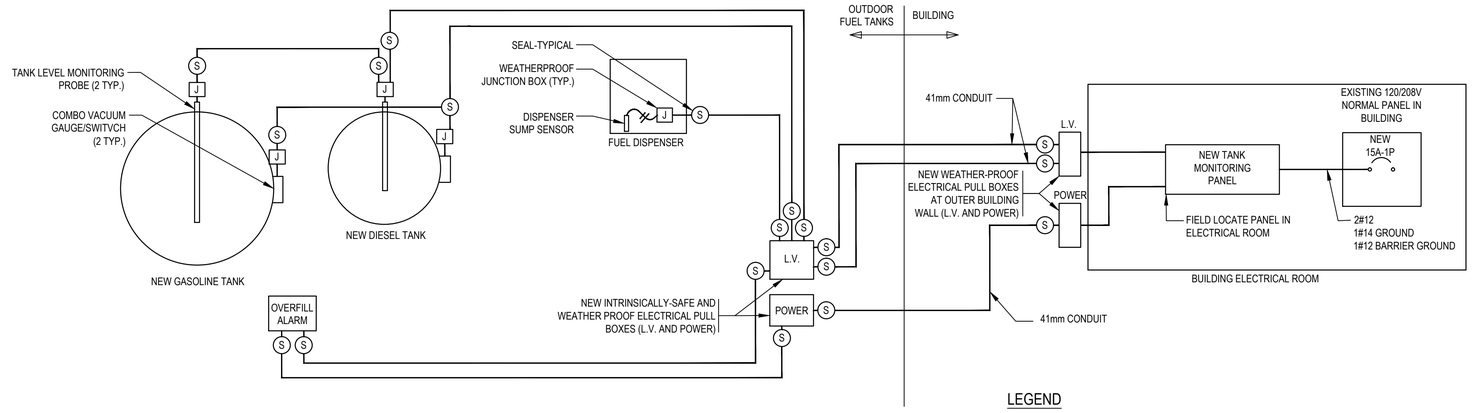
ELECTRICAL LINE DIAGRAM
SCALE: NOT TO SCALE
1 G4 G12

CONTROLS

I.D.	Device	From	To	Voltage	Conductors	Conduit Size	Comments
C1	Pump Pulser	Fuel Pump Pulser	Cardlock Reader	Low Voltage	Belden 83351E	21	Field Route
C2a	Gasoline Tank Solenoid Valve	Tank Pad Pull Box	Gasoline Dispenser	120 VAC	3C #12	21	Field Route from Pull Box to Solenoid
C2b	Diesel Tank Solenoid Valve	Tank Pad Pull Box	Diesel Dispenser	120 VAC	3C #12	21	Field Route from Pull Box to Solenoid
C3	Solenoid Valve Control	Fuel Dispenser	Solenoid Valves	120 VAC	3C #12	21	Field Route from
C4	Dispenser Sump Sensor	Fuel Dispenser	Monitoring Console	Intrinsically Safe	Belden 83351E	21	Install in Intrinsically Safe Conduit
C5	Gasoline Tank Level	Gasoline Tank Level	Monitoring Console	Intrinsically Safe	Belden 83351E	21	Install in Intrinsically Safe Conduit
C6	Gasoline Tank Vacuum Switch	Gasoline Tank Vacuum Switch	Monitoring Console	Intrinsically Safe	Belden 83351E	21	Install in Intrinsically Safe Conduit
C7	Diesel Tank Level	Diesel Tank Level	Monitoring Console	Intrinsically Safe	Belden 83351E	21	Install in Intrinsically Safe Conduit
C8	Diesel Tank Vacuum Switch	Diesel Tank Vacuum Switch	Monitoring Console	Intrinsically Safe	Belden 83351E	21	Install in Intrinsically Safe Conduit
C9	Dispenser Power	Fuel Dispenser	Cardlock Reader	120 VAC	3C #12	21	Field Route
C10	Emergency Stop (Tank Pad)	Tank Pad E-Stop	Cardlock Reader	120 VAC	3C #12	21	Field Route
C11	Emergency Stop (Building)	Building Exterior Wall E-Stop	Cardlock Reader	120 VAC	3C #12	21	Field Route
C12	Tank Level Alarm	Office Computer	Level Alarm	Low Voltage	CAT6 Ethernet	27	Install in Low Voltage Conduit
C13	Cardlock Reader Communication	Office Computer	Cardlock Reader	Low Voltage	CAT6 Ethernet	27	Install in Low Voltage Conduit

LOAD POWER

I.D.	Device	Load (Amperes)	Breaker Size	Wire Size (AWG)	Bond Size (AWG)	Conduit Size	Comments
P1	Duel-Product Fuel Pump	12.4 per Motor (two motors total)	2 x 20A	2 x 2C#6	2 x #8	35	Install in dedicated load wire conduit. One circuit per motor
P2	Cardlock Reader	3	15A	2C #12	#12	21	Install in dedicated load wire conduit.
P3	Dispenser Control	3	15A	2C #12	#12	21	Install in dedicated load wire conduit.
P4	Monitor Console	10 or less	15A	2C #12	#12	21	Field Route
P5	Level Alarm	1.5	15A	2C #12	#12	21	Install in dedicated load wire conduit.



LEGEND
J WEATHER-PROOF JUNCTION BOX
S SEAL
L.V. LOW-VOLTAGE CONDUCTORS

FUEL SYSTEM MONITORING CONSOLE SCHEMATIC
SCALE: NOT TO SCALE
2 G4 G12

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Région de l'Ontario

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LICENSED PROFESSIONAL ENGINEER
J. M. DOLAN
90502741
19 Nov 2016
PROVINCE OF ONTARIO

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04		
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Ontario
FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS – PARKS CANADA
Georgian Bay Islands National Park
2611 Muskoka Rd 5, Honey Harbour, ON

drawing title / titre du dessin
ELECTRICAL SCHEMATICS

drawn by / dessine par: JLK
designed by / conc par: JD
approved by / approuve par: JD
tender / soumission: Javier Banuelos
project manager / administrateur de projets
project date / date du projet: 2016/10/26
project no. / no. du projet: R.079639.001
drawing no. / dessine no.: G12

APPENDIX E

DRAWING SET

LIQUID FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS
BRUCE PENINSULA NATIONAL PARK OF CANADA
CYPRUS LAKE MAINTENANCE YARD
469 CYPRUS LAKE ROAD, NEAR TOBERMORY, ONTARIO

FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS - PARKS CANADA

Bruce Peninsula National Park
Cyprus Lake Maintenance Yard
469 Cyprus Lake Road, Tobermory, Ontario

LIST OF DRAWINGS

Drawing Number	Drawing Title
BC1	Title Sheet
BC2A	Notes (1 of 2)
BC2B	Notes (2 of 2)
BC3	Existing Conditions and Demolition Plan
BC4	New Fuel System Layout
BC5	Concrete Tank Pad and Apron
BC6	Concrete Details
BC7	Storage Tank and Fuel Pump Details
BC8	Mechanical Details
BC9	Signs and Tags
BC10	New Product Transfer Area Signage
BC11	Electrical Details
BC12	Electrical Schematics

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Architectural and Engineering Services
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Travaux publics et Services gouvernementaux Canada
Services d'architecture et de génie
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LEGEND

- ST — STORM SEWER
- W — WATERMAIN
- G — GAS PIPELINE
- P — PROPANE PIPE
- GO — FUEL TANK PRODUCT PIPE
- E — ELECTRICAL CONDUIT
- FM — FORCEMAIN
- SIB — IRON BAR
- APPROXIMATE PROPERTY BOUNDARY
- APPROXIMATE LIMIT OF ASPHALT SAW-CUT
- CONTRACTOR SUPPLIED TEMPORARY CHAIN-LINK FENCE ENCLOSURE

revision		date
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project title / titre du projet

Ontario

FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS – PARKS CANADA
Bruce Peninsula National Park
Cyprus Lake Maintenance Yard
469 Cyprus Lake Road, Tobermory, ON

drawing title / titre du dessin

TITLE SHEET

drawn by / dessine par: HET

designed by / conc par: JD

approved by / approuve par: JD

tender / soumission: Javier Banuelos

project manager / administrateur de projets

project date / date du projet: 2016/10/25

project no. / no. du projet: R.079639.001

drawing no. / dessine no.: BC1

GENERAL NOTES:

1. SYSTEM IS TO BE INSTALLED AS PER:
   - NATIONAL FIRE CODE OF CANADA (2010);
   - CEPA SOR/2008-197 STORAGE TANK SYSTEMS FOR PETROLEUM PRODUCTS AND ALLIED PETROLEUM PRODUCTS REGULATIONS;
   - CANADIAN COUNCIL OF MINISTERS OF THE ENVIRONMENT, PN1326 ENVIRONMENTAL CODE OF PRACTICE FOR ABOVEGROUND AND UNDERGROUND STORAGE TANK SYSTEM CONTAINING PETROLEUM AND ALLIED PETROLEUM PRODUCTS;
   - CSA C22.1-2015 CANADIAN ELECTRICAL CODE, 22ND EDITION;
   - ALL MANUFACTURER'S INSTRUCTIONS AND SPECIFICATIONS; AND
   - OTHER LOCAL, PROVINCIAL, FEDERAL REGULATIONS, ALL LATEST EDITIONS.
2. A CONTRACTOR SUBMITTING A BID IS REQUIRED TO BE KNOWLEDGEABLE IN PETROLEUM STORAGE TANK SYSTEMS AND RELATED EQUIPMENT.
3. IF FURTHER CLARIFICATIONS ARE REQUIRED ON EQUIPMENT OR THE INSTALLATION OF EQUIPMENT, IT IS THE CONTRACTORS RESPONSIBILITY TO REQUEST CLARIFICATIONS FROM CONSULTANT/OWNER.
4. ALL PIPING, ELBOWS, TEES, REDUCERS, UNIONS AND FITTINGS TO BE SOCKET WELD STEEL ASTM A312. ALL FITTINGS TO BE WELDED UNLESS OTHERWISE SPECIFIED. THREADED FITTINGS MUST BE SEALED WITH PETROLEUM RESISTANT SEAL.
5. CONTRACTOR TO REINSTATE DISTURBED SITE CONDITIONS TO MATCH EXISTING TO THE SATISFACTION OF THE ENGINEER AND DEPARTMENTAL REPRESENTATIVE AND OPERATIONS MANAGER ON-SITE. THE CONTRACTOR IS RESPONSIBLE FOR DAILY CLEANING OF WORK AREA.
6. CONTRACTOR SHALL NOT UNDERMINE OR COMPROMISE ANY FOOTINGS OR FOUNDATION STRUCTURES. ALWAYS BE AWARE OF THE LOCATION OF EXISTING UTILITIES AND OVERHEAD POWER LINES.
7. SITE UTILITIES ARE NOT LOCATED ON THESE DRAWINGS. CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL UTILITY LOCATES, CLEARANCES AND PERMITS PRIOR TO COMMENCEMENT OF WORK.
8. PIPING LAYOUTS ILLUSTRATED ON DRAWINGS INDICATED THE GENERAL ROUTING OF PIPE WORK AND DOES NOT SHOW ALL THE FITTINGS AND OFFSETS REQUIRED FOR THE COMPLETE INSTALLATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL PIPING, FITTINGS & OFFSETS REQUIRED.
9. THE CONTRACTOR SHALL PROVIDE A TWELVE (12) MONTH WARRANTY ON ALL LABOUR, MATERIAL AND EQUIPMENT.
10. THE CONTRACTOR SHALL PROVIDE A PAPER COPY AND AN ELECTRONIC COPY OF THE OPERATION AND MAINTENANCE MANUALS PRIOR TO COMMISSIONING.
11. THE CONTRACTOR SHALL PROVIDE AS BUILT DRAWINGS IN PAPER AND ELECTRONIC COPIES PRIOR TO FIRST FILL OF THE SYSTEM.
12. THE CONTRACTOR SHALL TRAIN THE SYSTEM OPERATORS AFTER THE NEW SYSTEM HAS BEEN INSTALLED.
13. THE CONTRACTOR IS RESPONSIBLE FOR THE COST OF COMMISSIONING AND TESTING ALL NEW AND REINSTATED EQUIPMENT.
14. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL EXISTING PIPING, FITTINGS, TANKS, AND FUEL AS PER FEDERAL REGULATIONS.
15. ALL EQUIPMENT SHALL BE STORED AND INSTALLED AS PER THE MANUFACTURER'S INSTRUCTIONS.
16. CONTRACTOR SHALL POST THE EC LABEL PRIOR TO FIRST FILL

MECHANICAL NOTES:

1. ALL PIPE SIZES ARE SHOWN IN MILLIMETERS.
2. INSTALL EQUIPMENT AS PER MANUFACTURER'S RECOMMENDATIONS. CLEARANCES AROUND NEW EQUIPMENT TO BE AS PER MANUFACTURER'S RECOMMENDATIONS AND CODE REQUIREMENTS.
3. LAYOUT, ROUTING & LOCATIONS ARE INDICATIVE, CONTRACTOR TO VERIFY SITE CONDITIONS & COORDINATE INSTALLATION WITH ALL TRADES ON SITE CONTRACTOR TO ADAPT INSTALLATION TO SITE CONDITION.
4. PROVIDE NECESSARY EXPANSION LOOPS, COMPENSATORS, ANCHORS, GUIDES, SUPPORTS ETC. AND FIRESTOP FOR ALL AFFECTED SYSTEMS.
5. THE SPILL CONTAINMENT SHALL BE APPROVED TO CAN/ULC S663-11, SPILL CONTAINMENT DEVICES FOR ABOVE GROUND TANKS.
6. ALL PIPING TO BE SCH 40 ASTM A312, TYPE 304 STAINLESS STEEL. SOCKET WELDED FITTINGS TO BE ASTM A312.
7. PIPING AND TUBING SHALL BE RUN AS PRACTICAL AS POSSIBLE AND PROVISIONS SHALL BE MADE FOR EXPANSION, CONTRACTION, JARRING, VIBRATION AND SETTLING.
8. THE TANKS SHALL BE INSTALLED WITH GAUGES AND ULC LABEL THAT ARE ACCESSIBLE TO OPERATORS.
9. NEW TANKS SHALL BE DOUBLE WALLED AND EQUIPPED WITH VISUAL GAUGES, VACUUM GAUGE AND ACCESS TO INTERSTITIAL MONITORING.
10. THE MAIN SUPPLY TANKS SHALL BE CONSTRUCTED TO ULC S601 STANDARD.
11. ALL PIPING SHOULD BE CLEARLY LABELED WITH CONTENTS. FLOW DIRECTION AND PRODUCT (DIESEL SUPPLY, GASOLINE SUPPLY). ALL FUEL RELATED EQUIPMENT SHALL BE CLEARLY IDENTIFIED.
12. THE CONTRACTOR SHALL COMPLETE AT A MINIMUM A TWO HOUR PRESSURE TEST USING NITROGEN GAS AT 50psi ON THE FUEL PIPING. TESTING TO BE CONDUCTED AFTER THE INSTALLATION IS COMPLETE AND PRIOR TO SYSTEM COMMISSIONING.
13. ALL GASKETS TO BE RATED FOR A MINIMUM TEMPERATURE OF 1000°F (BUNA-N OR EQUIVALENT).

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revision		date
04		
03	Issued for Tender	Nov 1
02	Issued for 99% Review	Oct 26
01	Issued for 75% Review	Oct 18

Do not scale drawings.
Verify all dimensions and conditions on site and immediately notify the engineer of all discrepancies.

A Detail No. / No. du détail
B drawing no. – where detail required / dessin no. – où détail exigé
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project title / titre du projet

Ontario

FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS – PARKS CANADA

Bruce Peninsula National Park
Cyprus Lake Maintenance Yard
469 Cyprus Lake Road, Tobermory, ON

drawing title / titre du dessin

NOTES (1 of 2)

drawn by / dessine par: HET

designed by / conc par: JD

approved by / approuve par: JD

tender / soumission: Javier Banuelos — project manager / administrateur de projets

project date / date du projet: 2016/10/25

project no. / no. du projet: R.079639.001

drawing no. / dessine no.: BC2A

ELECTRICAL NOTES

1. GENERAL CONDITIONS
   a. PROVIDE ALL LABOUR, EQUIPMENT, MATERIALS & TOOLS NECESSARY TO COMPLETE ALL SYSTEMS SHOWN ON THE DRAWINGS, THUS RENDERING A COMPLETE INSTALLATION.
   b. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN OR INDICATED.
   c. CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS, DIMENSIONS, ELEVATIONS ETC. IN THE FIELD.
2. CODES, PERMITS AND INSPECTION
   a. PAY FOR & BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS AS REQUIRED BY AUTHORITIES HAVING JURISDICTION OVER THIS WORK. INCLUDE THESE COSTS IN THE TENDER PRICE. SUBMIT FINAL INSPECTION REPORT TO OWNER.
   b. INSTALLATION SHALL CONFORM TO THE REQUIREMENTS OF THE CANADIAN ELECTRICAL CODE, 2015 EDITION, PROVINCIAL & FEDERAL CODES AND LOCAL BYLAWS AND N.S. STANDARDS FOR CONSTRUCTION AND INSTALLATION FOR PETROLEUM STORAGE TANK SYSTEMS, 1997.
3. DRAWING
   a. PREPARE AND PAY FOR ANY LARGE SCALE WORKING DRAWINGS WHICH MAY BE REQUIRED BY THE EXAMINING AUTHORITIES, INCLUDE THIS COST IN THE TENDER PRICE.
4. RECORD DRAWINGS
   a. KEEP A SEPARATE, COMPLETE, SET OF DRAWINGS ON SITE AND NOTE ALL CHANGES AND DEVIATIONS FROM THE ORIGINAL DESIGN. ONE SET OF THESE PLANS SHOWING AS-BUILT CONDITIONS SHALL BE FORWARDED TO THE OWNER AT THE COMPLETION OF THIS CONTRACT & BEFORE APPLYING FOR FINAL PAYMENT.
5. EXAMINATION OF SITE
   a. ANY DEVIATIONS AND/OR CONFLICTS ON SITE SHALL BE REPORTED TO THE DEPARTMENTAL REPRESENTATIVE PRIOR TO SUBMITTING TENDER.
6. IDENTIFICATION
   a. COLOUR CODE ALL ELECTRICAL JUNCTION BOXES TO BUILDING STANDARD. IDENTIFY WITH BLACK MARKER ON BOX COVERS ALL CIRCUITS CONTAINED WITHIN.
7. REVISIONS AND EXTRAS
   a. NO ADDITIONAL MONEY OVER THE CONTRACT PRICE SHALL BE PAID UNLESS AN APPROVED CHANGE ORDER IS ISSUED BY THE OWNER. CLAIMS FOR EXTRAS SHALL BE SUBMITTED WITH A COMPLETE BREAKDOWN OF MATERIAL, LABOUR, HOURLY RATES, ETC.
8. CLEANUP
   a. ALL CUTTING, PATCHING, & PAINTING REQUIRED FOR THE WORK OF THIS TRADE TO BE PERFORMED BY THE CONTRACTOR'S FORCES AT THE CONTRACTOR'S EXPENSE. CLEAN UP ALL DEBRIS UPON COMPLETION OF CONTRACT, COOPERATE WITH ALL OTHER TRADES.
   b. MAINTAIN SITE IN TIDY CONDITION FREE FROM ACCUMULATION OF WASTE PRODUCTS AND DEBRIS. UPON OBTAINING SUBSTANTIAL PERFORMANCE OF THE WORK, REMOVE SURPLUS PRODUCTS, TOOLS, MACHINERY, AND EQUIPMENT FROM THE SITE. COMPLETION OF CLEANUP IS REQUIRED FOR TOTAL PERFORMANCE OF THE WORK. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO REPAIR ANY DAMAGE DONE TO EXISTING FEATURES AS A RESULT OF THIS WORK. DAMAGED OR DISTURBED ITEMS SHALL BE REPLACED IN KIND AND AT NO ADDITIONAL COST TO THE OWNER.
9. EQUIPMENT AND MATERIAL
   a. ALL EQUIPMENT AND MATERIAL, UNLESS SPECIFICALLY NOTED OTHERWISE, SHALL BE NEW AND WITHOUT BLEMISH OR DEFECT. ALL MATERIAL SHALL BEAR A CSA (CANADIAN STANDARDS ASSOCIATION) APPROVAL STAMP. ALL DEVICES SHALL BE SPECIFICATION GRADE.
10. TESTING
   a. PERFORM TESTING ON EACH SYSTEM TO THE SATISFACTION OF THE OWNER AND SUBMIT TEST RESULTS FOR APPROVAL PRIOR TO THE FINAL ACCEPTANCE OF THE WORK.
   b. PANELS SHALL BE BALANCED WITHIN 5% OF LOAD PER PHASE. GROUNDING SHALL BE AS REQUIRED BY ELECTRICAL CODE.
11. ACCESSIBILITY
   a. ALL WORK SHALL BE INSTALLED SO AS TO BE READILY ACCESSIBLE FOR OPERATION, MAINTENANCE AND REPAIRS.
12. RESPONSIBILITY
   a. MAINTAIN RESPONSIBILITY FOR THE WORK UNTIL COMPLETION & FINAL ACCEPTANCE. REPLACE ANY ITEM THAT MAY BE DEFECTIVE, DAMAGED, LOST OR STOLEN WITHOUT ADDITIONAL COST TO THE OWNER OR DELAY TO THE COMPLETION OF THE PROJECT.
   b. THE OWNER SHALL NOT BE RESPONSIBLE FOR THE ACTS OF OMISSION OF THE CONTRACTOR, SUBCONTRACTOR OR THEIR AGENTS OR EMPLOYEES OR ANY OTHER PERSON PERFORMING WORK.
   c. THE CONTRACTOR SHALL DESIGN AND PROVIDE ANY TEMPORARY SHORING, BRACING, ETC. AS NEEDED FOR THE WORK SO AS NOT TO ENDANGER THE STRUCTURAL INTEGRITY OF ANY EXISTING FEATURE.
13. WARRANTY
   a. WARRANT ALL WORK AND APPARATUS INSTALLED UNDER THIS CONTRACT AGAINST ALL DEFECTS IN WORKMANSHIP AND MATERIAL FOR A PERIOD OF ONE YEAR AFTER LETTER OF FINAL ACCEPTANCE.
14. SAFETY
   a. OBSERVE ALL APPLICABLE SAFETY REQUIREMENTS INCLUDING THE USE OF SAFETY GLASSES, HARD HATS AND PROTECTION OF AREA WHEN WORKING OVERHEAD. THE CONTRACTOR SHALL ASSUME RESPONSIBILITY FOR CONTRACTOR SAFETY.
15. WIRING
   a. RUN ALL WIRING IN RIGID CONDUIT. INSTALL RIGID CONDUIT PERPENDICULAR & PARALLEL TO BUILDING LINES. SUPPORT RIGID CONDUIT IN ACCORDANCE WITH THE CANADIAN ELECTRICAL CODE. USE FLEXIBLE METAL CONDUIT FOR FINAL CONNECTIONS TO MOTORS AND VIBRATING EQUIPMENT. BX WIRE SHALL NOT BE USED EXCEPT WHERE EXPLICITLY SHOWN ON DRAWINGS.
   b. ALL WIRING TO BE 600V MINIMUM RATED #12 COPPER RW90 XLPE UNLESS NOTED OTHERWISE.
16. LOAD DISTRIBUTION PANELS
   a. THE CONTRACTOR SHALL VERIFY CIRCUIT BREAKER TYPE AND INSTALL CIRCUIT BREAKERS AS REQUIRED.
   b. ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR BALANCING THE CIRCUITS AND VERIFYING LOADING CAPACITY.

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revision		date
04		
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02	Issued for 99% Review	Oct 26
01	Issued for 75% Review	Oct 25

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project title / titre du projet

Ontario

FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS – PARKS CANADA

Bruce Peninsula National Park
Cyprus Lake Maintenance Yard
469 Cyprus Lake Road, Tobermory, ON

drawing title / titre du dessin

NOTES (2 of 2)

drawn by / dessine par: HET

designed by / conc par: JD

approved by / approuve par: JD

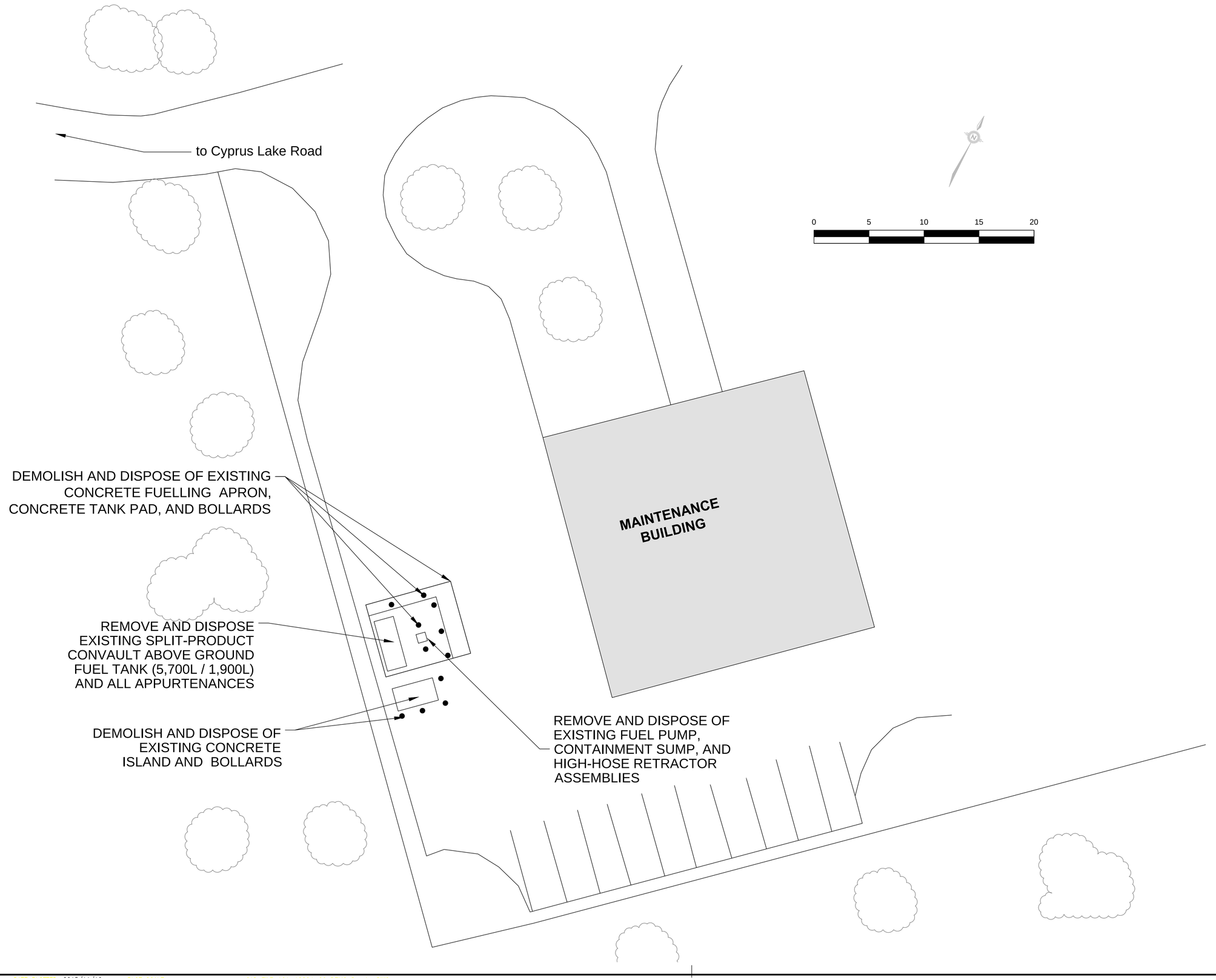
tender / soumission: Javier Banuelos

project manager / administrateur de projets

project date / date du projet: 2016/10/25

project no. / no. du projet: R.079639.001

drawing no. / dessine no.: BC2B



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PROVINCE OF ONTARIO

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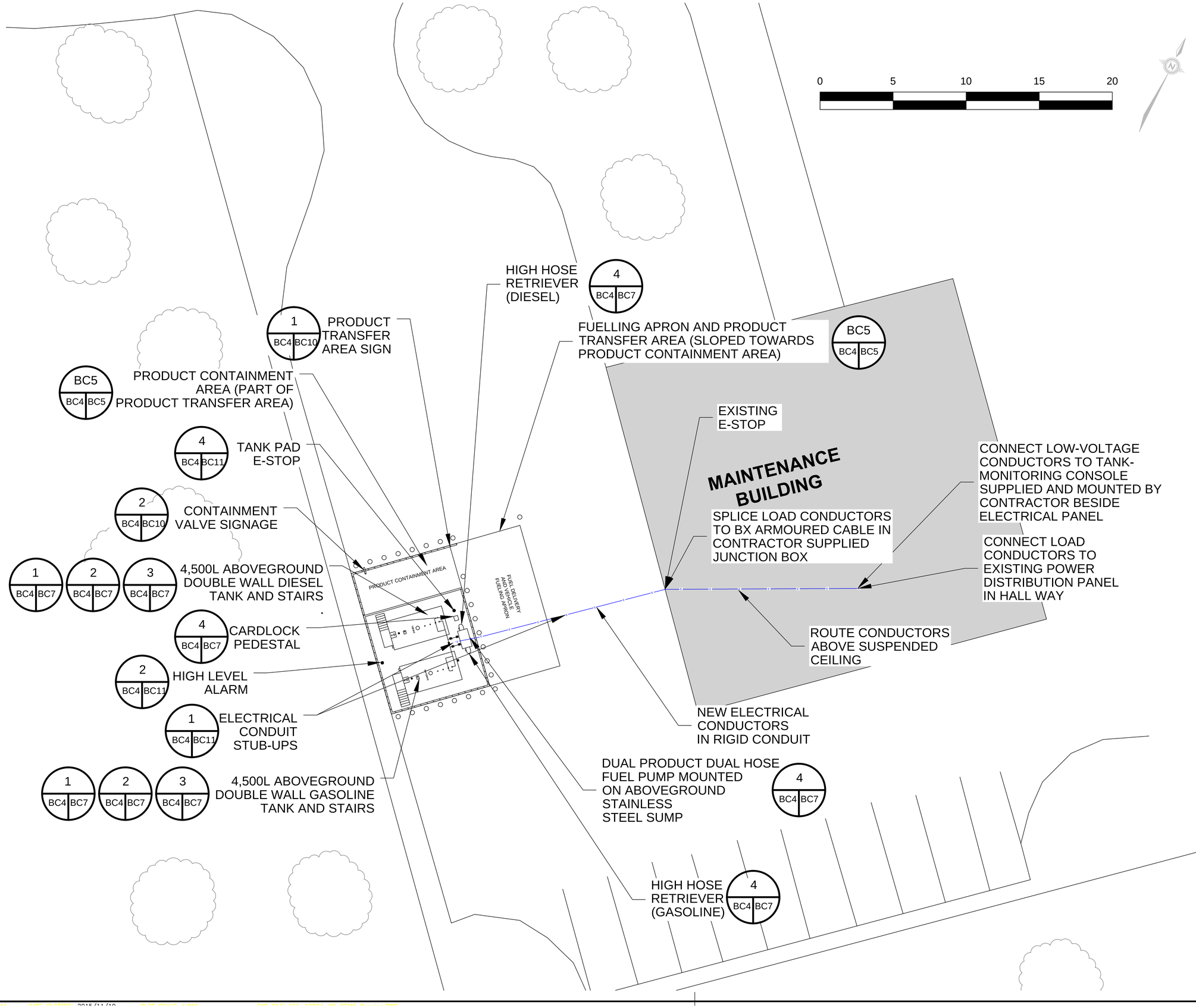
FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS – PARKS CANADA
Bruce Peninsula National Park
Cyprus Lake Maintenance Yard
469 Cyprus Lake Road, Tobermory, ON

drawing title / titre du dessin

EXISTING CONDITIONS AND DEMOLITION PLAN

drawn by / dessine par	HET
designed by / conc par	JD
approved by / approuve par	JD
tender / soumission	Javier Banuelos
project manager / administrateur de projets	
project date / date du projet	2016/10/25
project no. / no. du projet	R.079639.001
drawing no. / dessine no.	BC3



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PROVINCE OF ONTARIO

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FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS – PARKS CANADA

Bruce Peninsula National Park
Cyprus Lake Maintenance Yard
469 Cyprus Lake Road, Tobermory, ON

drawing title / titre du dessin

NEW FUEL SYSTEM LAYOUT

drawn by / dessine par: HET

designed by / conc par: JD

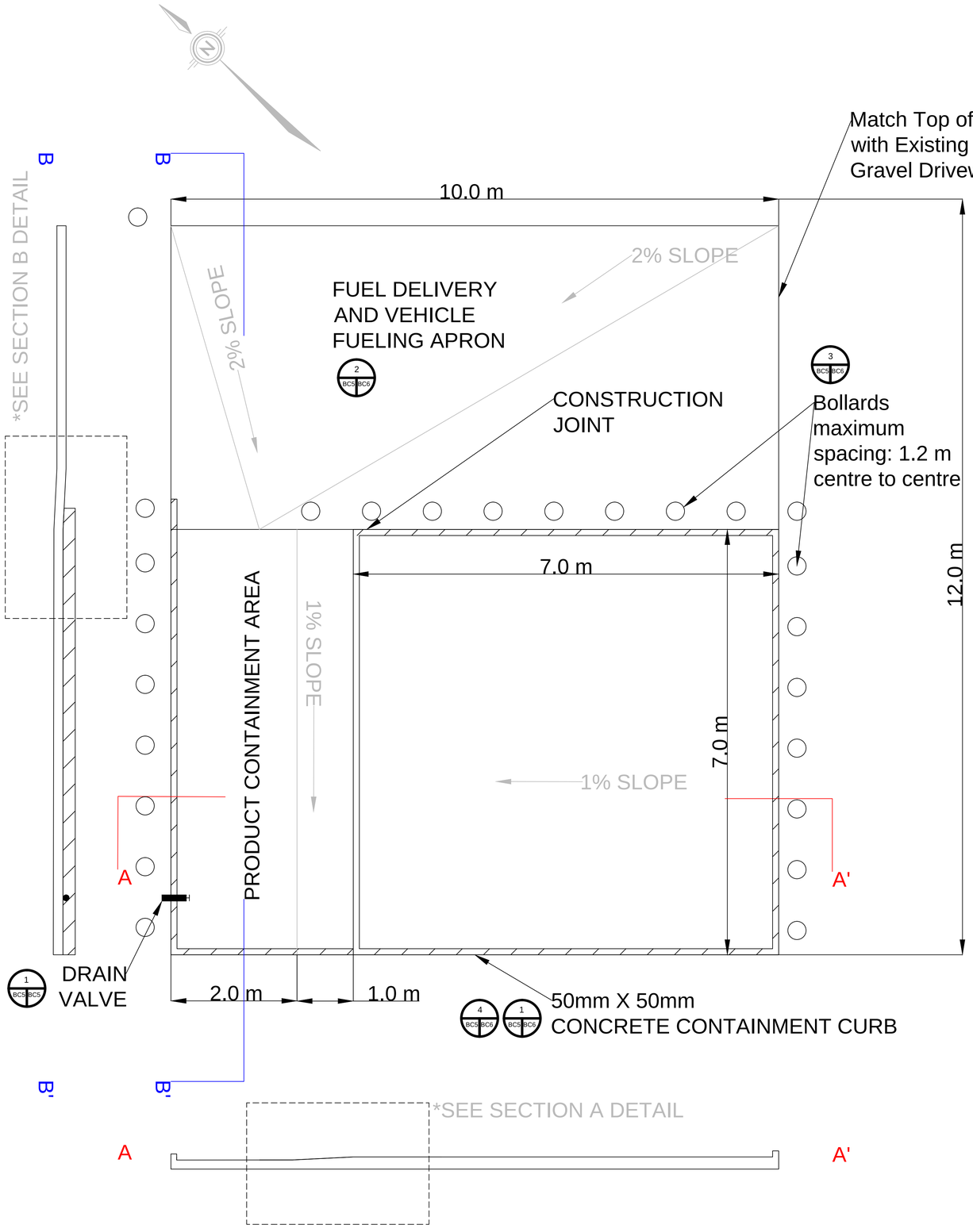
approved by / approuve par: JD

tender / soumission: Javier Banuelos — project manager / administrateur de projets

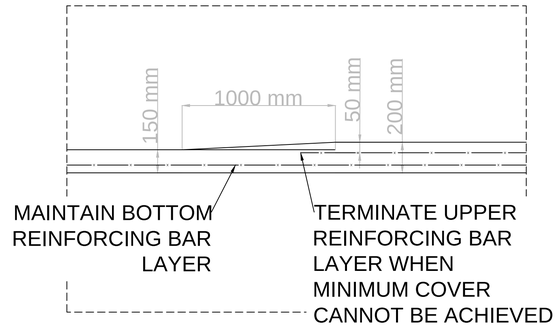
project date / date du projet: 2016/10/25

project no. / no. du projet: R.079639.001

drawing no. / dessine no.: BC4



SECTION A DETAIL



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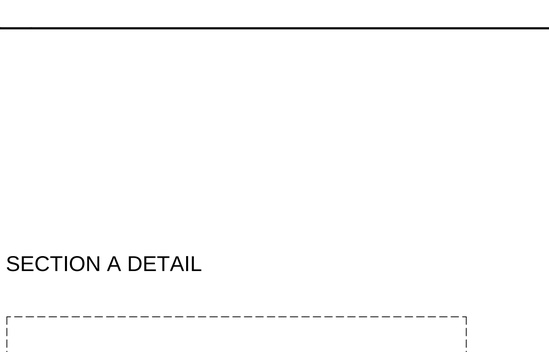

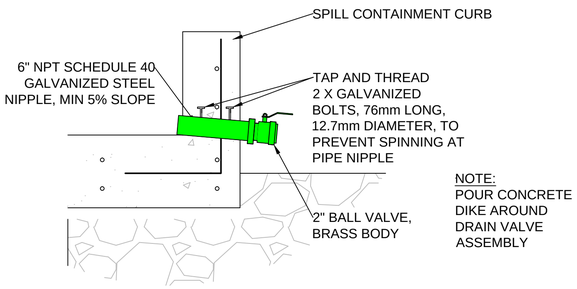

NOTE:
POUR CONCRETE
DIKE AROUND
DRAIN VALVE
ASSEMBLY

DRAIN VALVE DETAILS

SCALE: NOT TO SCALE

1
BC5 BC5

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J. M. DOLAN
90502741
2016/10/25
PROVINCE OF ONTARIO

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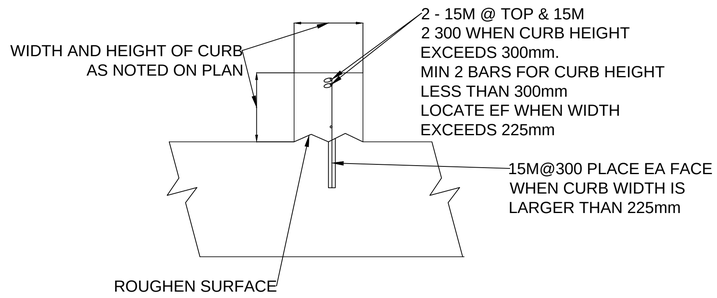
FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS – PARKS CANADA
Bruce Peninsula National Park
Cyprus Lake Maintenance Yard
469 Cyprus Lake Road, Tobermory, ON

drawing title / titre du dessin
CONCRETE TANK PAD
AND APRON

drawn by / dessine par: HET
designed by / conc par: JD
approved by / approuve par: JD
tender / soumission: Javier Banuelos
project manager / administrateur de projets
project date / date du projet: 2016/10/25
project no. / no. du projet: R.079639.001
drawing no. / dessine no.: BC5



CURB DETAIL
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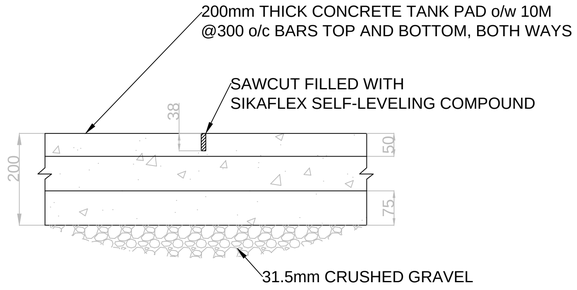
1 | BC5 BC6



SAWCUT DETAIL
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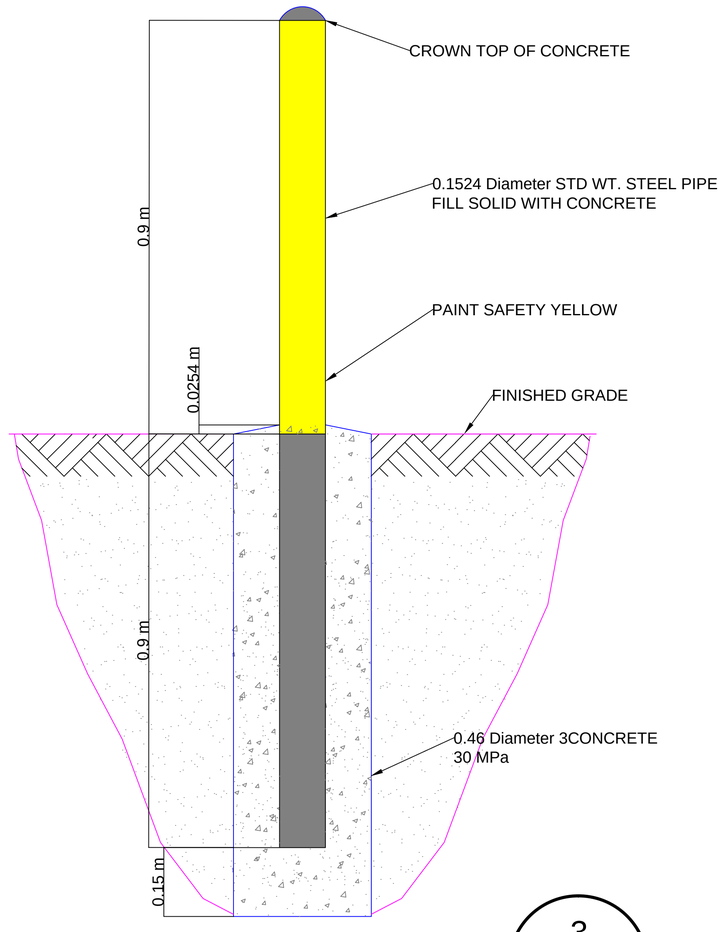

BOLLARD DETAIL
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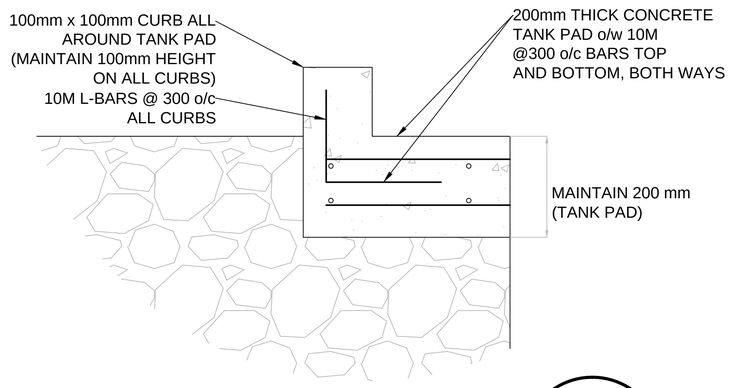
3 | BC5 BC6



PAD AND CURB DETAIL
SCALE: NOT TO SCALE

4 | BC5 BC6

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FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS – PARKS CANADA
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Cyprus Lake Maintenance Yard
469 Cyprus Lake Road, Tobermory, ON

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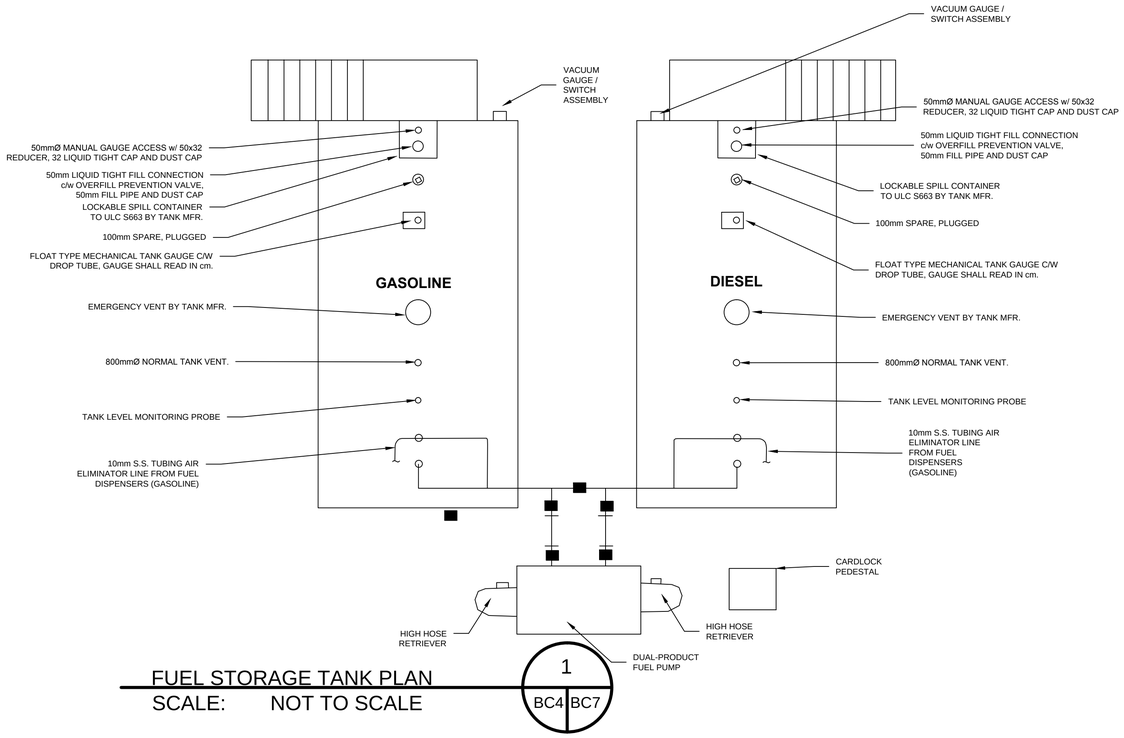
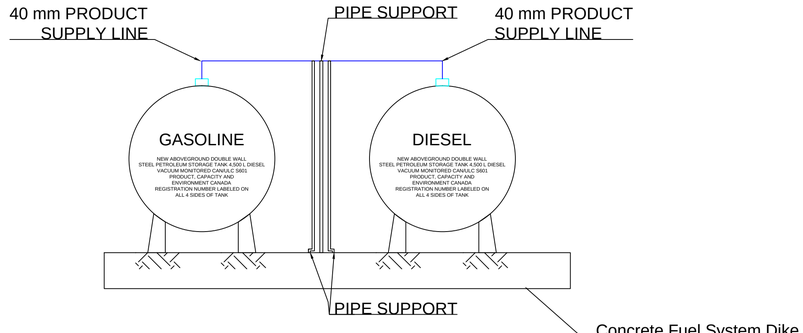
CONCRETE DETAILS
DEMOLITION PLAN

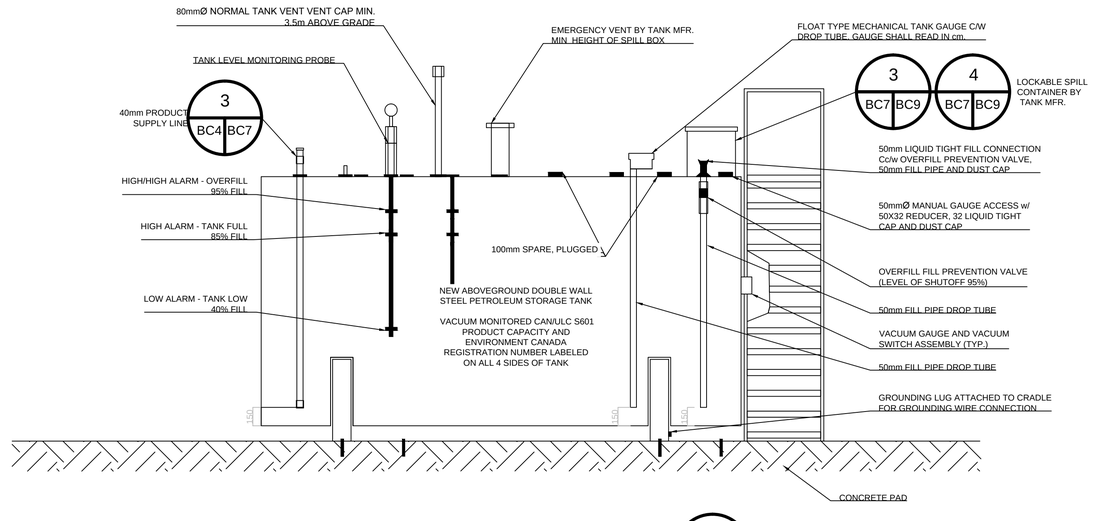
drawn by / dessine par: HET
designed by / conc par: JD
approved by / approuve par: JD
tender / soumission: Javier Banuelos
project manager / administrateur de projets
project date / date du projet: 2016/10/25
project no. / no. du projet: R.079639.001
drawing no. / dessine no.: BC6



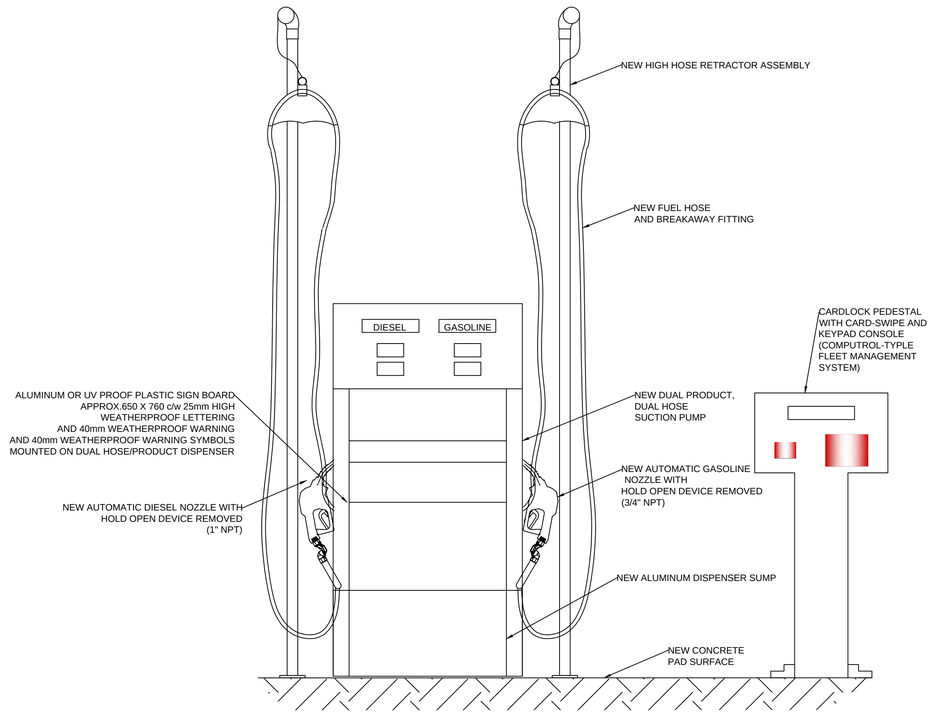
FUEL STORAGE TANK PLAN
SCALE: NOT TO SCALE
1 BC4 BC7



FUEL TANK CROSS SECTION
SCALE: NOT TO SCALE
2 BC4 BC7



FITTINGS AND CONTROLS
SCALE: NOT TO SCALE
3 BC4 BC7



PUMP AND HIGH HOSE RETREIVERS
SCALE: NOT TO SCALE
4 BC4 BC7

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project title
titre du projet

Ontario
FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS – PARKS CANADA
Bruce Peninsula National Park
Cyprus Lake Maintenance Yard
469 Cyprus Lake Road, Tobermory, ON

drawing title
titre du dessin

PRODUCT TRANSFER AREA SIGNAGE

drawn by / dessine par: HET
designed by / conc par: JD
approved by / approuve par: JD
tender / soumission: Javier Banuelos
project manager / administrateur de projets
project date / date du projet: 2016/10/25
project no. / no. du projet: R.079639.001
drawing no. / dessine no.: BC7

04 11

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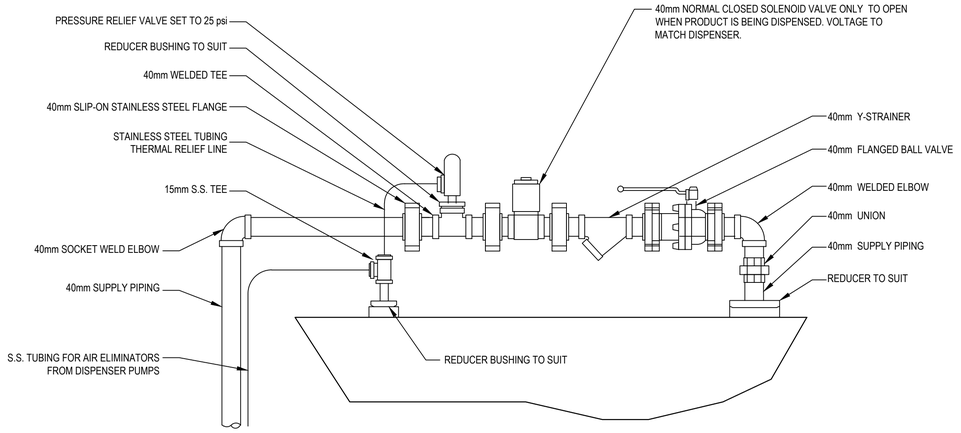

PRODUCT SUPPLY LINE DETAIL — 1 — BC4|BC8
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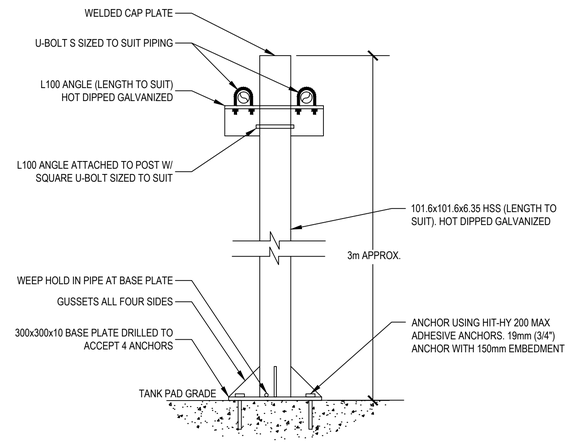

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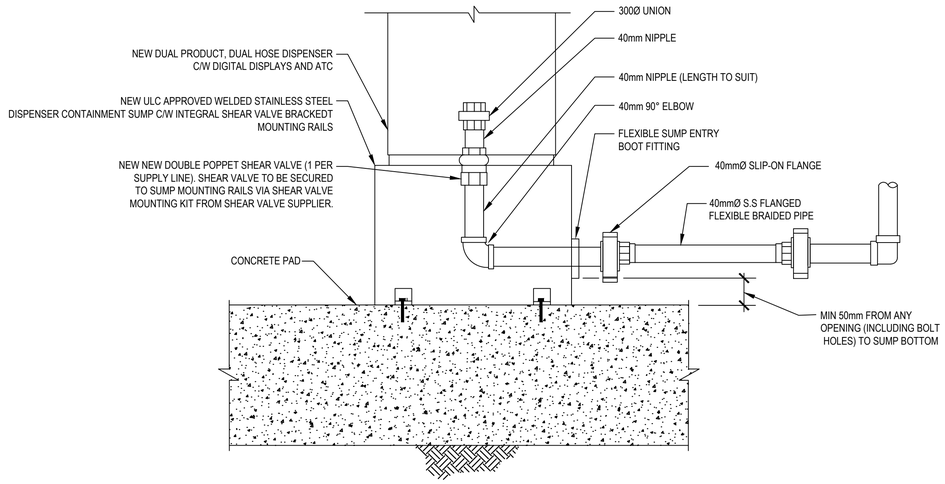

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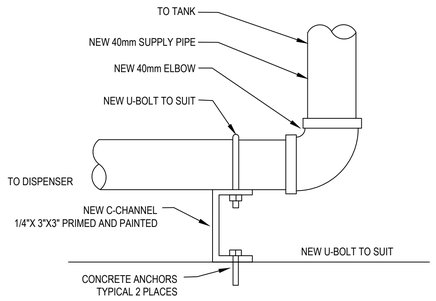

PAD-LEVEL PIPE SUPPORT — 4 — BC7|BC8
SCALE: NOT TO SCALE

Public Works and Government Services Canada
Architectural and Engineering Services
Ontario Region

Travaux publics et Services gouvernementaux Canada
Services d'architecture et de génie
Région de l'Ontario

WSP

LICENSED PROFESSIONAL ENGINEER
J. M. DOLAN
90502741
19 Nov 2015
PROVINCE OF ONTARIO

revision		date
04		
03		
02	Issued for Tender	Nov 1
01	Issued for 99% Review	Oct 26

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A / B C
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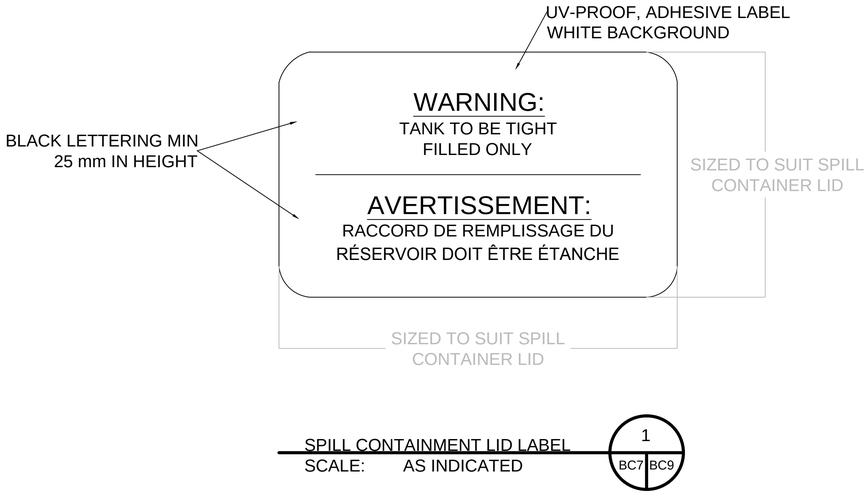
Bruce Peninsula National Park
Cyprus Lake Maintenance Yard
469 Cyprus Lake Road, near Tobermory, ON

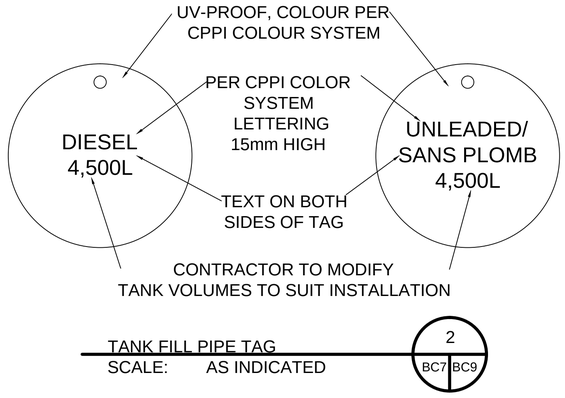
drawing title / titre du dessin
MECHANICAL DETAILS

drawn by / dessine par: JLK
designed by / conc par: JD
approved by / approuve par: JD
tender / soumission: Javier Banuelos
project manager / administrateur de projets
project date / date du projet: 2016/10/26
project no. / no. du projet: R.079639.001
drawing no. / dessine no.: BC8

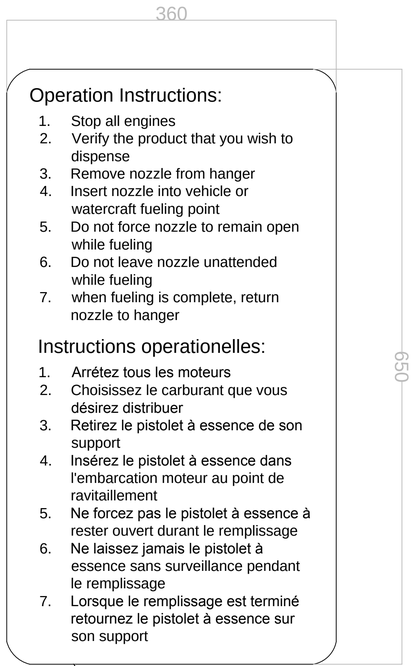
GSC–A1 DATE PLOTTED: 2015/11/10 PLOT SCALE: 1:250 CAD FILE: 161–12204–00 DEMO Drawing.DWG



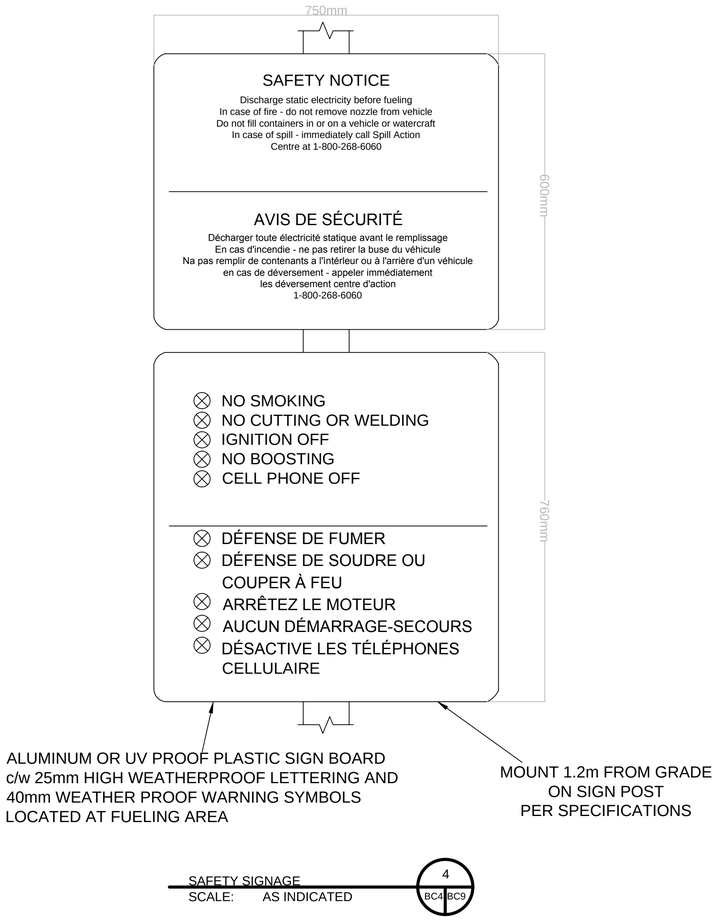
SPILL CONTAINMENT LID LABEL
SCALE: AS INDICATED — 1 — BC7 | BC9



TANK FILL PIPE TAG
SCALE: AS INDICATED — 2 — BC7 | BC9



PUMP SIGNAGE
SCALE: AS INDICATED — 3 — BC7 | BC9



SAFETY SIGNAGE
SCALE: AS INDICATED — 4 — BC4 | BC9

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Région de l'Ontario

WSP

LICENSED PROFESSIONAL ENGINEER
J. M. DOLAN
90502741
PROVINCE OF ONTARIO

LEGEND

- ST — STORM SEWER
- W — WATERMAIN
- G — GAS PIPELINE
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Bruce Peninsula National Park
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469 Cyprus Lake Road, Tobermory, ON

drawing title / titre du dessin
SAFETY
SIGNS AND TAGS

drawn by / dessine par: HET
designed by / conc par: JD
approved by / approuve par: JD
tender / soumission: Javier Banuelos
project manager / administrateur de projets:
project date / date du projet: 2016/10/25
project no. / no. du projet: R.079639.001
drawing no. / dessine no.: BC9

12mm GALVANIZED U-BOLT (typ.)

350mm

IN THE EVENT OF A SPILL OR EMERGENCY:

- IN THE EVENT OF A SPILL OR EMERGENCY:
- ENSURE PERSONAL AND PUBLIC SAFETY. NOTIFY PEOPLE IN IMMEDIATE AREA OF POTENTIAL DANGER AS REQUIRED.
- CLOSE CONTAINMENT CURB VALVE
- CONTAIN SPILL USING APPROPRIATE SPILL KITS AND SAFETY EQUIPMENT
- ISOLATE AND STOP LEAK, IF POSSIBLE PREVENT SPILLED PRODUCT FROM ENTERING INTO THE ENVIRONMENT
- COMPLETE CLEAN UP OF SPILLED PRODUCT USING APPROPRIATE SPILL KITS AND SAFETY EQUIPMENT
- CONTACT ENVIRONMENT CANADA ENVIRONMENT EMERGENCY 1-800-565-1633
- CONTACT ONTARIO SPILLS ACTION CENTRE AT 1-800-268-6060
- REFER TO SITE EMERGENCY RESPONSE PLAN FOR ADDITIONAL REQUIREMENTS.

EN CAS DE DÉVERSEMENT OU D`URGENCE:

- ASSUREZ VOTRE SÉCURITÉ ET CELLE DU PUBLIC. AU BESOIN, AVISEZ LES GENS DANS LES ENVIRONS IMMÉDIATS DES DANGERS POTENTIELS.
- FERMEZ LA VANNE DE CONFINEMENT.
- CONTENIR LE DÉVERSEMENT AVEC UNE TROUSSE ANTIDÉVERSEMENT ET L'ÉQUIPEMENT DE SÉCURITÉ APPROPRIÉ
- ISOLEZ ET ARRÊTEZ LA FUITE. SI POSSIBLE, EMPÊCHEZ LE PRODUIT DÉVERSÉ DE REJOINDRE L'ÉNVIRONNMENT ET LE PORT.
- NETTOYEZ LE PRODUIT DÉVERSÉ AVEC UNE TROUSSE ANTIDÉVERSEMENT ET L'ÉQUIPEMENT DE SÉCURITÉ APPROPRIÉS.
- CONTACTEZ LA LIGNE D'URGENCES ENVIRONNEMENTALES D`ENVIRONNEMENT CANADA AU 1-800-565-1633.
- CONTACTER LE CENTRE D'INTERVENTION AU CAS DE DÉVERSEMENTS DE L'ONTARIO 1-800-268-6060
- SE RÉFÉREZ AU PLAN D`INTERVENTION D'URGENCES POUR DES EXIGENCES SUPPLÉMENTAIRES.

500mm

FUEL DELIVERY STANDARD OPERATING PROCEDURES:

PRIOR TO PRODUCT TRANSFER:

1. ENSURE A SPILL KIT WITH SPILL RESPONSE MATERIAL IS PRESENT
   - SPILL RESPONSE MATERIALS TO INCLUDE:
     - ABSORBENT PADS
     - ABSORBENT/CONTAINMENT SOCKS
   - ENSURE THAT THE ENVIRONMENTAL PTA CONTAINMENT CURB AREA IS FREE OF SNOW/WATER ACCUMULATION
   - INSPECT DELIVERY HOSE AND FITTINGS
   - CONFIRM AVAILABLE TANK VOLUME
   - ENSURE DELIVERY TRUCK AND HOSE ARE ENTIRELY WITHIN CONCRETE PRODUCT TRANSFER AREA
   - CLOSE PRODUCT CONTAINMENT AREA VALVE
2. DURING PRODUCT TRANSFER:
   - ENSURE THE DELIVERY TRUCK OPERATOR USES A LIQUID AND VAPOUR TIGHT CONNECTION
   - REMAIN IN ATTENDANCE AT FILL CONNECTION AT ALL TIMES
   - WHEN TANK GAUGE READS 90% TANK CAPACITY, SLOW OR STOP DELIVERY, POSITIVE CLOSING SHUT-OFF VALVE IS SET TO STOP FLOW AT 95% TANK CAPACITY
3. AFTER PRODUCT TRANSFER
   - VERIFY NO SPILLS/RESIDUAL PRODUCT ARE PRESENT
   - IF SPILL OR RESDUAL PRODUCT, CLEAN WITH APPROPIATE MATERIALS
   - COMPLETE NECESSARY DOCUMENTATION
   - OPEN PRODUCT CONTAINMENT AREA VALVE

INCASE OF SPILL

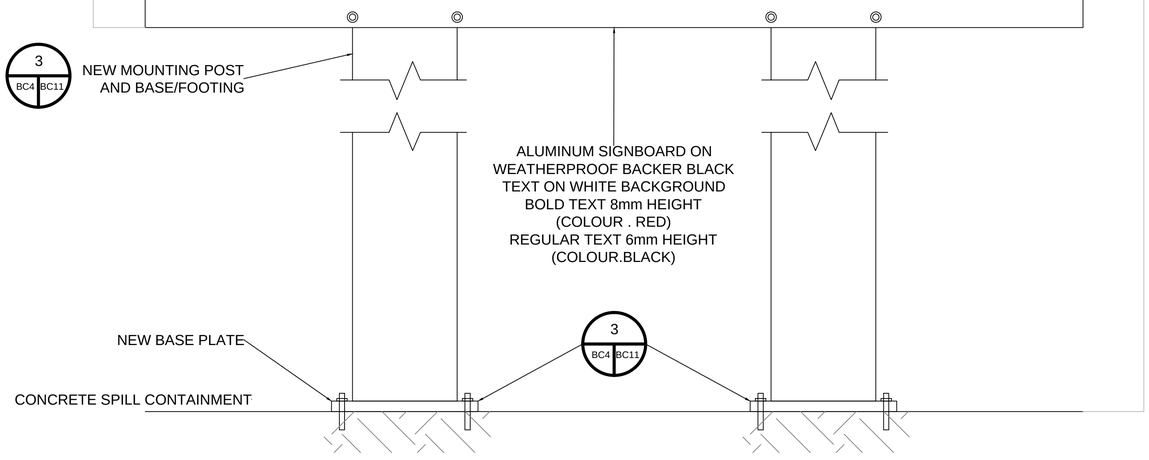
CALL 1-800-268-6060

PROCÉDURES D`OPÉRATION NORMALISÉES POUR LA LIVRAISON DE CARBURANT:

1. AVANT LE TRANSFERT DU PRODUIT:
   - S'ASSUREZ QU'UNE TROUSSE ANTIDÉEVERSEMENT CONTENANT LE MATÉRIEL D'INTERVENTION AUCAS D'URGENCE SE TROUVE SUR PLACE
   - LE MATÉRIEL D'INTERVENTION D'URGENCE DOIT COMPRENDRE:
     - DES TAMPONS ABSORBANTS
     - DES BARRAGES DE RÉTENTION/ABSORBANTS
   - S'ASSUREZ QUE L'AIRE DE TRANSFERT ET DE RÉTENTION NE CONTIENT PAS DE NEIGE NI D'EAU
   - INSPECTEZ LE TUYAU DE LIVRAISON ET SES RACCORDS
   - VÉRIFIEZ LE VOLUME DU RÉSERVOIR
   - J'ASSUREZ QUE LE CAMION DE LIVRAISON ET LE TUYAU SONT ENTIÉREMENT A L'INTÉRIEUR DE LA ZONE DE TRANSFERT EN BÉTON
   - FERMEZ LA VANNE DE CONFINEMENT
2. PENDENT LE TRANSFER DU PRODUIT:
   - S'ASSUREZ QUE L'OPÉRATEUR DU CAMION DE LIVRAISON UTILISE UNE CONNEXION ÉTANCHE AUX LIQUIDES ET A LA VAPEUR
   - DEMEUREZ SUR PLACE AU POINT DE REMPLISSAGE PENDANT LE TRANSFERT
   - LORSQUE LA JAUGE DU RESERVOIR INDIQUE QUE LE RÉSERVOIR EST À 90% DE LA CAPACITÉ, RALENTISSEZ OU ARRÊTEZ LE TRANSFERT, UN DISPOSITIF D'ARRET EST RÉGLÉ POUR ARRÊTER L'ÉCOUCEMENT LORSQUE LE RÉSERVOIR EST REMPLI A 95% DE SA CAPACITÉ
3. APRÈS LE TRANSFERT DU PRODUIT:
   - VÉRIFIER QU'IL NY A PAS DE DÉVERSEMENT NI DE PRODUIT RÉSIDUEL
   - S'IL Y A UN DÉVERSEMENT OU DU PRODUIT RÉSIDUEL, NETTOYEZ AVEC LE MATÉRIEL APPROPRIÉ
   - REMPLISSEZ LA DOCUMENTATION REQUISE
   - OUVREZ LA VANNE CONFINEMENT

EN CAS DE DÉVERSEMENT
APPELER 1-800-268-6060

2.0 m



NEW PRODUCT TRANSFER AREA SIGNAGE
SCALE: AS INDICATED

1
BC4 BC11

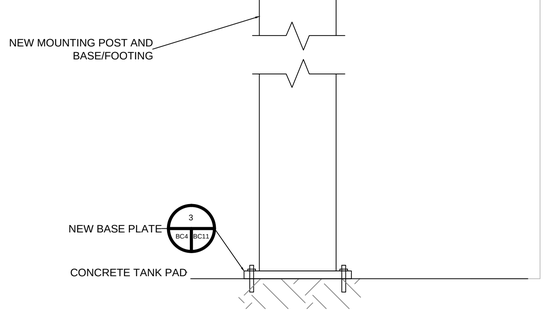
450

450

2.0 m

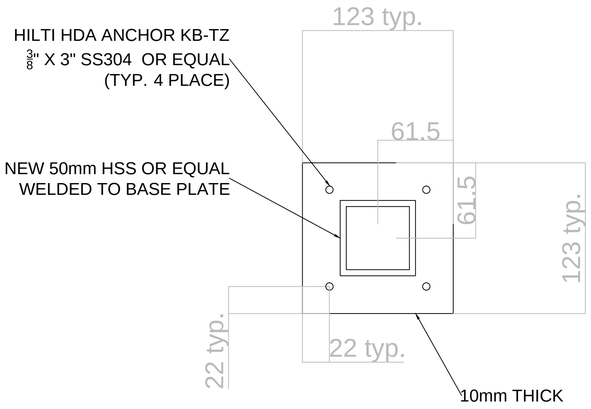
CONTAINMENT VALVE
VANNE DE CONFINEMENT

CLOSE IN CASE OF A SPILL AND WHEN FILLING TANKS
FERMEZ EN CAS DE DÉVERSEMENT ET LORS DU REMPLISSAGE DES RESERVOIRS



NEW CONTAINMENT VALVE SIGNAGE
SCALE: AS INDICATED

2
BC4 BC11



NEW BASE PLATE DETAIL
SCALE: AS INDICATE

3
BC4 BC11

Public Works and Government Services Canada
Architectural and Engineering Services Ontario Region

Travaux publics et Services gouvernementaux Canada
Services d'architecture et de genie Region de l'Ontario

WSP

LICENSED PROFESSIONAL ENGINEER
J. M. DOLAN
90502741
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FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS – PARKS CANADA
Bruce Peninsula National Park
Cyprus Lake Maintenance Yard
469 Cyprus Lake Road, Tobermory, ON

drawing title / titre du dessin
NEW PRODUCT TRANSFER AREA SIGNAGE

drawn by / dessine par: HET
designed by / conc par: JD
approved by / approuve par: JD
tender / soumission: Javier Banuelos
project manager / administrateur de projets
project date / date du projet: 2016/10/25
project no. / no. du projet: R.079639.001
drawing no. / dessine no.: BC10

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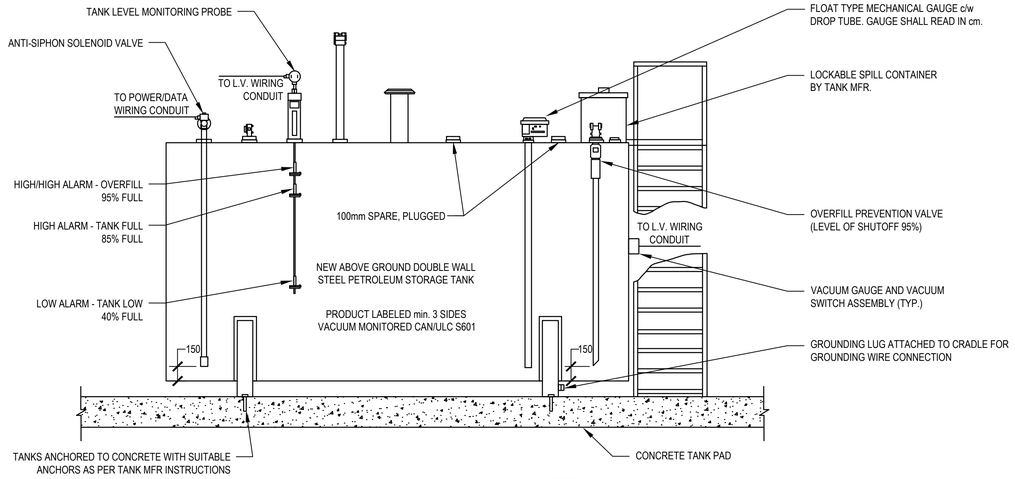
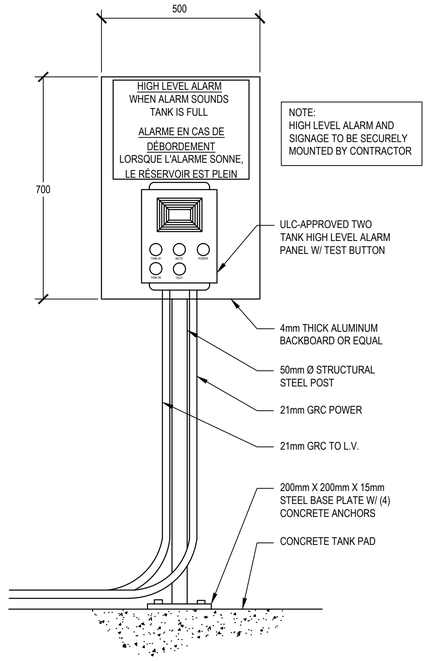


TANK MONITORING CONTROLS — 1 BC4 BC11
SCALE: NOT TO SCALE



TANK HIGH LEVEL ALARM — 2 BC4 BC11
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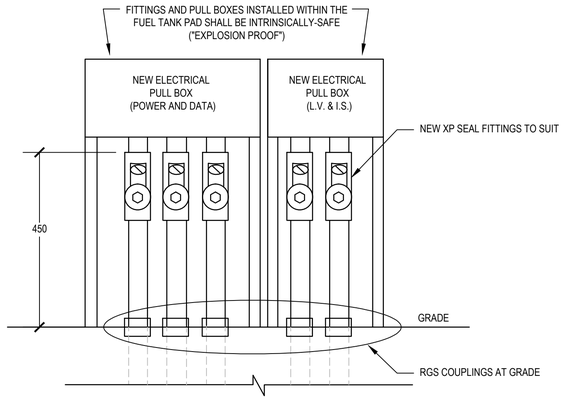

CONDUIT STUB-UPS — 3 BC4 BC11
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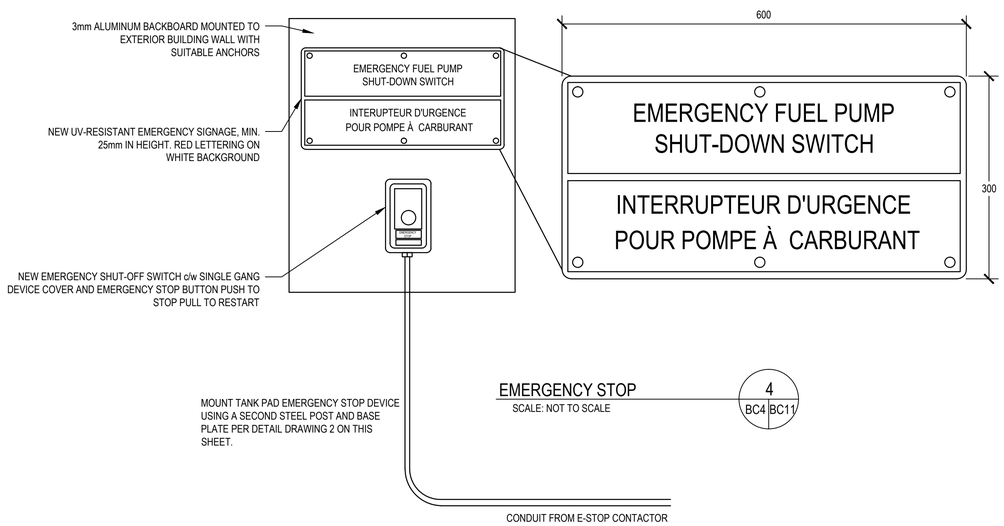

EMERGENCY STOP — 4 BC4 BC11
SCALE: NOT TO SCALE

Public Works and Government Services Canada
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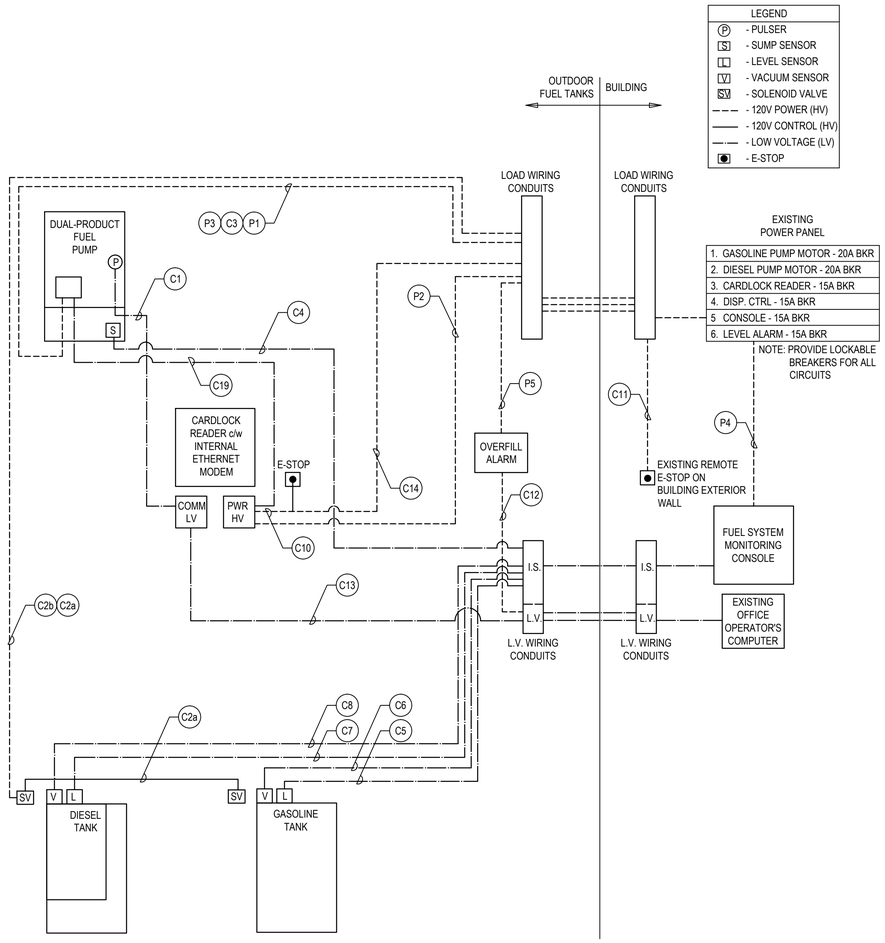
Bruce Peninsula National Park
Cyprus Lake Maintenance Yard
469 Cyprus Lake Road, near Tobermory, ON

drawing title / titre du dessin
ELECTRICAL DETAILS

drawn by / dessine par: EJM
designed by / conc par: JD
approved by / approuve par: JD
tender / soumission: Javier Banuelos
project manager / administrateur de projets
project date / date du projet: 2016/10/26
project no. / no. du projet: R.079639.001
drawing no. / dessine no.: BC11



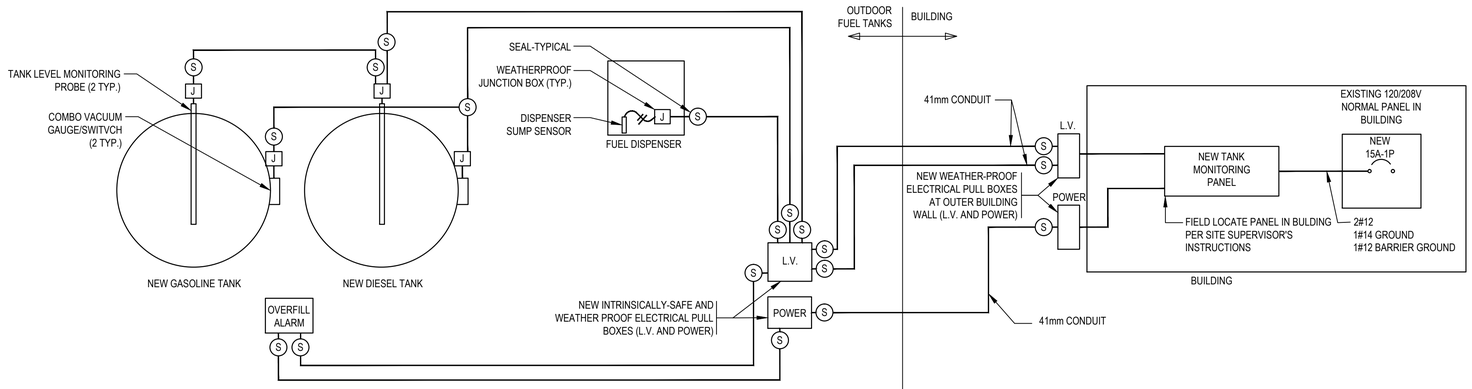
ELECTRICAL LINE DIAGRAM
SCALE: NOT TO SCALE
1 BC4 BC12

CONTROLS

I.D.	Device	From	To	Voltage	Conductors	Conduit Size	Comments
C1	Pump Pulser	Fuel Pump Pulser	Cardlock Reader	Low Voltage	Belden 83351E	21	Field Route
C2a	Gasoline Tank Solenoid Valve	Tank Pad Pull Box	Gasoline Dispenser	120 VAC	3C #12	21	Field Route from Pull Box to Solenoid
C2b	Diesel Tank Solenoid Valve	Tank Pad Pull Box	Diesel Dispenser	120 VAC	3C #12	21	Field Route from Pull Box to Solenoid
C3	Solenoid Valve Control	Fuel Dispenser	Solenoid Valves	120 VAC	3C #12	21	Field Route from
C4	Dispenser Sump Sensor	Fuel Dispenser	Monitoring Console	Intrinsically Safe	Belden 83351E	21	Install in Intrinsically Safe Conduit
C5	Gasoline Tank Level	Gasoline Tank Level	Monitoring Console	Intrinsically Safe	Belden 83351E	21	Install in Intrinsically Safe Conduit
C6	Gasoline Tank Vacuum Switch	Gasoline Tank Vacuum Switch	Monitoring Console	Intrinsically Safe	Belden 83351E	21	Install in Intrinsically Safe Conduit
C7	Diesel Tank Level	Diesel Tank Level	Monitoring Console	Intrinsically Safe	Belden 83351E	21	Install in Intrinsically Safe Conduit
C8	Diesel Tank Vacuum Switch	Diesel Tank Vacuum Switch	Monitoring Console	Intrinsically Safe	Belden 83351E	21	Install in Intrinsically Safe Conduit
C9	Dispenser Power	Fuel Dispenser	Cardlock Reader	120 VAC	3C #12	21	Field Route
C10	Emergency Stop (Tank Pad)	Tank Pad E-Stop	Cardlock Reader	120 VAC	3C #12	21	Field Route
C11	Emergency Stop (Building)	Building Exterior Wall E-Stop	Cardlock Reader	120 VAC	3C #12	21	Field Route
C12	Tank Level Alarm	Office Computer	Level Alarm	Low Voltage	CAT6 Ethernet	27	Install in Low Voltage Conduit
C13	Cardlock Reader Communication	Office Computer	Cardlock Reader	Low Voltage	CAT6 Ethernet	27	Install in Low Voltage Conduit

LOAD POWER

I.D.	Device	Load (Amperes)	Breaker Size	Wire Size (AWG)	Bond Size (AWG)	Conduit Size	Comments
P1	Duel-Product Fuel Pump	12.4 per Motor (two motors total)	2 x 20A	2 x 2C#6	2 x #8	35	Install in dedicated load wire conduit. One circuit per motor
P2	Cardlock Reader	3	15A	2C #12	#12	21	Install in dedicated load wire conduit.
P3	Dispenser Control	3	15A	2C #12	#12	21	Install in dedicated load wire conduit.
P4	Monitor Console	10 or less	15A	2C #12	#12	21	Field Route
P5	Level Alarm	1.5	15A	2C #12	#12	21	Install in dedicated load wire conduit.



FUEL SYSTEM MONITORING CONSOLE SCHEMATIC
SCALE: NOT TO SCALE
2 BC4 BC12

Public Works and Government Services Canada
Architectural and Engineering Services Ontario Region

Travaux publics et Services gouvernementaux Canada
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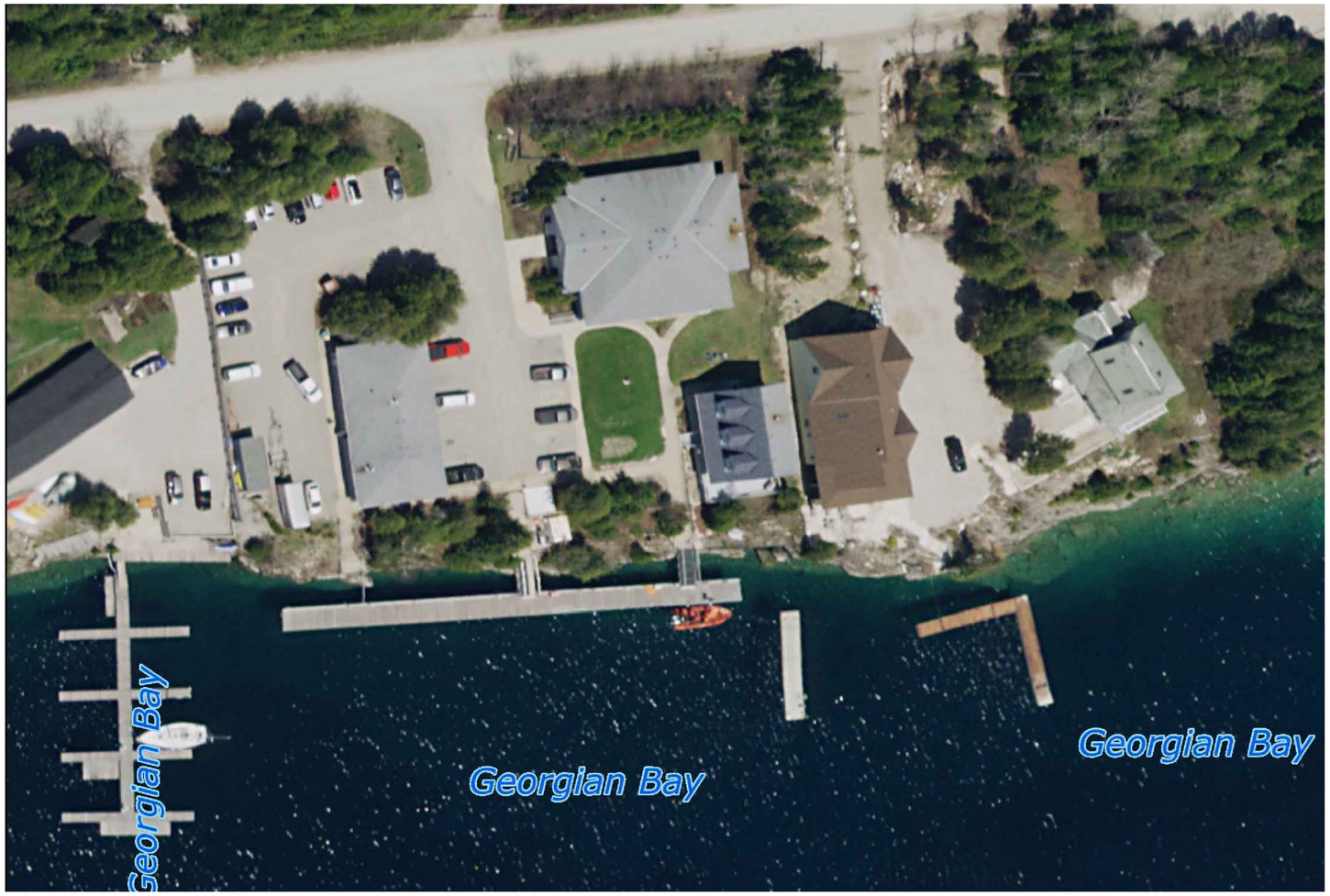
approved by / approuve par: JD
tender / soumission: Javier Banuelos
project manager / administrateur de projets
project date / date du projet: 2016/10/14
project no. / no. du projet: R.079639.001
drawing no. / dessine no.: BC12

GSC-A1 DATE PLOTTED: 2015/11/10 PLOT SCALE: 1:250 CAD FILE: 161-12204-00 DEMO Drawing.DWG

APPENDIX F

DRAWING SET

LIQUID FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS
BRUCE PENINSULA NATIONAL PARK OF CANADA
MARINE BASE OPERATIONS/RESCUE STATION
248 BIG TUB ROAD, NEAR TOBERMORY, ONTARIO



FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS - PARKS CANADA

Bruce Peninsula National Park
Marine Base Operations
248 Big Tub Road, Tobermory, Ontario

LIST OF DRAWINGS

Drawing Number	Drawing Title
BM1	Title Sheet
BM2A	Notes (1 of 2)
BM2B	Notes (2 of 2)
BM3	Existing Conditions and Demolition Plan
BM4	New Fuel System Layout
BM5	Concrete Tank Pad and Apron
BM6	Concrete Details
BM7	Storage Tank and Fuel Pump Details
BM8	Mechanical Details
BM9	Signs and Tags
BM10	New Product Transfer Area Signage
BM11	Electrical Details
BM12	Electrical Schematics

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02	Issued for Tender	Nov 1
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A Detail No. / No. du détail
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project title / titre du projet
Ontario
FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS – PARKS CANADA
Bruce Peninsula National Park
Marine Base Operations
248 Big Tub Road, Tobermory, ON

drawing title / titre du dessin
TITLE SHEET

drawn by / dessine par: HET
designed by / conc par: JD
approved by / approuve par: JD
tender / soumission: Javier Banuelos
project manager / administrateur de projets
project date / date du projet: 2016/10/25
project no. / no. du projet: R.079639.001
drawing no. / dessine no.: BM1

GENERAL NOTES:

1. SYSTEM IS TO BE INSTALLED AS PER:
   - NATIONAL FIRE CODE OF CANADA (2010);
   - CEPA SOR/2008-197 STORAGE TANK SYSTEMS FOR PETROLEUM PRODUCTS AND ALLIED PETROLEUM PRODUCTS REGULATIONS;
   - CANADIAN COUNCIL OF MINISTERS OF THE ENVIRONMENT, PN1326 ENVIRONMENTAL CODE OF PRACTICE FOR ABOVEGROUND AND UNDERGROUND STORAGE TANK SYSTEM CONTAINING PETROLEUM AND ALLIED PETROLEUM PRODUCTS;
   - CSA C22.1-2015 CANADIAN ELECTRICAL CODE, 22ND EDITION;
   - ALL MANUFACTURER'S INSTRUCTIONS AND SPECIFICATIONS; AND
   - OTHER LOCAL, PROVINCIAL, FEDERAL REGULATIONS, ALL LATEST EDITIONS.
2. A CONTRACTOR SUBMITTING A BID IS REQUIRED TO BE KNOWLEDGEABLE IN PETROLEUM STORAGE TANK SYSTEMS AND RELATED EQUIPMENT.
3. IF FURTHER CLARIFICATIONS ARE REQUIRED ON EQUIPMENT OR THE INSTALLATION OF EQUIPMENT, IT IS THE CONTRACTORS RESPONSIBILITY TO REQUEST CLARIFICATIONS FROM CONSULTANT/OWNER.
4. ALL PIPING, ELBOWS, TEES, REDUCERS, UNIONS AND FITTINGS TO BE SOCKET WELD STEEL ASTM A312. ALL FITTINGS TO BE WELDED UNLESS OTHERWISE SPECIFIED. THREADED FITTINGS MUST BE SEALED WITH PETROLEUM RESISTANT SEAL.
5. CONTRACTOR TO REINSTATE DISTURBED SITE CONDITIONS TO MATCH EXISTING TO THE SATISFACTION OF THE ENGINEER AND DEPARTMENTAL REPRESENTATIVE AND OPERATIONS MANAGER ON-SITE. THE CONTRACTOR IS RESPONSIBLE FOR DAILY CLEANING OF WORK AREA.
6. CONTRACTOR SHALL NOT UNDERMINE OR COMPROMISE ANY FOOTINGS OR FOUNDATION STRUCTURES. ALWAYS BE AWARE OF THE LOCATION OF EXISTING UTILITIES AND OVERHEAD POWER LINES.
7. SITE UTILITIES ARE NOT LOCATED ON THESE DRAWINGS. CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL UTILITY LOCATES, CLEARANCES AND PERMITS PRIOR TO COMMENCEMENT OF WORK.
8. PIPING LAYOUTS ILLUSTRATED ON DRAWINGS INDICATED THE GENERAL ROUTING OF PIPE WORK AND DOES NOT SHOW ALL THE FITTINGS AND OFFSETS REQUIRED FOR THE COMPLETE INSTALLATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL PIPING, FITTINGS & OFFSETS REQUIRED.
9. THE CONTRACTOR SHALL PROVIDE A TWELVE (12) MONTH WARRANTY ON ALL LABOUR, MATERIAL AND EQUIPMENT.
10. THE CONTRACTOR SHALL PROVIDE A PAPER COPY AND AN ELECTRONIC COPY OF THE OPERATION AND MAINTENANCE MANUALS PRIOR TO COMMISSIONING.
11. THE CONTRACTOR SHALL PROVIDE AS BUILT DRAWINGS IN PAPER AND ELECTRONIC COPIES PRIOR TO FIRST FILL OF THE SYSTEM.
12. THE CONTRACTOR SHALL TRAIN THE SYSTEM OPERATORS AFTER THE NEW SYSTEM HAS BEEN INSTALLED.
13. THE CONTRACTOR IS RESPONSIBLE FOR THE COST OF COMMISSIONING AND TESTING ALL NEW AND REINSTATED EQUIPMENT.
14. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL EXISTING PIPING, FITTINGS, TANKS, AND FUEL AS PER FEDERAL REGULATIONS.
15. ALL EQUIPMENT SHALL BE STORED AND INSTALLED AS PER THE MANUFACTURER'S INSTRUCTIONS.
16. CONTRACTOR SHALL POST THE EC LABEL PRIOR TO FIRST FILL

MECHANICAL NOTES:

1. ALL PIPE SIZES ARE SHOWN IN MILLIMETERS.
2. INSTALL EQUIPMENT AS PER MANUFACTURER'S RECOMMENDATIONS. CLEARANCES AROUND NEW EQUIPMENT TO BE AS PER MANUFACTURER'S RECOMMENDATIONS AND CODE REQUIREMENTS.
3. LAYOUT, ROUTING & LOCATIONS ARE INDICATIVE, CONTRACTOR TO VERIFY SITE CONDITIONS & COORDINATE INSTALLATION WITH ALL TRADES ON SITE CONTRACTOR TO ADAPT INSTALLATION TO SITE CONDITION.
4. PROVIDE NECESSARY EXPANSION LOOPS, COMPENSATORS, ANCHORS, GUIDES, SUPPORTS ETC. AND FIRESTOP FOR ALL AFFECTED SYSTEMS.
5. THE SPILL CONTAINMENT SHALL BE APPROVED TO CAN/ULC S663-11, SPILL CONTAINMENT DEVICES FOR ABOVE GROUND TANKS.
6. ALL PIPING TO BE SCH 40 ASTM A312, TYPE 304 STAINLESS STEEL. SOCKET WELDED FITTINGS TO BE ASTM A312.
7. PIPING AND TUBING SHALL BE RUN AS PRACTICAL AS POSSIBLE AND PROVISIONS SHALL BE MADE FOR EXPANSION, CONTRACTION, JARRING, VIBRATION AND SETTLING.
8. THE TANKS SHALL BE INSTALLED WITH GAUGES AND ULC LABEL THAT ARE ACCESSIBLE TO OPERATORS.
9. NEW TANKS SHALL BE DOUBLE WALLED AND EQUIPPED WITH VISUAL GAUGES, VACUUM GAUGE AND ACCESS TO INTERSTITIAL MONITORING.
10. THE MAIN SUPPLY TANKS SHALL BE CONSTRUCTED TO ULC S601 STANDARD.
11. ALL PIPING SHOULD BE CLEARLY LABELED WITH CONTENTS. FLOW DIRECTION AND PRODUCT (DIESEL SUPPLY, GASOLINE SUPPLY). ALL FUEL RELATED EQUIPMENT SHALL BE CLEARLY IDENTIFIED.
12. THE CONTRACTOR SHALL COMPLETE AT A MINIMUM A TWO HOUR PRESSURE TEST USING NITROGEN GAS AT 50psi ON THE FUEL PIPING. TESTING TO BE CONDUCTED AFTER THE INSTALLATION IS COMPLETE AND PRIOR TO SYSTEM COMMISSIONING.
13. ALL GASKETS TO BE RATED FOR A MINIMUM TEMPERATURE OF 1000°F (BUNA-N OR EQUIVALENT).

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project title / titre du projet
Ontario
FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS – PARKS CANADA
Bruce Peninsula National Park
Marine Base Operations
248 Big Tub Road, Tobermory, ON

drawing title / titre du dessin
NOTES (1 of 2)

drawn by / dessine par: HET
designed by / conc par: JD
approved by / approuve par: JD
tender / soumission: Javier Banuelos
project manager / administrateur de projets
project date / date du projet: 2016/10/25
project no. / no. du projet: R.079639.001
drawing no. / dessine no.: BM2A

ELECTRICAL NOTES

1. GENERAL CONDITIONS
   a. PROVIDE ALL LABOUR, EQUIPMENT, MATERIALS & TOOLS NECESSARY TO COMPLETE ALL SYSTEMS SHOWN ON THE DRAWINGS, THUS RENDERING A COMPLETE INSTALLATION.
   b. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN OR INDICATED.
   c. CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS, DIMENSIONS, ELEVATIONS ETC. IN THE FIELD.
2. CODES, PERMITS AND INSPECTION
   a. PAY FOR & BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS AS REQUIRED BY AUTHORITIES HAVING JURISDICTION OVER THIS WORK. INCLUDE THESE COSTS IN THE TENDER PRICE. SUBMIT FINAL INSPECTION REPORT TO OWNER.
   b. INSTALLATION SHALL CONFORM TO THE REQUIREMENTS OF THE CANADIAN ELECTRICAL CODE, 2015 EDITION, PROVINCIAL & FEDERAL CODES AND LOCAL BYLAWS AND N.S. STANDARDS FOR CONSTRUCTION AND INSTALLATION FOR PETROLEUM STORAGE TANK SYSTEMS, 1997.
3. DRAWING
   a. PREPARE AND PAY FOR ANY LARGE SCALE WORKING DRAWINGS WHICH MAY BE REQUIRED BY THE EXAMINING AUTHORITIES, INCLUDE THIS COST IN THE TENDER PRICE.
4. RECORD DRAWINGS
   a. KEEP A SEPARATE, COMPLETE, SET OF DRAWINGS ON SITE AND NOTE ALL CHANGES AND DEVIATIONS FROM THE ORIGINAL DESIGN. ONE SET OF THESE PLANS SHOWING AS-BUILT CONDITIONS SHALL BE FORWARDED TO THE OWNER AT THE COMPLETION OF THIS CONTRACT & BEFORE APPLYING FOR FINAL PAYMENT.
5. EXAMINATION OF SITE
   a. ANY DEVIATIONS AND/OR CONFLICTS ON SITE SHALL BE REPORTED TO THE DEPARTMENTAL REPRESENTATIVE PRIOR TO SUBMITTING TENDER.
6. IDENTIFICATION
   a. COLOUR CODE ALL ELECTRICAL JUNCTION BOXES TO BUILDING STANDARD. IDENTIFY WITH BLACK MARKER ON BOX COVERS ALL CIRCUITS CONTAINED WITHIN.
7. REVISIONS AND EXTRAS
   a. NO ADDITIONAL MONEY OVER THE CONTRACT PRICE SHALL BE PAID UNLESS AN APPROVED CHANGE ORDER IS ISSUED BY THE OWNER. CLAIMS FOR EXTRAS SHALL BE SUBMITTED WITH A COMPLETE BREAKDOWN OF MATERIAL, LABOUR, HOURLY RATES, ETC.
8. CLEANUP
   a. ALL CUTTING, PATCHING, & PAINTING REQUIRED FOR THE WORK OF THIS TRADE TO BE PERFORMED BY THE CONTRACTOR'S FORCES AT THE CONTRACTOR'S EXPENSE. CLEAN UP ALL DEBRIS UPON COMPLETION OF CONTRACT, COOPERATE WITH ALL OTHER TRADES.
   b. MAINTAIN SITE IN TIDY CONDITION FREE FROM ACCUMULATION OF WASTE PRODUCTS AND DEBRIS. UPON OBTAINING SUBSTANTIAL PERFORMANCE OF THE WORK, REMOVE SURPLUS PRODUCTS, TOOLS, MACHINERY, AND EQUIPMENT FROM THE SITE. COMPLETION OF CLEANUP IS REQUIRED FOR TOTAL PERFORMANCE OF THE WORK. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO REPAIR ANY DAMAGE DONE TO EXISTING FEATURES AS A RESULT OF THIS WORK. DAMAGED OR DISTURBED ITEMS SHALL BE REPLACED IN KIND AND AT NO ADDITIONAL COST TO THE OWNER.
9. EQUIPMENT AND MATERIAL
   a. ALL EQUIPMENT AND MATERIAL, UNLESS SPECIFICALLY NOTED OTHERWISE, SHALL BE NEW AND WITHOUT BLEMISH OR DEFECT. ALL MATERIAL SHALL BEAR A CSA (CANADIAN STANDARDS ASSOCIATION) APPROVAL STAMP. ALL DEVICES SHALL BE SPECIFICATION GRADE.
10. TESTING
   a. PERFORM TESTING ON EACH SYSTEM TO THE SATISFACTION OF THE OWNER AND SUBMIT TEST RESULTS FOR APPROVAL PRIOR TO THE FINAL ACCEPTANCE OF THE WORK.
   b. PANELS SHALL BE BALANCED WITHIN 5% OF LOAD PER PHASE. GROUNDING SHALL BE AS REQUIRED BY ELECTRICAL CODE.
11. ACCESSIBILITY
   a. ALL WORK SHALL BE INSTALLED SO AS TO BE READILY ACCESSIBLE FOR OPERATION, MAINTENANCE AND REPAIRS.
12. RESPONSIBILITY
   a. MAINTAIN RESPONSIBILITY FOR THE WORK UNTIL COMPLETION & FINAL ACCEPTANCE. REPLACE ANY ITEM THAT MAY BE DEFECTIVE, DAMAGED, LOST OR STOLEN WITHOUT ADDITIONAL COST TO THE OWNER OR DELAY TO THE COMPLETION OF THE PROJECT.
   b. THE OWNER SHALL NOT BE RESPONSIBLE FOR THE ACTS OF OMISSION OF THE CONTRACTOR, SUBCONTRACTOR OR THEIR AGENTS OR EMPLOYEES OR ANY OTHER PERSON PERFORMING WORK.
   c. THE CONTRACTOR SHALL DESIGN AND PROVIDE ANY TEMPORARY SHORING, BRACING, ETC. AS NEEDED FOR THE WORK SO AS NOT TO ENDANGER THE STRUCTURAL INTEGRITY OF ANY EXISTING FEATURE.
13. WARRANTY
   a. WARRANT ALL WORK AND APPARATUS INSTALLED UNDER THIS CONTRACT AGAINST ALL DEFECTS IN WORKMANSHIP AND MATERIAL FOR A PERIOD OF ONE YEAR AFTER LETTER OF FINAL ACCEPTANCE.
14. SAFETY
   a. OBSERVE ALL APPLICABLE SAFETY REQUIREMENTS INCLUDING THE USE OF SAFETY GLASSES, HARD HATS AND PROTECTION OF AREA WHEN WORKING OVERHEAD. THE CONTRACTOR SHALL ASSUME RESPONSIBILITY FOR CONTRACTOR SAFETY.
15. WIRING
   a. RUN ALL WIRING IN RIGID CONDUIT. INSTALL RIGID CONDUIT PERPENDICULAR & PARALLEL TO BUILDING LINES. SUPPORT RIGID CONDUIT IN ACCORDANCE WITH THE CANADIAN ELECTRICAL CODE. USE FLEXIBLE METAL CONDUIT FOR FINAL CONNECTIONS TO MOTORS AND VIBRATING EQUIPMENT. BX WIRE SHALL NOT BE USED.
   b. ALL WIRING TO BE 600V MINIMUM RATED #12 COPPER RW90 XLPE UNLESS NOTED OTHERWISE.
16. LOAD DISTRIBUTION PANELS
   a. THE CONTRACTOR SHALL VERIFY CIRCUIT BREAKER TYPE AND INSTALL CIRCUIT BREAKERS AS REQUIRED.
   b. ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR BALANCING THE CIRCUITS AND VERIFYING LOADING CAPACITY.

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02	Issued for Tender	Nov 1
01	Issued for 75% Review	Oct 25

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project title / titre du projet

Ontario

FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS – PARKS CANADA

Bruce Peninsula National Park
Marine Base Operations
248 Big Tub Road, Tobermory, ON

drawing title / titre du dessin

NOTES (2 of 2)

drawn by / dessine par: HET

designed by / conc par: JD

approved by / approuve par: JD

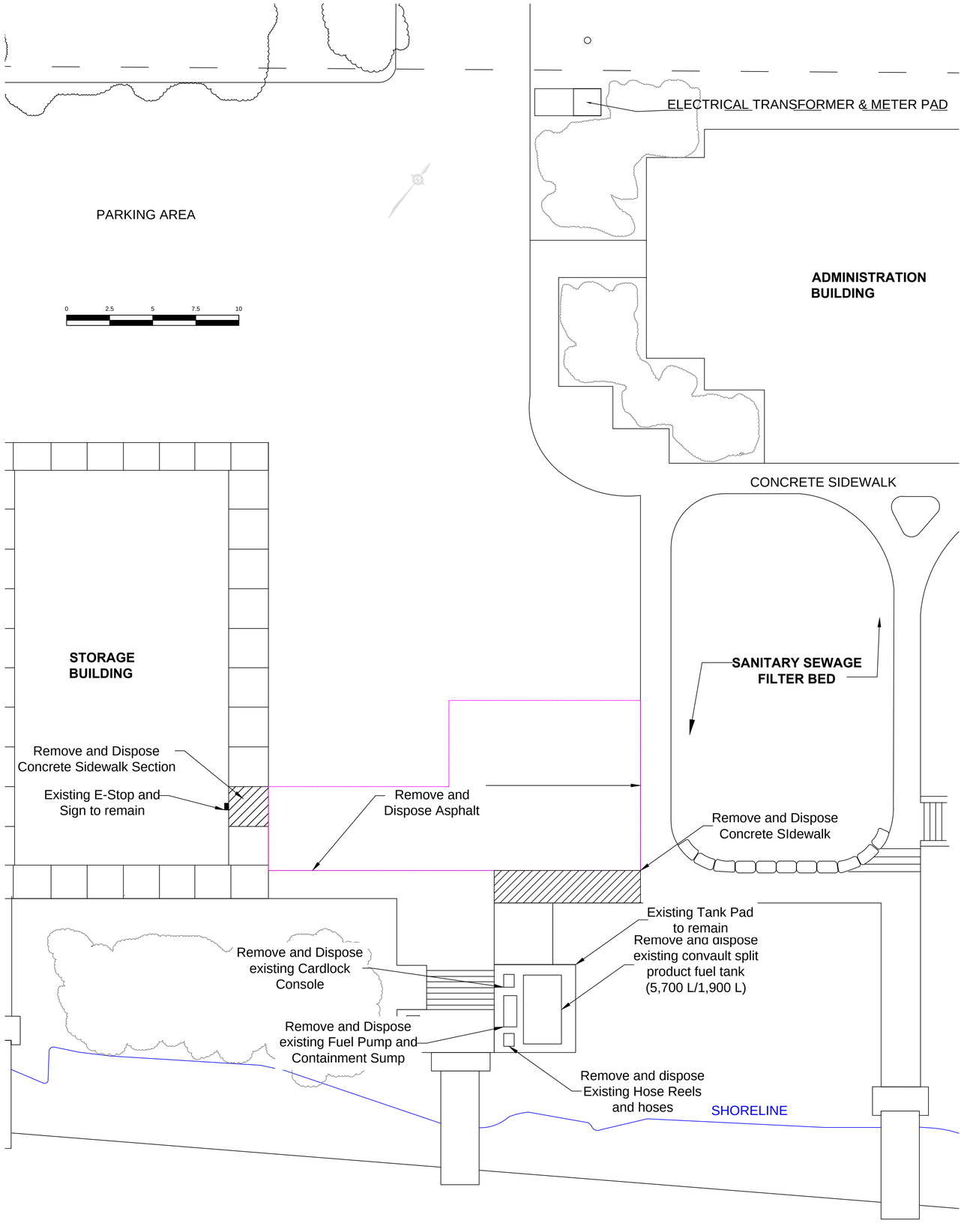
tender / soumission: Javier Banuelos

project manager / administrateur de projets

project date / date du projet: 2016/10/25

project no. / no. du projet: R.079639.001

drawing no. / dessine no.: BM2B



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LICENSED PROFESSIONAL ENGINEER
J. M. DOLAN
90502741
PROVINCE OF ONTARIO

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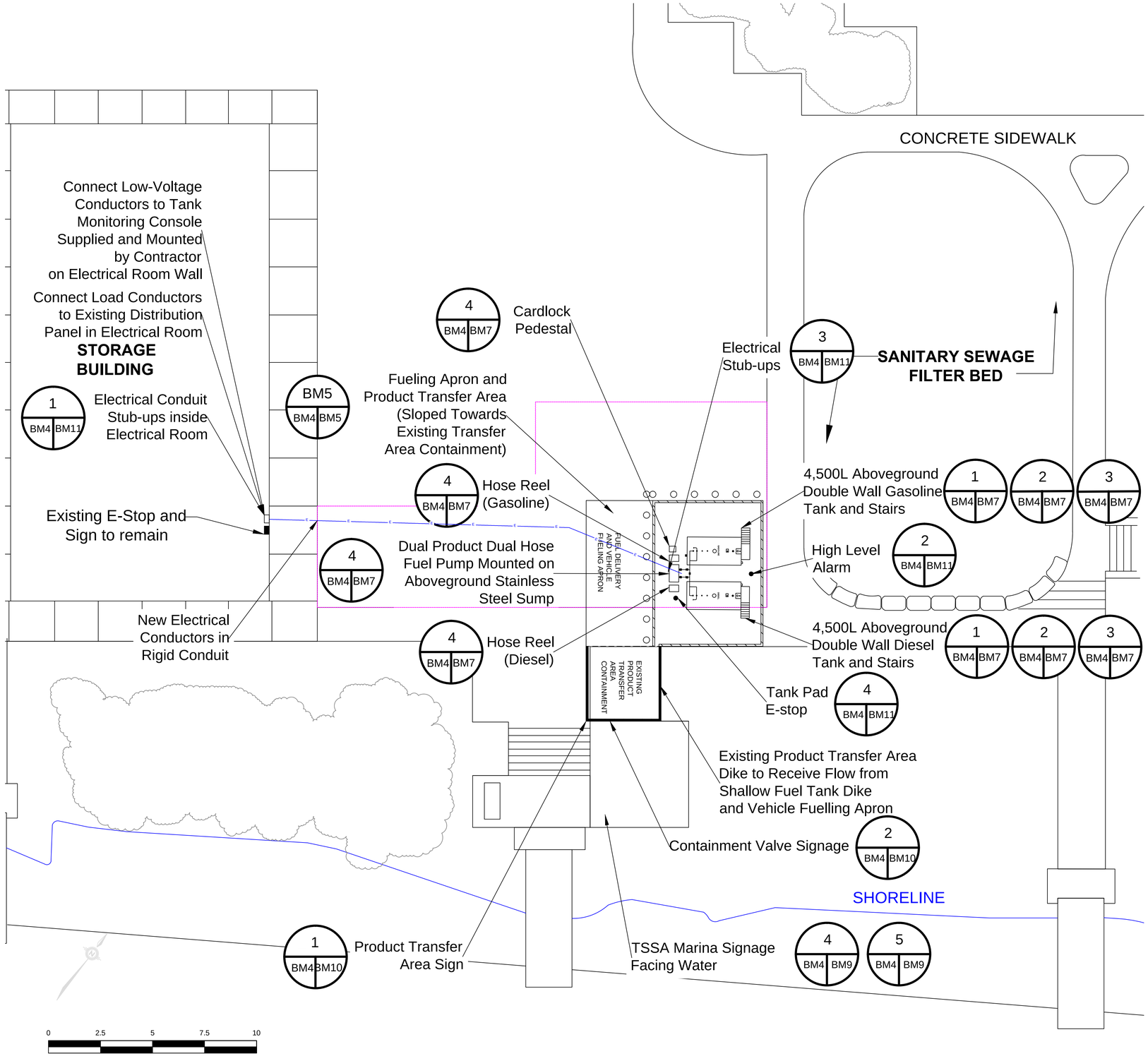
FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS – PARKS CANADA
Bruce Peninsula National Park
Marine Base Operations
248 Big Tub Road, Tobermory, ON

drawing title / titre du dessin
EXISTING CONDITIONS AND DEMOLITION PLAN

drawn by / dessine par: HET
designed by / conc par: JD
approved by / approuve par: JD
tender / soumission: Javier Banuelos
project manager / administrateur de projets
project date / date du projet: 2016/10/25
project no. / no. du projet: R.079639.001
drawing no. / dessine no.: BM3



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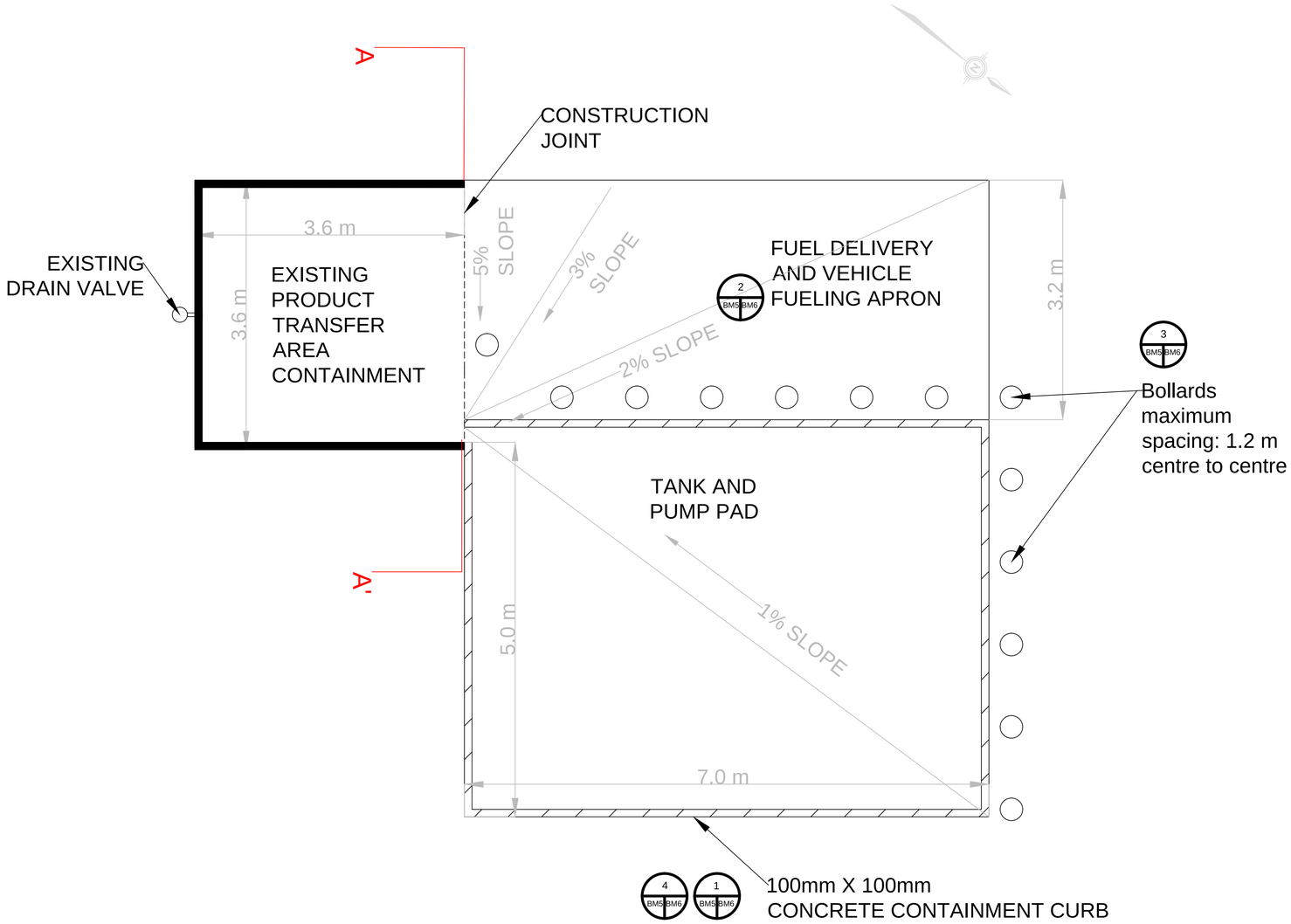
FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS – PARKS CANADA

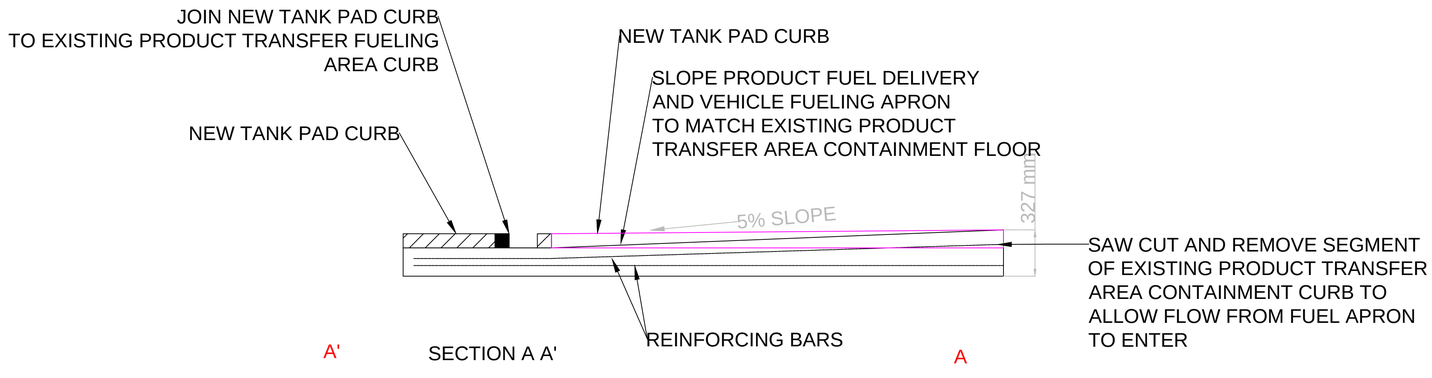
Bruce Peninsula National Park
Marine Base Operations
248 Big Tub Road, Tobermory, ON

drawing title / titre du dessin

NEW FUEL SYSTEM LAYOUT

drawn by / dessine par: HET
designed by / conc par: JD
approved by / approuve par: JD
tender / soumission: Javier Banuelos
project manager / administrateur de projets
project date / date du projet: 2016/10/25
project no. / no. du projet: R.079639.001
drawing no. / dessine no.: BM4





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drawing title / titre du dessin

CONCRETE TANK PAD AND APRON

drawn by / dessine par: HET

designed by / conc par: JD

approved by / approuve par: JD

tender / soumission: Javier Banuelos

project manager / administrateur de projets

project date / date du projet: 2016/10/25

project no. / no. du projet: R.079639.001

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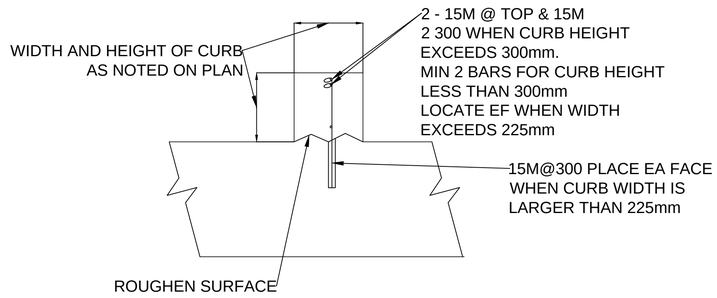
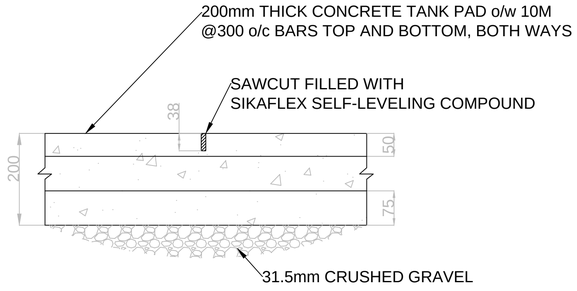


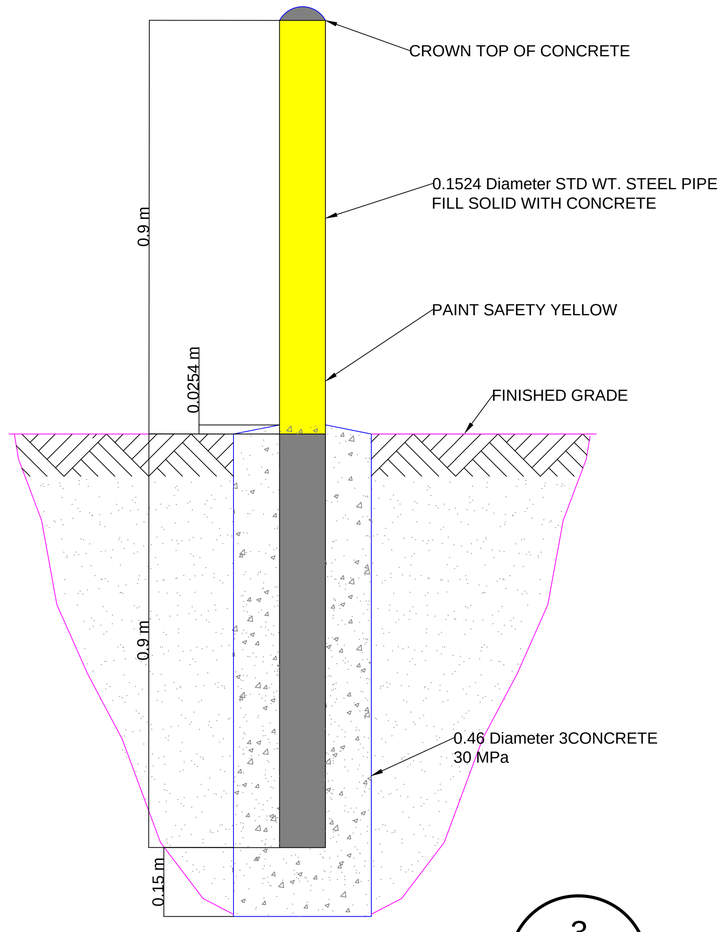
CURB DETAIL
SCALE: NOT TO SCALE

1 | BM5 | BM6



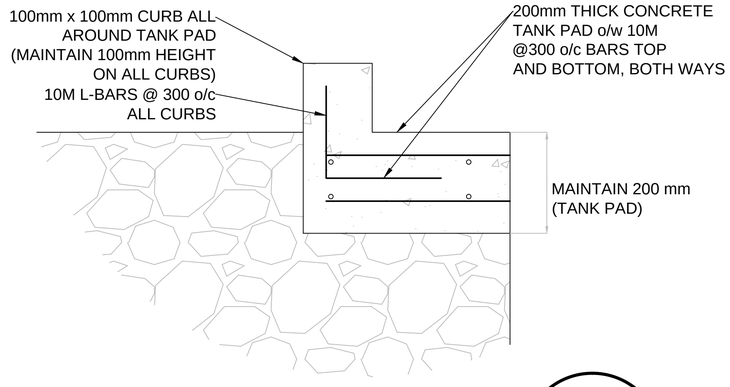
SAWCUT DETAIL
SCALE: NOT TO SCALE

2 | BM5 | BM6



BOLLARD DETAIL
SCALE: NOT TO SCALE

3 | BM5 | BM6



PAD AND CURB DETAIL
SCALE: NOT TO SCALE

4 | BM5 | BM6

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90502741
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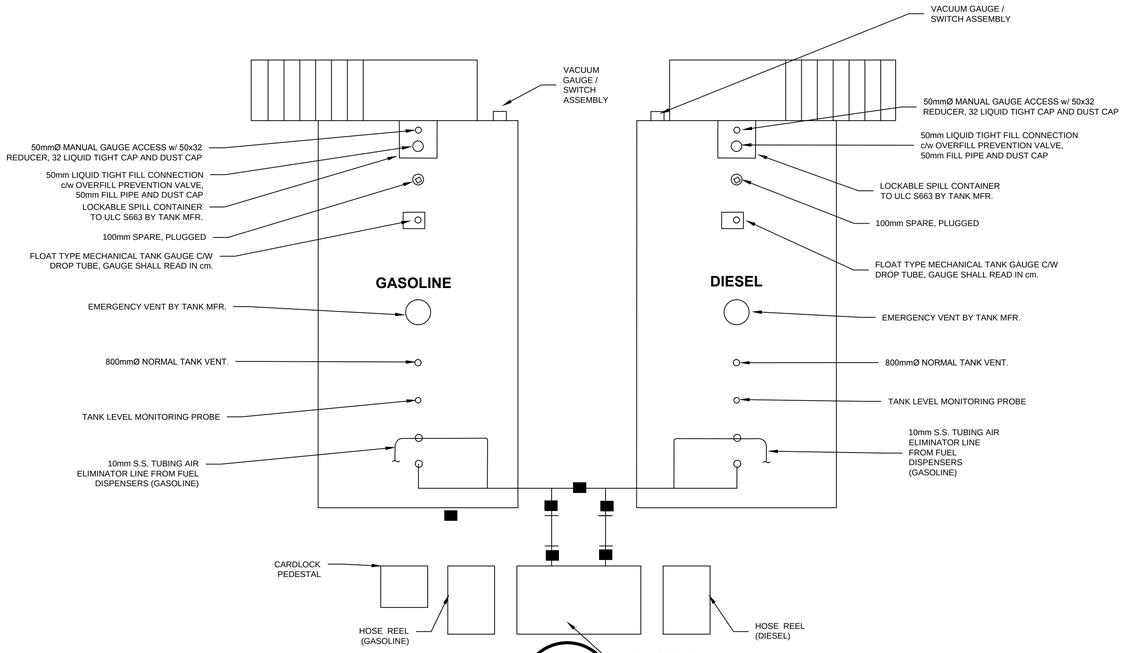
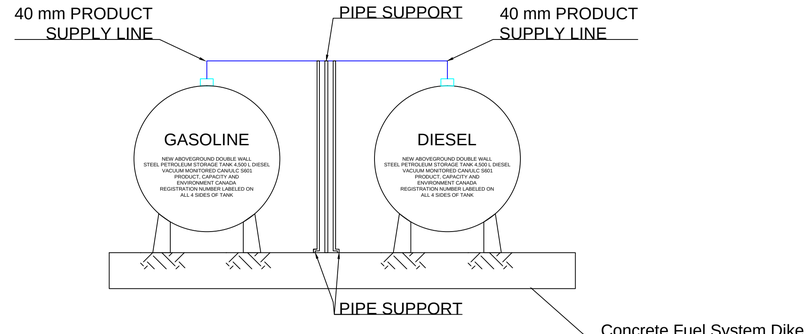
CONCRETE DETAILS
DEMOLITION PLAN

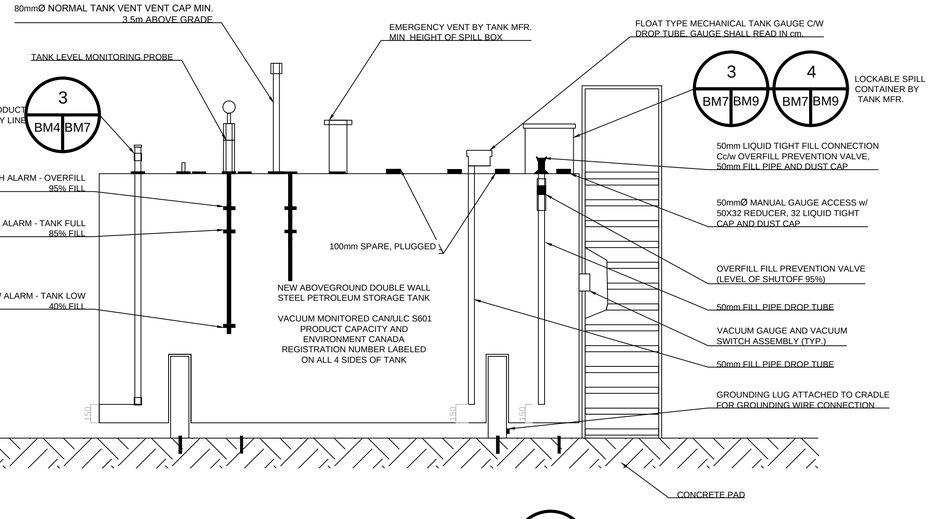
drawn by / dessine par: HET
designed by / conc par: JD
approved by / approuve par: JD
tender / soumission: Javier Banuelos
project manager / administrateur de projets
project date / date du projet: 2016/10/25
project no. / no. du projet: R.079639.001
drawing no. / dessine no.: BM6



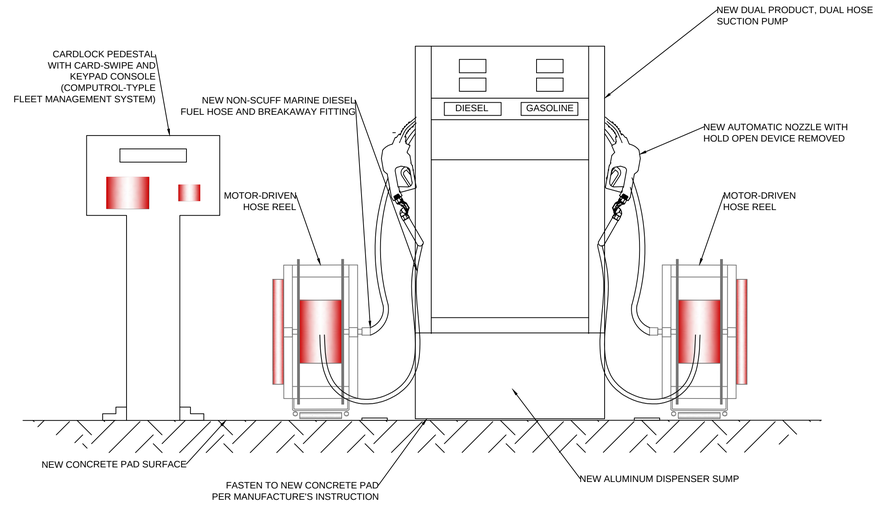
FUEL STORAGE TANK PLAN
SCALE: NOT TO SCALE
1 — BM4 | BM7



FUEL TANK CROSS SECTION
SCALE: NOT TO SCALE
2 — BM4 | BM7



FITTINGS AND CONTROLS
SCALE: NOT TO SCALE
3 — BM4 | BM7



PUMP AND HOSE REELS
SCALE: NOT TO SCALE
4 — BM4 | BM7

Public Works and Government Services Canada
Architectural and Engineering Services
Ontario Region

Travaux publics et Services gouvernementaux Canada
Services d'architecture et de génie
Région de l'Ontario

WSP

LICENSED PROFESSIONAL ENGINEER
J. M. DOLAN
90502741
PROVINCE OF ONTARIO

LEGEND

- ST — STORM SEWER
- W — WATERMAIN
- G — GAS PIPELINE
- P — PROPANE PIPE
- GO — FUEL TANK PRODUCT PIPE
- E — ELECTRICAL CONDUIT
- FM — FORCEMAIN
- SIB — IRON BAR
- APPROXIMATE PROPERTY BOUNDARY
- APPROXIMATE LIMIT OF ASPHALT SAW-CUT
- CONTRACTOR SUPPLIED TEMPORARY CHAIN-LINK FENCE ENCLOSURE

revision		date
04		
03		
02	Issued for Tender	Nov 1
01	Issued for 75% Review	Oct 25

Do not scale drawings.
Verify all dimensions and conditions on site and immediately notify the engineer of all discrepancies.

A — Detail No. No. du détail
B — drawing no. – where detail required dessin no. – où détail exigé
C — drawing no. – where detailed dessin no. – où détaillé

project title
titre du projet

Ontario
FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS – PARKS CANADA
Bruce Peninsula National Park
Marine Base Operations
248 Big Tub Road, Tobermory, ON

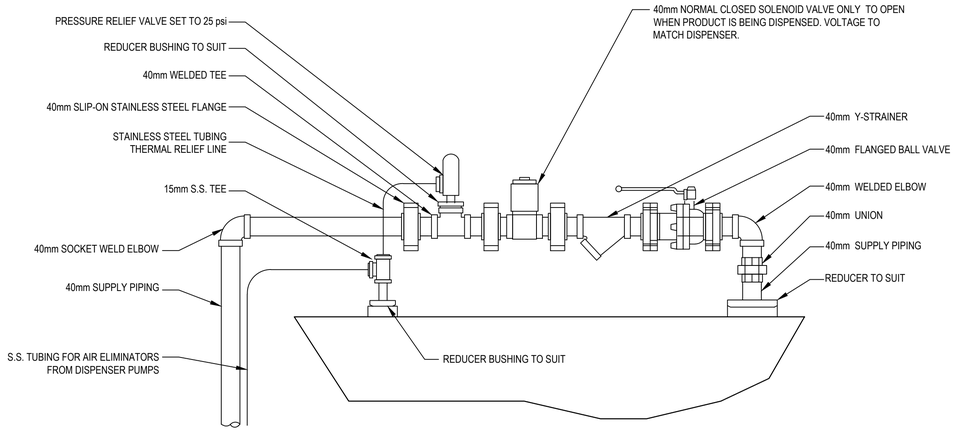
drawing title
titre du dessin

PRODUCT TRANSFER AREA SIGNAGE

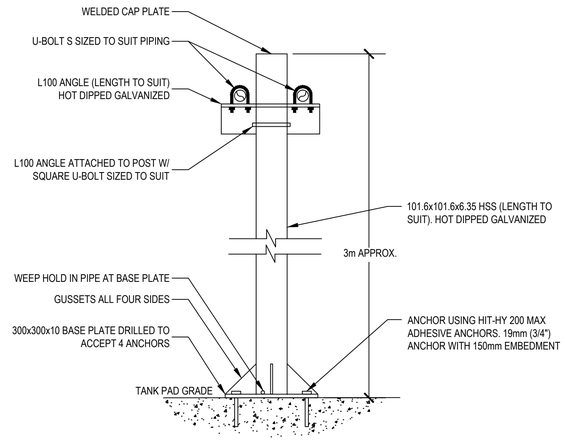
drawn by / dessine par: HET
designed by / conc par: JD
approved by / approuve par: JD
tender / soumission: Javier Banuelos
project manager / administrateur de projets
project date / date du projet: 2016/10/25
project no. / no. du projet: R.079639.001
drawing no. / dessine no.: BM7

04 11

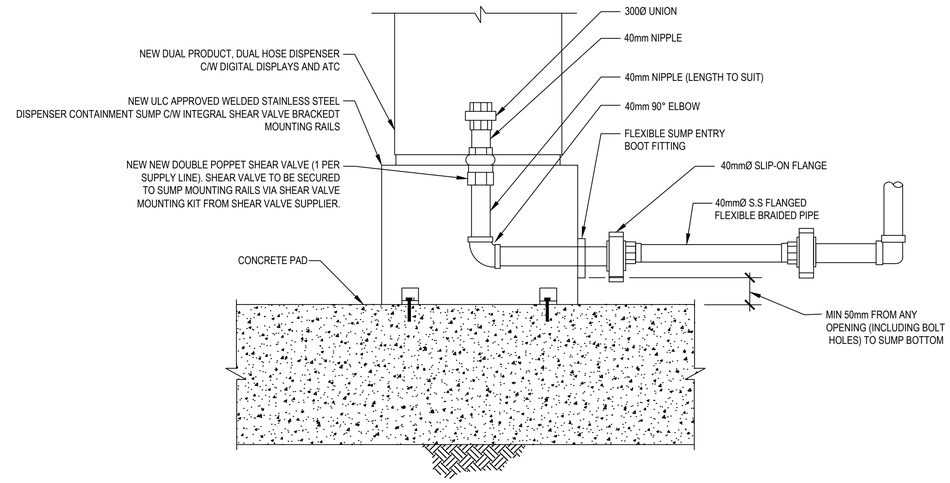
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 millimetres



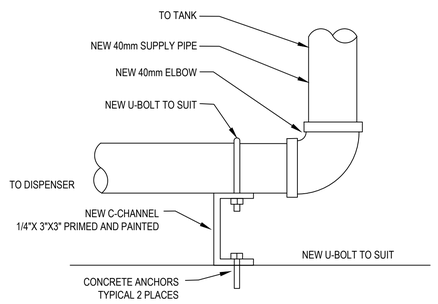
PRODUCT SUPPLY LINE DETAIL — 1 — BM4 BM8
SCALE: NOT TO SCALE



ELEVATED PIPE SUPPORT — 3 — BM4 BM8
SCALE: NOT TO SCALE



DISPENSER SUMP DETAIL — 2 — BM7 BM8
SCALE: NOT TO SCALE



PAD-LEVEL PIPE SUPPORT — 4 — BM7 BM8
SCALE: NOT TO SCALE

Public Works and Government Services Canada
Architectural and Engineering Services
Ontario Region

Travaux publics et Services gouvernementaux Canada
Services d'architecture et de génie
Région de l'Ontario

WSP

LICENSED PROFESSIONAL ENGINEER
J. M. DOLAN
90502741
19 Oct 2016
PROVINCE OF ONTARIO

revision		date
04		
03		
02	Issued for Tender	Nov 1
01	Issued for 99% Review	Oct 26

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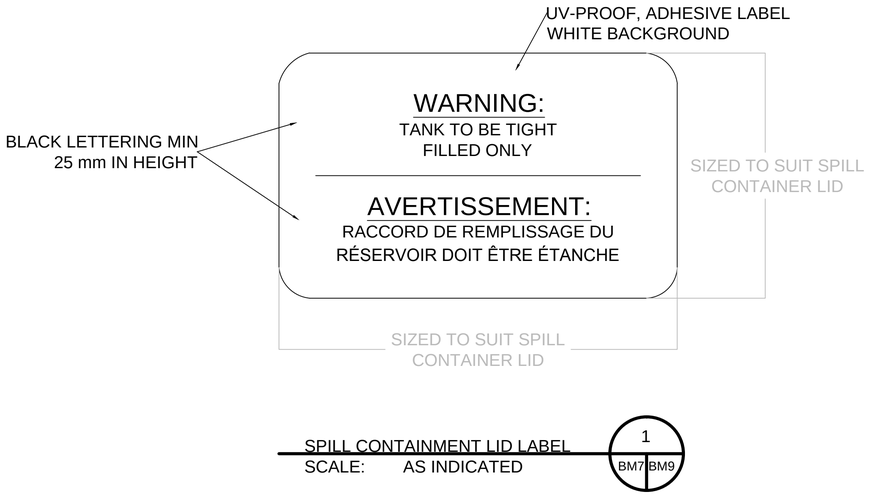
C drawing no. – where detailed / dessin no. – où détaillé

project title / titre du projet
Ontario
FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS – PARKS CANADA
Bruce Peninsula National Park
Marine Base Operations
248 Big Tub Road, Tobermory, ON

drawing title / titre du dessin
MECHANICAL DETAILS

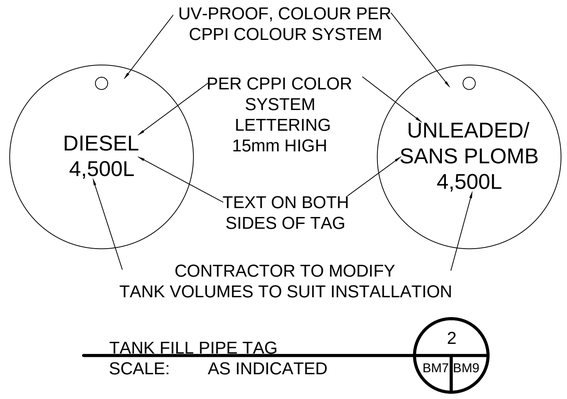
drawn by / dessine par: JLK
designed by / conc par: JD
approved by / approuve par: JD
tender / soumission: Javier Banuelos
project manager / administrateur de projets
project date / date du projet: 2016/10/26
project no. / no. du projet: R.079639.001
drawing no. / dessine no.: BM8

GSC–A1 DATE PLOTTED: 2015/11/10 PLOT SCALE: 1:250 CAD FILE: 161–12204–00 DEMO Drawing.DWG



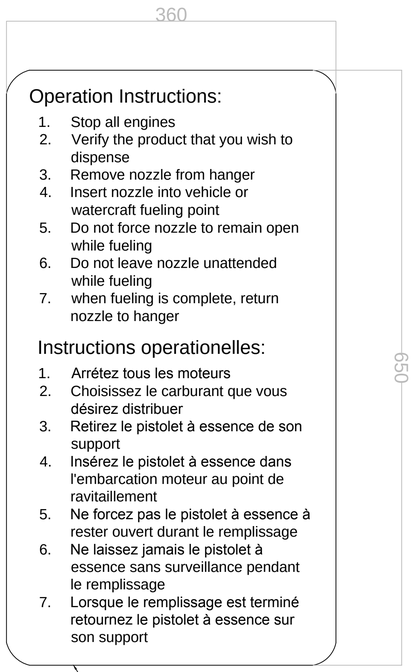
SPILL CONTAINMENT LID LABEL
SCALE: AS INDICATED

1
BM7 BM9



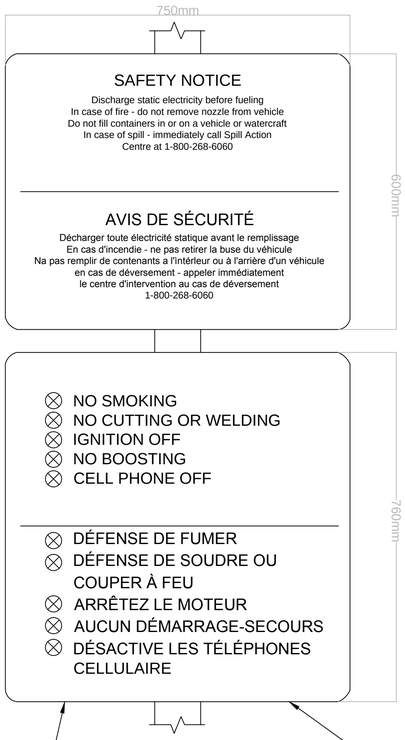
TANK FILL PIPE TAG
SCALE: AS INDICATED

2
BM7 BM9



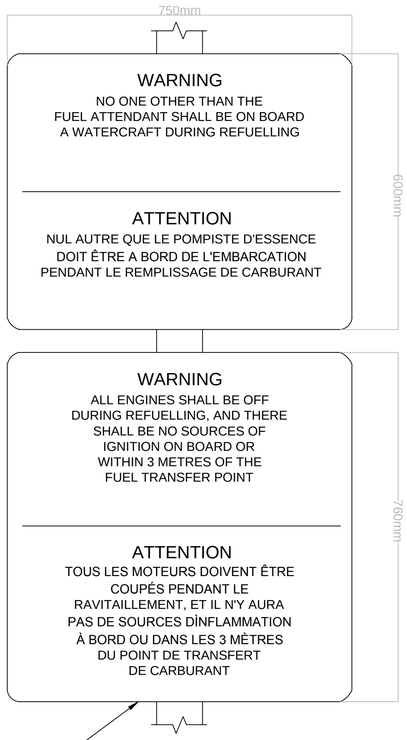
PUMP SIGNAGE
SCALE: AS INDICATED

3
BM7 BM9



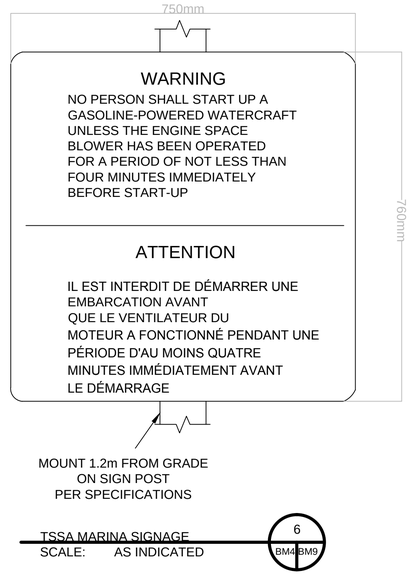
SAFETY SIGNAGE
SCALE: AS INDICATED

4
BM4 BM9



TSSA MARINA SIGNAGE
SCALE: AS INDICATED

5
BM4 BM9



TSSA MARINA SIGNAGE
SCALE: AS INDICATED

6
BM4 BM9

Public Works and Government Services Canada
Architectural and Engineering Services
Ontario Region

Travaux publics et Services gouvernementaux Canada
Services d'architecture et de génie
Région de l'Ontario

WSP

LICENSED PROFESSIONAL ENGINEER
J. M. DOLAN
90502741
PROVINCE OF ONTARIO

LEGEND

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revision		date
04		
03		
02	Issued for Tender	Nov 1
01	Issued for 75% Review	Oct 25

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A/B/C
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project title / titre du projet
Ontario
FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS – PARKS CANADA
Bruce Peninsula National Park
Marine Base Operations
248 Big Tub Road, Tobermory, ON

drawing title / titre du dessin
SAFETY
SIGNS AND TAGS

drawn by / dessine par: HET
designed by / conc par: JD
approved by / approuve par: JD
tender / soumission: Javier Banuelos
project manager / administrateur de projets
project date / date du projet: 2016/10/25
project no. / no. du projet: R.079639.001
drawing no. / dessine no.: BM9

12mm GALVANIZED U-BOLT (typ.)

350mm

IN THE EVENT OF A SPILL OR EMERGENCY:

- IN THE EVENT OF A SPILL OR EMERGENCY:
- ENSURE PERSONAL AND PUBLIC SAFETY. NOTIFY PEOPLE IN IMMEDIATE AREA OF POTENTIAL DANGER AS REQUIRED.
- CLOSE CONTAINMENT CURB VALVE
- CONTAIN SPILL USING APPROPRIATE SPILL KITS AND SAFETY EQUIPMENT
- ISOLATE AND STOP LEAK, IF POSSIBLE PREVENT SPILLED PRODUCT FROM ENTERING INTO THE ENVIRONMENT
- COMPLETE CLEAN UP OF SPILLED PRODUCT USING APPROPRIATE SPILL KITS AND SAFETY EQUIPMENT
- CONTACT ENVIRONMENT CANADA ENVIRONMENT EMERGENCY 1-800-565-1633
- CONTACT ONTARIO SPILLS ACTION CENTRE AT 1-800-268-6060
- REFER TO SITE EMERGENCY RESPONSE PLAN FOR ADDITIONAL REQUIREMENTS.

EN CAS DE DÉVERSEMENT OU D`URGENCE:

- ASSUREZ VOTRE SÉCURITÉ ET CELLE DU PUBLIC. AU BESOIN, AVISEZ LES GENS DANS LES ENVIRONS IMMÉDIATS DES DANGERS POTENTIELS.
- FERMEZ LA VANNE DE CONFINEMENT.
- CONTENIR LE DÉVERSEMENT AVEC UNE TROUSSE ANTIDÉVERSEMENT ET L'ÉQUIPEMENT DE SÉCURITÉ APPROPRIÉ
- ISOLEZ ET ARRÊTEZ LA FUITE. SI POSSIBLE, EMPÊCHEZ LE PRODUIT DÉVERSÉ DE REJOINDRE L'ÉNVIRONNMENT ET LE PORT.
- NETTOYEZ LE PRODUIT DÉVERSÉ AVEC UNE TROUSSE ANTIDÉVERSEMENT ET L'ÉQUIPEMENT DE SÉCURITÉ APPROPRIÉS.
- CONTACTEZ LA LIGNE D'URGENCES ENVIRONNEMENTALES D`ENVIRONNEMENT CANADA AU 1-800-565-1633.
- CONTACTER LE CENTRE D'INTERVENTION AU CAS DE DÉVERSEMENTS DE L'ONTARIO 1-800-268-6060
- SE RÉFÉREZ AU PLAN D`INTERVENTION D'URGENCES POUR DES EXIGENCES SUPPLÉMENTAIRES.

500mm

FUEL DELIVERY STANDARD OPERATING PROCEDURES:

PRIOR TO PRODUCT TRANSFER:

1. ENSURE A SPILL KIT WITH SPILL RESPONSE MATERIAL IS PRESENT
   - SPILL RESPONSE MATERIALS TO INCLUDE:
     - ABSORBENT PADS
     - ABSORBENT/CONTAINMENT SOCKS
   - ENSURE THAT THE ENVIRONMENTAL PTA CONTAINMENT CURB AREA IS FREE OF SNOW/WATER ACCUMULATION
   - INSPECT DELIVERY HOSE AND FITTINGS
   - CONFIRM AVAILABLE TANK VOLUME
   - ENSURE DELIVERY TRUCK AND HOSE ARE ENTIRELY WITHIN CONCRETE PRODUCT TRANSFER AREA
   - CLOSE PRODUCT CONTAINMENT AREA VALVE
2. DURING PRODUCT TRANSFER:
   - ENSURE THE DELIVERY TRUCK OPERATOR USES A LIQUID AND VAPOUR TIGHT CONNECTION
   - REMAIN IN ATTENDANCE AT FILL CONNECTION AT ALL TIMES
   - WHEN TANK GAUGE READS 90% TANK CAPACITY, SLOW OR STOP DELIVERY, POSITIVE CLOSING SHUT-OFF VALVE IS SET TO STOP FLOW AT 95% TANK CAPACITY
3. AFTER PRODUCT TRANSFER
   - VERIFY NO SPILLS/RESIDUAL PRODUCT ARE PRESENT
   - IF SPILL OR RESDUAL PRODUCT, CLEAN WITH APPROPIATE MATERIALS
   - COMPLETE NECESSARY DOCUMENTATION
   - OPEN PRODUCT CONTAINMENT AREA VALVE

INCASE OF SPILL

CALL 1-800-268-6060

PROCÉDURES D`OPÉRATION STANDARDS POUR LA LIVRAISON DE CARBURANT:

1. AVANT LE TRANSFERT DU PRODUIT:
   - S'ASSUREZ QU'UNE TROUSSE ANTIDÉEVERSEMENT CONTENANT LE MATÉRIEL D'INTERVENTION AUCAS D'URGENCE SE TROUVE SUR PLACE
   - LE MATÉRIEL D'INTERVENTION D'URGENCE DOIT COMPRENDRE:
     - DES TAMPONS ABSORBANTS
     - DES BARRAGES DE RÉTENTION/ABSORBANTS
   - S'ASSUREZ QUE L'AIRE DE TRANSFERT ET DE RÉTENTION NE CONTIENT PAS DE NEIGE NI D'EAU
   - INSPECTEZ LE TUYAU DE LIVRAISON ET SES RACCORDS
   - VÉRIFIEZ LE VOLUME DU RÉSERVOIR
   - J'ASSUREZ QUE LE CAMION DE LIVRAISON ET LE TUYAU SONT ENTIÉREMENT A L'INTÉRIEUR DE LA ZONE DE TRANSFERT EN BÉTON
   - FERMEZ LA VANNE DE CONFINEMENT
2. PENDENT LE TRANSFER DU PRODUIT:
   - S'ASSUREZ QUE L'OPÉRATEUR DU CAMION DE LIVRAISON UTILISE UNE CONNEXION ÉTANCHE AUX LIQUIDES ET A LA VAPEUR
   - DEMEUREZ SUR PLACE AU POINT DE REMPLISSAGE PENDANT LE TRANSFERT
   - LORSQUE LA JAUGE DU RESERVOIR INDIQUE QUE LE RÉSERVOIR EST À 90% DE LA CAPACITÉ, RALENTISSEZ OU ARRÊTEZ LE TRANSFERT, UN DISPOSITIF D'ARRET EST RÉGLÉ POUR ARRÊTER L'ÉCOUCEMENT LORSQUE LE RÉSERVOIR EST REMPLI A 95% DE SA CAPACITÉ
3. APRÈS LE TRANSFERT DU PRODUIT:
   - VÉRIFIER QU'IL NY A PAS DE DÉVERSEMENT NI DE PRODUIT RÉSIDUEL
   - S'IL Y A UN DÉVERSEMENT OU DU PRODUIT RÉSIDUEL, NETTOYEZ AVEC LE MATÉRIEL APPROPRIÉ
   - REMPLISSEZ LA DOCUMENTATION REQUISE
   - OUVREZ LA VANNE CONFINEMENT

EN CAS DE DÉVERSEMENT
APPELER 1-800-268-6060

2.0 m

3 BM4 BM11 NEW MOUNTING POST AND BASE/FOOTING

ALUMINUM SIGNBOARD ON WEATHERPROOF BACKER BLACK TEXT ON WHITE BACKGROUND BOLD TEXT 8mm HEIGHT (COLOUR . RED) REGULAR TEXT 6mm HEIGHT (COLOUR.BLACK)

NEW BASE PLATE

3 BM4 BM11

CONCRETE SPILL CONTAINMENT

NEW PRODUCT TRANSFER AREA SIGNAGE
SCALE: AS INDICATED

1 BM4 BM11

450

CONTAINMENT VALVE
VANNE DE CONFINEMENT

CLOSE IN CASE OF A SPILL AND WHEN FILLING TANKS
FERMEZ EN CAS DE DÉVERSEMENT ET LORS DU REMPLISSAGE DES RESERVOIRS

450

2.0 m

NEW MOUNTING POST AND BASE/FOOTING

3 BM4 BM11 NEW BASE PLATE

CONCRETE TANK PAD

NEW CONTAINMENT VALVE SIGNAGE
SCALE: AS INDICATED

2 BM4 BM11

HILTI HDA ANCHOR KB-TZ 3/8" X 3" SS304 OR EQUAL (TYP. 4 PLACE)

NEW 50mm HSS OR EQUAL WELDED TO BASE PLATE

123 typ.

61.5

61.5

123 typ.

22 typ.

22 typ.

10mm THICK

NEW BASE PLATE DETAIL
SCALE: AS INDICATE

3 BM4 BM11

Public Works and Government Services Canada
Architectural and Engineering Services Ontario Region

Travaux publics et Services gouvernementaux Canada
Services d'architecture et de genie Region de l'Ontario

WSP

LICENSED PROFESSIONAL ENGINEER
J. M. DOLAN
90502741
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revision		date
04		
03		
02	Issued for Tender	Nov 1
01	Issued for 75% Review	Oct 18

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project title / titre du projet

Ontario

FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS – PARKS CANADA

Bruce Peninsula National Park
Marine Base Operations
248 Big Tub Road, Tobermory, ON

drawing title / titre du dessin

NEW PRODUCT TRANSFER AREA SIGNAGE

drawn by / dessine par: HET

designed by / conc par: JD

approved by / approuve par: JD

tender / soumission: Javier Banuelos
project manager / administrateur de projets

project date / date du projet: 2016/10/25

project no. / no. du projet: R.079639.001

drawing no. / dessine no.: BM10

04 11

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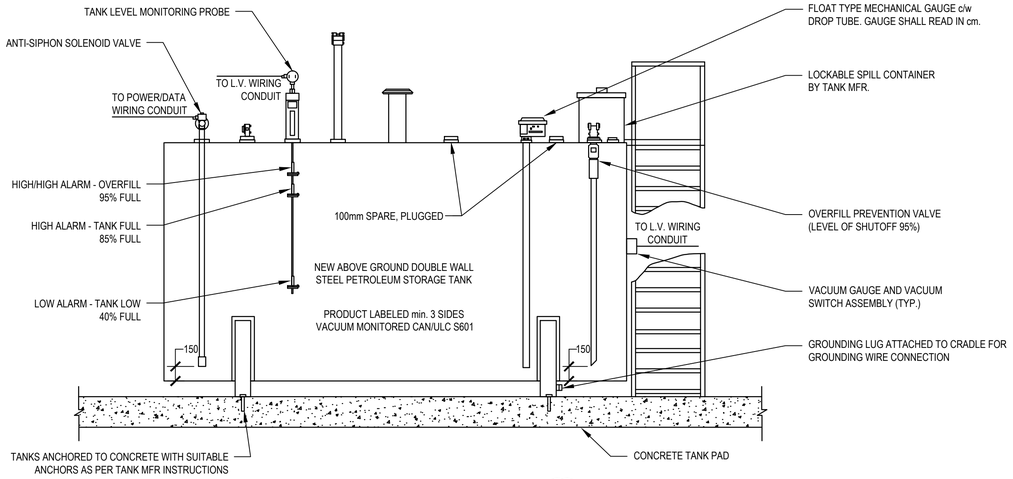
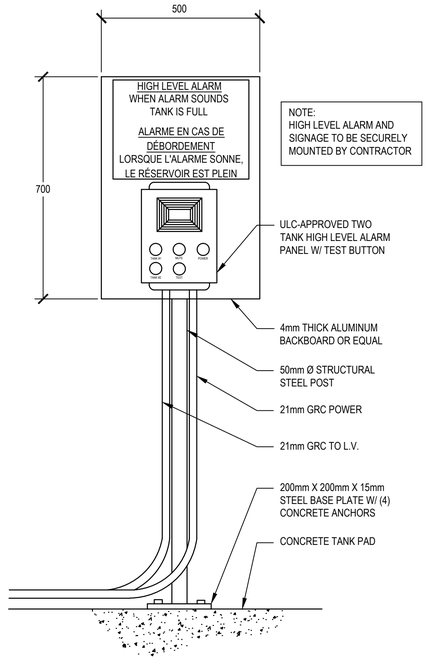


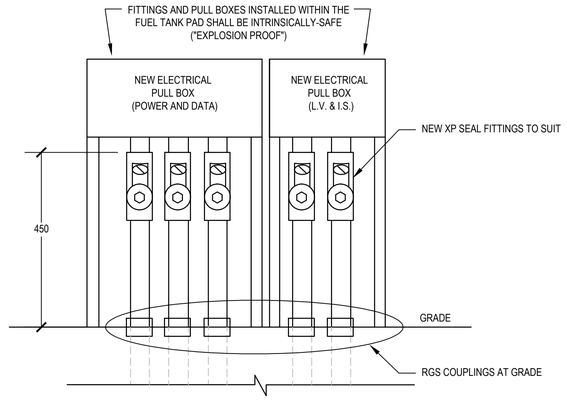
TANK MONITORING CONTROLS
SCALE: NOT TO SCALE

1
BM4 BM11



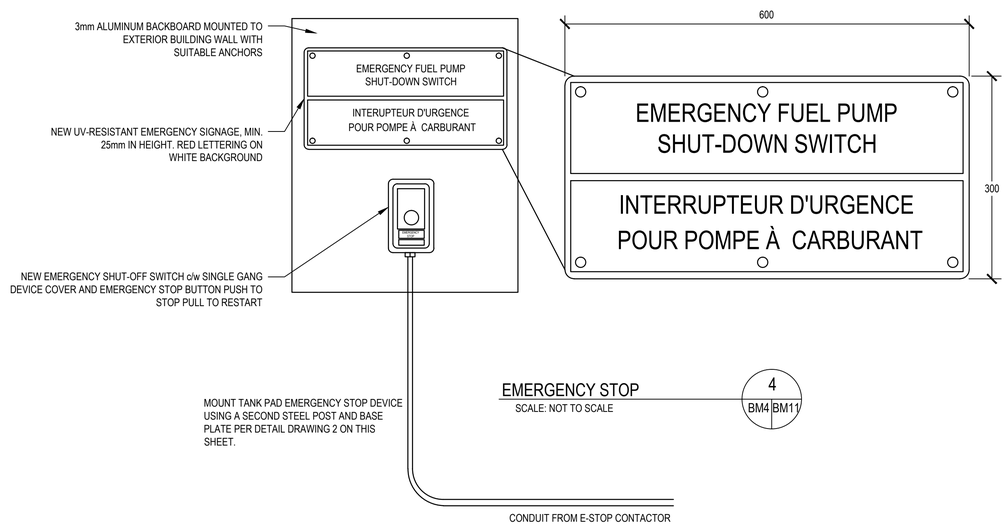
TANK HIGH LEVEL ALARM
SCALE: NOT TO SCALE

2
BM4 BM11



CONDUIT STUB-UPS
SCALE: NOT TO SCALE

3
BM4 BM11



EMERGENCY STOP
SCALE: NOT TO SCALE

4
BM4 BM11

Public Works and Government Services Canada
Architectural and Engineering Services
Ontario Region

Travaux publics et Services gouvernementaux Canada
Services d'architecture et de génie
Région de l'Ontario

WSP

LICENSED PROFESSIONAL ENGINEER
J. M. DOLAN
90502741
19 Nov 2015
PROVINCE OF ONTARIO

04		
03		
02	Issued for Tender	Nov 1
01	Issued for 99% Review	Oct 26
revision		date

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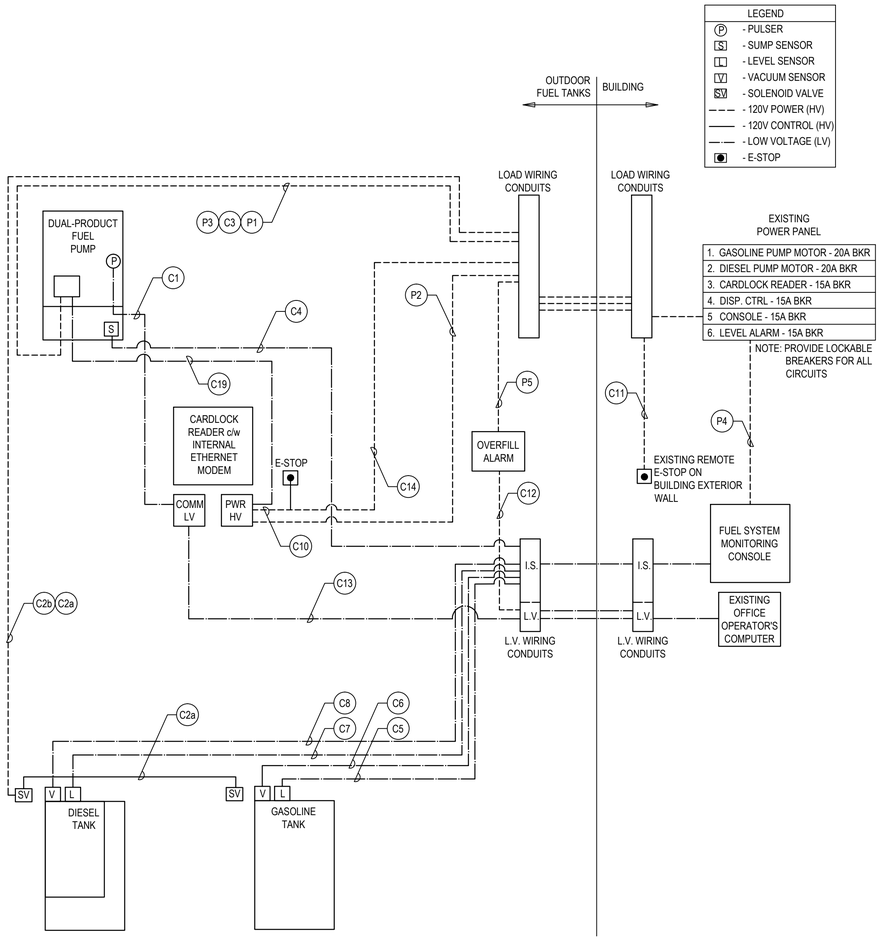
Ontario
FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS – PARKS CANADA
Bruce Peninsula National Park
Marine Base Operations
248 Big Tub Road, Tobermory, ON

drawing title / titre du dessin
ELECTRICAL DETAILS

drawn by / dessine par: EJM
designed by / conc par: JD
approved by / approuve par: JD
tender / soumission: Javier Banuelos
project manager / administrateur de projets
project date / date du projet: 2016/10/26
project no. / no. du projet: R.079639.001
drawing no. / dessine no.: BM11

GSC–A1 DATE PLOTTED: 2015/11/10 PLOT SCALE: 1:250 CAD FILE: 161–12204–00 DEMO Drawing.DWG



ELECTRICAL LINE DIAGRAM

SCALE: NOT TO SCALE

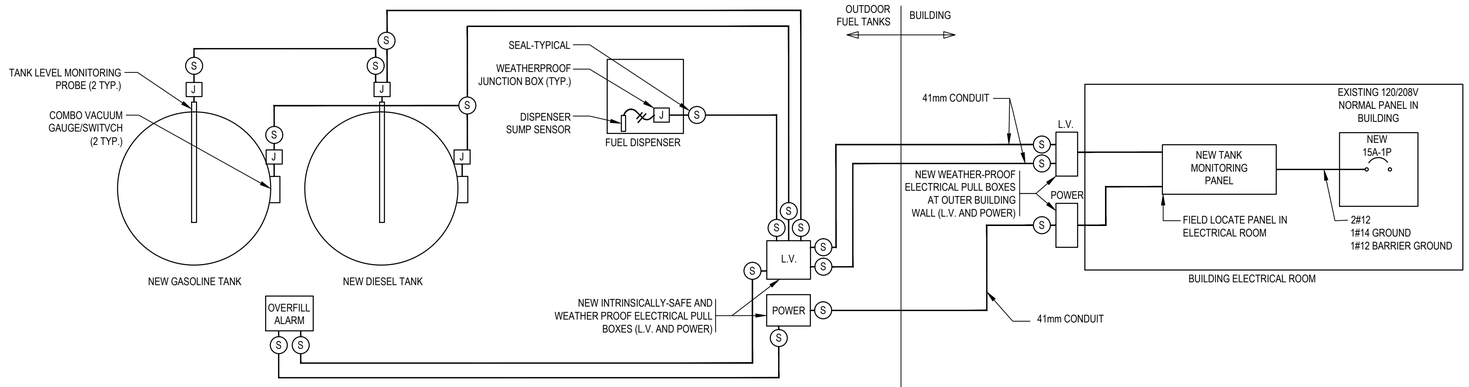
1
BM4 BM12

CONTROLS

I.D.	Device	From	To	Voltage	Conductors	Conduit Size	Comments
C1	Pump Pulser	Fuel Pump Pulser	Cardlock Reader	Low Voltage	Belden 83351E	21	Field Route
C2a	Gasoline Tank Solenoid Valve	Tank Pad Pull Box	Gasoline Dispenser	120 VAC	3C #12	21	Field Route from Pull Box to Solenoid
C2b	Diesel Tank Solenoid Valve	Tank Pad Pull Box	Diesel Dispenser	120 VAC	3C #12	21	Field Route from Pull Box to Solenoid
C3	Solenoid Valve Control	Fuel Dispenser	Solenoid Valves	120 VAC	3C #12	21	Field Route from
C4	Dispenser Sump Sensor	Fuel Dispenser	Monitoring Console	Intrinsically Safe	Belden 83351E	21	Install in Intrinsically Safe Conduit
C5	Gasoline Tank Level	Gasoline Tank Level	Monitoring Console	Intrinsically Safe	Belden 83351E	21	Install in Intrinsically Safe Conduit
C6	Gasoline Tank Vacuum Switch	Gasoline Tank Vacuum Switch	Monitoring Console	Intrinsically Safe	Belden 83351E	21	Install in Intrinsically Safe Conduit
C7	Diesel Tank Level	Diesel Tank Level	Monitoring Console	Intrinsically Safe	Belden 83351E	21	Install in Intrinsically Safe Conduit
C8	Diesel Tank Vacuum Switch	Diesel Tank Vacuum Switch	Monitoring Console	Intrinsically Safe	Belden 83351E	21	Install in Intrinsically Safe Conduit
C9	Dispenser Power	Fuel Dispenser	Cardlock Reader	120 VAC	3C #12	21	Field Route
C10	Emergency Stop (Tank Pad)	Tank Pad E-Stop	Cardlock Reader	120 VAC	3C #12	21	Field Route
C11	Emergency Stop (Building)	Building Exterior Wall E-Stop	Cardlock Reader	120 VAC	3C #12	21	Field Route
C12	Tank Level Alarm	Office Computer	Level Alarm	Low Voltage	CAT6 Ethernet	27	Install in Low Voltage Conduit
C13	Cardlock Reader Communication	Office Computer	Cardlock Reader	Low Voltage	CAT6 Ethernet	27	Install in Low Voltage Conduit

LOAD POWER

I.D.	Device	Load (Amperes)	Breaker Size	Wire Size (AWG)	Bond Size (AWG)	Conduit Size	Comments
P1	Duel-Product Fuel Pump	12.4 per Motor (two motors total)	2 x 20A	2 x 2C#6	2 x #8	35	Install in dedicated load wire conduit. One circuit per motor
P2	Cardlock Reader	3	15A	2C #12	#12	21	Install in dedicated load wire conduit.
P3	Dispenser Control	3	15A	2C #12	#12	21	Install in dedicated load wire conduit.
P4	Monitor Console	10 or less	15A	2C #12	#12	21	Field Route
P5	Level Alarm	1.5	15A	2C #12	#12	21	Install in dedicated load wire conduit.



FUEL SYSTEM MONITORING CONSOLE SCHEMATIC

SCALE: NOT TO SCALE

2
BM4 BM12

Public Works and Government Services Canada
Architectural and Engineering Services
Ontario Region

Travaux publics et Services gouvernementaux Canada
Services d'architecture et de génie
Région de l'Ontario

WSP

LICENSED PROFESSIONAL ENGINEER
J. M. DOLAN
90502741
PROVINCE OF ONTARIO

revision		date
04		
03		
02	Issued for Tender	Nov 1
01	Issued for 99% Review	Oct 26

Do not scale drawings.
Verify all dimensions and conditions on site and immediately notify the engineer of all discrepancies.

A Detail No. / No. du détail
B drawing no. – where detail required / dessin no. – où détail exigé
C drawing no. – where detailed / dessin no. – où détaillé

project title / titre du projet

Ontario

FUEL TANK SYSTEM REMOVALS AND INSTALLATIONS – PARKS CANADA

Bruce Peninsula National Park
Marine Base Operations
248 Big Tub Road, Tobermory, ON

drawing title / titre du dessin

ELECTRICAL SCHEMATICS

drawn by / dessine par	JLK
designed by / conc par	JD
approved by / approuve par	JD
tender / soumission	Javier Banuelos
project manager / administrateur de projets	
project date / date du projet	2016/10/26
project no. / no. du projet	R.079639.001
drawing no. / dessine no.	BM12

APPENDIX G

ENVIRONMENTAL CODE OF PRACTICE FOR ABOVEGROUND AND UNDERGROUND STORAGE TANK SYSTEMS CONTAINING PETROLEUM AND ALLIED PETROLEUM PRODUCTS

Note to Reader - Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products (PN 1326)

This code references Underwriters Laboratories of Canada (ULC) standards which are periodically updated. With this note CCME attempts to provide information on ULC updates, replacements and withdrawals since publication of the Code. Confirm all standards with ULC.

October 2015 – ULC Update

ULC Standards has published the Second Edition of CAN/ULC-S655-15, Standard for Aboveground Protected Tank Assemblies for Flammable and Combustible Liquids.

January 2013 – ULC Replacements and Withdrawals Update

Underwriters Laboratories of Canada (ULC) has published the First Edition CAN/ULC-S661-10, Standard for Overfill Protection Devices for Flammable and Combustible Liquid Storage Tanks. This standard supersedes ULC/ORD-C58.15-1992, Overfill Protection Devices for Flammable Liquid Storage Tanks, referenced in Table 1 and Sentences 3.3.4(1)(e) (ii), 3.6.2, and 4.3.2 of the Code. Refer to ULC Standard Bulletin 2011-09 for further information.

Underwriters Laboratories of Canada (ULC) has published the First Edition CAN/ULC-S663-11, Standard for Spill Containment Devices for Flammable and Combustible Liquid Aboveground Storage Tanks. This standard replaces and supersedes ULC/ORD-C142.19.94, Spill Containment Devises for Aboveground Flammable and Combustible Liquid Storage Tanks, referenced in Table 1 and Sentence 8.7.2(b) of the Code. Refer to ULC Standard Bulletin 2011-10 for further information.

Underwriters Laboratories of Canada (ULC) has published the First Edition CAN/ULC-S667-11, Metallic Underground Piping for Flammable and Combustible Liquids Standard which complements current referenced standards within the Code. Refer to ULC Standard Bulletin 2011-23 for further information.

Underwriters Laboratories of Canada (ULC) has published the First Edition CAN/ULC-S668-12, Standard for Liners Used for Secondary Containment of Aboveground Flammable and Combustible Liquid Tanks which complements current referenced standards within the Code. Refer to ULC Standard Bulletin 2012-09 for further information.

Effective August 23, 2012, Underwriters Laboratories of Canada (ULC) have withdrawn Technical Supplements for the Refurbishing of Underground and Aboveground Tanks:
ULC-601(A) - 2001, referenced in Table 1 and Sentence 3.7.1(1)(a) and 9.7.2(2)(b)
ULC-603(A) - 2001, referenced in Table 1 and Sentence 9.7.1(1)(a)
ULC-615(A) - 2002 and
ULC-630(A) - 2001, referenced in Table 1 and Sentence 3.7.1(1)(b), and 9.7.2(2)(a) of the Code.
Refer to ULC Standards Bulletin No. 2012-11 for further information.

May 2009 – ULC Updates

Underwriters Laboratories of Canada (ULC) has published the First Edition CAN/ULC-S660-08, Standard for Nonmetallic Underground Piping for Flammable and Combustible Liquids. This standard replaces, ULC/ORD-C971-2005, Nonmetallic Underground Piping for Flammable and Combustible Liquids, which had itself replaced the following ORDs referenced in Table 1 and Sentence 5.2.1(1) of the Code:

• ORD-C107.4-1992, “Ducted Flexible Underground Piping Systems”
• ORD-C107.7-1993, “Glass-Fibre Reinforced Plastic Pipe and Fittings”
• ORD-C107.14-1992, “Non-Metallic Pipe and Fittings”

Effective March 19, 2009, Underwriters Laboratories of Canada (ULC) have exited from the testing and certification of secondary containment liners, refer to ULC Certification Bulletin No. 2009-04 for further information.

Effective March 31, 2009, Underwriters Laboratories of Canada (ULC) have withdrawn ULC/ORD-C58.9-1997, Secondary Containment Liners for Underground and Aboveground Flammable and Combustible Liquid Tanks, referenced in Table 1 and Sentence 3.9.2(1) of the Code, refer to ULC Certification Bulletin No. 2009-04 for further information.

July 2005 – ULC Update

Effective July 1, 2005, the Underwriters’ Laboratories of Canada’s (ULC’s) Other Recognized Document (ORD), *ULC/ORD-C971-2005, Nonmetallic Underground Piping for Flammable and Combustible Liquids*, replaces the following ORDs referenced in Table 1 and Sentence 5.2.1(1) of the Code:

- ORD-C107.4-1992, “Ducted Flexible Underground Piping Systems”
- ORD-C107.7-1993, “Glass-Fibre Reinforced Plastic Pipe and Fittings”
- ORD-C107.14-1992, “Non-Metallic Pipe and Fittings”

CCME

Canadian Council of Ministers of the Environment

Le Conseil canadien des ministres de l'environnement

Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products

PN 1326

CCME Canadian Council of Ministers of the Environment

The Canadian Council of Ministers of the Environment (CCME) is the major intergovernmental forum in Canada for discussion and joint action on environmental issues of national, international and global concern. The 14 member governments work as partners in developing nationally consistent environmental standards, practices, and legislation.

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CCME Documents
Toll free: 1 (800) 805-3025
www.ccme.ca

Aussi disponible en français

La présente publication est également offerte en francais sous le titre Code de recommandations techniques pour la protection de l'environnement applicable aux systèmes de stockage hors sol et souterrains de produits pétroliers et de produits apparentés. PN 1327

ISBN 1-896997-33-3

Abstract

The Canadian Council of Ministers of the Environment's (CCME) "Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products" has been prepared for owners of storage tank systems, the petroleum marketing and distribution industry, and federal, provincial, and territorial departments which have the authority to regulate storage tanks containing petroleum or allied petroleum products.

The Code is a model set of technical requirements and only comes into effect if adopted, in whole or in part, by an authority having jurisdiction. It provides technical requirements for registration and approval of storage tank systems, design and installation of new storage tanks and piping, monitoring and leak detection, upgrading of existing systems, operation and maintenance, and the withdrawal from service of storage tank systems.

This publication updates, combines, and replaces CCME's 1993 "Environmental Code of Practice for Underground Storage Tank Systems Containing Petroleum Products and Allied Petroleum Products" and the 1994 "Environmental Code of Practice for Aboveground Storage Tank Systems Containing Petroleum Products." It reflects the advances in technology and the experience gained by industry and government regulators in proactively managing storage tanks systems in the intervening years.

Résumé

Le document du Conseil canadien des ministres de l'environnement (CCME) intitulé Code de recommandations techniques pour la protection de l'environnement applicable aux systèmes de stockage hors sol et souterrains de produits pétroliers et de produits apparentés a été préparé à l'intention des propriétaires de systèmes de stockage, de l'industrie de la commercialisation et de la distribution du pétrole ainsi que des ministères fédéraux, provinciaux et territoriaux qui ont le pouvoir de réglementer les systèmes de stockage contenant des produits pétroliers et des produits apparentés.

Le Code est un ensemble type d'exigences techniques; il n'entre en vigueur que s'il a été adopté, en tout ou en partie, par l'autorité compétente. Il formule des exigences techniques pour l'enregistrement et l'approbation des nouveaux systèmes de stockage; la conception et l'installation des nouveaux réservoirs de stockage et de la tuyauterie; la surveillance et la détection des fuites; l'amélioration des systèmes existants; l'exploitation et l'entretien; et la mise hors service des systèmes de stockage.

La présente publication met à jour, combine, et remplace le document du CCME de 1993 intitulé Code de recommandations techniques pour la protection de l'environnement applicable aux systèmes de stockage souterrains de produits pétroliers et de produits apparentés et le document de 1994 intitulé Code de recommandations techniques pour la protection de l'environnement applicable aux systèmes de stockage hors sol de produits pétroliers. Elle tient compte des progrès de la technologie et de l'expérience acquise par l'industrie et les organismes de réglementation gouvernementaux dans la gestion des systèmes de stockage depuis la parution des deux premiers codes.

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Preface

The "Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products" (hereafter referred to as "the Code") is published by the Canadian Council of Ministers of the Environment (CCME) through its National Task Force on Storage Tanks.

The Code comprises a model set of technical requirements designed to protect the environment by preventing product releases from aboveground and underground storage tank systems. The Code was written in a form suitable for adoption by legislative authorities in Canada.

The membership of the National Task Force was representative of provincial, territorial, and federal agencies which have the authority to regulate storage tank systems containing petroleum and allied petroleum products. The Code was developed with the voluntary assistance of many industry experts who have contributed to the work of the National Task Force on Storage Tanks. The National Task Force was assisted in its work by the staff of the CCME Secretariat.

The National Task Force recommends that the Code be reviewed by CCME within five years of its publication.

Comments and inquiries on the use of the Code and suggestions for its improvement are welcomed and should be sent to:

CCME Secretariat
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Winnipeg, Manitoba
R3C 1A3
Tel: (204) 948-2090
Fax: (204) 948-2125
Email: info@ccme.ca

Acknowledgements

The National Task Force on Storage Tanks acknowledges the many individuals and organizations that have contributed to the production of this Code.

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Rationale for an Environmental Code of Practice

Historically, the National Fire Code of Canada (NFCC) and Canadian Standards Association (CSA) requirements have been used in Canada for the installation and operation of underground storage tanks containing petroleum products. These codes were written from the viewpoint of fire prevention and primarily cover the elements of fire prevention and fire safety. In the late 1980s, the Canadian Council of the Ministers of the Environment (CCME) saw a need to provide recommended practices that went beyond the scope of these documents and provided an environmental perspective on the management of storage tanks containing petroleum and allied petroleum products.

As a result, CCME's "Environmental Code of Practice for Underground Storage Tank Systems Containing Petroleum Products and Allied Petroleum Products" was first published in 1988 and revised in 1993. This was followed in 1994 with the publication of the "Environmental Code of Practice for Aboveground Storage Tank Systems Containing Petroleum Products."

Federal, provincial, and territorial jurisdictions agreed that the existing underground and aboveground codes of practice should be updated to keep pace with changes in the NFCC, reflect new CSA requirements, and take advantage of advances in technology. It was also decided to combine the existing aboveground and underground CCME codes into one comprehensive document.

A Guide to the Use of this Code

Purpose

This Code presents a model set of technical requirements to protect the environment from existing, new, or proposed storage tank systems that contain petroleum and allied petroleum products. Its primary purpose is the promotion of environmentally sound management of petroleum and allied petroleum product storage tank systems through the application of uniform performance standards throughout Canada.

Relation to Federal, Provincial, and Territorial Regulations

This Code is a model set of technical requirements and only comes into effect if adopted, in whole or in part, by an authority having jurisdiction. Where this Code has been adopted, in whole or in part, by an authority having jurisdiction, it shall be subject to any restrictions or conditions added by the regulatory authority. Readers of this Code are therefore advised to check with the federal, provincial, or territorial authority having jurisdiction to see whether this Code applies in their area of interest. (See Appendix A for contact information for federal, provincial, and territorial authorities having jurisdiction.)

Relation to Other Codes

This Code is written as a complementary document to the National Fire Code of Canada (NFCC) and to CAN/CSA B139, "Installation Code for Oil Burning Equipment".

National Fire Code of Canada

This Code has been developed in conjunction with the National Research Council, publisher of the National Fire Code of Canada (NFCC), to minimize the possibility of conflict between the respective contents of the two codes.

While this Code provides minimum requirements for the prevention of petroleum and allied petroleum product losses from storage tank systems that may lead to environmental problems (primarily groundwater contamination), the NFCC sets technical requirements for the storage and handling of flammable and combustible liquids from the point of view of preventing fires or explosions.

In order to ensure effective application, fire officials, environmental officials, or other authorities having the jurisdiction to regulate petroleum and allied petroleum product storage tanks should be fully conversant with the technical requirements in both codes. This is the only way to ensure that storage tanks are built, installed, operated, and removed in a manner that is acceptable from both a fire safety and environmental point of view.

CSA Standard B139, Installation Code for Oil-Burning Equipment

This Code was developed in cooperation with the Canadian Standards Association, publishers of CAN/CSA-B139. Storage tank systems that fall within the scope of CAN/CSA B139 are predominantly furnace oil tanks and storage tanks containing diesel fuel and connected to standby emergency power generators.

The CAN/CSA-B139 Code was revised and published in 2000. This Code provides additional requirements that address concerns, such as environmental sensitivity or upgrading of existing storage tank systems, which are beyond the scope of CAN/CSA-B139-00.

Regulatory authorities, owners, and installers of storage tanks should be fully conversant with the technical requirements of CAN/CSA-B139-00, this Code (where it is in force), and all federal/provincial/territorial regulations that apply.

Structure and Content

This Code is drafted in such a way that it may be adopted or enacted for legal use by any jurisdictional authority in Canada.

A decimal numbering system is used throughout this Code. The first number indicates the Part of the Code, the second the Section within the Part, the third the Article within the Section. An Article may be broken down further into Sentences, Clauses, and Subclauses, each of which is in brackets, as shown here:

4	Part
4.5	Section
4.5.1	Article
4.5.1 (1)	Sentence
4.5.1 (1)(a)	Clause
4.5.1 (1)(a)(i)	Subclause

Sentence 3.2.8(1) is an example of a requirement in which all three clauses must be met to be in conformance with the Code.

3.2.8(1) No person shall install an *aboveground storage tank* system unless:

(a) required permits or approvals have been obtained from the *authority having jurisdiction*;

(b) plans, drawings and specifications of the system or equipment have been examined by the *authority having jurisdiction*; **and**

(c) the plans, drawings and specifications referred to in Clause (b) bear the stamp and signature of a professional engineer licensed to practice in the province/territory.

Sentence 5.4.2(1) is an example of a requirement in which only one of the clauses must be met to be in conformance with the Code.

5.4.2(1) Underground *piping* larger than 75 mm in diameter shall be designed, installed and maintained to meet the requirements of:

(a) *secondary containment* in conformance with Sentence 5.4.4(1);

(b) *leak detection* in conformance with Part 6; **or**

(c) API RP 1632-96, "Cathodic Protection of Underground Storage Tank and Piping Systems" and API Std 2610-94, "Design, Construction, Operation, Maintenance and Inspection of Terminal and Tank Facilities".

The following is a summary of the contents of this Code.

Part 1 Application and Definitions

Part 1 defines terms and stipulates to what the Code applies. It includes the necessary administrative details to ensure that the technical requirements can be applied with a minimum of difficulty.

Part 2 Registration and Approval of Storage Tank Systems

Part 2 contains the requirements for the registration and approval of storage tank systems. It includes the scope of the tank systems that are required to be registered as well as provisions regarding storage tank system identification.

Part 3 Design and Installation of New Aboveground Storage Tank Systems

The design and installation of new aboveground storage tank systems is covered in Part 3. The recommendations are intended to ensure that equipment is designed and installed properly in order to minimize the possibility of leaks and spills.

Part 4 Design and Installation of New Underground Storage Tank Systems

The design and installation of new underground storage tank systems are covered in Part 4. The recommendations are intended to ensure that equipment is designed and installed properly in order to minimize the possibility of leaks and spills.

Part 5 Design and Installation of New Piping Systems

Part 5 outlines the requirements for new piping systems for storage tank systems. It includes recommendations for product transfer, design standards, and installation.

Part 6 Monitoring and Leak Detection of Storage Tank Systems

The frequency and method of monitoring and leak detection for all new and existing storage tank systems are specified in Part 6. The recommendations are intended to prevent or minimize the environmental impact of spills or leaks.

Part 7 Upgrading of Existing Storage Tank Systems

Part 7 specifies how and when existing storage tank systems must be upgraded to be in conformance with this Code. It also defines those storage tank systems that are exempt from the upgrading requirement.

Part 8 Operation and Maintenance

Part 8 addresses the ongoing operation and maintenance of storage tank systems. The intention is to prevent product releases. When they do occur, however, the recommendations in this Part are designed to help operators of storage tank systems detect, terminate, and mitigate releases as quickly as possible.

Part 9 Withdrawal From Service of Underground Storage Tank Systems

Part 9 contains the requirements for the closure and withdrawal from service of storage tank systems, either temporarily or permanently. Provisions for tank removal and disposal are provided to ensure that abandoned storage tanks do not cause environmental problems.

Appendix A Authorities Having Jurisdiction

This Appendix lists the contact information for the various federal, provincial, and territorial authorities having jurisdiction.

Appendix B Explanatory Material

Appendix B contains explanations to assist the user in understanding these Code requirements. The numbering system used in the Appendix corresponds with the appropriate Article in this Code.

Appendix C Minimum Information Required for Registration of Storage Tank Systems

This appendix outlines the minimum information required by authorities having jurisdiction for the registration of storage tank systems.

Appendix D Spill Reporting

This Appendix lists the federal, provincial, and territorial environmental emergency reporting telephone numbers.

Part 1 Application and Definitions

Section 1.1 Application

1.1.1(1) Unless otherwise permitted by the *authority having jurisdiction*, the *owner* of a *storage tank system* shall comply with the provisions of this Code.

1.1.1(2) When additional environmental, public health, or safety concerns have been identified, the a*uthority having jurisdiction* may require measures above and beyond the provisions of this Code.

1.1.2 Except as provided in Article 1.1.3(1), this Code applies to *aboveground* and *underground storage tank* systems used for the storage of *petroleum* and *allied petroleum products*.

1.1.3(1) This Code does not apply to:

(a) a *storage tank system* containing raw production *petroleum and allied petroleum products*;

(b) a *storage tank system* located within the fence line of a refinery or in an area contiguous with the refinery process units;

(c) an *aboveground storage tank system* having a capacity of 2 500 L or less that is connected to a heating appliance or emergency generator; or

(d) a *mobile tank*.

1.1.4 Notwithstanding the requirements of Parts 7 and 8, an *owner* or *operator* shall not directly or indirectly cause or allow a *leak* or *spill* of *petroleum* or *allied petroleum products* from a *storage tank system* or vehicle.

Section 1.2 Equivalents

1.2.1 The provisions of this Code are not intended to limit the appropriate use of materials, systems, or equipment not specifically described herein.

1.2.2 Materials, systems, equipment, and procedures not specifically described herein, or that vary from the specific requirements in this Code, or for which no recognized test procedure has been established, may be used if it can be shown to the *authority having jurisdiction* that these alternatives are equivalent to those specifically described herein and will perform in an equivalent manner acceptable to the *authority having jurisdiction*.

Section 1.3 Alternatives

1.3.1 Alternatives to the materials, systems, equipment, and procedures or standards specified in this Code may be used if the *authority having jurisdiction* is satisfied that those alternatives provide a level of performance, public health, safety, or environmental protection that is equivalent to or exceeds the levels of performance or protection provided by this Code.

Section 1.4 Definitions

1.4.1 Words and phrases that are not included in the list of defined terms in this Part shall have the meanings that are commonly assigned to them in the context in which they are used in this Code, taking into account the specialized use of terms by various trades and professions to which the terminology applies.

1.4.2 The words and terms that are in *italics* in this Code shall have the following meanings unless otherwise indicated by the context:

Abandoned or ***abandonment*** means a *storage tank system* that has been *out-of-service* for more than one year.

Aboveground storage tank means a *storage tank* with all the *storage tank* volume above grade.

Aboveground storage tank system means one or more commonly connected *aboveground storage tanks* including all connected *piping*, both aboveground and underground, pumps, dispensing, and product transfer apparatus, dyking, *overfill protection devices*, and associated spill containment and collection apparatus.

Allied petroleum product means a mixture of hydrocarbons other than a *petroleum product* that may be water miscible and may have a density greater than water, and includes the following (See Appendix B, note B.1.4.2 *Allied Petroleum Product*):

(a) Thinners and solvents used by the paint and varnish industry specified under the Canadian General Standards Board (CGSB):

CAN/CGSB-1.124-99	Thinner for Vinyl Coatings
CAN/CGSB-1.136-92	Antiblush Thinner for Cellulose Nitrate Lacquer
CAN/CGSB-1.2-89	Boiled Linseed Oil
CAN/CGSB-1.4-2000	Petroleum Spirits Thinner
CAN/CGSB-1.70-99	High Solvency Thinner
CAN/CGSB-1.94-M89	Xylene Thinner (Xylol)
CAN/CGSB-1.110-M91	General Purpose Thinners for Lacquers
CAN/CGSB-1.164-92	Solvent for Vinyl Pretreatment Coating

(b) Solvents and chemicals used by chemical and manufacturing industry specified under CGSB (15), and benzene and toluene:

CAN/CGSB-15.50-92	Technical Grade Acetone
CAN/CGSB-15.52-92	Methyl Ethyl Ketone, Technical Grade

(c) Inks used by printing industry specified under CGSB (21):

CAN/CGSB-21.1-93	Offset Lithographic Printing Ink

(d) Products specified under CGSB (3):

3-GP-525Ma	Isopropanol
3-GP-531M	Methanol, Technical Grade
3-GP-855M	Ethylene Glycol, Uninhibited

Alter or ***alteration*** means to enlarge, reduce, refurbish, upgrade, or remove a *storage tank system*.

Approved means, when used in reference to a *storage tank*, component, or accessory, that the product has been investigated by a testing agency, accredited by the Standards Council of Canada, or is acceptable to the *authority having jurisdiction* and has been found to comply with specific requirements and is identified with an authorized marking of the testing agency, as appropriate.

Authority having jurisdiction means the federal, provincial, or territorial officer(s) with the legal authority to regulate storage tank systems in the area of interest. (See Appendix A.)

Cathodic protection or ***cathodically protected*** means a method of reducing or preventing *corrosion* of a metal surface by making that surface the cathode of an electrochemical cell.

Combustible liquid or ***product*** means any liquid having a closed cup *flash point* at or above 37.8 ˚C and below 93.3 ˚C.

Contingency plan means planned procedures for reporting, containing, removing, and cleaning up a *spill* or *leak*.

Construction means erection or installation.

Containment sump means a dispenser, pump, transition, or turbine sump.

Corrosion means the deterioration of a metal resulting from a reaction with its environment.

Corrosion expert means a person recognized by NACE International (formerly the National Association of Corrosion Engineers) as a *corrosion* specialist, *cathodic protection* specialist, or a registered professional engineer experienced in *corrosion protection*.

Corrosion protection means a method of reducing or preventing *corrosion* of a *storage tank system* through *cathodic protection*, the application of *protective coatings*, or the use of a non-corroding material in its construction.

Day means any continuous 24 hour period.

Discharge means releasing, *spilling*, *leaking*, pumping, pouring, emitting, *emptying*, or dumping of *petroleum* or *allied petroleum products* into the environment, whether intentional or unintentional.

Dispenser sump means a container located underneath or near a dispenser or self-contained suction pump that collects or contains *leaks*.

Effective date means the date this Code is adopted by an *authority having jurisdiction* or a date specified by an *authority having jurisdiction*.

Empty means to remove the contents of a *storage tank system* as far as is practicable by such means as draining, suction, pouring, or pumping.

Existing means that which was in place or commenced operation on or before the *effective date* of this Code.

Flammable liquid or ***product*** means any liquid having a closed cup *flash point* below 37.8 ˚C and a vapour pressure not exceeding 275.8 kPa (absolute) at 37.8 ˚C.

Flash point means the minimum temperature at which a liquid within a container gives off vapour in sufficient concentration to form an ignitable mixture with air near the surface of the liquid.

Free oil means the non-soluble, non-emulsified *petroleum* and *allied petroleum* product layer that accumulates in an *oil-water separator*.

Fuel oil means kerosine or any hydrocarbon oil as classified in CAN/CGSB-3.2-99, "Fuel Oil, Heating" and CAN/CGSB-3.3-99, "Kerosine".

Handling means the storing, transmitting, transporting, or distributing of *petroleum* or *allied petroleum products* and includes putting *petroleum products* into a container or into the fuel tank of a motor vehicle, vessel, or aircraft.

Impermeable barrier means a secondary *storage tank* wall, synthetic membrane *liner*, or other equivalent material in conformance with this Code.

Internal coating means a coating or lining of a non-corrodible material bonded firmly to the interior surface of a *storage tank* that does not chemically or physically degrade when in contact with the *petroleum* or *allied petroleum products* stored therein.

Interstitial space means the space between the primary *storage tank* or *piping* wall and the *impermeable barrier* within a *secondary containment system*. (See Appendix B, note B.1.4.2 *Interstitial space*)

Leak means any loss of liquid *petroleum* or *allied petroleum products* because of a defect in a *storage tank system*.

Leak detection means a device or method that is capable of detecting *leaks* in a *storage tank system*.

Liner means a material used as the outer barrier of a *secondary containment system*, but does not include the outer wall of double-wall *piping or storage tanks*.

Line-leak detector means a device used in pressure *piping* systems to detect a *leak* in the *piping*.

Mobile tank means a mobile refueling tank as described by ORD-C142.13-1977, Mobile Refueling Tanks.

Motive fuel means any fuel used to power a vehicle, aircraft, or vessel.

Oil-water separator means a device for collecting and separating non-soluble, non-emulsified *petroleum* and *allied petroleum products* from water.

Operator means the person who is responsible for the day-to-day operation of an installation where an *aboveground* or *underground storage tank* is located or, when referring to a vehicle, the driver in charge of the vehicle.

Out-of-service means that a *storage tank system* or portion thereof is no longer serving its intended use.

Overfill protection device means a mechanical device, electrical device, or fill procedure system that is intended to prevent a *storage tank* from being overfilled.

Owner means the Crown, an institution, corporate entity, Indian band, government department or agency, or a person who has legal *owner*ship of the *storage tank system* or who has been assigned custody to control, care for, manage, or dispose of the *storage tank system*.

Petroleum product means a single product or mixture of at least 70% hydrocarbons, by volume, refined from crude oil, with or without additives, that is used, or could be used, as a fuel, lubricant, or power transmitter and without restricting the foregoing, such products include gasoline, diesel fuel, aviation fuel, kerosine, naphtha, lubricating oil, *fuel oil*, engine oil and *used oil*, and exclude propane, paint, and solvents.

Piping means fuel conduits, including fittings and valves that are necessary for the safe *handling* and storage of *petroleum products* and *allied petroleum products* and are specified by a nominal inside diameter.

Precision leak detection test means a test capable of detecting a *storage tank leak* as small as 0.38 L/h with a probability of detection of 0.95 or greater and a probability of false alarm of 0.05 or less, within a period of 24 hours, accounting for variables such as vapour pockets, thermal expansion of product, temperature stratification, groundwater level, evaporation, pressure and end deflection.

Pressure liquid media leak detection test means a test utilizing a device to pressurize *piping* with a suitable test liquid to determine the presence of *leaks*.

Product transfer area means the area around the connection point between a delivery truck, railcar, or vessel and a *storage tank system* with a capacity of 2 500 L or more.

Protected means having impact, projectile, and fire resistance qualities for an *aboveground storage tank system*.

Protective coating means a coating applied to a surface to protect the substrate from *corrosion*.

Secondary containment means an i*mpermeable barrier* that prevents *leaks* from the primary *storage tank system* from reaching outside the containment area.

Separated solid means the particulate material that settles at the bottom of an *oil-water separator*.

Site means a lot or property where there is one or more *underground storage tank systems* within 100 m of each other, or one or more *aboveground storage tank systems* within 200 m of each other, and all *storage tanks* on the property are owned by the same *owner(s)*.

Sludge means the *petroleum* or *allied petroleum product* residue or material that accumulates at the bottom of a *storage tank*.

Spill means any loss of liquid *petroleum* or *allied petroleum product* from a *storage tank system* that is not attributable to a *leak* in the *storage tank system*.

Spill containment device means a container fitted to the inlet of a *storage tank* or to the suction coupling of a used *oil storage tank* that helps prevent *spills* from entering the environment.

Static liquid media leak detection test means a *leak detection* test in which a suitable test liquid is placed into the containment device and is monitored for a change in the liquid level and the rate of change.

Storage tank means a closed container for the storage of *petroleum* or *allied petroleum products* with a capacity of more than 230 L that is designed to be installed in a fixed location.

Storage tank system means a system for the storage and dispensing of *petroleum* or *allied petroleum product* and is not limited to *storage tanks*, associated *piping*, *vents*, pumps, and dispensing equipment.

Tank bottom water means water that accumulates at the bottom of a *storage tank*.

Underground storage tank means a *storage tank* with all of the *storage tank* volume below grade and the primary tank or double-wall completely surrounded by or in intimate contact with backfill.

Underground storage tank system means one or more commonly connected *underground storage tank(s)*, including all underground and aboveground connections, *piping*, pumps, and dispensers.

Used oil means oil from industrial and non-industrial sources that has been acquired for lubricating or other purposes and has become unsuitable for its original purpose due to the presence of impurities or the loss of original properties. *Used oil* does not include oils derived from animal or vegetable fats, crude oil or recovered *fuel oils spilled* onto land or water and wastes from petroleum-refining operations. The following categories of *used oil* are covered by this Code (See Appendix B, note B.1.4.2 *Used Oil*):

a) lubricating oils (engine, turbine, or gear);
b) hydraulic fluids (including transmission fluids); and
c) insulating oils.

Vent means an opening in a *storage tank system* that is specifically designed to relieve excess internal pressure or vacuum within a *storage tank system*.

Section 1.5 Reference Documents

1.5.1 Where there is a conflict between the provisions of this Code and those of a reference document, the provisions of this Code shall apply.

1.5.2 Unless otherwise specified herein, the documents listed in Table 1 shall include the latest editions, amendments, revisions, and supplements effective to December 31, 2002.

Table 1 - Reference Documents

Issuing Agency – American Petroleum Institute	
Document Number	**Title of Document**
API Spec 12B-95	Bolted Tanks for Storage of Production Liquids
API Spec 12D-94	Field Welded Tanks for Storage of Production Liquids
API Spec 12F-94	Shop Welded Tanks for Storage of Production Liquids
API 570-98	Piping Inspection Code: Inspection, Repair, Alteration, and Rerating of In-Service Piping Systems
API Std 650-98	Welded Steel Tanks for Oil Storage
API RP 651-97	Cathodic Protection of Aboveground Petroleum Storage Tanks
API RP 652-97	Lining of Aboveground Petroleum Storage Tank Bottoms
API Std 653-01	Tank Inspection, Repair, Alteration, and Reconstruction
API RP 1632-96	Cathodic Protection of Underground Storage Tank and Piping Systems
API RP 2350-96	Overfill Protection for Storage Tanks in Petroleum Facilities
API Std 2610-94	Design, Construction, Operation, Maintenance and Inspection of Terminal and Tank Facilities

Issuing Agency – Canadian Council of Ministers of the Environment	
Document Number	**Title of Document**
CCME PN 1057	Environmental Code of Practice for Vapour Recovery in Gasoline Distribution Networks (1991)
CCME PN 1180	Environmental Guideline for Controlling Emissions of Volatile - Organic Compounds from Aboveground Storage Tanks (1995)
CCME PN 1299	Canadian Environmental Quality Guidelines (1999)
CCME CWS for PHC	Canada-wide Standards for Petroleum Hydrocarbons in Soil (2001)

Issuing Agency – Canadian General Standards Board	
Document Number	**Title of Document**
CAN/CGSB-1.124-99	Thinner for Vinyl Coatings
CAN/CGSB-1.136-92	Antiblush Thinner for Cellulose Nitrate Lacquer
3-GP-525M	Isopropanol
3-GP-531M	Methanol, Technical
3-GP-855M	Ethylene Glycol, Uninhibited
CAN/CGSB-15.50-92	Technical Grade Acetone
CAN/CGSB-15.52-92	Methyl Ethyl Ketone, Technical Grade
CAN/CGSB-21.1-93	Offset Lithographic Printing Ink
CAN/CGSB-1.2-89	Boiled Linseed Oil
CAN/CGSB-1.4-2000	Petroleum Spirits Thinner
CAN/CGSB-1.70-99	High Solvency Thinner
CAN/CGSB-1.94-M89	Xylene Thinner (Xylol)
CAN/CGSB-1.110-M91	General Purpose Thinners for Lacquers
CAN/CGSB-1.164-92	Solvent for Vinyl Pretreatment Coating
CAN/CGSB-3.2-99	Fuel Oil, Heating
CAN/CGSB-3.3-99	Kerosine

Issuing Agency – Canadian Petroleum Products Institute	
Document Number	**Title of Document**
CPPI/PACE Report 87-1	Impressed Current Method of Cathodic Protection of Underground Petroleum Storage Tanks
CPPI (1995)	Using the CPPI Colour-Symbol System to Mark Equipment and Vehicles January 1990 for Product Identification
CPPI (1992)	Professional Driver's Manual
CPPI	Code of Practice for Management of Water Effluent Quality at Petroleum Storage and Distribution Facilities
CPPI (2000)	Recommended Practices: Operation of Shop-Fabricated Aboveground Petroleum Storage Tank Systems

Issuing Agency – Canadian Standards Association	
Document Number	**Title of Document**
CAN/CSA-B139-00	Installation Code for Oil Burning Equipment
CAN/CSA-Z245.1-98	Steel Line Pipe

Issuing Agency – Environmental Protection Agency	
Document Number	**Title of Document**
EPA/530/UST-90/007	Standard Test Procedures for Evaluating Leak Detection Methods: Statistical Inventory Reconciliation Methods
EPA 510-B-95-009	Introduction to Statistical Inventory Reconciliation

Issuing Agency – NACE International	
Document Number	**Title of Document**
NACE RP0169-2002	Control of External Corrosion on Underground or Submerged Metallic Piping Systems
NACE RP0285-2002	Corrosion Control of Underground Storage Tank Systems by Cathodic Protection.
NACE RP0193-2001	External Cathodic Protection of On-Grade Carbon Steel Storage Tank Bottoms
NACE TM0101-2001	Measurement Techniques Related to Criteria for Cathodic Protection on Underground or Submerged Metallic Tank Systems
NACE No. 10/SSPC-PA6	Fiberglass-Reinforced Plastic (FRP) Linings Applied to Bottoms of Carbon Steel Aboveground Storage Tanks

Issuing Agency – National Research Council	
Document Number	**Title of Document**
NRCC 38727	National Fire Code of Canada (NFCC) - 1995

Issuing Agency – Steel Tank Institute	
Document Number	**Title of Document**
STI SP001-00	Standard for Inspection of In-service Shop Fabricated Aboveground Tanks for the Storage of Flammable and Combustible Liquids.
STI R831-98	Optional Recommended Practice for Control of Localized Corrosion Within Underground Steel Petroleum Storage Tanks.
STI R893-89	Recommended Practice for External Corrosion Protection of Shop Fabricated Aboveground Tank Floors.
STI RP011-01	Recommended Practice for Anchoring of Steel Underground Storage Tanks.

Issuing Agency – Underwriters' Laboratories of Canada	
Document Number	**Title of Document**
ULC-S601-2000	Aboveground Horizontal Shop Fabricated Steel Tanks
ULC-S601(A)-2001	Shop Refurbishing of Aboveground Horizontal Shop Fabricated Steel Tanks
CAN/ULC-S602-1992	Aboveground Steel Tanks for Fuel Oil and Lubricating Oil
CAN/ULC-S603-1992	Underground Steel Tanks
CAN/ULC-S603.1-1992	Galvanic Corrosion Protection Systems for Underground Steel Tanks
ULC-S603(A)-2001	Refurbishing of Underground Steel Tanks
ULC-S615-1998	Underground Reinforced Plastic Tanks
ULC-S615(A)-1987	Refurbishing of Underground Reinforced Plastic Tanks
ULC-S618-2000	Magnesium and Zinc Anodes and Zinc and Copper/Copper Sulphate Reference Electrodes
ULC-S630-2000	Aboveground Vertical Shop Fabricated Steel Tanks
ULC-S630(A)-2001	Shop refurbishing of Aboveground Vertical Shop Fabricated Steel Tanks
CAN/ULC-S633-1999	Flexible Underground Hose Connectors
CAN/ULC-S643-2000	Aboveground Shop Fabricated Steel Utility Tanks
CAN/ULC-S651-2000	Emergency Valves
ULC-S652-1993	Tank Assemblies for Collection of Used Oil
ULC-S653-1994	Contained Aboveground Steel Tank Assembles
ULC-S655-1998	Aboveground Protected Tank Assemblies
ULC-S656-2000	Oil-Water Separators
ORD-C58.9-1997	Secondary Containment Liners for Underground and Aboveground Tanks
ORD-C58.10-1992	Underground Jacketed Steel Tanks
ORD-C58.12-1992	Leak Detection Devices (Volumetric Type) for Underground Storage Tanks
ORD-C58.14-1992	Leak Detection Devices (Nonvolumetric Type) for Underground Storage Tanks
ORD-C58.15-1992	Overfill Protection Devices for Flammable Liquid Storage Tanks
ORD-C58.19-1992	Spill Containment Devices for Underground Tanks
ORD-C58.20-1996	Special Corrosion Protection Underground Tanks
ORD-C80.1-2000	Aboveground Non-Metallic Tanks for Fuel Oil
ORD-C107.4-1992	Ducted Flexible Underground Piping Systems
ORD-C107.7-1993	Glass-Fibre Reinforced Plastic Pipe and Fittings
ORD-C107.12-1992	Line Leak Detection Devices for Flammable Liquid Piping
ORD-C107.14-1992	Non Metallic Pipe and Fittings
ORD-C107.19-1992	Secondary Containment of Underground Piping
ORD-C107.21-1992	Under-Dispenser Sumps
ORD-C142.5-1992	Aboveground Concrete Encased Steel Tank Assemblies
ORD-C142.6-2000	Storage Vaults
ORD-C142.13-1997	Mobile Refueling Tanks
ORD-C142.15-2000	Precast Concrete Tanks
ORD-C142.17-1998	Aboveground Special Purpose Relocatable Vertical Tanks
ORD-C142.18-1995	Aboveground Rectangular Steel Tanks
ORD-C142.19-1994	Spill Containment Devices for Aboveground Tanks
ORD-C142.20-1995	Aboveground Secondary Containment Tanks
ORD-C142.21-1995	Aboveground Used Oil Systems
ORD-C142.22-1995	Contained Aboveground Vertical Steel Tank Assemblies
ORD-C142.23-1991	Aboveground Waste Oil Tanks
ORD-C536-1998	Flexible Metallic Hose

Section 1.6 Abbreviations

1.6.1 The abbreviations used in this Code for the names of associations or other codes shall have the meanings assigned to them in this Article. The addresses of the associations or code-sponsoring organizations are provided as follows:

API American Petroleum Institute
1220 L Street N.W.
Washington, D.C. 20005
Phone: 202-682-8375 FAX: 202-962-4776
E-mail: publications@api.org
Web Page: www.pei.org

CAN National Standards of Canada
1200-45 O'Connor Street
Ottawa, Ontario K1P 6N7
Phone: 613-238-3222 FAX: 613-995-4564
E-mail: info@scc.ca
Web Page: ww.scc.ca

CCME Canadian Council of Ministers
of the Environment
123 Main Street,
Winnipeg, Manitoba R3C 1A3
Phone: 204-948-2090 FAX: 204-948-2125
Web Page: www.ccme.ca

CGSB Canadian General Standards Board
1402 - 222 Queen Street
Ottawa, Ontario K1A 1G6
Phone: 819-956-0425 FAX: 819-956-5644
E-mail: CGSB@Piper.PWGSC.gc.ca
Web Page: www.pwgsc.gc.ca/cgsb

CPCA Canadian Petroleum
Contractors Association
PO Box 415 Markham, Ontario, L3P 3J8
Tel: 705 735-9437 Fax 705 735-9418
Web Page: www.CPCAonline.com

CPPI Canadian Petroleum Products Institute
1000 - 275 Slater Street
Ottawa, Ontario K1P 5H9
Phone: 613-232-3709 FAX: 613-236-4280

CSA Canadian Standards Association
178 Rexdale Blvd.
Toronto, Ontario M9W 1R3
Phone: 416-747-4000 FAX: 416-747-4149
E-mail: sales@csa.ca
Web Page: www.csa.ca

EPA U.S. Environmental Protection Agency,
Office of Underground Storage Tanks
401 M Street S. W., Mail Code 5401G
Washington, D.C., U.S.A. 20460
Phone: 703-603-9900 FAX: 703-603-9163
Web Page: www.epa.gov/swerust1/index.htm

NACE NACE International (formerly National
Association of Corrosion Engineers)
1440 South Creek Drive
Houston, Texas, USA 77084-4906
Phone: 281-228-6200 FAX: 281-228-6329
Web Page: www.nace.org

NFCC National Fire Code of Canada,
published under the auspices of the
National Research Council of Canada
National Research Council of Canada
Ottawa, Ontario K1A 0R6
Phone: 613-993-2463 FAX: 613-952-7673
E-mail: Irc.Client-Services@nrc.ca
Web Page: www.nrc.ca/irc/

STI Steel Tank Institute
570 Oakwood Road
Lake Zurich, Illinois 60047
Phone 847-438-8265 FAX 847-438-8766
E-mail: wgeyer@steeltank.com
Web Page: www.steeltank.com

ULC Underwriters' Laboratories of Canada
7 Crouse Road
Scarborough, Ontario M1R 3A9
Phone: 416-757-3611 FAX: 416-757-9540
E-mail: ulcinfo@ulc.ca
Web Page: www.ulc.ca/

1.6.2 Abbreviations of words and phrases in this Code shall have the following meanings:

cm centimetre(s)
˚C degree(s) Celsius
h hour(s)
kPa kilopascal(s)
L litre(s)
m metre(s)
min minute(s)
mL millilitres
mm millimetre(s)
mV millivolt(s)
s second(s)
µm micrometre(s) or micron(s)

Part 2 Registration and Approval of Storage Tank Systems

SECTION 2.1 Scope

2.1.1 This Part applies to the registration and approval to construct a *storage tank system*.

SECTION 2.2 Registration of Existing Storage Tank Systems

2.2.1 The *owner* of an *existing storage tank* system shall register all *storage tanks* of the system with the *authority having jurisdiction* in a manner and timeframe prescribed by the *authority having jurisdiction*.

2.2.2 Registration of an *existing storage tank system* shall be conducted by completing and filing a registration form in a manner specified by the *authority having jurisdiction*. (See Appendix C)

2.2.3 The *owner* of an existing *storage tank system* shall identify registered tanks in a manner and time frame specified by the a*uthority having jurisdiction*.

2.2.4 The *authority having jurisdiction* may deem the age of an *existing storage tank system* to be unknown unless the *owner* provides the *authority having jurisdiction* with either the date of installation and/or the date of manufacture.

SECTION 2.3 Approval of Storage Tank Systems

2.3.1 No person shall construct or cause to construct, install, *alter*, or operate a *storage tank system* unless all required permits and approvals have been obtained from the *authority having jurisdiction*.

SECTION 2.4 Registration of New Storage Tank Systems

2.4.1 The *owner* of a *new storage tank system* installed after a date specified by the *authority having jurisdiction* shall register the *storage tank system*.

2.4.2 The new *storage tank system* shall be registered by completing and filing a registration form as specified by the *authority having jurisdiction*.
(See Appendix C)

2.4.3 The *owner* of a new *storage tank system* shall identify registered tanks in a manner specified by the *authority having jurisdiction*.

SECTION 2.5 Product Supply and Registration

2.5.1 After a date specified by the *authority having jurisdiction*, no person shall transfer or cause to be transferred *petroleum* or *allied petroleum products* to a *storage tank system* unless the *storage tank system* has been registered with the *authority having jurisdiction*.

Part 3 Design and Installation of Aboveground Storage Tank Systems

Section 3.1 Scope

3.1.1(1) This Part applies to the design and installation of a new *aboveground storage tank system*.

3.1.1(2) A *storage tank* installed in a concrete vault located below grade with the interior of the vault not filled with backfill material shall be considered an *aboveground storage tank* for the purpose of this Code.

Section 3.2 General Requirements

3.2.1 Except as provided in this Part, the design, fabrication and installation of an *aboveground storage tank system* shall be in conformance with the NFCC.

3.2.2 Except as provided in this Part, the design and installation of an *aboveground storage tank system* connected to an oil-burning appliance and equipment that comes within the scope of CAN/CSA-B139-00, "Installation Code for Oil Burning Equipment" shall be in conformance with that Code.

3.2.3 An *aboveground storage tank*, components, and accessories, for which there is a recognized standard, shall be *approved* only for the uses indicated under the standard.

3.2.4 A company or individual that is authorized by the *authority having jurisdiction* shall verify that the design and installation of an *aboveground storage tank system* meets the requirements of this Code or other requirements as specified by the *authority having jurisdiction*.

3.2.5 An *aboveground storage tank system* shall be installed by a company or individual that is authorized by the *authority having jurisdiction*.

3.2.6 An *aboveground storage tank* shall be equipped to control emissions of volatile organic compounds in conformance with CCME PN 1180, "Environmental Guideline for Controlling Emissions of Volatile Organic Compounds from Aboveground Storage Tanks". (See Appendix B, note B.3.2.6)

3.2.7(1) The *owner* of an *aboveground storage tank system* shall provide an as-built drawing to the *authority having jurisdiction* in the manner and time frame as specified by the *authority having jurisdiction*.

3.2.7(2) As-built drawings for an *aboveground storage tank system* shall include, as a minimum:
(a) the outline of all *storage tanks*;
(b) the centerline of all *piping* or *piping* groups;
(c) the centerline of all underground electrical power and monitor sensor conduit;
(d) building foundation outlines;
(e) *secondary containmen*t systems; and
(f) property lines.

3.2.8(1) No person shall install an *aboveground storage tank system* unless:
(a) required permits or approvals have been obtained from the *authority having jurisdiction*;
(b) plans, drawings and specifications of the system or equipment have been examined by the *authority having jurisdiction*; and
(c) the plans, drawings and specifications referred to in Clause (b) bear the stamp and signature of a professional engineer licensed to practice in the province/territory.

3.2.9 An *aboveground storage tank system* shall be designed and installed in accordance with the manufacturer's instructions, the appropriate standards, and this Code.

Section 3.3 Field-erected Storage Tank Systems

3.3.1(1) A field-erected *storage tank system* shall:

(a) have *corrosion protection* in conformance with Section 3.8;

(b) have a *secondary containment* system in conformance with Section 3.9;

(c) have *leak detection* in conformance with Part 6;

(d) have *containment sumps*, as applicable;

(e) be provided with overfill protection:

(i) for pipeline delivery, in the form of an alarm system that will automatically alert pipeline or terminal personnel so that action can be taken to prevent the *storage tank* from being overfilled;

(ii) for truck, rail, ship, or barge delivery, in the form of a visual and audible alarm system for detecting a high level that will activate and alert personnel in enough time to terminate the flow of the product to the storage tank and prevent an overfill (See Appendix B, note B.3.3.1(1)(e)(ii)); or

(iii) in conformance with API RP 2350-96, "Overfill Protection for Storage Tanks in Petroleum Facilities"; and

(f) have *piping* in conformance with Part 5, as applicable

3.3.2 If vapour balancing or vapour recovery systems are required, they shall be designed and built in conformance with CCME PN 1057, "Environmental Code of Practice for Vapour Recovery in Gasoline Distribution Networks".

Section 3.4 Shop-fabricated Storage Tank Systems

3.4.1(1) A shop-fabricated *storage tank* system shall:

(a) have *corrosion* protection in conformance with Section 3.8;

(b) have a *secondary containment* system in conformance with Section 3.9;

(c) have *leak detection* in conformance with Part 6;

(d) have *containment sumps*, as applicable;

(e) except as specified in Sentence 3.4.1(2), be provided with overfill protection:

(i) compatible with the intended method of filling;

(ii) designed, built, and approved in conformance with ORD-C58.15-1992, "Overfill Protection Devices for Flammable Liquid Storage Tanks," which will prevent filling the tank beyond 95% of the tank's capacity or activate an audible or combined audible/visual alarm at a product level of 90% of the tank's capacity; and

(iii) where a high-level alarm system is used, with audible and visual alarms located where personnel are constantly on duty during the product transfer operation and can promptly stop or divert delivery to the *tank*; and

(f) have *piping* in conformance with Part 5, as applicable.

3.4.1(2) A shop-fabricated *storage tank* system having a capacity of less than 5 000 L may be provided with overfill protection in the form of visual monitoring and gauging of the level in the *storage tank system* by trained employees in constant attendance throughout the transfer operation and who are located so as to be able to promptly shut down the flow, or communicate immediately with the person controlling the delivery so that the flow can be shut down promptly.

3.4.2 A horizontal *storage tank* shall be supported above grade level.

3.4.3 Where there is a dispenser, *leak detection* for the dispenser and related components shall be in conformance with Part 6.

Section 3.5 Aboveground Storage Tank Systems for Storing Used Oil

3.5.1(1) An *aboveground used oil storage tank* that is manually filled shall be designed, built, and approved in conformance with:

(a) ORD-C142.23-1991, "Aboveground Waste Oil Tanks"; or

(b) ULC-S652-1993, "Tank Assemblies for Collection of Used Oil".

3.5.1(2) A *used oil storage tank* that is not manually filled shall be designed, built, and *approved* in conformance with ULC-S652-1993, "Tank Assemblies for Collection of Used Oil". (See Appendix B, Note B.3.5.1(2))

Section 3.6 Design Standards

3.6.1(1) Based on the design, an *aboveground storage tank* shall be designed, built, and *approved* in conformance with the following, as applicable:

a) API Std 650-98, "Welded Steel Tanks for Oil Storage";

b) ULC-S601-2000, "Aboveground Horizontal Shop Fabricated Steel Tanks";

c) CAN/ULC-S602-1992, "Aboveground Steel Tanks for Fuel Oil and Lubricating Oil";

d) ULC-S630-2000, "Aboveground Vertical Shop Fabricated Steel Tanks";

e) CAN/ULC-S643-2000, "Aboveground Shop Fabricated Steel Utility Tanks";

f) ULC-S652-1993, "Tank Assemblies for Collection of Used Oil";

g) ULC-S653-1994, "Contained Aboveground Steel Tank Assemblies";

h) ORD-C142.5-1992, "Aboveground Concrete Encased Steel Tank Assemblies";

i) ORD-C142.18-1995, "Aboveground Rectangular Steel Tanks";

j) ORD-C142.21-1995, "Aboveground Used Oil Systems";

k) ORD-C142.22-1995, "Contained Aboveground Vertical Steel Tank Assemblies"; or

(l) ORD-C142.23-1991, "Aboveground Waste Oil Tanks".

3.6.2 An *overfill protection device* shall be designed, built, and *approved* in conformance with ORD-C58.15-1992, "Overfill Protection Devices for Flammable Liquid Storage Tanks".

3.6.3 A *containment sump* shall be designed, built, and *approved* in conformance with ORD-C107.21-1992, "Under-Dispenser Sumps".

3.6.4 A *liner* shall be designed, built, and *approved* in conformance with ORD-C58.9-1997, "Secondary Containment Liners for Underground and Aboveground Tanks".

3.6.5 An *aboveground storage tank* designed to contain an *allied petroleum product* shall be designed, built, and *approved* for use with that product.

3.6.6(1) An *aboveground storage tank* built in conformance with:

(a) API Spec 12B-95, "Bolted Tanks for Storage of Production Liquids";

(b) API Spec 12D-94, "Field Welded Tanks for Storage of Production Liquids"; or

(c) API Spec 12F-94, "Shop Welded Tanks for Storage of Production Liquids"

shall be used only for the storage of production *petroleum and allied petroleum products*.

Section 3.7 Repair, Alteration, Reconstruction, and Relocation

3.7.1(1) The repair, *alteration*, reconstruction, or relocation of an *aboveground storage tank system* shall be done in conformance with the technical requirements of, as applicable:

(a) ULC-S601(A)-2001, "Shop Refurbishing of Aboveground Horizontal Shop Fabricated Steel Tanks";

(b) ULC-S630(A)-2001, "Shop Refurbishing Aboveground Vertical Shop Fabricated Steel Tanks";

(c) API Std 653-01, "Tank Inspection, Repair, Alteration, and Reconstruction";

(d) STI SP001-00, "Standard for Inspection of In-service Shop Fabricated Aboveground Tanks for the Storage of Flammable and Combustible Liquids"; or

(e) the special acceptance procedures of ULC or API.

3.7.2 The *owner* of an *aboveground storage tank system* shall provide a revised as-built drawing in conformance with Sentence 3.2.7(2) to the *authority having jurisdiction* in a time frame specified by the *authority having jurisdiction* whenever new *construction*, *alteration*, or *site* upgrade occurs.

Section 3.8 Corrosion Protection of Aboveground Steel Storage Tank Systems

3.8.1(1) When *cathodic protection* is used, it shall be designed by a *corrosion expert* (See Appendix B, note B.3.8.1(1)) and be in conformance with:

(a) API RP 651-97, "Cathodic Protection of Aboveground Petroleum Storage Tanks";

(b) API Std 653-01, "Tank Inspection, Repair, Alteration, and Reconstruction";

(c) NACE RP0193-2001, "External Cathodic Protection of On-Grade Carbon Steel Storage Tank Bottoms"; or

(d) STI R893-89, "Recommended Practice for External Corrosion Protection of Shop Fabricated Aboveground Tank Floors."

3.8.2(1) Atmospheric *corrosion* of an *aboveground storage tank system* shall be controlled by:

(a) a *protective coating* applied in conformance with the coating manufacturer's instructions;

(b) a *corrosion* control program in accordance with API Std 653-01, "Tank Inspection, Repair, Alteration, and Reconstruction"; or

(c) the use of a non-corroding material in its construction.

Section 3.9 Secondary Containment Requirements

3.9.1(1) Subject to Sentences (2) and (3), a *secondary containment* system for an *aboveground storage tank* shall:

(1) for a *storage tank system* that consists of a single *storage tank*, have a volumetric capacity of not less than 110% of the capacity of the tank; or

(2) for a *storage tank system* that consists of more than one *storage tank*, have a volumetric capacity of not less than the sum of:

(a) the capacity of the largest *storage tank* located in the contained space; and

(b) 10% of the greater of:

(i) the capacity specified in Clause (a); or

(ii) the aggregate capacity of all other *storage tanks* located in the contained space.

3.9.1(2) A *secondary containment* system for a shop-fabricated *storage tank* shall be designed, built, and *approved* in conformance with:

(a) ULC-S653-1994, " Contained Aboveground Steel Tank Assemblies";

(b) ULC-S655-1998, "Aboveground Protected Tank Assemblies";

(c) ORD-C142.5-1992, "Aboveground Concrete Encased Steel Aboveground Tank Assemblies"; or

(d) a recognized standard for double-wall *tanks*.

3.9.1(3) A *secondary containmen*t system for a field-erected *aboveground storage tank* shall be:

(a) a single-wall and single-bottom *storage tank* placed entirely within a dyked area, with an *impermeable barrier* in the floor of the containment area and in the dyke walls;

(b) a single-wall, double-bottom *storage tank* placed entirely within a dyked area, with an *impermeable barrier* in the floor of the containment area and in the dyke walls, sealed to the perimeter of the *storage tank* or pad when the *liner* is not installed under the *tank*;

(c) a double-wall *storage tank* for a *storage tank* with a capacity of 50 000 L or less; or

(d) a double-wall *storage tank* placed entirely within a dyked area, with an *impermeable barrier* in the floor of the containment area and in the dyke walls, for a *storage tank* with a capacity of more than 50 000 L.

3.9.2(1) Except as provided in Sentence (2), a s*econdary containment impermeable barrier* shall be:

(a) designed, built, and *approved* in conformance with:

(i) ORD-C58.9-1997, "Secondary Containment Liners for Underground and Aboveground Tanks"; or

(ii) ORD-C142.20-1995, "Aboveground Secondary Containment Tanks"; and

(b) installed so that:

(i) the *liner* is sealed to the perimeter of the *storage tank* or pad when the *liner* is not installed under the *tank*;

(ii) the *liner* extends to the top of the dyke wall;

(iii) the *liner* is covered with a non-*combustible* material of such nature and thickness that it will not fail when the *secondary containment* is exposed to fire; and

(iv) *liners* that are intended to be exposed in service are listed for aboveground (exposed) use.

3.9.2(2) A *secondary containment impermeable barrier* that does not conform to Sentence (1) shall:

(a) use material compatible with the product being stored and acceptable to the *authority having jurisdiction* (See Appendix B, note 3.9.2(2)(a)); and

(b) be designed, constructed, and maintained to ensure a maximum hydraulic conductivity of 1×10^{-6} cm/s.

3.9.3(1) *Liner* penetrations shall be located at the high point or in a raised part of the dyke floor. (See Appendix B, note B.3.9.3(1))

3.9.3(2) All *liner* penetrations shall be sealed.

3.9.4 Monitoring of the *interstitial space* of the *secondary containment* system shall be provided in conformance with Part 6 of this Code.

Section 3.10 Spill Containment and Runoff Collection

3.10.1 *Spills*, overfills, and storm water from *product transfer areas* shall be contained, treated and disposed of in conformance with the applicable provincial or territorial regulations, guidelines or policies.

3.10.2 Containment area floors within dykes shall slope away from the tank base towards a sump at a slope greater than 1%.

3.10.3(1) An *oil-water separato*r used to treat storm water runoff, overfills, or a *spill* from the *product transfer area* shall be sized for a minimum hydraulic flow rate of a ten year return, one hour storm event, with the one hour rainfall intensity data obtained for the nearest weather station, and:

(a) be designed, built, and *approved* in conformance with ULC-S656-2000, "Oil-Water Separators"; or

(b) conform to the following:
   (i) be designed to produce a *discharge* of water that does not contain more than 15 mg/L of *free oil* and grease as measured by the partition-gravimetric method or other protocol as defined by the *authority having jurisdiction* ;
   (ii) be designed for an insoluble-in-water oil with a specific gravity of 0.875 ±0.025; and
   (iii) be designed based on the hydraulic retention time required to separate oil with a particle droplet size of 60 microns from storm water.

Part 4 Design and Installation of Underground Storage Tank Systems

Section 4.1 Scope

4.1.1 This Part applies to the design and installation of a new *underground storage tank system*.

Section 4.2 General Requirements

4.2.1 Except as provided in this Part, the design, fabrication and installation of an *underground storage tank system* shall be in conformance with Part 4 of the NFCC.

4.2.2 An *underground storage tank*, components, and accessories, for which there is a recognized standard, shall be *approved* only for the uses indicated by the standard.

4.2.3 An *underground storage tank system* shall be designed and installed in accordance with the manufacturer's instructions, the appropriate standards, and this Code.

4.2.4(1) Except as specified in Sentence (2), an *underground storage tank system* shall be designed and installed to have:

(a) double-wall *tank(s)* with monitorable *interstitial space*;
(b) an *overfill protection device*;
(c) a fill pipe *spill containment device*;
(d) *containment sumps*, as applicable;
(e) *leak detection* in conformance with Part 6;
(f) except for *venting* purposes, liquid- and vapour-tight connections, caps and adapters; and
(g) *corrosion protection*, as applicable.

4.2.4(2) An *underground storage tank system* for storing *used oil* shall be designed and installed to have:

(a) double-wall *tank(s)* with monitorable *interstitial space*;
(b) *corrosion protection*;
(c) a 50 mm (2 in) Schedule 40 suction pipe, for product removal that can be removed for the purpose of clearing a blockage;
(d) product removal or transfer connections located within a *spill containment device*;
(e) an *overfill protection device* where the *storage tank* is filled by pump or remote manual fill;
(f) where the fill port is outside, it shall be fitted with a *spill containment device* having a capacity of at least 25 L and the *spill containment device* shall be fitted with:
  (i) a rain cover; and
  (ii) a screen to prevent nuts, bolts, rags, and other such objects from entering the *storage tank*;
(g) in-take *venting* with an open area at least twice the open area of the suction pipe as specified in 4.2.4(2)(c) to avoid vacuum collapse from high rate of product removal; and
(h) *leak detection* in conformance with Part 6.

4.2.5 A company or individual that is authorized by the *authority having jurisdiction* shall verify that the design and installation of an *underground storage tank system* meets the requirements of this Code or other requirements as prescribed by the *authority having jurisdiction*.

4.2.6 An *underground storage tank system* shall be installed by a company or individual that is authorized by the *authority having jurisdiction*.

4.2.7 An *underground storage tank* shall be located and maintained to permit the eventual removal of the *storage tanks* when the *storage tank system* is taken *out-of-service*. (See Appendix B, note B.4.2.7)

4.2.8(1) The *owner* of an *underground storage tank system* shall provide an as-built drawing to the *authority having jurisdiction* in the manner and time frame as specified by the *authority having jurisdiction*.

4.2.8(2) As-built drawings for an *underground storage tank system* shall include, as a minimum:
- (a) the outline of all *storage tanks*;
- (c) the centerline of all *piping* or *piping* groups;
- (c) the centerline of all underground electrical power and monitor sensor conduit;
- (d) building foundation outlines;
- (e) *secondary containment systems*; and
- (f) property lines.

4.2.9(1) No person shall install an *underground storage tank system* unless:
- (a) required permits or approvals have been obtained from *the authority having jurisdiction*;
- (b) plans, drawings and specifications of the system or equipment have been examined by the a*uthority having jurisdiction*; and
- (c) the plans, drawings and specifications referred to in Clause 3.2.8(1)(b) bear the stamp and signature of a professional engineer licensed to practice in the province/territory.

Section 4.3 Design Standards

4.3.1(1) An *underground storage tank* shall be designed, built, and *approved* in conformance with the following:
- (a) CAN/ULC-S603-1992, "Underground Steel Tanks";
- (b) ULC-S615-1998, "Underground Reinforced Plastic Tanks";
- (c) ORD-C58.10-1992, "Underground Jacketed Steel Tanks";
- (d) ULC-S652-1993, "Tank Assemblies for Collection of Used Oil"; or
- (e) CAN/ULC-S603.1-1992, "Galvanic Corrosion Protection Systems for Underground Steel Tanks".

4.3.2 An *overfill protection device* shall be designed, built, and *approved* in conformance with ORD-C58.15-1992, "Overfill Protection Devices for Flammable Liquid Storage Tanks".

4.3.3 A *spill containment device* shall be designed, built, and *approved* in conformance with ORD-C58.19-1992, "Spill Containment Devices for Underground Tanks".

4.3.4 A *dispenser sump* shall be designed, built, and *approved* in conformance with ORD-C107.21-1992, "Under-Dispenser Sumps".

4.3.5 A *Liner* shall be designed, built, and *approved* in conformance with ORD-C58.9-1997, "Secondary Containment Liners for Underground and Aboveground Tanks".

4.3.6(1) Subject to Part 6, a *leak detection* device shall be designed, built, and *approved* in conformance with one of the following:
- (a) ORD-C58.12-1992, "Leak Detection Devices (Volumetric Type) for Underground Storage Tanks"; or
- (b) ORD-C58.14-1992, "Leak Detection Devices (Nonvolumetric) for Underground Tanks".

4.3.6(2) Subject to Part 6, a *leak detection* method shall be in conformance with EPA/530/UST-90/007, "Standard Test Procedures for Evaluating Leak Detection Methods: Statistical Inventory Reconciliation Methods".

4.3.7(1) A *storage tank* designed to contain a*llied petroleum products* may be constructed of materials other than steel when necessitated by the properties of the liquid stored and *approved* for use with that liquid.

4.3.7(2) A *storage tank* shall:
- (a) be designed, built, and *approved* in conformance with:
  - (i) CAN/ULC-S603-1992, "Underground Steel Tanks";
  - (ii) CAN/ULC-S603.1-1992, "Galvanic Corrosion Protection Systems for Underground Steel Tanks"; or
  - (iii) ORD-C58.10-1992, "Underground Jacketed Steel Tanks".

(b) be constructed of materials compatible with the liquid to be stored; and
(c) have *corrosion protection* in conformance with Section 4.5.

4.3.8(1) *Secondary containment* for *underground storage tanks* shall be designed, built, and *approved* in conformance with:
(a) for a double-wall steel *storage tank*, CAN/ULC-S603-1992, "Underground Steel Tanks;
(b) for a double-wall fibreglass-reinforced plastic *storage tank*, ULC-S615-1998, "Underground Reinforced Plastic Tanks"; or
(c) for a jacketed-steel *storage tank*, ORD-C58.10-1992 "Underground Jacketed Steel Tanks".

Section 4.4 Installation

4.4.1(1) *Petroleum* or *allied petroleum products* shall not be placed in an *underground storage tank* until:
(a) a fill pipe and *vent* line have been installed in the tank; and
(b) all other openings have been sealed or *piping* systems have been installed in accordance with their operational requirements.

Section 4.5 Corrosion Protection of Underground Steel Storage Tank Systems

4.5.1(1) A steel *underground storage tank system* shall be provided with *corrosion protection* in conformance with:
(a) CAN/ULC-S603.1-1992, "Galvanic Corrosion Protection Systems for Underground Steel Tanks" including appendices;
(b) a *storage tank* built in conformance with CAN/ULC-S603-1992, "Underground Steel Tanks" and coated in conformance with CAN/ULC-S603.1-1992, "Galvanic Corrosion Protection Systems for Underground Steel Tanks shall be provided with a *cathodic protection* system designed by a *corrosion expert* to conform with:
(i) CPPI/PACE Report 87-1, "Impressed Current Method of Cathodic Protection of Underground Petroleum Storage Tanks"; or
(ii) NACE RP0285-2002, "Corrosion Control of Underground Storage Tank Systems by Cathodic Protection";
(c) a *storage tank* with the entire primary tank surface encased in the interstice of a non-corrodible jacket built in conformance with ORD-C58.10-1992, "Underground Jacketed Steel Tanks"; or
(d) a *storage tank* with the entire primary tank surface encased in a non-corrodible jacket built in conformance with ORD-C58.20-1996 "Special Corrosion Protection Underground Tanks."

4.5.2(1) Except for a *storage tank* jacketed in conformance with ORD-C58.10-1992 "Underground Jacketed Steel Tanks" or ORD-C58.20-1996 "Special Corrosion Protection Underground Tanks" or installed in a vault with backfill, the *cathodic protection* system on all new installations of steel *underground storage tank system*s shall be tested for electrical isolation and system effectiveness after final backfilling in order to allow any corrective measures to be completed before final grading and placement of asphalt or concrete covers, as applicable.

4.5.2(2) A *cathodic protection* system shall meet the requirements of Section 8.6 of this Code.

4.5.2(3) When a *cathodic protection* system does not satisfy the requirements as specified in Section 8.6, the *owner* shall take corrective action in accordance with the recommendations of a *corrosion expert*.

4.5.2(4) The *owner* of a *underground storage tank system* shall, upon completion of the installation, ensure that the *cathodic*

protection system meets the requirements as specified in Section 8.6 and report in writing to the *authority having jurisdiction* the measured voltage potential(s) and whether or not *cathodic protection* has been achieved.

4.5.3(1) A new steel *storage tank* added to an *existing* system that already has an impressed current *cathodic protection* system shall:

(a) be in conformance with CAN/ULC-S603-1992, "Underground Steel Tanks"; and

(b) be electrically bonded into the impressed current *cathodic protection* system. (See Appendix B, note B.4.5.3(1)(b))

4.5.3(2) When a new *storage tank* built in conformance with CAN/ULC-S603.1-1992, "Galvanic Corrosion Protection Systems for Underground Steel Tanks" is installed near an *existing* CAN/ULC S603.1-1992, "Galvanic Corrosion Protection Systems for Underground Steel Tanks" *storage tank*, precautions shall be taken to ensure both the new and *existing* tanks are adequately *protected*. (See Appendix B, note B.4.5.3(2))

4.5.4(1) Impressed current *cathodic protection* shall be interlocked in such a manner that if the *cathodic-protection* system is turned off or bypassed either:

(a) power to the pump will be shut off; or

(b) audible and visual alarms will be turned on.

4.5.5 Impressed current *cathodic-protection* systems shall be equipped with a running time or a downtime totalizer. (See Appendix B, note B.4.5.5)

4.5.6(1) *Cathodically protected storage tanks* shall be installed with:

(a) test wires brought to the surface and fastened at an accessible location; or

(b) a permanent reference electrode and *approved* monitoring station, including test wires for each tank.

Part 5 Design and Installation of New Piping Systems

Section 5.1 Scope

5.1.1 This Part applies to the design and installation of *piping* associated with a *storage tank system*.

Section 5.2 General Requirements

5.2.1(1) *Piping* materials shall, as applicable, be designed, built, and *approved* in conformance with the following:

(a) ASTM A 53, "Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless";

(b) CAN/CSA Z245.1-98, "Steel Line Pipe";

(c) CAN/ULC-S633-1999, "Flexible Underground Hose Connectors";

(d) ORD-C107.7-1993, "Glass-Fibre Reinforced Plastic Pipe and Fittings";

(e) ORD-C107.4-1992, "Ducted Flexible Underground Piping Systems";

(f) ORD-C107.14-1992, "Non-Metallic Pipe and Fittings"; or

(g) ORD-C536-1998, "Flexible Metallic Hose".

5.2.2 Except as provided in this Part, the design and installation of *piping* shall be in conformance with the NFCC.

5.2.3 Except as provided in this Part, the design and installation of *piping* connected to an oil-burning appliance and equipment that comes within the scope of CSA Standard B139, "Installation Code for Oil Burning Equipment" shall be in conformance with that Code.

5.2.4 *Piping* material shall be installed and maintained in accordance with an *approved* standard, code, or in a manner acceptable to the *authority having jurisdiction*.

5.2.5 Single-wall *piping* shall not have buried or concealed mechanical joints. (See Appendix B, note B.5.2.5)

5.2.6 *Leak detection* testing and monitoring of *piping* shall be in conformance with Part 6.

5.2.7 A thermal relief valve shall *discharge* into the low pressure side of the *piping*.

5.2.8(1) *Piping* located below the maximum product level in a tank shall be provided with a means to prevent the release of liquid from the tank by syphon flow.

5.2.8(2) Except as provided in Sentence 5.2.8(3), a manual shut-off valve shall be lockable or have a method of locking.

5.2.8(3) A manual shut-off valve on the *piping* connecting a *storage tank* and a heating appliance or a stationary combustion engine does not need to be lockable or have a method of locking.

Section 5.3 Product Transfer

5.3.1 The fill pipe on a *storage tank* with a capacity of 5 000 L or more shall be equipped for the attachment of a liquid and vapour-tight connection at the time of filling and shall be sealed with a liquid- and vapour-tight cap when not in use.

5.3.2 The suction tube of a *used oil* tank shall be equipped for the attachment of a liquid-tight fitting and shall be sealed with a liquid-tight cap when not in use.

Section 5.4 Design Standard for Underground Piping Systems

5.4.1 Underground *piping* up to and including 75 mm in diameter shall have se*condary containment* in accordance with Sentence 5.4.4(1).

5.4.2(1) Underground *piping* larger than 75 mm in diameter shall be designed, installed and maintained to meet the requirements of:
(a) *secondary containmen*t in conformance with Sentence 5.4.4(1);
(b) *leak detection* in conformance with Part 6; or
(c) API RP 1632-96, "Cathodic Protection of Underground Storage Tank and Piping Systems" and API Std 2610-94, "Design, Construction, Operation, Maintenance and Inspection of Terminal and Tank Facilities".

5.4.3(1) Non-metallic *piping* may be used for underground installations provided the *piping* and fittings are designed, built, and *approved* in conformance with the requirements of:
(a) ORD-C107.7-1993, "Glass Fibre Reinforced Plastic Pipe and Fittings," or
(b) ORD-C107.4-1992, "Ducted Flexible Underground Piping Systems."

5.4.4(1) *Secondary containment* for underground *piping* shall:
(a) be designed, built, and *approved* in conformance with ORD-C107.7-1993, "Glass-Fibre Reinforced Plastic Pipe and Fittings";
(b) be designed, built, and *approved* in conformance with ORD-C107.4-1992, "Ducted Flexible Underground Piping Systems";
(c) consist of a single-wall fibreglass-reinforced plastic, or single-wall steel *piping*, contained within a duct designed, built, and *approved* in conformance with ORD-C107.19-1992, "Secondary Containment of Underground Piping"; or
(d) be double-wall steel *piping* provided with a *cathodic protection* system designed by a *corrosion expert*.

5.4.5(1) *Secondary containment* systems for *piping* shall be designed and installed such that *leaks*:
(a) accumulate in a *containment sump* that is readily available for visual inspection; or
(b) are detected by a monitoring system.

Section 5.5 Installation

5.5.1 *Piping* shall be installed by a company or individual that is authorized by the *authority having jurisdiction*.

5.5.2 *Piping* shall be located and maintained to permit the eventual removal of the *piping* when the *storage tank system* is permanently withdrawn from service.

5.5.3 *Piping* shall be located in a manner that will prevent allowable design stress from being exceeded.

5.5.4 *Piping* located aboveground shall be *protected* from physical damage due to impact.

Part 6 Monitoring and Leak Detection of Storage Tank Systems

Section 6.1 Scope

6.1.1 This Part applies to monitoring and *leak detection* for a *storage tank system*.

Section 6.2 General Requirements

6.2.1(1) A *storage tank system* shall be tested for *leaks* in conformance with Sections 6.2 and 6.3:

(a) at the time of final installation:

(i) for an *underground storage tank system*, final installation shall be when final surface materials have been installed and prior to being put into service; or

(ii) for an *aboveground storage tank system*, final installation shall be before the *storage tank system* is put into service; and

(b) whenever a *leak* is suspected in the primary or *secondary containment* of the *storage tanks*, *piping*, *containment sumps* or related components.

6.2.2 A *line-leak detector* shall be designed, built, and *approved* in conformance with ORD-C107.12-1992, "Line Leak Detection Devices for Flammable Liquid Piping."

6.2.3 Manual or electronic dip or inventory reconciliation shall be in conformance with Section 8.3.

6.2.4(1) Statistical inventory reconciliation shall be in conformance with:

(a) EPA/530/UST-90/007, "Standard Test Procedures for Evaluating Leak Detection Methods: Statistical Inventory Reconciliation Methods"; and

(b) EPA 510-B-95-009, "Statistical Inventory Reconciliation."

6.2.5 An automatic tank gauge system with a precision *leak detection* capability shall be designed, built, and *approved* in conformance with ORD-C58.12-1992, "Leak Detection Devices (Volumetric Type) for Underground Storage Tanks".

6.2.6 A continuous in-tank *leak detection* system shall conform to good engineering practice and shall meet the requirements of a *precision leak detection test*. (See Appendix B, Note B6.2.6.)

6.2.7(1) High-technology *secondary containment* monitoring shall continuously monitor the *interstitial space* and include the use of an automatic device designed, built, and *approved* in conformance with:

(a) ORD-58.12-1992, "Leak Detection Devices (Volumetric Type) for Underground Storage Tanks", or

(b) ORD-58.14-1992, "Leak Detection Devices (Nonvolumetric Type) for Underground Storage Tanks",.

6.2.8 Visual *leak detection* procedures shall be performed in conformance with Sentence 8.4.1(3).

6.2.9(1) A *pressure liquid media leak detection* test shall be in conformance with the requirements of a *precision leak detection test* and:

(a) the test device shall be third-party performance certified; and

(b) testing technicians shall be trained in the care and use of the test device

6.2.10(1) A *static liquid media leak detection* test shall be in conformance with the following requirements:

(a) leak rate shall not exceed 0.38 L/h;

(b) the duration of the test shall be a minimum of 1 hour;

(c) there shall be no visual evidence of a *leak*; and

(d) the test fluid shall exceed the elevation of *piping* and electrical conduit openings installed in sumps at the time of the *leak detection* test.

6.2.11(1) A high-pressure inert gas or vacuum *leak detection* test for *piping* shall be in conformance with the following procedures, as applicable:

(a) a high-pressure decline test using an inert gas or a vacuum test may be used as a *leak detection* test for *piping* systems that are in use and that have a volume of less than 1,000 L;

(b) whenever permitted by the equipment design and installation, product contained in the *piping* system shall be drained prior to conducting the high-pressure inert gas or vacuum test procedure;

(c) pumps, dispensers or other auxiliary equipment connected to the *piping* that cannot be subjected to the pressure of the test shall be isolated from the test procedures to prevent equipment damage;

(d) a test pressure or vacuum shall, as applicable:

(i) be more than 350 kPa (gauge) or 1.5 times the maximum operating pressure, whichever is greater;

(ii) not exceed 700 kPa (gauge), except when the *piping* system is designed for such pressures; and

(iii not exceed the equipment manufacturer's design limitations.

(e) stabilization is required after pressurization or vacuum is achieved;

(f) a *piping* system with a volume of less than or equal to 500 L shall have the pressure or vacuum maintained for a period of at least 60 min after stabilization;

(g) a *piping* system with a volume of greater than 500 L but less than or equal to 1,000 L shall have the test pressure or vacuum maintained for a period of at least two hours after stabilization;

(h) a *piping* system with a volume greater than 1000 L shall be tested using a procedure acceptable to the *authority having jurisdiction* (See Appendix B, Note B6.2.11 (1) (h); and

(i) a *piping* system shall be considered to be *leaking* when pressure variations that occur after stabilization and within the test time period are greater than two percent of the test pressure or vacuum.

6.2.12(1) A low-pressure inert gas or vacuum *leak detection* test for *piping* shall be conducted in conformance with the following procedures, as applicable:

(a) a low-pressure decline test using an inert gas or a vacuum test may be used to conduct a *leak detection* test on the *secondary containment* of double-wall tanks and double-wall pipe;

(b) product contained in the *secondary containment* system shall be drained prior to conducting the low-pressure decline or vacuum test procedure;

(c) a test pressure or vacuum shall, as applicable:

(i) be between 20 kPa and 35 kPa; and

(ii) not exceed the equipment manufacturer's design limitations;

(d) stabilization is required after pressurization or vacuum is achieved;

(e) *secondary containment* shall have the test pressure or vacuum maintained for a period of at least two hours after stabilization; and

(f) a *piping* system shall be considered to be *leaking* when pressure variations that occur after stabilization and within the test time period are greater than two percent of the test pressure or vacuum.

6.2.13(1) A *precision leak detection* test shall be in conformance with (See Appendix B, note B.6.2.13(1)):

(a) ORD-C58.12-1992, "Leak Detection Devices (Volumetric Type) for Underground Storage Tanks;" or

(b) ORD-58.14-1992, "Leak Detection Devices (Nonvolumetric Type) for Underground Tanks."

Section 6.3 Leak Detection Interlocks and Alarms

6.3.1(1) Subject to Sentence (2), an automatic *leak detection* device, including a high-technology *secondary containment* monitoring device and precision line *leak detection* device, shall be electrically interlocked in such a manner that:

(a) when the automatic *leak detection* device is activated, product flow shall be shut off; and

(b) except for on-*site* maintenance activities, when the automatic *leak detection* device is turned off or bypassed for more than one minute, product flow shall be terminated.

6.3.1(2) When an electrical interlock as specified in Sentence (1) is not possible, the *authority having jurisdiction* shall be notified whenever the *leak detection* device or method indicates a *leak*. (See Appendix B, note B.6.3.1(2))

6.3.2 A suction pump shall be equipped with a single check valve installed directly below the suction pump and *piping* shall slope so the contents of the pipe will drain back to the storage tank if the suction is broken.

6.3.3 A *leak detection* alarm shall be located where the staff routinely work and in a place where such alarms can be readily heard and seen.

Section 6.4 Monitoring Wells

6.4.1 When more than one monitoring well is necessary to monitor an installation effectively, the monitoring wells shall be numbered so that all monitoring and testing results can be easily correlated to a specific monitoring location.

6.4.2 A monitoring well shall be equipped with a liquid-proof cap.

6.4.3 A monitoring well shall be distinguished from a fill pipe and marked in conformance with CPPI (1995), "Using the CPPI Colour-Symbol System to Mark Equipment and Vehicles for Product Identification"

6.4.4 A monitoring well shall be secured to prevent unauthorized access and tampering.

6.4.5 A monitoring well located in a traffic area shall be cut off at ground level and/or properly *protected* from vehicles.

6.4.6 A monitoring well installed within the *interstitial space* shall not penetrate the *liner*.

6.4.7 A damaged monitoring well shall be repaired or replaced within 30 *days* after discovery of the damage.

6.4.8 A monitoring well shall be checked for liquid product and/or vapours at least monthly.

Section 6.5 Groundwater Monitoring Wells

6.5.1(1) When a vertical groundwater monitoring well is to be used, a professional hydrogeologist or other person authorized by the *authority having jurisdiction* shall:

(a) assess the *site* and establish the number and positioning of the monitoring wells so that product releases from any portion of the *storage tank system* that routinely contains a *petroleum* or *allied petroleum product* will be detected; and

(b) ensure compliance with the requirements of this Section.

6.5.2 The product stored in a *storage tank* shall be immiscible in water and shall have a specific gravity of less than one.

6.5.3 The hydraulic conductivity of the soil between a *storage tank system* and the monitoring wells shall not be less than 0.01 cm/s. (See Appendix B, note B 6.5.3)

6.5.4 The monitoring wells shall intercept the excavation zone of an *underground storage tank* or be as close as technically possible.

6.5.5 A monitoring well shall be a minimum of 50 mm in diameter.

6.5.6 Subject to Sentence 6.5.11(1), if a monitoring well is to be used as a recovery well, the screened zone shall extend at least 1.5 m into the water table and at least 1.5 m above the groundwater surface, as determined at the time of installation.

6.5.7 Subject to Sentence 6.5.11(1), the screened portion of a monitoring well shall be a minimum of 3.0 m in length and shall be factory slotted with a slot size of 0.25 mm or as *approved* by the *authority having jurisdiction*.

6.5.8 The area around the screened portion of a monitoring well shall be surrounded by a filter pack. (See Appendix B, note B.6.5.8)

6.5.9 Subject to Sentence 6.5.11(1), the filter pack shall extend to 0.5 m above the top of the screened portion of monitoring wells.

6.5.10 Subject to Sentence 6.5.11(1), the outside of a monitoring well shall be sealed from the ground surface to the top of the filter pack using bentonite, grout, or other material with equivalent performance.

6.5.11(1) Where the groundwater surface is less than 2.5 m from the ground surface, a professional hydrogeologist or other person authorized by the *authority having jurisdiction* shall determine the length and position of:
(a) the screened portion of a well;
(b) the filter pack; and
(c) the bentonite, grout, or other material with equivalent performance seal.

6.5.12 A monitoring well shall be installed with a cap or plug at the bottom of the screened section of the well.

6.5.13 A monitoring well shall be constructed of flush joint, threaded, or bell and spigot Schedule 40 PVC or equivalent. (See Appendix B, note B.6.5.13)

6.5.14 A continuous monitoring device or a manual method shall detect a minimum of 3 mm of free product on top of the groundwater surface in the monitoring well.

Section 6.6 Vapour Monitoring Wells

6.6.1(1) Where vapour monitoring is to be used, a professional hydrogeologist or other person authorized by the *authority having jurisdiction* shall:
(a) assess the *site* and establish the number and positioning of the monitoring wells so that product releases from any portion of the *storage tank system* that routinely contains a *petroleum* or *allied petroleum product* will be detected; and
(b) ensure compliance with the requirements of this Section.

6.6.2 The product stored or tracer compound placed in the *storage tank system* shall be sufficiently volatile to result in a vapour level that is detectable by the monitoring devices.

6.6.3 The measurement of vapours by the monitoring device shall not be rendered inoperative by the groundwater, rainfall, soil moisture, or other known interferences so that a *leak* could go undetected for more than 30 *days*.

6.6.4 The level of background contamination shall not interfere with the method used to detect *leaks* from the *storage tank system*.

6.6.5 A vapour monitor shall have its performance validated by a third-party testing organization in conformance with ORD-C58.14-1992, “Leak Detection Devices (Nonvolumetric) for Underground Tanks”.

6.6.6(1) A vapour monitor shall be designed and installed to detect any significant increase in concentration above the background level of:

(a) the *petroleum* or *allied petroleum product* stored;

(b) a component or components of the *petroleum* or *allied petroleum product*; or

(c) a tracer compound placed in the *storage tank system*.

Section 6.7 Frequency and Method

6.7.1 The reference letters in Table 2 represent the *leak detection* and monitoring methods specified in Tables 3 through 9.

6.7.2(1) Tables 3 through 9 specify the frequencies and methods of *leak detection* and monitoring that shall be used upon installation and, as applicable (See Appendix B, note B.6.7.2(1)):

(a) for in-service monitoring;

(b) for periodic *leak detection* testing; or

(c) if a leak is suspected.

Table 2 - Leak Detection and Monitoring Methods

Abbreviation	Leak detection and Monitoring Method Description[1][2]
ATG	Automatic tank gauge with monthly *precision leak detection* test
CITLD	Continuous in-tank *leak detection* system with monthly *leak detection* test (results are limited to an evaluation of the *storage tank* only)
CITLDS	Continuous in-tank *leak detection* system with monthly *leak detection* test (results provide an evaluation of the *storage tank* and *piping* system)
ELLD	Electronic line *leak detection* device
HPVLDT	High-pressure inert gas or vacuum *leak detection* test
HTSCM	High-technology *secondary containment* monitoring
IR	Manual dip and inventory reconciliation; electronic dip and electronic inventory reconciliation; or electronic dip and manual inventory reconciliation in conformance with Section 8.3
LPVLDT	Low-pressure inert gas or vacuum *leak detection* test
MLLD	Mechanical line *leak detection* device
OWM	Observation well vapour or groundwater monitoring (monthly)
PLDT	*Precision leak detection test of a storage tank* (See Appendix B, note B.6.2.13(1))
PLMLDT	*Pressure liquid media leak detection test*
SIR	Statistical inventory reconciliation (monthly reporting)
SLMLDT	*Static liquid media leak detection test*
SVCV	Single, vertical check valve
VLD	Visual *leak detection* (weekly)

[1]See Section 6.2 for definition and performance requirements of the prescribed methods.
[2]See Appendix B, note B.6.3.2(1)

Table 3 – New Underground Storage Tanks

Containment	Final Installation Leak Detection	In-service Monitoring	Periodic Leak Detection	Leak Suspected
Double-wall tanks	PLDT	SIR; VLD; ATG; HTSCM; CITLDS; or CITLD	Not required	PLDT

Table 4 – Aboveground Storage Tanks

Containment	Final Installation Leak Detection	In-service Monitoring	Periodic Leak Detection	Leak Suspected
Double-wall tanks	VLD	HTSCM; or VLD	Not required	VLD[1]; PLDT; or LPVLDT[1]
API Std 650-98 *(within approved secondary containment)*	API 650 standard	IR and VLD; or HTSCM	API 653	PLDT; or API 653
API Std 650-98 *(within non-approved secondary containment)*		IR and VLD	API Std 653-01; or PLDT (annually)	PLDT; or API Std 653-01
Single wall vertical tanks *(within approved secondary containment)*	VLD	IR and VLD ; or HTSCM	API Std 653-01	PLDT; or API Std 653-01
Single-wall vertical tanks *(within non-approved secondary containment)*		IR and VLD	API Std 653-01; or PLDT (annually)	PLDT; or API Std 653-01
Horizontal tanks	VLD	IR and VLD	Not required	VLD[2]; or PLDT

[1]on the interstice only
[2]where entire system including *piping* is visible

Table 5 - Underground Piping

Containment	Final Installation Leak Detection	In-service Monitoring	Periodic Leak Detection	Leak Suspected
Single-wall (greater than 75mm)	PLMLDT; or HPVLDT	OWM	PLMLDT; or HPVLDT (every year)	PLMLDT; or HPVLDT
		CITLDS; or ELLD	Not required	
Double-wall	PLMLDT; or HPVLDT and LPVLDT	ELLD; Sensor; CITLDS; or SVCV[1]	Not required	PLMLDT; or HPVLDT

[1]Suction style system only

Table 6 - Aboveground Piping

Containment	Final Installation Leak Detection	In-service Monitoring	Periodic Leak Detection	Leak Suspected
All types	PLMLDT; or HPVLDT	VLD	Not required	PLMLDT; or HPVLDT

Table 7 – Turbine, Transition and Dispenser Sumps

Containment	Final Installation Leak Detection	In-service Monitoring	Periodic Leak Detection	Leak Suspected
Dispenser Sumps	SLMLDT	HTSCM; or VLD	Not required	SLMLDT
Turbine and transition sumps	SLMLDT		VLD (annually) [1]	SLMLDT

[1]In conformance with Clause 8.4.1(4)(g)

Table 8 - Existing Single-Wall Underground Storage Tanks

Type	In-service Monitoring	Periodic Leak Detection	Leak Suspected
Steel without CP[1]	IR; and OWM or SIR	PLDT (annually)	PLDT
Steel with CP[1]; or FRP[2];	IR	PLDT (every 2 years)	
	IR; and OWM or SIR	PLDT (every 5 years)	
	ATG; or CITLDS	Not required	
	OWM and SIR	Not required	

[1]CP - *Cathodic protection*
[2]FRP - Fibreglass-reinforced-plastic

Table 9 – Existing Single-Wall Underground Piping

Type	In-service Monitoring	Periodic Leak Detection	Leak Suspected
Steel without CP[1]	IR; and OWM or SIR	PLMDT; or HPVLDT (annually)	PLMDT; or HPVLDT
Steel with CP[1], plastic, or FRP[2]	IR; and OWM or SIR	PLMDT; or HPVLDT (every 2 years)	
	CITLDS; or OWM and SIR	Not required	
	SVCV[3]; or ELLD[4]	Not required	

[1]CP - *Cathodic protection*
[2]FRP - Fibreglass reinforced plastic
[3]Suction style system only
[4]Pressure Piping

Part 7 Upgrading of Existing Storage Tank Systems

Section 7.1 Scope

7.1.1 This Part applies to an *existing storage tank system*.

Section 7.2 General Requirements

7.2.1 No person shall upgrade, or cause to be upgraded, an existing *storage tank system* unless approval has been obtained from the *authority having jurisdiction*.

7.2.2(1) Where an *existing storage tank system* is upgraded to be in conformance with this Code, the *owner* shall provide a revised as-built drawing to the *authority having jurisdiction* in the manner and time frame as specified by the *authority having jurisdiction*.

7.2.2(2) A revised as-built drawing shall be in conformance with Sentence 3.2.7(2) or 4.2.8(2), as applicable.

7.2.3 A partially buried *storage tank* is considered neither an *aboveground* nor *underground storage tank* and shall be withdrawn from service and removed in conformance with Part 9 within two years of the *effective date* of this Code.

Section 7.3 Aboveground Storage Tank Systems

7.3.1 An *existing aboveground storage tank* system not in conformance with Section 3.6 shall be withdrawn from service and removed in conformance with Part 9 within two years of the *effective date* of this Code.

7.3.2(1) Where underground *piping* connected to an *aboveground storage tank* has *corrosion protection* in conformance with Section 4.5 at the *effective date* of this Code, the *piping* may continue in service.

7.3.2(2) Where underground *piping* connected to an *aboveground storage tank* does not have *corrosion protection* in conformance with Section 4.5 at the *effective date* of this Code:

(a) the *piping* must be withdrawn from service and removed in conformance with Part 9 within two years of the *effective date* of this Code; or

(b) best management practices shall be implemented within two years of the *effective date* of this Code in conformance with:

i) API Std 2610-94, "Design, Construction, Operation, Maintenance and Inspection of Terminal and Tank Facilities"; and

ii) API 570-98, "Piping Inspection Code: Inspection, Repair, Alteration, and Rerating of In-Service Piping Systems".

7.3.3(1) Except as specified in Sentence (2), an *aboveground storage tank system* shall be upgraded within two years of the *effective date* of this Code to include, as applicable:

(a) liquid and vapour-tight connections, caps and adapters for a *storage tank* with a capacity of 5 000 L or more;

(b) *overfill protection* in conformance with Article 3.6.2 for a *storage tank* with a capacity of 5 000 L or more;

(c) underground *piping* in conformance with Section 5.4;

(d) *dispenser sumps* in conformance with Article 3.6.3, where an underground *piping* run terminates under a dispenser; and

(e) *secondary containment* in conformance with Section 3.9 and Sentences 7.3.4(1) and (2).

7.3.3(2) *Where secondary containment* is not upgraded as provided in Clause (1)(e), an annual *precision leak detection* test shall be performed.

7.3.4(1) Except as provided in Sentence (2), an *existing* field-erected *aboveground storage tank* not upgraded to be in conformance with Section 3.3 shall be withdrawn from service and removed in conformance with Part 9 within five years of the *effective date* of this Code.

7.3.4(2) Where authorized by the *authority having jurisdiction*, an *existing* field-erected *aboveground storage tank* may be exempt from adding an *impermeable barrier* under the tank to meet the *secondary containment* requirements of Section 3.9 provided that within two years of the *effective date* of this Code:

(a) best management practices are followed in conformance with API Std 653-01, "Tank Inspection, Repair, Alteration, and Reconstruction"; or

(b) if inspection requires replacing or lining the tank bottom, then 3.9.2(1)(b) shall apply (See Appendix B, note B.7.3.4(2)(b)).

7.3.4(3) In the event that a *storage tank owner* chooses the exemption provided in Clause 7.3.4(2)(b) and the *storage tank* bottom or shell becomes perforated, then all other *storage tanks* with equal or more years of similar service at that *site* that are being managed under API Std 653-01, "Tank Inspection, Repair, Alteration, and Reconstruction", shall be:

(a) inspected within one year; or

(b) re-evaluated within the time frame specified by the new corrosion rate.

7.3.5 An *existing aboveground storage tank* not upgraded with *spill* containment and runoff collection in conformance with Section 3.10 shall be withdrawn from service and removed in conformance with Part 9 within five years of the *effective date* of this Code.

7.3.6 An *existing* shop fabricated *aboveground storage tank system* not upgraded to be in conformance with Sections 3.4, 3.5, and this Section shall be withdrawn from service and removed in conformance with Part 9 within two years of the *effective date* of this Code.

Section 7.4 Underground Storage Tank Systems

7.4.1 An *existing underground storage tank* system that does not have *corrosion protection* shall be withdrawn from service and removed in conformance with Part 9 within 2 years of the *effective date* of this Code.

7.4.2 Where an existing *underground storage tank* system with *corrosion protection* is not upgraded in conformance with Sentences 7.4.3(1) or (2), it shall be withdrawn from service and removed in conformance with Part 9 within two years of the *effective date* of this Code.

7.4.3(1) Except as provided in Sentence 7.4.3(2), an *existing underground storage tank system* with *corrosion protection* must be upgraded to include:

(a) liquid and vapour-tight connections, caps and adapters;

(b) an *overfill protection device*;

(c) a fill pipe *spill containment device*;

(d) *dispenser sumps*; and

(e *leak detection* in conformance with Part 6.

7.4.3(2) An *existing underground storage tank system* with *corrosion protection* that is used for storing *used oil* shall be upgraded to include:

(a) liquid-tight connections, caps and adapters;

(b) a suction pipe in conformance with Clause 4.2.4.(2)(c)

(c) a *spill containment device* in conformance with Clauses 4.2.4(2)(d) and (f);

(d) an *overfill protection device* in conformance with Clause 4.2.4.(2)(e);

(e) *venting* in conformance with Clause 4.2.4(2)(g); and

(f) *leak detection* in conformance with Part 6.

Part 8 Operation and Maintenance

Section 8.1 Scope

8.1.1 This Part applies to the operation and maintenance of a *storage tank system*.

Section 8.2 General Requirements

8.2.1 Except as provided in this Part, the operation and maintenance of a *storage tank system* shall be in conformance with the NFCC.

Section 8.3 Inventory Control

8.3.1(1) Except as provided in Sentence 8.3.1(2), the *owner of a storage tank system* shall ensure that inventory control and reconciliation is conducted in conformance with this Section.

8.3.1(2) Subject to Sentence 8.3.2(1), inventory control and reconciliation is not required where:

(a) a *storage tank system* has been temporarily withdrawn from service and the tanks have been emptied; or

(b) all components designed to contain liquids are secondarily contained and have an *interstitial space* monitored:

(i) manually on any *day* the storage system is available for use; or

(ii) continuously using electronic sensing that provides a visual or auditory indication of the integrity of the interstice being compromised.

8.3.2(1) The *owner* of a *motive fuel storage tank* shall ensure that:

(a) the product level is measured and reconciled (See Appendix B, note B.8.3.2(1)(a)) in conformance with Sentence 8.3.2(2):

(i) each *day* that product is added or removed from an *underground storage tank*; or

(ii) at least weekly where product is added to or removed from an *aboveground storage tank system*; and

(b) the water level shall be measured and included in all reconciliation computations in conformance with Clause (a).

8.3.2(2) *Storage tank* inventory control measurements shall be reconciled by comparing product and water level measurements with dispenser meter readings, shipments, deliveries and internal transfers.

8.3.2(3) The computation of any gain or loss of product shall be recorded and included with a monthly summary of cumulative losses or gains of product.

8.3.3 Inventory control and reconciliation records shall be kept in a manner and format as prescribed by the *authority having jurisdiction*.

8.3.4(1) For an *underground storage tank*, the *authority having jurisdiction* shall be notified immediately, in conformance with Section 8.9, in the event of:

(a) any unexplained loss in excess of the greater of:

(i) 0.5% of the throughput in one month from the *tank* system, as indicated by the recording and reconciliation of inventory records over a month recording period done in conformance with Article 8.3.2; or

(ii) 0.5% of the *storage tank system* capacity;

(b) inventory reconciliation showing five or more consecutive *days* of unexplained product losses;

(c) inventory reconciliation showing 18 or more *days* of unexplained losses in one calendar month; or

(d) the level of water at the bottom of the tank exceeds 50 mm.

8.3.4(2) For an *aboveground storage tank*, the *authority having jurisdiction* shall be notified immediately, in conformance with Section 8.9, in the event of:

(a) any unexplained loss in excess of the greater of:
  (i) 1% of the throughput in one month from the *storage tank system* as indicated by the recording and reconciliation of inventory records done in conformance with Article 8.3.2; or
  (ii) 1% of the *storage tank system* capacity.
(b) inventory reconciliation showing five or more consecutive weeks of unexplained product losses; or
(c) inventory reconciliation showing an unexplained loss in one calendar month.

Section 8.4 Inspections and Maintenance of Storage Tank Systems

8.4.1(1) Routine in-service inspections shall be conducted in conformance with this Section.

8.4.1(2) Visual inspection of a *storage tank* facility to ensure that there has not been a *leak* or deterioration of the facility that could result in a *leak* shall be conducted and documented either:

(a) each day the facility is in operation; or
(b) at a frequency specified by the *authority having jurisdiction*. (See Appendix B, note B.8.4.1(2)(b))

8.4.1(3) Visual inspection of a *storage tank* facility to ensure that there has not been a *leak* or equipment failure shall be conducted weekly and documented for:

(a) foundations, tank walls, roof, and tank attachments;
(b) dyke capacity, condition of the dyke wall and floor, and water removal systems;
(c) pumps and product-*handling* equipment;
(d) tank gauging equipment;
(e) mechanical and automatic electronic *leak detection* equipment;
(f) *dispenser sumps* and *spill containment devices*; and
(g) *overfill protection devices*.

8.4.1(4) Inspection and performance testing in conformance with the manufacturer's requirements and procedures to ensure satisfactory equipment performance and operation of a *storage tank* facility shall be conducted annually and documented by a company or individual that is authorized by the *authority having jurisdiction* for:

(a) automatic tank gauges and monitoring systems;
(b) high-technology sensors;
(c) electronic or mechanical *leak detection* equipment;
(d) *corrosion protection* equipment;
(e) pressurized *piping* emergency valves;
(f) emergency shut-down devices;
(g) containment sumps including dispenser, turbine and transition containment devices; and
(h) *overfill protection devices*.

8.4.1(5) In addition to Sentence (4), a *storage tank* not in service at the time of the inspection shall be noted on the inspection report stating:

(a) date taken *out-of-service*; and
(b) whether the tanks:
  (i) will be *out-of-service* for less than 180 *days*;
  (ii) will be *out-of-service* for a period exceeding 180 *days*; or
  (iii) are operated on a seasonal basis.

8.4.2 Where required by Part 6, an *aboveground storage tank system* installed in conformance with API Std 650-98, "Welded Steel Tanks for Oil Storage" shall be inspected in conformance with API Std 653-01, "Tank Inspection, Repair, Alteration, and Reconstruction".

8.4.3 Any deficiencies in a *storage tank system* identified as a result of the inspections specified in this Section shall be documented and corrected to be in conformance with this Code by a company or individual that is authorized by the *authority having jurisdiction*.

Section 8.5 Product Transfer Operations

8.5.1 A person responsible for transferring *petroleum* or *allied petroleum product* to a *storage tank system* shall take all reasonable steps to prevent *spills*.

8.5.2(1) When a tank vehicle is being unloaded, the vehicle *operator* shall remain:
(a) in constant view of the fill pipe; and
(b) in constant attendance at the delivery control valve. (See Appendix B, note B.8.5.2(1)(b))

8.5.3(1) Transfer of *petroleum* or *allied petroleum product* into and out of a *storage tank system* shall be in conformance with procedures outlined in:
(a) the NFCC;
(b) API Std 2610-94, "Design, Construction, Operation, Maintenance, and Inspection of Terminal and Tank Facilities"; and
(c) CPPI (1992), "Professional Driver's Manual".

8.5.3(2) Standard procedures for normal operation, as well as for emergencies, shall be given to an *operator* and posted in printed form for convenient reference. An employee involved with the transfer of *petroleum* or *allied petroleum product* shall be trained in the correct operating procedures for all equipment and shut-down devices. (See Appendix B, note B.8.5.3(2))

8.5.4 The *owner* of a *storage tank system* shall ensure that filler ports, monitoring wells, and vapour recovery connections are colour-coded in conformance with CPPI (1995), "Using the CPPI Colour-Symbol System to Mark Equipment and Vehicles for Product Identification".

8.5.5 A *used oil storage tank* shall be fitted with a suction tube and *liquid- and vapour*-tight coupling and shall not have suction hoses dropped or inserted into the *used oil storage tank* during the product removal process.

8.5.6 No person shall transfer *used oi*l from a *storage tank* unless a connection is made to the coupling at the end of the *storage tank* suction tube.

8.5.7(1) Subject to Sentence (2), no person shall transfer *petroleum* or *allied petroleum product* to an *aboveground storage tank* with a capacity of 5 000 L or more unless a liquid- and vapour-tight fill connection is made to the *storage tank*.

8.5.7(2) No person shall transfer *petroleum* or *allied petroleum product* to an *underground storage tank* unless a liquid- and vapour-tight fill connection is made to the *underground storage tank*.

8.5.8 No person shall cause an *allied petroleum product* to be transferred into a *storage tank* unless the product being transferred is compatible with the internal surface of the *storage tank*.

Section 8.6 Cathodic Protection Monitoring

8.6.1(1) Except as provided in Sentence (2), maintenance checks on the operation of a *cathodic protection* system shall be conducted in conformance with:
(a) CAN/ULC-S603.1-1992, "Galvanic Corrosion Protection Systems for Underground Steel Tanks" for sacrificial anode systems;
(b) NACE RP0169-2002, "Control of Corrosion on Underground or Submerged Metallic Piping Systems";

(c) NACE RP0285-2002, "Corrosion Control of Underground Storage Tank Systems by Cathodic Protection";
(d) NACE RP0193-2001, "External Cathodic Protection of On-Grade Carbon Steel Storage Tank Bottoms";
(e) NACE TM0101-2001, "Measurement Techniques Related to Criteria for Cathodic Protection on Underground or Submerged Metallic Tank Systems";
(f) CPPI/PACE Report No. 87-1, "Impressed Current Method of Cathodic Protection of Underground Petroleum Storage Tanks" Clause 5.55(c) and Part 6.0 for impressed current systems; or
(g) API RP 651-97, "Cathodic Protection of Aboveground Petroleum Storage Tanks".

8.6.1(2) *Cathodic protection* measurements for a *storage tank system* shall be conducted by a person with NACE CP Level 1 (CP tester minimum certification) or otherwise as authorized by the *authority having jurisdiction*, at commissioning, within one year of commissioning, and annually thereafter.

Section 8.7 Oil-water Separators

(see Appendix B, note B.8.7)

8.7.1 An *oil-water separator* intended to collect and separate *free oil* from water shall be designed and installed in conformance with Sentence 3.10.3(1).

8.7.2 An *oil-water separator* shall be equipped with a *spill containment device* at the point of oil removal in conformance with:
(a) ORD-C58.19-1992, "Spill Containment Devices for Underground Tanks"; or
(b) ORD-C142.19-1994, "Spill Containment Devices for Aboveground Tanks".

8.7.3 The operation, maintenance and inspection of an *oil-water separator* shall be in conformance with the requirements of the manufacturer's instructions or as prescribed by the *authority having jurisdiction*.

8.7.4(1) Subject to Sentence (2), the depth of the *free oil* layer and *separated solids* accumulation in an *oil-water separator* shall be checked and recorded monthly.

8.7.4(2) If a monthly inspection is not possible, an *oil-water separator* shall be electronically monitored.

8.7.4(3) The depth of the *free oil* layer and *separated solids* accumulation in an *oil-water separator* shall be measured as close to the baffle as possible.

8.7.4(4) An *oil-water separator* shall have the *free oil* layer removed:
(a) continuously by an automatic skimmer; or
(b) at a maximum depth of 50 mm.

8.7.4(5) After a *spill* or *leak*, the depth of the *free oil* layer and *separated solids* accumulation in an *oil-water separator* shall be checked and recorded.

8.7.5 No person shall *discharge tank bottom water* or gasoline, solvents, *used oil*, glycol, detergents, or *sludges* from outside the *storage tank system* directly to an *oil-water separator*. (See Appendix B, note B.8.7.5)

8.7.6 The amount of solids entering an *oil-water separator* shall be minimized.

8.7.7(1) An *oil-water separator* shall have the *separated solids* removed:
(a) at a maximum depth of 150 mm; or
(b) at the maximum depth allowed by an automatic removal device.

8.7.8 *Free oil*, *separated solids*, and water from an *oil-water separator* shall be disposed of in a manner prescribed by the *authority having jurisdiction*.

Section 8.8 Transfer of Ownership

8.8.1 The new *owner* of a *storage tank system* shall notify the *authority having jurisdiction* in writing within 30 days of the transfer of ownership and provide the information specified by the *authority having jurisdiction*.

8.8.2 When the ownership of a *storage tank system* is transferred, all as-built drawings and records, or copies thereof required by this Code shall be transferred to the new *owner* of the *storage tank system*.

8.8.3 The *owner* of real property on which *underground storage tank*s are located shall inform the purchaser of the real property, in writing, of the existence of any *underground storage tank*s on the real property before the sale is closed. (See Appendix B, note B.8.8.3)

Section 8.9 Leak and Spill Response

8.9.1 The *owner* of each registered *storage tank system* shall prepare and maintain an emergency response *contingency plan*.

8.9.2(1) The *owner* or *operator* of a *storage tank system* shall immediately notify the *authority having jurisdiction* (See Appendix D- Spill Reporting) and provide the information requested when the *owner* or *operator* discovers, suspects, or is notified by any person of:

(a) any *leak* from a *storage tank system*;

(b) any *spill* or overfill that is 100 L or more; or

(c) any *spill* or overfill that could threaten fresh water supplies, groundwater, or the health and safety of the public.

8.9.3(1) The *owner* of a *storage tank system* where a *leak* or *spill* is known or suspected shall, in consultation with the *authority having jurisdiction*, take such actions as the *authority having jurisdiction* requires to verify, stop, clean up, and mitigate the impact of the *leak* or *spill*, including but not limited to:

(a) isolating *leaking* components of the *storage tank system*;

(b) arranging for immediate removal of the *petroleum* or *allied petroleum product* from the isolated *leaking* components of the *storage tank system*;

(c) inspecting the *storage tank* or *piping* and:

  (i) arranging for a *leak* test in conformance with this Code; or

  (ii) removing the suspected *leaking storage tank* or *piping*;

(d) taking all reasonable steps to establish the extent of the contamination (including vapours), contain the *leaked* or *spilled petroleum* or *allied petroleum product*, and prevent its further migration; and

(e) taking all reasonable steps to recover or remove escaped *petroleum* or *allied petroleum product* in conformance with Sentence 9.4.2(2).

Section 8.10 Precision Leak Detection Test

8.10.1 In addition to the requirements of Part 6, the *owner* of a *storage tank system* shall conduct a *precision leak detection test* when required by the *authority having jurisdiction*.

8.10.2(1) A *precision leak detection test* shall be conducted by a company or individual authorized by the *authority having jurisdiction* and shall be conducted by an individual that has been trained in the proper care and use of the test equipment and it's operating procedures.

8.10.2(2) When a *precision leak detection test* has been required by Part 6 or the *authority having jurisdiction*, a *precision leak test* report shall be forwarded by the *owner* to the *authority having jurisdiction* within ten *days* of the test.

8.10.2(3) A *precision leak detection test* report shall contain as a minimum:
- (a) *storage tank* and *piping* identification number and product type;
- (b) *owner's* name and mailing address;
- (c) facility address;
- (d) test date;
- (e) test results;
- (f) test methods;
- (g) test technician certification number provided by the test equipment manufacturer to verify satisfactory completion of applicable training and certification requirements; and
- (h) name and address of testing company or technician.

8.10.4 Where a *precision leak detection test* or inspection indicates a *leak*, the company or individual performing the test shall immediately notify the *owner* or *operator* of the *storage tank system* and the *authority having jurisdiction*.

Section 8.11 Records

8.11.1(1) The *owner* of a *storage tank system* shall maintain records for at least seven years of all:
- (a) inventory control and reconciliation as required by Section 8.3;
- (b) inspections and maintenance as required by Section 8.4;
- (c) *cathodic protection* monitoring as required by Section 8.6;
- (d) *precision leak detection tests* as required by Section 8.10;
- (f) maintenance and repairs;
- (g) monitoring well results;
- (h) construction, *alterations*, or upgrades;
- (i) as-built drawings; and
- (j) excavation or nearby *construction* that could affect the integrity of the *storage tank system*.

8.11.1(2) Subject to Sentence (3), the *owner* of a *storage tank system* shall maintain records required by this Code on-*site*.

8.11.1(3) The *authority having jurisdiction* may allow computerized records to be stored off-*site*.

8.11.2(1) The *owner* of an *oil-water separator* shall maintain records of:
- (a) the *free oil layer* in the separator;
- (b) the *separated solids* level, measured at a point where the maximum buildup can be expected;
- (c) the date and quantity of oil removed;
- (d) the date and quantity of s*eparated solids* removed;
- (e) the name of the contractor; and
- (f) all inspections and maintenance.

Section 8.12 Tank Bottom Water

8.12.1(1) *Tank bottom water* shall:
- (a) not be drained onto the ground or into an *oil-water separator* (See Appendix B, note B8.12.1(1)(a); and
- (b) be segregated from rainwater and disposed of in conformance with the applicable provincial or territorial regulations, guidelines and policies.

Section 8.13 Storage

8.13.1 In an *aboveground storage tank system*, the space created by *secondary containment* shall not be used for storage purposes.

Section 8.14 Transfer of Oil-contaminated Water

8.14.1 Centrifugal-type pumps shall not be used to transfer oil-contaminated water from dykes or sumps to the *oil-water separator*.

Part 9 Withdrawal from Service of Storage Tank Systems

Section 9.1 Scope

9.1.1 This Part applies to procedures to be followed when a *storage tank system* is removed, relocated, *abandoned*, disposed of, refurbished, or temporarily taken *out-of-service*.

Section 9.2 General Requirements

9.2.1 Except as provided in this Part, the withdrawal from service and removal of a *storage tank system* shall be in conformance with the NFCC and with any other requirements of the *authority having jurisdiction*.

9.2.2(1) A *storage tank system* shall be removed by a company or individual that is authorized by the *authority having jurisdiction*.

9.2.2(2) A company or individual removing a *storage tank system* shall ensure that the system is removed in conformance with the requirements of this Part.

Section 9.3 Temporary Withdrawal from Service

9.3.1 If a *cathodic protection* system is provided, it shall be maintained and operated while the *storage tank system* is temporarily withdrawn from service (See Appendix B, note B.9.3.1).

9.3.2(1) A shop-fabricated *aboveground storage tank system* shall pass an annual inspection in conformance with Sentence 8.4.1(4) before the *storage tank system* is returned to service.

9.3.2(2) A field-erected *aboveground storage tank* that has been *out-of-service* for more than one year shall, before being returned to service:

(a) pass an internal inspection conducted by an individual authorized by the *authority having jurisdiction* in conformance with API Std 653-01, "Tank Inspection, Repair, Alteration, and Reconstruction"; or

(b) pass a *precision leak detection test*.

9.3.2(3) For a field-erected *aboveground storage tank* that has been returned to service as specified in Sentence (2), the next internal inspection shall be the earlier of:

(a) within ten years of the most recent internal inspection; or

(b) at the date specified by API Std 653-01, "Tank Inspection, Repair, Alteration, and Reconstruction".

9.3.3(1) Except for a *storage tank system* that has been registered with the *authority having jurisdiction* as operating on a seasonal basis, when a *storage tank system* is to be *out-of-service* for more than 180 *days*, the *owner* or *operator* shall notify the *authority having jurisdiction* in writing, within seven *days* after the *storage tank system* goes out-of-service, providing:

(a) the name and mailing address of the *owner*;

(b) the name and mailing address of the *operator*;

(c) the location of the *storage tank system*;

(d) a description of the nature and quantity of the contents; and

(e) the registration number of the *storage tank*.

Section 9.4 Removal from Service

9.4.1 The *owner* of a *storage tank system* shall notify the *authority having jurisdiction* within 30 *days* of a decision to remove a *storage tank system* and provide the information requested by the *authority having jurisdiction*.

9.4.2(1) When a *storage tank system* has been permanently removed from service, the *owner* of a *storage tank system* shall ensure that:

(a) *petroleum* and *allied petroleum products* are removed and vapours purged from the *storage tank*, *piping*, dispensing, and transfer equipment; and

(b) the *storage tank*, *piping*, dispensing, and transfer equipment are removed.

9.4.2(2) If the *site* is contaminated with *petroleum* or *allied petroleum products*, the *site* shall be remediated to the criteria defined by:

(a) CCME PN 1299, "Canadian Environmental Quality Guidelines";

(b) CCME CWS for PHC, "Canada-wide Standards for Petroleum Hydrocarbons in Soil"; or

(c) other criteria prescribed by the *authority having jurisdiction*.

Section 9.5 Abandonment In-place

9.5.1 An aboveground *storage tank system* shall not be *abandoned* in-place.

9.5.2(1) In accordance with Articles 4.2.7 and 5.5.2, an *underground storage tank system* installed after the *effective date* of the Code shall not be *abandoned* in-place

9.5.2(2) Subject to Sentence 9.5.3(1), and Article 9.5.4, an existing *underground storage tank system* shall not be abandoned in-place.

9.5.3(1) An *owner* of an existing *underground storage tank system* may apply to the *authority having jurisdiction* for approval to *abandon* a *storage tank system* in-place by:

(a) describing fully in the application, the circumstances relating to the *storage tank system* location that would justify *abandoning* the *storage tank system* in-place;

(b) satisfying the *authority having jurisdiction* that the soil under and around the *storage tank system* has not been contaminated with a *petroleum* or *allied petroleum* product (see Appendix, note B9.5.3(1)); and

(c) providing confirmation that the *owner* of the property is aware and in agreement with the plan and procedures to *abandon* the *storage tank system* in-place.

9.5.4 When the *authority having jurisdiction* considers it impractical to remove an *underground storage tank system*, approval in writing may be granted to the *owner* to *abandon* the system in-place (See Appendix B, note B.9.5.4).

9.5.5(1) When the *authority having jurisdiction* has granted approval in writing to an *owner* to *abandon* an *underground storage tank system* in-place, the *abandonment* procedures shall ensure that:

(a) any liquid or sludge in the *underground storage tank system* is removed and disposed of by an acceptable method;

(b) the *underground storage tank system* is purged of vapours to less than 10% of the lower flammable limit and that the presence of vapours is checked with a *combustible* gas meter;

(c) sufficient holes are cut along the top of the *underground storage tank* to enable the complete filling of the storage tank with an inert material acceptable to the *authority having jurisdiction* (See Appendix B, Note B9.5.5(1));

(d) the *underground storage tank* is completely filled with an inert material acceptable to the *authority having jurisdiction* (See Appendix B, Note B9.5.5(1));

(e) a record of the size, description, and location of the *underground storage tank* is;

(i) permanently appended to the deed of the property;

(ii) submitted to the *authority having jurisdiction*; and

(f) associated *piping* not *abandoned* in place is removed from service in conformance with the NFCC.

Section 9.6 Disposal of Storage Tank Systems

9.6.1(1) When a *storage tank system* is to be disposed of:

(a) liquid *petroleum* or *allied petroleum product* shall be removed from the *storage tank system*;

(b) *sludge* in the *storage tanks* shall be removed and disposed of in a manner prescribed by the *authority having jurisdiction*;

(c) the *storage tank* shall be purged of vapours to less than 10% of the lower *flammable* limit and the presence of vapours shall be checked with a *combustible* gas meter;

(d) sufficient openings shall be cut in the *storage tank* to render it unfit for further use;

(e) the *storage tank* shall be transported in conformance with the Transportation of Dangerous Goods Act and in a manner prescribed by the *authority having jurisdiction* to an *approved* disposal facility; and

(f) an affidavit of destruction shall be provided by the *approved* disposal facility and shall be forwarded by the *owner* or by an authorized company or individual to the *authority having jurisdiction*.

Section 9.7 Reuse of Storage Tanks

9.7.1(1) A *cathodically protected* steel *underground storage tank* may be reused for the storage of *petroleum* or *allied petroleum products* after being:

(a) refurbished in accordance with ULC-S603(A)-2001, "Refurbishing of Underground Steel Tanks"; or

(b) inspected and relabeled in accordance with the Special Acceptance Program of Underwriters Laboratories of Canada.

9.7.2(1) A fibreglass-reinforced plastic *underground storage tank* may be reused for the storage of *petroleum* or a*llied petroleum products* after being:

(a) refurbished in accordance with ULC-S615(A)-1987, "Refurbishing of Reinforced Plastic Underground Tanks"; or

(b) inspected and relabeled in accordance with the Special Acceptance Program of Underwriters Laboratories of Canada.

9.7.2(2) A shop-fabricated *aboveground storage tank* may be reused for the storage of *petroleum* or *allied petroleum products*:

(a) for a vertical *aboveground storage tank*, after being refurbished in accordance with ULC-S630(A)-2001, "Shop Refurbishing of Aboveground Vertical Shop Fabricated Steel Tanks";

(b) for a horizontal *aboveground storage tank*, after being refurbished in accordance with ULC-S601(A)-2001, "Shop Refurbishing of Aboveground Horizontal Shop Fabricated Steel Tanks"; or

(c) after being inspected and relabeled in accordance with the Special Acceptance Program of Underwriters Laboratories of Canada.

9.7.3 A field-erected *aboveground storage tank* may only be reused for the storage of *petroleum* or *allied petroleum products* after being refurbished in accordance with API Std 653-01, "Tank Inspection, Repair, Alteration, and Reconstruction."

9.7.4 An *underground storage tank* removed from service shall not be reused as an *aboveground storage tank*.

Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products PN 1326

APPENDIX A Authorities Having Jurisdiction (Revised October 2015)

Federal Government

ENVIRONMENT CANADA
Waste Reduction Management Division
Public and Resources Sector Directorate
Environmental Stewardship Branch
Place Vincent Massey
Gatineau, QC K1A 0H3
Phone: 1-844-672-8038
Fax: 819-938-4454

Provincial and Territorial Authorities

ALBERTA
Office of the Chief Fire Administrator
Safety Services - Public Safety Division
Alberta Municipal Affairs
16th Floor Commerce Place
10155 - 102 Street
Edmonton, AB T5J 4L4
Phone: 1- 866-421-6929
Fax: 780-427-8686

Petroleum Tank Management
Association of Alberta
980, 10303 Jasper Avenue
Edmonton, AB T5J 3N4
Phone: 780-425-8265
Fax: 780-425-4722

BRITISH COLUMBIA
Ministry of Environment
Environmental Standards Branch
PO Box 9341 Stn Prov Govt
Victoria, BC V8W 9M1
Phone: 250-387-9950
Fax: 250-381-9921

Office of the Fire Commissioner
Ministry of Public Safety and Solicitor General
PO Box 9201 Stn Prov Govt
Victoria, BC V8W 9J1
Phone: 250-952-4913
Fax: 250-356-7197

MANITOBA
Manitoba Conservation and Water Stewardship
1007 Century Street
Winnipeg, MB R3H 0W4
Phone: 204-945-2458 or 204-4708315
Fax: 204-948-2338

NEW BRUNSWICK
Environmental Management Division
Department of the Environment
and Local Government
P.O. Box 6000
20 McGloin St.
Fredericton, NB E3B 5H1
Phone: 506-453-7945
Fax: 506-453-2390

NEWFOUNDLAND AND LABRADOR
Pollution Prevention Division
Department of Environment
P.O. Box 8700
St. John's, NL A1B 4J6
Phone: 709-729-2561
Fax: 709-729-6969

NOVA SCOTIA
Nova Scotia Environment
Industrial Management Unit
Sustainability & Applied Science Division
Barring Tower, Suite 1800
P.O. Box 442
Halifax, NS B3J 2P8
Phone: 902-424-2534
Fax: 902-424-0503

NORTHWEST TERRITORIES
Office of the Fire Marshal
Department of Municipal and Community Affairs
Government of the Northwest Territories
600 – 5201 50 Avenue
Yellowknife, NT X1A 3S9
Phone: 867-873-7469
Fax: 867-873-0622

NUNAVUT
Fire Marshal
Community and Government Services
Government of Nunavut
P.O. Box 1000, Station 700
Iqaluit, NU X0A 0H0
Phone: 867-975-5310
Fax: 867-979-4221

ONTARIO
Technical Standards & Safety Authority
Fuels Safety Program
Clarica Centre,West Tower
14th Floor 3300 Bloor Street West
Toronto, ON M8X 2X4
Phone: 416-734-3300
Fax: 416-231-1626

PRINCE EDWARD ISLAND
Department of Communities, land and Environment
31 Gordon Drive
P.O. Box 2000
Charlottetown, PE C1A 7N8
Phone: 902-368-5280
Fax: 902-368-5526

QUÉBEC
Réglementation en équipements pétroliers
Régie du bâtiment du Québec
Direction de la réglementation et du soutien technique
800, place D'Youville, 15e étage
Québec QC G1R 5S3
Téléphone: 418-643-9896
Télécopieur: 418-646-9280
Courriel: pierre.gauthier@rbq.gouv.qc.ca
Site internet: www.rbq.gouv.qc.ca

SASKATCHEWAN
Saskatchewan Environment
Environmental Protection Branch
102-112 Research Drive
Saskatoon, SK S7K 2H6
Phone: 306-933-7940
Fax: 306-933- 8442

Corrections and Public Safety
Office of the Fire Commissioner
310-1855 Victoria Avenue
Regina, SK S4P 3T2
Phone: 306-787-3774
Fax: 306-787-7107

YUKON
Community Services
Protective Services Branch.
P.O. Box 2703 (C-20)
Whitehorse, YT Y1A 2C6
Phone 867-667 5217 or 5230
Fax 867-393 6249

Appendix B Explanatory Material

B.1.4.2 *Allied petroleum product* - It is understood that a number of chemicals not included in this definition may be stored in *underground storage tanks*. This definition, however, represents *combustible* and *flammable* products that are directly petroleum-based and are the most widely used *petroleum products* in the manufacturing sector.

B.1.4.2 *Interstitial space* includes the following space:

(a) outside the *storage tank* bottom and above a synthetic membrane *liner* or prepared soil layer;
(b) between the *storage tank* bottom and a secondary bottom creating a *leak*-containment space;
(c) between two pipes of a double-wall *piping* system;
(d) between a pipe and a synthetic membrane *liner*; or
(e) space between a *storage tank* and a *secondary containment* system.

B.1.4.2 *Used oil* - The definition of *used oil* was taken from the 1989 CCME publication, PN 1042, "Code of Practice for Used Oil Management in Canada" with the following modifications.

(a) the category of "metal-working fluids" has been removed as this product class is considered to be sufficiently different from the definition of *petroleum products*. Since metal-working fluids may include a substantial amount of water, further consideration would have to be given to the need to line steel tanks.
(b) the category of "insulating fluids or coolant" has been modified for similar reasons, and now reads as "insulating oils".

Used oil contains primarily hydrocarbons; however, it may also contain additives (e.g., a total of 14% by volume of detergents and viscosity-improvers in lubricating oils for gasoline engines). It contains physical and chemical impurities (e.g., solids, metals, and chlorinated organics) due to physical contamination and chemical reactions occurring during its use. Contamination of *used oil* may also occur from mixing with other oily fluids or fluid wastes when it is collected for recycling.

This Code does not treat *used oil* exclusively as a hazardous waste. *Used oil* may or may not be designated as a hazardous waste depending on the types and amounts of chemical impurities it contains. For example, *used oil* containing 50 ppm or more of PCBs is designated as a hazardous waste in most Canadian jurisdictions. If the *used oil* is designated as a hazardous waste, other requirements for its storage may apply. Consult the *authority having jurisdiction*.

B.3.2.6 The CCME "Guideline for Controlling Emissions of Volatile Organic Compounds from Aboveground Storage Tanks" applies to *storage tanks* having a capacity of more than 4 000 L, designed to contain a *petroleum product* that has a vapour pressure of 10 kPa or greater. The published document is available from Manitoba Statutory Publications.

B.3.3.1(1)(e)(ii) The overfill alarm system required shall be in addition to the alarm or gauging system that is routinely used. This system shall be used as a back-up system when the primary means of detecting a high level has failed.

B.3.5.1(2) It is important to note that the requirements of the fire authorities must be met if any *used oil* collection tank is considered for use indoors.

B.3.8.1(1) The use of certain *secondary containment* techniques may preclude the use of *cathodic protection* and in some cases cause accelerated *corrosion* of the *storage tank* bottom. A *corrosion expert* shall be consulted.

B3.9.2 (2)(a) The *authority having jurisdiction* may specify an acceptable material for a *secondary containment impermeable barrier* based on local conditions or previous experience. Regardless of material, proper installation and ongoing maintenance of a *secondary containment impermeable barrier* is important.

B.3.9.3 (1) The installer shall advise the electrical contractor that synthetic membrane *liners* have been used and ensure that the *liner* is not punctured by grounding rods. It is recommended that grounding rods not be inserted within the dyked areas where a synthetic membrane or clay *liner* has been used for *secondary containment*. If penetrations are required, locating the penetrations at a high point reduces the likelihood of *leaks*.

B.4.2.7 *Abandonment* in-place of an *out-of-service storage tank* is not normally an acceptable practice. *Storage tanks* shall not be located near or under building foundations or in locations where the ultimate removal of the *storage tank* would be impractical.

B.4.5.3 (1)(b) Stray current from an impressed current system can cause *corrosion* to *storage tank systems* that are *cathodically protected* by sacrificial anodes.

B.4.5.3 (2) The anodes on a *cathodically protected storage tank* that conforms with CAN/ULC-S603.1, "Standard for Galvanic Corrosion Protection Systems for Steel Underground Tanks", are designed to protect the tank only. Inadequate *corrosion protection* of such *cathodically protected storage tanks* can occur if the *storage tank* is not electrically isolated from the *piping* or other *storage tanks*.

B.4.5. Rectifier shall have a non-resettable 115V. AC elapsed time indicator with 99,999 hour capacity. A battery powered downtime counter of the same hour capacity is an optional alternative.

B.5.2.5 Mechanical joints, such as flanged joints or couplers, shall not be used below ground. Additionally, it is good practice to minimize the use of threaded joints below ground.

B.6.2.6 CITLDS method combines use of an Automatic Tank Gauge probe to collect data and sophisticated data analysis used in Statistical Inventory Reconciliation (SIR) techniques. An *underground storage tank* is monitored continuously without interfering with normal tank operations. These systems are designed to meet the monthly monitoring performance standard of detecting a *leak* of 0.76 L/hr or 567 L per month with 95% probability and 5% false alarm.

B6.2.11. (1)(h) The determination of an appropriate procedure for a *leak detection test* of piping with a volume greater than 1000 L is based on several variables, including the ability to drain and isolate the line, line volume, product characteristics, the availability of test equipment, and the reliability of procedures to detect *leaks*. The best results will be generated when the product is drained from the line, the line is blinded or isolated at each end, and the line is pressurized with an inert gas. The length of time that the line is pressurized should be consistent with its volume. Industry's best practices should also be taken into consideration. Typically, refineries and terminals will use an inert gas to pressurize a line at one and one half times normal operating pressure and monitor the pressure for four or more hours.

B6.2.13

(1) Numerous technologies are available to conduct a *precision leak detection test* and determine the presence of *leaks* in a *storage tank*, associated connections, risers, connected equipment and the *vent* system. Commonly used methods include vacutech, mass measurement, volumetric, and acoustics. The various test systems have specific preparation requirements, operating procedures, and technical limitations. These requirements have been determined by the equipment manufacturer and are based on the design of the technology. Failure to follow the procedures or operate within these parameters can impact the accuracy of results and scope of the evaluation.

The test equipment has also been designed to evaluate various areas of the *storage tank* and associated equipment. In some cases, more than one test must be competed in order to evaluate the underfill area (below the fluid level) and the ullage space (above the fluid level). For example, a mass measurement or volumetric test could be used to evaluate the area below the fluid level. An acoustics test would be used in conjunction with the underfill test to evaluate the ullage space, risers and *vent* system. However, in some cases a test procedure can be used in more than one application. An ullage test could also be used to test an *empty* tank.

Various factors, including *tank* type – *aboveground*, *underground*, single-wall or double-wall, – interstice space design, and product level, must be considered and will influence the selection of an appropriate test. *Underground storage tanks* require an evaluation of the primary containment, connections, risers, connected equipment and the *vent* system. An aboveground *storage tank* requires an evaluation of the floor or any area of the *tank* that cannot be visually inspected for *leaks*. *Tank* components and *leak detection test* requirements are outlined in Table 10:

Table 10 - Tank Components and Leak Detection Test Requirements

Tank description	Product level	Test type
Single-wall *underground tank*	*Empty*	Ullage test
Single-wall *underground tank*	With product	Complete *tank* test
Double-wall *underground tank*	*Empty*	Ullage test
Double-wall *underground tank*	With product	Ullage test and LPVLDT on the interstice; or complete *tank* test
Double-wall *underground tank* with brine or vacuum interstice monitor	*Empty*	Ullage test
Double-wall *underground tank* with brine or vacuum interstice monitor	With product	Ullage test; or complete *tank* test
Single-wall *aboveground tank*	With product	Underfill test
Double-wall *aboveground tank*	*Empty*	Ullage test
		Ullage test and LPVLDT on the interstice
Double-wall *aboveground tank*	With product	Underfill test
		Underfill and LPVLDT on the interstice

B.6.3.1
(2) When the *leak detection* device is not an electrical device (such as a monitoring well or statistical inventory reconciliation), electrical interlocks may not be possible.

B.6.3.2 Even with the present mechanical type of *line-leak detectors*, a line *leak* within a submersible pump system can result in large volumes of product being pumped into the ground. *Leaks* from submersible pump systems have been the cause of some of the largest environmental and safety incidents. Where *line-leak detectors* are used, they shall not be bypassed when problems are encountered while dispensing the product.

The *authority having jurisdiction* may choose to prohibit the use of remote or submersible pump systems unless the pipes and pumps are within an acceptable *secondary containment* system.

B.6.5.3 The soil shall consist of gravels, coarse or medium sands, coarse silts, or other permeable material.

B.6.5.8 A filter pack is a porous medium usually consisting of sand or pea gravel.

B.6.5.13 Monitoring wells shall **not** be constructed of Schedule 20 PVC "sewer" or leach field *piping*.

B.6.7.2
(1) A mechanical line *leak* detector (MLLD) is unable to reliably detect small *leaks*. From the *effective date* of this Code and at the discretion of the *authority having jurisdiction*, an MMLD is not recognized as a method of detecting *leaks* in pressurized *piping*. Additional methods of *leak detection* may be used, or alternatively, the MLLD can be replaced by an *electronic line leak detector* (ELLD).

Inventory control for a *storage tank* is a form of inventory monitoring for *motive fuel storage tanks*. However, inventory control by itself is not an acceptable form of *leak detection*. Inventory control combined with acceptable statistical inventory reconciliation is an acceptable form of *leak detection* for the entire *storage tank system.*

An under-pump check valve is located directly below the pump of a suction system and is the only check valve installed on the system. With continuous slope back to the tank, a *leak* in the pipe will cause product to drain into the tank.

B.7.3.4
(2)(b) Allows a field-erected *storage tank* to simply follow the requirements of API Std 653-01, "Tank Inspection, Repair, Alteration, and Reconstruction." Strict adherence to API Std 653-01, "Tank Inspection, Repair, Alteration, and Reconstruction." is required. API Std 653-01, "Tank Inspection, Repair, Alteration, and Reconstruction." requires periodic *corrosion* monitoring. Once a *corrosion* rate is established, subsequent *corrosion* monitoring and repairs to the tank bottom can be performed prior to the occurrence of any perforations. If perforations do occur, it can be assumed that the provisions of API Std 653-01, "Tank Inspection, Repair, Alteration, and Reconstruction." have not been strictly followed. If this occurs, stronger preventive steps are specified.

B.8.3.2
(1)(a) To facilitate early detection of *leakage* from an *underground storage tank system*, proper inventory records must be developed, maintained, and reviewed continuously for any developing trends that may signify a loss of product. The traditional method of doing this has been to "dip" the *storage tanks*. Dipping is the actual measurement of the liquid contents of the *storage tank* with a graduated stick (dip stick). This measurement combined with the *storage tank* chart (suitable for use with the specific tank) can be converted to the liquid volume of the *storage tank*. A measuring device (generally a recording type of pump) that will measure the amount of product

withdrawn from the *storage tank* is also an integral part of the inventory control system. Finally, it is necessary to reconcile the product in storage with the amount recorded (daily/weekly) as having been withdrawn. Any continuous discrepancy (shortage) must be investigated as a possible *leak* from the *underground storage tank system*.

B.8.4.1
(2)(b) Frequent visual inspections of an *aboveground storage tank system* is required to provide early detection of equipment failures and product *spills*. The *authority having jurisdiction* may decide that *operators* of tanks of 5000 L and less capacity do not have to do daily checks. In addition, it may not be possible or practical to inspect a *storage tank* at unattended remote *sites*.

B.8.5.2
(1)(b) The NFCC requires that a vehicle *operator* remain in close proximity to the *discharge* control valve. There is concern that a vehicle *operator* may interpret 'close proximity' to include sitting in the cab of the tank vehicle, out of sight of the delivery point. Many overfills occur because the tank vehicle *operator* is not observing the filling operation and is unaware that the *storage tank* is overfilling. Therefore Sentence 8.5.2(1)(b) is more specific and requires a vehicle *operator* to be more attentive.

B.8.5.3
(2) A significant number of the *spills* that occur at *aboveground storage tank* facilities result from improper procedures during routine activities. These accidents can be reduced or eliminated if operating personnel are properly trained about correct safety procedures and the importance of following them to prevent injury and environmental incidents. Training must be periodically followed up to ensure that proper procedures are being followed.

B.8.6.1
(1) *Cathodically protected* potentials are required on all parts of the tank bottom in order for it to be considered to be *cathodically protected.* When a perimeter anode type *cathodic protection* system is used, the potential at the tank centre can be much different than that measured at the tank perimeter and a *corrosion expert* should be consulted

B.8.7 The CPPI "Code of Practice for Management of Water Effluent Quality at Petroleum Storage and Distribution Facilities" may be useful for anyone who *owns* or operates an *oil-water separator*.

An *oil-water separator* does not remove the soluble fraction of oil that is in the water or storm runoff. Therefore, it shall be noted that even if an *oil-water separator* produces an effluent that has an oil and grease or hydrocarbon content that is below provincial or territorial *discharge* limits, the effluent may still be acutely toxic to fish.

It is recommended that the designer shall ensure that when an *oil-water separator* is to be installed that a proper design basis is used. The *owner* shall control sources to the separator and remove the *free oil* layer and accumulated *separated solids* as required by the manufacturer's operating instructions.

B.8.7.5 Detergents and cleaning solutions cause oil to emulsify in water and prevent effective separation. Never wash trucks with such products in areas that drain to an *oil-water separator*.

B.8.8.3 At the time of a change of ownership, an environmental assessment or investigation of site contamination shall be conducted on real property on which *storage tanks* are located.

B.8.12.1

(1) The *tank bottom water* from the bottom of a *storage tank* normally contains water, insoluble hydrocarbon, and dissolved hydrocarbons. The concentration of dissolved or soluble hydrocarbons is often sufficiently high that the *tank bottom water* would be considered toxic if a biological toxicity test were conducted. Since *oil-water separators*, such as an API separator, only separate insoluble oil from water, the *tank bottom water* shall be segregated in a holding tank and sent to a wastewater treatment facility either on-*site* or off-*site* (and not directly to an *oil-water separator*).

B.9.3.1 *Corrosion* is the major factor which limits the life of a *steel storage tank system* and *corrosion* can be controlled for an indefinite period of time if *corrosion protection* is maintained. When *cathodic protection* system is used it is only effective when the system is "on". Therefore, the *cathodic protection* system must be maintained and operated continuously.

B.9.5.3

(1) The *authority having jurisdiction* could consider any of the following as reasonable conditions for allowing the *owner* to *abandon* a *storage tank* in place:

(a) located in whole or in part beneath a permanent building or other facility so that excavation of the *storage tank* is not practicable;

(b) so large or of a type of *construction* that the excavation of the *storage tank* is not practicable;

(c) inaccessible to the heavy equipment necessary for removal of the *storage tank*; or

(d) situated so that removal of the *storage tank* would endanger the structural integrity of nearby buildings or other facilities.

B.9.5.5

(1) Sand, gravel, or concrete are examples of what is considered acceptable inert material. Foam shall not be considered an acceptable inert material.

B.9.5.4 A *precision leak detection test* conducted in conformance with Section 8.10, or borehole sampling of the soil may be required to satisfy the *authority having jurisdiction* that the soil under and around the *storage tank* has not been contaminated by a *petroleum product* or *allied petroleum product*.

APPENDIX C Minimum Information Required for Registration of Storage Tank Systems

The registration form prescribed by the *authority having jurisdiction* shall require, as a minimum, the following information:

(a) name of *owner*;

(b) address *of owne*r;

(c) type of facility;

(d) location of *storage tanks* (if different than address of *owner*);

(e) storage capacity of tank;

(f) type of product stored;

(g) year of installation;

(h) ULC standard of tank

(i) type of *storage tank* material;

(j) type of *piping* material;

(k) *corrosion protection* provided (if applicable);

(l) type of pump;

(m) type of *leak detection*;

(n) type of *secondary containment* (if applicable);

(o) name of *operator* (if different than *storage tank owner*);

(p) name of land owner (if different than *storage tank owner*);

(q) name of installer; and

(r) manufacturer of *storage tank*.

APPENDIX D Spill Reporting

The *owner* or *operator* of a *storage tank system* who discovers, suspects, or is notified by any person of a *leak* or possible *leak* shall immediately notify the *authority having jurisdiction* by telephone and provide the information requested by the *authority having jurisdiction*.

Listed below are the emergency phone numbers of the federal, provincial, and territorial authorities. Either of the two listed numbers can be called.

PROVINCE / TERRITORY	FEDERAL AUTHORITY	PROVINCIAL / TERRITORIAL AUTHORITY
Newfoundland and Labrador	**1-800-563-2444** **709-772-2083** Coast Guard	**1-800-563-2444** **709-772-2083** Coast Guard
Prince Edward Island	**1-800-565-1633** Coast Guard (in Maritimes only)	**1-800-565-1633** Coast Guard (in Maritimes only)
Nova Scotia	**1-800-565-1633** Coast Guard (in Maritimes only)	**1-800-565-1633** Coast Guard (in Maritimes only)
New Brunswick	**1-800-565-1633** Coast Guard (in Maritimes only)	**1-800-565-1633** Coast Guard (in Maritimes only)
Québec	**514-383-2333** Environment Canada Emergency Answering Service	**514-873-3454** Dept. of Environment Environmental Emergency
Ontario	**613-239-6065** Environment Canada Environmental Emergencies	**1-800-268-6060** Ministry of the Environment Spills Action Centre
Manitoba	**403-468-8020** Environment Canada Environmental Emergencies	**204-944-4888** Manitoba Conservation Environmental Emergency Line
Saskatchewan	**403-468-8020** Environment Canada Environmental Emergencies	**1-800-667-7525** Spill Report Centre Saskatchewan Environment
Alberta	**403-499-2432** Environment Canada Spill Reporting	**1-800-222-6514** Alberta Environment and Local Fire Department
Nunavut	**867-920-8130** Spill Report Line	**867-920-8130** Spill Report Line
Northwest Territories	**867-920-8130** Spill Report Line	**867-920-8130** Spill Report Line
British Columbia	**604-666-6100** Environment Canada Environmental Emergencies **604-666-6011** CanadaCoast Guard	**1-800-663-3456** Provincial Emergency Program
Yukon	**403-667-7244** Environmental Protection Services	**403-667-7244** Environmental Protection Services