

**SPECIFICATIONS  
CAPE SPEAR NATIONAL HISTORIC SITE  
WATER SUPPLY SYSTEM**

**PARKS CANADA Project No.: 1327**

**Issued for Tender**


PREPARED FOR

Parks Canada

DATE

Nov. 3, 2017



PROVINCE OF NEWFOUNDLAND AND LABRADOR	
	PERMIT HOLDER This Permit Allows
DMG CONSULTING LIMITED	
To practice Professional Engineering in Newfoundland and Labrador.	
Permit No. as issued by PEGNL <u>N0588</u>	
which is valid for the year <u>2017</u>	
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**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1            Section 01400 Work Restrictions.

**1.2                WORK COVERED BY CONTRACT DOCUMENTS**

- .1            Work of this Contract comprises demolition and removal of an existing underground fibreglass 56,800L water storage tank, general construction of a new water supply line, distribution line, underground water storage tank on an existing base, and associated valves, hydrant, and fittings, located at Cape Spear; and further identified as Cape Spear National Historic Site – Water Supply System.

**1.3                CONTRACT METHOD**

- .1            Construct Work under unit price contract.

**1.4                WORK BY OTHERS**

- .1            Co-operate with other Contractors in carrying out their respective works and carry out instructions from Departmental Representative.
- .2            Co-ordinate work with that of other Contractors. If any part of work under this Contract depends for its proper execution or result upon work of another Contractor, report promptly to Departmental Representative, in writing, any defects which may interfere with proper execution of Work.
- .3            Work of Project executed prior to start of Work of this Contract, and which is specifically excluded from this Contract:
  - .1            New deep well installation.
- .4            Work of Project which will be executed after completion of Work of this Contract, and which is specifically excluded from this Contract:
  - .1            Connections of the water lines to the new distribution system.

**1.5                FUTURE WORK**

- .1            Project is designed for future building expansion. Provide terminated waterlines and electrical wires for future installation.
- .2            Insure that Work avoids encroachment into areas required for future work.

**1.6                WORK SEQUENCE**

- .1            Construct Work to accommodate Owner's continued use of premises during construction.
- .2            Co-ordinate Progress Schedule and co-ordinate with Owner Occupancy during construction.
- .3            Maintain fire access/control.

**1.7 CONTRACTOR USE OF PREMISES**

- .1 Unrestricted use of site until Substantial Performance.
- .2 Co-ordinate use of premises under direction of Departmental Representative.
- .3 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by Departmental Representative.
- .4 At completion of operations condition of existing work: equal to or better than that which existed before new work started.

**1.8 OWNER OCCUPANCY**

- .1 Owner will occupy premises during entire construction period for execution of normal operations. The facility will be closed to the public during construction.
- .2 Co-operate with Owner in scheduling operations to minimize conflict and to facilitate Owner usage.

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

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

**1.10 EXISTING SERVICES**

- .1 Notify Departmental Representative and utility companies of intended interruption of services and obtain required permission.
- .2 Establish location and extent of service lines in area of work before starting Work. Notify Departmental Representative of findings.
- .3 Submit schedule to and obtain approval from Departmental Representative for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.
- .4 Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.
- .5 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.
- .6 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.
- .7 Record locations of maintained, re-routed and abandoned service lines.
- .8 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

**1.11 DOCUMENTS REQUIRED**

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

- .2 Specifications.
- .3 Addenda.
- .4 Reviewed Shop Drawings.
- .5 List of Outstanding Shop Drawings.
- .6 Change Orders.
- .7 Other Modifications to Contract.
- .8 Field Test Reports.
- .9 Copy of Approved Work Schedule.
- .10 Health and Safety Plan and Other Safety Related Documents.
- .11 Other documents as specified.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not used.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1            Section 01 11 00            Summary of Work.

**1.2                ACCESS AND EGRESS**

- .1            Design, construct and maintain temporary "access to" and "egress from" work areas in accordance with relevant municipal, provincial and other regulations.

**1.3                USE OF SITE AND FACILITIES**

- .1            Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated.
- .2            Maintain existing services to building and provide for personnel and vehicle access.
- .3            Where security is reduced by work provide temporary means to maintain security.
- .4            Departmental Representative will not provide sanitary facilities for use by Contractor's personnel. Contractor responsible to provide necessary temporary facilities.
- .5            Closures: protect work temporarily until permanent enclosures are completed.

**1.4                EXISTING SERVICES**

- .1            Notify Departmental Representative and utility companies of intended interruption of services and obtain required permission.
- .2            Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends.
- .3            Provide for personnel and pedestrian traffic.
- .4            Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

**1.5                SPECIAL REQUIREMENTS**

- .1            Submit schedule in accordance with Section 01 32 16.07 - Construction Progress Schedule - Bar (GANTT) Chart.
- .2            Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.
- .3            Keep within limits of work and avenues of ingress and egress.

**1.6                SECURITY**

- .1            Where security has been reduced by Work of Contract, provide temporary means to maintain security.

**1.7 BUILDING SMOKING ENVIRONMENT**

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

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

## **Part 1        GENERAL**

### **1.1    Section Includes**

- .1      Inspection and testing by inspecting firms or testing laboratories designated by Department Representative.

### **1.2    Related Requirements Specified Elsewhere**

- .1      Particular requirements for inspection and testing to be carried out by testing laboratory designated by Departmental Representative are specified under various sections.

### **1.3    Appointment and Payment**

- .1      Departmental Representative will appoint and pay for services of testing laboratory except as follows:
  - .1      Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
  - .2      Inspection and testing performed exclusively for Contractor's convenience.
  - .3      Mill tests and certificates of compliance.
  - .4      Tests specified to be carried out by Contractor under the supervision of Departmental Representative.
- .2      Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, pay costs for additional tests or inspections as required by Departmental Representative to verify acceptability of corrected work.

### **1.4    Contractor's Responsibilities**

- .1      Provide labour, equipment and facilities to:
  - .1      Provide access to work for inspection and testing.
  - .2      Facilitate inspections and tests.
  - .3      Make good work disturbed by inspection and test.
  - .4      Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.
- .2      Notify Departmental Representative sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.
- .3      Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.
- .4      Pay costs for uncovering and making good Work that is covered before required inspection or testing is completed and approved by Departmental Representative.

**Part 2        PRODUCTS**

**Not Used**

**Part 3        EXECUTION**

**Not Used**

**END OF SECTION**

**Part 1            General**

**1.1               RELATED REQUIREMENTS**

- .1       Section 013216.07 Construction Progress Schedules – Bar (Gantt) Charts.

**1.2               ADMINISTRATIVE**

- .1       Schedule and administer project meetings throughout the progress of the work.
- .2       Prepare agenda for meetings.
- .3       Distribute written notice of each meeting four days in advance of meeting date to Departmental Representative.
- .4       Provide physical space and make arrangements for meetings.
- .5       Preside at meetings.
- .6       Record the meeting minutes. Minutes will include significant proceedings and decisions, and identify actions by parties.
- .7       Reproduce and distribute copies of minutes within five (5) days after meetings and transmit to meeting participants and affected parties not in attendance.
- .8       Representatives of Contractor, Subcontractor and Suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

**1.3               PRECONSTRUCTION MEETING**

- .1       Within 15 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
- .2       Departmental Representative, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.
- .3       Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.
- .4       Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.
- .5       Agenda to include:
  - .1       Appointment of official representative of participants in the Work.
  - .2       Schedule of Work: in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart.
  - .3       Schedule of submission of shop drawings, samples. Submit items in accordance with Section 01 33 00 - Submittal Procedures.
  - .4       Site security in accordance with Section 01 56 00 - Temporary Barriers and Enclosure].
  - .5       Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
  - .6       Owner provided products.

- .7 Record drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .8 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.
- .9 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.
- .10 Monthly progress claims, administrative procedures, photographs, hold backs.
- .11 Appointment of inspection and testing agencies or firms.
- .12 Insurances, transcript of policies.

#### **1.4 PROGRESS MEETINGS**

- .1 During course of Work and weeks prior to project completion, schedule progress meetings monthly.
- .2 Contractor, major Subcontractors involved in Work and Departmental Representative are to be in attendance.
- .3 Notify parties minimum five (5) days prior to meetings.
- .4 Contractor will record minutes of meetings and circulate to attending parties and affected parties not in attendance within five (5) days after meeting.
- .5 Agenda to include the following:
  - .1 Review, approval of minutes of previous meeting.
  - .2 Review of Work progress since previous meeting.
  - .3 Field observations, problems, conflicts.
  - .4 Problems which impede construction schedule.
  - .5 Review of off-site fabrication delivery schedules.
  - .6 Corrective measures and procedures to regain projected schedule.
  - .7 Revision to construction schedule.
  - .8 Progress schedule, during succeeding work period.
  - .9 Review submittal schedules: expedite as required.
  - .10 Maintenance of quality standards.
  - .11 Review proposed changes for effect on construction schedule and completion date.
  - .12 Other business.

#### **Part 2 Products**

##### **2.1 NOT USED**

- .1 Not Used.

#### **Part 3 Execution**

##### **3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 31 19 Project Meetings.

**1.2 DEFINITIONS**

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

**1.3 REQUIREMENTS**

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

**1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit to Departmental Representative within 10 working days of Award of Contract Bar (GANTT) Chart as schedule for planning, monitoring and reporting of project progress.

**1.5 PROJECT MILESTONES**

- .1 Project milestones form interim targets for Project Schedule.
  - .1 Excavation completed within 10 working days of Award of Contract date.
  - .2 Water cistern completed within 25 working days of Award of Contract date.
  - .3 Piping, equipment, valves, and hydrant completed within 35 working days of Award of Contract date.
  - .4 Site restoration within 50 working days of Award of Contract date.

**1.6 MASTER PLAN**

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

**1.7 PROJECT SCHEDULE**

- .1 Develop detailed Project Schedule derived from Master Plan.
- .2 Ensure detailed Project Schedule includes as a minimum, milestone and activity types as follows:
  - .1 Award.
  - .2 Shop Drawings, Samples.
  - .3 Permits.
  - .4 Mobilization.
  - .5 Excavation.
  - .6 Backfill.
  - .7 Plumbing.
  - .8 Lighting.
  - .9 Electrical.
  - .10 Piping.
  - .11 Controls.
  - .12 Testing and Commissioning.
  - .13 Supplied equipment long delivery items.

**1.8 PROJECT SCHEDULE REPORTING**

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

**1.9 PROJECT MEETINGS**

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

**Part 2 Products****2.1 NOT USED**

- .1 Not used.

**Part 3 Execution****3.1 NOT USED**

- .1 Not used.

**END OF SECTION**

## **Part 1            GENERAL**

### **1.1 Section Includes**

- .1 Unless otherwise specified, this section outlines the requirements and procedures for the contractor's submission of shop drawings, product data, samples, mock-ups, certificates, bonds and other pertinent pre-construction/construction documentation to the Departmental Representative for review.

### **1.2 General Requirements**

- .1 Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Do not proceed with Work affected by submittal until review is complete.
- .3 Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .4 Where items or information is not produced in SI Metric units, converted values are acceptable.
- .5 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .6 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .7 Verify field measurements and affected adjacent work areas are coordinated.
- .8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.
- .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.
- .10 Submittal format: paper originals, or alternatively clear and fully legible photocopies of originals, or PDF electronic copies. Facsimiles are not acceptable, except in special circumstances pre-approved by Departmental Representative. Poorly printed non-legible photocopies or facsimiles will not be accepted and be returned for resubmission.
- .11 Make changes or revisions to submissions which Departmental Representative may require, consistent with Contract Documents and resubmit as directed by Departmental Representative. When resubmitting, notify Departmental Representative in writing of any revisions other than those requested.
- .12 Keep one reviewed copy of each submission on site.

### 1.3 Shop Drawings and Product Data

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of the Work.
- .2 Submit shop drawings bearing stamp and signature of qualified professional Departmental Representative registered or licensed in Province of Newfoundland and Labrador, Canada.
- .3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .4 Allow 7 days for Departmental Representative's review of each submission.
- .5 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of the Work, state such in writing to Departmental Representative prior to proceeding with the Work.
- .6 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.
- .7 Accompany submissions with transmittal letter containing:
  - .1 Date.
  - .2 Project title and number.
  - .3 Contractor's name and address.
  - .4 Identification and quantity of each shop drawing, product data and sample.
  - .5 Other pertinent data.
- .8 Submissions include:
  - .1 Date and revision dates.
  - .2 Project title and number.
  - .3 Name and address of:
    - .1 Subcontractor.
    - .2 Supplier.
    - .3 Manufacturer.
  - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
  - .5 Details of appropriate portions of Work as applicable:
    - .1 Fabrication.
    - .2 Layout, showing dimensions, including identified field dimensions, and clearances.

- .3 Setting or erection details.
  - .4 Capacities.
  - .5 Performance characteristics.
  - .6 Standards.
  - .7 Operating weight.
  - .8 Wiring diagrams.
  - .9 Single line and schematic diagrams.
  - .10 Relationship to adjacent work.
- .9 After Departmental Representative's review, distribute copies.
  - .10 Submit PDF copies of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.
  - .11 Submit PDF copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.
  - .12 Submit PDF copies of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
    - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
    - .2 Testing must have been within 3 years of date of contract award for project.
  - .13 Submit PDF copies of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
    - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
    - .2 Certificates must be dated after award of project contract complete with project name.
  - .14 Submit PDF copies of manufacturer's instructions for requirements requested in specification Sections and as requested by Departmental Representative.
    - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
  - .15 Delete information not applicable to project.
  - .16 Supplement standard information to provide details applicable to project.

- .17 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .18 The review of shop drawings by Departmental Representative is for sole purpose of ascertaining conformance with general concept.
  - .1 This review shall not mean that the Departmental Representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.
  - .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

#### **1.4 Certificates and Transcripts**

- .1 Immediately after award of Contract, submit Letter of Good Standing, WHSCC.
- .2 Submit transcription of insurance's immediately after award of Contract.

#### **Part 2 PRODUCTS**

**Not used**

#### **Part 3 EXECUTION**

**Not used**

**END OF SECTION**

**Part 1            GENERAL**

**1.1            References**

- .1        Code and standards referenced in this section refer to the latest edition thereof.
- .2        Canadian Standards Association (CSA)
  - .1        FCC No. 301 Standard for Construction Operations.
- .3        Transportation of Dangerous Goods Act Regulations.
- .4        Newfoundland Occupational Health and Safety Act, Amended
- .5        Consolidated Newfoundland and Regulations 1149 WMIS Regulations Under the Occupational Health and Safety Act
- .6        Consolidated Newfoundland and Regulations 1165 Occupational Health and Safety Regulations under the Occupational Health and Safety Act.
- .7        Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations.
- .8        National Building Code of Canada.

**1.2            Related Sections**

- .1        Section 01 33 00 – Submittal Procedures

**1.3            Submittals**

- .1        Submit to Departmental Representative copies of the following document within 7 days after date of notice to proceed, including updates:
  - .1        Site Specific Health and Safety Plan.
  - .2        Completed “Attestation and Proof of Compliance with Occupational Health and Safety (OHS)” form found in the appendix at the commencement of the project.
  - .3        On Site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.
  - .4        Reports or directions issued by Federal and Provincial inspectors or other Authority having jurisdiction.
  - .5        Accident or Incident Reports.
  - .6        MSDS data sheets.
  - .7        Name of Contractor’s Representative(s) designated to perform full time health and safety supervision on site.
  - .8        Letter of Good Standing/Certificate of Clearance from the Provincial Worker’s Compensation Board.

- .2 Medical Surveillance: Obtain and maintain worker medical surveillance documentation for work posing a potential hazard to workers as stipulated in Federal or Provincial Occupational Health and Safety Regulations. Upon request, submit copy of documentation to Departmental Representative.
- .3 Upon request by Departmental Representative, submit reports and other documentation as stipulated to be produced and maintained by Federal and Provincial Occupational Health and Safety Regulations and as specified herein.
- .4 Submit above documents in accordance with the submittal procedures specified in Section 01 33 00
- .5 Acceptance of the Project Health and Safety Risk Assessment and Management Plan and other submitted documents by the Departmental Representative shall only be viewed as acknowledgement that the contractor has submitted the required documentation under this specification section.
- .6 The Departmental Representative makes no representation and provides no warranty for the accuracy, completeness and legislative compliance of the Project Health and Safety Risk Management Plan and other submitted documents by this acceptance.
- .7 Responsibility for errors and omissions in the Project Health and Safety risk Assessment and Management Plan and other submitted documents is not relieved by acceptance by the Departmental Representative.

**1.4 Occupational Health and Safety (Project Health and Safety Risk Assessment and Management Plans)**

- .1 Conduct operations in accordance with latest edition of the Newfoundland Occupational Health and Safety (OH&S) Act and Regulations.
- .2 Prepare a detailed Project Health and Safety Risk Assessment and Management Plan for the Departmental Representative. Assessment shall identify, evaluate and control job specific hazards and the necessary control measures to be implemented for managing hazards.
- .3 Provide a copy of the Project Health and Safety Risk Assessment and Management Plan to the Departmental Representative.
- .4 The written Health and Safety Risk Assessment and Management Plan shall incorporate the following:
  - .1 A site-specific health and safety plan, refer to clause 1.5 Site-Specific Health and Safety Risk Assessment and Management Plan of this section for requirements.
  - .2 An organizational structure which shall establish the specific chain of command and specify the overall responsibilities of contractor's employees at the work site.

- .3 A comprehensive workplan which shall:
  - .1 define work tasks and objectives of site activities/operations and the logistics and resources required to reach these tasks and objectives
  - .2 establish personnel requirements for implementing the plan, and
  - .3 establish site specific training and notification requirements and schedules.
- .4 A personal protected equipment (PPE) Program which shall detail PPE:
  - .1 Selection criteria based on site hazards.
  - .2 Use, maintenance, inspection and storage requirements and procedures.
  - .3 Decontamination and disposal procedures.
  - .4 Inspection procedures prior to during and after use, and other appropriate medical considerations.
  - .5 Limitations during temperature extremes, heat stress and other appropriate medical consideration.
- .5 An emergency response procedure, refer to Clause 1.6 Supervision and Emergency Response Procedure of this section for requirements.
- .6 A hazard communication program for informing workers, visitors and individuals outside of the work area as required.
- .7 A health and safety training program.
- .8 General safety rules.
- .5 Periodically review and modify as required each component of the Project Health and Safety Risk Assessment and Management Plan when a new hazard is identified during completion of work and when an error or omission is identified in any part of the Project Health and Safety Risk Assessment and Management Plan.
- .6 Implement all requirements of the Project Health and Safety Risk Assessment and Management Plan.
  - .1 Ensure that every person entering the project site is informed of requirements under the Project Health and Safety Risk Assessment and Management Plan.
  - .2 Take all necessary measures to immediately implement any engineering controls, administrative controls, personal protective equipment required or termination of work procedures to ensure compliance with the Project Health and Safety Risk Assessment and Management Plan.

### **1.5 Site Specific Health and Safety Risk Assessment and Management 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 with seven (7) calendar days of acceptance of bid.
  - .2 Submit updates as work progresses.

- .2 Health and Safety Plan shall contain three (3) parts with following information:
  - .1 Part 1 – Hazards: List of individual health risks and safety hazards identified by hazard assessment process.
  - .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 all 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 contact including:
      - .1 General Contractor and all Sub-Contractors.
      - .2 Federal and Provincial Departments as stipulated by laws and regulations of authorities having jurisdiction and local emergency resource organizations, as needed based on nature of emergency.
  - .4 Part 3b: Site Communications:
    - .1 Procedures used on site to share work related safety issues between workers, subcontractors, and General Contractor.
    - .2 List of critical tasks and work activities, to be communicated with the Facility Manager, which has risk of affecting tenant operations, or endangering health and 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:

Column 1	Column 2	Column 3
Part 1	Part 2	Part 3a/3b
Identified	Safety	Emergency Response &
Hazard	Measures	Site Communications

- .4 Develop Plan in collaboration with subcontractors. Address work activities of all trades. Revise and update Plan as sub-contractors arrive on site.
- .5 Implement and enforce compliance with requirements of plan for full duration of work to final completion and demobilization from site.
- .6 As work progresses, review and update Plan. Address additional health risks and safety hazards identified by on-going hazard assessments.

- .7 Post 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 any comments made of the Plan shall not be construed to imply approval in part, or in whole, of such Plan by 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, Departmental Representative's review of the Plan shall not relieve the Contractor of any of his legal obligations for Occupational Health and Safety provisions specified as part of the Work and those required by provincial legislation or those which would otherwise be applicable to the site of the work.

#### **1.6 Supervision and Emergency Rescue Procedure**

- .1 Carry out work under the direct supervision of competent persons responsible for safety by ensuring the work complies with the appropriate section of OH&S Act and Regulations
- .2 Assign a sufficient number of supervisory personnel to the work site.
- .3 Provide a suitable means of communications for workers required to work alone.
- .4 Develop an emergency rescue plan for the job site and ensure that supervisors and workers are trained in the emergency rescue plan.
- .5 The emergency response plan shall address, as a minimum:
  - .1 Pre-emergency planning.
  - .2 Personnel roles, lines of authority and communication.
  - .3 Emergency recognition and prevention.
  - .4 Safe distances and places of refuge.
  - .5 Site security and control
  - .6 Evacuation routes and procedures
  - .7 Decontamination procedures which are not covered by the site specific safety and health plan.
  - .8 Emergency medical treatment and first aid.
  - .9 Emergency alarm, notification and response procedures including procedures for reporting incidents to local, provincial and federal government departments.
  - .10 PPE and emergency equipment.
  - .11 Procedures for handling emergency incidents.
  - .12 Site specific emergency response training requirements and schedules.
- .6 The emergency response procedures shall be rehearsed regularly as part of the overall training program.

- .7 Provide adequate first aid facilities for the jobsite and ensure that a minimum number of workers are trained in first aid in accordance with the First Aid Regulations.

#### **1.7 Contractor's Safety Officer**

- .1 The contractor's Safety Officer will be solely responsible for the implementation and monitoring of the Project Health and Safety Risk Assessment and Management Plan, and will have the authority to implement health and safety changes as directed by the Departmental Representative. The Safety Officer shall have as a minimum:
  - .1 Completed training in hazardous occurrence management and response/protocols.
  - .2 Completed training in First Aid.
  - .3 Have working knowledge of occupational safety and health regulations.
  - .4 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.
  - .5 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.
  - .6 Be on site during execution of Work and report directly to and be under direction of site supervisor.

#### **1.8 Health and Safety Committee**

- .1 Establish an Occupational Health and Safety Committee where ten or more workers are employed on the job site as per the OH&S Act and Regulations.
- .2 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
- .3 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

#### **1.9 Responsibility**

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

**1.10 Unforeseen Hazards**

- .1 Should any unforeseen or peculiar safety-related factor, hazard, or condition become evident during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction. Advise the Departmental Representative verbally and in writing.

**1.11 Project Site Conditions**

- .1 The following are known or potential project related safety hazards at site:
  - .1 Working on and near water.
  - .2 Inclement Weather.
  - .3 Heavy equipment activity in the area.
  - .4 Overhead and underground power/utility lines.
  - .5 Heavy Lifting.
  - .6 Cutting tools and other construction/power tools.
  - .7 Risk of electric shock.
  - .8 Vehicular/pedestrian traffic.
  - .9 Trench excavation.
- .2 Above lists shall not be construed as being complete and inclusive of potential health and safety hazards encountered during work. Include above items into hazard assessment process.
- .3 Obtain from Departmental Representative, copy of MSDS Data sheets for existing hazardous products stored on site or being used by Facility personnel.

**1.12 Instruction and Training**

- .1 Workers shall not participate in or supervise any activity on the work site until they have been trained to a level required by this job function and responsibility. Training shall as a minimum thoroughly cover the following:
  - .1 Federal and Provincial Health and Safety Legislation requirements including roles and responsibilities of workers and person(s) responsible for implementing, monitoring and enforcing health and safety requirements.
  - .2 Limitations, use, maintenance and care of engineering controls and equipment.
  - .3 Limitations and use of emergency notifications and response equipment including emergency response protocol.
  - .4 Work practices and procedures to minimize the risk of an accident and hazardous occurrence from exposure to a hazard.
- .2 Provide and maintain training of workers, as required, by Federal and Provincial legislation.
- .3 Provide copies of all training certificates to the Departmental Representative for review, before a worker is to enter the work site.

- .4 Authorized visitors shall not access the work site until they have been:
  - .1 Notified of the names of persons responsible for implementing, monitoring and enforcing the health and Safety Risk Assessment and Management Plan.
  - .2 Briefed on safety and health hazards present on the site.
  - .3 Instructed in the proper use and limitations of personal protective equipment.
  - .4 Briefed as the emergency response protocol including notification and evacuation process.
  - .5 Informed of practices and procedures to minimize risks from hazards and applicable to activities performed by visitors.

### **1.13 Minimum Site Safety Rules**

- .1 Notwithstanding the requirement to abide by federal and provincial health and safety regulations, the following safety rules shall be considered minimum requirements to be obeyed by all persons granted access.
  - .1 Wear personal protective equipment (PPE) appropriate to function and task on site: the minimum requirements being hard hat, safety footwear and eye protection and for work on or near water, a personal flotation device.
  - .2 Immediately report unsafe activity or condition at site, near miss accident, injury and damage.
  - .3 Maintain site in tidy condition.
  - .4 Obey warning signs and safety tags.
- .2 Brief workers on site safety rules, and on the disciplinary measures to 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-contractors 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 General 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 Worker's 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.

#### **1.14 Construction Safety Measures**

- .1 Observe construction safety measures of National Building Code, latest edition, Provincial Government, OH&S Act and Regulations, Workplace Health and Safety and Compensation Commission and Municipal Authority provided that in any case of conflict or discrepancy more stringent requirements shall apply.
- .2 Administer the project in a manner that will ensure, at all times, full compliance with Federal and Provincial Acts, regulations and applicable safety codes and the site Health and Safety Risk Assessment and Management Plan.
- .3 Provide Departmental Representative with copies of all orders, directions and any other documentation, issued by the Provincial Department of Government Services, Occupational Health and Safety branch immediately after receipt.

#### **1.15 Posting of Documents**

- .1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Federal, Province and authority having jurisdiction, and in consultation with the Departmental Representative.

#### **1.16 Health and Safety Monitoring**

- .1 Periodic inspections of the Contractor's work may be carried out by the Departmental Representative to maintain compliance with the Health and Safety Program. Inspections will include visual inspections as well as testing and sampling as required.
- .2 The Contractor shall be responsible for any and all costs associated with delays as a result of Contractor's failure to comply with the requirements outlined in this section.

#### **1.17 Notification**

- .1 The contractor shall, prior to the commencement of work, notify in writing the Work Place Health and Safety Division, Department of Labour with the following information:
  - .1 Name and location of construction site.
  - .2 Company name and mailing address of contractor doing the work.
  - .3 The number of workers to be employed.
  - .4 A copy of the Health and Safety Risk Assessment and Management Plan if requested.

#### **1.18 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.
- .1 Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

#### **1.19 WHMIS**

- .1 Ensure that all controlled products are in accordance with the Workplace Hazardous Materials Information System (WHMIS) Regulations and Chemical Substances of the OH&S Act and Regulations regarding use, handling, labelling, storage, and disposal of hazardous materials.
- .2 Deliver copies of relevant Material Safety Data Sheets (MSDS) to job site and the Departmental Representative. The MSDS must be acceptable to Labour Canada and Health and Welfare Canada for all controlled products that will be used in the performance of this work.
- .3 Train workers required to use or work in close proximity to controlled products as per OH&S Act and Regulations.
- .4 Label controlled products at jobsite as per OH&S and Regulations.
- .5 Provide appropriate emergency facilities as specified in the MSDS where workers might be exposed to contact with chemicals, e.g. eye-wash facilities, emergency shower.
  - .1 Workers to be trained in use of such emergency equipment.
- .6 Contractor shall provide appropriate personal protective equipment as specified in the MSDS where workers are required to use controlled products.
  - .1 Properly fit workers for personal protective equipment
  - .2 Train workers in care, use and maintenance of personal protective equipment.
- .7 No controlled products are to be brought on-site without prior approved MSDS.
- .8 The MSDS are to remain on site at all times.

#### **1.20 Overloading**

- .1 Ensure no part of work or associated equipment is subjected to loading that will endanger its safety or will cause permanent deformation.

#### **1.21 Personal Protective Equipment**

- .1 Ensure workers on the jobsite use personal protective equipment appropriate to the hazards identified in the Health and Safety Risk Assessment and Management Plan and those workers are trained in the proper care, use, and maintenance of such equipment.

- .2 PPE selections shall be based on an evaluation of the performance characteristics of the PPE relative to the requirements and limitations of the site, task-specific conditions, duration and hazards and potential hazards identified on site.
- .3 Provide all workers and up to five (5) visitors to the site with proper hearing protection. Workers and visitors shall not be exposed to noise levels greater than 85 dB (A) over an eight hour shift without proper hearing protection.
- .4 Provide all workers and up to five (5) visitors to the site with CSA approved eye protection sufficient to act as a protective barrier between the eye and airborne contaminants, hazardous materials and physical hazard.
- .5 Provide workers and up to five (5) visitors to the site with CSA approved hard hats.

#### **1.22 Excavation Safety**

- .1 Protect excavations more than 1.25 metres deep against cave-ins or wall collapse by side wall sloping to the appropriate angle of repose, an engineered shoring/sheathing system or an approved trench box. Provide a ladder which can extend from the bottom of the excavation to at least 0.91 metres above the top of the excavation.
- .2 Ensure that all excavations less than 1.25 metres deep are effectively protected when hazardous ground movement may be expected.
- .3 Design trench boxes, certified by a registered Professional Engineer, and fabricated by a reputable manufacturer. Provide the manufacturer's Depth Certificate Statement permanently affixed. Use trench boxes in strict accordance with manufacturer's instructions and depth certification data.
- .4 For excavations deeper than six (6) metres, provide a certificate from a registered Professional Engineer stating that the protection methods proposed have been properly designed in accordance with accepted engineering practice. The engineer's certificate shall verify that the trench boxes, if used, are properly designed and constructed to suit the depth and soil conditions.
- .5 Ensure that the superintendent and every crew chief, foreperson and lead hand engaged in trenching operations or working in trenches have in his/her possession a copy of the Department of Labour's "Trench Excavation Safety Guide".

#### **1.23 Hazardous Materials**

- .1 Should material resembling hazardous materials (asbestos/mould) be encountered during the execution of work and notify the Departmental Representative. Do not proceed until written instructions have been received from the Departmental Representative.
- .2 Unless otherwise noted, for hazardous materials abatement and repair, employ the services of a recognized Environmental Consultant to provide all air monitoring and testing services for regulatory requirements.

**1.24 Heavy Equipment**

- .1 Ensure mobile equipment used on jobsite is of the type specified in OH&S Act and Regulations fitted with a Roll Over Protective (ROP) Structure.
- .2 Provide certificate of training in Power Line Hazards for operators of heavy equipment.
- .3 Obtain written clearance from the power utility where equipment is used in close proximity to (within 5.5 metres) overhead or underground power lines.
- .4 Equip cranes with:
  - .1 A mechanism which will effectively prevent the hook assembly from running into the top boom pulley.
  - .2 A legible load chart.
  - .3 A maintenance log book.

**1.25 Work Stoppage**

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

**Part 2 PRODUCTS**

**Not used**

**Part 3 EXECUTION**

**Not used**

**END OF SECTION**

## **Part 1           GENERAL**

### **1.1    Related Sections**

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

### **1.2    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 health of persons, animals, or plant life when released to the environment.
- .2       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.
- .3       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    General**

- .1       Contractor shall become familiar with and comply with the Public Works Basic Impact Analysis document attached in Appendix B prior to and during the construction.
- .2       Work under this contract is to be carried out in a National Historic Site, and environmental/cultural resource protection must be given a high priority by all staff involved with the work. Perform work in accordance with Canada National Parks Act and Regulations.
- .3       An Environmental Briefing will be held prior to work commencing at the site, which will outline environmental factors to be considered during the work. It is mandatory that all staff of the Contractor, which will be employed on this project, attend this meeting with the Departmental Representative and Environmental Protection Officer (EPO).
- .4       The Contractor shall meet all requirements as detailed in Appendix B – Parks Canada Basic Impact Analysis (BIA), Water System Rehabilitation, Cape Spear National Historic Site. This document is not all-inclusive, and site adjustment of the mitigation methods for the work may be required. The Departmental Representative will advise the Contractor of any additional requirements as they arise.
- .5       Restrict vegetation removal to areas indicated or designated by Departmental Representative. Vegetation clearing will not be permitted between May 1st and Aug 1st.

- .6 Minimize stripping of topsoil and vegetation. Organic debris removed during operations should be stored for use during site restoration. Grubbed or excavated material will not be pushed into areas to be left undisturbed. Such stockpiles should be located well away from any stream or water body and in designated areas.
- .7 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.
- .8 All site activities related to construction are to be confined within the defined project boundaries.
- .9 Temporary storage, parking areas, and turn-a-round facilities for contractor-related equipment and vehicles will be limited to those areas indicated or agreed to by the Departmental Representative. Restrict movement of vehicles and equipment to existing disturbed areas (access roads, borrow pits, disposal areas and right-of-ways).
- .10 Locate fuel storage facility a minimum of 100 m from any water body in an area approved by Departmental Representative and construct impermeable dykes so that any spillage is contained. Fueling of vehicles or equipment will not be permitted within 100 m of any water body. Maintenance of vehicles and equipment will be permitted only in designated areas as directed by the Departmental Representative.
- .11 Give immediate notice to Departmental Representative if evidence of archaeological finds, cultural resources, or artifacts are encountered during construction, and await his written instructions before proceeding with work in this area.

#### **1.4 Fires**

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

#### **1.5 Disposal of Wastes and Hazardous Materials**

- .1 Do not bury rubbish and waste materials on site. Dispose of materials at approved landfill sites.
- .2 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.
- .3 Store, handle and dispose of hazardous materials and hazardous waste in accordance with applicable Federal and Provincial laws, regulations, codes and guidelines.
- .4 Dispose of construction waste materials including creosote treated timbers and demolition debris, resulting from work, at approved landfill sites only. Carry out such disposal in strict

accordance with Provincial and Municipal rules and regulations. Separate out and prevent improper disposal of items banned from landfills. The cost for removal and disposal all waste material to be included in the lump sum price for Section 02 41 16.01 – Structure Demolition.

- .5 Establish methods and undertake construction practices which will minimize waste and optimize use of construction materials. Separate at source all construction waste materials, demolition debris and product packaging and delivery containers into various waste categories in order to maximize recycling abilities of various materials and avoid disposal of debris at landfill site(s) in a “mixed state”. Where recycling firms, specializing in recycling of specific materials exist, transport such materials to the recycling facility and avoid disposal at landfill sites.
- .6 Communicate with landfill operator prior to commencement of work, to determine what specific construction, demolition and renovation waste materials have been banned from disposal at the landfill and at transfer stations.

#### **1.6 Drainage**

- .1 Do not pump water containing suspended materials into waterways, sewer or drainage systems.
- .2 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.
- .3 Provide control devices such as filter fabrics, sediment traps and other necessary means to control drainage and run-off. Maintain in good order for the duration of the project.

#### **1.7 Work Adjacent to Waterways**

- .1 Do not operate construction equipment in waterways.
- .2 Do not dump excavated fill, waste material or debris in waterways.
- .3 Maintain equipment in good order with no fluid leaks.

## **1.8 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 Cover or wet down dry materials and rubbish to prevent blowing dust and debris.
- .4 Maintain inventory of hazardous materials and hazardous waste stored on site. List items by product name, quantity and date when storage began.
- .5 Have emergency spill response equipment and rapid clean-up kit, appropriate to work, at site. Locate adjacent to work and where hazardous materials are stored. Provide personal protective equipment as required for clean-up.
- .6 Report, to Federal and Provincial Department of the Environment, spills of petroleum and other hazardous materials as well as accidents having potential of polluting the environment. Also notify Departmental Representative and submit a written spill report to Department Representative within 24 hours of occurrence.
- .7 Provide a floating debris containment boom whenever any of the Contractors methods of work allow for the potential of floating debris.

## **1.9 Notification**

- .1 Departmental Representative will notify Contractor in writing of observed non-compliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.
- .2 Contractor: after receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.
- .3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.
- .4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

## **Part 2 PRODUCTS**

Not Used.

## **Part 3 EXECUTION**

Not Used.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 35 29.06 Health and Safety Requirements.
- .2 Section 01 35 43 Environmental Procedures.

**1.2 REFERENCES AND CODES**

- .1 Perform Work in accordance with National Building Code of Canada (NBC) including amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.
- .2 Meet or exceed requirements of:
  - .1 Contract documents.
  - .2 Specified standards, codes and referenced documents.

**1.3 HAZARDOUS MATERIAL DISCOVERY**

- .1 Asbestos: demolition of spray or trowel-applied asbestos is hazardous to health. Stop work immediately when material resembling spray or trowel-applied asbestos is encountered during demolition work. Notify Departmental Representative.
- .2 PCB: Polychlorinated Biphenyl: stop work immediately when material resembling Polychlorinated Biphenyl is encountered during demolition work. Notify Departmental Representative.
- .3 Mould: stop work immediately when material resembling mould is encountered during demolition work. Notify Departmental Representative.

**1.4 BUILDING SMOKING ENVIRONMENT**

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

**1.5 NATIONAL PARKS ACT**

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

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

END OF SECTION

**Part 1 GENERAL**

**1.1 Related Sections**

- .1 Section 01 29 83 – Payment Procedures for Laboratory Services.
- .2 Section 01 33 00 – Submittal Procedures.
- .3 Section 01 78 00 – Closeout Submittals.

**1.2 Inspection**

- .1 Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
- .2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative instructions, or law of Place of Work.
- .3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
- .4 Departmental Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such Work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Departmental Representative shall pay cost of examination and replacement.

**1.3 Independent Inspection Agencies**

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

**1.4 Access to Work**

- .1 Allow inspection/testing agencies access to Work.
- .2 Co-operate to facilitate such inspections and tests.
- .3 Make good work disturbed by inspectors and tests.

### **1.5 Procedures**

- .1 Notify appropriate agency and Departmental Representative sufficiently in advance of requirement for tests, in order that attendance arrangements can be made.
- .2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.
- .3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

### **1.6 Rejected Work**

- .1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- .2 Make good other Contractor's work damaged by such removals or replacements promptly.
- .3 If in opinion of Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Departmental Representative.

### **1.7 Tests and Mix Designs**

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

### **1.8 Mill Tests**

- .1 Submit mill test certificates and other certificates as specified in various sections.

## **Part 2 PRODUCTS**

**Not Used**

## **Part 3 EXECUTION**

**Not Used**

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES**

- .1 U.S. Environmental Protection Agency (EPA) / Office of Water
  - .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

**1.2 ACTION AND INFORMATIONAL SUBMITTALS**

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

**1.3 INSTALLATION AND REMOVAL**

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

**1.4 DEWATERING**

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

**1.5 WATER SUPPLY**

- .1 Provide continuous supply of potable water for construction use.

**1.6 TEMPORARY HEATING AND VENTILATION**

- .1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.
- .2 Ventilating:
  - .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
  - .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
  - .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
  - .4 Ventilate temporary sanitary facilities.

**1.7 TEMPORARY POWER AND LIGHT**

- .1 Provide and pay for temporary power during construction for temporary lighting and operating of power tools, to a maximum supply of 230 volts, 30 amps.
- .2 Arrange for connection with appropriate utility company if required. Pay costs for installation, maintenance and removal.

**1.8 TEMPORARY COMMUNICATION FACILITIES**

- .1 Provide and pay for temporary telephone and data hook up lines and equipment necessary for own use.

**1.9 FIRE PROTECTION**

- .1 Provide and maintain temporary fire protection equipment during performance of Work required by insurance companies having jurisdiction, governing codes, regulations and bylaws.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL**

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

**END OF SECTION**

## **Part 1 GENERAL**

### **1.1 Related Sections**

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

### **1.2 Section Includes**

- .1 Barriers.

### **1.3 Installation and Removal**

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

### **1.4 Hoarding**

- .1 Erect temporary site enclosure using new 1.2M high snow fence wired to rolled steel “T” bar fence posts spaced at 2.4 meters.

### **1.5 Access to Site**

- .1 Provide and maintain access to adjacent facilities.

### **1.6 Fire Routes**

- .1 Maintain access to property.

### **1.7 Protection for Off-Site and Public Property**

- .1 Protect surrounding private and public property from damage during performance of Work.
- .2 Be responsible for damage incurred.

### **1.8 Waste Management and Disposal**

- .1 Separate waste materials for reuse and recycling. Refer to Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

**Part 2        PRODUCTS**

**Not Used**

**Part 3        EXECUTION**

**Not Used**

**END OF SECTION**

## **Part 1 GENERAL**

### **1.1 General**

- .1 Use new material and equipment unless otherwise specified.
- .2 Within 7 days of written request by Departmental Representative, submit following information for any materials and products proposed for supply;
  - .1 name and address of manufacturer;
  - .2 trade name, model and catalogue number;
  - .3 performance, descriptive and test data;
  - .4 manufacturer's installation or application instructions;
  - .5 evidence of arrangements to procure.
  - .6 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.
- .5 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations except where required for operating instructions, or when located in mechanical or electrical rooms.

### **1.2 Quality**

- .1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
- .2 Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.
- .3 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
- .4 Should disputes arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.

### **1.3 Availability**

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

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

#### **1.4 Storage, Handling and Protection**

- .1 Deliver, handle and store products in manner to prevent damage, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
- .2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
- .3 Store products subject to damage from weather in weatherproof enclosures.
- .4 Store cementitious products clear of earth or concrete floors, and away from walls.
- .5 Store sheet materials, lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .6 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.

#### **1.5 Transportation**

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

#### **1.6 Manufacturer's Instructions**

- .1 Unless otherwise indicated in the specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.
- .2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative will establish course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract Time.

### **1.7 Quality Of Work**

- .1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.
- .2 Do not employ anyone unskilled in their required duties. Departmental Representative reserves right to require dismissal from site, workers deemed incompetent or careless.
- .3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative, whose decision is final.

### **1.8 Co-Ordination**

- .1 Ensure coordination of Work. Maintain efficient and continuous supervision.

### **1.9 Concealment**

- .1 Before installation inform Departmental Representative if there is interference. Install as directed by Departmental Representative.

### **1.10 Remedial Work**

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

### **1.11 Fastenings**

- .1 Prevent electrolytic action between dissimilar metals and materials.
- .2 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.
- .3 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.
- .4 Keep exposed fastenings to a minimum, space evenly and install neatly.
- .5 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

**1.12 Protection Of Work In Progress**

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

**1.13 Existing Utilities**

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

**Part 2 PRODUCTS**

**Not Used**

**Part 3 EXECUTION**

**Not Used**

**END OF SECTION**

**Part 1            General**

**1.1            ACTION AND INFORMATIONAL SUBMITTALS**

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

**1.2            MATERIALS**

- .1        Required for original installation.
- .2        Change in Materials: Submit request for substitution in accordance with Section 01 33 00 - Submittal Procedures.

**1.3            PREPARATION**

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

**1.4            EXECUTION**

- .1        Execute cutting, fitting, and patching, including excavation and fill, to complete Work.
- .2        Fit several parts together, to integrate with other Work.

- .3 Uncover Work to install ill-timed Work.
- .4 Remove and replace defective and non-conforming Work.
- .5 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.
- .6 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
- .7 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.
- .8 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.
- .9 Restore work with new products in accordance with requirements of Contract Documents.
- .10 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- .11 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.

**1.5 WASTE MANAGEMENT AND DISPOSAL**

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

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

## **Part 1 GENERAL**

### **1.1 Related Sections**

- .1 Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- .2 Section 01 91 13 – General Commissioning (Cx) Requirements

### **1.2 Project Cleanliness**

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by Owner or other Contractors.
- .2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.
- .3 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .4 Provide on-site containers for collection of waste materials and debris.
- .5 Provide and use marked separate bins for recycling. Refer to Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .6 Dispose of waste materials and debris at designated approved dumping areas.
- .7 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .8 Provide adequate ventilation during use of volatile or noxious substances.
- .9 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .10 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces.

### **1.3 Final Cleaning**

- .1 Cleaning shall include disinfection and verification that the waterlines, valves, tank, and other components of the water system, are flushed, super-chlorinated, re-flushed, and filled with potable water.
- .2 Water to be tested by a certified laboratory to confirm absence of bacteria.
- .3 When work is substantially performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .4 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
- .5 Prior to final review remove surplus products, tools, construction machinery and equipment.
- .6 Remove waste products and debris including that caused by Owner or other Contractors.

- .5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.
- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .7 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .8 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .9 Remove dirt and other disfiguration from exterior surfaces.

#### **1.4 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 Dispose of construction waste materials resulting from work, at approved landfill sites only. Carry out such disposal in strict accordance with Provincial and Municipal rules. Separate out and prevent improper disposal of items banned from landfills.

#### **1.5 Measurement for Payment**

- .1 No measurement will be made under this section.

### **Part 2 PRODUCTS**

**Not Used**

### **Part 3 EXECUTION**

**Not Used**

**END OF SECTION**

**Part 1            GENERAL**

**1.1    RELATED SECTIONS**

- .1        Section 01 35 43 – Environment Procedures.

**1.2    WASTE MANAGEMENT PLAN**

- .1        Prior to commencement of work, prepare Waste Management Work Plan.
- .2        Work Plan to include:
  - .1        Waste audit.
  - .2        Waste reduction practices.
  - .3        Material source separation process.
  - .4        Procedures for sending recyclables to recycling facilities.
  - .5        Procedures for sending non-salvageable items and waste to approved waste processing facility or landfill site.
  - .6        Training and supervising workforce on waste management at site.
- .3        Work Plan to incorporate waste management requirements specified herein and in other sections of the Specifications.
- .4        Where applicable, develop Work Plan in collaboration with all subcontractors to ensure all waste management issues and opportunities are addressed.
- .5        Implement and manage all aspects of Waste Management Work Plan for duration of work.
- .6        Revise Plan as work progresses addressing new opportunities for diversion of waste from landfill.

**1.3    WASTE AUDIT**

- .1        At project startup, conduct waste audit of:
  - .1        Site conditions identifying salvageable and non-salvageable items and waste resulting from demolition and removal work.
  - .2        Develop written list. Record type, composition and quantity of various salvageable items and waste anticipated, reasons for waste generation and operational factors which contribute to waste.

#### **1.4 Waste Reduction**

- .1 Based on waste audit, develop waste reduction program.
- .2 Structure program to prioritize actions, with waste reduction as first priority, followed by salvage and recycling effort, then disposal as solid waste.
- .3 Identify materials and equipment to be:
  - .1 Protected and turned over to Departmental Representative when indicated.
  - .2 Salvaged for resale or reuse by Contractor.
  - .3 Sent to recycling facility.
  - .4 Sent to waste processing/landfill site for their recycling effort.
  - .5 Disposed of in approved landfill site.
- .4 Reduce construction waste during installation work. Undertake practices which will minimize waste and optimize full use of new materials.

#### **1.5 Material Source Separation Process**

- .1 Develop and implement material source separation process at commencement of work as part of mobilization and waste management at site.
- .2 Provide on-site facilities to collect, handle and store anticipated quantities of reusable, salvageable and recyclable materials.
  - .1 Use suitable containers for individual collection of items based on intended purpose.
  - .2 Locate to facilitate deposit but without hindering daily operations.
  - .3 Clearly mark containers and stockpiles as to purpose and use.
- .3 Perform demolition and removal of existing structure components and equipment following a systematic deconstruction process.
  - .1 Separate materials and equipment at source carefully dismantling, labelling and stockpiling alike 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. Sale of such items not permitted on site.
    - .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.
- .4 Send leftover material resulting from installation work for recycling whenever possible.
- .5 Establish methods whereby hazardous and toxic waste materials, and their containers, encountered or used in the course work are properly isolated, stored on site and disposed in accordance with applicable laws and regulations from authorities having jurisdiction.

#### **1.6 Worker Training and Supervision**

- .1 Provide adequate training to workforce to emphasize purpose and worker responsibilities in carrying out the Waste Management Plan.

- .2 Waste Management Coordinator: designate person on site, experienced in waste management and having knowledge of the purpose and content of Waste Management Plan to:
  - .1 Oversee and supervise waste management during work.
  - .2 Provide instructions and directions to all workers and subcontractors on waste reduction, source separation and disposal practices.
- .3 Post a copy of Plan in a prominent location on site for review by workers.

#### **1.7 Certification of Material Diversion**

- .1 Submit to Departmental Representative, copies of certified weigh bills from authorized waste processing sites and sale receipts from recycling/reuse facilities confirming receipt of building materials and quantity of waste diverted from landfill.
- .2 Submit data at pre-determined project milestones as determined by Departmental Representative.
- .3 Compare actual quantities diverted from landfill with projections made during waste audit.

#### **1.8 Disposal Requirements**

- .1 Burning of rubbish and waste materials is prohibited. Dispose of construction waste materials resulting from work at approved landfill sites only. Carry out such disposal in strict accordance with Provincial and Municipal rules and regulations. Separate out and prevent improper disposal of items banned from landfills.
- .2 Disposal of waste, volatile materials, mineral spirits, oil, paint, paint thinner or unused preservative material into waterways, storm, or sanitary sewers is prohibited.
- .3 Do not dispose of preservative treated wood through incineration.
- .4 Do not dispose of preservative treated wood with other materials destined for recycling or reuse.
- .5 Dispose of treated wood, end pieces, wood scraps and sawdust at a sanitary landfill.
- .6 Dispose of waste only at approved waste processing facility or landfill sites approved by authority having jurisdiction.
- .7 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 in strict accordance with provincial and municipal regulations.
- .8 Transport waste intended for landfill in separated condition, following rules and recommendations of Landfill Operator in support of their effort to divert, recycle and reduce amount of solid waste placed in landfill.

- .9 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.
- .10 Sale of salvaged items by Contractor to other parties not permitted on site.

**Part 2 PRODUCTS**

**Not Used**

**Part 3 EXECUTION**

**Not Used**

**END OF SECTION**

## **Part 1            GENERAL**

### **1.1    Related Sections**

- .1      Section 01 78 00 – Closeout Submittals.
- .2      Section 01 74 11 - Cleaning

### **1.2    Inspection and Declaration**

- .1      Contractor's Inspection: Contractor and Subcontractors to conduct inspection of Work, identify deficiencies and defects, and repair as required conforming to Contract Documents.
  - .1      Notify Departmental Representative in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.
  - .2      Request Departmental Representative's Inspection.
- .2      Departmental Representative's Inspection: Departmental Representative and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor is to correct work accordingly.
- .3      Completion: submit written certificate that following have been performed:
  - .1      Work has been completed and inspected for compliance with Contract Documents.
  - .2      Defects have been corrected and deficiencies have been completed.
  - .3      Equipment and systems have been tested, and are fully operational.
  - .4      Operation of systems have been demonstrated to Owner's personnel.
  - .5      Work is complete and ready for final inspection.
- .4      Final Inspection: when items noted above are completed, request final inspection of Work by Departmental Representative. If Work is deemed incomplete by Departmental Representative, complete outstanding items and request re-inspection.
- .5      Declaration of Substantial Performance: when Departmental Representative considers deficiencies and defects have been corrected and it appears requirements of Contract have been substantially performed, make application for certificate of Substantial Performance.
- .6      Commencement of Lien and Warranty Periods: date of Owner's acceptance of submitted declaration of Substantial Performance shall be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.
- .7      Final Payment: when Departmental Representative considers final deficiencies and defects have been corrected and it appears requirements of Contract have been totally performed, make application for final payment. If Work is deemed incomplete by Departmental Representative, complete outstanding items and request re-inspection.
- .8      Payment of Holdback: after issuance of certificate of Substantial Performance of Work, submit an application for payment of holdback amount in accordance with Contract Documents.

**1.3    Cleaning**

- .1        In accordance with Section 01 74 11 - Cleaning.
- .2        Remove waste and surplus materials, rubbish and construction facilities from the site.

**Part 2            PRODUCTS**

**Not Used**

**Part 3            EXECUTION**

**Not Used**

**END OF SECTION**

**Part 1 GENERAL**

**1.1 Related Sections**

- .1 Section 01 33 00 Submittal Procedures
- .2 Section 01 74 21 Construction/Demolition Waste Management and Disposal.

**1.2 Submittals**

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prepare instructions and data using personnel experienced in maintenance and operation of described products.
- .3 Copy will be returned after final inspection, with Departmental Representative's comments.
- .4 Revise content of documents as required prior to final submittal.
- .5 Furnish evidence, if requested, for type, source and quality of products provided.
- .6 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.
- .7 Pay costs of transportation.

**1.3 Project Record Documents**

- .1 Departmental Representative will provide two white-print sets of contract drawings and two copies of specifications manual specifically for “as-built” purposes.
- .2 Maintain at site one set of the contract drawings and specifications to record actual as-built site conditions.
- .3 Maintain up-to-date, real time as-built drawings and specifications in good condition and make available for inspection by the Departmental Representative at any time during construction.
- .4 As-Built Drawings:
  - .1 Record changes in red ink on the prints. Mark only on one set of prints and at completion of project and prior to final inspection, neatly transfer notations to second set (also by use of red ink). Submit both sets to Departmental Representative. All drawings of both sets shall be stamped “As-Built Drawings” and be signed and dated by Contractor.
  - .2 Show all modifications, substitutions and deviations from what is shown on the contract drawings or in specifications.
  - .3 Record the following information:
    - .1 Horizontal and vertical location of various elements in relation to existing finished floor.

- .2 Field changes of dimension and detail.
  - .3 All design elevations, sections and details dimensioned and marked-up to consistently report finished installation conditions.
  - .4 Any details produced in the course of the contract by Departmental Representative to supplement or to change existing design drawings must also be marked-up and dimensioned to reflect final as-built conditions and appended to the as-built drawing document.
  - .5 All change orders issued over the course of the contract must be documented on the finished as-built documents, accurately and consistently depicting the changed condition as it applies to all affected drawing details.
- .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 that specified.
  - .2 Changes made by Addenda and Change Orders.
  - .3 Mark up both copies of specifications; stamp “as-built”, sign and date similarly to drawings as per above clause.
- .6 Maintain as-built documents current as the contract progresses. Departmental Representative will conduct reviews and inspections of the documents on a regular basis. Frequency of reviews will be subject to Departmental Representative’s discretion. Failure to maintain as-builts current and complete to satisfaction of the Departmental Representative shall be subject to financial penalties in the form of progress payment reductions and holdback assessments.

#### **1.4 As-Builts and Samples**

- .1 Maintain, in addition to requirements in General Conditions, at site for Departmental Representative one record copy of:
  - .1 Contract Drawings.
  - .2 Specifications.
  - .3 Addenda.
  - .4 Change Orders and other modifications to Contract.
  - .5 Reviewed shop drawings, product data, and samples.
  - .6 Field test records.
  - .7 Inspection certificates.
  - .8 Manufacturer's certificates.
- .2 Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.
- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.
- .4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.

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

### **1.5 Recording Actual Site Conditions**

- .1 Record information on set of black line opaque drawings, and in copy of Project Manual, provided by Departmental Representative.
- .2 Provide felt tip marking pens, maintaining separate colours for each major system, for recording information.
- .3 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.
- .4 Contract Drawings and shop drawings: mark each item to record actual construction, including:
  - .1 Measured depths of elements of foundation in relation to finish slab datum.
  - .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  - .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
  - .4 Field changes of dimension and detail.
  - .5 Changes made by change orders.
  - .6 Details not on original Contract Drawings.
  - .7 References to related shop drawings and modifications.
- .5 Specifications: mark each item to record actual construction, including:
  - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
  - .2 Changes made by Addenda and change orders.
- .6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

### **1.6 Final Survey**

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

## **Part 2 PRODUCTS**

**Not Used**

## **Part 3 EXECUTION**

**Not Used**

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 91 13 General Commissioning (CX) Requirements

**1.2 ADMINISTRATIVE REQUIREMENTS**

- .1 Demonstrate operation and maintenance of equipment and systems to Owner's personnel two weeks prior to date of substantial performance.
- .2 Owner: provide list of personnel to receive instructions, and co-ordinate their attendance at agreed-upon times.
- .3 Preparation:
  - .1 Verify conditions for demonstration and instructions comply with requirements.
  - .2 Verify designated personnel are present.
  - .3 Ensure equipment has been inspected and put into operation in accordance with Section 01 91 13 General Commissioning (CX) Requirements.
  - .4 Ensure testing, adjusting, and balancing has been performed in accordance with Section 01 91 13 - General Commissioning (Cx) Requirements and equipment and systems are fully operational.
- .4 Demonstration and Instructions:
  - .1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at agreed upon times, at the equipment location.
  - .2 Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.
  - .3 Review contents of manual in detail to explain aspects of operation and maintenance.
  - .4 Prepare and insert additional data in operations and maintenance manuals when needed during instructions.
- .5 Time Allocated for Instructions: ensure amount of time required for instruction of each item of equipment or system as follows:
  - .1 Section 33 21 19 Well Pumps: 2 hours of instruction.
  - .2 Section 33 11 16 Site Water Utility Distribution Piping: 2 hours of instruction.

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for Departmental Representative's approval.

- .3 Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.
- .4 Give time and date of each demonstration, with list of persons present.
- .5 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

## **Part 1 General**

### **1.1 SUMMARY**

- .1 Section Includes:
  - .1 General requirements relating to commissioning of project's components and systems, specifying general requirements to Performance Verification (PV) of components, equipment, sub-systems, systems, and integrated systems.
  - .2 Commissioning to include and verify that the waterlines, valves, tank, and other components of the water system, are flushed, super-chlorinated, re-flushed, and filled with potable water. Cleaning shall be completed as per AWWA C651, Disinfecting Water Mains, and C652, Disinfection of Water Storage Facilities.
  - .3 Water to be tested to confirm absence of bacteria.
- .2 Related Requirements
  - .1 Section 01 91 33 Commissioning Forms.
  - .2 Section 01 91 41 Commissioning: Training.
- .3 Acronyms:
  - .1 AFD - Alternate Forms of Delivery, service provider.
  - .2 BMM - Building Management Manual.
  - .3 Cx - Commissioning.
  - .4 EMCS - Energy Monitoring and Control Systems.
  - .5 OM - Operation and Maintenance.
  - .6 PI - Product Information.
  - .7 PV - Performance Verification.
  - .8 TAB - Testing, Adjusting and Balancing.

### **1.2 GENERAL**

- .1 Cx is a planned program of tests, procedures and checks carried out systematically on systems and integrated systems of the finished Project. Cx is performed after systems and integrated systems are completely installed, functional and Contractor's Performance Verification responsibilities have been completed and approved. Objectives:
  - .1 Verify installed equipment, systems and integrated systems operate in accordance with contract documents and design criteria and intent.
  - .2 Ensure appropriate documentation is compiled into the BMM.
  - .3 Effectively train OM staff.
- .2 Contractor assists in Cx process, operating equipment and systems, troubleshooting and making adjustments as required.
  - .1 Systems to be operated at full capacity under various modes to determine if they function correctly and consistently at peak efficiency. Systems to be operated interactively with each other as intended in accordance with Contract Documents and design criteria.

- .2 During these checks, adjustments to be made to enhance performance to meet environmental or user requirements.
- .3 Design Criteria: as per client's requirements or determined by designer. To meet Project functional and operational requirements.

### **1.3 COMMISSIONING OVERVIEW**

- .1 Cx to be a line item of Contractor's cost breakdown.
- .2 Cx activities supplement field quality and testing procedures described in relevant technical sections.
- .3 Cx is conducted in concert with activities performed during stage of project delivery. Cx identifies issues in Planning and Design stages which are addressed during Construction and Cx stages to ensure the built facility is constructed and proven to operate satisfactorily under weather, environmental and occupancy conditions to meet functional and operational requirements. Cx activities includes transfer of critical knowledge to facility operational personnel.
- .4 Departmental Representative will issue Interim Acceptance Certificate when:
  - .1 Completed Cx documentation has been received, reviewed for suitability and approved by Departmental Representative.
  - .2 Equipment, components and systems have been commissioned.
  - .3 OM training has been completed.

### **1.4 NON-CONFORMANCE TO PERFORMANCE VERIFICATION REQUIREMENTS**

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

### **1.5 PRE-CX REVIEW**

- .1 Before Construction:
  - .1 Review contract documents, confirm by writing to Departmental Representative.
    - .1 Adequacy of provisions for Cx.
    - .2 Aspects of design and installation pertinent to success of Cx.
- .2 During Construction:
  - .1 Co-ordinate provision, location and installation of provisions for Cx.
- .3 Before start of Cx:
  - .1 Have completed Cx Plan up-to-date.
  - .2 Ensure installation of related components, equipment, sub-systems, and systems is complete.

- .3 Fully understand Cx requirements and procedures.
  - .4 Have Cx documentation shelf-ready.
  - .5 Understand completely design criteria and intent and special features.
  - .6 Submit complete start-up documentation to Departmental Representative.
  - .7 Have Cx schedules up-to-date.
  - .8 Ensure systems have been cleaned thoroughly.
  - .9 Complete TAB procedures on systems, submit TAB reports to Departmental Representative for review and approval.
  - .10 Ensure "As-Built" system schematics are available.
- .4 Inform Departmental Representative in writing of discrepancies and deficiencies on finished works.

## **1.6 CONFLICTS**

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

## **1.7 ACTION AND INFORMATIONAL SUBMITTALS**

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

## **1.8 COMMISSIONING DOCUMENTATION**

- .1 Refer to Section 01 91 33 - Commissioning (Cx) Forms: Installation Check Lists and Product Information (PI) / Performance Verification (PV) Forms for requirements and instructions for use.
- .2 Departmental Representative to review and approve Cx documentation.
- .3 Provide completed and approved Cx documentation to Departmental Representative.

## **1.9 COMMISSIONING SCHEDULE**

- .1 Provide detailed Cx schedule as part of construction schedule in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart.

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

#### **1.10 COMMISSIONING MEETINGS**

- .1 Convene Cx meetings following project meetings: Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart and as specified herein.
- .2 Purpose: to resolve issues, monitor progress, identify deficiencies, relating to Cx.
- .3 Continue Cx meetings on regular basis until commissioning deliverables have been addressed.
- .4 At 80% construction completion stage, Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart, Departmental Representative to call a separate Cx scope meeting to review progress, discuss schedule of equipment start-up activities and prepare for Cx. Issues at meeting to include:
  - .1 Review duties and responsibilities of Contractor and subcontractors, addressing delays and potential problems.
  - .2 Determine the degree of involvement of trades in the commissioning process.
- .5 Thereafter Cx meetings to be held until project completion and as required during equipment start-up and functional testing period.
- .6 Meeting will be chaired by Departmental Representative, who will record and distribute minutes.
- .7 Ensure subcontractors are present at 80% and subsequent Cx meetings and as required.

#### **1.11 STARTING AND TESTING**

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

#### **1.12 WITNESSING OF STARTING AND TESTING**

- .1 Provide 7 days notice prior to commencement.
- .2 Departmental Representative to witness of start-up and testing.
- .3 Contractor's Cx personnel to be present at tests performed and documented by sub-trades, suppliers and equipment manufacturers.

#### **1.13 PROCEDURES**

- .1 Verify that equipment and systems are complete, clean, and operating in normal and safe manner prior to conducting start-up, testing and Cx.

- .2 Conduct start-up and testing in following distinct phases:
  - .1 Included in delivery and installation:
    - .1 Verification of conformity to specification, approved shop drawings and completion of PI report forms.
    - .2 Visual inspection of quality of installation.
  - .2 Start-up: follow accepted start-up procedures.
  - .3 Operational testing: document equipment performance.
  - .4 System PV: include repetition of tests after correcting deficiencies.
  - .5 Post-substantial performance verification: to include fine-tuning.
- .3 Correct deficiencies and obtain approval from Departmental Representative after distinct phases have been completed and before commencing next phase.
- .4 Document require tests on approved PV forms.
- .5 Failure to follow accepted start-up procedures will result in re-evaluation of equipment by an independent testing agency selected by Departmental Representative. If results reveal that equipment start-up was not in accordance with requirements, and resulted in damage to equipment, implement following:
  - .1 Minor equipment/systems: implement corrective measures approved by Departmental Representative.
  - .2 Major equipment/systems: if evaluation report concludes that damage is minor, implement corrective measures approved by Departmental Representative.
  - .3 If evaluation report concludes that major damage has occurred, Departmental Representative shall reject equipment.
    - .1 Rejected equipment to be remove from site and replace with new.
    - .2 Subject new equipment/systems to specified start-up procedures.

#### **1.14 START-UP DOCUMENTATION**

- .1 Assemble start-up documentation and submit to Departmental Representative for approval before commencement of commissioning.
- .2 Start-up documentation to include:
  - .1 Factory and on-site test certificates for specified equipment.
  - .2 Pre-start-up inspection reports.
  - .3 Signed installation/start-up check lists.
  - .4 Start-up reports,
  - .5 Step-by-step description of complete start-up procedures, to permit Departmental Representative to repeat start-up at any time.

#### **1.15 OPERATION AND MAINTENANCE OF EQUIPMENT AND SYSTEMS**

- .1 After start-up, operate and maintain equipment and systems as directed by equipment/system manufacturer.
- .2 With assistance of manufacturer develop written maintenance program and submit Departmental Representative for approval before implementation.

- .3 Operate and maintain systems for length of time required for commissioning to be completed.
- .4 After completion of commissioning, operate and maintain systems until issuance of certificate of interim acceptance.

#### **1.16 TEST RESULTS**

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

#### **1.17 START OF COMMISSIONING**

- .1 Notify Departmental Representative at least 7 days prior to start of Cx.
- .2 Start Cx after elements of building affecting start-up and performance verification of systems have been completed.

#### **1.18 INSTRUMENTS / EQUIPMENT**

- .1 Submit to Departmental Representative for review and approval:
  - .1 Complete list of instruments proposed to be used.
  - .2 Listed data including, serial number, current calibration certificate, calibration date, calibration expiry date and calibration accuracy.
- .2 Provide the following equipment as required:
  - .1 2-way radios.
  - .2 Equipment as required to complete work.

#### **1.19 COMMISSIONING PERFORMANCE VERIFICATION**

- .1 Carry out Cx:
  - .1 Under actual operating conditions, over entire operating range, in all modes.
  - .2 On independent systems and interacting systems.
- .2 Cx procedures to be repeatable and reported results are to be verifiable.
- .3 Follow equipment manufacturer's operating instructions.
- .4 EMCS trending to be available as supporting documentation for performance verification.

#### **1.20 WITNESSING COMMISSIONING**

- .1 Departmental Representative to witness activities and verify results.

#### **1.21 EXTRAPOLATION OF RESULTS**

- .1 Where Cx of weather, occupancy, or seasonal-sensitive equipment or systems cannot be conducted under near-rated or near-design conditions, extrapolate part-load results to design conditions when approved by Departmental Representative in accordance with equipment manufacturer's instructions, using manufacturer's data, with manufacturer's assistance and using approved formulae.

**1.22 EXTENT OF VERIFICATION**

- .1 Number and location to be at discretion of Departmental Representative.
- .2 Conduct tests repeated during verification under same conditions as original tests, using same test equipment, instrumentation.
- .3 Review and repeat commissioning of systems if inconsistencies found in more than 20% of reported results.
- .4 Perform additional commissioning until results are acceptable to Departmental Representative.

**1.23 REPEAT VERIFICATIONS**

- .1 Assume costs incurred by Departmental Representative for third and subsequent verifications where:
  - .1 Verification of reported results fail to receive Departmental Representative's approval.
  - .2 Repetition of second verification again fails to receive approval.
  - .3 Departmental Representative deems Contractor's request for second verification was premature.

**1.24 SUNDRY CHECKS AND ADJUSTMENTS**

- .1 Make adjustments and changes which become apparent as Cx proceeds.
- .2 Perform static and operational checks as applicable and as required.

**1.25 DEFICIENCIES, FAULTS, DEFECTS**

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

**1.26 COMPLETION OF COMMISSIONING**

- .1 Upon completion of Cx leave systems in normal operating mode.
- .2 Except for warranty and seasonal verification activities specified in Cx specifications, complete Cx prior to issuance of Interim Certificate of Completion.
- .3 Cx to be considered complete when contract Cx deliverables have been submitted and accepted by Departmental Representative.

**1.27 ACTIVITIES UPON COMPLETION OF COMMISSIONING**

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

**1.28 TRAINING**

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

**1.29 MAINTENANCE MATERIALS, SPARE PARTS, SPECIAL TOOLS**

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

**1.30 OCCUPANCY**

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

**1.31 INSTALLED INSTRUMENTATION**

- .1 Use instruments installed under Contract for TAB and PV if:
  - .1 Accuracy complies with these specifications.
  - .2 Calibration certificates have been deposited with Departmental Representative.
- .2 Calibrated EMCS sensors may be used to obtain performance data provided that sensor calibration has been completed and accepted.

**1.32 PERFORMANCE VERIFICATION TOLERANCES**

- .1 Application tolerances:
  - .1 Specified range of acceptable deviations of measured values from specified values or specified design criteria. Except for special areas, to be within +/- 10% of specified values.
- .2 Instrument accuracy tolerances:
  - .1 To be of higher order of magnitude than equipment or system being tested.
- .3 Measurement tolerances during verification:
  - .1 Unless otherwise specified actual values to be within +/- 2 % of recorded values.

**1.33 OWNER'S PERFORMANCE TESTING**

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

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1 General**

**1.1 SUMMARY**

- .1 Section Includes:
  - .1 Commissioning forms to be completed for equipment, system and integrated system.
- .2 Related Requirements
  - .1 Section 01 91 13 General Commissioning (Cx) Requirements.
  - .2 Section 01 91 41 Commissioning: Training.

**1.2 INSTALLATION/START-UP CHECK LISTS**

- .1 Include the following data:
  - .1 Product manufacturer's installation instructions and recommended checks.
  - .2 Special procedures as specified in relevant technical sections.
  - .3 Items considered good installation and engineering industry practices deemed appropriate for proper and efficient operation.
- .2 Equipment manufacturer's installation/start-up check lists are acceptable for use. As deemed necessary by Departmental Representative supplemental additional data lists will be required for specific project conditions.
- .3 Use check lists for equipment installation. Document check list verifying checks have been made, indicate deficiencies and corrective action taken.
- .4 Installer to sign check lists upon completion, certifying stated checks and inspections have been performed. Return completed check lists to Departmental Representative. Check lists will be required during Commissioning and will be included in Building Maintenance Manual (BMM) at completion of project.
- .5 Use of check lists will not be considered part of commissioning process but will be stringently used for equipment pre-start and start-up procedures.

**1.3 PRODUCT INFORMATION (PI) REPORT FORMS**

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

#### **1.4 PERFORMANCE VERIFICATION (PV) FORMS**

- .1 PV forms to be used for checks, running dynamic tests and adjustments carried out on equipment and systems to ensure correct operation, efficiently and function independently and interactively with other systems as intended with project requirements.
- .2 PV report forms include those developed by Contractor records measured data and readings taken during functional testing and Performance Verification procedures.
- .3 Prior to PV of integrated system, complete PV forms of related systems and obtain Departmental Representative's approval.

#### **1.5 COMMISSIONING FORMS**

- .1 Use Commissioning forms to verify installation and record performance when starting equipment and systems.
- .2 Strategy for Use:
  - .1 Contractor provides project-specific Commissioning forms with Specification data included.
  - .2 Contractor will provide required shop drawings information and verify correct installation and operation of items indicated on these forms.
  - .3 Confirm operation as per design criteria and intent.
  - .4 Identify variances between design and operation and reasons for variances.
  - .5 Verify operation in specified normal and emergency modes and under specified load conditions.
  - .6 Record analytical and substantiating data.
  - .7 Verify reported results.
  - .8 Form to bear signatures of recording technician and reviewed and signed off by Contractor and Departmental Representative.
  - .9 Submit immediately after tests are performed.
  - .10 Reported results in true measured SI unit values.
  - .11 Provide Departmental Representative with originals of completed forms.
  - .12 Maintain copy on site during start-up, testing and commissioning period.
  - .13 Forms to be both hard copy and electronic format with typed written results in Building Management Manual.

#### **1.6 LANGUAGE**

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

#### **Part 2 Products**

##### **2.1 NOT USED**

- .1 Not Used.

**Part 3            Execution**

**3.1                NOT USED**

.1            Not Used.

**END OF SECTION**

## **Part 1 General**

### **1.1 SUMMARY**

- .1 Section Includes:
  - .1 This Section specifies roles and responsibilities of Commissioning Training.
- .2 Related Requirements
  - .1 Section 01 91 13 General Commissioning (CX) Requirements.
  - .2 Section 01 91 33 Commissioning Forms.

### **1.2 TRAINEES**

- .1 Trainees: personnel selected for operating and maintaining this facility. Includes Facility Manager, building operators, maintenance staff, security staff, and technical specialists as required.
- .2 Trainees will be available for training during later stages of construction for purposes of familiarization with systems.

### **1.3 INSTRUCTORS**

- .1 Contractor personnel: to provide instruction on the following:
  - .1 Start-Up, operation, shut-down of equipment, components and systems.
  - .2 Control features, reasons for, results of, implications on associated systems of, adjustment of set points of control and safety devices.
  - .3 Instructions on servicing, maintenance and adjustment of systems, equipment and components.
- .2 Contractor to provide instruction on:
  - .1 Start-up, operation, maintenance and shut-down of equipment they have certified installation, started up and carried out PV tests.

### **1.4 TRAINING OBJECTIVES**

- .1 Training to be detailed and duration to ensure:
  - .1 Safe, reliable, cost-effective, energy-efficient operation of systems in normal and emergency modes under all conditions.
  - .2 Effective on-going inspection, measurements of system performance.
  - .3 Proper preventive maintenance, diagnosis and trouble-shooting.
  - .4 Ability to update documentation.
  - .5 Ability to operate equipment and systems under emergency conditions until appropriate qualified assistance arrives.

### **1.5 TRAINING MATERIALS**

- .1 Instructors to be responsible for content and quality.

- .2 Training materials to include:
  - .1 "As-Built" Contract Documents.
  - .2 Operating Manual.
  - .3 Maintenance Manual.
  - .4 Management Manual.
  - .5 TAB and PV Reports.
- .3 Project Manager, Commissioning Manager and Facility Manager will review training manuals.
- .4 Training materials to be in a format that permits future training procedures to same degree of detail.
- .5 Supplement training materials:
  - .1 Transparencies for overhead projectors.
  - .2 Multimedia presentations.
  - .3 Manufacturer's training videos.
  - .4 Equipment models.

## **1.6 SCHEDULING**

- .1 Include in Commissioning Schedule time for training.
- .2 Deliver training during regular working hours, training sessions to be 4 hours in length.
- .3 Training to be completed prior to acceptance of facility.

## **1.7 RESPONSIBILITIES**

- .1 Be responsible for:
  - .1 Implementation of training activities,
  - .2 Coordination among instructors,
  - .3 Quality of training, training materials,
- .2 Departmental Representative will evaluate training and materials.
- .3 Upon completion of training, provide written report, signed by Instructors, witnessed by Departmental Representative.

## **1.8 TRAINING CONTENT**

- .1 Training to include demonstrations by Instructors using the installed equipment and systems.
- .2 Content includes:
  - .1 Review of facility and occupancy profile.
  - .2 Functional requirements.
  - .3 System philosophy, limitations of systems and emergency procedures.
  - .4 Review of system layout, equipment, components and controls.
  - .5 Equipment and system start-up, operation, monitoring, servicing, maintenance and shut-down procedures.

- .6 System operating sequences, including step-by-step directions for starting up, shut-down, operation of valves, dampers, switches, adjustment of control settings and emergency procedures.
- .7 Maintenance and servicing.
- .8 Trouble-shooting diagnosis.
- .9 Inter-Action among systems during integrated operation.
- .10 Review of O M documentation.
- .3 Provide specialized training as specified in relevant Technical Sections of the construction specifications.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 02 65 00 Underground Storage Tank Removal

**1.2 MEASUREMENT AND PAYMENT**

- .1 Measurement Procedures.
  - .1 Measure removal of underground fibreglass water storage tank as single line item.
  - .2 Payment for stockpiling, disposal and restoration will be included in above removal items.

**1.3 REFERENCES**

- .1 Definitions:
  - .1 Demolition: rapid destruction of components following removal of hazardous materials.
  - .2 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, may include but not limited to: asbestos PCB's, CFC's, HCFC's poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health or well-being or environment if handled improperly.
  - .3 Waste Audit (WA): detailed inventory of materials in building. Indicates quantities of reuse, recycling and landfill.
    - .1 Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project.
    - .2 Indicates quantities of reuse, recycling and landfill.
  - .4 Waste Management Coordinator (WMC): contractor representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.
  - .5 Waste Reduction Workplan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials. WRW is based on information acquired from WA.
- .2 Reference Standards:
  - .1 Canadian Council of Ministers of the Environment (CCME)
    - .1 PN1326, Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products. Existing tank for domestic water storage only.
  - .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
    - .1 Material Safety Data Sheets (MSDS).
  - .3 Transport Canada (TC)
    - .1 Transportation of Dangerous Goods Act, 1992 (TDGA), c. 34.

#### **1.4 ADMINISTRATIVE REQUIREMENTS**

- .1 Site Meetings.
  - .1 Convene pre-demolition meeting prior to beginning work of this Section in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart to:
    - .1 Verify project requirements.
    - .2 Review installation and substrate conditions.
  - .2 Arrange for site visit with Departmental Representative to examine existing site conditions adjacent to demolition work, prior to start of Work.
  - .3 Ensure key personnel attend.
  - .4 Reporting Requirements: WMC to complete.
  - .5 WMC must provide verbal report on status of waste diversion activity at each meeting.
  - .6 Departmental Representative will provide written notification of change of meeting schedule established upon contract award 24 hours prior to scheduled meeting.
- .2 Scheduling: meet project time lines without compromising specified minimum rates of material diversion.
  - .1 Notify Departmental Representative when unforeseen delays occur.

#### **1.5 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Hazardous Materials:
  - .1 Provide description of Hazardous Materials and Notification of Filing with proper authorities prior to beginning of Work as required.
- .3 Waste Reduction Workplan:
  - .1 Prior to beginning of Work on site submit detailed Waste Reduction Workplan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal and indicate:
    - .1 Descriptions of and anticipated quantities, in percentages, of materials to be salvaged reused, recycled and landfilled.
    - .2 Schedule of selective demolition.
    - .3 Number and location of dumpsters.
    - .4 Anticipated frequency of tippage.
    - .5 Name and address of haulers.
- .4 Certificates:
  - .1 Submit copies of receipts from authorized disposal sites and reuse and recycling facilities for material removed from site upon request of Departmental Representative.
  - .2 Written authorization from Departmental Representative is required to deviate from haulers or facilities listed in Waste Reduction Workplan.

## **1.6 QUALITY ASSURANCE**

- .1 Regulatory Requirements: ensure Work is performed in compliance with applicable Provincial/Territorial regulations.

## **1.7 DELIVERY, STORAGE AND HANDLING**

- .1 Store and manage hazardous materials in accordance with Section 01 35 43 - Environmental Procedures.
- .2 Storage and Protection.
  - .1 Protect in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.
  - .2 Protect existing items designated to remain and items designated for salvage. In event of damage to such items, immediately replace or make repairs to approval of Departmental Representative and at no cost to Departmental Representative.
  - .3 Remove and store materials to be salvaged, in manner to prevent damage.
  - .4 Store and protect in accordance with requirements for maximum preservation of material.
  - .5 Handle salvaged materials as new materials.
- .3 Develop Construction Waste Management Plan related to Work of this Section.
- .4 Packaging Waste Management: remove for reuse and return of pallets, crates, and packaging materials as specified in Construction Waste Management Plan.

## **1.8 SITE CONDITIONS**

- .1 Site Environmental Requirements.
  - .1 Perform work in accordance with Section 01 35 43 - Environmental Procedures.
  - .2 Ensure that selective demolition work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.
  - .3 Do not dispose of waste of volatile materials including but not limited to, mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers.
    - .1 Ensure proper disposal procedures are maintained throughout the project.
  - .4 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers or onto adjacent properties.
  - .5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authorities.
  - .6 Protect trees, plants and foliage on site and adjacent properties where indicated.
- .2 Existing Conditions.
  - .1 Remove contaminated or hazardous materials encountered from site, prior to start of demolition Work, and dispose of in safe manner in accordance with applicable regulatory requirements.

**Part 2 Products**

**2.1 EQUIPMENT**

- .1 Leave machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.

**Part 3 Execution**

**3.1 PREPARATION**

- .1 Inspect site with Departmental Representative and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.
- .2 Locate and protect utilities. Preserve active utilities traversing site in operating condition.
- .3 Notify and obtain approval of utility companies before starting demolition.
- .4 Disconnect and Cap Mechanical Services.
  - .1 Water Lines: remove as directed by Departmental Representative and securely plug to form watertight seal.
  - .2 Other Underground Services: remove and dispose of as directed by Departmental Representative.
  - .3 Underground Storage Tanks: remove and dispose of in accordance with CCME PN1326 and directions of Departmental Representative and Section 02 65 00 - Underground Storage Tank Removal.

**3.2 REMOVAL OF HAZARDOUS WASTES**

- .1 Remove contaminated or dangerous materials defined by authorities having jurisdiction, relating to environmental protection, from site and dispose of in safe manner to minimize danger at site or during disposal.

**3.3 REMOVAL OPERATIONS**

- .1 Remove items as indicated.
- .2 Do not disturb items designated to remain in place.
- .3 Remove trees as required during demolition.
- .4 Stockpile topsoil for final grading and landscaping.
- .5 Disposal of Material:
  - .1 Dispose of materials not designated for salvage or reuse on site at authorized facilities approved in Waste Reduction Workplan.
- .6 Backfill:
  - .1 Backfill in areas as indicated and in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

### **3.4 STOCKPILING**

- .1 Label stockpiles, indicating material type and quantity.
- .2 Designate appropriate security resources/measures to prevent vandalism, damage and theft.  
  
Locate stockpiled materials convenient for use in new construction to eliminate double handling wherever possible.

### **3.5 REMOVAL FROM SITE**

- .1 Remove stockpiled material as directed by Departmental Representative , when it interferes with operations of project.
- .2 Remove stockpiles of like materials by alternate disposal option once collection of materials is complete.
- .3 Dispose of materials not designated for alternate disposal in accordance with applicable regulations.
  - .1 Disposal Facilities: approved and listed in Waste Reduction Workplan.
  - .2 Written authorization from Departmental Representative is required to deviate from disposal facilities listed in Waste Reduction Workplan.

### **3.6 RESTORATION**

- .1 Restore areas and existing works outside areas of demolition to conditions that existed prior to beginning of Work and to match condition of adjacent, undisturbed areas.
- .2 Use soil treatments and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

### **3.7 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
  - .2 Remove debris, trim surfaces and leave work site clean, upon completion of Work
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

### **3.8 PROTECTION**

- .1 Repair damage to adjacent materials or property caused by selective site demolition.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 02 41 13 Selective Site Demolition.

**1.2 REFERENCES**

- .1 Canadian Council of Ministers of the Environment (CCME)
  - .1 CCME PN 1326, Environmental Code of Practice for Underground Storage Tank Systems Containing Petroleum Products and Allied Petroleum Products.
  - .2 CCME PN 1299, Canadian Environmental Quality Guidelines.
    - .1 Chapter 7, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health.
- .2 Canadian Federal Legislation
  - .1 Canadian Environmental Protection Act (CEPA).
  - .2 Canadian Environmental Assessment Act (CEAA).
  - .3 Canada Labour Code.
    - .1 Part II - Occupational Health and Safety.
- .3 Underwriters' Laboratories of Canada (ULC)
  - .1 ULC-S615, Standard for Reinforced Plastic Underground Tanks for Flammable and Combustible Liquids. Note: Underground tank to be removed is used for domestic potable water only.

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide written storage tank description in accordance with Section 01 33 00 - Submittal Procedures.
- .3 Provide the following information on storage tank:
  - .1 Former contents.
  - .2 Location.
  - .3 Reason for removal.
- .4 Forward affidavit of destruction of underground storage tank to authority having jurisdiction.

**1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Waste Management and Disposal:
  - .1 Separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Divert metal materials from landfill to metal recycling facility approved by Departmental Representative.

- .3 Segregate and deliver non-salvageable or non-recyclable materials, including waste liquids and sludges to Provincially/Territorially licensed waste facility.

## **Part 2 Products**

### **2.1 NOT USED**

- .1 Not Used.

## **Part 3 Execution**

### **3.1 PREPARATION SAFETY AND SECURITY**

- .1 Conform to or exceed Federal, Provincial and Territorial codes, local municipal by-laws, by-laws, and codes and regulations of utility authorities having jurisdiction.
- .2 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .3 Protection:
  - .1 Meet safety requirements of Occupational Safety and Health, Canada Labour Code Part II and Regulations for Construction Projects.
  - .2 Cut, braze or weld metal only in monitored areas established to be free of ignitable vapour concentrations.
  - .3 Smoking is not permitted.

### **3.2 DRAINING**

- .1 Drain and flush piping into tank.
- .2 Pump out liquid from tank
  - .1 Use explosion proof, air driven or hand pump.
- .3 Remove sludge from tank bottom.
  - .1 Dispose of product and sludge in accordance with local, Provincial and Territorial regulations using waste disposal carrier licensed by Provincial/Territorial Environmental Agency having jurisdiction.

### **3.3 EXCAVATION TRENCHING AND BACKFILL**

- .1 Do work in accordance with Section 31 23 10 - Excavation, Trenching and Backfilling.
- .2 Provide protective material around excavation.
- .3 Provide constant supervision during excavation and backfilling.
- .4 Excavation:
  - .1 Excavate until top of tank and connections and openings are exposed.
  - .2 Disconnect piping:
    - .1 Remove fill tube.
    - .2 Disconnect fill gauge, product and vent lines.

- .3 Cap or plug open ends of lines that are not to be used further.
- .4 Remove piping from ground.
- .3 Temporarily plug tank openings.
- .4 Continue excavation until tank is completely exposed.
- .5 Temporarily stockpile on site soil in vicinity of tank, until waste classification can be established prior to final disposal.
- .5 Prevent movement, settlement or damage of adjacent structures. Provide shoring as required.

### **3.4 TANK REMOVAL**

- .1 Remove tank in accordance with CCME Code of Practice PN 1326 and/or applicable provincial standards and regulations, and place in secure location.
- .2 Block tank to prevent movement.
- .3 Contact Departmental Representative immediately if there is evidence of contamination in tank excavation, stop Work until further notice.
- .4 Remove and replace contaminated soil and accumulated flammable or combustible liquid with clean fill common to local area in accordance with Section 31 23 10 - Excavating, Trenching and Backfilling.

### **3.5 SECURING AND REMOVAL FROM SITE**

- .1 Dispose of tank in accordance with local, Provincial, Federal or Territorial regulations.
- .2 Truck removal:
  - .1 Secure tank on truck for transport to disposal site.
  - .2 Cut suitable openings in tank sides to render tank unusable.

### **3.6 SITE REMEDIATION**

- .1 To CCME PN 1299.
- .2 Repair/replace finish grade to match surrounding area, including but not limited to topsoil as specified in Section 31 22 13 Rough Grading.

### **3.7 WORKMANSHIP AND DISPOSAL**

- .1 Tanks destined for disposal:
  - .1 Dismantle, cut sufficient openings or otherwise render unusable.

END OF SECTION

## **Part 1 General**

### **1.1 REFERENCES**

- .1 American Society of Mechanical Engineers (ASME)
  - .1 ASME B16.1, Cast Iron Pipe Flanges and Flanged Fittings.
- .2 ASTM International Inc.
  - .1 ASTM A49, Standard Specification for Heat-Treated Carbon Steel Joint Bars.
  - .2 ASTM A126, Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
  - .3 ASTM A536, Standard Specification for Ductile Iron Castings.
  - .4 ASTM B62, Standard Specification for Composition Bronze or Ounce Metal Castings
- .3 Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS)
  - .1 MSS SP-61, Pressure Testing of Steel Valves.
  - .2 MSS SP-70, Grey Iron Gate Valves, Flanged and Threaded Ends.
  - .3 MSS SP-71, Grey Iron Swing Check Valves, Flanged and Threaded Ends.
  - .4 MSS SP-82, Valve Pressure Testing Methods.
  - .5 MSS SP-85, Cast Iron Globe and Angle Valves, Flanged and Threaded Ends.
- .4 American National Standards Institute/American Water Works Association
  - .1 ANSI/AWWA C800-05, Standard Specification for Underground Service Line Valves and Fittings.

### **1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Provide manufacturer's printed product literature, specifications and datasheets for valves and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
  - .1 Provide drawings stamped and signed by professional engineer registered or licensed in Province of NL, Canada.

### **1.3 CLOSEOUT SUBMITTALS**

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

### **1.4 DELIVERY, STORAGE AND HANDLING**

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

- .2 Delivery and Acceptance Requirements:
  - .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .3 Packaging Waste Management: remove for reuse and return of pallets, crates, padding, and packaging materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

## **1.5 MAINTENANCE MATERIAL SUBMITTALS**

- .1 Extra Materials/Spare Parts:
- .2 Furnish following spare parts:
  - .1 Valve seats: one (1).
  - .2 Discs: one (1).
  - .3 Stem packing: one (1).
  - .4 Valve handles: 2 of each size.
  - .5 Gaskets for flanges: one for every 10 flanged joints.
- .3 Tools:
  - .1 Furnish special tools for maintenance of systems and equipment.

## **Part 2 Products**

### **2.1 MATERIAL**

- .1 Valves:
  - .1 Except for specialty valves, to be of single manufacturer.
- .2 Standard specifications:
  - .1 Gate valves: MSS SP-70.
  - .2 Globe valves: MSS SP-85.
  - .3 Check valves: MSS SP-71.
- .3 Requirements common to valves, unless specified otherwise:
  - .1 Body, bonnet: ductile iron to ASTM A536 Grade 65-45-12.
  - .2 Connections: flanged ends with 2 mm raised face with serrated finish to ANSI B16.1.
  - .3 Inspection and pressure testing: to MSS SP-82.
  - .4 Bonnet gasket: non-asbestos.
  - .5 Stem: to have precision-machined Acme or 60 degrees V threads, top screwed for handwheel nut.
  - .6 Stuffing box: non-galling two-piece ball-jointed packing gland, gland bolts and nuts.
  - .7 Gland packing: non-asbestos.
  - .8 Handwheel: die-cast aluminum alloy to ASTM B85/B85M or malleable iron to ASTM A49. Nut of bronze to ASTM B62.

- .9 Identification tag: with catalogue number, size, other pertinent data.

## **2.2 GATE VALVES**

- .1 NPS 2 - 8, non rising stem, inside screw, bronze trim, solid wedge disc:
  - .1 Body and multiple-bolted bonnet: with full length disc guides designed to ensure correct re-assembly, Class 125.
  - .2 Disc: solid offset taper wedge, bronze to ASTM B62.
  - .3 Seat rings: renewable bronze to ASTM B62, screwed into body.
  - .4 Stem: bronze to ASTM B62.
  - .5 Disc: solid offset taper wedge, cast iron to ASTM A126 Class B, secured to wrought steel stem.
  - .6 Seat: integral with body.
  - .7 Stem: wrought steel.
  - .8 Operator: handwheel.
  - .9 Gate Valves - 50mm: Resilient seat to AWWA C509, UL or ULC listed, minimum working pressure of 1380 kPa, cast iron body, non-rising stem, stainless steel nuts and bolts, open counter-clockwise, and IP threaded joint. Valve shall have cast iron hand wheel to ASTM A126 Class B, with fusion-bonded epoxy resin coating to AWWA C550. Wheel shall be secured to stem with bolt ASTM zinc coated steel 8.8.
  - .10 All valves 100mm and larger shall be: cast iron body; non rising stem; stainless steel nuts and bolts, mechanical joint, unless otherwise specified; fusion-bonded epoxy resin coated to C550; O ring seals; open clockwise.
  - .11 Gate Valves - 10 mm and larger: Resilient seat to AWWA C509, minimum working pressure rating 1380 kPa.

## **2.3 BALL VALVES**

- .1 NPS 2 and under:
  - .1 Body and cap: cast high tensile bronze to ASTM B62.
  - .2 Pressure rating: minimum 690 kPa.
  - .3 Connections: screwed ends to ANSI B1.20.1 and with hexagonal shoulders.
  - .4 Stem: tamperproof ball drive.
  - .5 Stem packing nut: external to body.
  - .6 Ball and seat: replaceable stainless steel solid ball and Teflon seats.
  - .7 Stem seal: TFE with external packing nut.
  - .8 Operator: removable lever handle.

## **2.4 VALVE OPERATORS**

- .1 Install valve operators as follows:
  - .1 Handwheel: on valves except as specified.

## **2.5 VALVE BOXES:**

- .1 To be ABS composite lower section, complete with ductile iron upper section, 125mm diameter. The minimum overlapping distance between the top of the ABS section and the bottom of the ductile iron section shall be 150mm. Top of the box shall be marked “WATER” except for hydrant valves which are to be marked “HYDRANT”.
- .2 Curb Case: Curb stops to have 1.5 to 1.8m adjustable bituminous coated, cast iron service box with stainless steel stem to suit depth of bury. Top of cast iron box marked “WATER”.

## **2.6 AIR AND VACCUUM RELEASE VALVES:**

- .1 To CSA B64-M88, heavy duty combination air release valve employing direct acting kinetic principle. Valves to be constructed of cast iron body and cover, with bronze trim, stainless steel floats with shock-proof synthetic seat suitable for 2 MPa working pressure. Valves to expel air at a high rate during filling, at a low rate during operation, and to admit air while line is being drained. Valve to be complete with a suitable check unit. Ends to be flanged to ANSI B16.1.

## **2.7 CHECK VALVES**

- .1 Swing check valves, Class 125:
  - .1 Body and bolted cover: with tapped and plugged opening on each side for hinge pin. Grooved or flanged ends: plain faced with smooth finish.
    - .1 Up to NPS 16: ductile iron ASTM A536 Grade 65-45-12.
    - .2 NPS 18 and over: cast iron to ASTM A126 Class C.
  - .2 Ratings:
    - .1 NPS 2 1/2 - 12: 860 kPa steam; 1.4 MPa CWP.
  - .3 Disc: rotating for extended life.
    - .1 Up to NPS 6: bronze to ASTM B62.
  - .4 Seat rings: renewable bronze to ASTM B62 screwed into body.
  - .5 Hinge pin, bushings: renewable bronze to ASTM B62.
  - .6 Disc: A126 Class B, secured to stem, rotating for extended life.
  - .7 Seat: cast iron, integral with body.
  - .8 Hinge pin: exelloy; bushings: malleable iron.
  - .9 Identification tag: fastened to cover.
  - .10 Hinge: stainless steel.

## **Part 3 Execution**

### **3.1 INSTALLATION**

- .1 Install stem valves in upright position with stem above horizontal.

### **3.2 CLEANING**

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

- .2 Clean installed products in accordance to manufacturer's recommendation.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 31 14 13 Soil Stripping and Stockpiling.
- .2 Section 31 22 13 Rough Grading.
- .3 Section 31 23 16.26 Rock Removal.
- .4 Section 31 23 33.01 Excavating, Trenching and Backfilling.

**1.2 REFERENCES**

- .1 ASTM International
  - .1 ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort 600kN-m/m<sup>3</sup> (12,400 ft-lbf/ft<sup>3</sup>).
- .2 CSA International
  - .1 CSA A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
- .3 Ontario Provincial Standard Specifications (OPSS)
  - .1 OPSS 1004, Material Specification for Aggregates-Miscellaneous.
  - .2 OPSS SP 110F13, Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Material.

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

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

**Part 2 Products**

**2.1 MATERIALS**

- .1 Granular A, Sand to OPSS 1004.

**Part 3 Execution**

**3.1 EXAMINATION**

- .1 Verification of Conditions:
  - .1 Before commencing work establish locations of buried services on and adjacent to site.
- .2 Evaluation and Assessment:
  - .1 Arrange with appropriate authority for relocation of buried services that interfere with execution of work. Pay costs of relocating services.

- .2 Testing of materials and compaction of backfill and fill will be carried out by testing laboratory designated by Departmental Representative .
- .3 Not later than 1 week before backfilling or filling, provide to designated testing agency, 23 kg sample of fill materials proposed for use.
- .4 Not later than 48 hours before backfilling or filling with approved material, notify Departmental Representative so that compaction tests can be carried out by designated testing agency.
- .5 Before commencing work, conduct, with Departmental Representative condition survey of existing structures, trees and plants, lawns, fencing, service poles, wires, paving, and survey bench marks and monuments which may be affected by work.

### **3.2 PREPARATION**

- .1 Temporary Erosion and Sedimentation Control:
  - .1 Use temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, in accordance with requirements of authorities having jurisdiction.
  - .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
  - .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- .2 Protection of in-place conditions:
  - .1 Protect excavations from freezing.
  - .2 Keep excavations clean, free of standing water, and loose soil.
  - .3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Departmental Representative's approval.
  - .4 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.
  - .5 Protect buried services that are to remain undisturbed.
- .3 Removal:
  - .1 Remove obsolete buried services within 2 m of foundations. Cap cut-offs.
  - .2 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.
  - .3 Remove trees, stumps, logs, brush, shrubs, bushes, vines, undergrowth, rotten wood, dead plant material, exposed boulders and debris within areas designated on drawings.
  - .4 Remove stumps and tree roots below footings, slabs, and paving, and to 600 mm below finished grade elsewhere.

### **3.3 EXCAVATION**

- .1 Shore and brace excavations, protect slopes and banks and perform work in accordance with Provincial and Municipal regulations.

- .2 Do rock busting in accordance with Provincial and Municipal regulations. Repair damage to approval of Departmental Representative. No blasting will be permitted on site.
- .3 Topsoil stripping:
  - .1 Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected.
  - .2 Strip topsoil to depths required. Avoid mixing topsoil with subsoil.
  - .3 Strip topsoil over areas of new construction so that excavated material may be stockpiled without covering topsoil.
  - .4 Stockpile in locations as indicated.
  - .5 Dispose of excess topsoil as directed by Departmental Representative.
- .4 Excavate as required to carry out work, in all materials met.
  - .1 Do not disturb soil or rock below bearing surfaces. Notify Departmental Representative when excavations are complete.
  - .2 If bearings are unsatisfactory, additional excavation will be authorized in writing and paid for as additional work.
  - .3 Fill excavation taken below depths shown without Departmental Representative's written authorization with compacted Class A material.
- .5 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 650 mm.

### **3.4 SITE QUALITY CONTROL**

- .1 Fill material and spaces to be filled to be inspected and approved by Departmental Representative.

### **3.5 BACKFILLING**

- .1 Start backfilling only after inspection and receipt of written approval of fill material and spaces to be filled from Departmental Representative.
- .2 Remove snow, ice, construction debris, organic soil and standing water from spaces to be filled.
- .3 Lateral support: maintain even levels of backfill around structures as work progresses, to equalize earth pressures.
- .4 Compaction of subgrade: if disturbed, compact existing subgrade to same compaction as specified for fill. Fill excavated areas with selected subgrade material or gravel and sand, compacted as specified for fill.
- .5 Placing:
  - .1 Place backfill, fill and basecourse material in 150 mm lifts. Add water as required to achieve specified density.
- .6 Compaction: compact each layer of material to following densities for material to ASTM D698:
  - .1 To underside of basecourses: 95%.

- .2 Basecourses: 100%.
- .3 Elsewhere: 90%.
- .7 In trenches:
  - .1 Up to underside of pipe or conduit: gravel and sand placed by hand.
  - .2 Over pipe or conduit: excavated material approved by Departmental Representative. Remove all stones greater than 200mm diameter.
- .8 Blown rock material, not capable of fine grading, is not acceptable, imported material must be placed on this type of material.
- .9 Against foundations except as applicable to trenches: excavated material or imported material with no stones larger than 200 mm diameter within 600 mm of structures.
- .10 Underground tanks: use sand to bottom of granular base courses or to bottom of topsoil, as applicable.

### **3.6 GRADING**

- .1 Grade to ensure that water will drain away from buildings, walls and paved areas, to catch basins and other disposal areas approved by Departmental Representative. Grade to be gradual between finished elevations.

### **3.7 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Dispose of cleared and grubbed material off site daily.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 31 23 33.01 Excavating, Trenching and Backfilling.

**1.2 MEASUREMENT PROCEDURES**

- .1 Clearing and Grubbing will not be measured separately for payment.

**1.3 REFERENCES**

- .1 U.S. Environmental Protection Agency (EPA)/Office of Water
  - .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

**1.4 DEFINITIONS**

- .1 Clearing consists of cutting off trees and brush vegetative growth to not more than specified height above ground and disposing of felled trees, previously uprooted trees and stumps, and surface debris.
- .2 Close-cut clearing consists of cutting off standing trees, brush, scrub, roots, stumps and embedded logs, removing at, or close to, existing grade and disposing of fallen timber and surface debris.
- .3 Grubbing consists of excavation and disposal of stumps and roots to not less than 300mm depth below existing ground surface.

**1.5 QUALITY ASSURANCE**

- .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .2 Safety Requirements: worker protection.
  - .1 Workers must wear gloves, dust masks, long sleeved clothing, eye protection, protective clothing when clearing with hand tools.

**1.6 STORAGE AND PROTECTION**

- .1 Prevent damage to fencing, landscaping, natural features, bench marks, existing buildings, existing pavement, utility lines, site appurtenances, and water courses which are to remain.
  - .1 Repair damaged items to approval of Departmental Representative.

**1.7 WASTE MANAGEMENT AND DISPOSAL**

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

**Part 2 Products**

**2.1 MATERIALS**

- .1 Soil Material for Fill:
  - .1 Excavated soil material: free of debris, roots, wood, scrap material, vegetable matter, refuse, soft unsound particles, deleterious, or objectionable materials.
  - .2 Remove and store soil material for reused.

**Part 3 Execution**

**3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL**

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

**3.2 PREPARATION**

- .1 Inspect site and verify with Departmental Representative, items designated to remain.
- .2 Locate and protect utility lines: preserve in operating condition active utilities traversing site.
  - .1 Notify Departmental Representative immediately of damage to or when unknown existing utility lines are encountered.
- .3 Notify utility authorities before starting clearing and grubbing.
- .4 Keep roads and walks free of dirt and debris.

**3.3 CLEARING**

- .1 Clearing includes felling, trimming, and cutting of trees into sections and satisfactory disposal of trees and other vegetation designated for removal, including brush and rubbish occurring within cleared areas.
- .2 Clear as required for installations, by cutting at height of not more than 300 mm above ground.
- .3 Cut off branches overhanging area cleared as directed by Departmental Representative.

**3.4 CLOSE CUT CLEARING**

- .1 Close cut clearing to ground level of ground surface.
- .2 Perform close cut clearing by hand so that existing muskeg is not damaged.

### **3.5 GRUBBING**

- .1 Remove and dispose of roots larger than 5 cm in diameter, matted roots, and designated stumps from indicated grubbing areas.
- .2 Grub out stumps and roots to not less than 200 mm below ground surface.
- .3 Grub out visible rock fragments and boulders, greater than 300 mm in greatest dimension, but less than 0.25 m<sup>3</sup>.
- .4 Fill depressions made by grubbing with suitable material and to make new surface conform with existing adjacent surface of ground.

### **3.6 REMOVAL AND DISPOSAL**

- .1 Remove cleared and grubbed materials off site as indicated by Departmental Representative.
- .2 Remove diseased trees identified by Departmental Representative and dispose of this material to approval of Departmental Representative.

### **3.7 FINISHED SURFACE**

- .1 Leave ground surface in condition suitable for stripping of topsoil to approval of Departmental Representative.

### **3.8 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 REQUIREMENTS**

- .1 Section 31 11 00 Clearing and Grubbing.

**1.2 REFERENCES**

- .1 U.S. Environmental Protection Agency (EPA)/Office of Water
  - .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL**

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

**3.2 STRIPPING OF TOPSOIL**

- .1 Ensure that procedures are conducted in accordance with applicable Provincial requirements.
- .2 Remove topsoil before construction procedures commence to avoid compaction of topsoil.
- .3 Handle topsoil only when it is dry and warm.
- .4 Remove vegetation from targeted areas by non-chemical means and dispose of stripped vegetation by composting.
- .5 Remove brush from targeted area by non-chemical means and dispose of off site as directed by the Departmental Representative.
- .6 Strip topsoil as required for installations.
  - .1 Avoid mixing topsoil with subsoil.
- .7 Pile topsoil in berms in locations as indicated.

- .1 Stockpile height not to exceed 2 m.
- .8 Dispose of unused topsoil as directed by Departmental Representative.
- .9 Protect stockpiles from contamination and compaction.
- .10 Cover topsoil that has been piled for long term storage with trefoil or grass to maintain agricultural potential of soil.

### **3.3 PREPARATION OF GRADE**

- .1 Verify that grades are correct and notify Departmental Representative upon completion.

### **3.4 PLACING OF TOPSOIL**

- .1 Place topsoil only after Departmental Representative has accepted subgrade.
- .2 Spread topsoil during dry conditions in uniform layers not exceeding 150 mm, over unfrozen subgrade free of standing water.
- .3 Establish traffic patterns for equipment to prevent driving on topsoil after it has been spread to avoid compaction.
- .4 Cultivate soil following spreading procedures.

### **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 31 23 33.01 - Excavating, Trenching and Backfilling.

### **1.2   Definition**

- .1        Rock: any solid material in excess of 1.0m<sup>3</sup> and which cannot be removed by means of mechanical excavating equipment having 0.95 to 1.15m<sup>3</sup> bucket. Frozen material not classified as rock.

### **1.3   Measurement Procedures**

- .1        Mass rock:
  - .1        Rock quantities will be measured by in-place measurement.

### **1.4   Blasting**

- .1        Blasting on site is not permitted. Rock removal will be achieved by busting methods only.

## **Part 2        PRODUCTS**

**Not Used**

## **Part 3        EXECUTION**

### **3.1   Protection**

- .1        Prevent damage to surroundings and injury to persons in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

### **3.2   Rock Removal**

- .1        Co-ordinate this Section with Section 01 35 29.06 - Health and Safety Requirements.
- .2        Remove rock to alignments, profiles, and cross sections as required to install new work.
- .3        Use rock removal procedures to produce uniform and stable excavation surfaces. Minimize overbreak, and to avoid damage to adjacent structures.
- .4        Excavate rock to horizontal surfaces.
- .5        Excavate trenches to lines and grades below pipe invert indicated.
- .6        Cut trenches to widths as indicated.
- .7        Remove boulders and fragments which may slide or roll into excavated areas.

- .8 Correct unauthorized rock removal at no extra cost, in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

### **3.3 Rock Disposal**

- .1 Dispose of surplus removed rock off site. Dispose in locations acceptable to authorities having jurisdiction and Departmental Representative.
- .2 Do not dispose of removed rock into landfill. Material must be sent to appropriate location as approved by the Departmental Representative.

**END OF SECTION**

## **Part 1 GENERAL**

### **1.1 Related Sections**

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Section 01 35 43 – Environmental Procedures.
- .3 Section 01 56 00 – Temporary Barriers and Enclosures.
- .4 Section 02 41 13 – Selective Site Demolition
- .5 Section 31 22 13 – Rough Grading
- .6 Section 31 23 16.26 – Rock Removal.

### **1.2 References**

- .1 American Society for Testing and Materials (ASTM).
  - .1 ASTM C117, Standard Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
  - .2 ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .3 ASTM D422, Standard Test Method for Particle-Size Analysis of Soils.
  - .4 ASTM D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup>) (600 kN-m/m<sup>3</sup>).
  - .5 ASTM D1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup>) (2,700 kN-m/m<sup>3</sup>).
  - .6 ASTM D4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .2 Canadian General Standards Board (CGSB).
  - .1 CA/CGSB-8.2, Sieves, Testing, Woven Wire, Metric

### **1.3 Definitions**

- .1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.
  - .1 Rock excavation: excavation of material from solid masses of igneous, sedimentary or metamorphic rock which, prior to its removal, was integral with its parent mass, and boulders or rock fragments having individual volume in excess of 1 m<sup>3</sup>. Frozen material not classified as rock.
  - .2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.
- .2 Unclassified excavation: excavation of deposits of whatever character encountered in work.
- .3 Waste material: excavated material unsuitable for use in work or surplus to requirements.
- .4 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of work.

.5 Unsuitable materials:

- .1 Weak and compressible materials under excavated areas.
- .2 Frost susceptible materials under excavated areas.
- .3 Frost susceptible materials:
  - .1 Fine grained soils with plasticity index less than 10 when tested to ASTM D4318, and gradation within limits specified when tested to ASTM D422 and ASTM C136: Sieve sizes to CAN/CGSB-8.1.

<u>Sieve Designation</u>	<u>%Passing</u>
2.00 mm	100
0.10 mm	45-100
0.02 mm	10-80
<u>0.005 mm</u>	<u>0-45</u>

- .2 Coarse grained soils containing more than 20% by mass passing 0.075 mm sieve.

**1.4 Submittals**

- .1 Inform Departmental Representative at least 4 weeks prior to commencing work, of proposed source of fill materials and provide access for sampling.
- .2 Submit 70 kg samples of type of fill specified including representative samples of excavated material.
- .3 Ship samples as directed by Departmental Representative in tightly closed containers to prevent contamination.

**1.5 Quality Assurance**

- .1 Submit design and supporting data at least 2 weeks prior to commencing work.
- .2 Design and supporting data submitted to bear stamp and signature of qualified professional engineer registered or licensed in the province of Newfoundland and Labrador.
- .3 Keep design and supporting data on site.
- .4 Engage services of qualified professional engineer who is registered or licensed in Province of Newfoundland and Labrador to design and inspect cofferdams, shoring, bracing and underpinning required for work.
- .5 Do not use soil material until written report of soil test results are reviewed and approved by Departmental Representative.

**1.6 Existing Conditions**

- .1 Buried services:
  - .1 Before commencing work verify location of buried services on and adjacent to site.
  - .2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.

- .3 Remove obsolete buried services within 2 m of foundations: cap cut-offs.
- .4 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
- .5 Prior to commencing excavation work, notify applicable Owner or authorities having jurisdiction, establish location and state of use of buried utilities and structures. Departmental Representative or authorities having jurisdiction to clearly mark such locations to prevent disturbance during work.
- .6 Confirm locations of buried utilities by careful test excavations.
- .7 Maintain and protect from damage, water, sewer, electric, telephone and other utilities and structures encountered as indicated.
- .8 Where utility lines or structures exist in area of excavation, obtain direction of Departmental Representative before removing or re-routing.
- .9 Record location of maintained, re-routed and abandoned underground lines.
- .10 Confirm locations of recent excavations adjacent to area of excavation.
- .2 Existing buildings and surface features:
  - .1 Conduct, with Departmental Representative condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks, pavement, survey bench marks and monuments which may be affected by work.
  - .2 Protect existing buildings and surface features from damage while work is in progress. In event of damage, immediately make repair to approval of Departmental Representative.
  - .3 Where required for excavation, cut roots or branches as approved by Departmental Representative.

## Part 2 PRODUCTS

### 2.1 Materials

- .1 Backfill Class A fill: properties to Section 31 05 16 - Aggregate Materials and the following requirements:
  - .1 Crushed, pit run or screened stone, gravel or sand.
  - .2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1.

Sieve Designation	%Passing <u>Class A</u>
75 mm	-
50 mm	-
37.5 mm	-
25 mm	-
19 mm	100
12.5 mm	75-100
9.5 mm	50-80
4.75 mm	30-70
2.00 mm	20-45
0.425 mm	10-25

0.180 mm	-
<u>0.075 mm</u>	<u>3-8</u>

- .2 Backfill: selected material from excavation or other sources, approved by Departmental Representative for use intended, unfrozen and free from rocks larger than 200 mm, cinders, ashes, sods, refuse or other deleterious materials.

### **Part 3 EXECUTION**

#### **3.1 Site Preparation**

- .1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.

#### **3.2 Preparation/Protection**

- .1 Protect existing features in accordance with Section 01 56 00 - Temporary Barriers and Enclosures and applicable local regulations.
- .2 Keep excavations clean, free of standing water, and loose soil.
- .3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Departmental Representative's approval.
- .4 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage. Protect buried services that are required to remain undisturbed.

#### **3.3 Stripping of Topsoil**

- .1 Begin topsoil stripping of areas as required for installations after area has been cleared of brush and removed from site.
- .2 Strip topsoil to depths as required for installations.
  - .1 Do not mix topsoil with subsoil.
- .3 Stockpile in locations as indicated.
  - .1 Stockpile height not to exceed 2 m and should be protected from erosion.
- .4 Dispose of unused topsoil as directed by Departmental Representative.

#### **3.4 Stockpiling**

- .1 Stockpile fill materials in areas indicated. Stockpile granular materials in manner to prevent segregation.
- .2 Protect fill materials from contamination.

#### **3.5 Cofferdams, Shoring, Bracing and Underpinning**

- .1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Section 01 35 29.06 - Health and Safety Requirements.
  - .1 Where conditions are unstable, Departmental Representative to verify and advise methods.

- .2 Construct temporary Works to depths, heights and locations as approved by Departmental Representative.
- .3 During backfill operation:
  - .1 Unless otherwise indicated or directed by Departmental Representative remove sheeting and shoring from excavations.
  - .2 Do not remove bracing until backfilling has reached respective levels of such bracing.
  - .3 Pull sheeting in increments that will ensure compacted backfill is maintained at elevation at least 500 mm above toe of sheeting.
- .4 When sheeting is required to remain in place, cut off tops at elevations as indicated.
- .5 Upon completion of substructure construction:
  - .1 Remove cofferdams, shoring and bracing.
  - .2 Remove excess materials from site and restore as directed.
- .6

### **3.6 Dewatering and Heave Prevention**

- .1 Keep excavations free of water while work is in progress.
- .2 Submit for Departmental Representative's review details of proposed dewatering or heave prevention methods.
- .3 Avoid excavation below groundwater table if quick condition or heave is likely to occur. Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.
- .4 Protect open excavations against flooding and damage due to surface run-off.
- .5 Dispose of water in accordance with Section 01 35 43 - Environmental Procedures and in manner not detrimental to public and private property, or any portion of work completed or under construction.

### **3.7 Excavation**

- .1 Excavate to lines, grades, elevations and dimensions as indicated by Departmental Representative.
- .2 Remove concrete, masonry, paving, walks, demolished foundations and rubble and other obstructions encountered during excavation in accordance with Section 02 41 13 - Selective Site Demolition.
- .3 Excavation must not interfere with bearing capacity of adjacent foundations.
- .4 Keep excavated and stockpiled materials a safe distance away from edge of trench as directed by Departmental Representative.
- .5 Restrict vehicle operations directly adjacent to open trenches.
- .6 Dispose of surplus and unsuitable excavated material off site.
- .7 Do not obstruct flow of surface drainage or natural watercourses.

- .8 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .9 Notify Departmental Representative when bottom of excavation is reached.
- .10 Obtain Departmental Representative approval of completed excavation.
- .11 Correct unauthorized over-excavation as follows:
  - .1 Fill under other areas with backfill compacted to not less than 95% of corrected maximum dry density.

### **3.8 Fill Types and Compaction**

- .1 Use fill of types as indicated or specified below. Compaction densities are percentages of maximum densities obtained from ASTM D698 corrected maximum dry density.
  - .1 Exterior side of perimeter walls: use backfill to subgrade level. Compact to 95%.
  - .2 To correct over excavation in trenches: use backfill to underside of sand bedding compacted to 95%.

### **3.9 Backfilling**

- .1 Vibratory compaction equipment: approved by Departmental Representative.
- .2 Do not proceed with backfilling operations until Departmental Representative has inspected and approved installations.
- .3 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- .4 Do not use backfill material which is frozen or contains ice, snow or debris.
- .5 Place backfill material in uniform layers not exceeding 300 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.
- .6 Backfill around installations.
  - .1 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.
  - .2 Place layers simultaneously on both sides of installed work to equalize loading. Difference not to exceed 600 mm.

### **3.10 Restoration**

- .1 Upon completion of work, remove waste materials and debris, trim slopes, and correct defects as directed by Departmental Representative.
- .2 Clean and reinstate areas affected by work as directed by Departmental Representative.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 23 05 23.02 Valves.
- .2 Section 33 56 17 Underground Potable Water Storage Tank.

**1.2 MEASUREMENT PROCEDURES**

- .1 Measure water lines including trenching and backfilling, in metres of each size of pipe installed.
  - .1 Horizontal measurement will be made over surface, through valves and fittings, after work has been completed.
  - .2 Measure lateral connections from water main to hydrants as water main and include curb valve and adjustable valve box.
- .2 Measure hydrants including excavation and backfilling, in units installed.
- .3 Measure valves in units installed including excavation and backfilling, valves and valve boxes.
- .4 Measure granular bedding and surround material in cubic metres.

**1.3 REFERENCES**

- .1 American National Standards Institute/American Water Works Association (ANSI/AWWA)
  - .1 ANSI/AWWA B300, Standard for Hypochlorites.
  - .2 ANSI/AWWA B301, Standard for Liquid Chlorine.
  - .3 ANSI/AWWA B303, Standard for Sodium Chlorite.
  - .4 ANSI/AWWA C651, Standard for Disinfecting Water Mains.
  - .5 ANSI/AWWA C652, Standard for Disinfection of Finished Water Storage Facilities.
  - .6 ANSI/AWWA C800, Standard for Underground Service Line Valves and Fittings.
  - .7 ANSI/AWWA C900, Standard for Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings, 4 Inch through 12 Inch (100 mm - 300 mm), for Water Transmission and Distribution.
- .2 ASTM International
  - .1 ASTM C136, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .2 ASTM D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort 600 kN-m/m<sup>3</sup> (12,400 ft-lbf/ft<sup>3</sup>).
  - .3 ASTM F714, Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.
- .3 American Water Works Association (AWWA)/Manual of Practice
  - .1 AWWA M17, Installation, Field Testing, and Maintenance of Fire Hydrants.

- .4 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-8.2, Sieves, Testing, Woven Wire, Metric.
- .5 CSA International
  - .1 CAN/CSA-B137 Series, Thermoplastic Pressure Piping Compendium. (Consists of B137.0, B137.1, B137.2, B137.3, B137.4, B137.4.1, B137.5, B137.6, B137.8, B137.9, B137.10, B137.11 and B137.12).
    - .1 CAN/CSA-B137.1, Polyethylene Pipe, Tubing, and Fittings for Cold-Water Pressure Services.
    - .2 CAN/CSA-B137.3, Rigid Polyvinyl Chloride (PVC) Pipe for Pressure Applications.
- .6 Underwriters' Laboratories of Canada (ULC)
  - .1 CAN/ULC-S520, Standard for Fire Hydrants.

#### **1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for distribution piping materials and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Pipe certification to be on pipe.
- .3 Shop Drawings:
  - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of NL, Canada.
- .4 Samples:
  - .1 Submit manufacturer's test data and certification that pipe materials meet requirements of this section [4] weeks minimum prior to beginning work. Include manufacturer's drawings, information and shop drawings where pertinent.

#### **1.5 CLOSEOUT SUBMITTALS**

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Submit record drawings, including directions for operating valves, list of equipment required to operate valves, details of pipe material, location of air and vacuum release valves, hydrant details.
  - .1 Include top of pipe, horizontal location of fittings and type, valves, valve boxes, valve chambers and hydrants.
  - .2 Include instructions for flushing out waterlines prior to freezing weather.
- .3 Operation and Maintenance Data: submit operation and maintenance data for pipe, valves, valve boxes, valve chambers and hydrants for incorporation into manual.

## **1.6 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials off ground, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect water distribution piping from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse by manufacturer of pallets, crates, padding, packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

## **1.7 SCHEDULING OF WORK**

- .1 Schedule Work to minimize interruptions to existing services.
- .2 Submit schedule of expected interruptions for approval and adhere to interruption schedule as approved by Departmental Representative.
- .3 Notify Departmental Representative minimum of 48 hours in advance of interruption in service.
- .4 Do not interrupt water service for more than 3 hours and confine this period between 10:00 and 16:00 hours local time unless otherwise authorized.
- .5 Provide and post "Out of Service" sign on hydrant not in use.

## **1.8 MAINTENANCE MATERIAL SUBMITTALS**

- .1 Submit in accordance with Section [01 78 00 - Closeout Submittals].
- .2 Tools: provide tools as follows:
  - .1 One (1) service post wrench for curb stops.
  - .2 One (1) hydrant wrench.
  - .3 One (1) tee-handle operating key for each valve size.

## **Part 2 Products**

### **2.1 PIPE, JOINTS AND FITTINGS**

- .1 Fittings
  - .1 Mechanical joint fittings NPS [3] and larger: to ANSI/AWWA C110/A21.10.
- .2 Polyvinyl chloride pressure pipe: to ANSI/AWWA C900, pressure class 150, DR 18, 1 MPa gasket bell end, cast iron outside diameter.
  - .1 CAN/CSA-B137.3, PVC series 160, 1.1 MPa elastomeric gasket coupling.

- .3 Polyethylene pressure pipe:
  - .1 NPS 1/2 to NPS 6: to CAN/CSA-B137.1 type PE.
  - .2 Polyethylene to polyethylene joints: to be thermal butt fusion joined, to ASTM D2657, [flanged with aluminum backing flanges.
  - .3 Polyethylene fittings: to CAN/CSA-B137.1, for pipe sizes NPS 4 and less.

## **2.2 VALVES AND VALVE BOXES**

- .1 Refer to Section 23 05 23.02 Valves: Cast Iron.

## **2.3 HYDRANTS**

- .1 Post type hydrants: compression type hydrant, to CAN/ULC-S520, designed for working pressure of 200 kPa.
  - .1 Hydrants to open counter clockwise, threads to local standard. Provide metal caps and chains.
  - .2 Provide key operated gate valve located 1 m from hydrant.
  - .3 Depth of bury 2 m.
- .2 Hydrant paint: exterior enamel to MPI #96.

## **2.4 PIPE BEDDING AND SURROUND MATERIAL**

- .1 As indicated in Section 31 23 33.01 Excavating, Trenching and Backfilling.

## **2.5 BACKFILL MATERIAL**

- .1 As indicated in Section 31 23 33.01 Excavating, Trenching and Backfilling.

## **2.6 PIPE DISINFECTION**

- .1 Sodium hypochlorite to ANSI/AWWA B300 to disinfect water mains.
- .2 Disinfect water mains in accordance with ANSI/AWWA C651.

# **Part 3 Execution**

## **3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections are acceptable for distribution piping installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of approval to proceed from Departmental Representative.

### **3.2 PREPARATION**

- .1 Clean pipes, fittings, valves, hydrants, and appurtenances of accumulated debris and water before installation.
  - .1 Inspect materials for defects to approval of Departmental Representative.
  - .2 Remove defective materials from site as directed by Departmental Representative.

### **3.3 TRENCHING**

- .1 Do trenching work in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .2 Ensure trench depth allows coverage over pipe from finished grade as indicated.
- .3 Trench alignment and depth require Departmental Representative's approval prior to placing bedding material and pipe.

### **3.4 GRANULAR BEDDING**

- .1 Place granular bedding material in uniform layers not exceeding 150 mm compacted thickness to depth as indicated.
- .2 Do not place material in frozen condition.
- .3 Shape bed true to grade to provide continuous uniform bearing surface for pipe.
- .4 Shape transverse depressions in bedding as required to suit joints.
- .5 Compact each layer full width of bed to 95 % minimum of corrected maximum dry density to ASTM D698.
- .6 Fill authorized or unauthorized excavation below design elevation of bottom of specified bedding in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling with compacted bedding material.

### **3.5 PIPE INSTALLATION**

- .1 Terminate building water service 1.5 m outside building wall opposite point of connection to main.
  - .1 Install coupling necessary for connection to building plumbing.
  - .2 If plumbing is already installed, make connection; otherwise cap or seal end of pipe and place temporary marker to locate pipe end.
- .2 Lay pipes to manufacturer's standard instructions and specifications.
  - .1 Do not use blocks except as specified.
- .3 Join pipes in accordance with manufacturer's recommendations.
- .4 Bevel or taper ends of PVC pipe to match fittings.
- .5 Handle pipe by methods recommended by pipe manufacturer. Do not use chains or cables passed through pipe bore so that weight of pipe bears on pipe ends.
- .6 Do not exceed permissible deflection at joints as recommended by pipe manufacturer.
- .7 Keep jointing materials and installed pipe free of dirt and water and other foreign materials.

- .1 Whenever work is stopped, install a removable watertight bulkhead at open end of last pipe laid to prevent entry of foreign materials.
- .8 Position and join pipes with equipment and methods approved by Departmental Representative.
- .9 Cut pipes in approved manner as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.
- .10 Align pipes before jointing.
- .11 Install gaskets to manufacturer's recommendations. Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.
- .12 Avoid displacing gasket or contaminating with dirt or other foreign material.
  - .1 Remove disturbed or contaminated gaskets.
  - .2 Clean, lubricate and replace before jointing is attempted again.
- .13 Complete each joint before laying next length of pipe.
- .14 Minimize deflection after joint has been made.
- .15 Apply sufficient pressure in making joints to ensure that joint is completed to manufacturer's recommendations.
- .16 Ensure completed joints are restrained by compacting bedding material alongside and over installed pipes or as otherwise approved by Departmental Representative.
- .17 When stoppage of work occurs, block pipes in an approved manner to prevent creep during down time.
- .18 Recheck plastic pipe joints assembled above ground after placing in trench to ensure that no movement of joint has taken place.
- .19 Do not lay pipe on frozen bedding.
- .20 Do hydrostatic and leakage test and have results approved by Departmental Representative before surrounding and covering joints and fittings with granular material.
- .21 Backfill remainder of trench.

### **3.6 VALVE INSTALLATION**

- .1 Install valves to manufacturer's recommendations at locations as indicated.
- .2 Support valves located in valve boxes or valve chambers by means of bedding same as adjacent pipe. Valves not to be supported by pipe.

### **3.7 HYDRANTS**

- .1 Install hydrants at locations as indicated.
- .2 Install hydrants in accordance with AWWA M17.
- .3 Install gate valve and cast iron valve box on hydrant service leads as indicated.

- .4 Set hydrants plumb, with hose outlets parallel with edge of pavement or curb line, with pumper connection facing roadway and with body flange set at elevation of 50 mm above final grade.
- .5 To provide proper draining for each hydrant, excavate pit measuring not less than 1 x 1 x 0.5 m deep and backfill with coarse gravel or crushed stone to level 150 mm above drain holes.
- .6 Place appropriate sign on installed hydrants indicating whether or not they are in service during construction.

### **3.8 RESTRAINED JOINTS**

- .1 For restrained joints: only use restrained joints approved by Departmental Representative.

### **3.9 HYDROSTATIC AND LEAKAGE TESTING**

- .1 Do tests in accordance with ANSI/AWWA C600.
- .2 Provide labour, equipment and materials required to perform hydrostatic and leakage tests hereinafter described.
- .3 Notify Departmental Representative at least 48 hours in advance of proposed tests.
  - .1 Perform tests in presence of Departmental Representative.
- .4 Test pipeline in sections not exceeding 365 m in length, unless otherwise authorized by Departmental Representative.
- .5 Upon completion of pipe laying and after Departmental Representative has inspected Work in place, surround and cover pipes between joints with approved granular material placed to dimensions indicated.
- .6 Leave hydrants, valves, joints and fittings exposed.
- .7 When testing is done during freezing weather, protect hydrants, valves, joints and fittings from freezing.
- .8 Strut and brace caps, bends, tees, and valves, to prevent movement when test pressure is applied.
- .9 Open valves.
- .10 Expel air from main by slowly filling main with potable water.
  - .1 Install corporation stops at high points in main where no air-vacuum release valves are installed.
  - .2 Remove stops after satisfactory completion of test and seal holes with plugs.
- .11 Thoroughly examine exposed parts and correct for leakage as necessary.
- .12 Apply hydrostatic test pressure of 700 kPa (100 psi) minimum based on elevation of lowest point in main and corrected to elevation of test gauge, for period of 1 hour.
- .13 Examine exposed pipe, joints, fittings and appurtenances while system is under pressure.
- .14 Remove joints, fittings and appurtenances found defective and replace with new sound material and make watertight.
- .15 Repeat hydrostatic test until defects have been corrected.

- .16 Apply leakage test pressure of 700 kPa minimum after complete backfilling of trench, based on elevation of lowest point in main and corrected to elevation of gauge, for period of 2 hours.
- .17 Define leakage as amount of water supplied from water storage tank in order to maintain test pressure for 2 hours.
- .18 Do not exceed allowable leakage of 0.0000449 l/hr/m of pipe/mm of nominal pipe diameter.
- .19 Locate and repair defects if leakage is greater than amount specified.
- .20 Repeat test until leakage is within specified allowance for full length of water main.

### **3.10 PIPE SURROUND**

- .1 Upon completion of pipe laying and after Departmental Representative has inspected Work in place, surround and cover pipes as indicated.
- .2 Hand place surround material in uniform layers not exceeding 150 mm compacted thickness as indicated.
  - .1 Do not dump material on pipe.
- .3 Place layers uniformly and simultaneously on each side of pipe.
- .4 Do not place material in frozen condition.
- .5 Compact each layer from pipe invert to underside of backfill to 95 % maximum density to ASTM D698.

### **3.11 BACKFILL**

- .1 Place backfill material, above pipe surround, in uniform layers not exceeding 150 mm compacted thickness up to grades as indicated.
- .2 Do not place backfill in frozen condition.
- .3 Compact backfill to at least 90% maximum density to ASTM D698.

### **3.12 PAINTING OF HYDRANTS**

- .1 After installation, paint hydrants red.
- .2 After hydrant flow tests, paint caps and ports to meet colour selections approved by authority having jurisdiction.

### **3.13 FLUSHING AND DISINFECTING**

- .1 Flushing and disinfecting operations: witnessed by Departmental Representative, carried out by contractor.
  - .1 Notify Departmental Representative at least 2 days in advance of proposed date when disinfecting operations will begin.
- .2 Flush water mains and tank through available outlets with a sufficient flow of potable water to produce velocity of 1.5 m/s, within pipe for minimum 10 minutes, or until foreign materials have been removed and flushed water is clear.
- .3 Provide connections and pumps for flushing as required.

- .4 Open and close valves, hydrants and service connections to ensure thorough flushing.
- .5 When flushing has been completed to Departmental Representative's approval, introduce strong solution of chlorine as approved by Departmental Representative into water main and ensure that it is distributed throughout entire system.
- .6 Disinfect water mains and tank to the requirements of local authority and as noted below.
- .7 Rate of chlorine application to be proportional to rate of water entering pipe.
- .8 Chlorine application to be close to point of filling water main and to occur at same time.
- .9 Operate valves, hydrants and appurtenances while main contains chlorine solution.
- .10 Flush line to remove chlorine solution after 24 hours.
- .11 Measure chlorine residuals at extreme end of pipe-line being tested.
- .12 Perform bacteriological tests on water main, after chlorine solution has been flushed out.
  - .1 Take samples daily for minimum of 2 days.
  - .2 Should contamination remain or recur during this period, repeat disinfecting procedure.
  - .3 Contractor to submit certified copy of test results.
- .13 Take water samples at hydrants and service connections, in suitable sequence, to test for chlorine residual.
- .14 After adequate chlorine residual not less than 50 ppm has been obtained leave system charged with chlorine solution for 24 hours.
  - .1 After 24 hours, take further samples to ensure that there is still not less than 10 ppm of chlorine residual remaining throughout system.

### **3.14 SURFACE RESTORATION**

- .1 After installing and backfilling over water mains, restore surface to original condition as directed by Departmental Representative using stockpiled topsoil to a minimum depth of 150mm. Crown topsoil minimum of 75 mm at the centerline of the trench.

### **3.15 CLEANING**

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

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .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.

**1.2 REFERENCES**

- .1 American Society for Mechanical Engineers (ASME International)
- .2 American Society for Testing and Materials International, (ASTM)
  - .1 ASTM A 53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- .3 American Water Works Association (AWWA)
  - .1 ANSI/AWWA A100, Water Wells.
- .4 Canadian Standards Association (CSA International)
  - .1 CSA B137 Series, Thermoplastic Pressure Piping Compendium.
    - .1 CSA B137.1, Polyethylene Pipe, Tubing, and Fittings for Cold-Water Pressure Services.
    - .2 CSA B137.3, Rigid Polyvinyl Chloride (PVC) Pipe for Pressure Applications.
- .5 National Electrical Manufacturers Association (NEMA)

**1.3 SHOP DRAWINGS AND PRODUCT DATA**

- .1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate:
  - .1 Equipment including connections, piping, and fittings, strainers, control assemblies and ancillaries, identifying factory and field assembled.
  - .2 Certified performance and efficiency pump curves.
  - .3 Wiring as assembled and schematically.
  - .4 Dimensions, construction details and recommended installation.

**1.4 CLOSEOUT SUBMITTALS**

- .1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
- .2 Data to include:
  - .1 Manufacturer's name, type, model year, capacity and serial number.
  - .2 Details on operation, servicing and maintenance.

- .3 Recommended spare parts list and addresses of representatives.

## **1.5 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 74 19 - 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, and corrugated cardboard packaging material in appropriate on-site containers for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal and wiring materials from landfill to metal recycling facility as approved by Departmental Representative.
- .5 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

## **Part 2 Products**

### **2.1 GENERAL**

- .1 Well pump system: to include well pump, piping between well and building, water storage facilities, pressure system and controls.

### **2.2 WELL**

- .1 Well pump system to be compatible with well having following characteristics (all measurements from well head):
  - .1 Depth of well: 91 m.
  - .2 Size of casing: 150 mm.
  - .3 Static water level: 42 m.
  - .4 Pumping level: 79 m.
  - .5 Available drawdown: 35 m.

### **2.3 SUBMERSIBLE PUMP**

- .1 Pump: turbine type.
- .2 Capacity:
  - .1 Flow rate: 27 L/min.
  - .2 Discharge pressure at well head: 200 kPa.
  - .3 Pump setting below well head: 79 m.

### **2.4 DISCHARGE PIPING**

- .1 Between well head and storage tanks: 50mm diameter HDPE.

**Part 3            Execution**

**3.1                INSTALLATION**

- .1        Install well pump system in accordance with ANSI/AWWA A100, and local authority having jurisdiction.

**3.2                PIPING**

- .1        Pipe well pump system as indicated and connect to new storage tank.

**3.3                SUBMERSIBLE PUMP**

- .1        Connect to plastic discharge pipe with anti-torque arrestor.
- .2        Secure pump to well head with nylon safety line sized by pump manufacturer.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 02 65 00 Underground Storage Tank Removal.
- .2 Section 31 23 33.01 Excavating, Trenching and Backfilling.
- .3 Section 33 11 16 Site Water Utility Distribution Piping.

**1.2 REFERENCES**

- .1 American National Standards Institute (ANSI).
  - .1 ANSI/AWWA D120-09: Thermosetting Fibreglass-Reinforced Plastic Tanks.
  - .2 AWWA C652 – 11: Disinfection of Water Storage Facilities.
- .2 Canadian Standards Association
  - .1 CAN/CSA-B126 SERIES-13 - Water cisterns.
- .3 Underwriters' Laboratories of Canada. (ULC).
  - .1 ULC-S615-14: Underground Reinforced Plastic Tanks.
- .4 Health Canada Guideline for Installing, Maintaining, and Decommissioning Drinking Water Cisterns

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate details of construction, appurtenances, and installation.

**1.4 CLOSEOUT SUBMITTALS**

- .1 Submit operation and maintenance data for tank appurtenances for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

**1.5 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse or recycling in accordance with Section 01 74 19 - Construction/Demolition Waste Management and Disposal.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal, metal, paper, plastic, and corrugated cardboard packaging material for recycling or reuse in accordance with Waste Management Plan.
- .4 Divert unused metal and wiring materials from landfill to metal recycling facility as approved by Departmental Representative.
- .5 Fold up metal banding, flatten and place in designated area for recycling.

**Part 2 Products**

**2.1 FIBREGLASS REINFORCED PLASTIC**

- .1 One (1) tank of 56,800 L capacity; dimensions as indicated.
- .2 Construction: to ULC-S615 single walled.
- .3 Connections: 4 minimum. Sizes: as indicated.
- .4 Manholes: as indicated.

**2.2 ANCHORAGE**

- .1 Connect to existing concrete base as indicated
- .2 Provide threaded rods, nuts, washers, hold down straps and anchor bolts as indicated.

**2.3 PIPING, VALVES AND FITTINGS**

- .1 FRP pipe fittings designed, constructed and certified in conformance with ULC.
- .2 Mechanical joints on buried primary piping is not permitted.

**2.4 LEVEL GAUGING**

- .1 Tank water level gauging and indicator.
  - .1 Submersible potable drinking water pressure level sensor complete with wiring, attachments, and digital display mounted inside the mechanical room.

**Part 3 Execution**

**3.1 INSTALLATION**

- .1 Install tank as indicated and as per 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 trained installers.
- .4 Provide certification of installation to Departmental Representative.
- .5 Disinfect tank as per AWWA C652 – 11: Disinfection of Water Storage Facilities and as outlined in Section 33 11 16 Site Water Utility Distribution Piping.

**END OF SECTION**

## APPENDIX A

# Attestation and Proof of Compliance with Occupational Health and Safety (OHS)

Submission of this completed form, satisfactory to Parks Canada, is a condition of gaining access to the work place.

## Instructions:

Prime contractor must sign this form for all projects undertaken at Parks Canada work places.

This form is to be administered by the Project Manager and completed by the Prime Contractor AFTER contract award.

Parks Canada recognizes that federal OHS legislation places certain specific responsibilities upon Parks Canada as owner of the work place. In order to meet those responsibilities, Parks Canada is implementing a contractor safety regime that will ensure that roles and responsibilities assigned under Part II of the *Canada Labour Code* and the *Canada Occupational Health and Safety Regulations* are implemented and observed when involving contractor(s) to undertake works in Parks Canada work places.

Parks Canada Responsible Authority/Project Lead	Address	Contact Information
Project Manager/Contracting Authority (delete as required)		
Prime Contractor		
Subcontractor(s) (add additional fields as required)		

Location of Work

General Description of Work to be Completed

Mark "Yes" where applicable.

	A meeting has been held to discuss hazards and access to the work place and all known and foreseeable hazards have been identified to the contractor and/or subcontractor(s)
	The contractor and/or its subcontractor(s) will comply with all federal and provincial/territorial legislation and Parks Canada's policies and procedures, regarding occupational health and safety.
	The contractor and/or its subcontractor(s) will provide all prescribed safety materials, equipment, devices and clothing.
	The contractor and/or its subcontractor(s) will ensure that its employees are familiar with and use all prescribed safety materials, equipment, devices and clothing at all times.
	The contractor and/or its subcontractor(s) will ensure that its activities do not endanger the health and safety of Parks Canada employees.
	The contractor and/or its subcontractor(s) has inspected the site and has carried out a hazard assessment and has put in place a health and safety plan and informed its employees accordingly, prior to the commencement of the work.
	Where a contractor and/or its subcontractor(s) will be storing, handling or using hazardous substances in the work place, it will place warning signs at access points warning persons of the presence of the substances and any precautions to be taken to prevent or reduce any hazard of injury or death.
	The contractor and/or its subcontractor(s) will ensure that its employees are instructed in respect of any emergency procedures applicable to the site.

I, \_\_\_\_\_ (contractor), certify that I have read, understood and attest that my firm, employees and all sub-contractors will comply with the requirements set out in this document and the terms and conditions of the contract.

Name \_\_\_\_\_ Signature \_\_\_\_\_

Date \_\_\_\_\_

## APPENDIX B



## Parks Canada Basic Impact Analysis

### 1. PROJECT TITLE & LOCATION

Water System Rehabilitation, Cape Spear Lighthouse National Historic Site

### 2. PROPONENT INFORMATION

Annie Campeau, Project Engineer, 30 Victoria Street, Gatineau, QC - Tel: 819-420-9263

Jerry Feltham – Manager, FII – Newfoundland East Field Unit - Tel: 709 533 3122

Glenn Keough – Manager, National Historic Sites and Visitor Experience - Tel: 709 772-6709

### 3. PROPOSED PROJECT DATES

Planned commencement: Fall 2017

Planned completion: Fall 2017

### 4. INTERNAL PROJECT FILE # TN-2017-20

### 5. PROJECT DESCRIPTION

The Cape Spear Lighthouse National Historic Site (CSLNHS) is located at the most easterly point in Canada. Just 20 minutes east of St. John's, CSLNHS was designated as historically significant in 1962 for the age and the architecture of the historic lighthouse. In order to protect the commemorative integrity of the site, Parks Canada restored this lighthouse to its original appearance and CSLNHS was officially opened to the public in 1983. Today, Cape Spear continues to be protected as a National Historic Site for two main reasons: the age and architecture of the lighthouse and its significance as a gun battery during the Second World War.

Parks Canada is considering enhancing the site facilities by adding a café and more washrooms (FII project 585). There are currently washroom facilities at the site, however, these are serviced from an underground storage tank and water is trucked to the site as needed. The delivered water is initially of potable quality, however, there is no on-site treatment or sterile storage. The water provided to the public is considered non-potable and users are advised to not consume it.

Completion of the project will result in an adequate, reliable, potable water system capable of servicing current and anticipated CSLNHS requirements.

The scope of work for this project includes:

- a) demolition and removal of an existing underground fibreglass 56,800L water storage tank
- b) installation of new fiberglass 56,800L water storage tank on the existing tank base
- c) general construction of a new water supply line and associated valves, hydrant, and fittings

A new 50 mm high density polyethylene (HDPE) water main line will connect to a new drilled well (91 meter depth) that was completed on March 1, 2017. The new main line will follow an existing waterline, for approx. 350 meters, to existing washroom facilities and a new water storage tank located adjacent to the visitor parking area. Another new 25 mm HDPE water line will run for approx. 100 meters from the new storage tank to the visitor center/craft shop. This section of the new line will be installed in a previously undisturbed area. The size of the trenches will be approximately 0.75 m deep and 0.7 m wide. The construction corridor will be 4 m wide (Figure 1).





Figure 1. Google Earth image of Cape Spear National Historic Site showing the locations of the existing new drilled well, existing water storage tank and new waterline routes.

CSLNHS is situated in the highlands of the Avalon Peninsula and is underlain mainly by Precambrian Rock. Topography in the region is steeply sloping. Soils are of the Red Cove soil series and are characterized by reddish-grey, very firm, very stony, sandy loam and are moderately well-drained. The long, narrow ridge that forms the site is bordered by large water sources on three sides. Cape (Spear) Bay is located northwest of the site, the Atlantic Ocean is to the north, and Broad Cove is to the southeast. A small brook marks the western boundary of the site.

Flora on site consists of a combination of introduced and native species, mostly in the form of dense shrub vegetation resulting from successive fires in the area. A variety of vegetative communities exist within the site, however the area is predominated by rock barrens and alder barrens. The rock barrens consist primarily of bare soil and rock, along with carpets of vegetation consisting primarily of crowberry species (*Empetrum eamesii* and *Empetrum nigrum*). The alder barrens are comprised of sweet bayberry (*Myrica gale*) and dwarf alder (*Alnus crispa*) mixed with tufts of grass and herbs. Basin bogs and seepage fens are also found on site and consist primarily of sphagnum species. The presence of Rocky Mountain willowherb (*Epilobium saximontanum*) had been noted by Parks Canada Staff in 2001, a provincially listed rare species, on the north side of the trail situated between the lookout and the most easterly point of the site. The plant has not been noted since or elsewhere and is thought to have been misidentified. It is generally associated with calcareous habitats of western Newfoundland. Alpine Fescues (*Festuca brachyphylla*) was noted during a vascular plant survey in 1979. This species is also listed as a rare species in Newfoundland. It has not been recorded since and is thought to have been misidentified as it is an alpine species with the only known records from western Newfoundland. A survey of the vegetation on the proposed construction corridors was conducted on November 2, 2017. These species were not found. There are no known flora species listed under the federal *Species at Risk Act* (SARA) or the provincial *Endangered Species Act* (ESA) occurring at the site.

Resident fauna is limited to smaller mammals such as rodents and snowshoe hare (*Lepus americanus*), with medium and large mammals passing through the site on occasion. Many bird species can be found at the site including the horned lark (*Eremophila alpestris*), savannah sparrow (*Passerculus sandwichensis*), willow ptarmigan (*Lagopus lagopus*), American robin (*Turdus migratorius*), various sandpiper (*Calidris sp.* and *Actitis macularia*) and 2





snow bunting (*Plectrophenax nivalis*). Commonly sighted seabirds include murre (*Uria sp.*), shearwater (*Puffinus sp.*), black guillemot (*Cepphus grylle*), herring gull (*Larus argentatus*), greater black-backed gull (*Larus marinus*), and blacklegged kittiwake (*Rissa tridactyla*). The little brown bat (*Myotis lucifugus*) is classified as Endangered under SARA and the provincial ESA and may occur at the site although no known roosts or winter hibernacula have been previously identified. The short-eared owl (*Asio flammeus*) is classified as Special Concern under SARA and Vulnerable under the provincial ESA. This species could occur at the site. No breeding records or roosts have been confirmed and any occurrence would most likely be transient in nature. Marine species are abundant beyond the site boundaries and include, but are not limited to, such species as Atlantic cod (*Gadus morhua*), Atlantic salmon (*Salmo salar*), humpback whales (*Megaptera novaeangliae*), minke whales (*Balaenoptera acutorostrata*), and fin whales (*Balaenoptera physalus*).

The strategic location of the Cape Spear headland, overlooking the approaches to St. John's harbour, made it a key point for coastal navigation, communications, coastal defence and a special place for viewing. The natural features and relationships of the site that supported these activities still exist. The Cape Spear NHS Commemorative Integrity Statement provides details on the cultural resource inventory on site. The designated place includes the footprint of the original 1835 lighthouse building. The cultural resources of national historic significance (Level I) include the 1835 lighthouse and any structural remains of the original lighthouse on site. The cultural resources of other heritage value (Level II) include the structural components associated with the additions to the 1835 lighthouse, and the remains and vestiges of an attached fence and privy, the contemporary lighthouse complex including the VRC/Giftshop – the assistant keeper residence and, the World War II Battery complex. The cultural landscape consist of impressions left on the land as a result of activities relating to lightkeeping and WWII Defence at Cape Spear, i.e. footprints and former structures, remnants and evidence of ditches, wells and a water holding basin, evidence of pathways, roadways and, agricultural activities.

## 6. VALUED COMPONENTS LIKELY TO BE AFFECTED

As identified in Appendix 1 - Effects Identification Matrix.

## 7. EFFECTS ANALYSIS

The primary effects for all valued components will occur during the construction phase of the project.

### Natural Resources

Air - airborne dust particles from exposed soil and heavy equipment exhaust may result in reduced air quality. The effect is expected to be low given levels of rainfall typical in the Fall/Spring, reducing the potential for dust.

Water – wastes (e.g., garbage, litter, fuel and construction materials), erosion and sedimentation and surface water runoff may contaminate groundwater and the aquatic environments. The probability of a fuel spill is low, however, the area is subject to high winds and storm conditions. Erosion and sediment control and secure storage of materials will be important.

Soil and Landforms - excavation activities and operation of heavy machinery may result in soil compaction and rutting, soil erosion, loss of topsoil, exposure of subsoils, and soil contamination from waste (e.g., garbage, fuel). The area is historically a disturbed area so effects are expected to be low. Effective restoration of the site will be important.

Flora (including species at risk) - excavation will require removal of vegetation resulting in disturbance of adjacent natural areas, potential root exposure and physiological stress; ground disturbance may result in the introduction of invasive species, or expansion of existing invasive alien populations. Effects are expected to be low given that the site is historically a disturbed area and there are currently invasive species existing on the site. Effective restoration, however, will be important. Effects to species at risk are not expected.





Fauna (including species at risk) - operation of heavy equipment, increased human presence and noise may result in temporary habitat displacement/ preferred habitat avoidance (e.g., birds); artificial food sources such as garbage and litter may cause wildlife habituation/attraction (e.g., seabirds, fox); potential fuel spills, sediment and runoff may contaminate aquatic habitat; and potential runoff from fuel spills may cause injury or mortality to aquatic life. Effects are expected to be low given that construction will take place outside the migratory bird nesting season and this is a disturbed area with, at times, high levels of human activity. Effects to species at risk are not expected.

#### Cultural Resources

Archaeological sites – No major archaeological concerns with this project. There are no archaeological concerns with removing and replacing the current water tank with a new one if it stays in the same footprint. As for the new water line, there are no archaeological concerns if the main trench from the well to the visitor's center remains in the footprint of the abandoned line. The water line connecting the Visitor's center to the Gift Shop should not run through any known or presumed cultural resources.

Landscape and Landscape Features- Impact is expected to be low given that the main trench will use the footprint of existing abandoned waterline.

#### Visitor Experience

The potential effects on Visitor Experience are anticipated to occur during the construction period, including: reduced quality of visitor experience due to noise and presence of construction equipment; decreased aesthetic appeal and impacted viewscape; and potential hazard to visitors and staff due to construction activities (e.g., heavy equipment operation). The project will temporarily decrease the quality of the overall visitor experience but this is limited to the construction period. Most trails will remain accessible to visitors.

### **8. MITIGATION MEASURES**

#### General

##### Work Site Conditions/Staging/Laydown:

1. A project start up meeting will be held with the key people working onsite to review the mitigation measures, Parks Canada contact information and any site specific considerations with Parks Canada staff before work begins.
2. Staging and parking areas for material and equipment will be located at an area approved by Parks Canada staff.
3. The established 4 meter working corridor, and other existing disturbed areas approved by Parks Canada staff, will be used to access the site.
4. Clearly mark staging areas, work corridors and restricted areas with stakes, biodegradable flagging tape, fencing, temporary gates or other means; remove when project is completed.
5. Isolate operations and ground intrusion activities to the footprint of the 4 meter working corridor and limit vehicle access to essential vehicles only.
6. Confirm presence of buried infrastructure prior to excavation and take precautions to avoid damage.

##### Equipment Operation:

7. Equipment from outside the national historic site must be washed/cleaned free of soils prior to arrival.
8. Equipment must be properly tuned, clean and free of contaminants, in good operating order, free of leaks (e.g., fuel, oil or grease), and fitted with standard air emission control devices and spark arrestors prior to arrival on site.
9. During construction, any required cleaning of tools and equipment must be done greater than 30 meters from the shoreline to prevent the release of wash water that may contain deleterious substances.
10. Equipment operators must be fully trained and experienced.





11. Use low pressure/rubber tracked equipment or access matting where feasible to minimize soil compaction and ground disturbance.
12. Minimize idling of engines, contingent on operating instructions and temperature consideration.
13. Machinery (e.g., excavators, bobcats, chainsaws, and generators) must be stored, maintained and refuelled on a flat surface at least 100 meters from the ocean and any wetland areas.
14. Only minor repairs and maintenance (e.g., lubrication) of 'non-mobile' equipment such as flatbeds or shovels are permitted; all major repairs must be undertaken at an appropriate offsite location.

Waste:

15. All solid waste will be securely stored and handled according to applicable federal/provincial regulations.
16. All waste materials (e.g., construction material, refuse material, waste petroleum, and demolition waste) shall be removed from the site on project completion and considered, prior to disposal, for reuse, resale or recycling and then disposed of at an approved facility; cover waste loads during transportation.
17. Portable sanitary facilities must be serviced on a regular basis and accumulated waste disposed of at a sanitary waste disposal facility.
18. Burning of waste is not permitted at the National Historic Site.

Hazardous Materials:

19. Prevent the release of hazardous substances into the environment, including but not limited to, petroleum products and their derivatives and chemicals.
20. All on-site personnel must be briefed on reporting requirements for hazardous materials spills; spills must be reported immediately to the designated Parks Canada contact.
21. All construction sites must be equipped with containers suitable for the secure, temporary storage of hazardous wastes, separated by type.
22. A spill contingency response kit including sorbent material and berms to contain 110% of the largest possible spill (i.e., fuel or other toxic liquids) related to the work must be available on site at all times. On-site personnel must be aware of its location and trained in its use. Any contaminants must be recovered at source and disposed of according to applicable laws, policies and regulations.
23. Handle and store hazardous materials as per applicable federal legislation/regulations. The contractor must have all relevant and current Material Safety Data Sheets available onsite.
24. Petrochemical products, paints and chemicals must be stored 100 meters from aquatic environments. They must be secured overnight in a Parks Canada approved enclosed area under lock and key.
25. Any hazardous waste or contaminated material uncovered during excavation / construction, must be investigated, source identified, removed and disposed of outside the protected heritage place at an approved facility. Disposal documentation must be provided to the designated Parks Canada contact.

Natural Resources

Air:

26. Implement dust control measures during grading and re-surfacing especially during dry, windy weather.

Water:

27. Ensure all materials (e.g., organic materials, soil stockpiles, construction waste and materials) are securely stored in place, especially during high wind/storm conditions and at staging areas; materials must not enter aquatic environments or be allowed to disperse around the site.
28. This existing water line intersects a wetland area. Drainage patterns around/through any wetland areas must be restored at the end of the project.
29. Machinery will not be permitted into any wetland areas and must stay on the established 4 meter working corridor.





Soil and Landforms:

30. The contractor must prepare an erosion and sediment control plan and submit same to the designated Parks Canada contact for approval prior to the start of project activities.
31. Regularly inspect and maintain erosion and sediment control structures during all phases of the project and modify measures as necessary.
32. Use erosion and sediment control products made of 100% biodegradable materials (e.g., jute, sisal or coir fiber) when possible. Ensure backing materials are also biodegradable. Hay bales are not permitted.
33. Limit duration of soil exposure; phase activities whenever possible and restore disturbed areas as soon as possible.
34. Topsoil separation is required; stockpile topsoil away from subsoils and spoil material and more than 15 meters away from aquatic environments, drainage features and/or the top of steep slopes.
35. Excessive vegetation (i.e. tall shrubs) should be cut and removed from areas before topsoil separation begins.
36. Salvaged topsoil for reclamation activities will be stored inside the 4 meter working corridor or other areas approved by Parks Canada staff. This material will not be pushed or stored in natural areas to be left undisturbed.
37. Excavations must be drained (but not directly into any waterbody), back-filled and compacted as soon as possible.
38. Under thawed conditions, backfill material will be compacted prior to topsoil replacement; distribute topsoil evenly over the excavated area as per Parks Canada specifications.
39. Under frozen ground conditions, material will be sufficiently spread over the excavated site to allow for settlement under thawed conditions. Where practical, topsoil replacement will be postponed until the backfill has thawed.
40. Surface water shall be directed away from work areas. Sediment laden runoff must not enter any watercourse.
41. Remove temporary erosion and sediment control products, especially non-biodegradable materials, when they are no longer required.
42. When excavation is complete, shape loosened soils to match the local terrain and ensure noticeable construction impacts (e.g., ruts, holes, depressions, compacted areas) are appropriately re-graded, back-filled with topsoil, re-contoured and capped in preparation for restoration.
43. During grading, ensure that materials are not pushed, or permitted to enter or erode into water or wetlands and stay within delineated limits.

Flora:

44. Introduction of invasive plant species must be prevented:
  - Minimise bare soil exposure (e.g., plant native species, cover with natural mulch/ground coverings).
  - Minimise ground disturbance and vegetation removal, as practical and within project requirements.
45. Clear minimum area necessary. Remove and maintain sod mats for replacement when practical to improve re-vegetation success when work is complete.
46. Trees must be preserved and left in place. Any alteration to trees must be pre-approved by the designated Parks Canada contact.
47. Protect roots of trees to drip line to prevent disturbance or damage. Avoid traffic, dumping or storage of materials over root zone.
48. Restore any areas affected by construction activity as closely as possible to the natural surrounding area. Specifically:
  - Preserve native topsoil/rootmat from the site, spread over the affected areas, re-grade to natural contour, install effective erosion control measures (e.g., erosion control blankets) on the steepest sections of the waterline to ensure the soil does not wash away prior to native plant re-population next season.
  - Hydro seeding mixes shall be pre-approve by parks Canada staff.





Fauna:

49. All wildlife attractants must be secured (e.g., petroleum products, human food, recyclable drink containers and garbage) within wildlife-proof containers, in a secured building or a vehicle. Keep food waste separate from construction waste and remove daily. Notify the designated Parks Canada contact immediately should wildlife gain access to the above mentioned attractants.
50. Minimize the time excavations remain open and cover or fence when left unattended.
51. Never approach or harass wildlife (e.g., feeding, baiting, luring).
52. Alert the designated Parks Canada contact, immediately to any potential wildlife conflict (e.g., aggressive behaviour, persistent intrusion), distress or mortality. In the case of aggressive behaviour or persistent intrusion, stop work and evacuate the area.
53. The breeding season for most birds within Newfoundland occurs between May 1<sup>st</sup> and August 1<sup>st</sup>. Vegetation clearing/grubbing should not take place within this time frame. However, some species protected under the *Migratory Birds Convention Act* nest outside these timeframes. Under section 6 of the *Migratory Birds Regulations*, it is forbidden to disturb, destroy or take a nest or egg of a migratory bird; or to be in possession of a live migratory bird or its carcass, skin, nest or egg except under authority of a permit.
54. The construction limits will be surveyed for wildlife prior to clearing grubbing. If any nest/dens are discovered within the clearing limits, protect the area from clearing activities and immediately contact Parks Canada staff.

Cultural Resources

55. If cultural or archaeological resources are encountered, work must cease in the immediate area and the Parks Canada project manager notified immediately. They will then notify Martin Perron (Tel: 819-420-9558), Parks Canada Investments Project Archaeologist. If features (i.e., structural remains and/or artifact concentrations) are encountered, leave in place, mark the location (e.g. with prominent flagging) and do not disturb prior to archaeological assessment of nature and significance being completed.
56. A geotextile membrane and/or crushed stone will be required on the ground at the location of any material stockpiled in undisturbed areas.

Visitor Experience

57. Construction should be completed in as short a time period as is practicable, to allow for visitor access and to ensure visitor safety.
58. Maintain the site in as tidy a condition as possible for the duration of work.
59. Safety risks to visitors during construction must be minimized:
  - The work site must be closed and clearly delineated with fencing, barriers, temporary gates, caution tape, or combinations thereof.
  - Appropriate bilingual signage must be posted at common visitor access points and strategic locations.
  - Maintain a safe working distance between work activities and visitors, especially when transporting machinery and materials between any staging areas and the working corridor; consider the use of lookouts to manage traffic and direct visitors in this area.
  - Secure and clearly mark unattended safety hazards (e.g., excavations, debris piles) with fencing, warning signs, caution tape or combinations thereof.





## 9. OTHER Considerations

Check all that apply

- ☐ Public/stakeholder engagement
- ☐ Aboriginal engagement or consultation
- ☒ Surveillance

**Periodic inspection by Parks Canada staff to ensure mitigations are being followed.**

- ☐ Follow-up monitoring, required to evaluate effectiveness of mitigation measures and/or assess restoration success
- ☐ Follow-up monitoring, required by legislation or policy (indicate basis of requirement e.g. required by the *Species at Risk Act*)
- ☐ SARA Notification

## 10. SIGNIFICANCE OF RESIDUAL ADVERSE EFFECTS

Given the magnitude of effects, the short term of the project, the timing and reversibility after construction, the project is not likely to cause significant adverse residual environmental effects to natural resources. The project is anticipated to have negligible to minor changes to cultural resources and visitor experience and as such is not likely to cause significant adverse residual effects to the same.

## 11. EXPERTS CONSULTED

*Include Parks Canada experts. Add as many entries as necessary for the project.*

Department/Agency/Institution: Parks Canada	Date of Request: October 2017
Expert's Name & Contact Information: Anne Desgagne Martin Perron	Title: CRM Policy Advisor Archaeologist
Expertise Requested: cultural resources, archaeological resources	
Response: No major archaeological and cultural landscape concern with the project	

## 12. DECISION

Taking into account implementation of mitigation measures outlined in the analysis, the project is:

- ☒ **not likely to cause significant adverse environmental effects.**
- ☐ likely to cause significant adverse environmental effects.

### FOR SARA REQUIREMENTS:

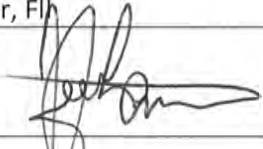
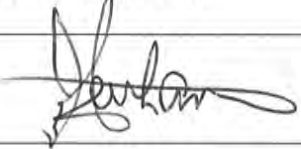
- ☒ **There are no residual adverse effects to species at risk and therefore the SARA-Compliant Authorization Decision Tool was not required**

**OR**, the SARA-Compliant Authorization Decision Tool ([Appendix 2](#)) was used and determined:

- ☐ There is no contravention of SARA prohibitions
- ☐ Project activities contravene a SARA prohibition and CAN be authorized under SARA
- ☐ Project activities contravene a SARA prohibition and CANNOT be authorized



**13. RECOMMENDATION AND APPROVAL***(Add additional blocks as required)*

<b>Prepared by:</b> Rod Cox – Resource Management Officer		<b>Date:</b> November 3, 2017
<b>Recommended by:</b> Jerry Feltham – Manager, FI		
<b>Signature:</b> 		<b>Date:</b> 11/06/17
<b>Approved by:</b> William Brake – Superintendent, NEFU		
<b>Signature:</b>  A/FUS		<b>Date:</b> 11/06/17

**14. ATTACHMENTS****15. NATIONAL IMPACT ASSESSMENT TRACKING SYSTEM**

- ☐ Project registered in [tracking system](#)
- ☒ Not yet registered (CEAA 2012 requires PCA submit a report to Parliament annually. EIAs must be entered in the tracking system **by the end of April** to enable reporting).

**\*\*\*Ensure that all required mitigation measures and conditions (e.g. follow-up monitoring requirements) are included in project permits and authorizations\*\*\***





## Appendix 1 : Effects Identification Matrix

**Section A** focuses on direct effects of the project and **Section B** on indirect effects that are caused by changes to the environment.

A. Direct Effects								
	<p><i>You may wish to change the components listed under the headings to specify the natural or cultural resources that are priority considerations for your PCA site or for the specific project being reviewed.</i></p>		Valued components potentially directly affected by the proposed project					
			Natural Resources					Cultural Resources
			Air	Soil & landforms	Water (surface, ground, crossings, etc.)	Flora (including SAR)	Fauna (including SAR)	Archaeological Sites
	Phase	Examples of Associated Activities						
Project Components	Preparation / Construction / Operation / Decommissioning	Supply and storage of materials	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
		Clearing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		Excavation	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
		Demolition	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Blasting/ Drilling	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
		Backfilling	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		Grading	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		Drainage	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Use of machinery	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Transport of materials/ equipment	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
		Disposal of waste	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Maintenance	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>





B. Indirect Effects (all phases)							
<p><i>You may wish to change the components listed under the headings to specify the natural or resources that are priority considerations for your PCA site or for the specific project being reviewed.</i></p>		Impacts as a result of changes to the environment					
		With respect to non-Aboriginal peoples:	With respect to Aboriginal peoples:		With respect to visitor experience		
		Health and socio-economic conditions	Health & socio-economic conditions	Current use of lands and resources for traditional purposes	Access & services	Recreation & accommod'n opportunities	Safety
Phase	Natural resource components affected by the project						
Preparation /construction operation/implementation/decommissioning	Could impacts to <u>air</u> lead to adverse effects on...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Could impacts to <u>soils and landforms</u> lead to adverse effects on...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Could impacts to <u>water</u> (e.g. surface, ground water and water crossings) lead to adverse effects on...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Could impacts to <u>flora</u> (including SAR) lead to adverse effects on...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Could impacts to <u>fauna</u> (including SAR) lead to adverse effects on...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Other...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

