

FRE-00020282-A1

January 4, 2016



Replacement of Petroleum  
Storage Tanks Building A5

**330 McGee Street  
Springhill, Nova Scotia  
B0M 1X0**

**exp Services Inc.**  
40 Henri Dunant Street  
Moncton, New Brunswick  
E1E 1E5  
Tel: (506) 858-1300  
Fax: (506) 858-1906



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SECTION	DESCRIPTION	PAGES
Division 01		
01 10 10	General Instructions	7
01 14 00	Work Restrictions	3
01 14 10	Scheduling and Management of Work	6
01 33 00	Submittal Procedures	4
01 35 24	Special Procedures on Fire Safety Requirements	5
01 35 25	Special Procedures on Lockout Requirements	5
01 35 28	Health and Safety Requirements	12
01 35 43	Environmental Procedures	3
01 35 59	Security Requirements at Correctional Service Canada Facilities	12
01 45 00	Testing and Quality Control	2
01 50 00	Temporary Facilities	4
01 51 00	Temporary Utilities	6
01 61 00	Common Product Requirements	4
01 74 11	Cleaning	3
01 74 21	Construction/Demolition Waste Management and Disposal	2
01 77 00	Closeout Procedures	1
01 78 00	Closeout Submittals	5
01 79 00	Demonstration and Training	2
01 91 31	Commissioning (Cx) Plan	9
Division 02		
02 41 17	Demolition	3
02 61 33	Hazardous Material	5
Division 03		
03 30 00	Cast-in-Place Concrete	5
Division 07		
07 84 00	Fire Stopping	3
Division 23		
23 05 29	Hangers and Supports	6

---

SECTION	DESCRIPTION	PAGES
<hr/>		
Division 25		
25 05 01	Common Work Results - Controls	10
25 05 12	Controls Training	3
Division 26		
26 05 00	Common Work Results - Electrical	8
26 05 15	Demolition	2
26 05 20	Wire And Box Connectors (0-1000V)	2
26 05 21	Wire And Cables (0-1000V)	2
26 05 23	Splitter, Junction, Pull Boxes, and Cabinets	2
26 05 29	Hangers and Supports for Electrical Systems	1
26 05 34	Conduits, Conduit Fastenings, and Conduit Fittings	3
26 05 45	Buried Cable and Ducts	3
26 05 46	Underground Concrete Encased Duct Banks	3
26 28 14	Fuses - Low Voltage	2
26 28 21	Moulded Case Circuit Breakers	2
26 29 10	Combination Motor Starters To 600V	3
26 50 00	Lighting	2
Division 31		
31 14 11	Earthwork and Related Work	5
Division 32		
32 12 16	Asphalt Concrete Paving	2
32 31 00	Chain Link Fence	4
Division 33		
33 30 00	Precast Manholes, Catch Basins & Structures	4
33 30 04	Transition Sump Leak Detection Systems	4
33 30 05	Aboveground Double Wall Pipe Leak Detection Systems	5
33 30 06	Oil/Water Separator Alarm System	4
33 40 00	Storm Sewers and Culverts	7
33 56 13	Aboveground Fuel Tanks	23

---

SECTION	DESCRIPTION	PAGES
Appendix A	CSC-EPP Environmental Protection Plan	3

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List of Drawings

Mechanical

M-101	Mechanical Layout Finished Site Plan
M-102	Basement Fuel Piping Plan
M-103	Details
M-104	Details
M-105	Mechanical Layout Temporary Fuel Oil Tank Replacement
M-201	Controls Layout
M-202	Controls Schematic and Details

Electrical

E-101	Electrical Layouts
E-102	Electrical Underground Duct Layout and Details

Civil

C-101	Existing and Demolition Site Plan
C-102	Finished Site Plan
C-103	Concrete Base Plan and Details
C-104	Details



MECHANICAL

exp Services Inc.  
40 Henri Dunant Street  
Moncton, N.B. E1E 1E5

Telephone: (506) 858-1300  
Fax: (506) 858-1906



ELECTRICAL

exp Services Inc.  
40 Henri Dunant Street  
Moncton, N.B. E1E 1E5

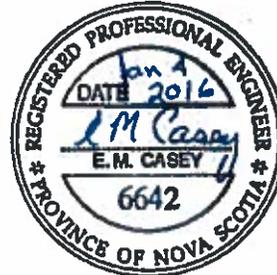
Telephone: (506) 858-1300  
Fax: (506) 858-1906



CIVIL

exp  
7071 Bayers Road, Suite 2002  
Halifax, N.S. B3L 2C2

Telephone: (902) 453-5555  
Fax: (902) 429-5457



exp Quality System Checks	
Project No.: FRE-00020282-A1	Date: 2016.01.04
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Prepared By: Yves Savoie, P.Eng. Scott Porter, P.Eng. Beth Casey, P.Eng.	<i>Yves Savoie</i> <i>Scott Porter</i> <i>Beth Casey</i>
Reviewed By: Chantal Daigle Verrier, P.Eng. John Davis, P.Eng.	<i>Chantal</i> <i>John T Davis</i>



## **PART 1. GENERAL**

### **1.1 DESCRIPTION OF WORK**

- .1 In general, the work includes, but is not limited to:
  - .1 The demolition and disposal of three (3) above ground fuel storage tanks, one (1) oil-water separator, concrete dyke walls and slabs, and related piping and materials of building A5, as shown in the project Drawings.
  - .2 The installation of three (3) new above ground fuel storage tanks, related equipment, storm water piping and associated components, associated concrete work, and materials for building A5, as shown on the project Drawings and described in the specifications to form a complete working system.
  - .3 The installation of new sensors, monitoring, and alarm devices for building A5 as shown on the project Drawings and described in the Specifications. Connection of said devices to the existing Building Management System, including programming and graphics.
  - .4 The installation of a new controller for said devices with provisions for future connection to the existing Building Management System.
  - .5 Provisions for a temporary fuel tank installation allowing continuous use of the boiler plant during construction.
  - .6 Related site grading and asphalt placement as shown on the Drawings described in the specifications to form a complete working system.
  - .7 The site of work is at Springhill institution 330 McGee Street, Springhill, NS.

### **1.2 CONTRACTOR QUALIFICATIONS**

- .1 Contractors to provide prior to award:
  - .1 Safety Certification with the NSCSA
  - .2 Qualified and accredited for petroleum equipment installation

### **1.3 FAMILIARIZATION WITH SITE**

- .1 Before submitting a bid, it is the responsibility of bidders to visit the site to review the nature and extent of the work.
- .2 Bidders who are unable to attend must obtain site visit authorization form from Departmental Representative prior to visiting the site.

#### **1.4 PRODUCT/SYSTEM OPTIONS**

- .1 Except as the drawings and specifications may be modified by Addenda, the successful Contractor will be held to furnish under his lump sum bid all work as specified. Alternates will be allowed only by procedures described herein. All materials and articles of any kind necessary for this work are subject to the approval of the Departmental Representative and his judgment and decision will be final. The submission of a bid will be taken as evidence of the bidder's compliance with these instructions.
- .2 Where bid documents stipulate a particular product, alternatives will NOT be considered by the Departmental Representative during the bidding period.
- .3 After bid closing when submitting for approval of alternates/equals the onus will be on the bidder to judge the acceptability of proposed alternates. The final decision on the acceptability of alternates/equals will be the Departmental Representative's.
- .4 After contract award, the successful Contractor may submit a formal request for approval of alternates/equals, with appropriate credit. Include with each request all basic data and characteristics of the proposed item, so that a direct comparison can be readily made. It is the responsibility of the bidder to submit complete description and technical information so that the Departmental Representative can make a proper appraisal. Approvals will be issued in writing.
- .5 The Departmental Representative will be the sole judge regarding acceptability of alternates.

#### **1.5 CODES AND STANDARDS**

- .1 Perform work in accordance with the latest edition of the National Building Code of Canada adopted by the local authority having jurisdiction and with other codes of

provincial or local application, including amendments up to project tender closing date. In the case of conflict or discrepancy, the more stringent requirement shall apply.

- .2 In addition to above, perform work in accordance with the following codes, regulations, guidelines:

.1 Canadian Environmental Protection Act, Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations, (2008 or latest). (CEPA)

.2 Canadian Council of Ministers of the Environment, Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products, (2003 or latest). (CCME)

.3 Nova Scotia Environment and Labour, Nova Scotia Standards for Construction and Installation for Petroleum Storage Tank Systems (1997 with 2005 amendments, or latest)

.4 National Fire Code of Canada, (2010 or latest). (NFC)

.5 Canadian Electrical Code, latest edition(CEC)

- .3 Materials and workmanship to meet or exceed the requirements of specified standards, codes and referenced documents.

#### **1.6 SETTING OUT WORK**

- .1 Assume full responsibility for and execute complete layout of work to locations, lines and elevations indicated.
- .2 Provide devices needed to lay out and construct work.

#### **1.7 INTERPRETATION OF DOCUMENTS**

- .1 Supplementary to the General Conditions of the Contract, the Division 01 specification sections take precedence over the technical specification.

#### **1.8 TERM DEPARTMENTAL REPRESENTATIVE**

- .1 Departmental Representative where used in Specifications and project Drawings shall mean the person or entity representing the interest of PWGSC for the purpose of the execution of this work.

### 1.9 COST BREAKDOWN

- .1 Before submitting first progress claim, the successful bidder shall submit a cost breakdown of the Contract price in detail and aggregate contract price. Required forms will be provided for application of progress payment.
- .2 The successful bidder shall provide a list of items of work numerically following the same division and section system of the specification and thereafter subdivide into major work components and building systems.
- .3 The cost breakdown will be used as basis for progress payment.

### 1.10 DOCUMENTS REQUIRED

- .1 Maintain at job site, one copy each of the following:
  - .1 Project Drawings
  - .2 Specifications
  - .3 Shop drawings
  - .4 Addenda
  - .5 Change Orders
  - .6 Modifications to Contract
  - .7 Copy of accepted Work Schedule
  - .8 Health and Safety Plan and other safety related documents
  - .9 Other documents as stipulated elsewhere in the Contract Documents.
  - .10 Field test reports

### 1.11 PERMITS

- .1 In accordance with the General Conditions of the contract, obtain and pay for building permit, compliance certificates, licenses and other permits and permissions as required by municipal, provincial and federal authorities.
- .2 Provide appropriate notification of project to provincial and other inspection authorities having jurisdiction.
- .3 Submit to Departmental Representative a copy of application forms and approval documents received from above referenced authorities.
- .4 Obtain compliance certificates as prescribed by legislative and regulatory provisions of municipal, provincial and federal authorities as applicable to the performance of the work.

### 1.12 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

- .1 Execute work with least possible interference or disturbance to Facility operations, occupants, public and normal use of premises. Arrange with Departmental Representative to facilitate execution of the work.
- .2 Provide barricades, barriers and warning signs around work areas and adjacent to areas in use by Facility occupants.
  - .1 Signage to be professionally made with bilingual message or use internationally recognized graphic symbols.
- .3 Separate work areas from other areas of the building and of the site. Provide dust barriers and fences as specified in section 01 50 00.
- .4 Facility access corridors and emergency exits:
  - .1 Ensure that building corridors, stairs, entrances and fire exits are left unobstructed and kept free of construction materials, tools, debris, dust and dirt at all times for safe passage by building users.
  - .2 Fire escape routes must be accessible and maintained at all times. Do not under any circumstances block fire exit doors and emergency escape routes.
- .5 Abide by security requirements and procedures specified in Section 01 35 59.
- .6 Where building security has been reduced by the work of the Contract, provide temporary means to maintain security in coordination with Departmental Representative.

### 1.13 ROUGHING-IN

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

### 1.14 CUTTING, FITTING AND PATCHING

- .1 Ensure that cutting and patching, required by trades and subtrades, is included in total bid price submitted for the work.
- .2 Execute cutting, fitting and patching required to make work fit properly.

- .3 Where new work connects with existing and where existing work is altered, cut, patch and make good to match existing work. This includes sections of existing work as a result of removal of existing services.
- .4 Do not cut, bore, or sleeve load-bearing members.
- .5 Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly.
- .6 Fit work tight to pipes, sleeves, ducts, conduits, and other services penetrating new and existing surfaces.
- .7 Openings made in existing fire rated walls, floors and ceilings shall be filled with purpose made, ULC approved, fire stopping material and smoke seals.
- .8 Reinstate integrity of fire rated separations which have been affected as a result of the work.

#### **1.15 LOCATION OF FIXTURES**

- .1 Location of equipment, fixtures and outlets, shown or specified shall be considered as approximate. Final location shall be as required to suit conditions at the time of installation.
- .2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with the manufacturer's recommendations for safety, access and maintenance.
- .3 Inform Departmental Representative when impending installation conflicts with other new or existing components. Follow directives for final location.
- .4 Submit field drawings to indicate final position of services and equipment.

#### **1.16 EXISTING SERVICES**

- .1 Before commencing work, investigate and establish location and extent of service lines in area of work and notify Departmental Representative of findings.
- .2 Where work involves breaking into, connecting or shutting down of existing services, obtain approval beforehand from Departmental Representative and carryout work at times as

directed by Departmental Representative with minimum disturbance to Facility and site operations. Adhere to approved schedule and provide notice to affected parties.

- .1 Abide by safety lockout requirements specified in Section 01 35 25.
- .3 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.
- .4 Protect, relocate or maintain existing active services as required. Where inactive services are encountered, cap off in manner approved by authority having jurisdiction over service. Record location of maintained, rerouted and abandoned service lines.
- .5 Provide temporary services to maintain critical building systems.

#### **1.17 BUILDING SMOKING ENVIRONMENT**

- .1 Comply with smoking restrictions in place at site of work.

#### **1.18 ASBESTOS DISCOVERY**

- .1 Demolition of spray or trowel-applied asbestos can be hazardous to health. Should material resembling spray or trowel-applied asbestos be encountered in course of work, stop work and notify Departmental Representative immediately. Do not proceed with relevant work until written instructions have been received from Departmental Representative.
- .2 Contractor shall consult the facility Asbestos Management Plan (AMP), if existing, prior to commencement of work. All work to be in accordance with AMP.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 RELATED SECTIONS**

- .1 01 14 10 - Scheduling and Management of Work
- .2 01 35 59 - Site Security Procedures

**1.2 ACCESS AND EGRESS**

- .1 Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders etc., independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

**1.3 USE OF SITE AND FACILITIES**

- .1 Execute work with the least possible interference or disturbance to facility operations. Make arrangements with Departmental Representative to facilitate work as stated. Provide minimum five (5) working days notice for any work that may disrupt facility operations.
- .2 Maintain existing services to buildings and site, and provide for personnel and vehicle access.
- .3 Where security may be reduced by the Work, provide temporary means to maintain security.
- .4 Contractor shall be responsible for providing their own site offices and sanitary facilities.
- .5 Use only elevators, existing in building for moving workers and material.
  - .1 Protect walls of passenger elevators, to authorization of Departmental Representative prior to use.
  - .2 Accept liability for damage, safety of equipment and overloading of existing equipment.
- .6 Closures: protect work temporarily until permanent enclosures are completed.

**1.4 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING**

- .1 Execute work with least possible interference or disturbance to facility operations, occupants, and normal use of premises. Arrange with Departmental Representative to facilitate execution of work.

### **1.5 EXISTING SERVICES**

- .1 Notify Departmental Representative and utility companies of intended interruption of services and obtain required permissions.
- .2 Where Work involves breaking into or connecting to existing services, provide Departmental Representative 48 hours notice of necessary interruption of mechanical or electrical services throughout course of work. Keep duration of interruptions to a minimum. Coordinate timing of planned interruptions with Departmental Representative.
- .3 Coordinate bypass/shutdown of life safety systems with O&M staff and Departmental Representative. Costs are the responsibility of the Contractor.
- .4 Allow for interrupted personnel, pedestrian and vehicular traffic.

### **1.6 SPECIAL REQUIREMENTS**

- .1 Carry out noise generating Work during "off hours" as defined in Section 01 14 10 - Scheduling and Management of Work. Coordinate with Departmental Representative and Facility operations staff.
- .2 Ensure that Contractor personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.
- .3 Keep within limits of work and avenues of ingress and egress.
- .4 Contractor may have deliveries made to the job site during regular hours.

### **1.7 SECURITY CLEARANCES**

- .1 Personnel employed on this project will be subject to security check. Obtain required security clearances, as instructed, for each individual who will require such in order to enter premises, including sub-trades.
- .2 Obey, abide by and follow site specific security requirements.

### **1.8 SECURITY ESCORT**

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

- .2 The Departmental Representative is responsible for providing a dedicated commissionaire to escort personnel within the building during working and after normal hours.

**1.9 BUILDING SMOKING ENVIRONMENT**

- .1 Comply with smoking restrictions.

**END OF SECTION**



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- .3 Provide sufficient details in Work Schedule to clearly illustrate an effective implementation plan, showing commencement and completion of all components of work within the time stated in the accepted bid.
  - .4 As a minimum, Work Schedule shall include:
    - .1 Bar (GANTT) Charts, indicating relevant work activities, tasks and other project elements, their anticipated durations and planned dates for achieving key activities supported by;
      - .1 Description of key elements of work illustrated in bar chart, demonstrating implementation plan for completion of project within designated time.
  - .5 Work schedule must take into consideration and reflect any required work phasing, sequence of work, special conditions and operational restrictions.
  - .6 Work schedule will be submitted to Departmental Representative. Any required changes will be made in coordination with Departmental Representative, trades and subtrades.
  - .7 Completed schedule will be submitted to Departmental Representative. Take necessary measures to complete work within scheduled time.
  - .8 Do not alter schedule without authorization from Departmental Representative.
  - .9 Ensure that trades and subtrades are made aware of the work restraints and operational restrictions specified.
  - .10 Schedule Updates:
    - .1 Submit bi-weekly to Departmental Representative.
    - .2 Provide information and pertinent details explaining reasons for necessary changes to implementation plan.
    - .3 Identify problem areas, anticipated delays, impact on schedule and proposed corrective measures to be taken.
  - .11 Departmental Representative will make interim reviews and evaluate progress of work based on reviewed schedule. Frequency of such reviews will be as decided by Departmental Representative. Address and take corrective measures on items identified in reviews by Departmental Representative. Update schedule accordingly.
  - .12 In every instance, change or deviation from the Work Schedule, no matter how minimal the risk or impact on safety or

inconvenience to the Facility, Facility operation or public might appear, will be subject to prior review by the Departmental Representative.

#### 1.4 WORK RESTRICTIONS

- .1 Minimize impact and interruption to the daily operations of the Institution during the entire course of the Work. Stringently follow directives given by the Departmental Representative in this regard.
- .2 The Work of this Contract may be carried out during regular working hours.
- .3 Area(s) being renovated must be reinstated and made operational at end of each work shift for daily use by Institutional staff during the days and operation hours of the Facility.
  - .1 Operational hours are specified in section 01 35 59.
- .4 Perform work in phases, as predetermined and planned with the Departmental Representative in order to effectively control dust and inconvenience to Facility users.
- .5 Facility circulation maintained:
  - .1 Ensure that entrances, corridors, stairwells, fire exits and other circulation routes are maintained free and clear providing safe and uninterrupted passage for Facility users and public at all times during the entire work.
  - .2 Maintain those areas clean and free of construction materials and equipment. Provide temporary dust barriers and other suitable enclosures to ensure users are not exposed to construction activities and are protected from exposure to dust, noise and hazardous conditions.
  - .3 Maintain fire escape routes accessible and fire fighting access open all times for the duration of the project.
  - .4 Do not under any circumstances block fire exit doors. Do not leave construction materials or debris in corridors, stairwells building entrances and exits.
- .6 Dust Control and Cleaning Requirements for interior work:
  - .1 See Section 01 50 00 for dust control and Section 01 74 11 for cleaning requirements.
  - .2 Effectively plan and implement dust control measures and cleaning activities as an integral part of all construction activities. Review measures with the Departmental Representative before undertaking work, especially for major dust generating activities.

- .3 Avoid situations and practices which result in dust and dirt being tracked into non-renovated areas of the facility by workers. This includes corridors and entrances used to gain access to various work areas.
- .4 Inform workers and make them sensitive to the need for dust and dirt control as a requirement of the Contract. Stringently enforce requirements. Immediately address noncompliance.
- .6 Moving Operations:
  - .1 Be responsible for temporarily moving existing workstations, desks, office equipment, computers and furnishings as required to perform the Work.
  - .2 Reinstate at the end of each work shift.
  - .3 Use only qualified personnel for disconnection and reconnection of various equipment.
- .7 Damage to Facility and tenant equipment:
  - .1 Damage to existing facility as a result of the execution of the work must be patched and repaired at no extra cost to the Contract.
- .8 Facility access corridors and emergency exits:
  - .1 Ensure that corridors, stairs, entrances and fire exits are left unobstructed and kept free of construction materials, tools, debris, dust and dirt at all times for safe passage of occupants.
  - .2 Fire escape routes must be accessible and maintained at all times. Do not under any circumstances block fire escape routes.
- .9 Ensure that trades and subtrades are aware of the Off-Hour requirement of the Contract and that any costs incurred as a result is included in the Contractor's bid price.
- .10 Ensure that sub-trades are made aware of and abide by the contents of this section and particularly the work restrictions specified herein due to operational requirements.

#### 1.5 PROJECT MEETINGS

- .1 Schedule and administer project meetings, in coordination with Departmental Representative, or as deemed necessary due to progress of work or particular situation.
- .2 Prepare agenda for meetings.

- .3 Notify participants in writing 3 days in advance of meeting date.
  - .1 Ensure attendance of subcontractors.
  - .2 Departmental Representative will provide list of other attendees to be notified.
- .4 Hold meetings at site or where arranged with Departmental Representative.
- .5 Preside at meetings and record minutes.
  - .1 Indicate significant proceedings and decisions. Identify action items by parties.
  - .2 Distribute to participants by mail, email or by facsimile within 3 working days after each meeting.

#### 1.6 WORK COORDINATION

- .1 The Contractor is responsible for coordinating the work of the various trades and predetermining where the work of such trades interfaces with each other.
  - .1 Designate one person from own employ having overall responsibility to review contract documents and shop drawings, plan and manage such coordination.
- .2 The Contractor shall convene meetings between trades whose work interfaces and ensure that they are fully aware of the areas and the extent of where interfacing is required.
  - .1 Provide each trade with the plans and specifications as required, to assist in planning and carrying out their respective work.
  - .2 Develop work plans as required to coordinate potential interference between work of various trades and distribute to all affected parties.
    - .1 Pay particularly close attention to overhead work within or near to building structural elements.
    - .2 Use drawings to identify building elements, services lines, rough-in points and indicate from where various services are coming.
  - .3 Plan and coordinate work in such a way to minimize quantity of service line offsets.
- .3 Submission of shop drawings and ordering of prefabricated equipment or prebuilt components shall only occur once coordination for such items has taken place between trades and all conditions affecting the work of the interfacing trades has been made known and accounted for.
- .4 Work Cooperation:

- .1 Ensure cooperation between trades in order to facilitate the general progress of the work and avoid situations of spatial interference.
- .2 Ensure that each trade provides other trades reasonable opportunity for the completion of the work and in such a way as to prevent unnecessary delays, cutting, patching and the need to remove and replace completed work.
- .5 No extra costs will be paid to the Contract for expenses incurred by General Contractor or subcontractors, resulting from failure to carry out proper coordination of the work. Disputes between the various trades as a result of their not being informed of the areas and extent of interface work shall be the sole responsibility of the General Contractor and shall be resolved at their own cost.

**END OF SECTION**

**PART 1. GENERAL**

**1.1 SUBMITTAL GENERAL REQUIREMENTS**

- .1 Submit to Departmental Representative for review, requested submittals specified in various sections of the specifications including shop drawings, samples, permits, compliance certificates, test reports, work management plans and other data required as part of the work.
- .2 Submit sufficient copies required by the Contractor and sub-trades plus 1 copy which will be retained by the Departmental Representative. Include within submission additional copies for insertion into the O & M manuals specified in section 01 78 00.
- .3 Accompany data with transmittal letter identifying project name, project number, Contractor's name and address, supplier name, description of items and quantity of drawings/data being submitted.
- .4 Allow up to 15 calendar days from date of receipt for review of submittals by the Departmental Representative.
- .5 Do not proceed with work applicable to shop drawing item until relevant submission has been reviewed by Departmental Representative.
- .6 Submit with reasonable promptness and in orderly sequence so as to allow for Departmental Representative's review and not cause delay of Work. Failure to submit in ample time will not be considered sufficient reason for an extension of Contract time and no claim for extension by reason of such default will be allowed.
- .7 Submissions shall include:
  - .1 Date and revision dates.
  - .2 Project title and project number.
  - .3 Name and address of:
    - .1 Subcontractor.
    - .2 Supplier.
    - .3 Manufacturer.
  - .4 Contractor's stamp, signed by Contractor's authorized Representative certifying review of submissions, verification of field measurements and compliance with Contract Documents.
  - .5 Cross references to particular details of contract drawings and specifications section number for which shop

- 
- drawing submission addresses.
- .6 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.
  - .8 Present data, dimensions and engineering values in SI Metric units.
  - .9 Review submittals prior to submission. Ensure that necessary requirements have been determined and verified and that each submittal has been checked and coordinated with requirements of Work and Contract Documents.
    - .1 Submittals not stamped, signed, dated and identified as to specific project will be returned unexamined by Departmental Representative and considered rejected.
    - .2 Verify field measurements and affected adjacent Work are coordinated.
  - .10 Notify Departmental Representative in writing, at time of submission, identifying deviations from the Project Documents, stating reasons for deviations.
  - .11 Contractor's responsibility for errors, omissions or deviations in submissions from the Project Documents is not relieved by the Departmental Representative's review.
  - .12 Submittal format: paper originals, or alternatively clear and fully legible copies of originals. Facsimiles are not acceptable, except in special circumstances authorized by Departmental Representative. Poorly prepared, non-legible, submittals will not be accepted and will be returned for resubmission.
  - .13 Make changes or revisions to submissions which Departmental Representative may require; consistent with the Project Documents and resubmit. When resubmitting, identify revisions.
  - .14 Keep one reviewed copy of each submittal document on site for the duration of the Work.

## 1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 The term "shop drawings" means fabrication drawings, erection drawings, diagrams, illustrations, schedules, performance charts, technical product data, brochures, specifications, test reports, installation instructions and other data which are to be provided by the Contractor to illustrate compliance with specified materials and details of a portion of work.
- .2 Shop Drawings Format:
  - .1 Opaque white prints or photocopies of original drawings modified to clearly illustrate work specific to project requirements. Maximum sheet size to be 1000 x 707 mm.
  - .2 Product data from manufacturer's standard catalogue sheets, brochures, literature, performance charts and diagrams, used to illustrate standard manufactured products, to be original full colour brochures, clearly marked indicating applicable data and deleting information not applicable to project.
  - .3 Drawings, photocopies or facsimiles considered to be illegible will not be accepted and returned not reviewed.
- .3 Shop Drawings Content:
  - .1 Indicate materials, methods of construction, attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of the work. Where items or equipment attach or connect to other items or equipment, confirm that all interrelated work has been coordinated, regardless of section or trade from which the adjacent work is being supplied and installed.
  - .2 Supplement manufacturer's standard drawings and literature with additional information to provide details applicable to project.
- .4 Delete information not applicable to project on all Submittals.
- .5 Adjustments or corrections made on shop drawings by the Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, advise the Departmental Representative in writing prior to proceeding with Work.
- .6 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections and comments are made, fabrication and installation may proceed upon receipt of shop drawings. If shop drawings are rejected

and noted to be resubmitted, do not proceed with that portion of work until resubmission and review of corrected shop drawings, through same submission procedures indicated above.

- .7 Be advised that costs and expenses incurred by Departmental Representative to conduct more than one review of poor or incorrectly prepared shop drawing submittal for a particular material, equipment or component of work may be assessed against the Contractor in the form of a financial holdback to the Contract.
- .8 After Departmental Representative's review, distribute copies as required.
- .9 The review of shop drawings by the Departmental Representative is for the sole purpose of ascertaining conformance with the design concept. This review shall note that responsibility remains with The Contractor, and such reviews do not relieve the Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting the requirements of the Project Documents. The Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to the fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

**END OF SECTION**

**PART 1. GENERAL**

**1.1 SECTION INCLUDES**

- .1 Fire Safety Requirements
- .2 Hot Work Permits
- .3 Existing Fire Protection and Alarm Systems

**1.2 RELATED WORK**

- .1 Section 01 35 28 Health and Safety Requirements

**1.3 REFERENCES**

- .1 Fire Protection Standards issued by Fire Protection Services of Human Resources Development Canada as follows:
  - .1 FCC No. 301-Latest Edition; Standard for Construction Operations.
  - .2 FCC No. 302- Latest Edition; Standard for Welding and Cutting.
  - .3 FCC standards, may be viewed at the Regional Fire Protection Services' office (previously known as the Fire Commissioner of Canada) located at 99 Wyse Road, 8th Floor, Dartmouth, NS, Tel: (902) 426-6053.

**1.4 DEFINITIONS**

- .1 Hot Work defined as:
  - .1 Welding work
  - .2 Cutting of materials by use of a torch or other open flame devices
  - .3 Grinding with equipment which produces sparks.
  - .4 Use of open flame torches such as for roofing work.

**1.5 SUBMITTALS**

- .1 Submit Hot Work permit to Departmental Representative for review, within 14 calendar days after contract award.
- .2 Submit in accordance with section 01 33 00.

## 1.6 FIRE SAFETY REQUIREMENTS

- .1 Abide by the following fire safety measures during the Work:
  - .1 National Fire Code
  - .2 Fire Protection Standards FCC 301-1982, Standard for Construction Operations and FCC 302-1982, Standard for Welding and Cutting.
  - .3 Federal and Provincial Occupational Health and Safety Acts and Regulations
- .2 In event of conflict between any provisions of above authorities the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, Departmental Representative will advise on the course of action to be followed.
- .3 FCC standards may be viewed at:
  - .1 [http://www.hrsdc.gc.ca/eng/labour/fire\\_protection/policies\\_standards/commissioner/](http://www.hrsdc.gc.ca/eng/labour/fire_protection/policies_standards/commissioner/)
  - .2 Fire Protection Services - Atlantic Region office, Halifax, N.S, Tel. (902)426-6053

## 1.2 HOT WORK AUTHORIZATION

- .1 Obtain Departmental Representative's written "Authorization to Proceed" before conducting any form of Hot Work on site.
- .2 Hot Work defined as:
  - .1 Welding work
  - .2 Cutting of materials by use of torch or other open flame devices
  - .3 Grinding with equipment which produces sparks.
  - .4 Use of open flame torches such as for roofing work.
- .3 To obtain authorization submit to Departmental Representative:
  - .1 Contractor's typewritten Hot Work Procedures to be followed on site.
  - .2 Description of the type and frequency of Hot Work required.
  - .3 Obtain Hot Work Permit form from Institutions Engineering and Maintenance Department.
- .4 Upon review and confirmation that effective fire safety measures will be implemented and followed during performance of hot work, Departmental Representative will give authorization to proceed as follows:
  - .1 Issue one written "Authorization to Proceed" for each

individual job per day.

- .5 Requirement for individual authorization will be based on:
  - .1 Nature or phasing of work;
  - .2 Risk to Facility operations;
  - .3 Quantity of various trades needing to perform hot work on project
  - .4 Other situation deemed necessary by Departmental Representative to ensure fire safety on premises.
- .6 Do not perform any Hot Work until receipt of Departmental Representative's written "Authorization to Proceed" for that portion of work.
- .7 In occupied Facility, coordinate performance of Hot Work with Facility Manager through Departmental Representative. Follow Departmental Representative's directives in this regard.

### 1.3 HOT WORK PROCEDURES

- .1 Develop and implement written safety procedures and work practices to be followed on site when performing Hot Work. Stringently enforce compliance by workers.
- .2 Hot work procedures to include:
  - .1 Requirement to perform hazard assessment of work area beforehand in accordance with the site Safety Plan.
  - .2 Use of a Hot Work Permit system issued, by Contractor's site Superintendent, to worker or subcontractor granting permission to conduct Hot Work.
  - .3 Permit required for each Hot Work event.
  - .4 Provision for a designated person to carry out a minimum 1 hour fire safety watch upon completion of Hot Work.
  - .5 Compliance with fire safety codes, standards and occupational health and safety regulations specified.
  - .6 Site specific rules and procedures in force at the site as provided by the Facility Manager.
- .3 Generic procedures, if used, must be edited and supplemented with pertinent information tailored to reflect specific project conditions. Label document as being the Hot Work Procedures for this contract.
- .4 Procedures shall clearly establish work responsibilities of:
  - .1 Worker performing hot work
  - .2 Person issuing the Hot Work Permit,
  - .3 Fire Safety Watcher,
  - .4 Subcontractor(s) and Contractor.

- .5 Brief all workers and subcontractors on Hot Work Procedures and of Permit system. Stringently enforce compliance.
- .6 Failure to comply with fire safety procedures may result in the issue of a Non-Compliance notification as specified in Section 01 35 28.

#### 1.4 HOT WORK PERMIT

- .1 Information on permit form to include:
  - .1 Project name, project number;
  - .2 Specific room or area where hot work performed;
  - .3 Date of issue;
  - .4 Description of hot work type needed;
  - .5 Special procedures and precautions to be followed, including type of fire extinguisher needed;
  - .6 Name & signature of issuing person;
  - .7 Name of worker conducting the hot work;
  - .8 Permit validity period not to exceed 8 hours. Indicate permit's start date/time and termination date/time;
  - .9 Worker's signature and date/time of hot work completion;
  - .10 Stipulated period of safety watch needed;
  - .11 Fire Safety Watcher's signature with date/time when terminated.
- .2 Each Hot Work Permit to be completed in full, signed and returned to Contractor's Superintendent for safe keeping on site.
- .3 Keep Hot Work permits on site for the duration of the Work. Provide for inspection by Departmental Representative upon request.
- .4 Permit to be typewritten form. Industry Standard forms shall only be used if all data specified above is included on form.

#### 1.5 FIRE PROTECTION AND ALARM SYSTEMS

- 1. Fire protection and alarm systems shall not be:
  - .1 Obstructed.
  - .2 Shut-off, unless authorized by Departmental Representative.
  - .3 Left inactive at the end of a working day or shift.
- .2 Do not use fire hydrants, standpipes and hose systems for purposes other than fire fighting.

- .3 Costs incurred, from the fire department, Facility owner, and Facility operator resulting from negligently setting off false alarms will be charged to the Contractor in the form of financial progress payment reductions and holdback assessments against the Contract.

**END OF SECTION**

**PART 1. GENERAL**

**1.1 SECTION INCLUDES**

- .1 Procedures to isolate and lockout electrical facility or other equipment from energy sources.

**1.2 RELATED WORK**

- .1 Section 01 35 29: Health and Safety Requirements.

**1.3 DEFINITIONS**

- .1 Electrical facility: means any system, equipment, device, apparatus, wiring, conductor, assembly or part thereof that is used for the generation, transformation, transmission, distribution, storage, control, measurement or utilization of electrical energy, and that has an amperage and voltage that is dangerous to persons.
- .2 Guarantee of Isolation: means a guarantee by a competent person in control or in charge that a particular facility or equipment is isolated.
- .3 Guarded: means that an equipment or facility is covered, shielded, fenced, enclosed, inaccessible by location, or otherwise protected in a manner that, to the extent that is reasonably practicable, will prevent or reduce danger to any person who might touch or go near such item.
- .4 De-energize: in the electrical sense, that a piece of equipment is isolated and grounded, e.g. if the equipment is not grounded, it cannot be considered de-energized (DEAD).
- .5 Isolate: means that an electrical facility, mechanical equipment or machinery is separated or disconnected from every source of electrical, mechanical, hydraulic, pneumatic or other kind of energy that is capable of making it dangerous.
- .6 Live/Alive: means that an electrical facility produces, contains, stores or is electrically connected to a source of alternating or direct current of an amperage and voltage that is dangerous or contains any hydraulic, pneumatic or other kind of energy that is capable of making the facility dangerous to persons.

#### **1.4 COMPLIANCE REQUIREMENTS**

- .1 Isolate and lockout electrical facilities and mechanical equipment in accordance with:
  - .1 CSA C22.1-06 Canadian Electrical Code.
  - .2 Federal and Provincial Occupational Health and Safety Acts and Regulations.
  - .3 Regulations and code of practice applicable to piece of equipment being locked out as recommended by manufacturer.
  - .4 Procedures specified herein.
- .2 In event of conflict between any provisions of above the most stringent will apply. Should a dispute arise in determining the most stringent requirement, Departmental Representative will advise on the course of action to be followed.
- .3 Ensure that lockout procedures established are stringently followed by all workers.

#### **1.5 SUBMITTALS**

- .1 Submit copy of proposed lockout procedures and sample of lockout tags to Departmental Representative for review, within 14 calendar days of contract award.
- .2 Submit in accordance with section 01 33 00.

#### **1.6 ISOLATION OF EXISTING SERVICES**

- .1 Obtain Departmental Representative's written authorization prior to working on existing live or active electrical facilities and equipment and before proceeding with isolation of such item.
- .2 To obtain authorization, submit to Departmental Representative the following documentation:
  - .1 Written request for Isolation of the service or Facility and;
  - .2 Copy of Contractor's Lockout Procedures.
- .3 Make a request for isolation for each event, unless directed otherwise by Departmental Representative, as follows:
  - .1 Fill-out standard forms in current use at the Facility as provided by Departmental Representative or;

- .2 Where no form exists, make request in writing identifying:
  - .1 Identification of system, equipment or service to be isolated, including its location;
  - .2 Duration of the isolation, indicating date and time of both the start and termination periods.
  - .3 Voltage of service feed to system or equipment being isolated.
  - .4 Name and signature of person making the request.
- .4 Do not proceed with work until receipt of written notification from Departmental Representative granting the Isolation Request and authorizing to proceed with the Work.
  - .1 Departmental Representative may designate another person at the Facility as the individual authorized to grant the Isolation Request.
- .5 Conduct safe, orderly shutdown of equipment or facilities. De-energize, isolate, and lockout power and other sources of energy feeding equipment or facility.
- .6 Plan and schedule shut down of existing services in consultation with Departmental Representative. Minimize impact and downtime of facility operations. Follow Departmental Representative's directives in this regard.
- .7 Conduct hazard assessment as part of the process in accordance with health and safety requirements specified Section 01 35 30.

## 1.7 LOCKOUTS

- .1 De-energize, isolate and lockout electrical facility, mechanical equipment and machinery from potential sources of energy prior to working on such items.
- .2 Develop and implement clear and specific lockout procedures to be followed as part of the Work.
  - .1 Describe safe work procedures, practices, and work sequence to safely isolate potential energy sources; lockout and tagout electrical facilities and equipment.
  - .2 Generic procedures shall be edited and tailored to reflect actual work requirements,
  - .3 Incorporate previously established rules and procedures in force at site as provided by the Facility Manager through the Departmental Representative.
  - .4 Label the lockout procedures as being those pertinent to the Work of this Contract.

- .3 Include as part of the Lockout Procedures a system of lockout permits managed by Contractor's Superintendent or other qualified person designated by him/her as being "in-charge" at the site.
  - .1 A lockout permit shall be issued to specific worker providing a Guarantee of Isolation before each event when work must be performed on a live equipment or electrical facility.
  - .2 Duties of person managing the permit system to include:
    - .1 Issuance of permits and lockout tags to workers.
    - .2 Determining permit duration.
    - .3 Maintaining record of permits and tags issued.
    - .4 Making a Request for Isolation to Departmental Representative when required as specified above.
    - .5 Designating a Safety Watcher, when one is required based on type of work.
    - .6 Ensuring equipment or facility has been properly isolated.
    - .7 Collecting and safekeeping lockout tags returned by workers as a record of the event.
- .4 Clearly establish and describe responsibilities of:
  - .1 Workers.
  - .2 Person managing the permit and lockout tag system.
  - .3 Safety Watcher.
  - .4 Subcontractor(s) and General Contractor.
- .5 Procedures shall meet code and regulation compliance requirements specified elsewhere in this section.
- .6 Use energy isolation lockout devices specifically designed and appropriate for type of facility or equipment being locked out.
- .7 Use industry standard lockout tags.
- .8 Provide appropriate safety grounding and guards as required.

### 1.8 CONFORMANCE

- .1 Brief workers and sub-trades on the requirements of this section. Stringently enforce use and compliance.
- .2 Failure to follow lockout procedures specified herein may result in the issuance of a Non-Compliance notification as specified in section 01 35 28.

### **1.9 DOCUMENTS ON SITE**

- .1 Post Lockout Procedures on site, on common location for viewing by workers.
- .2 Keep copies of Request for isolation forms and lockout permits and lockout tags issued to workers on site for full duration of Work.
- .3 Make available to Departmental Representative or to authorized safety representative upon request.

**END OF SECTION**

**PART 1. GENERAL**

**1.1 DEFINITIONS**

- .1 COHS: Canada Occupational and Health Safety Regulations made under the Canada Labour Code, Part II.
- .2 PPE: personal protective equipment
- .3 Medical Injury: any injury requiring medical aid, as defined in the Canadian Dictionary of Safety Terms-1987 published by the Canadian Society of Safety Engineers (C.S.S.E), for which medical treatment was provided and the cost of which is covered by the Workers Compensation Board of the Province in which the injury occurred.
- .4 Competent: qualified and knowledgeable in Occupational Health and Safety as defined in the Provincial Occupational Health and Safety Regulations of the Province where the Work of this Contract occurs.

**1.2 SUBMITTALS**

- .1 Make submittals in accordance with Section 01 33 00.
- .2 Submit to the Departmental Representative, site-specific Health and Safety Plan prior to commencement of Work.
  - .1 Submit within 7 work days of notification of Award of Contract.
  - .2 Departmental Representative will review Contractor's site-specific Health and Safety Plan and may provide comments.
  - .3 Revise Plan as appropriate and resubmit within 15 work days after receipt of comments.
  - .4 Departmental Representative's review and comments made of Contractor's Health and Safety Plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety of the Work.
  - .5 Submit revisions of Safety Plan during the course of Work.
- .3 Submit name of Contractor's Health and Safety Site Representative.
- .4 Submit building permit, compliance certificates and other permits obtained.

- .5 Submit copy of Letter of Good Standing from Provincial Workers Compensation organization.
- .6 Submit copies of reports or directions issued by Federal, Provincial and Territorial Health and Safety Inspectors.
- .7 Submit copies of accident or incident reports.
- .8 Submit WHMIS MSDS - Material Safety Data Sheets.
- .9 Upon request by Departmental Representative, submit reports and other documentation stipulated to be produced and maintained by Federal and Provincial Occupational Health and Safety Regulations and as specified herein.

### 1.3 COMPLIANCE REQUIREMENTS

- .1 Comply with the Occupational Health and Safety Act for the Province of Nova Scotia, and the General Regulations made pursuant to the Act.
- .2 Comply with Canada Labour Code Part II, and the Canada Occupational Health and Safety Regulations.
- .3 Observe construction safety measures of:
  - .1 Part 8 of National Building Code of Canada
  - .2 Municipal statutes and ordinances.
  - .3 Provincial Workers Compensation Board.
- .4 In event of conflict or discrepancy between provisions of the above specified regulations, the most stringent requirement shall apply. Should a dispute arise in determining the most stringent requirement, Departmental Representative will advise on the course of action to be followed.
- .5 A copy of the Canada Labour Code Part II may be obtained at:  
Canadian Government Publishing  
Public Works & Government Services Canada  
Ottawa, Ontario, K1A 0S9  
Tel: (819) 956-4800 (1-800-635-7943)  
Publication No. L31-85/2000 E or F)
- .6 Maintain Workers Compensation Coverage for duration of Contract.

- .7 Medical Surveillance: Where prescribed by legislation or regulation, obtain and maintain worker medical surveillance documentation.

#### **1.4 RESPONSIBILITY**

- .1 Be responsible for health and safety of persons on site, safety of property on site and for the protection of persons and environment adjacent to site to extent that they may be affected by conduct of the Work.
- .2 Comply with and enforce compliance by workers, sub-trades and other persons granted access to work site with safety requirements of Contract Documents, applicable federal, provincial, and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

#### **1.5 SITE CONTROL AND ACCESS**

- .1 Control work site and entry points to construction areas. Approve and grant access only to workers and authorized persons. Immediately stop and remove non-authorized persons.
- .2 Isolate work site and storage areas from other areas by use of appropriate means.
  - .1 Erect fences, hoarding, barricades and temporary lighting as required to effectively delineate work site, stop non-authorized entry, and to protect pedestrians and vehicular traffic around and adjacent to the Work and create a safe environment.
  - .2 Post signage at entry points and other strategic locations indicating restricted access.
  - .3 Use professionally made signs with bilingual message in the 2 official languages or international known graphic symbols.
- .3 Provide safety orientation session to persons granted access to site. Advise of site hazards and safety rules to be observed while on site.
- .4 Ensure persons granted site access wear appropriate personal protective equipment (PPE) suitable to work and site conditions. Supply PPE to authorized persons who require access to perform tests, inspections, or other approved purposes.

- .5 Secure site, when not in use, against entry and to protect persons against harm.

#### **1.6 PROTECTION**

- .1 Carry out work placing emphasis on health and safety of the Public, Facility personnel, construction workers and protection of the environment.
- .2 Erect safety barricades, lights and signage on site to effectively delineate work areas, protect pedestrian and vehicular traffic around and adjacent to work and to create a safe working environment.
  - .1 Erect hoarding and temporary lighting as required. See Section 01 50 00 for minimum acceptable barricades.
- .3 Should unforeseen or peculiar safety related hazard or conditions become evident during the performance of the work, immediately take measures to rectify the situation and prevent damage or harm. Advise Departmental Representative verbally and in writing.

#### **1.7 FILING OF NOTICE**

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

#### **1.8 PERMITS**

- .1 Post on site: permits, licenses and compliance certificates specified in section 01 10 10.
- .2 Where particular permit or compliance certificate cannot be obtained, notify Departmental Representative in writing and obtain approval to proceed before carrying out applicable portion of work.

#### **1.9 HAZARD ASSESSMENTS**

- .1 Perform site specific health and safety hazard assessment of the Work and its site.
- .2 Carryout initial assessment prior to commencement of Work with further assessments as needed during the progress of the Work.

- .3 Record results and address in Health and Safety Plan.
- .4 Keep documentation on site for the entire duration of the Work.

#### **1.10 HEALTH AND SAFETY MEETINGS**

- .1 Attend pre-construction health and safety meeting conducted by Departmental Representative. Have following persons in attendance:
  - .1 Site Superintendent
  - .2 Contractor's designated Health and Safety Site Supervisor
  - .3 Departmental Representative will advise of date, time and location.
- .2 Conduct health and safety meetings and tool box briefings on site. Hold meetings on a regular and scheduled basis during entire work in accordance with requirements and frequency stipulated in provincial occupational health and safety regulations.
  - .1 Keep workers informed of potential hazards and provide safe work practices and procedures to be followed.
  - .2 Take written minutes and post on site.

#### **1.11 HEALTH AND SAFETY PLAN**

- .1 Develop written site-specific Project Health and Safety Plan, based on hazard assessments, prior to commencement of work.
  - .1 Submit copy to Departmental Representative within 14 calendar days of Contract Award.
  - .2 Submit updates as work progresses.
- .2 Health and Safety Plan shall contain three 3 parts with the following information:
  - .1 Part 1 - Hazards: List of individual health risks and safety hazards identified by hazard assessment.
  - .2 Part 2 - Safety Measures: Engineering controls, personal protective equipment and safe work practices used to mitigate hazards and risks listed in Part 1 of Plan.
  - .3 Part 3a: Emergency Response: standard operating procedures, evacuation measures and emergency response in the occurrence of an accident, incident or emergency.
    - .1 Include response to hazards listed in Part 1 of Plan.
    - .2 Evacuation measures to complement the Facility's existing Emergency Response and Evacuation Plan. Obtain pertinent information from Departmental Representative.

- .3 List names and telephone numbers of officials to be contacted including:
  - .1 General Contractor and Sub-trades.
  - .2 Federal and Provincial Departments as stipulated by laws and regulations and local emergency resource organizations, as needed based on the nature of the emergency or accident.
  - .3 Representatives from the Departmental Representative and site Facility management. Departmental Representative will provide a list of individuals.
  
- .4 Part 3b - Site Communications:
  - .1 Procedures used on site to share work related safety issues between workers, sub-trades, and the General Contractor.
  - .2 List of critical tasks and work activities, communicated with the Facility Manager, which has risk of affecting tenant operations, or endangering the health and/or safety of Facility personnel and the general public. Develop list in consultation with the Departmental Representative.
  
- .3 Prepare Health and Safety Plan in a three column format, addressing the three parts specified above, as follows:
 

<u>Column 1</u>	<u>Column 2</u>	<u>Column 3</u>
Part 1	Part 2	Part 3a/3b
Identified Hazards	Safety Measures	Emergency Response & Site Communications
  
- .4 Develop Plan in collaboration with sub-trades. Address work activities of all trades. Revise and update Plan as Sub-contractors arrive on site.
  
- .5 Implement and enforce compliance with the requirements of Plan for the full duration of Work, to final completion and demobilization from site.
  
- .6 As work progresses, review and update Plan. Address additional health and safety risks and hazards identified through on-going hazard assessments.
  
- .7 Post a copy of Plan, and updates on site.
  
- .8 Submission of the Health and Safety Plan, and updates, to the Departmental Representative is for review and information purposes only. Departmental Representative's receipt, review and comments made shall not be construed to imply approval in

part or in whole of the Plan by the Departmental Representative and shall not be interpreted as a warranty of being complete and accurate or as a confirmation that all health and safety requirements of the Work have been addressed and that it is legislative compliant. Furthermore, the Departmental Representative's review of the Plan shall not relieve the Contractor of his legal obligations for Occupational Health and Safety provisions specified as part of the Work and those required by provincial legislation.

### **1.12 SAFETY SUPERVISION AND INSPECTIONS**

- .1 Designate one person to be present on site at all times, responsible for supervising health and safety of the Work.
  - .1 Person to be competent in Occupational Health and Construction Safety as defined in the Provincial Occupational Health And Safety Act.
- .2 Assign responsibility, obligation and authority to such designated person to stop work as deemed necessary for reasons of health and safety.
- .3 Conduct regularly scheduled safety inspections of work site on a minimum weekly basis.
  - .1 Note deficiencies and remedial action taken in a log book or diary.
- .4 Keep inspection reports on site.
- .5 Health and Safety Representative to be on site at all times when work is in progress.
- .6 Meetings:  
Conduct regular tool box safety meetings during the Work, in conformance with Occupational Health and Safety regulations.
- .7 Cooperate with the Facility's Occupational Health and Safety representative.
- .8 Maintain documentation of inspections and safety meetings on site.

### **1.13 TRAINING**

- .1 Ensure that all workers and other persons granted access to site are competently trained and knowledgeable on:
  - .1 Safe use of tools and equipment.

- .2 How to wear and use personal protective equipment (PPE).
- .3 Safe work practices and procedures to be followed in carrying out work.
- .4 Site conditions and minimum safety rules to be observed on site, as given at site orientation session.

#### **1.14 MINIMUM SITE SAFETY RULES**

- .1 Notwithstanding requirements to abide by federal and provincial health and safety regulations, the following safety rules shall be considered the minimum requirements to be obeyed by all persons granted site access:
  - .1 Wear personnel protective equipment (PPE) appropriate to function and task on site; the minimum requirements being hard hat, safety footwear and eye protection.
  - .2 Immediately report unsafe activities or conditions at the Work site, near-miss accidents, injury and damage.
  - .3 Maintain site in tidy condition.
  - .4 Obey warning signs and safety tags.
  - .5 Follow manufacturers Health and Safety precautions.
- .2 Brief workers on site safety rules and on disciplinary measures which may be taken by Departmental Representative for violation or non compliance of such rules. Post rules on site.
- .3 The following actions or conduct by Contractor, workers and sub-trades will be considered as non conformance with the health and safety requirements of the Contract for which a Non-Compliance Notification will be issued to the Contractor by the Departmental Representative:
  - .1 Failure to follow the minimum site safety rules specified above.
  - .2 Negligence resulting in serious injury or major property damage.
  - .3 Deliberate non-compliance with Federal and Provincial Acts and Regulations.
  - .4 Falsification of information in Workers Compensation Reports, safety reports and other health and safety related documents submitted to Departmental Representative or to Authority having jurisdiction.
  - .5 Possession of firearms on site.
  - .6 Possession of non-prescriptive illegal drugs or alcohol.
  - .7 Action, or lack thereof, resulting in the issuance of Warnings, Fines or Stop Work Orders from a Provincial Authority having jurisdiction.
  - .8 Violation of other specified health and safety rules and requirements as determined by Departmental Representative.

- .4 See elsewhere in this section for details on Non-Compliance Notifications and resulting disciplinary measures.

#### **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 REPORTING**

- .1 Investigate and report the following incidents and accidents:
  - .1 Those as required by Provincial Occupational Safety and Health Act and Regulations.
  - .2 Injury requiring medical aid as defined in the Canadian Dictionary of Safety Terms-1987, published by the Canadian Society of Safety Engineers (C.S.S.E) as follows:
    - .1 Medical Aid Injury: any minor injury for which medical treatment was provided and the cost of which is covered by Workers' Compensation Board of the province in which the injury was incurred.
    - .3 Property damage in excess of \$5000.00,
    - .4 Interruption to Facility operations with potential loss to a Federal Dept. in excess of \$5000.00,
    - .5 Those which require notification to Workers Compensation Board or other regulatory agencies as stipulated by applicable law or regulations.
- .2 Send written report to Departmental Representative for all above cases.

#### **1.17 TOOLS AND EQUIPMENT SAFETY**

- .1 Routinely check and maintain tools, equipment and machinery for safe operation.
- .2 Conduct checks as part of site safety inspections. When requested, submit proof that checks and maintenance have been carried out.

- .3 Tag and immediately remove from site items found faulty or defective.

#### **1.18 HAZARDOUS PRODUCTS**

- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS).
- .2 Keep MSDS data sheets for all products delivered to site.
  - .1 Post on site.
  - .2 Submit copy to Departmental Representative.

#### **1.19 BLASTING**

- .1 Blasting or other use of explosives is not permitted on site.

#### **1.20 POWDER ACTUATED DEVICES**

- .1 Use of powder actuated fastening devices is prohibited.

#### **1.21 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 having jurisdiction.
- .2 Post other documents as specified herein, including:
  - .1 Site specific Health and Safety Plan
  - .2 WHMIS data sheets

#### **1.22 SITE RECORDS**

- .1 Maintain on site copy of safety related documentation and reports stipulated to be produced in compliance with Acts and Regulations of authorities having jurisdiction and of those documents specified herein.
- .2 Upon request, make available to Departmental Representative or authorized Safety Officer for inspection.

#### **1.23 NON COMPLIANCE AND DISCIPLINARY MEASURES**

- .1 Immediately address and correct health and safety violations and non-compliances.
- .2 Negligence or failure to follow occupational health and safety provisions specified in the Project Documents and applicable laws and regulations may result in disciplinary measures taken by the Departmental Representative against the Contractor.
- .3 Departmental Representative uses a system of Non-Compliance Notifications and Disciplinary Measures on projects as follows:
  - .1 A Non-Compliance Notification is issued to the Contractor by Departmental Representative when there is a violation or non compliance of the project's health and safety requirements, or of Provincial or Federal regulations by any worker, sub-trades or other persons whom the Contractor has granted access to the work site.
  - .2 Non-Compliance Notifications are progressive in nature, resulting in disciplinary measures imposed depending on the frequency, nature and severity of the infraction.
  - .3 Disciplinary measures include:
    - .1 removal of the offending person or party from site;
    - .2 financial penalties in the form of progress payment reduction or holdback assessments made against the Contract;
    - .3 taking the Work Out of Contractor's Hands in accordance with the General Conditions.
- .4 Departmental Representative will make final decision as to what constitutes a violation and when to issue a Non-Compliance Notification.
- .5 Non-Compliance Notifications issued by the Departmental Representative shall not be construed as to overrule or disregard warnings, orders and fines levied against Contractor by authorities having jurisdiction.
- .6 Details of the Non-Compliance Notification and Disciplinary Measures system will be provided by the Departmental Representative upon contract award and prior to commencement of work.
- .7 Be responsible to fully brief workers and sub-trades on the operation and importance of the Non-Compliance Notification and Disciplinary Measures System.

**END OF SECTION**

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PWGSC  
Replacement of Petroleum  
Storage Tanks, Bldg A5  
Springhill Institution  
Project# R.061879.001

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HEALTH AND SAFETY  
REQUIREMENTS

Section 01 35 28  
Page 12  
2016-01-04

## **PART 1. GENERAL**

### **1.1 Related Sections**

- .1 Section 01 10 10 - General Instructions

### **1.2 Definitions**

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

### **1.3 Submittals**

- .1 Prior to commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by the Consultant. Environmental Protection Plan is to present comprehensive overview of known or potential environmental issues which must be addressed during construction.
- .2 Address topics at level of detail commensurate with environmental issue and required construction tasks.

### **1.4 Fires**

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

### **1.5 Disposal of Wastes**

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

#### **1.6 Drainage**

- .1 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.
- .2 Do not pump water containing suspended materials into waterways, sewer or drainage systems.

#### **1.7 Site Clearing and Plant Protection (Not Used)**

- .1 Not Used

#### **1.8 Work Adjacent to Waterways (Not Used)**

- .1 Not Used

#### **1.9 Pollution Control**

- .1 Maintain temporary erosion and pollution control features installed under this contract.
- .2 Control emissions from equipment and plant to local authorities' emission requirements.
- .3 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area, by providing temporary enclosures.
- .4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

#### **1.10 Historical / Archaeological Control (Not Used)**

- .1 Not Used

### **1.11 Notification**

- .1 The Consultant will notify the 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. After receipt of such notice, inform the Consultant of proposed corrective action and take such action for approval by the Consultant.
- .2 Consultant will issue stop order of work until satisfactory corrective action has been taken.
- .3 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

### **PART 2. PRODUCTS**

#### **2.1 Not Used**

### **PART 3. EXECUTION**

#### **3.1 Not Used**

**END OF SECTION**

## 1.1 GENERAL

- .1 Perform the Work in such a way as to minimize disruptions to the daily operations of the Institution and to ensure that security at the Institution is maintained at all times.
- .2 Abide by security rules and procedures specified herein and as stipulated at the security briefing conducted prior to commencement of the Work.

## 1.2 DEFINITIONS

- .1 Institution: means the Penitentiary or Correctional Facility where the Work will be carried out.
- .2 Director: means the person in charge of the Correctional Institution or Penitentiary where the Work will be carried out and includes any authorized person at the Facility, as designated by the Director, to provide directions on his/her behalf.
- .3 Contraband: means any of the following:
  - .1 An intoxicant, including alcoholic beverages, drugs and narcotics;
  - .2 A weapon or a component thereof, ammunition for a weapon, and any other object that is designed to kill, injure or disable a person or that is altered so as to be capable of killing, injuring or disabling a person, when possessed without prior authorization;
  - .3 An explosive or a bomb or a component thereof;
  - .4 Currency over the prescribed limit of \$25.00 dollars and;
  - .5 Any other item, as deemed by the Director, to pose a risk to the security of a Penitentiary or to the safety of persons, when that item is possessed without prior authorization from the Director.
- .4 Unauthorized smoking items: means all smoking items including, but not limited to, cigarettes, cigars, tobacco, chewing or snuffing tobacco, cigarette making machines, matches and lighters.
- .5 Commercial vehicle: means any motor vehicle used to transport materials, equipment and tools to the site as required for construction purposes.
- .6 CSC: means the Department of Correctional Services Canada.

- .7 CPIC Security Clearance: means a personal background check made through the RCMP Canadian Police Information Centre.
- .8 Construction employee: means any person working for the General Contractor or subcontractor(s), commercial vehicle or equipment operator, material supplier and personnel from testing, inspection or regulatory agencies who need to circulate on the Institution's property as part of the Work.
- .9 Departmental Representative: as defined in the General Conditions.
- .10 Perimeter: means the fenced or walled area of the Institution that restrains the movement of the inmates.
- .11 Construction zone: means the area shown on the project drawings where the Contractor will be allowed to work. This area may or may not be isolated from the security area of the Institution.

### 1.3 PRELIMINARY PROCEEDINGS

- .1 Prior to commencement of work, the Contractor shall meet with the Director to:
  - .1 Discuss the nature and extent of all activities involved in the work of this contract.
  - .2 Obtain security rules, regulations and procedures in force at the Institution and directives to be followed by the Contractor and all construction employees during the entire course of the work.
- .2 The Departmental Representative will coordinate a pre-construction meeting between the Contractor, the Director and Facility security personnel who will provide details on site security requirements.
- .3 The Contractor shall:
  - .1 Ensure that all construction employees are aware of the CSC security requirements.
  - .2 Ensure that a copy of the CSC security requirements is prominently displayed at the work site at all times.
  - .3 Co-operate with Institutional staff in ensuring that security requirements and procedures are stringently followed by all construction employees.

- .4 Failure to follow site security requirements by the Contractor or by a construction employee could result in the immediate removal of the offending party or person from the site.

#### **1.4 WORKER SECURITY CLEARANCE**

- .1 CPIC security clearance must be obtained for all construction employees who need to circulate on the Institution's property during the course of the Work.
  - .1 Application forms will be provided by the Departmental Representative.
  - .2 Have forms filled out by each worker.
- .2 Submit to the Director:
  - .1 A list of the names with date of birth of all construction employees;
  - .2 Completed security clearance form for each person.
- .3 No person will be admitted inside the Institution without a valid CPIC Security Clearance, pertinent to the Institution of the Work, and a recent picture identification, such as a provincial driver's permit, to show proof of identity.
  - .1 Security clearance obtained for other Institutions or other CSC properties are not valid for Work of this contract.
- .4 Allow two (2) weeks for processing of security clearances.
- .5 Be aware that facial photographs of security cleared construction employees may taken as deemed required by the Director.
  - .1 These photographs will be posted for display at appropriate locations in the Institution or placed into an electronic database for identification purposes.
  - .2 Photo ID cards may also be issued to each construction employee to be donned while on site. ID cards must be prominently displayed at all times. ID cards must be returned to the Institution upon completion of the work.
- .6 CSC Security Clearance will be denied and entry into the Institution will be refused to any person which the Director has reason to believe is a security risk to the Facility's operations.
  - .1 Also, a person will be subject to the immediate removal from the Institution if he/she:

- .1 Appears to be under the influence of alcohol, drugs or narcotics.
- .2 Behaves in an unusual disorderly manner.
- .3 Is found in possession of contraband.
  
- .7 Facilitate the security clearance application process:
  - .1 Provide an application form to all workers including those of subcontractors.
  - .2 Submit a list of names and birth dates for all persons who require security clearance to the Departmental Representative.
  - .3 Coordinate and expedite subcontractor submissions.
  - .4 Assist applicants in filling out the application form and submitting related documentation.
  - .5 Review application form of each applicant for completeness.
  - .6 Have each worker keep a copy of their completed form in case the initial submission gets lost.
  - .7 Submit documentation in an organized manner complete with transmittal letter clearly identifying the specific project for which security clearance is being requested.
  - .8 Send data to the approved mailing address provided by the Departmental Representative.

#### 1.5 VEHICLES AND TRAILORS

- .1 All unattended vehicles on the Institution's property shall have their windows, doors and trunks closed and locked at all times. Keys must be removed and kept securely in the possession of the vehicle's owner or with an employee of the Contractor or subcontractor who owns the vehicle.
- .2 The Director may limit the number and type of vehicles allowed at the Institution at any given time.
- .3 Drivers of delivery vehicles must have a valid CPIC security clearance. Vehicles that must enter the secure perimeter must be under constant escort by Institutional staff or Commissionaires while inside that area.
- .4 Office and Storage trailers:
  - .1 Permission is required from the Director to place and leave trailers on site.
  - .2 If permitted, trailers shall only be placed outside the Secure Perimeter of the Institution and at a specifically designated location on site.

- .3 All trailers shall have their doors kept locked at all times. Windows shall be securely locked when unoccupied.
- .4 All windows shall be covered with expanded steel mesh, securely fastened in place with tamperproof fasteners.

#### **1.6 PARKING OF VEHICLES**

- .1 Director will designate a location on site, outside the Secure Perimeter, where construction employee vehicles may be parked.
- .2 All other areas of the site are prohibited and vehicles are subject to being removed by the Institution with towing costs borne by their owner.

#### **1.7 SHIPMENTS**

- .1 Shipments of materials, equipment and tools to site shall be clearly marked with the project title and Contractor's name to avoid confusion with the Institution's own shipments.
- .2 Contractor shall have a designated person on site to receive and take possession of all deliveries.
- .3 Under no circumstances will Institutional staff accept any delivery designated for the Contractor or the Work.

#### **1.8 TELEPHONES**

- .1 Telephone landlines, facsimile machines and computers with internet connections are not permitted within the Secure Perimeter of the Institution unless prior approval is obtained from the Director.
- .2 If approved, place telephones, facsimile machines and computers with internet connections only where indicated and not accessible to Inmates.
  - .1 Equip computers with approved password protection features which will block internet connection by unauthorized persons.
- .3 Wireless cellular and digital telephones, including but not limited to devices for telephone messaging, pagers, Blackberries, telephone used as 2-way radios, are not

permitted within the Secure Perimeter of the Institution unless prior approval is obtained from the Director.

- .1 Should wireless cellular telephones be permitted, the owner/user of such device shall not permit it's use by an Inmate.
- .4 The Director may approve but limit the use of two way radios.

### **1.9 WORK HOURS**

- .1 Be aware that the Institution operational hours are:
  - .1 Weekdays from Monday to Friday, between the hours of 08:00 and 17:00 but excludes statutory holidays.
  - .2 Changes to previously determined work hours will only be made for special situations and for certain aspects of the Work deemed necessary and where is it determined to be the least disruptive approach to the operations of the Institution as determined by the Director.
    - .1 A minimum of 7 days advance notice is required to obtain permission for changes to work hours.
    - .2 In case of an emergency, the advanced notification may be waived by the Director.
- .3 Be aware that Off Hour work results in the need for the Institution to provide extra CSC security staff or commissionaires to be posted at the Institution to maintain security surveillance.

### **1.10 OFF-HOURS SITE ACCESS**

- .1 Construction personnel and commercial vehicles will not be permitted access to the Institution outside of the stipulated work hours specified, unless approved by the Director.

### **1.11 OVERTIME WORK**

- .1 No overtime work will be allowed at the end of a work shift.
- .2 Where overtime work is deemed necessary at the end of a work shift to complete a critical component of the work, it shall be planned and requested a minimum of 48 hours beforehand for approval by the Director.

- .3 Should unplanned overtime work occur due to an emergency situation, such as to complete a concrete pour or to make the work site safe and secure, the Contractor shall immediately advise the Director of this pending situation and stringently follow all directions given by the Director.

#### 1.12 TOOLS AND EQUIPMENT

- .1 Make a complete list of all tools and equipment brought on site for use in the Work. Provide copy of the list to the Director and to the Departmental Representative.
- .2 Maintain and update list during the entire course of the Work.
- .3 Keep all tools and equipment under constant supervision. This is of particular importance for power-driven and cartridge-driven tools, cartridges, files, saw blades, rod saws, wire, rope, ladders as well as all types of jacking devices.
- .4 Store all tools and equipment in lockable tool boxes and place in approved and secure location.
- .5 Lock tool boxes when not in use. Keys shall remain in the possession of employees designated by Contractor.
- .6 Scaffolding: Store and securely lock scaffolding components when not erected. Once erected, secure against unauthorized disassembly by use of such of manner as approved by Director.
- .7 Immediately report to the Director any missing tools and/or equipment.
- .8 Tool Check: Be aware that CSC security personnel will conduct tool and equipment checks during the course of the Work against the list provided by Contractor. Frequency of checks to be as follows:
  - .1 At commencement and completion of the project.
  - .2 Weekly basis when the construction period is greater than 1 week.
- .9 Controlled items: entry and use of certain tools and equipment, such as cartridges and hacksaw blades, are highly controlled at the Institution. The Director will determine and advise which items are to be controlled.

- .1 Controlled items will be given to the Contractor at the beginning of each workday and only in sufficient quantity required for one day.
- .2 Controlled items must be returned to CSC security personnel at the end of each workday including all worn down or broken components such as blades, cartridges etc...
  
- .10 When propane or natural gas is used as fuel for construction heaters, the Contractor shall provide full time supervision of that operation during non-working hours.

#### **1.13 KEYS**

- .1 Security keys will not be issued to Contractor. Instruct all construction employees that all security keys must always remain with the security escort.

#### **1.14 SECURITY HARDWARE**

- .1 Turn over to Director all security hardware and security devices of items or equipment removed as part of the Work. This includes items intended for disposal as well as those for temporary safekeeping until ready for reinstallation as part of the Work.

#### **1.15 PRESCRIPTION DRUGS**

- .1 Construction employees who are required to take prescription drugs during the workday shall obtain approval from the Director beforehand and shall only bring on site a one days supply each day.

#### **1.16 SMOKING RESTRICTIONS**

- .1 Contractor and construction employees are not permitted to:
  - .1 Smoke inside the Institution or outdoors within the Secure Perimeter and;
  - .2 Must not possess unauthorized smoking items within the Secure Perimeter of the Institution.
- .2 Persons found in violation of this directive shall immediately cease smoking and dispose of all unauthorized smoking items.

Further smoking violation will result in the removal of the offending person off the Institution.

- .3 Smoking at the Institution is only permitted outdoors, outside the boundary of the Secure Perimeter and in a location designated by the Director.

#### **1.17 CONTRABAND**

- .1 Weapons, ammunition, explosives, alcoholic beverages, drugs and narcotics are considered Contraband and are strictly prohibited at the Institution.
- .2 Discovery of Contraband at the site and in work areas by the Contractor shall be reported immediately to the Director, complete with the identification of person(s) in possession of such Contraband.
- .3 Contractor shall be vigilant with construction employees and suppliers to ensure that no contraband items are brought on site. Advise all persons that the discovery of contraband will result in cancellation of their security clearance and their immediate removal from the site. Serious infractions could result in the removal of the subcontractor or Contractor from the Institution for the duration of the Contract.
- .4 Arms and ammunition found in vehicles owned by the Contractor, subcontractors, suppliers or construction employee will result in the immediate cancellation of security clearance for the driver of that vehicle.

#### **1.18 SEARCHES**

- .1 All vehicles and persons entering onto Institutional property may be subject to search.
- .2 Based on reasonable grounds, the Director may order the search of any person suspected to be in possession of contraband at the site.
- .3 Be aware that persons entering the Institution may be subject to screening of their personal effects for traces of contraband drug residue.

### 1.19 MOVEMENT OF VEHICLES

- .1 Be aware that commercial vehicles will only be allowed to enter or leave the Secure Perimeter of the Institution (ie: pass through the designated vehicle security gate) between the following hours of each day:
  - .1 From 08:15 AM to 11:30 AM and;
  - .2 From 12:00 PM to 16:00 PM.
- .2 Vehicles will not be allowed to leave the Institution until an inmate count has been completed.
- .3 Vehicles must be escorted by an authorized CSC Staff or Commissionaire while inside the Secure Perimeter of the Institution.
- .4 Contractor shall provide 24 hours advance notice to the Director of the arrival of heavy equipment such as excavator, cranes, concrete trucks etc...to the site.
- .5 Vehicles being loaded with soil or other debris at site, or any vehicle considered impossible to search, must be under continuous supervision by CSC staff or Commissionaires working under the authority of the Director.
- .6 Commercial vehicles will only be allowed access onto the Institution's property when their contents are certified by the Contractor, or his representative, as being strictly necessary to the execution of the work.
- .7 Vehicles shall be refused access to Institutional property if, in the opinion of the Director, they contain an article which jeopardizes the security of the Institution.
- .8 Private vehicles of construction employees will NOT be allowed inside the Secure Perimeter area of a medium or maximum security Institution, except for a special situation as may be authorized by the Director.
- .9 Subject to the Director's prior approval, certain construction equipment may be permitted to remain on site overnight and during weekends provided that such equipment is securely locked and the battery removed. The Director may also require that the equipment be tied by chain and padlocked to a solid unmovable object.

### **1.20 MOVEMENT OF PERSONS AT THE INSTITUTION**

- .1 Subject to the requirements of good security, the Director will permit the Contractor and construction employees as much freedom of action and movement in the work areas of the site as is possible.
- .2 Notwithstanding the above clause, the Director will:
  - .1 Prohibit or restrict access to certain parts of the Institution.
  - .2 Require that access to certain areas of the Institution, (either for the entire duration of the work or for certain specific time periods) be only allowed under escort by a member of CSC security staff or by a Commissionaire.
- .3 During lunch and coffee breaks, all construction employees shall remain within the construction work areas of the site. No person shall be permitted to eat in the Officer's lounge or the dining room of the Institution.

### **1.21 SURVEILLANCE AND INSPECTION**

- .1 Construction activities and related movement of personnel and vehicles will be under surveillance and subject to inspection by the Institution security staff to ensure that established site security requirements are stringently followed.
- .2 CSC staff will ensure that an understanding of the need to carry out surveillance and inspections, as specified above, is established among construction employees and maintained throughout the duration of the entire Work.

### **1.22 STOPPAGE OF WORK**

- .1 The Director may, at any given time during the course of the Work, stop Contractor and construction employees from entering the Institution, order their immediate departure or instruct them to remain in a designated location due to an emergency security situation occurring at the Institution.
  - .1 Should this occur, Contractor's Superintendent shall obtain the name of the CSC staff member issuing the order, note the date and time when the notification was received and immediately obey the order as quickly as possible.

- .2 Advise the Departmental Representative within 24 hours of receipt of such notification from the Institution.

### **1.23 CONTACT WITH INMATES**

- .1 Unless specifically authorized, it is forbidden to come into contact with inmates, to talk with them, to receive objects from them or to give them objects. Any construction employee doing any of the above will be removed from the site and his security clearance revoked.
- .2 Note that cameras are not allowed on CSC property.
- .3 Notwithstanding the above, should Director approve the use of cameras for work purposes, it is strictly forbidden to take pictures of inmates, CSC staff members or of any part of the Institution other than those required as part of the Work.

### **1.24 COMPLETION OF THE WORK**

- .1 Prior to takeover and occupancy of the facility or premises by CSC, remove all leftover material, waste, tools and equipment that are not specifically required to complete the Work or which are to remain at the Institution as part of the Work.

**END OF SECTION**

### 1.1 REVIEWS AND INSPECTIONS

- .1 Give timely notice requesting reviews and inspection of Work designated for special tests, inspections or approvals by Departmental Representative or by inspection authorities having jurisdiction.
- .2 Furnish labour and facilities to provide access to work being inspected, tested and reviewed.
- .3 In accordance with the General Conditions, the Departmental Representative may order any part of Work to be examined if Work is suspected to be not in accordance with the Project Documents.
- .4 If Contractor covers or permits to be covered Work designated for tests, inspections, reviews or approvals before such is made, uncover Work until particular inspections, tests or reviews have been completed and until such time as Departmental Representative gives permission to proceed.
- .5 Pay costs to uncover and make good work disturbed by inspections and tests.

### 1.2 TESTING

- .1 Tests on materials, equipment and building systems, as specified in the various sections of the specifications, is the responsibility of the Contractor except where stipulated otherwise.
  - .1 Provide all necessary instruments, equipment and qualified personnel to perform test.
  - .2 At completion of test, submit copies of test report in accordance with Section 01 33 00.
- .2 Unspecified tests may also be made by the Departmental Representative, at the discretion of the Departmental Representative. The costs of these tests will be borne by the Departmental Representative.
- .3 Where tests reveal work not in accordance with contract requirements, the Contractor shall pay costs for additional tests incurred by the Departmental Representative as required to verify acceptability of corrected work.

### 1.3 ACCESS TO WORK

- .1 Facilitate Departmental Representative's access to Work. If part of Work is being fabricated at locations other than construction site, coordinate to allow access to such Work when it is in progress.
- .2 Furnish labour and facility to provide access to the work being reviewed, inspected and tested.
- .3 Co-operate to facilitate such reviews, inspections and tests.

#### **1.4 REJECTED WORK**

- .1 Remove and replace defective Work, whether result of poor workmanship, use of defective or damaged products and whether incorporated in Work or not, which has been identified by Departmental Representative as failing to conform to Project Documents.
- .2 Make good damages to existing or new substrates and finishes resulting from removal or replacement of defective work.

**END OF SECTION**

### **1.1 RELATED SECTIONS**

- .1 Section 01 14 00: Work Restrictions
- .2 Section 01 35 59: Security Requirements at Correctional Service Canada Facilities
- .3 Section 01 74 11: Cleaning

### **1.2 SITE ACCESS AND PARKING**

- .1 Use only those access routes as designated by Departmental Representative to access work areas of site.
- .2 See Section 01 35 59 for requirements on parking of Contractor and worker vehicles and for placement of storage sheds on site.
- .3 Make good damage resulting from Contractors' use of existing roads, asphalted areas and lawns on site. Make repairs only under favourable and suitable weather conditions.

### **1.3 BUILDING ACCESS**

- .1 Use only those approved doors, corridors and stairwells within building, as designated by Departmental Representative.

### **1.4 MATERIAL STORAGE AND SITE TRAILORS**

- .1 No space exist inside buildings for storage of materials and equipment.
- .2 One trailer may be placed on site for material storage and office. Locate where designated by Departmental Representative.
- .3 Minimize the quantity of materials stored on site at any given time.
  - .1 Do not encumber site and work areas with large quantities of stored materials.
  - .2 Free-standing stockpiles of materials and debris on exterior grounds of site is not permitted.

## 1.5 WASTE DUMPSTERS

- .1 Provide wheeled carts and other suitable equipment to remove demolition debris and waste from interior of building at end of each work shift.

## 1.6 INTERIOR DUST CONTROL

- .1 Develop and implement a Dust Control Plan, as an integral part of the Work.
  - .1 The Plan shall indicate protective measures and work procedures to be followed to minimize the creation of dust and dirt, stop their propagation to other areas of the building and for cleaning and reinstatement of operational during the course of the Work.
  - .2 The Plan shall be in writing. Submit and discuss with Departmental Representative before proceeding with work to determine the best possible approaches to meet the Plan objectives.
  - .3 Revise Plan as work progresses to address changes in work requirements.
- .2 Dust control measures shall include:
  - .1 evaluating the various dust generating work activities to be undertaken and the physical layout of each room and work area.
  - .2 developing specifically tailored strategy to control dust for each work area.
  - .3 pre-determining the extent and location of dust barriers and protective devices needed to confine dust and to maintain air quality in Occupied areas.
  - .4 obtaining Departmental Representative's approval of proposed control measures for major dust generating activities.
- .3 Incorporate within Plan the following minimum requirements:
  - .1 Provide full height dustproof partition to fully enclose the room or area where work will be performed for each work shift.
  - .2 Construct partition of minimum 10 mil polyethylene sheathing, installed tightly to abutting walls, floor and roof deck, sealed with continuous duct tape along all edges and seams and supported with 38 x 89 wood framing as required to maintain the integrity of seals. Overlap seams by 150 mm.
  - .3 Use compressible neoprene gaskets at locations where duct tape cannot provide an effective seal.

- .4 Do not terminate partition at the underside of a suspended ceiling leaving the above ceiling space open to other rooms.
  - .5 Provide a dust-tight access door in partition by the use of two overlapping and weighted poly sheet curtains.
  - .6 Provide additional polyethylene seals over doorways, windows and other wall openings in work area.
  - .7 Disassemble and temporarily move employee workstations, desks, office equipment and other furnishings in work area to protect them against damage.
  - .8 Provide fabric drop sheets and other protective devices, such as plywood, over carpet, office equipment and furnishings which cannot be moved from work area.
  - .9 Assist facility staff in moving computers and other IT equipment from work areas. Provide 24 hour advance notice to Departmental Representative of specific work shifts where such equipment must be disconnected and moved.
  - .10 Shut down ventilation system and seal diffusers, grilles, ducts etc... to stop dust spread. Coordinate shut down with Facility Manager.
- 
- .4 At end of each work shift:
    - .1 Remove protective covers, surplus materials, debris, tools and equipment from inside the building.
    - .2 Reassemble workstations, reinstall office equipment and furnishings displaced by work and make area operational.
    - .3 Clean area and premises as specified in Section 01 74 11.

#### **1.7 SANITARY FACILITIES**

- .1 Contractor is responsible for providing sanitary facilities for own forces during the course of the Work.

#### **1.8 POWER AND COMMUNICATIONS**

- .1 Power supply is available and will be provided for construction usage at no cost.
  - .1 Make arrangements for the use of such services through the by Departmental Representative.
  - .2 by Departmental Representative will designate each location of existing power source to which connections can be made to obtain temporary power service.
  - .3 Connect to existing power supply in accordance with Canadian Electrical Code.

#### **1.9 WATER SUPPLY**

- .1 Water supply is available on site and will be provided for construction usage at no cost. Make arrangements for the use and transportation of such services to work area through the Departmental Representative.

#### **1.10 SCAFFOLDING**

- .1 Erect and maintain scaffolding in rigid, secure and safe manner. Erect independent of walls.

#### **1.11 HEATING AND VENTILATION**

- .1 Existing heating system may be used for construction purposes within buildings.
- .2 Shut down air distribution system in work areas to stop spread of dust and fumes beyond the immediate work area(s).
- .3 Ventilate work areas and enclosed spaces as required to:
  - .1 Facilitate progress of work.
  - .2 Provide adequate ventilation to meet health regulations for safe working environment.
  - .3 Prevent accumulations of dust, fumes, mists, vapours or gases within building.
  - .4 Prevent harmful accumulation of hazardous substances into atmosphere.
  - .5 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
- .4 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.
- .5 Maintain strict supervision of operation of temporary ventilating equipment to:
  - .1 Conform with applicable codes and standards.
  - .2 Enforce safe practices.
  - .3 Prevent abuse of services.

**END OF SECTION**

## **PART 1. GENERAL**

### **1.1 DESCRIPTION OF WORK**

1. Install one (1) 10,000 L capacity double wall steel aboveground fuel oil storage tank to serve as temporary fuel oil storage system throughout the project construction period.
2. Install fuel oil supply (FOS) and fuel oil return (FOR) piping from temporary aboveground fuel oil storage tank to connect to existing "Tank 2 System" FOS and FOR, as indicated, to form a complete fuel oil transfer system.
3. Install temporary concrete slab for temporary aboveground fuel oil storage tank on top of asphalt, as indicated.
4. Install fencing c/w gates to surround the fuel oil tank storage area.
5. Acquire all permits required and register installation as required by code and local authority having jurisdiction. This trade shall bear all costs associated with permits and registrations.
6. Perform aboveground fuel oil tank system inventory control as required by code and local authority having jurisdiction.
7. Perform aboveground fuel oil tank system monitoring.
8. Remove fuel oil storage tank, concrete slab, fencing and piping. Restore temporary storage site to existing conditions after removal of tank.

### **1.2 INSTALLATION AND REMOVAL**

- .1 All work associated with installation and removal of aboveground fuel oil storage tank, fuel oil supply piping, and fuel oil return piping, shall be done in accordance with all relevant regulations and guidelines, including, but not limited to:
  - .1 the *Petroleum Management Regulations* made under *Section 25 and 84 of the N.S. Environment Act*,

- .2 CSA B139-04 Installation Code for Oil Burning Equipment,
  - .3 National Fire Code 2010.
  - .4 Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations June 2008,
  - .5 CCME Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products 2003,
  - .6 National Building Code 2010, and
  - .7 local authority having jurisdiction.
- .2 Waste handling to be done in accordance with section 01 74 21 - Construction/Demolition Waste Management and Disposal.

### 1.3 SUBMITTALS

- .1 Submit to Departmental Representative, work plan for the provision of a temporary fuel oil storage system.
- .2 Work plan to include:
  - .1 List of equipment and accessories.
  - .2 Documentation of manufacturing standards of equipment and accessories.
  - .3 Piping schematic showing final installation details such as tie-ins, capped-off pipes and locations of wall/ floor penetrations.
  - .4 Proposed piping support method.
  - .5 Final tank location and orientation relative to Building A5 and the new oil storage system.
  - .6 Construction schedule indicating the following milestones:
    - .1 Installation.
    - .2 Start-up.
    - .3 Decommissioning.
    - .4 Restoration of temporary fuel oil storage site to existing conditions.
- .3 Contractor to obtain approval from Departmental Representative prior to installation of temporary fuel oil storage system and accessories.

### PART 2. PRODUCTS

## 2.1 ABOVEGROUND FUEL OIL STORAGE TANK

- .1 10,000 L (2,200 Imp. Gal.) capacity, shop fabricated, aboveground horizontal, double walled steel (360o), vacuum monitored storage tank. Manufactured in accordance with ULC S601 Code.
  - .1 Exterior finish: Blast cleaned to SSPC-SP6 with one coat of grey primer and one finish coat of white epoxy enamel.
  - .2 Tank to be complete with:
    - .1 End supports fabricated from wide flange designed to support tank.
    - .2 Lifting lugs.
    - .3 Emergency vents.
    - .4 Dipstick and gauge chart.
    - .5 Normal vent c/w riser pipe.
    - .6 Access stairs c/w handrail and platform.
    - .7 Level indicator c/w level monitor.
    - .8 Vacuum monitor.
    - .9 Overfill spill container c/w locking fill cap.
    - .10 Documentation and/or certification indicating equipment is suitable for intended use.

## 2.2 TANK ACCESSORIES

- .1 Anti-siphon valves
  - .1 Heavy bronze body with oil-proof gasketing, spring-loaded poppet, composition seat and dashpot.
- .2 Overfill prevention valves
  - .1 ULC listed.
  - .2 Materials:
    - .1 Valve body, adaptor and collar: cast aluminum.
    - .2 Poppet: cast aluminum, hard-coated.
    - .3 Cam: stainless steel.
    - .4 Follower: brass.
    - .5 Shaft: zinc-plated.
    - .6 Float: closed-cell nitrile.
  - .3 Fully adjustable.
  - .4 690 kPa (100 PSI) pressure rated with low pressure

drop.

- .3 Open atmospheric vents
  - .1 Materials: Aluminum body with 40-mesh brass screen.
  - .2 Attach to top of vent line with set screws.

## **2.3 CONCRETE**

- .1 .1 In accordance with Section 03 30 00 - Cast-in-Place Concrete, and as indicated on drawings.

## **2.4 PIPING, VALVES AND FITTINGS**

- .1 .1 Schedule 40 piping, fittings and valves in accordance with Section 33 56 13 - Aboveground Fuel Tanks, Part 2.4.

## **2.5 OVERFILL PROTECTION**

- .1 .1 Vent whistle-fill fitting.
  - .1 50 mm whistle-fill fitting mounted on tank vent pipe to give whistle sound during filling until risk of overfilling.

## **2.6 LEVEL GAUGING**

- .1 .1 Tank gauging stick: to manufacturer's standard.
- .2 .2 Mechanical level gauge:
  - .1 Mechanical clock gauge with metric face for measuring liquid level in aboveground storage tank.
  - .2 Vapour tight construction.
  - .3 Stainless steel float and cable, aluminum body.
  - .4 360° degree swivel for adjustable orientation.
  - .5 Maximum measurement shall be at least 3,600 mm.
  - .6 Gauge suitable for reading level within 3mm accuracy at a distance of 6 meters from gauge.
  - .7 Provide gauge chart for horizontal tank. Volume shall be in litres and depth shall be in 1 cm increments.
  - .8 Provide protection from weather and UV-radiation.

## **2.7 FENCING**

- .1 In accordance with Section 32 31 00 - Chain Link Fence.

### **PART 3. EXECUTION**

#### **3.1 ABOVEGROUND FUEL TANK AND ACCESSORIES**

- .1 .1 Install tank and accessories in accordance with CAN/CSA-B139, National Fire Code of Canada, CCME PN 1326 and manufacturer's recommendations.
- .2 Position tank using lifting lugs and hooks, and where necessary use spreader bars. Do not use chains in contact with tank walls.
- .3 Install tanks using installers certified by Nova Scotia Department of Environment.
- .4 Provide certification of installation to Departmental Representative.
- .5 Test tanks for leaks to requirements of authority having jurisdiction.
- .6 Locate tank to:
  - .1 maintain at least minimum clearances from buildings as dictated by the National Fire Code of Canada, local authority having jurisdiction, and as indicated on drawings.
  - .2 minimize interference with construction of new fuel oil tanks, new infrastructure, and piping.
  - .3 ensure easy-access filling of tank.

#### **3.2 ABOVEGROUND FUEL PIPING**

- .1 Install temporary FOS and FOR piping to minimize interference with construction of new fuel oil tanks, associated infrastructure and piping.
- .2 Provide pipe supports in accordance with Section 23 05 29 - Hangers and Supports, National Plumbing Code, National Fire Code and National Building Code.

- .3 Piping shall be supported so that they are not in direct contact with the ground.

### **3.3 LEVEL GAUGE SYSTEM**

- .1 Provide leak and vapour proof caulking at connections.
- .2 Calibrate system.
- .3 Installation: Follow manufacturer's instructions.

### **3.4 ANTI-SIPHON VALVE**

- .1 Locate in a vertical position at the highest point in supply line with no part of the line between the valve and the tank below the maximum oil storage level. Spring is to be with appropriate tension for elevation.
- .2 Installation: Follow manufacturer's instructions.

**END OF SECTION**

### **1.1 RELATED SECTIONS**

- .1 Section 01 14 10: Scheduling and Management of Work.
- .2 Section 01 35 28: Health and Safety Requirements.
- .3 Section 01 50 00: Temporary Facilities.

### **1.2 GENERAL**

- .1 Use new material and equipment unless otherwise specified.
- .2 Within 7 days of written request by Departmental Representative, submit the following information for any materials and products proposed for supply:
  - .1 Name and address of manufacturer
  - .2 Trade name, model and catalogue number
  - .3 Evidence of Compliance with specified standards
  - .4 Performance, descriptive and test data
  - .5 Manufacturer's installation or application instructions;
  - .6 Evidence of arrangements to procure
  - .7 Evidence of manufacturer delivery problems or unforeseen delays
- .3 Provide material and equipment of specified design and quality, performing to published ratings and for which replacement parts are readily available.
- .4 Use products of one manufacturer for equipment or material of same type or classification unless otherwise specified.

### **1.3 PRODUCT QUALITY & REFERENCED STANDARDS**

- .1 Contractor is responsible for submitting relevant technical data and independent test reports to confirm whether a product or system proposed meets the project requirements and specified standards.
- .2 Final decision as to whether a product or system meets contract requirements rests solely with the Departmental Representative in accordance with the General Conditions of the Contract.

#### **1.4 MANUFACTURERS INSTRUCTIONS**

- .1 Unless otherwise specified, comply with the manufacturer's latest printed instructions for materials and installation methods to be used. Obtain written instructions directly from manufacturers.
- .2 Notify Departmental Representative in writing of conflicts between these specifications and the manufacturer's instructions. The Departmental Representative will designate which document is to be followed.

#### **1.5 AVAILABILITY**

- .1 Immediately notify Departmental Representative in writing of material delivery problems from manufacturer. Provide support documentation per clause 1.1.2 above.

#### **1.6 WORKMANSHIP**

- .1 Ensure quality of work is of the highest standard, executed by workers experienced and skilled in the respective duties for which they are employed.
- .2 Remove unsuitable or incompetent workers from site in accordance with the General Conditions of the Contract.
- .3 Ensure cooperation of workers in laying out work. Maintain efficient and continuous supervision on site at all times.
- .4 Coordinate work between trades and sub-trades.
- .5 Coordinate placement of openings, sleeves and accessories.

#### **1.7 ROUGHING-IN**

- .1 Be responsible for correct roughing-in and hook-up of equipment and fixtures.

#### **1.8 FASTENINGS - GENERAL**

- .1 Provide metal fastenings and accessories in same texture, colour and finish as base metal in which they occur.

- .2 Use heavy duty commercial grade fasteners of type as recommended by manufacturer of material being fastened.
- .3 Prevent electrolytic action between dissimilar metals. Use non-corrosive fasteners, anchors and spacers for exterior work and in humid interior areas.
- .4 Space anchors within limits of load bearing or shear capacity and ensure that they provide positive permanent anchorage.
- .5 Keep exposed fastenings to minimum, space evenly and lay out neatly.
- .6 Fastenings which cause spalling or cracking of material to which anchorage is made, are not acceptable.
- .7 Do not use explosive actuated fastening devices unless approved by Departmental Representative. See section 01 35 28 on Health and Safety in this regard.
- .8 Use lock-tight washers, gaskets and resilient washers where vibrations occur or where vibration is anticipated.

#### **1.9 FASTENINGS - EQUIPMENT**

- .1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for the service for which they are employed.
- .2 Use heavy hexagon heads, semi-finished unless otherwise specified.
- .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 and, use resilient washers with stainless steel.

#### **1.10 STORAGE, HANDLING AND PROTECTION**

- .1 See Section 01 50 00 regarding site storage restrictions.
- .2 Deliver, handle and store materials in manner to prevent deterioration and soiling in accordance with manufacturer's instructions.

- .3 Deliver to site in original undamaged containers with manufacturer's seals and labels intact. Do not remove from packaging or handling until required in Work.
- .4 Provide additional protective cover where manufacturer's packaging is insufficient to provide adequate protection.
- .5 Store products subject to damage from weather in weatherproof enclosures.
- .6 Store cementitious products clear of earth or concrete floors, and away from walls.
- .7 Immediately remove damaged and rejected materials from site.
- .8 Touch-up damage to factory finished surfaces. Use touch-up materials to match factory finish. Do not paint over or otherwise conceal manufacturers name plates or equipment identification tags on new or existing equipment.

**END OF SECTION**

### **1.1 RELATED SECTIONS**

- .1 Section 01 50 00: Temporary Facilities

### **1.2 GENERAL**

- .1 Conduct cleaning and disposal operations in compliance with local ordinances and anti-pollution laws.
- .2 Store volatile waste in covered metal containers, and remove from premises at the end of each working day.
- .3 Provide adequate ventilation during the use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .4 The work outlined in this section applies to those areas of the Facility which have been affected by the execution of the work of this Contract.

### **1.3 MATERIALS**

- .1 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning product manufacturer.

### **1.4 CLEANING DURING CONSTRUCTION**

- .1 Maintain the work areas in a tidy condition, free from accumulation of material, waste, debris, dirt and dust. Conduct cleaning on a daily basis.
- .2 Keep building entrances, corridors, stairwells and occupied areas in a clean dust free condition at all times. Conduct thorough cleaning of these areas at the end of each work shift when used by workers or affected by the Work.
- .3 Provide on-site containers for collection of waste materials and debris. Coordinate location of on-site containers with Departmental Representative and Institution Director.
- .4 Use separate collection bins, clearly marked as to purpose, for source separation and recycling of waste and debris in accordance with waste management requirements specified.

- .5 Remove waste and debris from work areas on a daily basis.
- .6 No waste dumpsters will be allowed to remain on site inside the security perimeter of the Institution.
- .7 Schedule cleaning and vacuuming operations as a integral part of work shift function.
- .8 Schedule cleaning operations so that resulting dust, debris and other contaminants will not contaminate wet, newly painted surfaces or building systems.
- .9 Provide dust barriers, dividers, seals on doors and employ other dust control measures as required to ensure that dust and dirt, generated by work, are not transmitted to other areas of building. Should dust migrate into interior occupied areas; employ such means as necessary to immediately clean contaminated surfaces.
  - .1 See Section 01 50 00 for requirements on dust control and for erection of dust partitions.
- .10 Immediately clean dust, dirt, smears, scuffs and soiled surfaces in resulting from the Work.
  - .1 Perform cleaning, dusting and washing operations, carpet vacuuming (including shampooing) and floor washing as necessary to thoroughly clean soiled surfaces to pre-construction condition.

#### **1.5 CLEANING OF OCCUPIED AREAS**

- .1 Clean interior occupied areas at end of each work shift which have been dirtied or soiled by the Work or by workers when used to gain access to work areas.
- .2 Cleaning of Occupied Areas to include; as a minimum:
  - .1 Washing of walls, floors and other surfaces dirtied or smeared.
  - .2 Vacuuming carpets.
  - .3 Dusting and vacuuming of workstations, desk tops, chairs and other office furnishings.
- .3 Use competent persons experienced in commercial cleaning functions.
  - .1 Ensure that personnel arrive at an appropriate times near the end of each work shift to conduct required cleaning before Facility employees arrive for their work.

- .2 Be present on premises for 1 additional hour after Contractor's off-hour work shift has terminated to address any complaints and concerns from Facility staff on the degree of cleanliness required and to perform additional cleaning as needed.

#### **1.6 FINAL CLEANING**

- .1 In preparation for acceptance of the project on an Interim or Final Certificate of Completion, perform final cleaning of areas and surfaces affected by the Work.
- .2 Remove grease, dust, dirt, stains, labels, fingerprints, marks and other foreign materials, from finished surfaces.
- .3 Replace items with broken pieces, scratches or disfigured.
- .4 Clean lighting reflectors, lenses, and other lighting surfaces.
- .5 Vacuum clean and dust building interiors, behind grilles, louvers and screens.
- .6 Inspect finishes, fitments and equipment. Ensure specified workmanship and operation.
- .7 Remove debris and surplus materials from crawl areas, roof areas and other accessible concealed spaces.

**END OF SECTION**

## 1.1 DEFINITIONS

- .1 Hazardous Material: Product, substance, or organism that is used for its original purpose, and that is either dangerous goods or a material that may cause adverse impact to the environment or adversely affect the health of persons, animals, or plant life when released into the environment.

## 1.2 WASTE MANAGEMENT

- .1 Incorporate environmental and sustainable practices in managing waste resulting from work.
- .2 Divert as much waste as possible from landfills.
- .3 Coordinate work of subtrades and subcontractors to ensure all possible waste reduction and recycling opportunities are taken. Follow waste management requirements specified.
- .4 Reduce waste during installation of new materials. Undertake to optimize full use of materials and minimize waste.
- .5 Develop procedures to reduce quantity of waste generated by construction such as delivering materials to site with minimal packaging etc.
- .6 Provide on-site facilities to collect, handle and store anticipated quantities of reusable, salvageable and recyclable materials. Coordinate facilities with Departmental Representative and Institution Directori9.
- .7 During demolition and removal work, separate materials and equipment at source, carefully dismantling, labeling and stockpiling like items for the following purposes:
  - .1 Reinstallation into the work where indicated.
  - .2 Salvaging reusable items not needed in project which Contractor may sell to other parties.
  - .3 Sending as many items as possible to locally available recycling facility.
  - .4 Segregating remaining waste and debris into various individual waste categories for disposal in a "non-mixed state" as recommended by waste processing/landfill sites.
- .8 Separate product packaging and containers from the general waste stream. Send to recycling facility or return to supplier/manufacturer.
- .9 Recycle leftover and remnant material whenever possible.
- .10 Establish methods whereby hazardous and toxic materials, and their containers, used on site are properly handled, stored and disposed

of in accordance with applicable federal, provincial and municipal laws and regulations.

### 1.3 DISPOSAL REQUIREMENTS

- .1 Burying or burning of rubbish and waste materials is prohibited.
- .2 Do not dispose volatile materials, such as mineral spirits, oil, paint, and other hazardous materials into waterways, storm, or sanitary sewers. Abide by applicable federal, provincial and municipal laws and regulations.
- .3 Dispose of waste only at authorized waste processing facilities or landfill sites approved by authority having jurisdiction.
- .4 Contact the authority having jurisdiction prior to commencement of work, to determine what, if any, demolition and construction waste materials have been banned from disposal in landfills and at transfer stations. Take appropriate action to isolate such banned materials at site of work and dispose of in strict accordance with federal, provincial and municipal regulations.
- .5 Transport and dispose of waste intended for waste processing plant or landfill facility in separated condition and to Operator's rules and recommendations in support of their effort to recycle, reduce and divert certain waste stream from general landfill.
- .6 Collect, bundle and transport salvaged materials to be recycled in separated categories and condition as directed by recycling facility. Ship materials only to approved recycling facilities.
- .7 Sale of salvaged items by Contractor to other parties is not permitted on the work site.

**END OF SECTION**

### 1.1 SECTION INCLUDES

- .1 Administrative procedures preceding review and acceptance of Work by Departmental Representative.

### 1.2 RELATED SECTIONS

- .1 Section 01 78 00 - Closeout Submittals.

### 1.3 INSPECTION AND DECLARATION

- .1 Contractor's Inspection: Coordinate and perform an inspection and check of all Work in concert with sub-trades. Identify and correct deficiencies, defects, repairs and perform outstanding items to complete the work in conformance with Project Documents.
  - .1 Notify Departmental Representative in writing when deficiencies from Contractor's inspection have been rectified and that the Work is deemed to be complete and ready for Departmental Representative's review of the completed work.
- .2 Departmental Representative's Review: Accompany Departmental Representative during all interim and final reviews of the Work.
  - .1 Address defects, faults and outstanding items of work identified by such inspections.
  - .2 Advise Departmental Representative when deficiencies identified have been rectified.
  - .3 Note that Departmental Representative will not issue a Certificate of Substantial Performance of the work until such time as the Contractor performs the following work and turns over the specified documents
    - .1 Project record as-built documents
    - .2 Final Operations and Maintenance Manuals
    - .3 Maintenance materials, parts and tools
    - .4 Compliance certificates from applicable authorities
    - .5 Reports resulting from designated tests
    - .6 Demonstration and training complete with user manuals
    - .7 Manufacturer's Guarantee certificates
    - .8 Testing, adjusting and balancing of equipment and systems complete with submission of test reports
    - .9 Commissioning of equipment and systems specified
  - .4 Correct discrepancies before Departmental Representative will issue the Certificate of Completion.

**END OF SECTION**

### **1.1 SECTION INCLUDES**

- .1 Project Record Documents.
- .2 Operations and Maintenance data.

### **1.2 REFERENCED STANDARDS**

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

### **1.3 RELATED SECTIONS**

- .1 Section 01 77 00 - Closeout Procedures
- .2 Section 01 33 00 - Submittal Procedures

### **1.4 SUBMITTALS**

- .1 Two copies of project drawings and specifications will be provided to the contractor, specifically for "as-built" purposes.
- .2 Maintain one set of the project drawings, and specifications at site to record actual "as-built" site conditions.
- .3 Maintain project up-to-date, real time as-built drawings and specifications in good condition and make available for review by the Departmental Representative upon request.
- .4 As-Built Drawings:
  - .1 Record changes in red ink on the prints. Retain the services of a Draftsperson and Professional Engineer licensed to practice in the province of Nova Scotia. Generate CAD drawings reflecting these changes.
  - .2 All drawings of both sets shall be stamped "As-Built Drawings" and be signed and dated by the Contractor. The same drawings shall be stamped and signed by a Professional Engineer as per CEPA 34.
  - .3 Submit both sets to Departmental Representative prior to application for certificate of Substantial Performance.

- 
- .4 Show all modifications, substitutions and deviations from what is shown on the project drawings or in the specifications.
  - .5 Record following information:
    - .1 Location of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of structure
    - .2 Field changes of dimension and detail
    - .3 Location of capped or terminated services or utilities
    - .4 Chases for mechanical, electrical and other services
    - .5 Reflected ceiling plan condition showing finished layout of ceiling-mounted services and devices
    - .6 Plumbing, heating, air conditioning, ventilation, sprinkler and electrical services moved or affected by the work: all to be dimensioned and referenced to building columns or load bearing walls
    - .7 Design elevations, sections, floor plans and details, dimensioned and detailed to show finished installation conditions
    - .8 Additional details produced by the Departmental Representative during the course the Work to supplement or to change existing design drawings;
    - .9 Addenda, Change Orders or site instructions issued during the Work documenting accurately and consistently the changed condition as it applies to affected drawing details;
    - .10 Manufacturer, trade name, and catalogue number of each product actually installed, particularly those items substituted from that specified.
    - .11 Other items as required by CEPA 34.
  - .5 As-built Specifications: legibly mark in red each item to record actual construction, including:
    - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly items substituted from those specified.
    - .2 Changes made by Addenda, Change Orders and Site Instruction.
    - .3 Mark up both copies of specifications; stamp "As-Built", sign and date similarly to drawings per above clause.
  - .6 Maintain As-Built documents current as the contract progresses. Departmental Representative will conduct reviews of the documents on a regular basis.
  - .7 The contractor shall be required to fill out and turn in to Departmental Representative the completed asset data collection forms for each new piece of equipment installed and/or removed.

- .8 "Dismantling, Decommissioning or Deconstruction Notice" to be filled out for each piece of equipment removed that contains Halocarbon.
- .9 Provide scanned copy of the red line as-builts to Departmental Representative.

#### 1.5 REVIEWED SHOP DRAWINGS

- .1 Compile full set of reviewed shop drawings for inclusion into each copy of the O&M Manuals specified.

#### 1.6 OPERATIONS & MAINTENANCE MANUAL

- .1 Definition: an organized compilation of operating and maintenance data including detailed technical information, documents and records describing operation and maintenance of individual products or systems as, specified the in individual sections of the Project Specifications.
- .2 Manual Language: final manuals to be in English.
  - .1 Upon review and acceptance by the Departmental Representative, submit 4 final copies. Include 2 red line copies.
  - .2 Submit digital copy of O&M Manuals to departmental representative.
- .3 Submission Date: submit complete operation and maintenance manual to Departmental Representative 3 weeks prior to application for Certificate of Substantial Performance of the Work.
- .4 Binding:
  - .1 Assemble, coordinate, bind and index required data into Operation and Maintenance Manual.
  - .2 Use vinyl, hard covered, 3 "D" ring binders, loose leaf, sized for 215 x 280 mm paper, with spine pocket.
  - .3 Where multiple binders are needed, correlate data into related consistent groupings.
  - .4 Identify contents of each binder on spine, and Front Cover.
  - .5 Organize and divide data following same numerical system as the section numbers of the Specification.
  - .6 Dividers: separate each section by use of cardboard dividers and labels. Provide tabbed fly leaf for each individual product and system and give description of

- 
- product or component.
  - .7 Type lists and notes. Do not hand write.
  - .8 Drawings, diagrams and manufacturers' literature must be legible. Provide with reinforced, punched binder tab. Bind in with text; fold larger drawings to size of text pages and insert in plastic sleeve.
- .5 Manual Contents:
- .1 Cover sheet containing:
    - .1 Date submitted.
    - .2 Project title, location and project number.
    - .3 Names and addresses of Contractor, and all Subtrades.
  - .2 Table of Contents: provide full table of contents in each binder(s), clearly indicate which contents are in each binder.
  - .3 List of maintenance materials.
  - .4 List of spare parts.
  - .5 List of special tools.
  - .6 Original or certified copy of warranties and product guarantees.
  - .6 Copy of approval documents and certificates issued by Inspection Authorities.
  - .7 Copy of reports and test results performed by Contractor as specified.
  - .8 Product Information (PI Data) on materials, equipment and systems as specified in various sections of the Project Specifications. Data to include:
    - .1 List of equipment including manufacturer's name, supplier, local source of supplies and service depot(s). Provide full addresses and telephone numbers.
    - .2 Nameplate information including equipment number, make, size, capacity, model number and serial number.
    - .3 Parts list.
    - .4 Installation details.
    - .5 Operating instructions.
    - .6 Maintenance instructions for equipment.
    - .7 Maintenance instructions for finishes.
  - .9 Contractor shall be familiar with Departmental Representative manual guidelines in Appendix A of this specification document.
- .6 Shop drawings:
- .1 Include complete set of reviewed shop drawings into each copy of the Operations and Maintenance Manuals.
  - .2 Fold and bind material professionally in a manner that corresponds with the specification section numbering system.
  - .3 When a large quantity of data is submitted, place into

separate binders of same size as O&M binders.

- .7 Equipment and Systems Data: the following list indicates the type of data and extent of information required to be included for each item of equipment and for each system:
- .1 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 color 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, alignment, adjusting, balancing, and checking instructions.
  - .6 Servicing and lubrication schedule, and list of lubricants required.
  - .7 Manufacturer's printed operation and maintenance instructions.
  - .8 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
  - .9 Provide installed control diagrams by controls manufacturer.
  - .10 Provide Contractor's coordination drawings, with installed color coded piping diagrams.
  - .11 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
  - .12 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
  - .13 Include test and balancing reports.
  - .14 Additional requirements as specified in individual specification sections.
  - .15 Refer to "Operations and Maintenance Manual" document attached for further requirements.

**END OF SECTION**

### 1.1 RELATED SECTIONS

- .1 Section 01 78 00: Operations and Maintenance Manual

### 1.2 DESCRIPTION

- .1 Demonstrate scheduled operation and maintenance of equipment and systems to Facility staff prior date of final inspection.
- .2 Departmental Representative will provide a list of persons to receive training.
- .3 Cooperate with the Departmental Representative in coordinating time and attendance of personnel with the manufacturer's training Representatives.

### 1.3 QUALITY CONTROL

- .1 Ensure that only personnel from own forces, Sub-trades or Suppliers who are competent and fully knowledgeable in the particular component, equipment or system installed are used to provide training and demonstrations.
- .2 When specified, obtain the manufacturer's authorized Representative to provide demonstration and instruction on the operation of equipment and systems and to provide a written report when completed.
- .3 Upon request, provide evidence of individual trainer's knowledge and qualifications.

### 1.4 SUBMITTALS

- .1 Submit training schedule indicating date and time of each training session, complete with a list of equipment and systems to be demonstrated. Submit Schedule 2 weeks in advance of designated date for Departmental Representatives review and acceptance.
- .2 Submit report within 1 week after completion of training sessions, certifying that demonstration and instructions have been satisfactorily completed.
  - .1 Indicate actual date and time when training was held and the list of persons present.

### **1.5 CONDITIONS FOR DEMONSTRATIONS**

- .1 Before conducting demonstration and training sessions, ensure that equipment and systems have been inspected, tested, are fully operational and that performance verification and TAB have been carried out.
- .2 Provide copies of completed O&M manuals for use during demonstration and training sessions.

### **1.6 PREPARATION**

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

### **1.7 DEMONSTRATION AND INSTRUCTIONS**

- .1 Include the following as part of the demonstration and training:
  - .1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each piece of equipment.
  - .2 Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as the basis of instruction.
  - .3 Review contents of manual in detail to explain all aspects of operation and maintenance.
  - .4 Prepare and insert additional data in operations and maintenance manuals when the need for additional data becomes apparent during instructions.
  - .5 Provide other specific training and instructions as specified in trade sections.

### **1.8 TIME ALLOCATED FOR INSTRUCTIONS**

- .1 Observe the time period allocated for each item as specified. Provide additional time when required to ensure personnel fully understand all aspects of the information and instructions being provided. Allow for questions by participants.

**END OF SECTION**

## 1.1 SUMMARY

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

## 1.2 RELATED SECTIONS

- .1 Section 25 05 01: Controls General Requirements

## 1.3 REFERENCES

- .1 Public Works and Government Services Canada (PWGSC)
  - .1 PWGSC - Commissioning Guidelines CP.4 -3<sup>rd</sup> edition -03.
- .2 Underwriters' Laboratories of Canada (ULC)

## 1.4 GENERAL

- .1 Provide a fully functional system:
  - .1 Systems, equipment and components meet user's functional requirements before date of acceptance, and operate consistently.
  - .2 O&M personnel have been fully trained in aspects of installed systems.
  - .3 Complete documentation relating to installed equipment and systems.
- .2 Term "Cx" in this section means "Commissioning".
- .3 Use this Cx Plan as master planning document for Cx:
  - .1 Outlines organization, scheduling, allocation of resources, documentation, pertaining to implementation of Cx.
  - .2 Communicates responsibilities of team members involved in Cx Scheduling, documentation requirements, and verification procedures.
  - .3 Sets out deliverables relating to O&M, process and administration of Cx.
  - .4 Describes process of verification of how built works meets design requirements.
  - .5 Produces a complete functional system prior to issuance of Certificate of Substantial Completion.



- .1 Changes resulting from Client program modifications.
- .2 Design and construction changes, including Addenda, Change Orders and site instructions.
- .2 Revise, refine and update as required during construction phase. At each revision, indicate revision number and date.
- .3 Submit each revised Cx Plan to Departmental Representative for review and obtain written authorization.
- .4 Include testing parameters at full range of operating conditions and check responses of equipment and systems.

#### **1.7 COMPOSITION, ROLES AND RESPONSIBILITIES OF Cx TEAM**

- .1 Departmental Representative to maintain overall responsibility for project and is sole point of contact between members of commissioning team.
- .2 Project Manager will select Cx Team consisting of following members:
  - .1 Departmental Representative Design Quality Review Team: during construction, will conduct periodic site reviews to observe general progress.
  - .2 Departmental Representative Quality Assurance Commissioning Manager: ensures Cx activities are carried out to ensure delivery of a fully operational project including:
    - .1 Review of Cx documentation from operational perspective.
    - .2 Review for performance, reliability, durability of operation, accessibility, maintainability, operational efficiency under conditions of operation.
    - .3 Protection of health, safety and comfort of occupants and O&M personnel.
    - .4 Monitoring of Cx activities, training, development of Cx documentation.
    - .5 Work closely with members of Cx Team.
  - .3 Departmental Representative is responsible for:
    - .1 Monitoring operations Cx activities.
    - .2 Monitoring of Training Plan.
  - .4 Construction Team: contractor, sub-trades, suppliers and support disciplines, are responsible for construction/installation in accordance with contract documents, including:
    - .1 Testing.

- .2 TAB.
- .3 Performance of Cx activities.
- .4 Delivery of training and Cx documentation.
- .5 Assigning one person as point of contact with Departmental Representative and PWGSC Cx Manager for administrative and coordination purposes.
- .5 Contractor's Cx agent implements specified Cx activities including:
  - .1 Demonstrations.
  - .2 Training.
  - .3 Testing.
  - .4 Preparation, submission of test reports.
- .6 Property Manager: represents lead role in Operation Phase and onwards and is responsible for:
  - .1 Receiving facility.
  - .2 Day-To-Day operation and maintenance of facility.

#### 1.8 Cx PARTICIPANTS

- .1 Employ the following Cx participants to verify performance of equipment and systems:
  - .1 Installation contractor and sub-trades:
    - .1 Equipment and systems except as noted.
- .2 Equipment manufacturer: equipment specified to be installed and started by manufacturer.
  - .1 To include performance verification.
- .3 Specialist sub-trades: equipment and systems supplied and installed by specialist sub-trades.
- .4 Specialist Cx agency:
  - .1 Possessing specialist qualifications and installations providing environments essential to client's program but are outside scope or expertise of Cx specialists on this project.
- .5 Ensure that Cx participants:
  - .1 Can complete work within scheduled time frames.
  - .2 Are available for emergency and troubleshooting services during the first year of operation by user for adjustments and modifications outside of responsibility of O&M personnel, including:
    - .1 Changes to EMCS control strategies beyond level of training provided to O&M personnel.

- .6 Provide names of participants to Departmental Representative and details of instruments and procedures to be followed for Cx 1 month prior to starting date of Cx for review.

#### **1.9 EXTENT OF CX**

- .1 Cx Structural and Architectural Systems:
  - .1 Architectural and structural:
    - .1 In-situ soils and imported bedding and fill materials.
    - .2 Exterior systems.
    - .3 Accessibility and operational safety.
  - .2 Commission mechanical systems and associated equipment:
    - .1 Plumbing systems
      - .1 Storm water systems.
      - .2 Oil interceptor.
    - .2 Seismic restraint and control measures.
    - .3 EMCS
  - .3 Commission electrical systems and equipment:
    - .1 Low voltage below 750 V:
      - .1 Low voltage equipment.
      - .2 Low voltage distribution systems.
      - .3 Electronic data and communications information systems.

#### **1.10 DELIVERABLES RELATING TO O&M PERSPECTIVES**

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

- .7 Electrical Panel inventory containing detailed inventory of electrical circuitry for each panel board. Duplicate of inventory inside each panel.

#### **1.11 DELIVERABLES RELATING TO THE CX PROCESS**

- .1 General:
  - .1 Start-up, testing and Cx requirements, conditions for acceptance and specifications form part of relevant technical sections of these specifications.
- .2 Definitions:
  - .1 Cx as used in this section includes:
    - .1 Cx of components, equipment, systems, subsystems, and integrated systems.
    - .2 Factory inspections and performance verification tests.
- .3 Deliverables: provide:
  - .1 Cx Specifications.
  - .2 Startup, pre-Cx activities and documentation for systems, and equipment.
  - .3 Completed installation checklists (ICL).
  - .4 Completed product information (PI) report forms.
  - .5 Completed performance verification (PV) report forms.
  - .6 Results of Performance Verification Tests and Inspections.
  - .7 Description of Cx activities and documentation.
  - .8 Description of Cx of integrated systems and documentation.
  - .9 Training Plans.
  - .10 Cx Reports.
  - .11 Prescribed activities during warranty period.
- .4 Departmental Representative to witness tests.

#### **1.12 PRE-CX ACTIVITIES AND RELATED DOCUMENTATION**

- .1 Items listed in this Cx Plan include the following:
  - .1 Pre-Start-Up reviews by Departmental Representative prior to start up and rectification of deficiencies.
  - .2 Departmental Representative may monitor some of these pre-start-up reviews.
  - .3 Include completed documentation with Cx report.

- 
- .4 Conduct pre-start-up tests: conduct pressure, static, flushing, cleaning, and "bumping" during construction as specified in technical sections. To be witnessed by Departmental Representative and does not form part of Cx specifications.
  - .5 Include completed documentation in Cx report.
  - .2 Pre-Cx activities - ARCHITECTURAL AND STRUCTURAL:
    - .1 In-situ soil property confirmation.
    - .2 Fill material source quality confirmation.
    - .3 Bedding material source quality confirmation.
  - .3 Pre-Cx activities - MECHANICAL:
    - .1 Plumbing systems:
      - .1 "Bump" each item of equipment in its "stand-alone" mode.
      - .2 At this time, complete pre-start-up checks and complete relevant documentation.
      - .3 After equipment has been started, test related systems in conjunction with control systems on a system-by-system basis.
    - .2 EMCS:
      - .1 EMCS trending to be available as supporting documentation for performance verification.
      - .2 Perform point-by-point testing in parallel with start-up.
      - .3 Carry out point-by-point verification.
      - .4 Demonstrate performance of systems, to be witnessed by Departmental Representative prior to start of 30 day Final Acceptance Test period.
      - .5 Perform final Cx and operational tests during demonstration period and 30 day test period.
      - .6 Only additional testing after foregoing have been successfully completed to be "Off-Season Tests".

### 1.13 START-UP

- .1 Start up components, equipment and systems.
- .2 Equipment manufacturer, supplier, installing specialist sub-contractor, as appropriate, to start-up, under Contractor's direction.
- .3 Departmental Representative to monitor some of these start-up activities.
  - .1 Rectify start-up deficiencies.

- .4 Performance Verification (PV):
  - .1 Approved Cx Agent to perform.
    - .1 Repeat when necessary until results meet design requirements.
    - .2 Use procedures to suit project requirements.
    - .3 Departmental Representative reserves right to verify up to 30% of reported results.
    - .4 Failure of randomly selected item shall result in rejection of PV report or report of system startup and testing.

#### **1.14 CX ACTIVITIES AND RELATED DOCUMENTATION**

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

#### **1.15 CX SCHEDULES**

- .1 Prepare detailed Cx Schedule and submit to Departmental Representative for review at the same time as the project Construction Schedule. Include:
  - .1 Milestones, testing, documentation, training and Cx activities of components, equipment, subsystems, systems and integrated systems, including:
    - .1 Design criteria, design intents.
    - .2 Submission of list of instrumentation with relevant certificates: 21 days before start of Cx.
    - .3 Identification of deferred Cx.
    - .4 Implementation of training plans.
    - .5 Cx reports: immediately upon successful completion of Cx.
  - .2 Detailed training schedule to demonstrate no conflicts with testing, completion of project and hand-over.
  - .3 After acceptance, incorporate Cx Schedule into Construction Schedule.

- .4 Contractor, Contractor's Cx agent and Departmental Representative will monitor progress of Cx against this schedule.
- .2 After authorization/permission, incorporate Cx Schedule into Construction Schedule.
- .3 Contractor, Contractor's Cx agent, and Departmental Representative will monitor progress of Cx against this schedule.

#### **1.16 CX REPORTS**

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

#### **1.17 ACTIVITIES DURING WARRANTY PERIOD**

- .1 Cx activities must be completed before issuance of Interim Certificate. Certain Cx activities may be necessary during Warranty Period.

#### **1.18 FINAL SETTINGS**

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

**END OF SECTION**

**PART 1. GENERAL**

**1.1 RELATED SECTIONS**

- .1 Section 01 10 10 - General Instructions

**1.2 STANDARD**

- .1 National Building Code of Canada (latest edition)
- .2 Nova Scotia Building Code (latest edition)

**1.3 PROTECTION**

- .1 Prevent movement, settlement, and other damage to parts of building to remain in place. Provide bracing and shoring required.
- .2 Keep noise, dust, and inconvenience to occupants to a minimum.
- .3 Protect building systems, services and equipment designated to remain or be relocated.
- .4 Provide temporary covers, railings, supports and other protection as required.
- .5 Protect existing room finishes identified in drawings to remain. Make good to match, at no additional cost to the Departmental Representative. Cost, including material and labour, shall be borne by the trade responsible for damage.

**1.4 NOTICE**

- .1 Notify the Departmental Representative before disrupting building access or services.

**1.5 COORDINATION**

- .1 Work specified in this section is not intended to supercede demolition and renovation work specified in other sections.

- .2 Coordinate demolition and renovation work with other sections.

## **PART 2. PRODUCTS**

### **2.1 Not Used**

## **PART 3. EXECUTION**

### **3.1 GENERAL**

- .1 Execute demolition work in a careful and orderly manner with least possible disturbance to the staff and public. Sprinkle debris with water where necessary to prevent annoyance from dust.
- .2 Where work of this contract requires work to mechanical and electrical systems inside existing walls, ceilings, bulkheads, etc., be responsible for opening areas as necessary to expose work areas. After removals have been carried out, new mechanical and electrical work is completed, and all work has been inspected, be responsible for restoring disturbed surfaces to match their original, undisturbed condition. Replace broken or otherwise damaged fasteners and anchorage systems.

### **3.2 DEMOLITION WORK**

- .1 Demolition:
  - .1 Do demolition work indicated on drawings and as required to permit new construction.
  - .2 Remove parts of existing building, as indicated, to permit new construction.
  - .3 Concrete demolition:
    - .1 When removing portions of concrete, saw-cut to provide neat sides on remaining portion as required.
- .2 Arrange for electrical and mechanical trades to properly cap off abandoned lines and services as required.

- .3 Carefully remove items to be reused and protect from damage.

### **3.3 SALVAGE AND DISPOSAL**

- .1 All materials resulting from demolition work, except items to be reused or items identified to be retained by Departmental Representative, shall become the property of the Contractor. Dispose of material off site in accordance with authority having jurisdiction; no burning or selling at site will be permitted.

### **3.4 DECOMMISSIONING OF MONITORING WELLS**

- .1 Decommission existing monitoring wells indicated prior to commissioning new oil tanks.
- .2 Remove all pumping equipment including pumps, tubing, and other obstructions from the well.
- .3 The actual depth of the well is to be measured and recorded. Provide to the consultant.
- .4 Existing well casing to be cut off to a minimum of 0.3m below finished grade prior to grouting.
- .5 Monitoring wells to be decommissioned by entirely filling the monitoring well with approved grout by either the pressure grout method or hand placement of dry granular bentonite chips. Submit procedure to the consultant for review prior to installation.
- .6 Grade the location of the former well to eliminate surface water ponding. The potential for grout settlement in the borehole over time is to be accounted for when grading. Apply approved topsoil to promote establishment of vegetation.
- .7 Submit a site plan documenting exact locations of each decommissioned monitoring well, as well as the methodology used, to Nova Scotia Department of Environment upon completion.

**END OF SECTION**

## **1. GENERAL**

### **1.1 REFERENCES**

- .1 Export and Import of Hazardous Waste Regulations SOR/2002-300.
- .2 National Fire Code of Canada 2005.
- .3 Transportation of Dangerous Goods Act (TDG Act) 1999, (c. 34).
- .4 Transportation of Dangerous Goods Regulations (T-19.01-SOR/2003-400).

### **1.2 DEFINITIONS**

- .1 Dangerous Goods: product, substance, or organism that is specifically listed or meets hazard criteria established in Transportation of Dangerous Goods Regulations.
- .2 Hazardous Material: product, substance, or organism that is used for its original purpose; and that is either dangerous goods or a material that may cause adverse impact to environment or adversely affect health of persons, animals, or plant life when released into the environment.
- .3 Hazardous Waste: any hazardous material that is no longer used for its original purpose and that is intended for recycling, treatment or disposal.
- .4 Workplace Hazardous Materials Information System (WHMIS): a Canada-wide system designed to give employers and workers information about hazardous materials used in workplace. Under WHMIS, information on hazardous materials is provided on container labels, material safety data sheets (MSDS), and worker education programs. WHMIS is put into effect by combination of federal and provincial laws.

### **1.3 SUBMITTALS**

- .1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit to Departmental Representative, current Material Safety Data Sheet (MSDS) for each hazardous material required prior to bringing hazardous material on site.

- .3 Submit hazardous materials management plan to Departmental Representative that identifies hazardous materials, their use, their location, personal protective equipment requirements, and disposal arrangements.

#### 1.4 STORAGE AND HANDLING

- .1 Co-ordinate storage of hazardous materials with Departmental Representative and abide by internal requirements for labeling and storage of materials and wastes.
- .2 Store and handle hazardous materials and wastes in accordance with applicable federal and provincial laws, regulations, codes, and guidelines.
- .3 Store and handle flammable and combustible materials in accordance with current National Fire Code of Canada requirements.
- .4 Keep no more than 45 litres of flammable and combustible liquids such as gasoline, kerosene and naphtha for ready use.
  - .1 Store flammable and combustible liquids in approved safety cans bearing the Underwriters' Laboratory of Canada or Factory Mutual seal of approval.
  - .2 Storage of quantities of flammable and combustible liquids exceeding 45 litres for work purposes requires the written approval of the Departmental Representative.
- .5 Transfer of flammable and combustible liquids is prohibited within buildings.
- .6 Do not transfer flammable and combustible liquids in vicinity of open flames or heat-producing devices.
- .7 Do not use flammable liquids having flash point below 38 degrees C, such as naphtha or gasoline as solvents or cleaning agents.
- .8 Store flammable and combustible waste liquids for disposal in approved containers located in safe, ventilated area. Keep quantities to minimum.
- .9 Observe smoking regulations, smoking is prohibited in areas where hazardous materials are stored, used, or handled.
- .10 Storage requirements for quantities of hazardous materials and wastes in excess of 5 kg for solids, and 5 litres for liquids:
  - .1 Store hazardous materials and wastes in closed and sealed containers.

- .2 Label containers of hazardous materials and wastes in accordance with WHMIS.
- .3 Store hazardous materials and wastes in containers compatible with that material or waste.
- .4 Segregate incompatible materials and wastes.
- .5 Ensure that different hazardous materials or hazardous wastes are not mixed.
- .6 Store hazardous materials and wastes in secure storage area with controlled access.
- .7 Maintain clear egress from storage area.
- .8 Store hazardous materials and wastes in location that will prevent them from spilling into environment.
- .9 Have appropriate emergency spill response equipment available near storage area, including personal protective equipment.
- .10 Maintain inventory of hazardous materials and wastes, including product name, quantity, and date when storage began.
- .11 Ensure personnel have been trained in accordance with Workplace Hazardous Materials Information System (WHMIS) requirements. Report spills or accidents immediately to Departmental Representative. Submit a written spill report to Departmental Representative within 24 hours of incident.

## 1.5 TRANSPORTATION

- .1 Transport hazardous materials and wastes in accordance with federal Transportation of Dangerous Goods Act, Transportation of Dangerous Goods Regulations, and applicable provincial regulations.
- .2 If exporting hazardous waste to another country, ensure compliance with federal Export and Import of Hazardous Waste Regulations.
- .3 If hazardous waste is generated on site:
  - .1 Co-ordinate transportation and disposal with Departmental Representative.
  - .2 Ensure compliance with applicable federal, provincial and municipal laws and regulations for generators of hazardous waste.
  - .3 Use licensed carrier authorized by provincial authorities to accept subject material.
  - .4 Prior to shipping material obtain written notice from intended hazardous waste treatment or disposal facility that it will accept material and that it is licensed to accept this material. Label container[s] with legible,

visible safety marks as prescribed by federal and provincial regulations.

- .5 Ensure that trained personnel handle, offer for transport, or transport dangerous goods.
- .6 Provide photocopy of shipping documents and waste manifests to Departmental Representative.
- .7 Track receipt of completed manifest from consignee after shipping dangerous goods. Provide a photocopy of completed manifest to Departmental Representative.
- .8 Report discharge, emission, or escape of hazardous materials immediately to Departmental Representative and appropriate provincial authority. Take reasonable measures to control release.

## **2. PRODUCTS**

### **2.1 MATERIALS**

- .1 Only bring on site quantity of hazardous materials required to perform work.
- .2 Maintain MSDSs in proximity to where materials are being used. Communicate this location to personnel who may have contact with hazardous materials.

## **3. EXECUTION**

### **3.1 DISPOSAL**

- .1 Dispose of hazardous waste materials in accordance with applicable federal and provincial acts, regulations, and guidelines.
- .2 Recycle hazardous wastes for which there is authorized/permitted, cost effective recycling process available.
- .3 Send hazardous wastes to authorized hazardous waste disposal or treatment facilities.
- .4 Burning, diluting, or mixing hazardous wastes for purpose of disposal is prohibited.
- .5 Disposal of hazardous materials in waterways, storm or sanitary sewers, or in municipal solid waste landfills is prohibited.

- .6 Dispose of hazardous wastes in timely fashion in accordance with applicable provincial regulations.
- .7 Minimize generation of hazardous waste to maximum extent practicable. Take necessary precautions to avoid mixing clean and contaminated wastes.
- .8 Identify and evaluate recycling and reclamation options as alternatives to land disposal, such as:
  - .1 Hazardous wastes recycled in manner constituting disposal.
  - .2 Hazardous waste burned for energy recovery.
  - .3 Lead-acid battery recycling.
  - .4 Hazardous wastes with economically recoverable precious metals.

**END OF SECTION**

**PART 1. GENERAL**

**1.1 REFERENCES**

- .1 CSA-A23.1 (latest edition): Concrete Materials and Methods of Concrete Construction.
- .2 CSA-A23.2 (latest edition): Methods of Test for Concrete.
- .3 CSA A283 (latest edition): Qualification Code for Concrete Testing Laboratories.
- .4 CSA G30.5-M1983: Welded Steel Wire Fabric for Concrete Reinforcement.
- .5 CAN/CSA-G30.18-M92: Billet-Steel Bars for Concrete Reinforcement.
- .6 Reinforcing Steel: Reinforcing Steel Manual of Standard Practice, Institute of Canada (RSIC), Third Edition, 1996.

**1.2 RELATED SECTIONS**

- .1 Section 01 10 10 - General Instructions

**1.3 STANDARDS ON SITE**

- .1 Keep a copy of CAN/CSA-A23.1 (latest edition) at the work site, and make available for reference.

**1.4 SHOP DRAWINGS**

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit reinforcement shop drawings clearly showing plan, layout, sizes, dimensions, installation details, bar lists, chair sizes and other relevant details and information.

## **1.5 QUALIFICATIONS**

- .1 Concrete shall be supplied by an approved and qualified concrete supplier.

## **PART 2. PRODUCTS**

### **2.1 MATERIALS**

- .1 Reinforcing steel:
  - .1 billet steel, to CAN/CSA-G30.18 (latest edition), Grade 60 deformed bars.
  - .2 size as shown on drawings.
- .2 Reinforcing steel and welded wire fabric supports:
  - .1 Footings and slabs-on-grade:
    - .1 Class C, Type CB chairs or bolsters.
    - .2 of adequate for strength and support of reinforcing steel under construction loads.
- .3 Reinforcing polypropylene fibres:
  - .1 Acceptable products: PSI Fibrestrand 150 by Euclid
- .4 Non-shrink grout:
  - .1 Acceptable products: SikaGrout 212 HP

### **2.2 REINFORCING STEEL FABRICATION**

- .1 Fabricate and detail reinforcement in accordance with Reinforcing Steel Institute of Canada Manual of Standard Practice.
- .2 Do bending and splicing in accordance with CAN/CSA-A23.1 (latest edition).

### **2.3 MIX DESIGNS**

- .1 Proportion concrete in accordance with CAN/CSA-A23.1 (latest edition), Alternative 1 to give the following properties.
- .2 Have mix design prepared by concrete supplier, or CSA Certified Materials Testing Laboratory, to meet the criteria for the specified mix.

.3 Mix design:

	<u>All Concrete</u>
<b>Class</b>	F-1
<b>Nominal Maximum Size Aggregate</b>	3/4" (19 mm)
<b>Slump</b>	50mm to 100mm
<b>Air Content</b>	5% to 7%
<b>Minimum Compressive Strength at 28 days</b>	32 MPa
<b>Other Admixtures</b>	None

- .4 Materials, proportions and source of supply of ready-mixed concrete shall be subject to review by the Departmental Representative.
- .5 Provide 3.0 kg/m<sup>3</sup> of polypropylene micro-fibre in concrete mix for oil pipe encasement. Mix in accordance with manufacturer's specifications.

**PART 3. EXECUTION**

**3.1 PLACING REINFORCEMENT**

- .1 Accurately space and support reinforcement in accordance with CAN/CSA-A23.1-M (latest edition).
- .2 Minimum clear cover for reinforcement shall be in accordance with CAN/CSA-A23.1 (latest edition) and as detailed.
- .3 Place reinforcing steel supports in continuous rows at 30-inches centre-to-centre.
- .4 Coordinate placement of reinforcement with Mechanical trade.
- .5 Placement of reinforcement shall proceed in such a way to prevent damage to rink piping. All damage shall be reported to mechanical trade for immediate repair.
- .6 Upon completion of reinforcement installation and prior to concrete pour, the Consultant to inspect installation. Give 72 hour written

notice of date for review to the Consultant and Departmental Representative. Make corrections as required to satisfaction of the Consultant.

### **3.2 PLACING**

- .1 Handling, depositing, consolidation and vibration shall conform to CAN/CSA-A23.1 (latest edition).
- .2 Appropriate measures shall be taken to ensure rink piping reinforcement and other embedded items are not damaged or displaced by workers, equipment, or other loads which may be present during the concreting operation.
- .3 Give 72 hours written notice of date for concrete placement to the Consultant and Departmental Representative.

### **3.3 CURING AND PROTECTION**

- .1 Curing and protection shall conform to CAN/CSA-A23.1 (latest edition).

### **3.4 CONCRETE FINISHINES**

- .1 All exposed surfaces to have steel trowel finish.
- .2 Hand steel trowel surfaces not accessible for power trowelling.

### **3.5 TESTING**

- .1 A Testing Company shall be employed by the Contractor at his expense to advise on quality control regarding all aspects of protection, mixing, transporting, placing, and finishing of the cast-in-place concrete.
- .2 Review and testing of concrete and concrete materials shall be carried out by a testing laboratory certified in accordance with CSA A283 (latest edition).
- .3 Provide access to the work for review and selection of samples, and provide materials required for test specimens.
- .4 Materials for concrete shall be tested, if required, and approved before concrete placing begins.

- .5 Cast a minimum of one (1) set of three (3) standard cylinders for each 100 cubic-yards of concrete placed.
- .6 One cylinder shall be tested at age seven (7) days; remaining two (2) at age 28 days.
- .7 Report test results will be issued to the Contractor and Consultant.
- .8 Slump and air content tests will be taken at intervals as frequent as considered necessary, and if required, make immediate adjustments to correct them.
- .9 Cement:
  - .1 to CAN/CSA-A5-M (latest edition), Type 10.
- .10 Fine and coarse aggregates:
  - .1 to CAN/CSA-A23.1 (latest edition).
- .11 Air entraining admixture:
  - .1 to CAN3-A266.1 (latest edition)
  - .2 Acceptable products: Darex AEA as manufactured by Grace Construction Materials.
- .12 Insulation:
  - .1 extruded polystyrene, shiplapped edges
  - .2 to CAN/CGSB-51.20-M (latest edition), Type VI
  - .3 Acceptable products: Styrofoam Highload-40.
- .12 Cement board:
  - .1 aggregated portland cement board with vinyl-coated, woven glass-fibre mesh embedded in front and back surfaces, specially formulated to resist water and steam, square cut and smooth finished edges.
- .13 Isolation board:
  - .1 Acceptable products: Sealtight Asphalt Expansion Joint Filler by W.R. Meadows.

**END OF SECTION**

## **1. GENERAL**

### **1.1 REFERENCES**

- .1 Underwriter's Laboratories of Canada (ULC)
  - .1 ULC-S115-1995, Fire Tests of Firestop Systems.

### **1.2 SUBMITTALS**

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit shop drawings to show proposed material, reinforcement, anchorage, fastenings and method of installation. Construction details should accurately reflect actual job conditions.

### **1.3 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 74 22 - Construction/Demolition Waste Management And Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal packaging material for recycling in accordance with Waste Management Plan.

## **2. PRODUCTS**

### **2.1 MATERIALS**

- .1 Fire stopping and smoke seal systems: in accordance with ULC-S115.
  - .1 Asbestos-free materials and systems capable of maintaining an effective barrier against flame, smoke and gases in compliance with requirements of ULC-S115 and not to exceed opening sizes for which they are intended.
  - .2 Firestop system rating: 90 minutes.
- .2 Service penetration assemblies: certified by ULC in accordance with ULC-S115 and listed in ULC Guide No.40 U19.
- .3 Service penetration firestop components: certified by ULC in accordance with ULC-S115 and listed in ULC Guide No.40

U19.13 and ULC Guide No.40 U19.15 under the Label Service of ULC.

- .4 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.
- .5 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.
- .6 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.
- .7 Primers: to manufacturer's recommendation for specific material, substrate, and end use.
- .8 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.
- .9 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.
- .10 Sealants for vertical joints: non-sagging.

### **3. EXECUTION**

#### **3.1 PREPARATION**

- .1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials. Ensure that substrates and surfaces are clean, dry and frost free.
- .2 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.
- .3 Maintain insulation around pipes and ducts penetrating fire separation.
- .4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

#### **3.2 INSTALLATION**

- .1 Install fire stopping and smoke seal material and components in accordance with ULC certification and manufacturer's instructions.

- .2 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.
- .3 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.
- .4 Tool or trowel exposed surfaces to a neat finish.
- .5 Remove excess compound promptly as work progresses and upon completion.
- .6 Paint to match existing conditions.

### 3.3 SCHEDULE

- .1 Firestop and smoke seal at:
  - .1 Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls.
  - .2 Edge of floor slabs at curtain wall and precast concrete panels.
  - .3 Top of fire-resistance rated masonry and gypsum board partitions.
  - .4 Intersection of fire-resistance rated masonry and gypsum board partitions.
  - .5 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.
  - .6 Penetrations through fire-resistance rated floor slabs, ceilings and roofs.
  - .7 Openings and sleeves installed for future use through fire separations.
  - .8 Around mechanical and electrical assemblies penetrating fire separations.
  - .9 Rigid ducts: greater than 129 cm<sup>2</sup>: fire stopping to consist of bead of fire stopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.

### 3.4 CLEANING

- .1 Remove excess materials and debris and clean adjacent surfaces immediately after application.
- .2 Remove temporary dams after initial set of fire stopping and smoke seal materials.

END OF SECTION

## **PART 1. General**

### **1.1 RELATED SECTIONS**

- .1 Section 01 33 00 - Submittal Procedures.

### **1.2 REFERENCES**

- .1 American National Standards Institute/ American Society of Mechanical Engineers (ANSI/ASME)
  - .1 ANSI/ASME B31.1-01, Power Piping, (SI Edition).
- .2 American Society for Testing and Materials (ASTM)
  - .1 ASTM A307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
  - .2 ASTM A563, Specification for Carbon and Alloy Steel Nuts.
- .3 Factory Mutual (FM)
- .4 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)
  - .1 MSS SP58, Pipe Hangers and Supports - Materials, Design and Manufacture.
  - .2 MSS SP69, Pipe Hangers and Supports - Selection and Application.
  - .3 MSS SP89, Pipe Hangers and Supports - Fabrication and Installation Practices.
- .5 Underwriters Laboratories of Canada (ULC)

### **1.3 DESIGN REQUIREMENTS**

- .1 Construct pipe hanger and support to manufacturer's recommendations utilizing manufacturer's regular production components, parts and assemblies.
- .2 Base maximum load ratings on allowable stresses prescribed by ASME B31.1 or MSS SP58.
- .3 Ensure that supports, guides, anchors do not transmit excessive quantities of heat to building structure.
- .4 Design hangers and supports to support systems under all conditions of operation, allow free expansion and contraction, prevent excessive stresses from being introduced into pipework or connected equipment.
- .5 Provide for adjustments after erection and during commissioning. Amount of adjustment to be in accordance with MSS SP58.

### **1.4 PERFORMANCE REQUIREMENTS**

- .1 Design supports, platforms and hangers to withstand seismic events.

#### **1.5 SHOP DRAWINGS AND PRODUCT DATA**

- .1 Submit shop drawings and product data for the following items:
  - .1 Bases, hangers and supports.
  - .2 Connections to equipment and structure.
  - .3 Structural assemblies.

#### **1.6 CLOSEOUT SUBMITTALS**

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

#### **1.7 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction Demolition Waste Management and Disposal.

### **PART 2. General**

#### **2.1 GENERAL**

- .1 Fabricate hangers, supports and sway braces in accordance with ANSI B31.1 and MSS SP58.
- .2 Use components for intended design purpose only. Do not use for rigging or erection purposes.

#### **2.2 PIPE HANGERS**

- .1 Finishes:
  - .1 Pipe hangers and supports: hot dipped galvanized after manufacture.
  - .2 Use hot dipped galvanizing process.
  - .3 Ensure steel hangers in contact with copper piping are copper plated.
- .2 Upper attachment structural: Suspension from lower flange of I-Beam or embed in cast concrete.
  - .1 Cold piping NPS 2 maximum: Malleable iron C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip.

- .1 Rod: 13mm FM approved.
- .2 Cold piping 65 mm or greater, all hot piping: tie rod, nuts and washers, FM approved.
- .3 Upper attachment to concrete.
  - .1 Ceiling: Carbon steel welded eye rod, clevis plate, clevis pin and cotters with weldless forged steel eye nut. Ensure eye 6 mm minimum greater than rod diameter.
  - .2 Concrete inserts: wedge shaped body with knockout protector plate FM approved.
- .4 Shop and field-fabricated assemblies.
  - .1 Steel brackets: hot dipped galvanized after manufacture.
  - .2 Design to be under tensile stress only.
  - .3 Ensure design and manufacture allows for sufficient clearances to facilitate maintenance.
  - .4 Provide detailed shop drawings indicating material dimensions and anchorage.
- .5 Hanger rods: threaded rod material to MSS SP58.
  - .1 Ensure that hanger rods are subject to tensile loading only.
  - .2 Provide linkages where lateral or axial movement of pipework is anticipated.
- .6 Pipe attachments: material to MSS SP58.
  - .1 Attachments for steel piping: carbon steel galvanized.
  - .2 Use insulation shields for hot pipework.
- .7 Adjustable clevis: material to MSS SP69 FM approved, clevis bolt with nipple spacer and vertical adjustment nuts above and below clevis.
- .8 U-bolts: carbon steel to MSS SP69 with 2 nuts at each end to ASTM A563.
  - .1 Finishes for steel pipework: galvanized.

### **2.3 RISER CLAMPS**

- .1 Steel or cast iron pipe: galvanized carbon steel to MSS SP58, type 42, FM approved.
- .2 Bolts: to ASTM A 307
- .3 Nuts: to ASTM A563

### **2.4 EQUIPMENT ANCHOR BOLTS AND TEMPLATES**

- .1 Provide templates to ensure accurate location of anchor bolts.

## **2.5 PLATFORMS**

- .1 By manufacturer of storage tanks, fabricated from stainless steel grade 304.

## **PART 3. General**

### **3.1 MANUFACTURER'S INSTRUCTIONS**

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

### **3.2 INSTALLATION**

- .1 Install in accordance with:
  - .1 Manufacturer's instructions and recommendations.
- .2 Clamps on riser piping:
  - .1 Support independent of connected horizontal pipework using riser clamps and riser clamp lugs welded to riser.
  - .2 Bolt-tightening torques to be to industry standards.
  - .3 Steel pipes: Install below coupling or shear lugs welded to pipe.
  - .4 Cast iron pipes: Install below joint.
- .3 Clevis plates:
  - .1 Attach to concrete with 4 minimum concrete inserts, one at each corner.
- .4 Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.
- .5 Use approved constant support type hangers where:
  - .1 Vertical movement of pipework is 13 mm or more,
  - .2 Transfer of load to adjacent hangers or connected equipment is not permitted.

### **3.3 HANGER SPACING**

- .1 Plumbing piping to Canadian Plumbing Code and Authorities having jurisdiction.
- .2 Within 300 mm of each elbow
- .3 Vertical piping shall be supported at its base and at floor level by rests which can bear the weight of the pipe that is between it and the rest above it. Maximum spacing of vertical supports shall be 7.5 m.
- .4 Galvanized iron or steel pipe less than 150 mm: 2.5 m.
- .5 Galvanized iron or steel pipe 150mm diameter or greater: 3.75 m
- .6 Space hangers for piping to the following:

Maximum Pipe Size :	Maximum Spacing Steel
up to 32 mm	2.1 m
38 mm	2.7 m
50 mm	3.0 m

### 3.4 HANGER INSTALLATION

- .1 Install hanger so that rod is vertical under operating conditions.
- .2 Adjust hangers to equalize load.
- .3 Support from structural members. Where structural bearing does not exist or inserts are not in suitable locations, provide supplementary structural steel members.

### 3.5 HORIZONTAL MOVEMENT

- .1 Angularity of rod hanger resulting from horizontal movement of pipework from cold to hot position not to exceed 4 degrees from vertical.
- .2 Where horizontal pipe movement is less than 13 mm, offset pipe hanger and support so that rod hanger is vertical in the hot position.

### 3.6 FINAL ADJUSTMENTS

- .1 Adjust hangers and supports:

- .1 Ensure that rod is vertical under operating conditions.
- .2 Equalize loads.
  
- .2 Adjustable clevis:
  - .1 Tighten hanger load nut securely to ensure proper hanger performance.
  - .2 Tighten upper nut after adjustment.

**END OF SECTION**

**PART 1. GENERAL**

**1.1 DESCRIPTION OF WORK**

- .1 This Contractor is responsible for coordination with all other trades and for reviewing all other discipline's Contract Documents.
- .2 The Division 33 contractor shall remove the existing tank sensors and monitoring devices. The Division 25 Contractor shall remove controls wiring from these devices back to the existing TAC controllers as indicated.
- .3 The Controls Contractor shall supply and install new controllers, I/O modules, controls wiring, and auxiliary equipment to allow for the connection of three new aboveground oil tanks and equipment as indicated in the Contract Documents to the BMS.
- .4 Division 26 shall supply and install wiring from three new oil tank vacuum switches (supplied and installed by Division 33) to new remote tank monitors (supplied by Division 33 and installed by Division 26). Controls Contractor shall supply and install new controls wiring from the remote tank monitors to new controllers as indicated in the Contract Documents.
- .5 Supply and install wiring for three new oil tank radar level transmitters (supplied and installed by Division 33). Calibrate and program oil tank radar level transmitters as required.
- .6 Supply and install wiring for four flow meters (supplied and installed by Division 33). Calibrate and program flow meters as required.
- .7 Division 33 shall supply and install new aboveground double wall pipe leak monitoring system and cables. Controls Contractor shall supply and install controls wiring from the new system panel to the BMS for alarms as indicated.
- .8 Division 33 shall supply and install new transition sump leak detection system, sensors, and cables. Controls Contractor shall supply and install controls wiring from new system panel to the BMS for alarms as indicated.
- .9 Supply and install new alarm horn/strobes in the boiler plant and building exterior as indicated.

- .10 Supply and install new controls and control wiring for new tank field lighting (flood lights and lighting contactor by Electrical Contractor).
- .11 Division 33 shall supply and install new oil / water separator alarm system, sensor, and wiring. Controls Contractor shall supply and install controls wiring from new system panel to the BMS for alarms as indicated.
- .12 All new equipment shall be a direct extension of the existing LONWORKS FT-10 78kbps control network DDC system.
- .13 All new equipment and systems shall be fully compatible with all new and existing sensors, instrumentation, and monitoring equipment as indicated in the Contract Documents.
- .14 New graphics and programming of the existing system related to this project shall be by the existing controls service provider. This Contractor shall be responsible for acquiring these services and for carrying the associated costs under this Contract.

## 1.2 DETAILED DESCRIPTION OF WORK INCLUDED

- .1 Detailed control system design for the sequences and alarms as described using products of a standard of manufacture as specified herein. Detailed design shall include finalizing control product for materials involved and production of detailed wiring diagrams and location drawings for all connections required. The diagrams and drawings shall indicate the number and size of conductors required, and location/termination details to the numbered/lettered terminal strips or color coded wire leads involved. All device representation on the diagrams and location drawings shall be labeled as shown on the contract drawings.
- .2 Supply and installation of ancillary control device, relays, transformers, and miscellaneous control materials delivered to the site for installation by this trade or by others.
- .3 It shall be the responsibility of this Contractor to install, wire, program, and make fully operational, the connection of the devices indicated under this contract to the existing DDC system.
- .7 Necessary control, sensor, and monitoring device wiring shall be by this Contractor. Wiring shall be run in conduit or armoured cable as required. Voltage ratings requirements of

control wiring to be coordinated with Division 26. Armoured control cable shall be CSA rated for the environment in which it is installed.

- .8 This Contractor shall be responsible to supply and install conduit and cable from underground ducts or stub ups (by Division 26, reference Contract Drawings) to equipment and devices unless otherwise indicated. Boiler plant conduit shall be EMT, tank field conduit shall be galvanized steel in accordance with Section 26 05 34 - Conduit, Conduit Fastenings, and Conduit Fittings.
- .9 Spare 15A circuits in existing panels to be used for 120V feeds to control devices and panels. Coordinate with Division 26 for panel locations, wiring terminations, and labeling of panel circuits.
- .10 Alarms are to be dialed out to operation and maintenance personnel pagers as coordinated with Departmental Representative.
- .11 Existing application software shall be programmed as required by the existing controls service provider. This Contractor shall be responsible for acquiring these services and carrying the associated costs. Obtain contact information for current controls service provider from Departmental Representative.
- .12 The Owner shall be provided with copies of the source program and documentation necessary for the user to interpret it and make any changes necessary.
- .13 The existing Operator's Work Stations (OWS) linked to the control system shall be programmed by the existing controls service provider complete with graphics, input, output, and alarm screens for all control, sensors, and monitoring devices installed under this contract as per the contract documents. This Contractor shall be responsible for acquiring these services and carrying the associated costs.
- .14 All alarm outputs shall also be sent to the main EMCS post.

### 1.3 RELATED SECTIONS

- .1 Section 33 30 04 - Transition Sump Leak Detection System.

- .2 Section 33 30 05 - Aboveground Double Wall Pipe Leak Detection System.
- .3 Section 25 30 06 - Oil / Water Separator Alarm System.

#### **1.4 SUBMITTALS**

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop drawings:
  - .1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Submit completed control diagrams and location drawings, indicating all device positions, equipment device model numbers, set points, and wiring layouts.
  - .3 Submit technical literature on new components and samples as requested.
  - .4 Submit drawing of controller layout and construction proposed.
- .3 Operation and Maintenance Data and Service:
  - .1 Provide complete operation and maintenance data and control diagrams for incorporation into manual.
  - .2 Provide a plasticized copy of the appropriate record control diagram at each control panel or cabinet location.
  - .3 In addition to warranty and training requirements specified elsewhere, provide a sequence and device performance check every three months during the first year of operation, from date of acceptance. Conduct such tests in the presence of the Owner's service staff and report in writing the results and any resetting made, for each system.

#### **1.5 QUALITY ASSURANCE**

- .1 Site Visit: Contractor to visit site and become familiar with the project and all conditions which may affect costs. Ignorance of existing conditions will not be considered as basis for extra claims.
- .2 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 30 - Health and Safety Requirements.

#### **1.6 TESTING**

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- .1 This work shall include pre-delivery testing of major subsystems, field testing and adjustment of major subsystems and devices, and of the existing DDC system, and an on-site final operational acceptance test of the complete operational existing DDC system. Performance certification shall be provided by the Contractor.
  - .2 Site testing will consist of four phases as detailed below:
    - .1 Phase 1 - Construction and Preliminary Commissioning:
      - .1 The Contractor shall properly install the proposed and approved equipment, check all points for continuity and proper connection, and calibrate all sensors and devices. An all points list shall be forwarded to the Departmental Representative for review prior to start-up for approval.
      - .2 Deficiencies which may inhibit monitoring or control of the systems shall be brought to the attention of the Departmental Representative.
    - .2 Phase 2 - Start-Up:
      - .1 The Owner's representative shall be present as each system is brought on line. The Contractor will be responsible for making this switch over, using his own forces.
    - .3 Phase 3 - Final Start-Up:
      - .1 Prior to inspection, the Contractor must submit completed Verification Reports.
      - .2 The Contractor's field technician, the Owner's representative, and the Departmental Representative shall be present during this phase.
      - .4 The Contractor will simulate power failure and verify proper operation and recovery of systems.
      - .3 Modem operation will be demonstrated if applicable.
      - .4 Verify all I/O points with regards to proper operation. The Departmental Representative will randomly inspect 50% of each point type for input/output response. Any failure will result in termination of inspection and future 100% inspections will be at the Contractor's cost.
      - .5 All deficiencies shall be noted during this phase, and the Contractor shall correct these deficiencies within 7 days.
      - .6 The Departmental Representative and Owner will require testing and verification of all point commissioning. The Contractor is to commit the

necessary resources, manpower, and devices to allow the Departmental Representative to complete commissioning.

.4 Phase 4 - Final Inspection:

.1 This phase shall consist of verifying to Departmental Representative that the deficiencies as outlined in phase three have been rectified. Any remaining deficiencies will be corrected in one week by the Contractor and costs for additional inspection shall be billed to the Contractor.

.3 Material and equipment to be CSA certified. Where CSA certified material and equipment is not available, the Contractor shall submit a certificate from a testing organization adequately equipped and competent to perform such services, and approved by the Contracting Officer, stating that the item has been tested in accordance with the specified organization's test methods and that the item conforms to the specified organization's standard or code.

## 1.7 TRAINING

.1 Requirements for training as specified in Section 25 05 12 - Controls Training.

## 1.8 EXISTING CONDITIONS - CONTROL COMPONENTS

.1 Submit written request for permission to disconnect existing controls and to obtain equipment downtime before proceeding with Work.

.2 Assume responsibility for control, sensors, and monitoring devices to be incorporated into existing DDC system after written receipt of approval from the Departmental Representative.

.1 Be responsible for repair costs due to negligence or abuse of equipment.

.2 Responsibility for existing devices terminates upon final acceptance as approved by the Departmental Representative.

.3 Remove existing devices and wiring as indicated.

.4 Disconnect existing sensors and wiring and maintain for connection to new equipment as indicated.

## **PART 2. PRODUCTS**

### **2.1 ACCEPTABLE MATERIAL**

- .1 All new equipment shall be a direct extension of the existing LONWORKS FT-10 78kbps control network DDC system.
- .2 All new equipment and systems shall be fully compatible with all new and existing sensors, instrumentation, and monitoring equipment as indicated in the Contract Documents.

### **2.2 IDENTIFICATION**

- .1 Provide labels to identify all new control panels and monitoring devices as follows:
  - .1 Nameplates: 3 mm thick plastic engraving sheet, black face, white core, lettering accurately aligned and engraved into core, permanently attached.
  - .2 Wording on nameplates to be approved by Departmental Representative prior to manufacture.

## **PART 3. Execution**

### **3.1 INSTALLATION**

- .1 Install products using factory trained journeymen certified by the Province of Nova Scotia. Provide all control devices located in existing control panel.
- .2 Install controls, sensors, and ancillary equipment where indicated. Where position is not shown, install in a position best suited for proper operation.
- .3 Submit to Departmental Representative controls and sensors installation details prior to installation.

### **3.2 COMMISSIONING**

- .1 Controls, sensors, and monitoring devices to be properly set up and calibrated for sequences specified.
- .2 Put controls, sensors, and monitoring devices through specified sequences and verify correct operation on site. Make adjustments as required for proper operating condition. Allow

minimum additional two days for a competent technician involved in the project to fully demonstrate the sequences specified to the Departmental Representative.

### 3.3 GRAPHICS AND ALARMS

- .1 Provide a graphic for each new oil tank system at the operator work station (OWS) located in the boiler plant office (building A5). This graphic should import all the relevant real-time parameters, including:
  - .1 Tank #1 inventory level.
  - .2 Tank #2 inventory level.
  - .3 Tank #3 inventory level.
  - .4 New Pump #14 status.
  - .5 Existing Pump #11 status.
  - .6 Existing Pump #12 status.
  - .7 Existing Pump #13 status.
  - .8 Tank #1 supply oil flow meter line measurement.
  - .9 Tank #1 return oil flow meter line measurement.
  - .10 Tank #2 supply oil flow meter line measurement.
  - .11 Tank #2 return oil flow meter line measurement.
  - .12 Operator manual controls (on/off) for flood lighting.
  - .13 Operator adjustable controls (automatic timed setting) for flood lighting.
  - .14 All primary and secondary alarm states as indicated below.
- .2 Provide primary alarm notification consisting of graphical indications at the OWS, activation of boiler plant and exterior horn/strobes, and notification of the main EMCS post. Primary alarms to include:
  - .1 Tank #1 high level (alarm upon 90% capacity fill).
  - .2 Tank #2 high level (alarm upon 90% capacity fill).
  - .3 Tank #3 high level (alarm upon 90% capacity fill).
  - .4 Tank #1 low level (alarm upon 10% capacity fill).
  - .5 Tank #2 low level (alarm upon 10% capacity fill).
  - .6 Tank #3 low level (alarm upon 10% capacity fill).
  - .7 Tank #1 vacuum loss.
  - .8 Tank #2 vacuum loss.
  - .9 Tank #3 vacuum loss.

- .10 Transition Sump and basement leak sensor activation (alarm in from new sump leak detection system).
- .11 Aboveground double wall pipe leak detection (alarm in from new pipe leak monitoring system).
- .3 Provide secondary alarm notification consisting of graphical indications at the OWS and notification of the main EMCS post. Secondary alarms to include:
  - .1 Tank #1 midlevel indication (alarm upon 50% capacity fill).
  - .2 Tank #2 midlevel indication (alarm upon 50% capacity fill).
  - .3 Monthly inventory throughput loss of 1% or more.
  - .4 Three consecutive throughput losses greater than 200L/day.
  - .5 Pump #11 out of range amperage.
  - .6 Pump #12 out of range amperage.
  - .7 Pump #13 out of range amperage.
  - .8 Pump #14 out of range amperage.
  - .9 Tank #1 supply oil flow meter error indication.
  - .10 Tank #1 return oil flow meter error indication.
  - .11 Tank #2 supply oil flow meter error indication.
  - .12 Tank #2 return oil flow meter error indication.
  - .13 Tank #1 level meter error indication.
  - .14 Tank #2 level meter error indication.
  - .15 Tank #3 level meter error indication.
  - .16 Error indication from pipe leak monitoring system.
  - .17 Error indication from sump leak detection system.
  - .18 Oil / water separator sensor alarm from oil / water separator alarm system.

### 3.4 SEQUENCE OF OPERATIONS

- .1 Pumps 11 and 14 are to be run continuously. Alternate pumps on a weekly basis.
- .2 Pumps 12 and 13 are to be run continuously. Alternate pumps on a weekly basis.
- .3 Tank #1 and #2 switching sequence:

Upon the tank inventory dropping to the midlevel point (50% capacity fill), the associated pump set shall be stopped as to prohibit oil flow from the tank, and the midlevel alarm for that tank shall be indicated. The alternate pump set shall then be activated to allow oil to be provided by the other tank.

- .4 Floodlighting shall be automatically turned on and off at a predetermined daily "dusk to dawn" schedule. The operator shall be able to adjust this setting and to manually turn the floodlighting on and off through the OWS.

**END OF SECTION**

**PART 1. GENERAL**

**1.1 SECTION INCLUDES**

- .1 Requirements and procedures for training program, instructors, and training materials, for DDC Control System Work.

**1.2 RELATED SECTIONS**

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 25 05 01 - Common Work Results - Controls.

**1.3 SUBMITTALS**

- .1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit training proposal complete with hour-by-hour schedule including brief overview of content to Departmental Representative 30 days prior to the anticipated date of beginning of training. List name of trainer and type of A/V aids to be used.
- .3 Submit report within one week after completion of training program that training has been satisfactorily completed.

**1.4 QUALITY ASSURANCE**

- .1 Provide competent instructors thoroughly familiar with aspects of the new controls, systems, and the existing DDC system installed in the facility.
- .2 Departmental Representative reserves right to approve instructors.

**1.5 INSTRUCTIONS**

- .1 Provide instructions to designated personnel in adjustment, operation, maintenance and pertinent safety requirements of controls and systems installed.
- .2 Training to be project-specific.

**1.6 TIME FOR INSTRUCTION**

- .1 Two full 8-hour training sessions will be required for this project.

### **1.7 TRAINING MATERIALS**

- .1 Provide equipment, visual and audio aids, and materials for classroom training.
- .2 Supply manual for each trainee, describing in detail data included in each training program. Review contents of manual in detail to explain aspects of operation and maintenance (O&M).

### **1.8 TRAINING PROGRAM**

- .1 Program to begin at date and time mutually agreeable to Contractor and Departmental Representative.
- .2 Train O&M personnel in functional operations and procedures to be employed for systems operation.
- .3 Supplement with on-the-job training during 30 day test period.
- .4 Include overview of system architecture, communications, operation of OWS and peripherals, report generation.
- .5 Include detailed training on operator interface functions for control of mechanical systems, Control Description Logic (CDL's) for each system, and elementary preventive maintenance.
- .6 Equipment maintenance training: provide personnel with training in maintenance of controls equipment, including general equipment layout, trouble shooting, and preventive maintenance.

### **1.9 ADDITIONAL TRAINING**

- .1 List courses offered by name, duration and approximate cost per person per week. Note courses recommended for training supervisory personnel.

### **1.10 MONITORING OF TRAINING**

- .1 Departmental Representative to monitor training program and may modify schedule and content.

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PWGSC  
Replacement of Petroleum  
Storage Tanks, Bldg A5  
Springhill Institution  
Project# R.061879.001

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CONTROLS

Section 25 05 12

Page 3

2016-01-04

**END OF SECTION**

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**PART 1. GENERAL**

**1.1 DESCRIPTION OF WORK**

- .1 Supply and install new power feeds (including, but not limited to, circuit breakers, wiring, conduit, starters, and disconnect switches) for new mechanical equipment and systems as indicated under this contract.
- .2 Supply and install new 120 Volt power feeds (including, but not limited to, circuit breakers, wiring, and conduit) for new control panels, sensors, and devices as indicated under this contract.
- .3 Supply and install LED flood lighting and lighting contactor for new oil tank area as indicated.
- .4 Supply and install new underground duct, conduit under concrete tank slab, stub ups, junction boxes, vaults, conduit seals, supports, and equipment as indicated.
- .5 Install and mount three remote tank monitors as indicated (remote tank monitors shall be supplied by Division 33).

**1.2 REFERENCES**

- .1 Canadian Standards Association (CSA International)
  - .1 CSA C22.1-15, Canadian Electrical Code, Part 1 (23th Edition), Safety Standard for Electrical Installations.
  - .2 CAN3-C235-83(R2000), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.
- .2 Electrical and Electronic Manufacturer's Association of Canada (EEMAC)
  - .1 EEMAC 2Y-1-1958, Light Gray Colour for Indoor Switch Gear.
- .3 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)
  - .1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

**1.3 DEFINITIONS**

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

**1.4 DESIGN REQUIREMENTS**

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

#### 1.5 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop drawings:
  - .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Indicate details of construction, dimensions, capacities, weights, and electrical performance characteristics of equipment and material.
  - .3 Where applicable, include wiring, single line, and schematic diagrams.
- .3 Quality Control: in accordance with Section 01 45 00 - Quality Control.
  - .1 Submit test results of installed electrical systems and instrumentation.
  - .2 Permits and fees: in accordance with General Conditions of contract.
  - .3 Submit, upon completion of work, load balance report as described in PART 3 - LOAD BALANCE.
  - .4 Submit certificate of acceptance from Electrical Inspection Department upon completion of work to Departmental Representative.

#### 1.6 QUALITY ASSURANCE

- .1 Site Visit: Contractor to visit site and become familiar with the project and all conditions which may affect costs. Ignorance of existing conditions will not be considered as basis for extra claims.
- .2 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 30 - Health and Safety Requirements.

## **1.7 SYSTEM STARTUP**

- .1 Instruct Departmental Representative and Operating Personnel in operation, care and maintenance of systems, system equipment and components.
- .2 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that Operating Personnel are conversant with aspects of its care and operation.

## **1.8 OPERATING INSTRUCTIONS**

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

## **1.9 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 74 22 - Construction/Demolition Waste Management And Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal packaging material for recycling in accordance with Waste Management Plan.
- .4 Divert unused wiring materials from landfill to metal recycling facility.

## **PART 2. PRODUCTS**

### **2.1 MATERIALS AND EQUIPMENT**

- .1 Provide material and equipment in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Material and equipment to be CSA certified. Where CSA certified material and equipment is not available, obtain special approval from Electrical Inspection Department.
- .3 Factory assemble control panels and component assemblies.

## 2.2 WARNING SIGNS

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

## 2.3 WIRING TERMINATIONS

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

## 2.4 EQUIPMENT IDENTIFICATION

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

NAMEPLATE SIZES

letters

- .2 Wording on nameplates to be approved by Departmental Representative prior to manufacture.
- .3 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
- .4 Disconnects, starters and contactors: indicate equipment being controlled and voltage.
- .5 Terminal cabinets and pull boxes: indicate system and voltage.
- .6 Transformers: indicate capacity, primary and secondary voltages.

**2.5 WIRING IDENTIFICATION**

- .1 Identify branch circuit wiring, including neutral conductors, at both ends, including all junction boxes located in between, with permanent indelible identifying markings indicating panel and circuit number (i.e. J-12).
- .2 Maintain phase sequence and colour coding throughout.
- .3 Colour coding: to CSA C22.1.
- .4 Use colour coded wires in communication cables, matched throughout system.

**2.6 CONDUIT AND CABLE IDENTIFICATION**

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

	Prime	Auxiliary
up to 250 V	Yellow	
up to 600 V	Yellow	Green
up to 5 kV	Yellow	Blue

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

## 2.7 FINISHES

- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
  - .1 Paint outdoor electrical equipment "equipment green" finish to EEMAC Y1-1.
  - .2 Paint indoor switchgear and distribution enclosures light gray to EEMAC 2Y-1.

## PART 3. EXECUTION

### 3.1 INSTALLATION

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

### 3.2 NAMEPLATES AND LABELS

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

### 3.3 CONDUIT AND CABLE INSTALLATION

- .1 Install cables, conduits, and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.

### 3.4 MOUNTING HEIGHTS

- .1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.
- .2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation. Install electrical equipment at following heights unless indicated otherwise.
  - .1 Panelboards: as required by Code or as indicated.

### 3.5 CO-ORDINATION OF PROTECTIVE DEVICES

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

### 3.6 FIELD QUALITY CONTROL

- .1 Load Balance:
  - .1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.
  - .2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.
  - .3 Provide upon completion of work, load balance report as directed in PART 1 - SUBMITTALS: phase and neutral currents on panelboards, dry-core transformers and motor control centers, operating under normal load, as well as hour and date on which each load was measured, and voltage at time of test.
- .2 Conduct following tests in accordance with Section 01 45 00 - Quality Control.
  - .1 Power distribution system including phasing, voltage, grounding and load balancing.
  - .2 Circuits originating from branch distribution panels.
  - .3 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.
  - .4 Insulation resistance testing:
    - Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
    - Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
    - Check resistance to ground before energizing.
- .3 Carry out tests in presence of Departmental Representative.

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

### **3.7 CLEANING**

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

### **3.8 INCIDENTAL WORK REQUIREMENTS**

- .1 All cutting and patching incidental to all electrical work shall be in accordance with Section 01 10 10 - General Instructions.
- .2 Firestopping as indicated in accordance with Section 07 84 00 - Firestopping.

**END OF SECTION**

**PART 1. GENERAL**

**1.1 REFERENCES**

- .1 Section 26 05 00 - Common Work Results - Electrical.
- .2 All removal or modifications of electrical construction to be carried out in accordance with safety standards outlined in the Canadian Electrical Code 2015.

**1.2 DEFINITIONS**

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

**1.3 PROTECTION**

- .1 Contractor shall be responsible for any damages to existing structure and equipment as a result of this work.

**1.4 RE-USE OF MATERIALS**

- .1 Materials and equipment identified on drawings as being re-used are to be taken down, reinstalled, etc. as required to allow for new construction.
- .2 Contractor must identify any damaged equipment or materials intended for re-use prior to demolition and point out deficiencies to Departmental Representative at that time.

**1.5 DISPOSAL**

- .1 Prior to demolition, Departmental Representative will identify any items of electrical equipment which are to be set aside as directed for future use by owner. Contractor shall provide a list of equipment being removed for Departmental Representative's review.
- .2 All other materials and equipment removed under work of this Section become property of the Contractor for disposal off site.
- .3 All electrical equipment determined to be environmentally hazardous shall be disposed of in accordance with NS Department of Environment instructions and guidelines and Environment Canada regulations. These guidelines must be

strictly adhered to. Contractor must obtain and familiarize themselves with proper disposal methods.

## **1.6 SCHEDULING**

- .1 Contractor must note that normal operations are to be maintained and work activities must be coordinated to maintain electrical services in occupied areas. Contractor shall provide any temporary work.
- .2 Overtime work and work outside normal work hours as deemed necessary to accomplish this scheduling are the responsibility of the Contractor and must meet the requirements of the Department of Labour. All costs from such overtime must be included in the Contractor's Estimated Total Tender Price.
- .3 Essential services including, but not limited to, Fire Alarm, security, emergency and exit lighting, telephone and data systems must be maintained in operation at all times. All shutdowns required for this work must be minimized and planned and coordinated with schedules provided by Departmental Representative.

## **PART 2. PRODUCTS - NOT APPLICABLE**

## **PART 3. EXECUTION**

### **3.1 GENERAL REMOVALS**

- .1 Schedule all removal work with Departmental Representative. Do not disrupt operations except as permitted by schedule.
- .2 Contractor shall be responsible for re-energizing, terminating, and verifying functionality of all existing circuitry disabled by work carried out under this contract.

**END OF SECTION**

**PART 1. GENERAL**

**1.1 SECTION INCLUDES**

- .1 Materials and installation for wire and box connectors.

**1.2 RELATED SECTIONS**

- .1 Section 26 05 21 - Wire and Cables.

**1.3 REFERENCES**

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

**PART 2. PRODUCTS**

**2.1 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, as required to: CAN/CSA-C22.2 No.18.

**PART 3. EXECUTION**

**3.1 INSTALLATION**

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

- .1 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. Replace insulating cap.

**END OF SECTION**

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**PART 1. GENERAL**

**1.1 RELATED SECTIONS**

- .1 Section 26 05 20 - Wire and Box Connectors.

**1.2 REFERENCES**

- .1 CSA C22.2 No .0.3-96, Test Methods for Electrical Wires and Cables.

**1.3 SUBMITTALS**

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

**PART 2. PRODUCTS**

**2.1 BUILDING WIRES**

- .1 Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG.
- .2 Copper conductors: size as indicated, with 600 V min. insulation of chemically cross-linked thermosetting polyethylene material rated RW90.

**2.2 ARMOURED CABLES**

- .1 Conductors: insulated, copper, size as indicated.
- .2 Type: AC90.

**2.3 TECK CABLE**

- .1 Cable: to CAN/CSA-C22.2 No. 131.
- .2 Conductors:
  - .1 Grounding conductor: copper.
  - .2 Circuit conductors: copper, size as indicated.
- .3 Insulation:
  - .1 Type: ethylene propylene rubber.
  - .2 Chemically cross-linked thermosetting polyethylene rated type RW90, 600 V.

- .4 Inner jacket: polyvinyl chloride material.
- .5 Overall covering: thermoplastic material.
- .6 Fastenings:
  - .1 One hole steel straps to secure surface cables 50 mm and smaller. Two hole steel straps for cables larger than 50 mm.
- .7 Connectors:
  - .1 Watertight approved for TECK cable.

### **PART 3. EXECUTION**

#### **3.1 INSTALLATION OF BUILDING WIRES**

- .1 Install wiring as follows:
  - .1 In conduit systems in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

#### **3.2 INSTALLATION OF ARMOURED CABLES**

- .1 Group cables wherever possible.
- .2 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors - 0 - 1000 V.

#### **3.3 INSTALLATION OF TECK CABLE 0 -1000 V**

- .1 Install cables.
  - .1 Group cables wherever possible on channels.
- .2 Terminate cables in accordance with Section 26 05 20- Wire and Box Connectors - 0 - 1000 V.

**END OF SECTION**

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**PART 1. GENERAL**

**1.1 RELATED SECTIONS**

- .1 Section 26 05 20 - Wire and Box Connectors (0-1000V).

**1.2 SUBMITTALS**

- .1 Submit shop drawings for buried vaults in accordance with Section 01 33 00 - Submittal Procedures.

**PART 2. PRODUCTS**

**2.1 JUNCTION AND PULLBOXES**

- .1 Welded steel construction with screw-on flat covers for surface mounting.
- .2 Covers with 25 mm minimum extension all around, for flush-mounted pull and junction boxes.
- .3 Weatherproof complete with gasketing and watertight conduit and cable fittings where indicated.

**2.2 STEEL WIRING VAULTS**

- .1 Heavy duty weatherproof, watertight junction box, sizes as indicated to CSA C22.2 No.25.
- .2 Heavy duty cover rated for vehicular traffic to AASTO H-20 (7258 kg wheel load).
- .3 Hot dipped galvanized steel body, dimensions as indicated.
- .4 Hot dipped galvanized steel checkered cover with external flange for flush mounting, complete with neoprene gasket cemented to cover.
- .5 Stainless steel tamper proof cover screws.

**2.3 HDPE WIRING VAULTS**

- .1 CSA listed high density polyethylene (HDPE) pull box vault, suitable for direct burial, dimensions as indicated.
- .2 Weatherproof, water tight, HDPE bolted lid rated 5 kN, for flush mounting with grade.
- .3 Stainless steel tamper proof cover screws.

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**PART 3. EXECUTION**

**3.1 JUNCTION, PULL BOXES INSTALLATION**

- .1 Install pull boxes in inconspicuous but accessible locations.
- .2 Install pull boxes so as not to exceed 30m of conduit run between pull boxes.
- .3 Install weatherproof junction boxes for stub ups, in electrical vaults, and in transition sump pits with adequate conduit and cable outlets as indicated.

**3.2 STEEL WIRING VAULT INSTALLATION**

- .1 Install as per manufacturer's instructions and in accordance with other trades.
- .2 Install boxes such that covers are flush with finished grade of concrete slab.
- .3 Fully seal joint between boxes and concrete slab.
- .4 Make watertight all conduit penetrations.

**3.3 ELECTRICAL VAULT INSTALLATION**

- .1 Install as per manufacturer's instructions and in accordance with other trades.
- .2 Install boxes such that covers are flush with finished grade.
- .3 Install complete with internal vertical separator for isolation of controls and instrumentation and power wiring.
- .4 Make watertight all conduit penetrations.

**3.4 IDENTIFICATION**

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

**END OF SECTION**

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**PART 1. GENERAL**

**1.1 RELATED SECTIONS**

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

**PART 2. PRODUCTS**

**2.1 SUPPORT CHANNELS**

- .1 Galvanized, U shape, size 41 x 41 mm, 2.5 mm thick, surface mounted unless otherwise indicated.

**PART 3. EXECUTION**

**3.1 INSTALLATION**

- .1 Support equipment, conduit, or cables using clips, spring loaded bolts, cable clamps, u-bolts, 6 mm threaded rod, designed as accessories to basic channel members.
- .2 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.
- .3 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Departmental Representative.
- .4 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

**END OF SECTION**

**PART 1. GENERAL**

**1.1 RELATED SECTIONS**

- .1 Section 26 05 46 - Underground Cable Ducts.

**1.2 REFERENCES**

- .1 Canadian Standards Association (CSA International)
  - .1 CAN/CSA C22.2 No.18-98(R2003), Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.
  - .2 CSA C22.2 No.83-M1985(R2003), Electrical Metallic Tubing.

**1.3 SUBMITTALS**

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

**PART 2. PRODUCTS**

**2.1 CONDUITS**

- .1 Rigid metal conduit: to CSA C22.2 No. 45, galvanized steel threaded.
- .2 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings.
- .3 Rigid PVC conduit: to CSA C22.2 No. 211.2.

**2.2 CONDUIT FASTENINGS**

- .1 One hole steel straps to secure surface conduits 50 mm and smaller.
- .2 Two hole steel straps for conduits larger than 50 mm.

**2.3 CONDUIT FITTINGS**

- .1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified. Coating: same as conduit.
- .2 Ensure factory "ells" where 90 degrees bends for 25 mm and larger conduits.

## **2.4 CONDUITS IN HAZARDOUS LOCATIONS**

- .1 Install explosion proof, threaded conduit sealing fittings, rated Class 1, Zone 2 where indicated.
- .2 Fittings shall be CEC Class I, Div 2 compliant, suitable for horizontal or vertical installation.
- .3 Fitting shall have threaded hubs to match conduit c/w integral bushings, and threaded sealing compound opening.
- .4 Sealing compound shall be CEC Class I, Div 2 compliant, cUL listed, rated for -40 to 165 F.
- .5 Install sealing compound to form complete seal between fitting bushings and conduit and conductors entering hub.

## **2.5 FISH CORD**

- .1 Polypropylene.

## **PART 3. EXECUTION**

### **3.1 MANUFACTURER'S INSTRUCTIONS**

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

### **3.2 INSTALLATION**

- .1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.
- .2 All conduit penetrations as indicated shall be sealed and firestopped as per Section 07 84 00 - Firestopping.
- .3 Install conduit sealing fittings in hazardous areas, fill with compound.
- .4 Conceal conduits except in mechanical and electrical service rooms, attic, and crawlspace.
- .5 Surface mount conduits.

- .6 Minimum conduit size for lighting and power circuits: NPS  $\frac{3}{4}$ " (19 mm).
- .7 Bend conduit cold: Replace conduit if kinky or flattened more than  $\frac{1}{10}$ <sup>th</sup> of its original diameter.
- .8 Mechanically bend steel conduit over 19 mm diameter.
- .9 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.
- .10 Maximum conduit support spacing:
  - .1 1.5m for 21mm trade size conduit.
  - .2 2m for 27mm and 35mm trade size conduit.
  - .3 3m for 41mm and larger.
- .11 Install fish cord in empty conduits.
- .12 Remove and replace blocked conduit sections.
  - .1 Do not use liquids to clean out conduits.
- .13 Dry conduits out before installing wire.

### 3.3 SURFACE CONDUITS

- .1 Run parallel or perpendicular to building lines.
- .2 Run conduits in flanged portion of structural steel.
- .3 Do not pass conduits through structural members except as indicated. Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

### 3.4 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.

### 3.5 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

**PART 1. GENERAL**

**1.1 RELATED SECTIONS**

- .1 Section 26 05 00 - Common Work Results - Electrical.
- .2 Section 26 05 21 - Wires and Cables (0-1000 V).
- .3 Section 26 05 34 - Conduits, Conduit Fastenings, and Conduit Fittings.
- .4 Section 26 05 46 - Underground Concrete Encased Duct Banks.
- .5 Section 31 23 10 - Excavating, Trenching and Backfilling.

**1.2 REFERENCES**

- .1 Canadian Standards Association (CSA)

**PART 2. PRODUCTS**

**2.1 PVC DUCTS AND FITTINGS**

- .1 Rigid PVC ducts and fittings type DB2 for direct burial.
- .2 Rigid PVC couplings, reducers, bell end fittings, plugs, caps, adaptors, conduit, and junction boxes, as required to make complete installation.
- .3 Rigid PVC 90° and 45° bends as required.
- .4 Rigid PVC 5° angle couplings as required.
- .5 Expansion joints as recommended by manufacturer.
- .6 Waterproof fittings, seals, and cable glands for connection to sump pits, electrical vaults, and equipment stub ups. Install as per manufacturer's instructions.

**2.2 WIRING**

- .1 As indicated by the contract drawings and specifications.

**2.3 MARKERS**

- .1 Marker Tape: Red polyethylene marker type 75 mm wide with labeled black lettering "Warning - Electrical Power Cable Below".

### **PART 3. EXECUTION**

#### **3.1 DUCT INSTALLATION**

- .1 Install duct in accordance with manufacturer's instructions.
- .2 Clean inside of ducts before installation.
- .3 Ensure full, even support every 1.5 m throughout duct length.
- .4 Slope ducts with 1 to 400 minimum slope.
- .5 During construction, cap ends of ducts to prevent entrance to foreign materials.
- .6 Pull through each duct wooden mandrel not less than 300 mm long and of diameter 6 mm less than internal diameter of duct, followed by stiff bristle brush to remove sand, earth and other foreign matter. Pull stiff bristle brush through each duct immediately before pulling-in cables.
- .7 In each duct install pull rope continuous throughout each duct run with 3m spare rope at each end.
- .8 Install markers as required.
- .9 Install expansion joints in conduit systems in all rises above grade and in all connections to fixed equipment.

#### **3.2 CABLE INSTALLATION IN DUCTS**

- .1 Install cables as indicated in ducts.
- .2 Do not pull spliced cables inside ducts.
- .3 Install multiple cables in duct simultaneously.
- .4 Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.
- .5 To facilitate matching of colour coded multi-conductor control cables reel off in same direction during installation.

- .6 Before pulling cable into ducts and until cables are properly terminated, seal ends of non-leaded cables with moisture seal tape.
- .7 After installation of cables, seal duct ends with duct sealing compound.

### 3.3 FIELD QUALITY CONTROL

- .1 Perform tests as follows:
  - .1 Perform tests using qualified personnel. Provide necessary instruments and equipment.
  - .2 Check phase rotation and identify each phase conductor of each feeder.
  - .3 Check each feeder for continuity, short circuits, and grounds. Ensure resistance to ground of circuits is not less than 50 megohms.
- .2 Pre-acceptance tests:
  - .1 After installing cable but before splicing and terminating, perform insulation resistance test with 1000 V megger on each phase conductor.
  - .2 Check insulation resistance after each splice and/or termination to ensure that cable system is ready for acceptance testing.
- .3 Acceptance Tests:
  - .1 Ensure that terminations and accessory equipment are disconnected.
  - .2 Ground shields, ground wires, metallic armour and conductors not under test.
  - .3 High Potential (Hipot) Testing:
    - .1 Conduct hipot testing to IEEE 400 and in accordance with manufacturer's recommendations.
- .4 Provide Consultant with list of test results showing location at which each test was made, circuit tested and result of each test.
- .5 Remove and replace entire length of cable if cable fails to meet any of test criteria.

END OF SECTION

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**PART 1. GENERAL**

**1.1 GENERAL**

- .1 The contractor shall verify locations of all existing underground obstructions and services prior to digging trenches.
- .2 The contractor shall coordinate with other trades and become familiar with all other discipline's contract documents and proposed equipment installations prior to digging trenches. All conflicts shall be reported prior to commencing work.

**1.2 RELATED SECTIONS**

- .1 Section 03 30 00 - Cast in Place Concrete.
- .2 Section 26 05 00 - Common Work Results - Electrical.
- .3 Section 26 05 21 - Wires and Cables (0-1000 V).
- .4 Section 26 05 23 - Splitters, Junction, Pull Boxes, and Cabinets.
- .5 Section 26 05 34 - Conduits, Conduit Fastenings, and Conduit Fittings.
- .6 Section 26 05 45 - Buried Cable and Ducts.
- .7 Section 31 23 10 - Excavating, Trenching and Backfilling.

**1.3 REFERENCES**

- .1 Canadian Standards Association (CSA)

**PART 2. PRODUCTS**

**2.1 PVC DUCTS AND FITTINGS**

- .1 Rigid PVC ducts and fittings type DB2 for direct burial.
- .2 Rigid PVC split ducts.
- .3 Rigid PVC couplings, reducers, bell end fittings, plugs, caps, and adaptors as required to make complete installation.
- .4 Rigid PVC 90° and 45° bends as required.

- .5 Rigid PVC 5° angle couplings as required.
- .6 Expansion joints as recommended by manufacturer.
- .7 Waterproof fittings, seals, and cable glands for connection to electrical vaults. Install as per manufacturer's instructions.

## **2.2 SOLVENT WELD COMPOUND**

- .1 Solvent weld compound for PVC duct joints.

## **2.3 CABLE PULLING EQUIPMENT**

- .1 Continuous 6mm stranded nylon pull rope, tensile strength 5 kN, in each conduit

## **2.4 MARKERS**

- .1 Marker Tape: Red polyethylene marker type 75 mm wide with labeled black lettering "Warning - Electrical Power Cable Below".

## **PART 3. EXECUTION**

### **3.1 DUCT BANK INSTALLATION**

- .1 Install reinforced concrete encased underground duct banks, including form work.
- .2 Build duct bank on undisturbed soil or on well-compacted granular fill not less than 150mm thick, compacted to 95% of maximum proctor dry density.
- .3 Open trench completely before ducts are laid and ensure that no obstructions will necessitate change in grade of ducts.
- .4 Install ducts at elevations and with slope as indicated and minimum slope of 1 to 400.
- .5 Install base spacers at maximum intervals of 1.5m levelled to grades indicated for bottom layer of ducts.
- .6 Lay PVC ducts with configuration and reinforcing as indicated with preformed interlocking, rigid plastic intermediate spacers to maintain horizontal spacing between ducts as indicated. Stagger joints in adjacent layers at

- least 150mm and make joints watertight. Encase duct bank with 50mm thick concrete cover.
- .7 Use galvanized steel conduit for sections extending above finished grade level.
  - .8 Make transpositions, offsets, and changes in direction using 5 degree bends sections, do not exceed a total of 20 degrees with duct offset.
  - .9 Terminate duct runs with a duct coupling set flush with the end of the concrete envelope when dead ending duct bank for future extension.
  - .10 Cut, ream, and taper end of ducts infield to manufacturer's recommendations, so that duct ends are fully equal to factory-made ends.
  - .11 Allow concrete to attain 50% of its specified strength before backfilling.
  - .12 Use anchors, ties, and trench jacks as required to secure ducts and prevent moving during pouring of concrete. Tie ducts to spacers with twine or other non-metallic material. Remove weights or wood braces before concrete has set and fill voids.
  - .13 Clean ducts before laying. Cap ends during construction and after installation to prevent entrance of foreign materials.
  - .14 In each duct install pull rope continuous throughout each duct run with 3m spare rope at each end.
  - .15 Immediately after pouring of concrete, pull through each duct a mandrel followed by a stiff bristle brush to remove sand, earth and other foreign matter. Avoid disturbing or damaging ducts where concrete has not set completely. Pull stiff bristle brush through each duct immediately before pulling in cables.
  - .16 Install four 3m lengths of 15m reinforcing rods, one in each corner of duct bank when connecting duct to buildings.
  - .17 Install markers as required.
  - .18 Install expansion joints in conduit systems in all rises above grade and in all connections to fixed equipment.
  - .19 Concrete for encasement of electrical ducts shall be in accordance with CSA Standards (minimum concrete strength of 32MPa).

**END OF SECTION**

**PART 1. GENERAL**

**1.1 RELATED SECTIONS**

- .1 Section 26 05 00 - Common Work Results - Electrical.
- .2 Section 26 29 10 - Combination Motor Starters to 600V.

**1.2 REFERENCES**

- .1 Canadian Standards Association (CSA)
  - .1 CSA C22.2 No.248.12-94. Low Voltage Fuses Part 12: Class R (Bi-National Standards with, UL 248-12 (first Edition).

**1.3 SUBMITTALS**

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

**1.5 MAINTENANCE MATERIALS**

- .1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals
- .2 Six spare fuses of each type and size installed up to and including 600 A.

**PART 2. PRODUCTS**

**2.1 FUSES GENERAL**

- .1 Fuse type reference L1, L2, J1, R1, etc. have been adopted for use in this specification.
- .2 Fuses: product of one manufacturer for entire project.

**2.2 FUSE TYPES**

- .1 Class J Fuses (formerly HRCI-J).
  - .1 Type J1, time delay, capable of carrying 500% of its rated current for 10 s minimum.
  - .2 Type J2, fast acting.
  - .3 200kA interrupting rating, 600 volt, rating as indicated.

**PART 3. EXECUTION**

**3.1 INSTALLATION**

- .1 Install fuses in mounting device immediately before energizing circuit.
- .2 Ensure correct fusing fitted to physically match mounting devices.
- .3 Ensure correct fuses fitted to assigned electrical circuit.

**END OF SECTION**

**PART 1. GENERAL**

**1.1 SECTION INCLUDES**

- .1 Materials and installation for moulded case circuit breakers.

**1.2 RELATED SECTIONS**

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

**1.3 REFERENCES**

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

**1.4 SUBMITTALS**

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

**PART 2. PRODUCTS**

**2.1 BREAKERS GENERAL**

- .1 Moulded case circuit breakers and 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.
- .3 Plug-in moulded case circuit breakers: quick- make, quick-break type, for manual and automatic operation.
- .4 Common-trip breakers: with single handle for multi-pole applications.
- .5 Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting.
- .6 Circuit breakers to have minimum 10kA symmetrical rms interrupting capacity rating.

**PART 3. EXECUTION**

**3.1 INSTALLATION**

- .1 Install circuit breaker in existing spare bucket in existing MCC as per manufacturer's instructions, size and rating as indicated. Install mounting equipment, door handle, and make door modifications as required.
- .2 Install circuit breakers compatible with existing panel board as per manufacturer's instructions as required, size and rating as indicated.

**END OF SECTION**

**PART 1. GENERAL**

**1.1 RELATED SECTIONS**

- .1 Section 26 05 00 - Common Work Results - Electrical.
- .2 Section 26 28 14 - Fuses Low Voltage.

**1.2 REFERENCES**

- .1 Canadian Standards Association (CSA)
  - .1 CSA C22.2 No.4-M89 (R2000), Enclosed Switches.
  - .2 CSA C22.2 No.39-M89 9R2003), Fuseholder Assemblies.
- .2 International Electrotechnical Commission (IEC)
  - .1 IEC 947-4-1-1990, Part 4: Contactors and Motor Starters.

**1.3 SUBMITTALS**

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate:
  - .1 Mounting method and dimensions.
  - .2 Starter type and size.
  - .3 Layout of identified internal and front panel components.
  - .4 Enclosure type and dimensions.
  - .5 Wiring diagram for each type of starter.
  - .6 Interconnection diagrams.
- .3 Provide operations and maintenance data for each type and style of motor starter for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

**PART 2. PRODUCTS**

**2.1 COMBINATION STARTERS**

- .1 Combination magnetic starters of size, type, rating and enclosure type as indicated with components as follows:
  - .1 Contactor solenoid operated, rapid action type.
  - .2 Motor overload protective device in each phase, manually reset from outside enclosure with front door closed.
  - .3 Wiring and schematic diagram inside starter enclosure in visible location.

- .4 Identify each wire and terminal for external connections, within starter, with permanent number marking identical to diagram.
- .2 Combination type starters to include fused disconnect switch with operating lever on outside of enclosure to control disconnect as follows:
  - .1 Fusible disconnect switch complete with fusing in enclosure to CSA C22.2 No.4. Size, rating, and enclosure as indicated
  - .2 Provision for padlocking in ON/OFF switch position by multiple padlocks.
  - .3 Mechanically interlocked door to prevent opening when handle in ON position.
  - .4 Quick make - quick break action.
  - .5 ON-OFF switch position indication on enclosure cover.
  - .6 Fuseholder: to CSA C22.2 No 39, suitable without adaptors, for type and size of fuse indicated
- .3 Accessories:
  - .1 Hand/Off/Auto standard, labelled as indicated.
  - .2 Overload relays manually reset from front with door closed.
  - .3 Indication lamp.

## **2.2 EQUIPMENT IDENTIFICATION**

- .1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results - Electrical.
- .2 Indicate name of load controlled on Size 2 nameplate.

## **PART 3. EXECUTION**

### **3.1 INSTALLATION**

- .1 Install starters, connect power and control as indicated.
- .2 Ensure correct fuses and overload devices elements installed.

### **3.2 FIELD QUALITY CONTROL**

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results Electrical General Requirements, and manufacturer's instructions.
- .2 Operate switches, contactors to verify correct functionality.

- .3 Perform starting and stopping sequences of contactors and relays.
- .4 Check that sequence controls, interlocking with other separate related starters, equipment, control devices, operate as indicated.

**END OF SECTION**

**PART 1. GENERAL**

**1.1 SECTION INCLUDES**

- .1 Materials and installation for exterior site and tank area lighting.

**1.2 RELATED SECTIONS**

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

**1.3 REFERENCES**

- .1 Canadian Standards Association (CSA)
  - .1 CSA C22.2 No.137-M1981 (R2009), Electric Luminaires for Use in Hazardous Locations.

**1.4 SUBMITTALS**

- .1 Submit complete shop drawings for luminaires, driver, and mounting equipment in accordance with Section 01 33 00 - Submittal Procedures.

**PART 2. PRODUCTS**

**2.1 LED FLOOD LIGHTS**

- .1 CSA certified C22.2 No. 137.
- .2 LEDs and Driver:
  - .1 High efficiency LEDs, 6300 lumen output, 5000k.
  - .2 347 volt AC, 126 nominal watts, 0.85 PF.
- .3 Luminaire:
  - .1 Copper free aluminum housing with epoxy powder coat.
  - .2 Silicone gaskets, shatter resistant glass lens, stainless steel external hardware, complete with pipe slip fitter mounting.
  - .3 Replaceable driver and LEDs.
  - .4 Operating temperature range: -40 to 50 degrees Celsius.
  - .5 Rated life: 60,000 hours.
  - .6 NEMA 4X rated, approved for wet locations.
  - .7 Approved for Class 1, Zone 2 Hazardous location.
- .4 Acceptable product or approved equal:
  - .1 Cooper Crouse-Hinds - Champ Series FMV9LCY/347-SFA6.

## **2.2 LIGHTING CONTACTOR**

- .1 Contactors: to CSA C22.2 No.14.
- .2 Controlled as indicated and rated for load controlled.
- .3 Complete with 1 normally open and 1 normally closed auxiliary contacts unless indicated otherwise.
- .4 Mount in CSA Enclosure type 1.
- .5 Include following options in cover:
  - .1 Hand-Off-Auto selector switch.
- .6 Control transformer: in contactor enclosure.
- .7 Provide equipment identification in accordance with Section 26 05 01 - Common Work Results - Electrical.

## **PART 3. EXECUTION**

### **3.1 INSTALLATION**

- .1 Locate and install luminaires as indicated.
- .2 Connect luminaires to lighting circuits as indicated.
- .3 Verify final tilt and orientation upon final installation.
- .4 Install lighting contactor in enclosure in main electrical room as indicated.
- .5 Connect auxiliary connection controls wiring (by Division 25).

**END OF SECTION**

**PART 1. GENERAL**

**1.1 RELATED SECTIONS**

- .1 Section 01 10 10 - General Instructions
- .2 Section 01 35 43 - Environmental Procedures

**1.2 REGULATIONS**

- .1 Shore and brace excavations, protect slopes and banks and perform all work in accordance with Provincial and Municipal regulations whichever is more stringent.
- .2 Materials and workmanship must meet or exceed requirements of specified standards, codes and referenced documents.

**1.3 TESTING & REVIEWS**

- .1 Testing of materials and compaction of backfill will be carried out by a testing laboratory designated by the departmental Representative.
- .2 Not later than 48 h before backfilling or filling with approved material, notify the Consultant so that compaction tests can be carried out by designated testing agency.
- .3 Before commencing work, conduct, with the Departmental Representative, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks and paving, survey bench marks and monuments which may be affected by work.

**1.4 BURIED SERVICES**

- .1 Before commencing work, establish the location of all buried services on and adjacent to the site.
- .2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work. Pay costs of relocating services.

### **1.5 INTERPRETATION OF DOCUMENTS**

- .1 Division 01 sections take precedence over the technical specification sections in other Divisions of the Specification Manual.

### **1.5 COST BREAKDOWN**

- .1 Before submitting first progress claim submit breakdown of Contract price in detail. Required forms will be provided for application of progress payment.
- .2 List items of work numerically following the same division/section number system of the specification manual and thereafter sub-divide into major work components and building systems.
- .3 Cost breakdowns will be used as basis for progress payment.

### **1.6 DOCUMENTS REQUIRED**

- .1 Maintain at job site, one copy each of the following:
  - .1 Project Drawings
  - .2 Project Specifications
  - .3 Addenda
  - .4 Reviewed Shop Drawings
  - .5 List of outstanding shop drawings
  - .6 Change Orders
  - .7 Other modifications to Contract
  - .8 Field Test Reports
  - .9 Copy of Accepted Work Schedule
  - .10 Health and Safety Plan and other safety related documents
  - .11 Other documents as stipulated elsewhere in the Contract Documents.

### **1.8 PERMITS**

- .1 In accordance with the General Conditions, obtain and pay for permits, certificates, licenses and other as required by municipal, provincial and federal authorities.
- .2 Provide appropriate notifications of project to municipal and provincial inspection authorities.
- .3 Obtain compliance certificates as prescribed by legislative and regulatory provisions of municipal, provincial and federal authorities as applicable to the performance of work.

- .4 Submit to Departmental Representative, a copy of application forms and approval documents received from above referenced authorities.

**1.5 PROTECTION**

- .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 Consultant'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.

**PART 2. PRODUCTS**

**2.1 GRAVELS**

- .1 Gravels: Pit run or manufactured sand and gravel consisting of hard durable particles free of deleterious materials such as weak rock, organics, mud, frozen ground, ice, snow, and foreign matter (such as asphalt or concrete, etc.); and shall meet the following gradation requirements when tested to ASTM C136 and ASTM C117:

Type-1		Type-2	
Sieve Size	% Passing	Sieve Size	% Passing
20,000	100	80,000	100
14,000	50 - 85	56,000	70 - 100
5,000	20 - 50	28,000	50 - 80
160	5 - 12	14,000	35 - 65
80	3 - 8	5,000	20 - 50
		160	5 - 12
		80	0 - 7

**2.2 SELECT FILL**

- .1 Select fill: approved, well-graded pit run or manufactured sand and gravel. Soil free of deleterious materials such as weak rock, organics, mud, frozen material, rock in excess of 150 mm on any dimension, and foreign matter (concrete, asphalt, etc.). Sandstone materials are considered acceptable.

- .2 Native till materials may be used as select fill if their in-situ water contents are maintained and they meet the specification as described above.

### 2.3 PIPE BEDDING

- .1 Sewer and water pipe bedding shall consist of approved well graded sand or granular material free of clay, frozen lumps, organic and deleterious material, and shall meet the following gradation requirements when tested to ASTM C136 and ASTM C117:

Sieve Size	% Passing
38 mm	100
25 mm	95 - 100
19 mm	90 - 100
9.5 mm	60 - 100
4.75 mm	35 - 80
2.36 mm	15 - 60
0.300 mm	0 - 30
0.075 mm	0-10

## PART 3. EXECUTION

### 3.1 CLEARING & GRUBBING

- .1 Remove trees, stumps, logs, brush, shrubs, bushes, vines, undergrowth, rotten wood, dead plant material, exposed boulders and debris within THE "Extent of Construction" areas designated on drawings.
- .2 Remove stumps and tree roots below footings, slabs, and paving, and to 600 mm below finished grade elsewhere.
- .3 Dispose of cleared and grubbed material off site daily to disposal areas acceptable to authority having jurisdiction.

### 3.2 EXCAVATION

- .1 Strip topsoil 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. Stockpile topsoil on site for later use.
- .2 Excavate as required to carry out work, in all materials met. Do not disturb soil or rock below bearing surfaces. Notify Consultant when excavations are complete. If bearings are unsatisfactory,

additional excavation will be authorized in writing and paid for as additional work. Excavation taken below depths shown without Consultant's written authorization to be filled with concrete of same strength as for footings at Contractor's expense.

- .3 Excavate trenches to provide uniform continuous bearing and support for 150 mm thickness of pipe bedding material on solid and undisturbed ground. Trench widths below point 150 mm above pipe not to exceed diameter of pipe plus 600 mm.
- .4 Excavate for trenching and roadways to subgrade levels. In addition, remove all topsoil, organic matter, debris and other loose and harmful matter encountered at subgrade level.

### **3.3 BACKFILLING**

- .1 Inspection: do not commence backfilling until fill material and spaces to be filled have been inspected and approved by Consultant.
- .2 Harmful matter: remove all snow and ice, construction debris, organic soil and free standing water from spaces to be filled.
- .3 Lateral support: maintain even levels of backfill around structures as work progresses, to equalize earth pressures.
- .4 Compaction of subgrade: compact existing subgrade under walks, paving, and slabs on grade, to same compaction as specified for fill. Fill excavated areas with select subgrade material compacted as specified for fill.
- .5 Place backfill, fill and base course material in maximum 300 mm lifts.
- .6 Compact each layer by rollers, mechanical tampers, or other suitable equipment to obtain a density of not less than 98% Standard Proctor Density, with the following exceptions:
  - .1 Gravel under paved surface to 100% Standard Proctor Density.
  - .2 Clear stone to 70% Standard Proctor Density.

**END OF SECTION**

**PART 1. GENERAL**

**1.1 RELATED SECTIONS**

- .1 Section 03 30 00 - Cast-in-Place Concrete
- .2 Section 31 14 11 - Earthwork and Related Work
- .3 Section 33 30 00 - Precast Manholes, Catch Basins and Structures
- .4 Section 01 33 00 - Submittal Procedures

**1.2 STANDARDS**

- .1 Nova Scotia Transportation and Infrastructure Renewal Standard Specification - Highway Construction and Maintenance.
- .2 Transportation Association of Canada: Manual of Uniform Traffic Control Devices for Canada

**PART 2. PRODUCTS**

**2.1 MATERIALS**

- .1 Asphalt materials: to Province of Nova Scotia Department of Transportation and Infrastructure Renewal Standard Specification - Highway Construction and Maintenance.

**2.2 ASPHALT CONCRETE**

- .1 Asphalt concrete mix: to Nova Scotia Transportation and Infrastructure Renewal Standard Specification - Highway Construction and Maintenance, Division 4, Section 4, mix Type C.

**PART 3. EXECUTION**

**3.1 GENERAL**

- .1 Use workers skilled in placing asphalt concrete.

### **3.2 FINE GRADING**

- .1 Fine grade gravel surface to within 10mm of elevations and cross sections indicated immediately prior to placement of asphalt materials. Add or remove gravel as required. Compact to 100% Standard Proctor Density.

### **3.3 ADJUSTING TOPS OF COSTING**

- .1 Prior to placing asphalt surface course: of Castings:
  - .1 Adjust manhole covers and catch basin frames to match asphalt surface, using manufactured or cast-in-place grade rings where applicable.
  - .2 Adjust valve boxes to finished asphalt surface. Raise or lower top sections of valve boxes where applicable.

### **3.4 PRIME COAT**

- .1 When required by the Project Documents, apply prime coat to Nova Scotia Transportation and Infrastructure Renewal Standard Specification - Highway Construction and Maintenance, Division 4, Section 5.

### **3.5 TACK COAT**

- .1 Apply tack coat on existing asphalt concrete to Nova Scotia Transportation and Infrastructure Renewal Standard Specification - Highway Construction and Maintenance, Division 4, Section 1. Apply tack coat to contact surface of curbs, castings and structures.

### **3.6 PAVING**

- .1 Transport, place and compact asphalt concrete mix to Province of Nova Scotia Department of Transportation and Infrastructure Renewal Standard Specification - Highway Construction and Maintenance. Construct pavement within specified tolerances to lines, elevations, cross sections and dimensions at locations indicated.
- .2 Thickness of new asphalt concrete paving to match existing.

**END OF SECTION**

**PART 1. GENERAL**

**1.1 RELATED SECTIONS**

- .1 Section 03 30 00 - Cast-in-Place Concrete
- .2 Section 31 14 11 - Earthwork and Related Work
- .3 Section 01 33 00 - Submittal Procedures

**1.2 STANDARDS**

- .1 ASTM F657-07, Standard Practice for Installation of Chain Link Fence.
- .2 CAN/CGSB-138.1M-97, Fabric for Chain Link Fence.
- .3 CAN/CGSB-138.2M-96, Steel Framework for Chain Link Fence.
- .4 CAN/CGSB-138.3M-96, Installation of Chain Link Fence.
- .5 CAN/CGSB-138.4M-96, Gates for Chain Link Fence.

**1.3 SHOP DRAWINGS**

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

**1.4 CERTIFICATES**

- .1 Submit manufacturer's test data and certification that products and materials meet requirements of this Section and in accordance with Section 01 33 00 Submittal Procedures.

**1.5 HANDLING & STORAGE**

- .1 Handle and store fence materials in such a Storage manner as to avoid damage. Do not damage coatings.

**PART 2. PRODUCTS**

**2.1 MATERIALS**

- .1 Posts, rails, and Fittings: to CAN2-138.2-M, schedule 40, galvanized steel.
- .2 Fabric and coating: to CAN2-138.1-M.

**PART 3. EXECUTION**

**3.1 GRADING**

- .1 Remove debris and correct ground undulations along fence line to obtain smooth uniform gradient between posts. Provide clearance between bottom of fence and ground surface of 30mm to 50mm.

**3.2 ERECTION OF FENCE**

- .1 Erect fence along lines as indicated and in accordance with CAN/CGSB-138.3.
- .2 Excavate post holes to dimensions indicated.
- .3 Space line posts 3m apart, measured parallel to ground surface.
- .4 Space straining posts at equal intervals not exceeding 150m if distance between end or corner posts on straight continuous lengths of fence over reasonably smooth grade is greater than 150m.
- .5 Install additional straining posts at sharp changes in grade.
- .6 Install corner post where change in alignment exceeds 10°.
- .7 Install end posts at end of fence and at buildings. Install gateposts on both sides of gate openings.
- .8 Place concrete in post holes then embed posts into concrete to depths indicated. Extend concrete 50mm above ground level and slope to drain away from posts. Brace to hold posts in plumb position and true to alignment and elevation until concrete has set.

- .9 When driving posts directly into the ground or setting posts in bedrock as an approved method, driving depths, diameter of drill hole, grouting compound and the like shall be as specified in the Project Documents.
- .10 Do not install fence fabric until concrete has cured sufficiently. Submit concrete mix to Departmental Representative for review.
- .11 Install brace between end and gate posts and nearest line post, at inclination as indicated. Install braces on both sides of corner and straining posts in similar manner.
- .12 Install overhang tops and caps.
- .13 Install top rail between posts and fasten securely to posts and secure waterproof caps and overhang tops.
- .14 Install bottom tension wire, stretch tightly and fasten securely to end, corner, gate and straining posts with turnbuckles and tension bar bands.
- .15 Lay out fence fabric. Stretch tightly to tension recommended by manufacturer and fasten to end, corner, gate and straining posts with tension bar secured to post with tension bar bands spaced at 300mm intervals. Knuckled selvedge at bottom. Twisted selvedge at top.
- .16 Secure fabric to top rails, line posts and bottom tension wire with tie wires at 450 mm intervals. Give tie wires minimum two twists.
- .17 Install barbed wire strands and clip securely to lugs of each projection where indicated.
- .18 Install grounding rods as indicated.

### **3.3 INSTALLATION OF GATES**

- .1 Install gates in locations as indicated.
- .2 Level ground between gate posts and set gate bottom approximately 40mm above ground surface.
- .3 Install gate stops at all gate locations.

### **3.4 TOUCH UP**

- .1 Clean damaged surfaces with wire brush removing loose and cracked coatings. Apply two coats of organic zinc-rich paint to damaged areas. Pretreat damaged surfaces according to manufacturers' instructions for zinc-rich paint.

### **3.5 CLEANING**

- .1 Clean and trim areas disturbed by operations. Dispose of surplus material and replace damaged turf with sod.

**END OF SECTION**

**PART 1. GENERAL**

**1.1 RELATED SECTIONS**

- .1 Section 03 30 00 - Cast-in-Place Concrete
- .2 Section 31 14 11 - Earthwork and Related Work
- .3 Section 33 40 00 - Storm Sewers and Culverts
- .4 Section 01 33 00 - Submittal procedures

**1.2 STANDARDS**

- .1 ASTM A48/A48M-03(R2008), Gray Iron Castings.
- .2 ASTM C478M-08, Precast Reinforced Concrete Manhole Sections (Metric)
- .3 CAN/CSA A257 Series-03, Standards for Concrete Pipe and Manhole Sections.
- .4 CAN/ULC S701-05, Thermal Insulation, Polystyrene Boards and Pipe Covering

**1.3 SHOP DRAWINGS**

- .1 Submit Shop Drawings to the Departmental Representative for review prior to construction as per Section 01 33 00.

**1.4 HANDLING AND STORAGE**

- .1 Prevent damage to materials during storage and handling.
- .2 Store gaskets in cool location out of direct sunlight, and away from petroleum products.

**PART 2. PRODUCTS**

**2.1 MATERIALS**

- .1 Precast Bases and Sections:
  - .1 Precast Concrete Bases and Sections: to ASTM and Sections C478M or CSA A257.

- .2 Gaskets:
  - .1 O-Rings: to manufacturer's standard.
  - .2 Bituminous Compound: precast manufacturer's recommended compound.
  
- .3 Frames, covers and gratings:
  - .1 to ASTM A48, gray cast iron, factory coated.

### **PART 3. EXECUTION**

#### **3.1 PREPARATION**

- .1 Carefully inspect products for defects and remove defective products from site.

#### **3.2 EXCAVATION AND BACKFILLING**

- .1 Do excavating and backfilling to Section 31 14 11 earthwork and Related Work.

#### **3.3 INSTALLATION**

- .1 Construct units as indicated.
- .2 Complete units as pipe laying progresses.
- .3 Cast or set base on 150 mm thick pipe bedding or material as indicated in the Project Documents compacted to 95% Standard Proctor Density or as indicated. Top of base to be level.
- .4 Place stubs at elevations and in positions indicated. Provide flexible pipe joints within 1m of outside face of poured-in-place and precast structure where there is no in-wall gasket for pipe sizes up to and including 750mm diameter.
- .5 Form manhole bases to provide smooth U-shaped channels with depth equal to diameter of pipes or as indicated. Curve channels smoothly and slope uniformly from inlet to outlet. Benching to drain towards channel, 4% maximum slope.

- .6 Install base section of precast shafting on cast-in-place base as indicated and assure watertight joint.
- .7 Install gaskets in accordance with manufacturer's published instructions.
- .8 Install precast sections plumb and true with opening centered over upstream pipe.
- .9 Make all joints watertight in sanitary sewer manholes and valve chambers.
- .10 Install ladder if required by Project Documents.
- .11 Set frame and cover or grating to elevation and slope indicated. Use cast-in-place concrete for adjustment and secure frame in place with cement grout or use manufactured type.
- .12 Clean debris and foreign material from unit. Remove fins and sharp projections. Prevent debris from entering system.

### **3.3 INSTALLATION IN EXISTING SYSTEM**

- .1 Installing units in existing systems:
  - .1 Where new unit is to be installed in existing run of pipe, ensure full support of existing pipe during installation, and carefully remove that portion of existing pipe to dimensions required and install new unit as specified.
  - .2 Make joints watertight between new unit and existing pipe.
  - .3 Where deemed expedient to maintain service around existing pipes and when systems constructed under this project are ready to be put in operation, complete installation with appropriate break-outs, removals, redirection of flows, blocking unused pipes or other necessary work.

### **3.4 TESTING**

- .1 Test manholes and catch basins.
- .2 Provide labour, equipment and materials required to perform testing.
- .3 Backfill prior to testing.

- .4 Notify the Departmental Representative 24 hours in advance of proposed test. Do test in presence of the Departmental Representative.
  
- .5 Test method:
  - .1 Water testing: perform test as follows:
    - .1 If water used for flushing or testing is obtained from a potable water supply, the potable water supply is to be continuously separated from the service being flushed or tested by an air gap or a level of protection equal to or greater than that provided by a double check valve backflow prevention device.
    - .2 Plug all inlet and outlet pipes with watertight plugs.
    - .3 Fill with water to top of precast sections.
    - .4 Allow time for initial absorption.
    - .5 Measure and record volume of water required to maintain level for one hour.
    - .6 Leakage not to exceed 5.0 litres per hour per 1000 mm diameter per 1000 mm of height above groundwater.
    - .7 Locate and repair defects if test fails. Retest using same methodology.
    - .8 Repair leaks regardless of test results.
  
- .6 Vacuum Testing:
  - .1 Plug all inlet and outlet pipes. Restrain pipes.
  - .2 Place and seal vacuum tester head on manhole frame.
  - .3 Draw vacuum of 250mm Hg on the manhole and measure the time for the vacuum to drop to 225mm Hg.
  - .4 Time to be not less than 45, 50, 65, and 80 seconds for manhole diameters of 1050mm, 1200mm, 1500mm, and 1800mm respectively.
  - .5 For manholes deeper than 6m, increase test times by 2 seconds per 300mm of additional manhole depth.
  - .6 Locate and repair defects if test fails. Retest using same methodology.
  - .7 Repair leaks regardless of test results.

**END OF SECTION**

**PART 1. GENERAL**

**1.1 DESCRIPTION**

- .1 The system shall continuously monitor new transition sump sensors for the presence of hydrocarbons and water, as well as, alarms from existing basement leak sensors. Detected leaks shall be indicated at the system console and communicated to the boiler plant OWS and main site monitoring station via the existing DDC system.
- .2 System as described shall be supplied and installed by Division 33. Connection of system to the BMS as indicated shall be by the Controls Contractor.

**1.2 RELATED SECTIONS**

- .1 Section 25 05 01 - Common Work Results - Controls.
- .2 Section 33 56 13 - Aboveground Fuel Tanks.

**1.3 REFERENCES**

- .1 Canadian Standards Association (CSA International)
  - .1 CAN/CSA-E60079-11-02(R2006) - Electrical Apparatus for Explosive Gas Atmospheres.
  - .2 CSA C22.1-06, Canadian Electrical Code, Part 1 (20th Edition), Safety Standard for Electrical Installations.

**1.4 SUBMITTALS**

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate:
  - .1 Complete descriptive system diagram of console showing interconnection of sensors, input modules, output modules, relays, communication ports and modules, and electrical connections.
  - .2 Enclosure dimensions and mounting details.
  - .3 Operating specifications.
  - .4 Sensor technical data, wiring diagrams, and installation instructions.
  - .5 Sensor leader cable technical data and instructions.
  - .6 Manufacturer's installation instructions for specified equipment and devices.

- .3 Provide operations and maintenance data for complete system for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

## **1.5 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 74 22 - Construction/Demolition Waste Management And Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal packaging material for recycling in accordance with Waste Management Plan.
- .4 Divert unused wiring materials from landfill to metal recycling facility.

## **PART 2. PRODUCTS**

### **2.1 STANDARDS COMPLIANCE**

- .1 All equipment and materials shall conform to the standards or certifications of the Canadian Standards Association (CSA) or Canadian Underwriters Laboratory (cUL).

### **2.2 GENERAL**

- .1 The complete system including, but not limited to, console, I/O modules, sensors and sensor cables, and connectors shall be of a single manufacturer.
- .2 Accepted manufacturers are as follows:
  - .1 OPW Fuel Management Systems
  - .2 Veeder-Root
  - .3 Franklin Fueling Systems

### **2.3 SYSTEM CONSOLE**

- .1 Surface mounted, microprocessor based leak detection controller, with multiline LCD display. Visible alarm, warning, and power indicators. Nonvolatile memory for event history.
- .2 Integrated keypad for programming, setup, and configuration.

- .3 Continuous leak monitoring capabilities.
- .4 Sufficient input modules for quantity of sensors as indicated in the Contact Documents. Provide one spare input module.
- .5 Sufficient relay output modules for functionality as indicated in the Contact Documents. Provide one spare relay module.
- .6 Alarm output provisions for connection to existing DDC system.
- .7 Minimum operating temperature range: 0 to 40 degrees Celsius.
- .8 Programmable water and oil alarm level set points.
- .9 This Contractor shall be responsible for providing console that is fully compatible with new and existing sensors as indicated and is fully functional as indicated.
- .10 Acceptable product:
  - .1 OPW Fuel Management Systems - SiteSentinel Series
  - .2 Veeder-Root - TLS-350 Series
  - .3 Franklin Fueling Systems - TS-5 Series

#### **2.4 MAGNETORESTRICTIVE SENSORS**

- .1 Discriminating, fast acting, containment sump sensors.
- .2 Capable of detecting and differentiating the presence of both hydrocarbons and water.
- .3 Compatible with No. 2 fuel oil.
- .4 Minimum operating temperature range: -40 to 60 degrees Celsius.
- .5 Sensor alarm and warning conditions:
  - .1 Fuel high level alarm.
  - .2 Water high level alarm.
  - .3 Sensor malfunction alarm.
- .6 Sensors shall be intrinsically safe and approved for Class 1 - Zone 1 hazardous rated locations.
- .7 Acceptable product:
  - .1 OPW Fuel Management Systems - 30-0232-DH-20 Series
  - .2 Veeder-Root - 857080 Series
  - .3 Franklin Fueling Systems - TMS-DMS Series

### **PART 3. EXECUTION**

#### **3.1 INSTALLATION**

- .1 Perform complete installation as to provide a complete, operational system as described in the Contract Drawings and Specifications.
- .2 Coordinate installation with all other trades. Reference Mechanical and Electrical Contract Documents for transfer sump and conduit routing details.
- .3 Install alarm console as indicated in the Contract Documents and in accordance with the manufacturer's requirements.
- .4 Connect existing sensor and equipment wiring to new console.
- .5 Install new sensors as indicated in the Contract Documents and in accordance with the manufacturer's requirements. Install all required sensor cables and wiring and connect to new console as per manufacturer's instructions.
- .6 Connect communications ports to existing DDC system as indicated.

#### **3.2 FIELD QUALITY CONTROL**

- .1 Program console and alarm settings for complete functionality as indicated.
- .2 All new and existing sensors are to be properly set up and calibrated.
- .3 Test all sensors under listed alarm conditions and verify operation of console display, indicators, and console outputs to existing DDC system. Make adjustments as required for proper operating condition.

#### **3.3 TESTING AND COMMISSIONING**

- .1 Calibrate and test field devices for accuracy and performance in accordance with Section 01 91 13 - Commissioning (Cx) Plan.

**END OF SECTION**

**PART 1. GENERAL**

**1.1 DESCRIPTION**

- .1 The system shall continuously monitor the interstitial space of new aboveground double wall piping for the presence of hydrocarbons. Detected leaks shall be indicated at the main system console and communicated to the boiler plant OWS and main monitoring station via the existing DDC system.
- .2 System as described shall be supplied and installed by Division 33. Connection of system to the BMS as indicated shall be by the Controls Contractor.

**1.2 RELATED SECTIONS**

- .1 Section 25 05 01 - Common Work Results - Controls.
- .2 Section 33 56 13 - Aboveground Fuel Tanks.

**1.3 REFERENCES**

- .1 Canadian Standards Association (CSA International)
  - .1 CAN/CSA-E60079-11-02(R2006) - Electrical Apparatus for Explosive Gas Atmospheres.
  - .2 CSA C22.1-06, Canadian Electrical Code, Part 1 (20th Edition), Safety Standard for Electrical Installations.

**1.4 SUBMITTALS**

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate:
  - .1 Overall system architecture indicating console, modules, and sensing cable layouts and lengths.
  - .2 Complete console layout showing interconnection of input modules, output modules, communication ports and modules, and electrical connections.
  - .3 Enclosure dimensions and mounting details.
  - .4 Operating specifications.
  - .5 Sensing cable technical data, wiring diagrams, and installation instructions.
  - .6 Manufacturer's installation instructions for specified equipment and devices.

- .3 Provide operations and maintenance data for complete system for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

### **1.3 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 74 22 - Construction/Demolition Waste Management And Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal packaging material for recycling in accordance with Waste Management Plan.
- .4 Divert unused wiring materials from landfill to metal recycling facility.

## **PART 2. PRODUCTS**

### **2.1 STANDARDS COMPLIANCE**

- .1 All equipment and materials shall conform to the standards or certifications of the Canadian Standards Association (CSA) or Canadian Underwriters Laboratory (cUL).

### **2.2 GENERAL**

- .1 The complete system including, but not limited to, monitoring and alarm console, modules, sensing cable, leader cable, connectors, splices, and sensing cable terminations shall be of a single manufacturer.
- .2 Accepted manufacturers are as follows:
  - .1 PermAlert Environmental Specialty Products
  - .2 Tyco Thermal Controls
  - .3 Approved alternate manufacturer

### **2.3 SYSTEM CONSOLE**

- .1 Surface mounted, microprocessor leak detection controller, with LCD display. Visible alarm, warning, and power indicators. Nonvolatile memory for event history.
- .2 Integrated keypad for programming, setup, and configuration.
- .3 Multiple leak detection capabilities.

- .4 Sufficient interface modules to monitor 110% of the total overall sensing cable length as required in the Contact Documents.
- .5 4-20mA communication port for connection to existing DDC system.
- .6 Minimum operating temperature range: 0 to 40 degrees Celsius.
- .7 Precision: +/- 0.1% of total circuit length.
- .8 Metric units.
- .9 Minimum alarm outputs:
  - .1 Leak detection alarm.
  - .2 Leak location.
  - .3 Sensing cable fault alarm.
- .10 This Contractor shall be responsible for providing console that is fully compatible with sensing cables as indicated and is fully functional as indicated.
- .11 Acceptable product:
  - .1 Tyco Thermal Controls - TraceTek TTDM Series.
  - .2 PermAlert Environmental Specialty Products - PAL-AT Series.
  - .3 Approved alternate.

#### **2.4 FUEL SENSING CABLE**

- .1 Non-resettable, liquid hydrocarbon sensing cable.
- .2 Capable of detecting hydrocarbon fuels at any point along its length within 1 meter, without reacting to water.
- .3 Core consisting of:
  - .1 Two sensing wires.
  - .2 Alarm signal wire.
  - .3 Continuity wire.
  - .4 Conductive polymer jacket.
- .4 Outer fluoropolymer braid.
- .5 Typical response time for #2 diesel fuel - 120 minutes at 20 degrees Celsius.
- .6 Operating temperature range: -20 to 60 degrees Celsius.
- .7 Sensing cable shall be intrinsically safe and approved for Class 1 - Zone 1 hazardous rated locations.
- .8 Acceptable product:

- .1 PermAlert Environmental Specialty Products - PAL-AT TFH Series
- .2 Tyco Thermal Controls - TraceTek TT5000 Series
- .3 Approved alternate.

### **PART 3. EXECUTION**

#### **3.1 INSTALLATION**

- .1 Perform complete installation as to provide a complete, operational system as described in the Contract Drawings and Specifications.
- .2 Coordinate installation with all other trades. Reference Mechanical and Electrical Contract Documents for aboveground double wall pipe and conduit routing details.
- .3 Install monitoring console in boiler plant office as indicated in the Contract Documents and in accordance with the manufacturer's requirements.
- .4 Install new sensing cable as indicated in the Contract Documents and in accordance with the cable manufacturer's instructions and the pipe installer's requirements.
- .5 Install all required sensing cable, leader cables, splices, connectors, terminations, and interface equipment and connect to new console as per manufacturer's requirements.
- .6 Install zener safety barrier and other safety equipment in accordance with local authority having jurisdiction and manufacturer's requirements.
- .7 Connect communications ports to existing DDC system as indicated.

#### **3.2 FIELD QUALITY CONTROL**

- .1 Program console for complete functionality as indicated.
- .2 Properly setup and calibrate console for complete functionality as indicated.
- .3 Test continuity of sensing cable as per manufacturer's instructions. Verify operation of console display, alarm indicators, and console output to existing DDC system. Make adjustments as required for proper operating condition.

#### **3.3 TESTING AND COMMISSIONING**

- .1 Calibrate and test field devices for accuracy and performance in accordance with Section 01 91 13 - Commissioning (Cx) Plan.

**END OF SECTION**

**PART 1. GENERAL**

**1.1 DESCRIPTION**

- .1 The system shall continuously monitor the oil/water separator for the presence of hydrocarbons. Detected oil shall be indicated at the main control unit and communicated to the boiler plant OWS and main monitoring station via the existing DDC system.
- .2 System as described shall be supplied and installed by Division 33. Connection of system to the BMS as indicated shall be by the Controls Contractor.

**1.2 RELATED SECTIONS**

- .1 Section 25 05 01 - Common Work Results - Controls.

**1.3 REFERENCES**

- .1 Canadian Standards Association (CSA International)
  - .1 CAN/CSA-E60079-11-02(R2006) - Electrical Apparatus for Explosive Gas Atmospheres.
  - .2 CSA C22.1-06, Canadian Electrical Code, Part 1 (20th Edition), Safety Standard for Electrical Installations.

**1.4 SUBMITTALS**

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate:
  - .1 Overall system architecture indicating console, modules, and sensor.
  - .2 Complete console layout showing interconnection of input modules, output modules, communication ports and modules, and electrical connections.
  - .3 Enclosure dimensions and mounting details.
  - .4 Operating specifications.
  - .5 Sensor technical data, wiring diagrams, and installation instructions.
  - .6 Manufacturer's installation instructions for specified equipment and devices.
- .3 Provide operations and maintenance data for complete system for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

### **1.3 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 74 22 - Construction/Demolition Waste Management And Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal packaging material for recycling in accordance with Waste Management Plan.
- .4 Divert unused wiring materials from landfill to metal recycling facility.

## **PART 2. PRODUCTS**

### **2.1 STANDARDS COMPLIANCE**

- .1 All equipment and materials shall conform to the standards or certifications of the Canadian Standards Association (CSA) or Canadian Underwriters Laboratory (cUL).
- .2 Accepted manufacturers are as follows:
  - .1 Arjay Engineering Ltd
  - .2 Approved alternate manufacturer

### **2.2 GENERAL**

- .1 The complete system including, but not limited to, control unit and sensor shall be of a single approved manufacturer.

### **2.3 CONTROL UNIT**

- .1 Intelligent alarm controller, with backlit LCD display and keypad in surface mounted NEMA 4X polycarbonate enclosure.
- .2 Visible alarm (red) and power (green) indicator lights.
- .3 Alarm buzzer mounted on enclosure.
- .4 Display shall indicate oil level in metric units.
- .5 Integrated keypad for programming, setup, and configuration.
- .6 120 VAC power input.
- .7 Two 10 amp @240 VAC SPDT alarm relays.

- .8 4-20mA analog output for connection to existing DDC system.
- .9 Minimum operating temperature range: -20 to 55 degrees Celsius.
- .10 This Contractor shall be responsible for providing control unit that is fully compatible with sensor as indicated and is fully functional as indicated.
- .11 Acceptable product:
  - .1 Arjay Engineering Ltd - 2852-OWS Series.
  - .2 Approved alternate.

#### **2.4 SENSOR**

- .1 High frequency capacitive level probe to monitor dielectric change between the water and surface oil.
- .2 PTFE active probe with 316 stainless steel probe shield.
- .3 Cast aluminum, epoxy coated explosion proof junction head.
- .4 Length of probe as required for installation in oil water man hole as per manufacturer's instructions.
- .5 Operating temperature range: -60 to 55 degrees Celsius.
- .6 Sensor shall be approved for Class 1 - Zone 1 hazardous rated locations.
- .7 Acceptable product:
  - .1 Arjay Engineering Ltd - PAA Series.
  - .2 Approved alternate.

### **PART 3. EXECUTION**

#### **3.1 INSTALLATION**

- .1 Perform complete installation as to provide a complete, operational system as described in the Contract Drawings and Specifications.
- .2 Coordinate installation with all other trades. Reference Electrical Contract Documents for conduit routing details.
- .3 Install control unit in boiler plant office as indicated in the Contract Documents and in accordance with the manufacturer's requirements.

- .4 Install new sensor as indicated in the Contract Documents and in accordance with the manufacturer's requirements. Install all required wiring and connect to new control unit as per manufacturer's instructions.
- .5 Install zener safety barrier and other safety equipment in accordance with local authority having jurisdiction and manufacturer's requirements.
- .6 Connect alarm outputs to existing DDC system as indicated.

### **3.2 FIELD QUALITY CONTROL**

- .1 Program control unit and alarm settings for complete functionality as indicated.
- .2 Properly install, set up, and calibrate sensor.
- .3 Test sensor under listed alarm conditions and verify operation of console display, indicators, and console outputs to existing DDC system. Make adjustments as required for proper operating condition.

### **3.3 TESTING AND COMMISSIONING**

- .1 Calibrate and test field devices for accuracy and performance in accordance with Section 01 91 13 - Commissioning (Cx) Plan.

**END OF SECTION**

**PART 1. GENERAL**

**1.1 RELATED SECTIONS**

- .1 Section 03 30 00 - Cast-in-Place Concrete
- .2 Section 31 14 11 - Earthwork and Related Work
- .3 Section 33 30 00 - Precast Manholes, Catch Basins and Structures
- .4 Section 01 33 00 - Submittal Procedures

**1.2 STANDARDS**

- .1 ASTM C14M-07, Concrete Sewer, Storm Drain, and Standards Culvert Pipe (Metric).
- .2 ASTM C76M-08a, Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe (Metric).
- .3 ASTM D1056-07, Flexible Cellular Materials - Sponge or Expanded Rubber.
- .4 CSA-G401-M-07, Corrugated Steel Pipe Products.
- .5 CAN/CSA A257 Series-03, Standards for Concrete Pipe and Manhole Sections.
- .6 CAN/CSA B1800 Series-06, Thermoplastic Non- Pressure Piping Compendium.

**1.3 SHOP DRAWINGS**

- .1 Submit Shop Drawings to the Departmental Representative for review prior to construction as per Section 01 33 00.

**1.4 HANDLING AND STORAGE**

- .1 Prevent damage to materials during storage and handling.
- .2 Store gaskets in cool location out of direct sunlight, and away from petroleum products.

**PART 2. PRODUCTS**

**2.1 MATERIALS**

- .1 Plastic Pipe and Fittings:
  - .1 Pipe:
    - .1 PVC DR35
  - .2 Fittings:
    - .1 Approved petroleum-resistant gaskets.
  - .3 Joints: bell and spigot with locked-in petroleum-resistant gasket.

**PART 3. EXECUTION**

**3.1 PREPARATION**

- .1 Carefully inspect products for defects and remove defective products from site.
- .2 Ensure that pipe and fittings are clean before installation.

**3.2 EXCAVATION AND BACKFILLING**

- .1 Do excavating and backfilling to Section 31 14 11 Earthwork And Related Work.

**3.3 PIPE INSTALLATION**

- .1 Lay and joint pipe and fittings as specified herein and according to manufacturer's published instructions.
- .2 Lay pipe and fittings on prepared bed, true to line and grade indicated within following tolerances:
  - .1 Horizontal Alignment: 50mm.
  - .2 Vertical Alignment: the lesser of 13mm or one half the rise per pipe length.
- .3 Commence laying at outlet and proceed in upstream direction with bell ends facing upgrade.
- .4 Prevent entry of bedding material, water or other foreign matter into pipe. Use temporary watertight bulkheads when pipelaying is not in progress.

- .5 Install gaskets in accordance with manufacturer's published instructions. During cold weather, store gaskets in heated area to assure flexibility.
- .6 Align pipe carefully before joining. Do not use excessive force to join pipe sections.
- .7 Support pipes as required to assure concentricity until joint is properly completed.
- .8 Keep pipe joints free from mud, silt, gravel or other foreign material.
- .9 Avoid displacing gasket or contaminating with dirt, petroleum products, or other foreign material. Remove, clean, reinstall and lubricate gaskets so disturbed.
- .10 Complete each joint before laying next length of pipe.
- .11 Where deflection at joints is permitted, deflect only after the joint is completed. Do not exceed maximum joint deflection recommended by pipe manufacturer.
- .12 Where a flexible joint is not integral to the structure, provide flexible joint not more than 1m from outside face of structure.
- .13 Install plastic pipe in accordance with CAN/CSA B1800.
- .14 Cut pipe as required for fittings or closure pieces, square to centreline, and as recommended by manufacturer.
- .16 Make watertight connections to manholes and catch basins. Use non shrink grout when suitable gaskets are not available.

### **3.3 UNDERCROSSING**

- .1 Provide shop drawings showing proposed method of installation for pipe in undercrossing.
- .2 Excavate working pit according to reviewed shop drawings.
- .3 Dewater area of excavation and undercrossing.
- .4 Place jacking, boring or tunnelling equipment in working pit to approved line and grade of the proposed pipe.

- .5 Install encasing pipe to proposed line and grade as indicated.
- .6 Use mechanical or welded type joints for encasing pipe.
- .7 After encasing pipe has been installed, check line and grade for approval.
- .8 Remove any soil that remains in the casing pipe.
- .9 Insert pipe into encasement pipe, starting from the working pit.
- .10 Place pipe one length at time outside encasement pipe. Maneuver pipe into position.
- .11 Use approved blocking method to guide pipe in true alignment.

### **3.4 INSPECTION**

- .1 The Departmental Representative may require inspection of installed sewers by television camera, photographic camera or by other visual method.
- .2 Provide television camera inspection.

### **3.5 DEFLECTION TESTING**

- .1 Measure deflection by pulling deflection gauge Testing - Plastic through each pipe from manhole to manhole after Pipe backfilling.
- .2 Provide deflection gauges to measure a 5% and 7- 1/2% deflection. Gauges to be a "Go-No-Go" device.
- .3 Within 30 days after installation, pull a deflection gauge measuring 5% deflection through the installed section of pipeline. If this test fails proceed with 7-1/2% deflection test. If 7-1/2% deflection test fails, locate defect and repair. Retest using same methodology.
- .4 30 days prior to completion of warranty period, pull a deflection gauge measuring 7-1/2% deflection through the installed section of pipeline. If 7 1/2% deflection test fails, locate defect and repair. Retest using same methodology.

### 3.6 CLOSED CIRCUIT TELEVISION INSPECTION

- .1 Conduct closed circuit television inspection Television procedures to meet North American Association Inspection of Pipeline Inspectors (NAAPI) WRc Standard.
- .2 Equipment:
  - .1 Provide equipment meeting following requirements:
    - .1 Self-contained, self-leveling monitoring unit and pan-tilt camera with remotely controlled lighting system capable of varying the illumination.
    - .2 Picture quality shall produce continuous 600-line resolution picture, showing entire periphery of pipe.
    - .3 A meter device with readings above ground or marking on cable to clearly identify exact location of camera.
- .3 Inspection:
  - .1 Perform inspection of pipe from manhole to catch basin by passing TV camera through sewer in direction of flow.
  - .2 Classify results in accordance with North American Pipeline Inspectors (NAAPI) WRc Standard.
- .4 Records:
  - .1 Maintain inspection record in log form, during television inspection.
  - .2 Log to include location of each fault and service lateral distance measured from centreline of reference manhole and position referenced to axis of pipe.
  - .3 Photograph fault from the television screen. All photographs to be clear and precise with distinct definition of fault.
  - .4 Include detailed technical description with photographs as supporting data for each fault.
  - .5 Provide minimum of two photographs for each sewer main section televised, detailing typical joint, and typical building service lateral.
  - .6 All photos and videos to be in colour.
- .5 Reports:
  - .1 Provide a composite report of TV inspection. Enclose report in binder on letter size paper. Include following pages and information:
    - .1 Title page identifying project, camera operator and dates of inspection.

- .2 Index page identifying street name, section from manhole to manhole, page number or numbers where information for section is contained.
- .2 Organize inspection records in sequence from upstream manhole to downstream manhole.
- .3 Report on each pipe section to contain:
  - .1 Heading:
    - .1 Manhole numbers applicable to section.
    - .2 Reference drawing number, if applicable.
    - .3 Weather on the day of inspection.
    - .4 Statement of soil condition in area of inspection, i.e., dry, damp, wet, frozen.
    - .5 Date of inspection.
  - .2 Key Plan, showing corresponding manhole numbers, magnetic north, horizontal distance, pipe and material between manholes, and direction of flow.
  - .3 Inspection findings for each sewer main section to include:
    - .1 Location of all faults.
    - .2 Photographs of all faults.
    - .3 One photograph each of typical joint.
    - .4 Mount photographs on left-hand page and place corresponding description on right-hand page. Number all photographs in order. Number beside photograph to correspond with description number.
    - .5 Enclose all pages of report in transparent sheet protector.
- .6 Accuracy:
  - .1 Maximum permissible error in accuracy to be within following limits of fault location:
    - .1 Up to 375 mm pipe:  $\pm 75$  mm per 100 m of length.
    - .2 450 mm - 600 mm pipe:  $\pm 150$  mm per 100 m of length.
    - .3 750 mm - 900 mm pipe:  $\pm 225$  mm per 100 m of length.
- .7 Video Record:
  - .1 Supply a complete record of all inspections in digital format.
  - .2 Index all files, listing sections of inspections.
  - .3 Submit video or CD's with written reports to the Departmental Representative.
- .8 Repeat Inspection:
  - .1 Repair faults detected during television inspection. Repeat television inspection at no cost to Owner.

.9 Testing:

.1 Low Pressure Air Testing

CAUTION:

FOR SAFETY OF PERSONNEL AND PUBLIC, OBSERVE PROPER PRECAUTIONS DURING AIR TESTING. USE TEST EQUIPMENT DESIGNED TO OPERATE ABOVE GROUND. DO NOT PERMIT PERSONNEL IN TRENCH DURING TESTING. DO NOT AIR TEST PIPE WITH DIAMETER GREATER THAN 600 MM.

- .1 Provide air testing equipment meeting the following requirements:
- .1 Air Blower: 14 litres/sec, maximum pressure 70 kPa continuous.
  - .2 Pressure Relief Valve: Sized to relieve full blower capacity at maximum blower pressure. Range 20 - 70 kPa, adjustable.
  - .3 Pressure Gauges: Range 0 to 70 kPa with accuracy +/- 0.25 kPa.
- .2 Provide plugs at each end of section, with one plug equipped for air inlet connection.
- .3 Fill test section slowly until a constant pressure of 28 kPa is reached. If ground water is above section being tested, the Departmental Representative may recommend increase in air pressure.
- .4 Allow minimum 2 minutes for air temperature to stabilize, adding only amount of air required to maintain pressure.
- .5 After 2 minute period, shut off air supply.
- .6 Decrease pressure to 24 kPa. Measure time required for pressure to reach 17kPa. Minimum time allowed for pressure drop is as follows:
- | Pipe Diameter<br>(mm) | Minimum Time<br>(Min:Sec) |
|-----------------------|---------------------------|
| 100                   | 1:53                      |
| 150                   | 2:50                      |
| 200                   | 3:47                      |
| 250                   | 4:43                      |
| 300                   | 5:40                      |
| 375                   | 7:05                      |
| 450                   | 8:30                      |
| 525                   | 9:55                      |
| 600                   | 11:20                     |
- .7 Locate and repair defects if test fails. Retest.
- .8 Repair visible leaks regardless of test results.

**END OF SECTION**

**PART 1. GENERAL**

**1.1 SECTION INCLUDES**

- .1 Materials and installation for aboveground oil storage tanks.

**1.2 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 03 30 00 - Cast-in-Place Concrete.
- .5 Section 26 05 00 - Common Work Results - Electrical.
- .6 Section 33 30 04 - Transition Sump Leak Detection Systems.
- .7 Section 33 30 05 - Aboveground Double Wall Pipe Leak Detection Systems.

**1.3 REFERENCES**

- .1 American National Standards Institute (ANSI).
  - .1 ANSI/NFPA-329, Handling Underground Releases of Flammable and Combustible Liquids.
  - .2 ANSI/API 650, Welded Steel Tanks for Oil Storage.
- .2 American Petroleum Institute (API).
  - .3 API RP 651, Cathodic Protection of Aboveground Petroleum Storage Tanks.
  - .4 API STD 653, Tank Inspection, Repair, Alteration, and Reconstruction.
- .3 American Society for Testing and Materials International, (ASTM).
  - .5 ASTM C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
- .4 Canadian Council of Ministers of the Environment (CCME).

- .6 CCME-PN1326, Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products.
- .5 Department of Justice Canada (Jus).
  - .7 Canadian Environmental Protection Act, 1999 (CEPA).
- .6 Canadian Standards Association (CSA)/CSA International.
  - .8 CAN/CSA-B139, Installation Code for Oil Burning Equipment.
- .7 The Master Painters Institute (MPI).
  - .9 Architectural Painting Specification Manual.
- .8 National Research Council/Institute for Research in Construction.
  - .10 NRCC 38727, National Fire Code of Canada (NFC).
- .9 Transport Canada (TC).
  - .11 Transportation of Dangerous Goods Act, 1992 (TDGA).
- .10 Underwriters' Laboratories of Canada (ULC).
  - .12 ULC/ORD-C58.9, Secondary Containment Liners for Underground and Aboveground Tanks.
  - .13 ULC/ORD-C58.12, Leak Detection Devices (Volumetric Type) for Underground Storage Tanks.
  - .14 ULC/ORD-C58.14, Leak Detection Devices (Nonvolumetric Type) for Underground Storage Tanks.
  - .15 ULC/ORD-C58.15, Overfill Protection Devices for Underground Tanks.
  - .16 ULC/ORD-C971, Nonmetallic Underground Piping for Flammable and Combustible Liquids.
  - .17 ULC/ORD-C142.23, Aboveground Waste Oil Tanks.
  - .18 ULC-S601, Aboveground Horizontal Shop Fabricated Steel Tanks.
  - .19 CAN/ULC-S602, Aboveground Steel Tanks for Fuel Oil and Lubricating Oil.
  - .20 CAN/ULC-S603.1, Galvanic Corrosion Protection Systems for Steel Underground Tanks.
  - .21 ULC-S630, Aboveground Vertical Shop Fabricated Steel Tanks.
  - .22 ULC-S652, Tank Assemblies for Collection of Used Oil.
- .11 National Research Council Canada (NRC)
  - .23 National Fire Code of Canada 2010.

#### **1.4 SUBMITTALS**

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

- .2 Indicate details of construction.
- .3 Shop drawings to detail and indicate following as applicable to project requirements. Submit manufacturer's product data to supplement shop drawings.
  - .1 Aboveground Storage Tanks shall include:
    - .1 Size, materials and locations lifting lugs.
    - .2 Tanks capacity.
    - .3 Size and location of fittings.
    - .4 Environmental compliance package accessories.
    - .5 Decals, type size and location.
    - .6 High level and vacuum sensor types.
    - .7 Accessories: provide details and manufacturers product data.
    - .8 Size, materials and locations of railings, stairs, ladders and walkways.
    - .9 Finishes.
    - .10 Field-erected AST overflow-protection systems: provide details of design, type, materials and locations.
  - .2 Anti-siphon/Solenoid valves: type, materials, sizes and hydrostatic head pressure setting.
  - .3. Piping, valves and fittings: type, materials, sizes, piping connection details, valve shut-off type and location, cathodic protection system complete with stamp of corrosion expert indicating that design complies with standards, Federal and Provincial regulations.
  - .4 Fill Stations: provide details of design, type materials, locations fitting sizes, fitting types.
  - .5 Spill containment: provide description of method[s] and show sizes, materials and locations for collecting spills at connection point between storage tank system and delivery truck.
  - .6 Size, material and location of manholes.
  - .7 Electronic accessories: provide details and manufacturers product data.
  - .8 Identification, name, address and phone numbers of corrosion expert where applicable. Note: Grading drawings to be stamped by licensed corrosion expert.
  - .9 Anchors: description, material, size and locations.
  - .10 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.
  - .11 Ancillary devices: provide details and manufacturer's product data.

- .12 Leak detection system, type and locations, and alarm system.
  - .13 Emergency Shut-off valve: Materials, End Connection types, pressure rating, seal, actuator type, valve box material and assembly. For valve adapters to PVC piping, provide materials and proposed assembly.
  - .14 Grounding and bonding: provide details of design, type, materials and locations.
  - .15 Corrosion protection: provide details of design, type, materials and locations.
  - .16 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 - Closeout Submittals.

#### **1.5 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Separate for reuse and recycling and place in designated containers Metal Plastic waste in accordance with Waste Management Plan.
- .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 sewer 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.

## **PART 2. PRODUCTS**

### **2.1 ABOVE GROUND HORIZONTAL STEEL TANKS**

- .1 Clemmer LS Vac-U-Test 60,000 L (22,000 Imp .Gal.) shop fabricated, above ground horizontal, double walled steel (360°), vacuum monitored storage tank. 3,000 dia x 8,510mm (118 ¾" dia x 335"L). Manufactured in accordance with ULC S601 Code.
  - .1 Exterior finish: Blast cleaned to SSPC-SP6 with one coat of grey primer and one finish coat of white epoxy enamel.
  - .2 Tanks to be complete with:
    - .1 End supports fabricated from wide flange steel designed to support tank.
    - .2 Lifting lugs.
    - .3 Emergency vent.
    - .4 Dipstick and gauge chart.
    - .5 Normal vent c/w galvanized riser pipe.
    - .6 Elevated walkway complete with handrails supported on the tank and stairway, fabricated with stainless steel grade 304. Position as indicated.
    - .7 Secondary containment (interstitial vacuum space and tank capacity) shall be equal or greater than 100% of total tank capacity.
    - .8 Clemmer RVLM-1 Level and Vacuum Monitor.

- .2 Clemmer LS Vac-U-Test 10,000 L (2,200 Imp .Gal.) shop fabricated, above ground horizontal, double walled steel (360°), vacuum monitored storage tank. 2,000mm dia x 3,200mm (79" dia x 126"L). Manufactured in accordance with ULC S601 Code.
  - .1 Exterior finish: Blast cleaned to SSPC-SP6 with one coat of grey primer and one finish coat of white epoxy enamel.
  - .2 Tank to be complete with:
    - .1 End supports fabricated from wide flange steel designed to support tank.
    - .2 Lifting lugs.
    - .3 Emergency vents.
    - .4 Dipstick and gauge chart.
    - .5 Normal vent c/w riser pipe.
    - .6 Elevated walkway complete with handrails supported on the tank and stairway, fabricated with stainless steel grade 304. Position as indicated.
    - .7 Secondary containment (interstitial vacuum space and tank capacity) shall be equal or greater than 100% of total tank capacity.
    - .8 Clemmer RVLM-1 Level and Vacuum Monitor.

## 2.2 TANK ACCESSORIES

- .1 Anti-Siphon/Solenoid Valves
  - .1 Two-way, one directional flow, hung piston valve, normally closed when unpowered. Installed on pipeline leading from an aboveground tank and used to help prevent accidental siphoning of product.
    - .1 Bronze body.
    - .2 120 Volts operation.
    - .3 Normally closed.
    - .4 Class H standard coil.
    - .5 No differential pressure required to open the valve.
    - .6 Watertight and rated for hazardous locations - NEMA 4X, Group D
    - .7 Viton seal.
    - .8 Built-in expansion relief.
    - .9 CSA Certified.
    - .10 Standard of Acceptance: Morrison Bros. Fig 710
  - .2 In-line strainers shall be installed on inlet of solenoid valves.
    - .1 Bottom clean-out.
    - .2 Stainless steel construction.
    - .3 100 mesh screen.

- .4 Size to match associated fuel line. Tanks 1 and 2 size shall be 38mm strainer. Tank 3 size shall be 25mm.
  - .5 Standard of Acceptance: Morrison Bros. Fig 284S
- .2 Overfill Prevention Valves
- .1 ULC listed.
  - .2 Materials:
    - .1 Valve body, adaptor and collar: cast aluminum
    - .2 Poppet: cast aluminum, hard-coated.
    - .3 Cam: stainless steel.
    - .4 Follower: brass.
    - .5 Shaft: zinc-plated.
    - .6 Float: closed-cell nitrile.
  - .3 Fully adjustable.
  - .4 690 kPa (100 PSI) pressure rated with low pressure drop
  - .5 Provide the following spare parts:
    - .1 Retaining Collar. Minimum one, each size.
    - .2 350mm nipple. Minimum one, each size.
    - .3 Float. Minimum one, each size.
    - .4 Body, adaptor and collar: cast aluminum
  - .6 Standard of acceptance: OPW 61fSTOP
- .3 Open Atmospheric Vents (aboveground tanks)
- .1 Materials: Aluminum body with 40-mesh brass screen.
  - .2 Attach to top of vent line with set screws.
  - .3 Provide the following spare parts:
    - .1 Screw, nut and screen. Minimum one, each size.
  - .4 Standard of acceptance: Morrison Bros Fig. 354
- .4 Utility Tank Vent
- .1 For use on containment boxes
  - .2 Aluminum body
  - .3 40-mesh brass screen
  - .4 Brass set screws
  - .5 Standard of Acceptance: OPW fig. 23 (38mm)

## 2.3 CONCRETE

- .1 In accordance with Section 03 30 00 - Cast-in-Place Concrete.

## 2.4 PIPING, VALVES AND FITTINGS

- .1 Single wall Schedule 40 steel piping:
  - .1 For use indoor, in transition sumps, containment boxes and for tank fill pipes.

- 
- .2 To ASTM A53/A53M, continuous weld or electric resistance welded, screwed.
  - .3 Steel pipe coating: Bituminous paint in accordance with manufacturer's recommendation. Color to match existing.
- .2 Double-wall Underground piping:
    - .1 Flexible pipe used in underground service designed, constructed and certified to ULC/ORD-C971.
    - .2 Primary pipe and secondary outer pipe to be PVDF construction
    - .3 690 kPa (100 PSI) rated working pressure
    - .4 Temperature rating of -29 to +49 degrees Celsius.
    - .5 Installation: Follow manufacturer's instructions.
    - .6 Standard of acceptance: Franklin Fueling Systems XP Pressure/Suction series, OPW Flexworks Double Wall Supply Piping.
  - .3 Underground corrugated flexible conduit
    - .1 Ducted pipe for providing access to underground piping. Not to be used as secondary containment piping.
    - .2 Installation: Follow manufacturer's instructions unless indicated otherwise.
    - .3 Standard of acceptance: Franklin Fueling Systems DCT-400 series, OPW AXP40
  - .4 Aboveground Double Wall Piping
    - .1 Carrier Pipe: Extra heavy weight carbon steel, ASTM A-53 Grade B ERW or seamless. Joints for piping 50mm and below to be socket or butt welded. Sections to be provided with 6 inches of piping exposed at each end for field joint fabrication.
    - .2 Secondary Containment: Carbon steel in accordance with ASTM A-135 Grade B, or ASTM A-53 Grade B with a minimum thickness of 10 Gauge for secondary piping 150mm to 650mm. Piping shall be spiral wound, welded joint and pressure tested to 70kPa. Secondary containment piping shall be protected by 2.54mm (100 mil) thick filament wound fibreglass reinforced plastic. Secondary Containment shall be fabricated to maintain 64mm clearance around Carrier Pipe.
    - .3 Carrier Pipe Supports: Supports shall be carbon steel 6.35mm thick plate type designed and factory installed by the secondary containment manufacturer. Support spacing shall be determined by the manufacturer based on pipe diameter, pipe material and operating temperature of the product pipes, and at not more than 3,000 mm intervals. Supports to be designed to allow continuous airflow and drainage of the secondary

- containment in place. Supports shall have 19mm ID type 304 stainless steel guide tubes at every support to facilitate pulling of a leak detection/location cable and to prevent damage during pulling operations. Plastic type supports shall not be allowed.
- .4 Sub-assemblies: End seals and other sub-assemblies shall be designed and factory prefabricated to prevent ingress of moisture into the system. All sub-assemblies shall be designed to allow for complete draining of the secondary containment. Containment pull ports shall be located at a maximum of 150m apart for straight runs and reduced by 46m for every 90 degree change in direction.
  - .5 Standard of Acceptance: Permalert Ultra FS.
- .5 Ball Valves NPS 7mm - 100mm
    - .1 Materials: Brass body.
    - .2 Working pressure up to 4,100 kPa (600 psig).
    - .3 Complete with lockable handle with PVC grip.
    - .4 Provide the following spare parts:
      - .1 Valve seats: one for every ten valves, each size. Minimum one.
      - .2 Discs: one for every ten valves, each size. Minimum one.
      - .3 Stem packing: one for every ten valves, each size. Minimum one.
      - .4 Gaskets for flanges: one for every ten flanges.
    - .5 Standard of acceptance: Morrison Bros. Co. (Fig.691B),
- .6 Remote Fill Stations
    - .1 ULC listed.
    - .2 Lid and container constructed of 12 Ga. Steel
    - .3 56 litre capacity.
    - .4 Powder coated white, weather-tight enclosure and continuously vented to prevent build-up of vapours.
    - .5 25mm NPT drain with locking ball valve.
    - .6 Single column base with adjustable height from 790mm to 1195mm. Base plate with four 13mm mounting holes.
    - .7 Lockable lid, held open by gas spring cylinders during use.
    - .8 One fill port per remote fill station only
    - .9 Standard of Acceptance: Morrison Bros. Co Fig. 515 - AST Remote Spill Container
- .7 Check Valves (50mm and 75mm)
    - .1 Bronze body, brass seat ring, viton disc, bronze cap.
    - .2 Full bore inside diameter.
    - .3 Rated normal pressure limit: 860kPa (125 psi).
    - .4 Provide the following spare parts

- .1 Pin (50mm only): one for every ten valves, each size. Minimum one.
- .2 Stem (75mm only): one for every ten valves, each size. Minimum one.
- .3 Plug: one for every ten valves, each size. Minimum one.
- .4 Cap: one for every ten valves, each size. Minimum one.
- .5 Disc (50mm only): one for every ten valves, each size. Minimum one.
- .6 Disc Sub-Assembly (75mm only): one for every ten valves, each size. Minimum one.
- .7 Disc Nut (50mm only): one for every ten valves, each size. Minimum one.
- .8 Disc Holder (50mm only): one for every ten valves, each size. Minimum one.
- .9 Carrier: one for every ten valves, each size. Minimum one.
- .10 Retaining Ring (50mm only): one for every ten valves, each size. Minimum one.
- .11 Washer (50mm only): one for every ten valves, each size. Minimum one.
- .12 Lock Nut (75mm only): one for every ten valves, each size. Minimum one.
- .5 Standard of Acceptance: OPW 175 Swing Check Valve.
- .8 Flexible Entry Boot NPS 13mm - 100mm ( $\frac{1}{2}$ " - 4")
  - .1 Install air testable version for testing of the 100mm (4") corrugated ducting.
  - .2 Includes stainless steel studs and corrosion resistant nuts and washer plates.
    - .1 Standard of acceptance: Franklin Fueling Systems APT (DEB Series), OPW Flexworks DEB
- .9 Transition Sumps
  - .1 Materials: Non corroding polyethylene container with fibreglass top.
  - .2 Weatherproof lockable cover.
  - .3 Standard of acceptance: OPW Flexworks (PST-4630)

## 2.5 LEVEL GAUGING

- .1 Tank gauging stick: to manufacturer's standard.
- .2 Mechanical Level Gauges
  - .1 Mechanical clock gauge with metric face for measuring liquid level in aboveground storage tanks.
  - .2 Vapor tight construction.
  - .3 Stainless steel float and cable, aluminum body.

- .4 360degree swivel for adjustable orientation.
  - .5 Maximum measurement shall be at least 3,600 mm.
  - .6 Gauge suitable for reading level within 3mm accuracy at a distance of 6 meters away
  - .7 Standard of acceptance: Morrison Bros Fig818MET with drop tube float.
  - .8 Provide gauge chart for horizontal tank. Volume shall be in litres and depth will be in 1 cm increments. Provide protection from weather and UV from sunlight.
- .3 Electronic Level Transmitter:
- .1 2-wire pulse radar level transmitter for continuous monitoring of liquids in storage tanks.
  - .2 Working range of 20m.
  - .3 Working pressure of 40 bar (580 psig).
  - .4 Designed to withstand a range of temperatures from -40 to 200 degrees Celsius (-40F to 392F).
  - .5 Tank connection: 100mm flat faced flanged ASME Class 150.
  - .6 Output signal 4 to 20mA.
  - .7 Power: 24V DC, max 30V DC.
  - .8 Approvals: CSA
  - .9 Standard of acceptance: Siemens Sitrans LR250

## 2.6 FLOW MEASUREMENT

- .1 Oil Flowmeter:
- .1 Coriolis mass flowmeter used to measure liquids or gases.
  - .2 Flowmeter Measured values: Volume flow, mass flow, density fraction, temperature and totalizer.
  - .3 Accuracy: 0.10%
  - .4 Measuring range: 0 -192,000kg/h
  - .5 Temperature range: -50 to 180 degrees Celsius (-58F to 356F)
  - .6 Single tube bended, full bore design.
  - .7 NEMA 4 Enclosure
  - .8 Standard of Acceptance: Siemens MASS2100 DI25 sensor with MASS 6000 transmitter.

## 2.7 OVERFILL AND SPILL CONTAINMENT

- .1 Shop-fabricated AST overfill protection.
- .1 Audible and visual alarm located where personnel are constantly on duty during transfer operation and can promptly stop or divert flow when detected levels are too high.

## 2.8 PRODUCT TRANSFER

- .1 Aboveground Storage tanks shall be provided with emergency vents in addition to normal vents.
  - .1 Liquid and vapour-tight connection on fill pipes.

## 2.9 SPILLS, OVERFILLS AND STORM RUNOFF WATER

- .1 Contained, treated and disposed of in accordance with applicable provincial or territorial regulations, guidelines and policies.
- .2 Oil/water separator (for storm water runoff from product transfer area).
  - .1 Designed to produce discharge water with 10 mg/L, or less, of oil and grease.
  - .2 Sized for hydraulic flow rate of 440 L/min for oil with specific gravity of .85.
  - .3 Designed to capture spill of petroleum product of volume equal to amount of petroleum product transferred in 2 minutes at highest pumping rate normally used within area that drains to oil/water separator.
  - .4 Product holding capacity of 6,445L.
  - .5 Designed with hydraulic retention time required to separate oil particles from storm water based on Stokes' law.
  - .6 Designed in accordance with the API manual on disposal of refinery wastes, API Bulletin No 1630 First Edition, API Bulletin No 421 and ULC S615.
  - .7 Standard of Acceptance: ZCL Composites Inc. model COWS-620.
- .3 Open Atmospheric Vents (oil/water separator)
  - .1 Materials: Aluminum body with 40-mesh brass screen.
  - .2 Attach to top of vent line with set screws.
  - .3 Standard of acceptance: Morrison Bros Fig. 354.
- .4 Emergency shut-off valve for isolating drainage of the tank area from site drainage system.
  - .1 Gate valve for use with PVC drainage pipe.
  - .2 Meets or exceeds applicable requirements of ANSI/AWWA C515 Standard.
  - .3 UL Listed, FM Approved and certified to ANSI/NSF 61.
  - .4 Ductile Iron body and bonnet with nominal 10 mil fusion epoxy coated interior and exterior surfaces.
  - .5 Ductile Iron wedge, symmetrical and fully encapsulated with molded rubber; no exposed iron.

- .6 Non-rising stem.
  - .7 Triple O-ring seal stuffing box.
  - .8 50mm square wrench nut.
  - .9 Suitable for pressures up to 1,723 kPa.
  - .10 Ends: Mechanical Joint (MJ).
  - .11 Standard of Acceptance: Mueller Co. A-2361 D.I. Resilient Wedge Gate Valve M.J. x M.J.
- 
- .5 Valve box for access at ground level
    - .1 Valve box complete with cast iron lid and 300mm ductile iron adjustable top.
    - .2 Standard of Acceptance: Mueller Co. MVB series.

## 2.10 FROST BARRIERS

- .1 Waterproofing protection board: Extruded polystyrene board to rigid closed cell type, with integral high density skins.
  - .1 Board size: 1220mm wide, 15.24 metres long, 6mm thick.
  - .2 Compressive strength: minimum 55 kPa.
  - .3 Edges: Square, fan folded panels at 610mm o.c.
  - .4 Water Vapour Permeance: to ASTM E96, 51ng/Pa per 25.4mm thickness.
  - .5 Standard of Acceptance: Dow Protection Board III Extruded Polystyrene Insulation.
- .2 Adhesive: To CGSB 71-GP-24M, Type 1.

## 2.11 PUMP P-14

- .1 Helical gear pump for use in an oil transfer system from oil storage tanks to oil-fired burners.
  - .1 Bearings: Full face thrust bearings, bronze.
  - .2 Direct Drive with safety guard.
  - .3 Self Priming
  - .4 Pedestal type pump, mounted to manufacturer supplied base.
  - .5 Pump Characteristics: 37.8L/min (10 GPM), 1,300kPa (188 PSI) at 1,750 RPM, 2.2kW (3 hp) motor.
  - .6 Standard of Acceptance: Albany Pump Model 018H

## 2.12 STRAINERS

- .1 Duplex Strainer to provide protection to pumps, nozzles, valves and other sensitive pipeline equipment from foreign contaminants such as dirt and debris.
  - .1 Duplex valve for screen maintenance without interruption of flow.

- .2 Cast iron body, cover and valve caps
- .3 Stainless steel basket screen.
- .4 ANSI B16.1 flanged port connections
- .5 Manufacturer supplied steel mounting foot.
- .6 Working Pressure: 1,378 kPa at 65°C(200PSI at 150°F)
- .7 UL Listed, bodies individually tested to UL specifications.
- .8 Standard of Acceptance: Kraissl 72F series

### **2.13 HYDRAULIC PRESSURE RELIEF VALVES**

- .1 Relief valve for protecting oil transfer system from over-pressure.
  - .1 Cast iron body with screw connections
  - .2 Buna O-ring cap seal
  - .3 Piston material: Hardened steel
  - .4 Standard of Acceptance: Fulflo V-Series
- .2 For every Hydraulic Pressure Relief Valve, provide the following spare parts:
  - .1 O-Ring
  - .2 Spring
  - .3 Piston
  - .4 Gasket

### **2.14 NON-SHRINK GROUT**

- .1 To Section 03 30 00 - Cast-In-Place-Concrete.

### **2.15 EPOXY COATINGS**

- .1 Epoxy coatings shall be applied to protect surfaces from UV and weather conditions in outdoor environments.
- .2 Apply coatings where indicated on drawings.
- .3 Surface Preparation: Sa2 1/2 or NACE 2, suitable for hand tool or power tool preparation.
- .4 Base coat: Solvent free, direct to steel.
  - .1 Standard of acceptance: 2 layers 3M Scotchkote Epoxy Coating 152LV @ 20 mils total.
- .5 Top coat: High gloss polyurethane cosmetic coating.
  - .1 Scotchkote Uni-tech XF 129. 1 coat @ 2 mils.

### **2.16 DIESEL FUEL FILTRATION SYSTEM**

- .1 Enclosure:
  - .1 Filtration system must be protected in a lockable, weatherproof, rust-proof NEMA rated enclosure complete with lifting points.
  - .2 Enclosure to be insulated and equipped with CSA approved internal cabinet heater for freeze protection.
  - .3 Enclosure to be ventilated with manually operated venting.
  - .4 Enclosure footprint is not to exceed 600mm x 600mm. Coatings shall be applied to protect surfaces from UV and weather conditions in outdoor environments.
  
- .2 Pump and Motor Assembly
  - .1 Base mounted, TEFC motor and positive displacement rotary gear pump with cast iron or bronze housing.
  - .2 Pump shall be industrial type intended for continuous heavy duty service.
  - .3 Motor to be protected with splash guard.
  - .4 Capacities
    - .1 Pump fluid: #2 fuel oil and fatty acid methyl esters (biodiesel) blends.
    - .2 Flow rate: Per manufacturer's recommendations for systems up to 10,000L.
    - .3 Combined motor and cabinet heater electrical requirements not to exceed 120V, single phase, 60Hz, 20A dedicated circuit.
  
- .3 Filtration System
  - .1 Stainless steel or schedule 10 powder coated mild steel filter canister with replaceable filter element which shall:
    - .1 Extract free standing and emulsified water to 0.009% volume/volume.
    - .2 Remove particles down to 0.5 microns.
    - .3 Use covalent bonding technology to remove emulsified water and collect free water.
  - .2 The filtration system must work with low sulphur diesel (LSD), ultra-low sulphur diesel (ULSD) and fatty acid methyl ester (biodiesel) blends.
  - .3 Filter replacement is to be simple, convenient and easily accessible, requiring no disassembly of the system or enclosure.
  
- .4 Internal Piping
  - .1 All internal piping to consist of CSA approved copper and stainless steel piping and meet ASME B31.3
  - .2 Stainless steel flex lines to be used to reduce pump vibration and noise.

- .3 Internal piping to include a visual flow indicator (sight glass).
- .5 Controller
  - .1 Programmable logic controller to ensure automatic fuel maintenance. Start and run time to be pre-programmed as per manufacturer recommendations for this system size (10,000L). The controller shall have the capability to be programmed on-site by qualified/trained personnel. The controller shall have the capability to detect the following faults:
    - .1 Spill inside of cabinet.
    - .2 High water level in filter canister.
    - .3 Differential pressure across the filter canister, requiring filter change.
    - .4 Low temperature detected inside of cabinet.
    - .5 High temperature detected at motor.
    - .6 High temperature detected at pump.
  - .2 All faults to input a fault warning to existing building management system (BMS) via single dry contact.
  - .3 All faults to shut down filtration system until fault is resolved, except low temperature.
  - .4 Controller to open/close supply piping solenoid valve at tank as required for system operation.
- .6 Auxiliaries
  - .1 Systems shall include drip tray at bottom of cabinet, pressure transmitters, switch over valves, oil filter pressure/vacuum gauges, temperature sensors, internal cabinet heater, visual flow indicator, 100-200 micron basket strainer on inlet side of pump.
- .7 Standard of Acceptance:
  - .1 Refuel Systems Incorporated RSI-5 Series

### **PART 3. EXECUTION**

#### **3.1 ABOVEGROUND FUEL TANKS**

- .1 Install tanks and accessories in accordance with CAN/CSA-B139, National Fire Code of Canada, CCME PN 1326 and manufacturer's recommendations.
- .2 Position tanks using lifting lugs and hooks, and where necessary use spreader bars. Do not use chains in contact with tank walls.

- .3 Install tanks using installers certified by Nova Scotia Department of Environment.
- .4 Provide certification of installation to Departmental Representative.
- .5 Test tanks for leaks to requirements of authority having jurisdiction.
- .6 Where coating is damaged, touch-up with original coating material.
- .7 Install drop down piping in oil tanks for supply pipes. Size to match associated fuel pipe. Fill pipes and return pipes shall not have drop down piping installed.

### **3.2 LEVEL GAUGE SYSTEM**

- .1 Provide leak and vapour proof caulking at connections.
- .2 Shield capillary and tubing connections in heavy duty 50 mm polyethylene pipe.
- .3 Calibrate system.

### **3.3 LEAK DETECTION SYSTEM**

- .1 Install in accordance with manufacturer's recommendations.

### **3.4 DOUBLE WALL ABOVEGROUND PIPING**

- .1 Final installation shall be done in the presence of manufacturer's trained field representative.
- .2 The piping installation contractor shall be responsible for running a pull cable throughout the length of the secondary containment pipe using the built-in steel guide tubes. The pull cable shall be used to pull leak detection cable (by controls contractor).
- .3 Install piping in accordance with the directions furnished by the manufacturer. Test the secondary containment at 10 psig and product piping hydrostatically tested to 50 psig. Maintain test pressures for not less than 1 hour.
- .4 Keep the secondary piping clean and dry during the installation process.

- .5 Keep isolation valves and anti-siphon valves in enclosures. Enclosures shall drain to tank.
- .6 Aboveground piping shall be supported as indicated on drawings and such that they are not in direct contact with the ground.

### **3.5 UNDERGROUND DOUBLE WALL PIPING**

- .1 Flexible double wall pipe shall be installed underground only and shall terminate in sumps.
- .2 Flexible piping shall be installed with bend radius not less than the radius prescribed by manufacturer.
- .3 Kinked sections of pipe shall be cut-off, discarded and never used.
- .4 Keep all piping, fittings and other components in original packaging until ready for use. Piping to be protected from impacts, vehicles and shall be stored such that they will not be subject to direct sunlight or other harmful environmental conditions.
- .5 Install piping using manufacturer supplied tools and fittings.
- .6 Continuous pipe lengths shall be used between sumps. All fittings shall be located inside sumps.
- .7 Ducted access piping shall be used for all underground piping to provide easy access to double wall pipe.
- .8 Flexible pipe shall enter transition sumps through sides, not less than 50mm from the bottom of the sump. Penetration into sump shall be sealed using manufacturer supplied boots. Seal shall be such that a leak in the primary piping will drain product into the transition sump.
- .9 Piping entry angle shall not be more than 15°.
- .10 Flexible piping shall be installed with a slope to drain into transition sumps in the event of a leak.
- .11 Ducted access piping shall be installed in pipe sleeves encased in concrete (by div. 03). Piping shall be sloped at a minimum rate of 2% to drain to nearest sump.

### **3.6 REMOTE FILL STATIONS**

- .1 New tanks will be provided with a separate Remote Fill Station, as indicated on drawings, with single fill port connection.
- .2 Remote fill stations shall be anchored with four 13 mm anchors on the base plate. Drilling for anchors by the mechanical contractor.
- .3 Obtain and follow manufacturer's instructions.

### **3.7 SOLENOID VALVES**

- .1 Install on highest point of supply line, orientation as shown on drawing. Solenoid valves shall be installed with strainers on inlet side, with a 100 mesh screen.

### **3.8 OIL-WATER SEPARATOR**

- .1 Install in accordance with the CCME Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products.
- .2 Emergency shut off valve shall be located on the outlet side of the oil water separator
- .3 Maintain a slope of 2% towards the inlet of the Oil-Water Separator and a slope of 2% from the outlet of the Oil-Water Separator towards the catch basin.
- .4 Provide pump-outs on inlet and discharge side for drainage of Oil-Water Separator. Connect pump-out fittings with a riser pipe vertically to grade (no elbows). Install a spill box at grade. Construct riser such that any surface load cannot be transferred to the tank connection.
- .5 Provide vent for Oil-Water Separator. Vent pipe shall be 100mm sch.40 galvanized steel terminated 3,500 mm above grade with 100mm vent cap.
- .6 Install manway riser, riser street box and cover as per manufacturer's instructions.
- .7 Follow manufacturer's written instructions for installation of Oil Water Separator.

### **3.9 FROST BARRIERS**

- .1 Follow manufacturer's installation instructions.
- .2 Verify that the insulation boards and adjacent materials are compatible.
- .3 Unfold bundles prior to application.
- .4 Apply continuous 6 mm beads of adhesive in a grid pattern. Apply adhesive fully around protrusions.
- .5 Place boards in a method to maximize contact with bedding. Stagger side and end joints. Butt edges and ends tight to adjacent boards.
- .6 Place folds at corners or transition points to provide continuous board installation and protection.

### **3.10 ELECTRONIC LEVEL TRANSMITTER**

- .1 Radar Transmitter shall be mounted on a 100 mm ASME Class 150 flat faced flange with a 100 mm horn antenna.
- .2 Radar Transmitter shall be installed such that the end of the horn protrudes a minimum of 10mm below the inner tank wall. Use horn extension supplied by same manufacturer as Radar Transmitter as required.
- .3 Keep Emission Cone beam free from interference from pipes, I-beams or filling streams
- .4 Follow manufacturer's written instructions for installation of Radar Transmitter.
- .5 Wiring and integration of the Level Transmitter into the existing EMCS shall be the responsibility of the Controls Contractor.

### **3.11 OIL FLOWMETER**

- .1 Oil Flowmeters shall not be installed in the vicinity of strong electromagnetic fields such as motors, pumps and transformers.
- .2 Avoid long drop lines downstream from the Flowmeter.

- .3 Flowmeters shall not be installed near the highest point of the system, where air/gas bubbles will be trapped. Install flow meter in low pipeline sections, at the bottom of a U-section in the pipeline.
- .4 Flowmeters shall be anchored to a steel frame using manufacturer supplied mounting brackets. Separate steel frames shall be used for multiple Flowmeter applications.
- .5 Wiring and integration of the Flowmeter into the existing EMCS shall be the responsibility of the Controls Contractor.

### **3.12 CONTAINMENT BOXES**

- .1 Containment boxes shall be used to contain single wall above ground piping and accessories on fuel supply and return lines.
- .2 Transitions from schedule 40 piping to double wall above ground piping shall be inside containment boxes.
- .3 Containment boxes shall be bolted to fuel storage tank flanges and connection shall be epoxy coated.
- .4 Provide weather tight access door for access to isolation valves and anti-siphon valves.
- .5 Fillet weld aboveground double wall piping to inside and outside of containment box. Apply epoxy coating on welded surface.
- .6 Provide utility tank vent for pressure and vacuum relief as indicated on drawings.

### **3.13 STRAINERS**

- .1 Strainers shall be installed in accordance with Manufacturers' instructions.

### **3.14 FUEL POLISHING SYSTEM**

- .1 Onsite installations and commissioning shall be performed by manufacturer's authorized service representative. System is to be installed by approved installer in the Province of Nova Scotia.

- .2 Manufacturer shall provide training and a customized operations and maintenance manual for the filtration system including the following:
  - .1 Inspection and testing of equipment.
  - .2 Filter element replacement.
  - .3 Preventative maintenance.
  - .4 Controller programming.
- .3 The equipment being maintained is to be covered under the parts and labour warranty for a duration of 1 year. Manufacturer to guarantee that the equipment specified is capable of maintain the low sulphur, ultra-low sulphur and biodiesel blend.
- .4 Any and all revisions or alterations to the fuel polishing system, piping and storage facility must follow manufacturer's recommendation or risk having warranty and guarantees voided.
- .5 Manufacturer will make detailed inspection including photographs of completed installation prior to commissioning and store such documentation in a central database for reference. A copy shall be provided to the owner upon completion of installation and commissioning.
- .6 Cost of 1 year's worth of filter cartridges will be included as part of this project.
- .7 Manufacturer is responsible to obtain a fuel sample prior to start-up of the fuel filtration system and again six months after the system has been started. The sample is to be taken either from the bottom of the storage tank or the inlet of the fuel filtration system. Both the start-up sample and the six month sample must be taken from the same location using the same methodology. Results will be presented to the departmental representative.
- .8 The fuel samples are to be analyzed for:
  - .1 Free standing water, saturated water and emulsified water using the Karl Fischer titration methodology.
  - .2 Particulate size analysis using the SEM methodology with results indicating particulates 0.25 micron and larger.
- .9 Manufacturer is to provide an example of the particulate size analysis report as part of the tender package for evaluation. Cost of all sampling will be included as part of this project.

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PWGSC  
Replacement of Petroleum  
Storage Tanks, Bldg A5  
Springhill Institution  
Project# R.061879.001

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ABOVEGROUND FUEL TANKS

Section 33 56 13

Page 23

2016-01-04

**END OF SECTION**

## GENERAL ENVIRONMENTAL PROTECTION PLAN

*Project Name:* Underground Storage Tank Decommissioning and Aboveground Storage Tank Relocation and Installation (Replace, Relocate, and Decommission Petroleum Storage Tanks)

*Location:* Springhill Institution, Springhill, Cumberland County, Nova Scotia

The proponent must consider the following items for the abovementioned project. Those items that are applicable to a proposed project should be included in the project specifications, contract, lease, or licence documents and monitored on site for compliance.

### **Mitigation / Environmental Protection Measures:**

- Employees will be trained in health and safety protocols (e.g. safe work practices, emergency response).
- Proper safety procedures must be followed during the duration of the project as per applicable municipal, provincial and federal regulations.
- As part of Emergency Response Procedures, all spills and releases are to be reported to the Canadian Coast Guard 24 hour emergency response line (1-800-565-1633).
- The Contractor must supply adequate signage and safety measures during transportation of materials and equipment.
- Trucks are to be roadworthy and must follow all speed limits. Speeds shall be reduced in bad weather. The trucks are to take special care during periods of peak traffic. All loads are to be appropriately secured.
- All machinery should be well muffled.
- All work to be conducted in accordance with the *Migratory Birds Convention Act*, which outlines that no migratory bird nests or eggs will be moved or obstructed during the construction or operational phase of the project.
- Proponents and Contractors should ensure that food scraps and garbage are not left at the project site.
- Avoid disturbances to all birds in and near the project area.
- The Contractor is to prevent hydrocarbon product releases in and around the project area.
- Task lighting, as well as lighting for the safety of the employee, should be shielded to shine down and only where it is needed, without compromising safety.
- Task lighting and working hours to be regulated by conditions of the relevant provincial permit and/or consultation with local authorities.
- Project vehicles will keep to designated project transportation routes.

*Underground Storage Tank Removal and Aboveground Storage Tank Relocation and Installation, Springhill Institution, Springhill, Cumberland County, Nova Scotia*

*PWGSC Project No. R.0000835.002–August 24, 2009*

- The Contractor will conduct a walk of the site with the Departmental Representative to identify all vegetation that is not to be disturbed by on-site activities. Vegetation will be identified by flagging tape or other suitable and non-damaging means. The Contractor will implement protection measures such as barriers, signs, fencing, stakes, and/or marking tape to designate to everyone the location of the vegetation.
- Any new personnel or sub-contractors to the site will be alerted by the Contractor of the presence and location of vegetation that require protection.
- Fuel levels must be inspected on a daily basis to ensure there is no leakage to the surrounding environment.
- Engines must not be allowed to idle between work periods.
- Work is to be carried out during daylight hours (unless special arrangements are made to facilitate work at night) to mitigate any disturbance in the project area.
- All equipment and vehicles are to be kept in good repair.
- All machinery shall be well muffled. If necessary, trucks may be required to avoid the use of “hammer” braking along specific sections of the route.
- The exposed soil area must be minimized by limiting the area that is exposed at one time and by limiting the time that any one area is exposed. All stockpiled soil must be covered and/or dyked to prevent erosion and release of sediment laden water. Wherever possible, exposed soils must be stabilized.
- Machinery must be checked for leakage of lubricants or fuel and must be in good working order. Refuelling must be done at least 30 m from any water body and on an impermeable surface. Basic petroleum spill clean-up equipment should be on-site. All spills or leaks should be promptly contained, cleaned up and reported.
- Work should be scheduled to avoid periods of heavy precipitation. Erosion control structures (temporary matting, geotextile filter fabric) are to be used, as appropriate, to prevent erosion and release of sediment and/or sediment laden water during the construction phase. These structures are to be left in place until vegetation is re-established and/or all exposed soils are stabilized.
- Do not discharge residual or rejected concrete on site. Do not wash and clean concrete vehicles on site. Carryout all dumping and cleaning operations at the concrete plant according to all provincially approved practices/regulations.
- Remove any accidental release of concrete on site prior to solidification.
- Ensure concrete trucks are clean and will not release any material during transport to the site.
- Underground storage tank decommissioning is to be conducted in accordance with the “Technical Guidelines for Underground Storage Tank Systems Containing Petroleum

Products and Allied Petroleum Products”.

- Aboveground storage tanks must be installed and maintained in accordance with the “Technical Guidelines for Aboveground Storage Tank Systems Containing Petroleum Products”.
- Any construction or demolition debris, excavated soil material and impacted surface/ground water will be disposed of in a Provincially approved manner (Either a permit or receipts for tippage must be submitted to Departmental Representative by the contractor to verify that the material was disposed of in a provincially approved manner).
- An environmental consultant will be on site to perform a confirmatory sampling program (in the area of the UST excavation) to confirm the presence or absence of contaminants in the surrounding soil. Any excavated soil that is contaminated must be stored on site for the shortest time possible and disposed of at an approved facility.
- All close-out soil samples will be collected by the consultant in laboratory supplied jars and submitted to a Canadian Association of Environmental Analytical Laboratories (CAEAL) or Standards Council of Canada (SCC) Accredited laboratory for analyses of hydrocarbon parameters (including BTEX) using Atlantic RBCA Tier 1 Risk-Based Screening Levels (RBSLs) for rush turn around analysis (24-48 hours) .
- Following the receipt of the soil analysis (rush analysis 24-48 hours), and the confirmation that there were no exceedances, the surrounding area of the UST excavation will be backfilled with clean fill and soil stabilized.
- Ensure that all relevant regulations/guidelines are followed, including, but not limited to: Canadian Standards Association B139-04 Installation Code for Oil Burning Equipment, National Fire Code 2005, Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations June 2008 and CCME Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products 2003.
- Any and all stipulations of federal, provincial, or municipal authorities and/or their officers must be strictly followed. Federal departments are not bound by provincial or municipal legislation, however, as a best practice the most stringent standards are used where applicable. Any discrepancies must be successfully resolved before the pertinent work may begin.