Part 1 General

1.1 TITLE AND DESCRIPTION OF WORK

.1 Title of Work: PFC Remediation System (PFCRS).

.2 Introduction.

.1 The Department of National Defence (DND) will conduct a Perfluorinated Compounds (PFC) Removal Technology Demonstration for Contaminated Groundwater at the Oil Disposal Pit (hereafter referred to as the 'Site') which is located within the Royal Roads Landfill, CFB Cold Lake, Alberta.

.2 In 2012, Environment and Climate Change Canada (ECCC) Emergencies Science and Technology Section (ESTS) launched a technology feasibility study for the remediation of PFC-contaminated sites under the Canadian Federal Contaminated Sites Action Plan (FCSAP). Since then, ESTS has investigated different technologies and recently recommended to FCSAP that pump and treat (P&T) with carbon adsorption is a promising treatment approach for PFC contaminated groundwater.

.3 Considerable research has been conducted to determine effective Granular Activated Carbon (GAC) products to remove PFC's. Current research results have indicated that most GAC products are ineffective in removing PFC's from groundwater, however, two specific GAC products have been identified as promising and have been selected for this pilot study:

.1 Evoqua's UltraCarb 1240AW; and

.2 Calgon F400.

.4 The primary objective of the field trial is to evaluate the efficacy of granular activated carbon in removing PFC's in a real field setting and to determine real world engineering data that can be used to design systems for PFC removal at other sites.

.5 Public Works and Government Services Canada (PWGSC) manages the project on behalf of DND. PWGSC retains an environmental consultant to act as the "Departmental Representative" referred to in these specifications.

.3 Description of Work:

.1 Construction of pilot system and associated components is expected to be completed by summer 2018 such that the Technology Demonstration Trial (trial) shall begin soon after construction. The trial will begin with the first 30-day trial to be conducted in summer 2018. Based on the performance of the first 30-day trial, the requirement for a second 30-day trial will be determined. The second trial will be bid as a separate line item. Provided there is a requirement for a second trial, there will be a break of about 3 to 4 weeks before the start of the second 30-day trial in order to try to capture any seasonal variability, allow for replacement of the GAC media, and incorporate any lessons learned from the first trial. Health and Safety is a large part of this work and includes training, personal protective equipment and decontamination procedures. At the end of the trials, the contractor will be required to decommission the works, restore the site, and demobilize. Some structures will remain on site. The field trials are described in

Appendix A. Note that the storm water trial that is described in Appendix A will **not** be conducted.

.2 The phases of the work of this contract are:

.1 Phase 1 – Planning includes at a minimum, award meeting, start-up meeting, schedule and submittal submissions, training, shop drawings, Health and Safety Plan, and acquiring infrastructure for the system in order to mobilize to Site.

.2 Phase 2 – Mobilize to Site and prepare Site.

.3 Phase 3 - Construction of the system infrastructure including decontamination systems, infiltration gallery, filtration system, fuel/generator system, and all other required supports for the system.

.4 Phase 4 – Provision of the Water Treatment Unit, connection and commissioning.

.5 Phase 5 – Maintain equipment for the first 30-day groundwater trial.

.6 Phase 6 – Change water treatment GAC filter media (3 to 4-week break), if required.

.7 Phase 7 – Maintain equipment for second 30-day groundwater trial, if required.

.8 Phase 8 – Decontamination, decommissioning, site restoration, and demobilization.

.3 The system consists of the following main components:

.1 Water treatment system (rented).

.2 Groundwater extraction well field (existing).

.3 Water storage tanks (rented).

.4 Treated water infiltration gallery (to be constructed).

.5 Process piping and pumping (to be constructed).

.6 Electrical supply (rented generator).

.4 Main system components are to be rented for the duration of the project, specifically the water treatment system, pumps, lines, fittings, tanks, electrical generators and air compressors.

.5 Work includes on call emergency service to keep the system running and respond to critical system alarms. The contractor's health and safety plan must include measures to ensure worker safety.

.6 Work is adjacent to an active aerodrome, therefore compliance with height of equipment restrictions is required and Notice to Airmen (NOTAM) will be required if using cranes and excavators.

.7 The fuel storage tank used by the system's generator will require registration with Environment and Climate Change Canada (ECCC).

1.2 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work under this Contract covers provision of a PFC Remediation System at 4 Wing Cold Lake, Cold Lake Alberta. The Site is identified in Drawings attached.

.2 Work of this contract comprises the following:

.1 Prime contractor for health and safety.

.2 All design activities (shop drawings, construction drawings, as-builts) required to complete the work.

.3 Mobilization and demobilization.

.4 Site preparation includes but is not limited to:

.1 Development of the main access road from a sand ATV trail to a gravel road capable of supporting the contractor's mobile equipment.

.2 Placement of steel conduit pipes for passage of electrical power and process water across the road.

.3 Most clearing has already been completed, however grubbing is required in locations indicated on drawings.

.4 Preparation of gravel pads for tanks, trailers and equipment.

.5 Other site preparation deemed necessary by the contractor to complete the work.

.5 Maintain site facilities and barriers for the duration of the 2018 field trials.

.6 Supply, place, and maintain the water tanks.

.7 Supply, install, and maintain the pneumatic pumps in the extraction wells, and install and maintain pump supply lines.

.8 Supply, place, and install a water treatment system for the duration of the field trials.

.9 Supply materials and construct infiltration gallery.

.10 Supply, install, and maintain water piping, valves and connections.

.11 Supply, install, and maintain water transfer pumps and controls.

.12 Supply, install, and maintain air compressor for pneumatic water pumps for the duration of the field trials.

.13 Supply, install, and maintain compressed air supply piping, valves and connections.

.14 Supply, install, and maintain temporary electrical service and generator for the duration of the field trials.

.15 System commissioning.

.16 Maintenance of the entire system for the duration of the field trials.

.17 On-call emergency maintenance of the system for the duration of the field trials.

.18 Decontamination, decommission and demobilization of rented equipment and supplies.

.19 Disposal of non-hazardous and hazardous waste including but not limited to: spent granular activated carbon, backwash water, cleaning water, particulate filter media/bags, filter cartridges, used generator oil, used generator filters and any other waste generated by the onsite activities of the contractor, departmental representative and visitors.

.20 Structures to be left on site at demobilization include: gravel road, gravel pads, infiltration gallery, extraction wells and chain-link fence.

.21 Removal of the rest of the site infrastructure and restore site to pre-study conditions except as noted in .20 above.

1.3 MEASUREMENT PROCEDURES

.1 Mobilization will be paid in accordance with lump sum price established for mobilizing all necessary equipment, materials, supplies, facilities, and personnel to Site. Includes pre-mobilization submittals, insurance, bonding, and permits.

.2 Demobilization will be paid in accordance with lump sum price established for demobilizing all equipment, materials, supplies, facilities, and personnel from the Site, decontaminating all equipment prior to removal from site, preparing site for closure, as-built documents, and completion submittals.

.3 Site Facilities Operation will be paid in accordance with unit rate price table established for time to operate and maintain all infrastructure, including temporary structures and facilities, sanitary facilities, roadways, security, and services. Includes meetings, progress submittals, traffic control, health and safety, environmental protection, and cleaning. Includes living out allowances, including travel, room and board. Emergency maintenance to be charged as a unit bid price for overtime per hour.

.4 Site closure will be paid in accordance with lump sum price established to restore the site to make suitable for use following the completion of the field trials. Includes removal of any incidental or generated material.

1.4 PROJECT/SITE CONDITIONS

.1 Work at Site may involve contact with contaminated materials including:

- .1 Petroleum hydrocarbons (PHCs).
- .2 Benzene, toluene, ethylbenzene and xylene (BTEX).
- .3 Perfluorinated Alkylated Substances (PFAS) including Perfluorooctane sulfonate (PFOS)/ perfluorooctanoate (PFOA).
- .4 1,1-dichloroethane, 1,1,1-trichloroethane.
- .5 Polycyclic aromatic hydrocarbons (PAH).
- .6 Phenols.
- .7 Metals.

1.5 EXISTING SERVICES

.1 Electric power is not available.

.2 Establish location and extent of all service lines/utilities in area of work before starting work. Notify Departmental Representative of findings.

.3 Provide alternative routes for pedestrian and vehicular traffic if necessary.

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

.5 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.

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

.7 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.6 CONTRACT METHOD

.1 Construct Work under lump sum plus unit price contract.

1.7 CONTRACTOR USE OF SITE

.1 Co-ordinate use of site under direction of Departmental Representative.

.2 Use of Site:

.1 Exclusive and complete for execution of Work.

.2 Assume responsibility for assigned premises for performance of this Work.

.3 Be responsible for coordination of all Work activities onsite, including the work of other contractors engaged by the Departmental Representative.

.3 Perform Work in accordance with Contract Documents. Ensure Work is carried out in accordance with indicated phasing.

.4 Do not unreasonably encumber Site with material or equipment.

1.8 CODES, BYLAWS, STANDARDS

.1 Perform Work in accordance with the National Building Code of Canada (NBC), the National Fire Code, Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations, Transportation of Dangerous Goods, and any other required or indicated Laws, Regulations, Codes, Construction Standards and/or any other Code or Bylaw of local application.

.2 Comply with restrictions of applicable Federal, Provincial and local bylaws, rules and regulations enforced at the location concerned. These include:

.1 Pollution, waste, or garbage restrictions.

.2 Truck, traffic, and road access restrictions.

.3 Water, storm water, and sewer restrictions.

.4 Noise restrictions.

.5 Signage, fencing, hoarding restrictions.

.6 Fire prevention restrictions.

.7 Fuel equipment and storage restrictions.

.3 Meet or exceed requirements of Contract Documents, specified standards, codes and referenced documents.

.4 In any case of conflict or discrepancy, the most stringent requirements will apply.

.5 All works must comply with the regulations set out in the Cold Lake Airport Zoning Regulations: http://laws-lois.justice.gc.ca/eng/regulations/SOR-91-253/page-1.html#ord

1.9 SECURITY CLEARANCES

.1 Not Used

1.10 DOCUMENTS REQUIRED

.1 Maintain at job site, one copy of each document as follows:

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

1.11 PERMITS

.1 Obtain all necessary Federal, Provincial, Canadian Forces Base (DND), and Municipal permits required to complete work.

.2 Submit copies of permits to Departmental Representative in accordance with Section 01 33 00 – Submittal 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 MEASUREMENT PROCEDURES

.1 Not Used

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Not Used

1.3 CODES

.1 Perform Work to Current Codes, Construction Standards and Bylaws, including Amendments.

1.4 CONTRACT DOCUMENTS

.1 The Contract Documents, including drawings and specifications, are intended to complement each other, and to provide for and include everything necessary for the completion of the Work.

.2 Drawings are, in general, diagrammatic and are intended to indicate the scope and general arrangement of the Work.

1.5 DIVISION OF SPECIFICATIONS

.1 The specifications are subdivided in accordance with the current 6-digit National Master Specifications System.

.2 A division may consist of the Work of more than 1 subcontractor. Responsibility for determining which subcontractor provides the labour, material, equipment and services required to complete the Work rests solely with the Contractor.

1.6 WORK SCHEDULE

.1 Carry on Work as per indicated “PHASES” and as follows:

.1 Within 10 working days after Contract award, provide a “phasing bar chart” and a schedule showing anticipated progress stages and final completion of the Work within the time period required by the Contract Documents. Indicate the following:

.1 Submission of shop drawings, product data, MSDS sheets and samples.

.2 Commencement and completion of Work of each section of the specifications or trade for each phase as outlined.

.3 Final completion date within the time period required by the Contract Documents.

.2 Do not change accepted Schedule without notifying Departmental Representative in writing. Additionally, provide new schedule to the Departmental Representative for approval.

.3 Interim reviews of Work progress based on work schedule will be conducted as decided by Departmental Representative and schedule updated by Contractor in conjunction with and to approval of Departmental Representative.

1.7 COST BREAKDOWN

.1 Before submitting the first progress claim, submit a breakdown of the Contract lump sum prices in detail as determined by the Departmental Representative and aggregating Contract price.

1.8 DOCUMENTS REQUIRED

.1 Maintain 1 copy each of the following posted at the job Site:

.1 Contract drawings.
.2 Contract specifications.
.3 Addenda or other modifications to Contract Documents.
.4 Change orders.
.5 Copy of current Work schedule.
.6 Reviewed and accepted shop drawings.
.7 One set of record drawings and specifications for “as-built” purposes.
.8 Field test reports.
.9 Reviewed and accepted submissions.
.10 Manufacturers’ installation and application instructions (as appropriate).
.11 National Building Code of Canada (as appropriate).
.12 Current construction standards of workmanship listed in technical Sections (as appropriate).
.13 Health and Safety documents.
.14 Environmental Protection Plan.
.15 Permits and other approvals.

1.9 REGULATORY REQUIREMENTS

.1 Any wastewater discharge from the site shall meet the most stringent discharge criteria, federal, provincial or municipal bylaw. Any discharge water that are removed from federal lands may become subject to provincial or municipal laws and regulations.

.2 Provincial or municipal standards may be used in conjunction with federal standards on federal lands only as guidelines for establishing remediation goals and objectives. The term "standards" is used in this part in order to maintain consistency in terminology throughout this document and does not imply that standards contained in provincial or municipal laws and regulations apply on federal lands.

.3 Obtain and pay for – Building Permit, Certificates, Licenses and other permit enforced at the location concerned required by regulatory municipal, provincial or federal authorities to complete the Work.

.4 Provide inspection authorities with plans and information required for issue of acceptance certificates.

.5 Furnish inspection certificates in evidence that the Work installed conforms to the requirements of the authority having jurisdiction.

1.10 EXAMINATION

.1 Examine Site and be familiar and conversant with existing conditions likely to affect Work, including Contaminated Waste.

.2 Provide photographs of surrounding properties, objects and structures liable to be damaged or be the subject of subsequent claims.

1.11 EXISTING SERVICES

.1 Where Work involves breaking into or connecting to existing services, carry out Work at times determined by the authorities having jurisdiction.

.2 Notify Departmental Representative and utility companies of intended interruption of services and obtain required permission.

.3 Provide alternative routes for personnel, pedestrian, and vehicular traffic.

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

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

.6 Provide temporary services as required to maintain critical building and tenant systems.

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

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

.9 Construct barriers as required for safety.

1.12 SETTING OUT OF WORK

.1 Assume full responsibility for and execute complete layout of Work to locations, lines and elevations indicated.

.2 Provide devices needed to lay out and construct Work.

.3 Supply such devices as templates required to facilitate Departmental Representative’s inspection of Work.

1.13 ACCEPTANCE OF SUBSTRATES

.1 Each trade will examine surfaces prepared by others and job conditions which may affect his work, and will report defects to the Departmental Representative. Commencement of Work will imply acceptance of prepared Work or substrate surfaces.

1.14 QUALITY OF WORK

.1 Ensure that quality workmanship is performed through use of skilled tradesmen, under supervision of qualified journeyman.

.2 The workmanship, erection methods and procedures to meet minimum standards set out in the National Building Code of Canada.

.3 In cases of dispute, decisions as to standard or quality of Work rest solely with the Departmental Representative, whose decision is final.

1.15 WORKS COORDINATION

.1 Coordinate work of sub-trades.

.1 Designate one person to be responsible for review of contract documents and shop drawings and managing coordination of Work.

.2 Convene meetings between subcontractors whose work interfaces and ensure awareness of areas and extent of interface required.

.1 Provide each subcontractor with complete plans and specifications for Contract, to assist them in planning and carrying out their respective work.

.2 Develop coordination drawings when required, illustrating potential interference between work of various trades and distribute to affected parties.

.3 Facilitate meeting and review coordination drawings. Ensure subcontractors agree and sign off on drawings.

.4 Publish minutes of each meeting.

.5 Submit copy of coordination drawings and meeting minutes to Departmental Representative for information purposes.

.3 Submit shop drawings and order of prefabricated equipment or rebuilt components only after coordination meeting for such items has taken place.

.4 Work coordination:

.1 Ensure cooperation between trades in order to facilitate general progress of Work and avoid situations of spatial interference.

.2 Ensure that each trade provides all other trades reasonable opportunity for completion of Work and in such a way as to prevent unnecessary delays, cutting, patching and removal or replacement of completed Work.

.3 Ensure disputes between subcontractors are resolved.

.5 Departmental Representative is not responsible for, or accountable for extra costs incurred as a result of Contractor’s failure to coordinate Work.

1.16 APPROVALS OF SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

.1 Submit the requested shop drawings, product data, MSDS sheets and samples indicated in each of the technical Sections to the Departmental Representative.

.2 Allow sufficient time for the following:

.1 Review of product data.

.2 Approval of shop drawings.

.3 Review of re-submission.

.4 Ordering of accepted material and/or products.

1.17 RELICS AND ANTIQUITIES

.1 Relics and antiquities and items of historical or scientific interest will remain property of Department. Protect such articles and request directives from Departmental Representative.

.2 Give immediate notice to Departmental Representative if evidence of archeological finds are encountered during excavation/construction, and await Departmental Representative's written instructions before proceeding with Work in this area.

1.18 PRODUCTS SUPPLIED BY DEPARTMENTAL REPRESENTATIVE

.1 Not Used.

1.19 TESTING AND INSPECTION

.1 The Contractor will appoint and pay for the services of testing agency or testing laboratory as specified, and where required for the following:

.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.

.2 Where tests or inspections by designated testing laboratory reveal Work is not in accordance with the Contract requirements, Contractor will pay costs for additional tests or inspections as the Departmental Representative may require to verify acceptability of correct Work.

.3 Contractor will furnish labour and facilities to:

.1 Notify Departmental Representative in advance of planned testing.

.4 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.

.5 Pay costs for uncovering and making good Work that is covered before required inspection or testing is completed and reviewed for acceptance by Departmental Representative.

.6 The Departmental Representative may require, and pay for, additional inspection and testing services not included above.

.7 Provide Departmental Representative with 2 copies of testing laboratory reports as soon as they are available.

1.20 AS-BUILT DOCUMENTS

.1 Submit as-built drawing signed and stamped by a Professional Engineer licensed by the Association of Professional Engineers and Geoscientists (APEGA).

.2 As Work progresses, maintain accurate records to show all deviations from the Contract Documents. Note on as-built specifications, drawings and shop drawings as changes occur.

1.21 WASTE MANAGEMENT AND DISPOSAL

.1 All non-hazardous waste must be disposed of off-site. A landfill is located approximately 8 km from the site for non-hazardous waste.

.2 Any hazardous materials must be disposed of at an approved facility. The contractor must submit originals of the disposal manifest to the Departmental Representative.

.3 All soils shall be contained in such a manner as to not contaminate any surrounding soils. Prior to disposal all soils will be tested and classified to determine proper disposal. The contractor must submit originals of the disposal manifest to the Departmental Representative.

1.22 CLEANING

.1 Conduct daily cleaning and disposal operations. Comply with local ordinances and anti-pollution laws.

.2 Ensure clean-up of the work areas each day after completion of Work.

1.23 DUST CONTROL

.1 Prevent fugitive dust from the Site from interfering with onsite and offsite uses.

1.24 ENVIRONMENTAL PROTECTION

.1 Prevent extraneous materials from contaminating air beyond construction area, by providing temporary enclosures during Work.

.2 Do not dispose of waste or volatile materials into water courses, storm or sanitary sewers.

.3 Ensure proper disposal procedures in accordance with all applicable provincial regulations.

1.25 SYSTEM OF MEASUREMENT

.1 The metric system of measurement (SI) will be employed on this Contract.

1.26 FAMILIARIZATION WITH SITE

.1 Before submitting tender become familiar with all conditions likely to affect the cost of the Work.

.2 No claims or change orders will be considered by PWGSC in regard to existing conditions due to the Contractor’s lack of familiarity with the Site.

1.27 SUBMISSION OF TENDER

.1 Submission of a tender is deemed to be confirmation of the fact that the Tenderer has analyzed the Contract Documents and inspected the Site, and is fully conversant with all conditions.

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 MEASUREMENT PROCEDURES

.1 Not Used

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Not Used

1.3 ADMINISTRATIVE

.1 Schedule and administer project meetings throughout the progress of the Work at the call of Departmental Representative.

.2 Prepare agenda for meetings.

.3 Distribute written notice with agenda of each meeting 2 working 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. Include significant proceedings and decisions. Identify actions by parties.

.7 Reproduce and distribute copies of minutes within 2 working days after meetings and transmit to meeting participants, affected parties not in attendance, and Departmental Representative.

.8 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

1.4 PRECONSTRUCTION MEETING

.1 Within 5 working days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.

.2 Departmental Representative, Contractor, Superintendent, major Subcontractors, field inspectors and supervisors will be in attendance.

.3 Establish time and location of meeting and notify parties concerned minimum 3 working days before meeting.

.1 Agenda to include:

.2 Appointment of official representative of participants in the Work.

.3 Schedule of Work.

.4 Schedule of submissions.

.5 Requirements for temporary facilities.

.6 Site security.

.7 Change orders, procedures, approvals required, administrative requirements.

.8 Monthly progress claims, administrative procedures, hold backs.

.9 Appointment of inspection and testing agencies or firms.

1.5 PROGRESS MEETINGS

.1 During course of Work schedule progress meetings weekly.

.2 Contractor, Superintendent, major Subcontractors involved in Work, Departmental Representative, and Owner are to be in attendance.

.3 Agenda to include:

.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 offsite 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 on completion date.

.12 Other business.

1.6 TAILGATE MEETINGS

.1 During the course of the work conduct daily tailgate meetings at the start of each work shift. Multiple meetings will be required if the Contractor intends to work multiple shifts within a 24-hour period. Records of all tailgate meetings shall be sent to Departmental Representative.

.2 All construction workers to attend, including Contractor, Superintendent, major Subcontractors, and environmental consultants. Departmental Representative may attend.

.3 Agenda to include:

.1 Planned Work activities and environmental considerations for that shift.

.2 Coordination activities required between Contractor, Subcontractors, Departmental Representative, and other contractors including environmental consultant.

.3 Health and Safety items as identified or otherwise required.

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 MEASUREMENT PROCEDURES

.1 Not Used

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Not Used

1.3 APPROVALS

.1 Approval of shop drawings and samples required by Departmental Representative as indicated.

1.4 GENERAL

.1 This Section specifies general requirements and procedures for the Contractor's submissions of shop drawings, product data, samples and other requested submittals to Departmental Representative for review. Additional specific requirements for submissions are specified in individual technical sections.

.2 Present shop drawings, product data and samples in SI Metric units.

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

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

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

.6 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative's review of submission unless Departmental Representative gives written acceptance of specific deviations.

.7 Make any changes in submissions which Departmental Representative may require consistent with Contract Documents and resubmit as determined by Departmental Representative.

.8 Notify Departmental Representative in writing, when resubmitting, of any revisions other than those requested by Departmental Representative.

.9 Do not proceed with Work until relevant submissions are reviewed and accepted by the Departmental Representative.

.10 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.

.11 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.

.12 Verify field measurements and affected adjacent Work are coordinated.

.13 Adjustments made on submittals by Departmental Representative are not intended to change Contract price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

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

1.5 SHOP DRAWINGS AND PRODUCT DATA

.1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.

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

.3 Allow 3 days for Departmental Representative's review of each submission.

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

.5 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.

.6 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.

.7 Submissions include:

.1 Date and revision dates.
.2 Project title and number.
.3 Name and address of:
.1 Subcontractor.

.2 Supplier.

.3 Manufacturer.

.4 Details of appropriate portions of Work as applicable:

.1 Fabrication.

.2 Layout, showing dimensions, including identified field dimensions, and clearances.

.3 Setting or erection details.

.4 Capacities.

.5 Performance characteristics.

.6 Standards.

.7 Operating weight.

.8 Wiring diagrams.

.9 Single line and schematic diagrams.

.10 Relationship to adjacent work.

.8 Submit electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.

.9 Submit electronic 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.

.10 Submit electronic 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.

.11 Submit electronic 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.

.12 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.

.13 Delete information not applicable to project.

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

.15 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.

.16 Review of shop drawings is for sole purpose of ascertaining conformance with general concept. This review shall not mean that PWGSC approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting all requirements of construction and Contract Documents. 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 all sub-trades.

1.6 SAMPLES

.1 Submit for review samples as requested in respective specification Sections. Label samples with origin and intended use.

.2 Deliver samples prepaid to Departmental Representative's business address.

.3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.

.4 Adjustments made on samples by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative and prior to proceeding with Work.

.5 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.

.6 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

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 MEASUREMENT PROCEDURES

.1 Not Used

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Contaminated Waste Management Plan: within 10 working days after Contract award and prior to mobilization to Site submit Health and Safety Plan as well as Environmental Plan detailing the management of all waste including Hazardous and/or Contaminated Waste. Conduct weekly contaminated waste inspection and submit written documentation of inspection to Departmental Representative within 24 hours of the inspection.

.2 Environmental Protection Plan: within 15 working days after contract award and prior to mobilization to Site submit Environmental Protection Plan (EPP) including fuel storage requirements, tank registration, spill response, dust control, runoff water control, etc.

.3 Submittals for Progress Meetings: make submittals at least 24 hours prior to scheduled progress meetings as follows:

- .1 Updated progress schedule detailing activities. Include review of progress with respect to previously established dates for starting and stopping various stages of Work, major problems and action taken, injury reports, equipment breakdown, and material removal.
- .2 Copies of transport manifests, trip tickets, and disposal receipts for waste materials removed from work area.
- .3 Other information required by Departmental Representative or relevant to agenda for upcoming progress meeting.

.4 Site Layout: within 20 working days after Contract award and prior to mobilization to Site, submit site layout drawings showing existing conditions and facilities, construction facilities and temporary controls provided by Contractor including following:

- .1 Equipment and personnel decontamination areas.
- .2 Means of ingress, egress and temporary traffic control facilities.
- .3 Equipment and material staging areas.
- .4 Soil stockpile areas.
- .5 Exclusion Zones, Contaminant Reduction Zones, and other zones specified in Contractor's site-specific Health and Safety Plan.
- .6 Grading, including contours, required to construct temporary facilities.

.5 Training: within 20 working days after Contract award and prior to mobilization to Site, submit documentation verifying that hazardous materials employees have been trained, tested, and certified to safely and effectively carry out their assigned duties. Submit list of PPE and respirator fit test documentation if required.

.6 Water Treatment Facility: within 20 working days after Contract award and prior to mobilization to Site, submit design, commissioning plan, operation and maintenance procedures of onsite Water Treatment Facility.

.7 Transport Manifests: within 5 working days of offsite transport, submit original documentation verifying that material has been transported appropriately, including:

.1 Method of transport.
.2 Name of Transport Company.
.3 Location, date, and quantity of pick-up.
.4 Location, date, and quantity of drop-off.

.8 Certificate of Disposal: within 10 working days of disposal at offsite Disposal Facility, submit documentation verifying that materials have been disposed by Contractor, including:

.1 Issued by the Disposal Facility.
.2 On company letterhead.
.3 Name and location of facility where the material is being disposed.
.4 Date and quantity for each shipment received and total quantity received.
.5 Signed by identified authorized company representative.

.9 Certificate of Treatment: within 10 working days of treatment at offsite Treatment Facility, submit documentation verifying that materials have been treated by Contractor, including:

.1 Issued by the Treatment Facility.
.2 On company letterhead.
.3 Name and location of facility where the material is being treated.
.4 Date and quantity for each shipment received and total quantity received.
.5 Date and quantity for each treatment event and total quantity treated.
.6 Treatment methodology.
.7 Laboratory certificates demonstrating treatment objectives were met.
.8 Disposition of treated material.
.9 Signed by identified authorized company representative.

1.3 SEQUENCING AND SCHEDULING

.1 Do not commence Work involving contact with potentially Contaminated Wastes until decontamination facilities are operational and reviewed for acceptance by Departmental Representative.

1.4 DRUMS FOR STORAGE OF RESIDUAL SLUDGE

.1 Storage of Sludge: 200 L steel drums meeting Transportation of Dangerous Goods Act, closable lids, complete with labels for marking contents and date filled.

1.5 VEHICULAR ACCESS AND PARKING

.1 Maintenance and Use:

.1 Prevent contamination of access roads. Immediately scrape up debris or material on access roads which is suspected to be contaminated as determined by

Departmental Representative; transport and dispose of in appropriate offsite disposal facility. Clean access roads at least once per shift.

.2 Departmental Representative may collect soil samples for chemical analyses from traveling surfaces of constructed and existing access routes prior to, during, and upon completion of Work. Excavate and dispose of clean soil contaminated by Contractor's activities at no additional cost or time.

1.6 DUST AND PARTICULATE CONTROL

.1 Execute Work by methods to minimize raising dust from construction operations.

.2 Implement and maintain dust and particulate control measures immediately as determined necessary by Departmental Representative during construction and in accordance with regulations.

.3 Provide positive means to prevent airborne dust from dispersing into atmosphere. Use potable water for dust and particulate control.

.4 As minimum, use appropriate covers on trucks hauling fine or dusty material. Use watertight vehicles to haul wet materials.

.5 Prevent dust from spreading to adjacent property sites.

.6 Departmental Representative will stop Work at any time when Contractor's control of dusts and particulates is inadequate for wind conditions present at Site, or when air quality monitoring indicates that release of fugitive dusts and particulates into atmosphere equals or exceeds specified levels.

.7 If Contractor's dust and particulate control is not sufficient for controlling dusts and particulates into atmosphere, stop Work. Contractor must discuss procedures that Contractor proposes to resolve problem. Make necessary changes to operations prior to resuming excavation, handling, processing, or other Work that may cause release of dusts or particulates at no additional cost or time.

1.7 POLLUTION CONTROL

.1 Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious toxic substances and pollutants produced by construction operations.

.2 Be prepared to intercept, clean up, and dispose of spills or releases that may occur whether on land or water. Maintain materials and equipment required for cleanup of spills or releases readily accessible onsite.

.3 Promptly report spills and releases potentially causing damage to environment to:

.1 Authority having jurisdiction or interest in spill or release including conservation authority, water supply authorities, drainage authority, road authority, and fire department.

.2 Departmental Representative.

.4 Take immediate action using available resources to contain and mitigate effects on environment and persons from spill or release.

.5 Provide spill response materials including, containers, adsorbent, shovels, and personal protective equipment. Make spill response materials available at all times in which hazardous materials or wastes are being handled or transported. Spill response materials: compatible with type of material being handled.

.6 Volatile Organic Compounds (VOC) Control:

.1 In addition to requirements of Health and Safety for Contaminated Sites, monitor air quality for volatile organics at perimeter security locations as approved by Departmental Representative, every hour during contaminated materials excavation and management activities, and maintain log of air quality readings.

.2 If air quality monitoring indicates that release of volatile organics in air at site boundary exceeds Level C of Personnel Protective Equipment threshold for air quality, implement corrective actions to control volatile organics.

.3 If actions are not sufficient to control release of volatile organics within 1/2 hour of identification of air quality problem, suspend work resulting in excessive volatile organic emissions. Departmental Representative and Contractor to discuss additional methods that Contractor proposes to control release of volatile organics.

.4 Make necessary changes at no additional cost to Departmental Representative prior to resuming Work.

1.8 EQUIPMENT DECONTAMINATION

.1 Decontaminate water treatment equipment, pumps, tanks, pipe work and associated components prior to decommissioning and transporting off-site.

.2 Wastewater generated from equipment decontamination shall be treated through the water treatment system and any residual wastewater from the decontamination operations shall be stored in a plastic drum for disposal at an approved licensed facility.

.3 Place residual sediment from storage tanks in steel drums for characterization and disposal at an appropriate licensed facility identified by contractor and approved by Departmental representative.

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

1.9 WATER CONTROL

.1 Maintain excavations free of water.

.2 Protect Site from puddling or running water. Grade Site to drain. Provide water barriers as necessary to protect Site from soil erosion.

.3 Prevent surface water runoff from leaving work areas.

.4 Do not discharge decontaminated water, or surface water runoff, or groundwater which may have come in contact with potentially Contaminated Waste, offsite or to municipal sewers.

.5 Prevent precipitation from infiltrating or from directly running off stockpiled materials. Cover stockpiled materials with an impermeable liner during periods of Work stoppage including at end of each working day and as determined by Departmental Representative.

.6 Direct surface waters that have not contacted potentially Contaminated Wastes to surface drainage systems.

.7 Control surface drainage including ensuring that gutters are kept open, water is not allowed across or over pavements or sidewalks except through accepted pipes or properly constructed troughs, and runoff from unstabilized areas is intercepted and diverted to suitable outlet.

.8 Dispose of water in manner not injurious to public health or safety, to property, or to any part of Work completed or under construction.

.9 Provide, operate, and maintain necessary equipment appropriately sized to keep excavations, staging pads, and other work areas free from water.

.10 Have on hand sufficient pumping equipment, machinery, and tankage in good working condition for ordinary emergencies, including power outage, and competent workers for operation of pumping equipment.

1.10 EROSION AND SEDIMENT CONTROL

.1 Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas, from stockpiles, staging areas, and other work areas. Prevent erosion and sedimentation.

.2 Minimize amount of bare soil exposed at one time. Stabilize disturbed soils as quickly as practical. Strip vegetation, regrade, or otherwise develop to minimize erosion. Remove accumulated sediment resulting from construction activity from adjoining surfaces, drainage systems, and water courses, and repair damage caused by soil erosion and sedimentation as determined by Departmental Representative.

.3 Provide and maintain temporary measures which may include, silt fences, hay or straw bales, ditches, geotextiles, drains, berms, terracing, riprap, temporary drainage piping, sedimentation basins, vegetative cover, dikes, and other construction required to prevent erosion and migration of silt, mud, sediment, and other debris offsite or to other areas of Site where damage might result, or that might otherwise be required by Laws and Regulations. Make sediment control measures available during construction. Place silt fences and/or hay or straw bales in ditches to prevent sediments from escaping from ditch terminations.

.4 Hay or Straw Bale: wire bound or string tied; securely anchored by at least 2 stakes or rebars driven through bale 300 mm to 450 mm into ground; chinked (filled by wedging) with hay or straw to prevent water from escaping between bales; and entrenched minimum of 100 mm into ground.

.5 Silt Fence: assembled, ready to install unit consisting of geotextile attached to driveable posts. Geotextile: uniform in texture and appearance, having no defects, flaws, or tears that would affect its physical properties; and contain sufficient ultraviolet ray inhibitor and stabilizers to provide minimum 2-year service life from outdoor exposure.

.6 Net Backing: industrial polypropylene mesh joined to geotextile at both top and bottom with double stitching of heavy-duty cord, with minimum width of 750 mm.

.7 Posts: sharpened wood, approximately 50 mm square, protruding below bottom of geotextile to allow minimum 450 mm embedment; post spacing 2.4 m maximum. Securely fasten each post to geotextile and net backing using suitable staples.

.8 Plan construction procedures to avoid damage to Work or equipment encroachment onto water bodies or drainage ditch banks. In event of damage, promptly take action to mitigate effects. Restore affected bank or water body to existing condition.

.9 Installation:

.1 Construct temporary erosion control items as required.

.2 Do not construct bale barriers and silt fence in flowing streams or in swales.

.3 Check erosion and sediment control measures weekly after each rainfall; during prolonged rainfall check daily.

.4 Bales and/or silt fence may be removed at beginning of work day, replace at end of work day.

.5 Whenever sedimentation is caused by stripping vegetation, regrading, or other development, remove it from adjoining surfaces, drainage systems, and watercourses, and repair damage as quickly as possible.

.6 Prior to or during construction, Departmental Representative may require installation or construction of improvements to prevent or correct temporary conditions onsite. Improvements may include berms, mulching, sediment traps, detention and retention basins, grading, planting, retaining walls, culverts, pipes, guardrails, temporary roads, and other measures appropriate to specific condition. Temporary improvements must remain in place and in operation as necessary or until otherwise determined by Departmental Representative.

.7 Repair damaged bales, end runs, and undercutting beneath bales.

.8 Unless requested by Departmental Representative, remove temporary erosion and sediment control devices upon completion of Work. Spread accumulated sediments to form a suitable surface for seeding or dispose of, and shape area to permit natural drainage to satisfaction of Departmental Representative. Materials once removed become property of Contractor.

.10 Construct fill areas by selective placement to avoid erosive surface silts or clays.

.11 Do not disturb existing embankments or embankment protection.

.12 Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

.13 If soil and debris from Site accumulate in low areas, storm sewers, roadways, gutters, ditches, or other areas where in Departmental Representative's determination it is undesirable, remove accumulation and restore area to original condition.

1.11 PROGRESS CLEANING

.1 Maintain cleanliness of Work and surrounding site to comply with federal, provincial, and local fire and safety laws, ordinances, codes, and regulations.

.2 Coordinate cleaning operations with disposal operations to prevent accumulation of dust, dirt, debris, rubbish, and waste materials.

1.12 FINAL DECONTAMINATION

.1 Perform final decontamination of equipment, and materials which may have come in contact with potentially Contaminated Wastes prior to removal from Site. Refer to “Equipment Decontamination” above.

.2 Perform decontamination as specified to satisfaction of Departmental Representative. Contractor to perform additional decontamination if required.

1.13 GENERAL REMOVAL

.1 Remove all waste within Work areas as determined by Departmental Representative.

.2 Remove surplus materials and temporary facilities from Site.

.3 Dispose waste materials, litter, debris, and rubbish offsite.

.4 Do not burn or bury rubbish and waste materials onsite.

.5 Do not dispose of volatile or hazardous wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.

.6 Do not discharge wastes into streams or waterways.

.7 Dispose of following materials at appropriate licensed facility identified by Contractor and accepted by Departmental Representative:

.1 Non-Contaminated Waste.

.2 Disposable Personal Protective Equipment worn during final cleaning.

.3 Residual sludge generated from final decontamination operations.

.8 Residual sludge sample and analysis: Departmental Representative will perform sampling and analysis of stored sludge for disposal purposes prior to removal from Site. Results of analyses will determine appropriate methods of disposal. Upon receipt of analytical results, transfer residual sludge without spills or release to offsite disposal facility, as appropriate. Following completion of tank emptying, decontaminate tank interior with steam or high-pressure water wash supplemented by detergent. Dispose of tank decontamination water with tank contents.

.9 Minimize generation of Hazardous Waste to maximum extent practicable. Take necessary precautions to avoid mixing Non-Contaminated Waste and Contaminated Waste.

.10 Identify and evaluate recycling and reclamation options as alternatives to land disposal, such as:

.1 Hazardous Waste recycled in manner constituting disposal;

.2 Hazardous Waste burned for energy recovery;

.3 Lead-acid battery recycling;

.4 Hazardous Waste with economically recoverable precious metals.

1.14 CONTAMINATED WASTE REMOVAL

.1 Contaminated Waste will be segregated, transported, treated, and disposed into the following classifications as determined by the Departmental Representative:

.1 Special Waste – Treatable: This material must be treated at a Treatment Facility prior to disposal at a Disposal Facility unless otherwise indicated or determined by Departmental Representative.

.2 Special Waste – Non-treatable: This material must be disposed at a Disposal Facility unless otherwise indicated or determined by Departmental Representative.

.3 Special Waste – Comingled: This material must be treated at a Treatment Facility prior to disposal at a Disposal Facility unless otherwise indicated or determined by Departmental Representative.

.4 Non-Special Waste – Treatable: This material must be treated at a Treatment Facility prior to disposal at a Disposal Facility unless otherwise indicated or determined by Departmental Representative. This material may be treated at an onsite Land Treatment Facility as appropriate.

.5 Non-Special Waste – Non-treatable: This material must be disposed at a Disposal Facility unless otherwise indicated or determined by Departmental Representative.

.6 Non-Special Waste – Comingled: This material must be treated at a Treatment Facility prior to disposal at a Disposal Facility unless otherwise indicated or determined by Departmental Representative.

.2 Contaminated Waste Transport: transport offsite using appropriate containers.

.1 Transport material offsite as soon as practical. Do not unreasonably stockpile material onsite.

.2 Cover material while being transported to prevent release of airborne dust, vapours, or odours, and to prevent saturation and leachate generation of material.

.3 Manifest all material removed from Site documenting movement, interim storage and treatment, and final destination.

.3 Contaminated Waste Treatment: treat offsite at Treatment Facility identified by Contractor and accepted Departmental Representative.

.1 Treat material offsite as soon as practical. Do not unreasonably stockpile material offsite.

.2 Material treated must subsequently be disposed of at a Disposal Facility after treatment.

.3 Certificate of Treatment required for all material treated offsite.

.4 Treatment includes bioremediation, thermal desorption, and incineration. Treatment does not include blending, mixing, or dilution.

.5 If proposed Treatment Facility is not acceptable to Departmental Representative, Contractor must identify an alternate Treatment Facility that is acceptable.

.4 Contaminated Waste Disposal: dispose offsite at Disposal Facility identified by Contractor and accepted Departmental Representative.

.1 Dispose material offsite as soon as practical. Do not unreasonably stockpile material offsite.

.2 Material sent to a Disposal Facility must be permanently stored at that facility.

.3 Certificate of Disposal required for all material disposed offsite.

.4 If proposed Disposal Facility is not acceptable to Departmental Representative, Contractor must identify an alternate Disposal Facility that is acceptable.

1.15 RECORD KEEPING

.1 Maintain adequate records to support information provided to Departmental Representative regarding exception reports, annual reports, and biennial reports.

.2 Maintain bills of ladings for minimum of 375 days from date of shipment or longer period required by applicable law or regulation.

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 MEASUREMENT PROCEDURES

.1 Not Used

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit to Departmental Representative submittals listed for review.

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

.3 Submit the following:

- .1 Health and Safety Plan.
- .2 Copies of reports or directions issued by Federal and Provincial health and safety inspectors.
- .3 Copies of incident and accident reports.
- .4 Complete set of Material Safety Data Sheets (MSDS), and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.
- .5 Emergency Procedures.

.4 The Departmental Representative will review the Contractor's site-specific project Health and Safety Plan and emergency procedures, and provide comments to the Contractor within 5 working days after receipt of the plan. Revise the plan as appropriate and resubmit to Departmental Representative.

.5 Medical surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Departmental Representative.

.6 Submission of the Health and Safety Plan, and any revised version, to the Departmental Representative is for information and reference purposes only. It will not:

- .1 Be construed to imply approval by the Departmental Representative.
- .2 Be interpreted as a warranty of being complete, accurate and legislatively compliant.
- .3 Relieve the Contractor of his legal obligations for the provision of health and safety on the project.

1.3 REFERENCES

.1 Government of Canada:

- .1 Canada Labour Code - Part II
- .2 Canada Occupational Health and Safety Regulations

.2 National Building Code of Canada (NBC):

.1 Part 8, Safety Measures at Construction and Demolition Sites.

.3 Canadian Standards Association (CSA) as amended:

.1 CSA Z797-2009 Code of Practice for Access Scaffold

.2 CSA S269.1-1975 (R2003) False work for Construction Purposes

.3 CSA S350-M1980 (R2003) Code of Practice for Safety in Demolition of Structures

.4 Fire Protection Engineering Services, HRSDC:

.1 FCC No. 301, Standard for Construction Operations

.2 FCC No. 302, Standard for Welding and Cutting

.5 American National Standards Institute (ANSI):

.1 ANSI A10.3, Operations – Safety Requirements for Powder-Actuated Fastening Systems

.6 Province of Alberta:

.1 Occupational Health and Safety Act, R.S.A. 2016.

.2 Occupational Health and Safety Regulation

.7 Canada Labour Code, Canada Occupational Safety and Health Regulations, SOR/96-525.

1.4 REGULATORY REQUIREMENTS

.1 Comply with specified codes, acts, bylaws, standards and regulations to ensure safe operations at Site.

.2 In event of conflict between any provision of the above authorities, the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, the Departmental Representative will advise on the course of action to be followed.

1.5 WORKER’S COMPENSATION BOARD COVERAGE

.1 Comply fully with the Workers' Compensation Act, regulations and orders made pursuant thereto, and any amendments up to the completion of the Work.

.2 Maintain Workers' Compensation Board coverage during the term of the Contract, until and including the date that the Certificate of Final Completion is issued.

1.6 COMPLIANCE WITH REGULATIONS

.1 PWGSC may terminate the Contract without liability to PWGSC where the Contractor, in the opinion of PWGSC, refuses to comply with a requirement of the Workers' Compensation Act or the Occupational Health and Safety Regulations.

.2 It is the Contractor's responsibility to ensure that all workers are qualified, competent and certified to perform the Work as required by the Workers' Compensation Act or the Occupational Health and Safety Regulations.

1.7 RESPONSIBILITY

.1 Assume responsibility as the Prime Contractor for Work under this contract.

.1 Be responsible for health and safety of persons onsite, safety of property onsite 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.

1.8 HEALTH AND SAFETY COORDINATOR

.1 The Health and Safety Coordinator must:

.1 Be responsible for completing all health and safety training, and ensuring that personnel that do not successfully complete the required training are not permitted to enter the Site to perform Work.

.2 Be responsible for implementing, daily enforcing, and monitoring the site-specific Health and Safety Plan.

.3 Be on Site during execution of Work.

1.9 GENERAL CONDITIONS

.1 Provide safety barricades and lights around work site as required to provide a safe working environment for workers and protection for pedestrian and vehicular traffic.

.2 Ensure that non-authorized persons are not allowed to circulate in designated construction areas of the work site:

.1 Provide appropriate means by use of barricades, fences, warning signs, traffic control personnel, and temporary lighting as required.

.2 Secure Site at night time or provide security guard as deemed necessary to protect Site against entry.

1.10 PROJECT/SITE CONDITIONS

.1 Work at Site will involve contact with contaminants identified in Specifications and environmental reports.

1.11 WORK PERMITS

.1 Obtain specialty permits related to project before start of Work.

1.12 FILING OF NOTICE

.1 The Prime Contractor is to complete and submit a Notice of Project as required by Provincial or Territorial authorities.

.2 Provide copies of all notices to the Departmental Representative.

1.13 HEALTH AND SAFETY PLAN

.1 Conduct a site-specific hazard assessment based on review of Contract Documents, required Work, and project Site. Identify any known and potential health risks and safety hazards.

.2 Prepare and comply with a site-specific project Health and Safety Plan based on hazard assessment, including, but not limited to, the following:

- .1 Primary requirements:
  - .1 Contractor's safety policy.
  - .2 Identification of applicable compliance obligations.
  - .3 Definition of responsibilities for project safety/organization chart for project.
  - .4 General safety rules for project.
  - .5 Job-specific safe work, procedures.
  - .6 Wildlife safety, specifically black bears.
  - .7 Inspection policy and procedures.
  - .8 Incident reporting and investigation policy and procedures.
  - .9 Occupational Health and Safety Committee/Representative procedures.
  - .10 Occupational Health and Safety meetings.
  - .11 Occupational Health and Safety communications and record keeping procedures.
- .2 Summary of health risks and safety hazards resulting from analysis of hazard assessment, with respect to site tasks and operations which must be performed as part of the Work.
- .3 List hazardous materials to be brought onsite as required by Work.
- .4 Indicate Engineering and administrative control measures to be implemented at the Site for managing identified risks and hazards.
- .5 Identify personal protective equipment (PPE) to be used by workers.
- .6 Identify personnel and alternates responsible for site safety and health.
- .7 Identify personnel training requirements and training plan, including site orientation for new workers.

.3 Develop the plan in collaboration with all subcontractors. Ensure that work/activities of subcontractors are included in the hazard assessment and are reflected in the plan.

.4 Revise and update Health and Safety Plan as required, and re-submit to the Departmental Representative.

.5 Departmental Representative's review: the review of Health and Safety Plan by Public Works and Government Services Canada (PWGSC) will not relieve the Contractor of responsibility for errors or omissions in final Health and Safety Plan or of responsibility for meeting all requirements of construction and Contract Documents.

1.14 EMERGENCY PROCEDURES

.1 List standard operating procedures and measures to be taken in emergency situations. Include an evacuation plan and emergency contacts (i.e. names/telephone numbers) of:

- .1 Designated personnel from own company.
- .2 Regulatory agencies applicable to Work and as per legislated regulations.
- .3 Local emergency resources.
- .4 Departmental Representative and site staff.

.2 Include the following provisions in the emergency procedures:

- .1 Notify workers and the first-aid attendant, of the nature and location of the emergency.
- .2 Evacuate all workers safely.
- .3 Check and confirm the safe evacuation of all workers.
- .4 Notify the fire department or other emergency responders.
- .5 Notify adjacent workplaces or residences which may be affected if the risk extends beyond the workplace.
- .6 Notify Departmental Representative and site staff.

.3 Provide written rescue/evacuation procedures as required for, but not limited to:

- .1 Work at heights.
- .2 Work in confined spaces or where there is a risk of entrapment.
- .3 Work with hazardous substances.
- .4 Underground work.
- .5 Work on, over, under and adjacent to water.

.4 Design and mark emergency exit routes to provide quick and unimpeded exit.

.5 Revise and update emergency procedures as required, and re-submit to the Departmental Representative.

1.15 HAZARDOUS PRODUCTS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials, and regarding labeling and provision of Material Safety Data Sheets (MSDS) acceptable to the Departmental Representative and in accordance with the Canada Labour Code.

.2 Where use of hazardous and toxic products cannot be avoided:

- .1 Advise Departmental Representative beforehand of the product(s) intended for use. Submit applicable MSDS and WHMIS documents as required.
- .2 Provide adequate means of ventilation as required.

1.16 UNFORESEEN HAZARDS

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

1.17 POSTED DOCUMENTS

.1 Post legible versions of the following documents onsite:

- .1 Health and Safety Plan.
- .2 Sequence of Work.
- .3 Emergency procedures.
- .4 Site drawing showing project layout, locations of the first-aid station, evacuation route and marshalling station, and the emergency transportation provisions.
- .5 Notice of Project.
- .6 Floor plans or site plans.
- .7 Notice as to where a copy of the Workers' Compensation Act and Regulations are available on the work site for review by employees and workers.
- .8 Workplace Hazardous Materials Information System (WHMIS) documents.
- .9 Material Safety Data Sheets (MSDS).
- .10 List of names of Joint Health and Safety Committee members, or Health and Safety Representative, as applicable.

.2 Post all Material Safety Data Sheets (MSDS) onsite, in a common area, visible to all workers and in locations accessible to tenants when Work of this Contract includes construction activities adjacent to occupied areas.

.3 Postings should be protected from the weather, and visible from the street or the exterior of the principal construction site shelter provided for workers and equipment, or as accepted by the Departmental Representative.

1.18 MEETINGS

.1 Attend health and safety pre-construction meeting and all subsequent meetings called by the Departmental Representative.

.2 Ensure all site personnel attend a daily health and safety “tailgate” or “toolbox” meeting, which will include:

- .1 Sign-in of all attendees.
- .2 Planned Work activities and environmental considerations for that shift.
- .3 Hazards associated with these Work activities, including environmental hazards (e.g. potential for hypothermia, heat exhaustion, heat stroke).
- .4 Appropriate job-specific safe work procedures.
- .5 Required personal protective equipment (PPE).
- .6 Appropriate emergency procedures.

.3 Retain records of all health and safety meetings onsite during Work, and retain as corporate records for a minimum of 7 years after Work is completed.

1.19 CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by the Departmental Representative.

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

.3 The Departmental Representative may issue a "stop work order" if non-compliance of health and safety regulations is not corrected immediately or within posted time. The General Contractor/subcontractors will be responsible for any costs arising from such a "stop work order".

1.20 UTILITY CLEARANCE

.1 The Contractor is solely responsible for utility clearance.

.2 The Contractor will not rely upon drawings or other information provided with utility locations.

1.21 AFTER HOURS WORK AND WORKING ALONE

.1 Health and safety plan must address worker safety when workers are required to work alone or after hours.

.2 Contractor’s contingency plan for ensuring worker safety must be accepted by PWGSC and 4 Wing Cold Lake.

1.22 PERSONAL PROTECTIVE EQUIPMENT PROGRAM

.1 Submit Personal Protective Equipment (PPE) program addressing:

.2 Donning and doffing procedures.

.3 PPE selection based upon Site hazards.

.4 PPE use and limitations of equipment.

.5 Work mission duration, PPE maintenance and storage.

.6 PPE decontamination and disposal.

.7 PPE inspection procedures prior to, during, and after use.

.8 Evaluation of effectiveness of PPE program, and limitations during temperature extremes, and other appropriate medical considerations.

.9 Medical surveillance requirements for personnel assigned to work at Site.

.10 Frequency and types of air monitoring, personnel monitoring, and environmental sampling techniques and instrumentation to be used, including methods of maintenance and calibration of monitoring and sampling equipment.

.11 Site control measures employed at Site including site map, site work zones, use of 'buddy system', site communications including site security, alerting means for emergencies, standard operating procedures or safe work practices, and identification of nearest medical assistance.

.12 Decontamination procedures for both personnel and equipment.

.13 Emergency response requirements addressing: pre-emergency planning, personnel roles, lines of authority and communication, emergency recognition and prevention, safe distances and places of refuge, site security and control, evacuation routes and procedures, decontamination procedures not covered under decontamination section, emergency medical treatment and first aid, emergency alerting and response procedures, critique of response and follow-up, PPE and emergency equipment, site topography, layout, prevailing weather conditions, and procedures for reporting incidents to local, provincial, or federal agencies.

.14 Written respiratory protection program for project activities.

.15 Procedures dealing with heat and/or cold stress.

.16 Spill containment program if drummed waste material is generated, excavated, stored, or managed onsite.

1.23 OFFSITE CONTINGENCY AND EMERGENCY RESPONSE PLAN

.1 Prior to commencing Work involving handling of hazardous materials, develop offsite Contingency and Emergency Response Plan.

.2 Plan must provide immediate response to serious site occurrence such as explosion, fire, or migration of significant quantities of toxic or hazardous material from Site.

1.24 PERSONNEL HEALTH, SAFETY, AND HYGIENE

.1 Training: ensure personnel entering Site are trained in accordance with specified personnel training requirements. Training session must be completed by Health and Safety Officer.

.2 Levels of Protection: establish levels of protection for each Work area based on planned activity and location of activity.

.3 Personal Protective Equipment:

.1 Furnish site personnel with appropriate PPE as specified above. Ensure that safety equipment and protective clothing is kept clean and maintained.

.4 Develop protective equipment usage procedures and ensure that procedures are strictly followed by site personnel; include following procedures as minimum:

.1 Ensure prescription eyeglasses worn are safety glasses and do not permit contact lenses onsite within work zones.

.2 Ensure footwear is steel-toed safety shoes or boots and is covered by rubber overshoes when entering or working in potentially contaminated work areas.

.3 Dispose of or decontaminate PPE worn onsite at end of each workday.

.4 Decontaminate reusable PPE before reissuing.

.5 Ensure site personnel have passed respirator fit test prior to entering potentially contaminated work areas.

.6 Ensure facial hair does not interfere with proper respirator fit.

.5 Respiratory Protection:

.1 Provide site personnel with extensive training in usage and limitations of, and qualitative fit testing for, air purifying and supplied-air respirators in accordance with specified regulations.

.2 Develop, implement, and maintain respirator program.

.3 Monitor, evaluate, and provide respiratory protection for site personnel.

.4 Ensure levels of protection as listed have been chosen consistent with site-specific potential airborne hazards associated with major contaminants identified onsite.

.5 In absence of additional air monitoring information or substance identification, retain an industrial hygiene specialist to determine minimum levels of respiratory protection required.

.6 Immediately notify Departmental Representative when level of respiratory protection required increases.

.7 Ensure appropriate respiratory protection during Work activities. As minimum requirement, ensure that persons entering potentially contaminated work areas are supplied with and use appropriate respiratory protection.

.6 Wildlife: Black bears are common in the area where the work is to be performed.

.1 Specify measures for discouraging bears.

.2 Develop, implement and train personnel in plans and actions for discouraging bears.

.3 Train personnel in actions when encountering bears.

.4 Provide personnel with equipment and training to be used should they encounter a bear.

.7 Heat Stress/Cold Stress: implement heat stress or cold stress monitoring program as applicable and include in site-specific Health and Safety Plan.

.8 Personnel Hygiene and Personnel Decontamination Procedures. Provide minimum as follows:

.1 Suitable containers for storage and disposal of used disposable PPE.

.2 Potable water and suitable sanitation facility.

.9 Emergency and First-Aid Equipment:

.1 Locate and maintain emergency and first-aid equipment in appropriate location onsite including first-aid kit to accommodate number of site personnel; portable emergency eye wash; two 9 kg ABC type dry chemical fire extinguishers.

.10 Site Communications:

.1 Post emergency numbers near site telephones.

.2 Ensure personnel use of "buddy" system and develop hand signal system appropriate for site activities.

.3 Provide employee alarm system to notify employees of site emergency situations or to stop Work activities if necessary.

.4 Furnish selected personnel with 2-way radios.

.5 Safety Meetings: conduct mandatory daily safety meetings for personnel, and additionally as required by special or Work-related conditions; include refresher training for existing equipment and protocols, review ongoing safety issues and protocols, and examine new site conditions as encountered. Hold additional safety meetings on as-needed basis.

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 MEASUREMENT PROCEDURES

.1 Not Used

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Within 10 working days after Contract award and prior to mobilization to Site, submit Environmental Protection Plan for review by Departmental Representative.

1.3 ENVIRONMENTAL PROTECTION PLAN

.1 Ensure Environmental Protection Plan includes comprehensive overview of known or potential environmental issues to be addressed during construction.

.2 Comply with:

- .1 Federal, Provincial, Municipal, permit, and contractual environmental requirements.
- .2 Regulatory guidelines and best management practices.
- .3 Relevant Environmental Management Plans.

.3 Address topics at level of detail commensurate with environmental issue and required construction tasks. Include methods, procedures, and equipment.

.4 Include in Environmental Protection Plan:

- .1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.
- .2 Names and qualifications of persons responsible for manifesting material to be removed from Site.
- .3 Names and qualifications of persons responsible for training site personnel.
- .4 Descriptions of environmental protection personnel training program.
- .5 Communications Plan identifying emergency contact list and conditions for implementing emergency contact. Emergency contact to include: Contractor emergency response team, Departmental Representative and alternate, Owner and alternate, Federal, Provincial, and Municipal emergency contacts.
- .6 Erosion and Sediment Control Plan identifying type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.
- .7 Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials onsite.
- .8 Traffic Control Plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Ensure plans include measures to minimize amount of mud transported onto paved public roads by

vehicles or runoff. Trucks and truck traffic must comply with all Federal, Provincial, and Municipal laws and regulations.

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

.10 Spill Control Plan including procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance. Identify locations and contents of spill kits.

.11 Solid Non-Contaminated Waste Disposal Plan identifying methods and locations for solid waste disposal including clearing waste.

.12 Air Pollution Control Plan detailing provisions to assure that dust, debris, materials, and trash, are contained on project Site. Include procedures if air pollution do not comply with appropriate levels, there are public complaints, or if onsite or offsite damage occurs.

.13 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.

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

.15 Historical, Archaeological, Cultural Resources, Biological Resources and Wetlands Plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands. Include procedures if previously unknown historical, archaeological, cultural resources are discovered during Work.

.16 Noise and Vibration Control Plan identifying methods and procedures for preventing, monitoring, and controlling noise and vibration for compliance with Federal, Provincial, and Municipal laws and regulations. Include procedures if noise or vibrations do not comply with appropriate levels, there are public complaints, or if onsite or offsite damage occurs.

1.4 FIRES

.1 Fires and burning of rubbish onsite not permitted.

1.5 DRAINAGE

.1 Provide Erosion and Sediment Control Plan identifying type and location of erosion and sediment controls provided. Ensure plan includes monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.

.2 Provide temporary drainage and pumping required to keep excavations and Site free from water.

.3 Ensure pumped water into waterways, sewer or drainage systems is free of suspended materials.

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

1.6 SITE CLEARING AND PLANT PROTECTION

.1 Protect trees and plants onsite and adjacent properties as required.

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

.3 Minimize stripping of topsoil and vegetation.

.4 Restrict tree removal to areas required or designated by Departmental Representative.

1.7 WORK ADJACENT TO WATERWAYS

.1 Guidelines and Practices

.1 Follow practices described in Fisheries and Oceans Canada (September 1993) Land Development Guidelines for the Protection of Aquatic Habitat.

.2 Follow practices described in AB Environment and Parks Standards and Best Practices.

.2 General

.1 Construction equipment to be operated on land only.

.2 Do not use waterway beds for borrow material.

.3 Waterways to be free of excavated fill, waste material and debris.

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

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

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

.3 Machinery

.1 Ensure all hydraulic machinery to be used instream uses environmentally sensitive hydraulic fluids which are non-toxic to aquatic life, and which are readily or inherently bio-degradable

.2 Place oil drip trays or absorbent materials (e.g. pads) under any heavy equipment working within the Fisheries Sensitive Zone adjacent to the watercourse to ensure there is no potential for contamination of the streambanks or watercourse resulting from leaks or drip off machinery. Ensure that there is no potential for oil, grease or other deleterious substances to enter any watercourse, ravine or storm sewer system.

.3 All equipment and machinery working within 15 meters of any watercourse must be in good working condition (power washed) and free of leaks or excess oil and grease. No fuels, lubricants, construction wastes or other deleterious substances may enter any watercourse at any time.

.4 Watercourse Maintenance

.1 Unless otherwise indicated, care must be taken not to disturb streamside or riparian vegetation. Important in-water aquatic vegetation, such as cattails, will not be disturbed.

.2 Unless otherwise indicated, there must be no disturbance to the watercourse bank or the root systems of vegetation growing on the watercourse banks.

.5 Sediment Control and Deleterious Substances

.1 All work must be undertaken and completed in such a manner to prevent the release of silt, sediment or sediment laden water, raw concrete or concrete leachate, or any other deleterious substances to any ditch, watercourse, ravine or storm sewer system.

.2 Construction and excavation wastes, overburden, soil, concrete, concrete leachate, grout, oil, grease or any other substance deleterious to aquatic life must be disposed of or placed in a manner that will prevent their entry into any watercourse, ravine or storm sewer system.

.3 All excavated material must be removed from the Site or placed in a stable area above the high water mark of the watercourse, as far as possible from the channel, and protected from erosion by mitigating measures including temporary covering exposed soil with: polyethylene tarps, geotextile fabric, hydro-seed or planting vegetation. Material that is moved offsite must be disposed of in such a manner as to prevent its entry into any ditch, watercourse, wetland, floodplain, ravine or storm sewer system.

.4 Unless otherwise indicated, any fill used must be inert material, free from contaminants and must be placed so that it will not gain entry into any ditch, watercourse, wetland, floodplain, ravine or storm sewer system.

.5 No fill is to be stockpiled on marsh or marsh fringe areas.

.6 Unless otherwise indicated, at a minimum sediment plumes must meet:

.1 When background is less than or equal to 50 nephelometric turbidity units (NTU), induced turbidity must not exceed 5 NTU above the background value.

.2 When background is greater than 50 NTU, induced turbidity must not exceed the background value by more than 10% of the background value.

.3 When background is less than or equal to 100 milligrams per liter (mg/L) non-filterable residue (NFR or TSS), induced NFR or TSS must not exceed 10 mg/L above background value.

.4 When background is greater than 100 mg/L NFR or TSS, induced NFR or TSS must not exceed the background level by more than 10 % of the background value.

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 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area.

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

.5 Spill kits and containment are to be maintained onsite and ready for deployment in the event of spills, leaks, or other releases.

.1 Spill kits are to include sufficient quantities of absorbent material.

.2 Spill kits are to be in close proximity to machinery.

.3 During the Work there are to be trained and qualified personnel available that are ready to deploy spill kits when necessary.

.6 The Contractor is responsible for all costs associated with a spill, leak, or other release of a deleterious substance as a result of their Work. This will include costs of spill response equipment and materials, associated sampling and analysis, and any required restoration of the impacted area.

.7 Provide and maintain secondary containment for fuel storage and fuel supply lines.

.8 Contractor to regularly inspect all machinery on the Site to ensure it is in good repair and free of leaks.

1.9 WASTE MANAGEMENT AND DISPOSAL

.1 Dispose of waste off site at an approved facility.

.2 Dispose of hazardous materials at an approved facility. Submit copies of disposal manifest to Departmental Representative.

.3 Contain waste soil in such a manner as to not contaminate any surrounding soils (i.e. soil bags). Test and classify waste soil prior to disposal to determine proper disposal. Submit copies of disposal manifest to Departmental Representative.

1.10 NOTIFICATION

.1 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws, regulations, permits, or other environmental procedure violations.

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

.1 Do not take action until after receipt of written acceptance 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

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 PRECEDENCE

.1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.2 REFERENCES AND CODES

.1 Perform Work in accordance with the National Building Code of Canada (NBC), and other required or indicated Codes, Construction Standards and/or any other Code or Bylaw of local application.

.2 Meet or exceed requirements of:

.1 Contract documents.

.2 Specified standards, codes and referenced documents.

.3 Comply with restrictions of applicable local bylaws, rules and regulations enforced at the location concerned. These include:

.1 Pollution, waste, or garbage restrictions.

.2 Truck, traffic, and road access restrictions.

.3 Water, storm water, and sewer restrictions.

.4 Noise restrictions.

.5 Signage, fencing, hoarding restrictions.

.6 Fire prevention restrictions.

.7 Fuel equipment and storage restrictions.

.4 All works must comply with the regulations set out in the Cold Lake Airport Zoning Regulations: http://laws-lois.justice.gc.ca/eng/regulations/SOR-91-253/page-1.html#ord

.5 Government of Canada:

.1 Canadian Environmental Protection Act, 1999 (S.C. 1999, c. 33).

.2 Canadian Environmental Assessment Act, 2012 (S.C. 2012, c. 19, s. 52).

.3 Transportation of Dangerous Goods Act, 1992 (1992, c. 34).

.4 National Fire Code of Canada 2015 (NFC).

.5 National Plumbing Code of Canada 2015.

.6 National Building Code of Canada 2015.

.1 Part 8, Safety Measures at Construction and Demolition Sites.

.7 Canada Labour Code, Canada Occupational Safety and Health Regulations, SOR/96 525.

.8 Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations (SOR/2008-197)

.9 Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products published by the Canadian Council of Ministers of the Environment in 2003.

.10 Canada Labour Code - Part II.

.11 Canada Occupational Health and Safety Regulations.

.6 Province of Alberta:

.1 Occupational Health and Safety Act, R.S.A. 2016.

.2 Occupational Health and Safety Regulation

.7 Canadian Standards Association (CSA) as amended:

.1 CSA Z797-2009 Code of Practice for Access Scaffold

.2 CSA S269.1-1975 (R2003) False work for Construction Purposes

.3 CSA S350-M1980 (R2003) Code of Practice for Safety in Demolition of Structures

.4 CAN/CSA-Z321-[96], Signs and Symbols for the Occupational Environment.

.5 NFPA 110, Standard for Emergency and Standby Power Systems.

.6 CAN/CSA-A23.1-[00], Concrete Materials and Methods of Concrete Construction.

.7 CAN/CSA-A23.2-[00], Methods of Test for Concrete.

.8 CAN/CSA-A3000-[98]-A5-[98], Portland Cement.

.9 CAN/CSA-A23.1/A23.2-[00(August 2001)], Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.

.10 CAN/CSA-G164-[M92(R2003)], Hot Dip Galvanizing of Irregularly Shaped Articles.

.11 CAN/CSA-A3000-[98(R2002)], Cementitious Materials Compendium. Includes:

.1 CAN/CSA-A23.5-[98], Supplementary Cementing Materials

.12 CSA B137 Series-[02], 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).

.13 CSA B137.1-[02], Polyethylene Pipe, Tubing, and Fittings for Cold-Water Pressure Services.

.14 CSA B1800-[02], Plastic Non-pressure Pipe Compendium - B1800 Series (Consists of B181.1, B181.2, B181.3, B181.5, B182.1, B182.2, B182.4, B182.6, B182.7, B182.8 and B182.11).

.15 CSA B182.2-[02], PVC Sewer Pipe and Fittings (PSM Type).

.8 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-148.1, Methods of Testing Geotextiles

.1 No.2-[M85], Methods of Testing Geosynthetics - Mass per Unit Area.

.2 No.3-[M85], Methods of Testing Geosynthetics - Thickness of Geotextiles.

.3 No.7.3-[92], Methods of Testing Geotextiles and Geomembranes - Grab Tensile Test for Geotextiles.

.4 No. 10-[94], Methods of Testing Geosynthetics - Geotextiles - Filtration Opening Size.

.2 CAN/CGSB-138.1-[96], Fabric for Chain Link Fence.

.3 CAN/CGSB-138.2-[96], Steel Framework for Chain Link Fence.

.4 CAN/CGSB-138.3-[96], Installation of Chain Link Fence.

.5 CAN/CGSB-138.4-[96], Gates for Chain Link Fence.

.9 American National Standards Institute (ANSI):

.1 ANSI A10.3, Operations – Safety Requirements for Powder-Actuated Fastening Systems

.10 American Society for Testing and Materials (ASTM)

.1 ASTM D 698-91, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft^3) (600kN-m/m^3).

.2 ASTM D4491-[99a], Standard Test Methods for Water Permeability of Geotextiles by Permittivity.

.3 ASTM D4595-[86(2001)], Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.

.4 ASTM D4751-[99a], Standard Test Method for Determining Apparent Opening Size of a Geotextile.

.5 ASTM A53/A53M-[02], Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

.6 ASTM A90/A90M-[01], Standard Test Method for Weight [Mass] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.

.7 ASTM A121-[99], Standard Specification for Zinc-Coated (Galvanized) Steel Barbed Wire.

.8 A653/A653M-[03], Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.9 ASTM C618-[03], Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.

.10 ASTM F1664-[01], Standard Specification for Poly(Vinyl Chloride) (PVC)-Coated Steel Tension Wire Used with Chain-Link Fence.

.11 Fire Protection Engineering Services, HRSDC:

.1 FCC No. 301, Standard for Construction Operations

.2 FCC No. 302, Standard for Welding and Cutting

Part 2 Products

2.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA-Z321-[96], Signs and Symbols for the Occupational Environment.

.2 NFPA 110, Standard for Emergency and Standby Power Systems.

.2 Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations (SOR/2008-197)

.3 Canadian Environmental Protection Act, 1999

.4 Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products published by the Canadian Council of Ministers of the Environment in 2003.

1.2 MEASUREMENT

.1 Construction facilities and related work measures as a Lump Sum.

1.3 INSTALLATION AND REMOVAL

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

.2 Remove from site all such work after use.

1.4 HOISTING

.1 Provide, operate and maintain hoists (cranes) required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for use thereof.

.2 Hoists (cranes) shall be operated by qualified operator.

.3 Obtain a Notice to Airmen (NOTAM) prior to operation of cranes in accordance with 4 Wing Directives. Departmental Representative will assist in obtaining a NOTAM.

1.5 SITE STORAGE/LOADING

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

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

1.6 CONSTRUCTION PARKING

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

.2 Provide and maintain adequate access to project site.

.3 Build and maintain temporary roads as required to perform the Work and as approved by Departmental Representative.

.4 Maintain site access roads for duration of Contract and make good damage resulting from Contractors' use of roads.

1.7 OFFICE TRAILER

.1 Provide office trailer heated/cooled to 22 °C, lighted and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.

.2 Provide a clearly marked and fully stocked first-aid case in a readily available location.

.3 Subcontractors may provide their own offices as necessary. Direct location of these offices.

.4 Departmental Representative/Contractor Site office.

.1 Provide office for Departmental Representative.

.1 Inside dimensions minimum 3.6 m long x 3 m wide x 2.4 m, complete with one lockable door.

.2 Equip office with 1 m x 2 m table, 2 chairs and one desk.

.5 Site office trailer with heating/cooling.

.6 Provide a full-sized refrigerator for food.

.7 Provide an additional full-sized refrigerator for process water samples and any other test samples.

.8 Provide shelving for sample containers.

.9 Maintain in clean condition.

1.8 EQUIPMENT, TOOL AND MATERIALS STORAGE

.1 Provide and maintain, in a clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.

.1 Minimum dimensions 2.4 m (8 ft) x 6.1m (20ft).

.2 Locate materials not required to be stored in weatherproof sheds on site in a manner to cause least interference with work activities.

1.9 SANITARY FACILITIES

.1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.

.2 Post notices and take such precautions as required by local health authorities. Keep area and premises in sanitary condition.

.3 Provide portable toilet on site for workers.

1.10 ELECTRICAL POWER GENERATION AND DISTRIBUTION

.1 Provide an appropriately sized electrical power generator for the duration of the work.

- .1 Provide continuous power for the duration of the work.
- .2 Maintain and repair generator as required.
- .3 Refuel generator as needed.
- .4 Provide and maintain secondary containment for fuel storage and fuel supply lines.
  - .1 Inspect secondary containment as part of regular generator maintenance schedule.
- .5 Generator in a weatherproof, sound attenuating enclosure.

.2 Provide, assemble and test all necessary electrical distribution lines and control devices.

.3 Obtain all necessary permits and inspections for electrical devices and related work.

.4 Generator, electrical distribution lines, and control devices including panel, breakers, and fuses shall be appropriately sized to supply sufficient power to the following:

- .1 Office Trailer.
- .2 Air blower for Extraction Well pumps.
- .3 Transfer and Backwash Pumps.
- .4 Submersibles Pumps.
- .5 Water Treatment System.
- .6 Any other Equipment required to operate and maintain the system.

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 INSTALLATION AND REMOVAL

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

.2 Remove from site all such work after completion of field trials.

1.2 TEMPORARY BARRIER FENCE

.1 Erect temporary safety fence using standard 4-foot high orange plastic mesh fencing to prevent un-authorized persons from entering the work site as indicated.

1.3 GUARD RAILS AND BARRICADES

.1 Provide secure, rigid guard rails and barricades around deep excavations.

1.4 ACCESS TO SITE

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

1.5 PUBLIC TRAFFIC FLOW

.1 Not applicable.

1.6 FIRE ROUTES

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

1.7 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

.1 Not applicable.

1.8 SIGNAGE

.1 Supply and attach signs to comply with requirements of the Alberta Occupational Health and Safety Act, Regulations and Codes and Wing Standing Orders.

.2 At a minimum, signage should be installed at the remediation system compound at the entrance(s) and other locations, where applicable based on the local requirements: Example of such signage includes but not limited to the following:

- .1 Danger High Voltage (where applicable).
- .2 Danger Flammable Gas (where applicable).
- .3 No Smoking/Cellular Phones/Open Flames.
- .4 Hearing/Eye Protection Required.
- .5 24-Hour emergency contact number (Departmental Representative, Contractor, or Managing Contractor).

.6 Authorized Personnel Only.

.7 WHMIS information.

.3 Supply and attach safety signs to fence entrance listing required personal protective equipment.

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 INSPECTION AND DECLARATION

.1 Contractor's Inspection: Contractor and all Subcontractors shall conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.

- .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's Inspection and 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 shall 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 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 and Contractor. 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.

1.2 Site Restoration

.1 Following site infrastructure should be removed and the site should be restored to pre-existing conditions, at the end of this project:

- .1 Water Treatment Unit and associated equipment.
- .2 Storage tanks.
- .3 Pipe works.
- .4 Electrical works.
- .5 Generator.
- .6 Pumps.

.2 Following site infrastructure should be left in place at the end of this project:

- .1 Gravel pads.
- .2 Gravel roads.
- .3 Infiltration gallery.
- .4 Extractions wells.
- .5 Permanent Chain Link Fence.

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 Description of System:

.1 Water Treatment Unit (WTU) is part of a larger Groundwater Remediation system which consists of:

.1 Extraction and Monitoring Wells.

.2 Water Treatment Unit.

.3 In-Ground Infrastructure.

.4 Water Storage Tanks.

.5 Infiltration Gallery.

.6 Temporary Electrical Service.

.2 WTU includes the following sub-components:

.1 Control Panel with PLC.

.2 Back-washable Sediment Filters.

.3 Air Stripping System.

.4 Heavy Metals Removal Filter.

.5 Cartridge Filters.

.6 Parallel Granular Activated Carbon Filter Units (GAC) - operated in lead/lag configuration.

.7 Polishing Ion Exchange Filter

.8 Treated Water Backwashing System.

.3 This specification is to be used in conjunction with the provided issued for bid Drawings.

.2 Work Includes.

.1 Design, provision and fabrication of system.

.2 Engineering stamped drawings.

.3 Transportation between fabrication facility and Royal Roads Landfill, CFB Cold Lake, Alberta.

.4 Loading, unloading, placement and connection of system.

.5 Labour and material to connect equipment and/or plumbing.

.6 Supply and installation of all walkways, stairs, pipe supports, hangers and/or ladders.

.7 Installation of any system accessories.

.8 Start-up and commissioning.

.9 Repair and maintenance.

.10 On-call maintenance support for the 30-day trials and the 3 to 4-week break between the trials. Trials will be in Summer and Fall 2018. The minimum 3 to 4-week break between the trials will try to capture any seasonal variability, allow for GAC media change out and time to incorporate any modifications to the system based on the results of the first trial run. The work may include supporting Departmental Representative for after normal work hour emergencies.

.11 Supply consumables for the start-up and duration of the work including, but not limited to:

.1 Cartridge filters.

.2 GAC cartridges for air filters.

.3 One additional load of each GAC type for Granular Activated Carbon Filter Units (GAC) for the second trial, if required.

.4 One additional load of resin for Polishing Ion Exchange filter units for the second trial, if required.

.12 Decommissioning.

.13 Waste disposal.

.14 Insurance of system during transportation.

.15 Clean-up and site restoration prior to removal and shipping.

.16 Loading, unloading and transportation between 4 Wing Cold Lake and fabrication facility.

.17 All other associated works.

1.2 MEASUREMENT FOR PAYMENT

.1 As per Unit Price Table.

1.3 SUBMITTALS

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

.2 Submit System Drawings and Specifications within 10 working days of Contract Award. Manufacturer`s Drawings and Specifications shall address technical requirements. Technical drawings and specifications shall include, but not be limited to:

.1 Drawings: drawings provided shall include, but not be limited to: layout of system including electrical, piping and instrumentation diagrams; plumbing, and equipment housing details.

.2 Detailed component lists.

.3 Manufacturer's printed product literature and datasheets for water treatment plants, and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Permits and Certifications:

.1 Contractor shall obtain permits, certifications, and/or substantive regulatory requirements necessary for operation of system. Required permits, certifications, and/or substantive regulatory requirements shall be provided prior to mobilization.

1.4 OPERATION AND MAINTENANCE MANUAL

.1 Supply one copy electronic and 3 hard copies of an operation and maintenance manual for system. Manual includes but is not limited to:

.1 System layout.

.2 Process and Instrumentation Diagram (P&ID).

.3 Electrical drawings.

.4 Detailed parts listing.

.5 Alarms and alarm message details.

.6 System message details.

.7 Control program operation.

.8 Maintenance program.

.9 Commissioning checklist.

.10 Warranty information.

.11 Contact information.

.12 Troubleshooting.

1.5 START-UP COMMISSIONING

.1 Start-up commissioning is required.

1.6 NOISE CONTROL

.1 System is intended to operate in an industrial setting (airport) and shall meet federal, provincial and local noise pollution control regulations.

1.7 QA/QC TESTING

.1 Complete QA/QC Testing prior to shipment.

.2 System passes QA/QC testing prior to shipment.

.3 Submit results of QA/QC via email to Departmental Representative.

1.8 MOBILIZATION

.1 System shall not be mobilized to site until Contractor supplied drawings & specifications have been approved by Departmental Representative and Contractor has received written confirmation to proceed with mobilization.

1.9 WASTE MANAGEMENT AND DISPOSAL

.1 Dispose of non-hazardous waste off site at an approved licensed facility.

.2 Dispose of hazardous materials at an approved licensed facility. Submit original copies of disposal manifest to Departmental Representative.

.3 Test the foul backwash water and discharge directly to infiltration gallery at the direction of the Departmental Representative and only if complying with regulatory requirements and/or CCME guidelines. The foul backwash shall be recirculated through the WTU before discharging to the infiltration gallery if not meeting the discharge requirements.

.4 Contain waste soil in such a manner as to not contaminate any surrounding soils (i.e. soil bags). Test and classify waste soil prior to disposal to determine proper disposal. Provide results of testing to the Departmental Representative and seek written approval to dispose. Submit copies of disposal manifest to Departmental Representative.

Part 2 Products

2.1 MATERIALS

.1 All supplied material shall meet specification requirements.

.2 Supply sufficient replacement filter media for the duration of the trial.

2.2 RENTAL WATER TREATMENT UNIT SPECIFICATIONS:

.1 Services Available: Provision of an appropriately sized electrical service is a requirement of this specification package.

.2 Environmental Conditions.

- .1 Equipment will be operated at Royal Roads Landfill, CFB Cold Lake, Alberta.
- .2 Altitude 539 masl.
- .3 Ambient air temperature range during summer & fall months: +5°C to +45°C. The system is to be operated intermittently for two 30-day trials with a 30-day break, during the summer and fall months where non-freezing temperatures are anticipated.
- .4 Industrial location.

.3 Regulatory Requirements.

- .1 Complete system must be appropriately approved and certified to operate in the province of Alberta.

.4 Packaged Water Treatment Plant.

- .1 Provide packaged plant which operates at constant rate and arranged for "on-off" operation.
- .2 Design Flow Rate: 20 L/min.
- .3 WTU design conforms to these specifications and the Process Flow Drawing.
- .4 Required System Components (minimum):
  - .1 Back-washable Sediment Filters:
    - .1 The Back-washable Sediment Filters system shall be provided complete with pipe, fittings and necessary valves.
    - .2 The filter shall be designed to remove suspended solids and sediments from the influent groundwater.
    - .3 The filter media shall be of the non-consumable type.
    - .4 The Back-washable Sediment Filters shall consist of twin alternating vessels, each capable of treating design flow rate.
    - .5 The vessels shall be designed for a maximum working pressure of 850 KPa or more.
    - .6 System backwashes shall be initiated by the operator or automatically using water supplied from the treated water tank.
    - .7 All filter components shall be made of a non-corrosive material.
    - .8 Inlet and outlet ports shall accept a quick connect, double O-ring sealed adapter.
  - .2 Air Stripping System:

.1 The Air Stripping System shall be packed tower, tray tower or similar system supplied complete with all components including but not limited to: air stripper, air blower, and stripper water pump.

.2 The Air Stripping System shall be provided complete with pipe, fittings and necessary valves.

.3 The air stripper shall be capable of removing 99% of the volatile organic compounds (VOCs) from the influent.

.4 The air to water ratio will be kept in accordance with generally accepted chemical engineering practice.

.5 The air stripper exhaust shall be passed through a vapor phase activated carbon treatment device to remove VOCs from the air stripper exhaust to allow discharge to atmosphere.

.6 All air stripper system components shall be made of a non-corrosive material.

.7 Air stripper will be installed in accordance with manufacturer's recommendations.

.3 Heavy Metals Removal Filter:

.1 The Heavy Metals removal filter system shall be provided complete with pipe, fittings and necessary valves.

.2 The Heavy Metals removal filter shall be provided to remove trace dissolved iron, manganese and arsenic from the water, in addition to removing oxidized iron and manganese from the influent.

.3 Media selected for the heavy metals removal filter shall be selective towards removal of iron, manganese and arsenic from water. Media selection will be approved by Departmental Representative.

.4 The Heavy Metals Removal Filters shall consist of twin alternating vessels, each capable of treating design flow rate.

.5 The vessels shall be designed for a maximum working pressure of 850 KPa or more.

.6 System backwashes shall be initiated by the operator or automatically using water supplied from the treated water tank.

.7 All filter components shall be made of a non-corrosive material.

.8 Inlet and outlet ports shall accept a quick connect, double O-ring sealed adapter.

.4 Cartridge Filters:

.1 The Cartridge Filters shall be provided complete with filter housing, pipe, fittings and necessary valves.

.2 The Cartridge filter micron rating shall be as indicated in the drawings.

.5 Granular Activated Carbon Filter Units (GAC):

.1 GAC units shall be provided complete with pipe, fittings and necessary valves.

.2 The GAC unit shall consist of two parallel trains; each train will have two lead/lag vessels and shall be capable of alternating between vessels.

.3 Each GAC unit capacity shall be 10 L/min.

.4 Lead GAC vessels shall provide a minimum empty bed contact time of 10 minutes.

.5 Lag GAC vessels shall provide a minimum empty bed contact time of 20 minutes.

.6 Each GAC vessel shall contain a minimum of 170 kg of GAC.

.7 The system shall be suitable for operation at working pressures up to 1035 kPa or more.

.8 The GAC shall be made from bituminous coal.

.9 The GAC shall have an effective size of 0.55–0.75 mm and a uniformity coefficient of 1.9 (max). The GAC shall have a total pore volume of 0.767 mL/g, and a minimum Iodine number of 1000 mg/g.

.10 The GAC shall have high affinity to PFCs and shall have a proven record of removing PFCs through research.

.11 The GAC shall meet the American Water Works Association (AWWA) Standard for Granular Activated Carbon (B604).

.12 Contractor to submit supporting literature for Departmental Representative approval.

.13 The field trials will utilize Calgon F400 and Evoqua's UltraCarb 1240AW (i.e. one GAC type in each train).

.6 Polishing Ion Exchange (PIX) Filters:

.1 The PIX Filters system shall be provided complete with pipe, fittings and necessary valves.

.2 Each vessel shall include ion exchange resin capable of selectively remove remaining PFAS (specifically short chain PFAS). Resin type provided may include Purofine PFA694E or similar, as approved by Departmental Representative.

.3 Each PIX unit capacity shall be 10 L/min and each PIX vessel shall provide a minimum empty bed contact time of 3 minutes.

.4 The vessels shall be designed for a maximum working pressure of 850 KPa or more.

.5 System backwashes shall be initiated by the operator or automatically using water supplied from the treated water tank.

.6 All filter components shall be made of a non-corrosive material.

.7 Inlet and outlet ports shall accept a quick connect, double O-ring sealed adapter.

.7 Treated Water Backwashing System:

.1 The contractor shall provide process piping, valves and fittings to facilitate backwash using PFC free water from the Treated Water Tank as indicated in the Process Flow Diagram.

.2 Foul backwash water shall be passed through a bag/cartridge filter and GAC filter before storage as indicated.

.3 Backwash water pump may be utilized to recycle treated water back through the lead GAC/PIX/lag GAC units until treated water effluent limits are satisfied.

.5 Packaged Water Treatment Plant to reduce, clarify, remove objectionable organic matter, metals, PAHs, PHCs (F1 to F4), PFOS and PFAS, BTEX, VOC. In general, the effluent water quality shall be as tabulated:

Design Influent quality	**Anticipated Effluent quality**
pH=6.3-7.1	pH=6.0-9
TSS=unknown	TSS=<20 mg/L
PFOA=1.5 µg/L	PFOA=0.7 µg/L
PFOS=15 µg/L	PFOS=0.3 µg/L
Benzene= 150 µg/L	Benzene=5 ug/L
Toluene= 600 µg/L	Toluene=24 ug/L
Ethylbenzene= 250 µg/L	Ethylbenzene=24 ug/L
Xylenes=1000 µg/L	Xylenes=30 ug/L
Iron= 11.9 mg/L	Iron= <0.3 mg/L
Manganese = 2 mg/L	Manganese = <0.05 mg/L
Arsenic=15 µg/L	Arsenic=5 ug/L
F1= 2000 µg/L	F1= 0.81 µg/L
Benzo(a)pyrene = 50 µg/L	Benzo(a)pyrene = 0.015 µg/L

.6 Control System:

.1 Supply a program for controlling system.

.2 Provide documentation.

.3 Provide troubleshooting.

.4 Programmable Logic Controller Based.

.5 Data log all sensor inputs on a variable time basis selectable by user with an interval between 1 and 60 minutes, including but not limited to:

.1 Temperature – log inside and ambient air temperature.

.2 Pressure – log pressures from pressure transmitters indicated on Process Flow Diagram.

.3 Flow – discharge water flow transmitter.

.6 On-site and remote alarms via Email or text message:

.1 Treatment Vessel Pressure Alarm – trigger pressure set by user via Human Machine Interface.

.2 Process Room Temperature High.

.3 Process Room Temperature Low.

.4 Process Room Lower Explosive Limit – to be set by user, Action - turn on ventilation fan.

.5 Power failure.

.6 Low flow – to be set by user.

.7 Emergency-Stop button activated.

.8 Leak detection sump.

.9 Other alarms deemed necessary by designer.

.10 The alarm system shall allow for connection of additional alarms including, but not limited to: tank low and high-level alarms, diesel generator failure alarms, low atmospheric temperatures, leaks and spills alarms among others.

.7 Warnings and notifications:

.1 System stopped.

.2 System started.

.3 Other warnings and notifications deemed necessary by designer.

.7 Electrical Panel:

.1 Emergency-Stop button on panel door.

.2 Programmable Logic Controller, Human Machine Interface and communications devices power supplied by back-up Uninterruptible Power Supply.

.3 Surge and lightning protection for control system.

.8 System Enclosure:

.1 System shall be enclosed in a temperature controlled, insulated, trailer, vented supplied with lockable door and interior and exterior lights.

.2 External lighting over entrance ways shall be controlled by daylight sensor.

.3 Emergency-Stop button external to system enclosure.

.9 Additional Enclosure.

.1 The contractor shall provide a weather-proof building to house the transfer pumps as well as any other additional equipment needed.

.10 Sampling and Monitoring:

.1 Provide isolation valve before each System Component.

.2 Provide sampling port after each System Component.

.3 Provide pressure gauge before and after each System Component.

2.3 SYSTEM GROUND SUPPORT

.1 Provide support for packaged treatment system to ensure the system is level and secured.

Part 3 Execution

3.1 MOBILIZATION

.1 Do not mobilize to site until written approval is received from Departmental Representative. Delays caused by Contractor's failure to acquire permits, meet other regulatory requirements, or fulfill other contract requirements shall result in no additional costs.

3.2 TRANSPORTATION, UNLOADING AND PLACEMENT

.1 Transport system from fabrication facility and unload at the site at CFB Cold Lake, Alberta.

.2 Place system as indicated and as directed by Departmental Representative.

3.3 CONNECTIONS

.1 Connect Water Treatment Unit to electrical service.

.2 Connect Water Treatment Unit to influent, effluent and backwash lines.

3.4 EXAMINATION

.1 Conduct a pre-installation examination of system to assess equipment readiness. Perform a pre-operational test of equipment and controls to check for leaks and continuity.

3.5 COMMISSIONING

.1 Commission system with onsite assistance from system supplier.

.2 Commission system in presence of Departmental Representative.

.3 Wet test system to satisfaction of Departmental Representative.

3.6 DECOMMISSIONING

.1 Remove and dispose of all filter media to an approved facility.

.2 Submit original copies of the disposal manifest to Departmental Representative.

.3 Clean system prior to return to supplier.

3.7 OPERATION, REPAIR AND MAINTENANCE

.1 Provide on-call maintenance services for the system under the direction of Departmental Representative for duration of trials.

.2 Repair equipment as needed to keep system operating for duration of trials.

.3 Maintain System:

.1 Maintain in accordance with system supplier’s instructions.

.2 Replace filter media as required and/or when breakthrough of primary filters is observed or when directed to do so by Departmental Representative.

.3 Backwash filter units as need or as directed by Departmental Representative.

.4 Complete any other maintenance required to keep system operating for duration of Demonstration.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standard Association (CSA)

.1 CAN/CSA-A23.1-[M94], Concrete Materials and Methods of Concrete Construction.

.2 CAN/CSA-A23.1-[00], Concrete Materials and Methods of Concrete Construction.

.3 CAN/CSA-A23.2-[00], Methods of Test for Concrete.

.4 CAN/CSA-A3000-[98]-A5-[98], Portland Cement.

.2 American Society for Testing and Materials (ASTM)

.1 ASTM D 698-91, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft^3) (600kN-m/m^3).

1.2 MEASUREMENT PROCEDURES

.1 As per Unit Price Table.

1.3 REGULATIONS

.1 Shore and brace excavations, protect slopes and banks and perform all work in accordance with Provincial and Municipal regulations whichever is more stringent.

1.4 TESTS AND INSPECTIONS

.1 Do not begin backfilling or filling operations until material has been approved for use by Departmental Representative.

.2 Before commencing work, conduct with Departmental Representative a condition survey of the entire site including but not limited to existing structures, trees and other plants, lawns, fencing, service poles, wires, and paving, survey bench marks and monuments which may be affected by work.

1.5 BURIED SERVICES

.1 Before commencing work establish the location of all buried services on and adjacent to the site. Provide locate drawing of utilities to Departmental Representative.

.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 work area.

1.6 PROTECTION

.1 Keep excavations clean, free of standing water, and loose soil.

.2 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Departmental Representatives approval.

.3 Protect existing trees from damage.

.4 Protect buried services that are required to remain undisturbed.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Dispose of non-hazardous waste off site at an approved licensed facility.

.2 Dispose of hazardous materials at an approved licensed facility. Submit copies of original disposal manifest to Departmental Representative.

.3 Contain waste soil in such a manner as to not contaminate any surrounding soils (i.e. soil bags). Test and classify waste soil prior to disposal to determine proper disposal. Submit copies of original disposal manifest to Departmental Representative.

Part 2 Products

2.1 MATERIALS

.1 Granular A.

.2 Granular B.

.3 Materials acceptable to Departmental Representative.

Part 3 Execution

3.1 EXCAVATION

.1 Excavate trenches to provide uniform continuous bearing and support for thickness of pipe, bedding material on solid and undisturbed ground.

.2 Excavated Soils:

.1 Stockpile excavated soils in location designated by Departmental Representative.

.2 Cover excavated soils with impermeable membrane, min 60mil HDPE or similar.

.3 Place impermeable membrane under stockpiled soils, min 80mil HDPE or similar.

3.2 GRAVEL PAD & TANK PAD

.1 Prepare pad for office trailer, tanks and enclosures placed directly on the ground as indicated.

.2 Minimum pad thickness:150 mm thick.

.3 Material: Granular B.

.4 Compact using a mechanical compacting device.

.5 Pad must be smooth and free of sharp debris.

3.3 BACKFILLING

.1 Do not proceed with backfilling operations until completion of following:

.1 Departmental Representative has inspected and approved installations.

.2 Inspection, testing, approval, and recording location of underground utilities.

.3 Slopes are measured, calculated and approved.

.4 Removal of concrete formwork.

.5 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.

.2 Remove 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 Placing:

.1 Place backfill and fill material in 150 mm lifts.

.5 Compaction: compact each layer of material using a mechanical compacting device.

3.4 GRADING

.1 Grade finished surface so that water will drain to existing curb storm drains. Grade so that pools cannot form onsite.

3.5 SHORTAGE AND SURPLUS

.1 Supply all necessary fill to meet backfilling and grading requirements and with minimum and maximum rough grade variance.

.2 Dispose of surplus material off site.

END OF SECTION

Part 1 General

1.1 MEASUREMENT PROCEDURES

.1 Measure clearing and grubbing in hectares as per Unit Price Table.

1.2 STORAGE AND PROTECTION

.1 Prevent damage to natural features, bench marks, water courses.

.1 Repair any damaged items to approval of Departmental Representative.

Part 2 Products

2.1 MATERIALS

.1 Not used.

Part 3 Execution

3.1 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.

.3 Notify utility authorities before starting clearing and grubbing.

3.2 UNDERBRUSH CLEARING

.1 Clear underbrush from areas at ground level as directed by Departmental Representative.

3.3 GRUBBING

.1 Grub out stumps and roots as directed by Departmental Representative.

.2 Grub out visible rock fragments and boulders, greater than 300 mm in greatest dimension, but less than 0.25 m^3.

3.4 REMOVAL AND DISPOSAL

.1 Remove cleared and grubbed materials to clearing and grubbing disposal areas, as indicated:

.1 Dispose of vegetative material (trunks, branches, and leaves) free of roots and soil in the location indicated.

.2 Dispose of root material and soil in the location indicated.

3.5 FINISHED SURFACE

.1 Leave ground surface in condition suitable for grading and soil stripping operations to approval of Departmental Representative.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Materials and installation of polymeric geotextiles used in drainage structures purpose of which is to:

.1 Separate and prevent mixing of granular materials of different grading.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 33 36 33 – Utility Drainage Field (Infiltration Gallery)

1.3 MEASUREMENT PROCEDURES

.1 Measure geotextiles as lump sum in accordance with unit price table.

1.4 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)

.1 ASTM D4491-[99a], Standard Test Methods for Water Permeability of Geotextiles by Permittivity.

.2 ASTM D4595-[86(2001)], Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.

.3 ASTM D4751-[99a], Standard Test Method for Determining Apparent Opening Size of a Geotextile.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-148.1, Methods of Testing Geotextiles

.1 No.2-[M85], Methods of Testing Geosynthetics - Mass per Unit Area.

.2 No.3-[M85], Methods of Testing Geosynthetics - Thickness of Geotextiles.

.3 No.7.3-[92], Methods of Testing Geotextiles and Geomembranes - Grab Tensile Test for Geotextiles.

.4 No. 10-[94], Methods of Testing Geosynthetics - Geotextiles - Filtration Opening Size.

1.5 SUBMITTALS

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

.2 Submit to Departmental Representative following samples at least 4 weeks prior to beginning Work.

.1 Minimum length of 1 m of roll width of geotextile.

.3 Submit to Departmental Representative 2 copies of mill test data and certificate at least 4 weeks prior to start of Work, and in accordance with Section 01 33 00 - Submittal Procedures.

1.6 DELIVERY, STORAGE AND HANDLING

.1 During delivery and storage, protect geotextiles from direct sunlight, ultraviolet rays, excessive heat, mud, dirt, dust, debris and rodents.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Dispose of waste off site at an approved facility.

.2 Dispose of hazardous materials at an approved facility. Submit copies of disposal manifest to Departmental Representative.

.3 Contain waste soil in such a manner as to not contaminate any surrounding soils (i.e. soil bags). Test and classify waste soil prior to disposal to determine proper disposal. Submit copies of disposal manifest to Departmental Representative.

Part 2 Products

2.1 MATERIAL

.1 Geotextile: non-woven needle punched synthetic fibre fabric, supplied in rolls.

- .1 Width: 3 m minimum.
- .2 Length: 50 m minimum.
- .3 Composed of: minimum 95% by mass of polypropylene, polyethylene or polyester.

.2 Physical properties:

- .1 Thickness: 3 mm minimum.
- .2 Tensile strength and elongation (in any principal direction): to ASTM D4595.
  - .1 Tensile strength: minimum 660 N, wet condition.
  - .2 Elongation at break: minimum 50 %.

.3 Hydraulic properties:

- .1 Apparent opening size (AOS): to ASTM D4751, $\leq$ 600 micrometres.
- .2 Permittivity: to ASTM D4491, 0.5 pers.

Part 3 Execution

3.1 INSTALLATION

.1 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated and retain in position with edge of infiltration gallery.

.2 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.

.3 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile.

.4 Overlap each successive strip of geotextile 300 mm over previously laid strip.

.5 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.

.6 After installation, cover with overlying layer within 4 h of placement.

.7 Replace damaged or deteriorated geotextile to approval of Departmental Representative.

.8 Cover geotextile as indicated. Material to be approved by Departmental Representative. Do not compact.

3.2 CLEANING

.1 Remove construction debris from Project site and dispose of debris in an environmentally responsible and legal manner.

3.3 PROTECTION

.1 Vehicular traffic not permitted on geotextile.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDE

.1 Materials and installation for chain link fences and gates.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

1.3 MEASUREMENT PROCEDURES

.1 As per unit price table.

1.4 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).

- .1 ASTM A53/A53M-[02], Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
- .2 ASTM A90/A90M-[01], Standard Test Method for Weight [Mass] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.
- .3 ASTM A121-[99], Standard Specification for Zinc-Coated (Galvanized) Steel Barbed Wire.
- .4 A653/A653M-[03], Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .5 ASTM C618-[03], Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
- .6 ASTM F1664-[01], Standard Specification for Poly(Vinyl Chloride) (PVC)-Coated Steel Tension Wire Used with Chain-Link Fence.

.2 Canadian General Standards Board (CGSB).

- .1 CAN/CGSB-138.1-[96], Fabric for Chain Link Fence.
- .2 CAN/CGSB-138.2-[96], Steel Framework for Chain Link Fence.
- .3 CAN/CGSB-138.3-[96], Installation of Chain Link Fence.
- .4 CAN/CGSB-138.4-[96], Gates for Chain Link Fence.

.3 Canadian Standards Association (CSA International).

- .1 CAN/CSA-A23.1/A23.2-[00(August 2001)], Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.
- .2 CAN/CSA-G164-[M92(R2003)], Hot Dip Galvanizing of Irregularly Shaped Articles.
- .3 CAN/CSA-A3000-[98(R2002)], Cementitious Materials Compendium. Includes:
  - .1 CAN/CSA-A23.5-[98], Supplementary Cementing Materials

1.5 SUBMITTALS

.1 Submit insulation manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures. Include product characteristics, performance criteria, and limitations.

.2 Submit shop drawing of fence detail.

.1 indicate on shop drawing:

.1 location of one-man gate, two vehicle gate, terminal and corner posts

.2 location of line posts

.3 gate construction details

.4 location of bracing posts

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Dispose of waste materials and debris in accordance with Municipal and Provincial regulations.

.2 Recycle and reuse surplus materials and waste where possible and appropriate.

Part 2 Products

2.1 MATERIALS

.1 All materials shall conform to this Specification and the Canadian General Standards Board (CGSB) Specifications CAN/CGSB-138.1, CAN/CGSB-138.2 and CAN/CGSB-138.4. Where any contradictions occur, Specification CW 3550-R2 shall take precedence over CGSB Specifications.

.2 Terminal posts, comprising of end, gate, corner and straining posts shall be standard seamless, continuous weld, schedule 40 hot dip galvanized steel pipe weighing 11.28 kg per lineal metre. Posts shall be supplied with weatherproof caps. Tubing, conduit or open seam material will not be accepted.

.1 End, gate, corner and straining posts shall be of the lengths and dimensions:

.1 pipe diameter: 76.2 mm (3”).

.2 pipe length: 3200 mm (10.5’).

.3 diameter & depth of concrete pile: 300 mm (12”) x 1000 mm (40”).

.3 Line Posts.

.1 Line posts shall be supplied with weatherproof eye top caps to accommodate continuous horizontal top rail and shall be of the lengths and dimensions:

.1 pipe diameter: 51 mm (2”).

.2 pipe length: 3048 mm (10”).

.3 diameter & depth of concrete pile: 300mm (12”) x 1000mm (40”).

.4 Top and Bottom Rails. Top rails, or bottom rails where specified, shall be standard, continuous weld, schedule 40 hot dip galvanized steel pipe weighing 3.38 kg per lineal metre. Top rails shall be 3048 mm (10’) in length and have an outside diameter of not less than 39 mm (1 5/8”).

.5 Top and Bottom Rail Sleeve Couplings. Top and bottom rail sleeve couplings shall be schedule 40, hot dip galvanized steel pipe and manufactured specifically as a top/bottom rail sleeve coupling for chain link fencing.

.6 Fabric.

.1 Fabric shall be No. 10 gauge steel wire woven into a uniform 60 mm (2 3/8") diamond pattern mesh or as specified. Size of mesh shall be determined by measuring the minimum clear distance between the wires forming the parallel sides of the mesh. Permissible variation in size of mesh shall be 3 mm (1/8"). Diameter of wire shall be no less than 3.68 mm (0.145"). The top and bottom selvage shall be knuckled.

.2 Fabric shall be zinc coated before weaving by the hot dip process to an average mass per unit area of not less than 490 g/m^2.

.3 Mesh fabric shall not be excessively rough, or have blisters, sal ammoniac spots, bruises or flaking.

.4 Chain link fabric shall have a minimum tensile strength of 415 MPa.

.7 Bottom Tension Wire. Bottom tension wire shall be No. 6 gauge single strand galvanized steel wire.

.8 Turnbuckles. Where turnbuckles are specified, they shall be drop forged steel and be hot dip galvanized. The average overall length shall be approximately 300 mm, with ends in the closed position. Bolt diameter shall be 10 mm and shall be capable of taking up a minimum of 150 mm slack.

.9 Braces. Braces, shall be schedule 40 hot dip galvanized steel pipe, not less than 43 mm outside diameter and weigh 3.38 kg per lineal metre.

.10 Fittings and Accessories.

.1 Tension bars shall be 5 x 19 mm galvanized flat steel and not less than 50 mm shorter than the height of the fabric with which they are to be used.

.2 Tension bands shall be 3 x 19 mm galvanized flat steel c/w 8 x 32 mm galvanized carriage bolts and nuts.

.3 Brace bands shall be 3 x 19 mm galvanized flat steel c/w 8 x 32 mm galvanized carriage bolts and nuts to fasten top rail receptacles to terminal posts.

.4 Cut ends of tension bars shall be ground smooth to remove all sharp edges and burrs.

.5 Fabric clips shall be No. 9 gauge aluminum alloy wire.

.6 Weatherproof post tops/caps, receptacles, and fittings shall be of adequate strength and may be of aluminum alloy, malleable steel or pressed steel. All ferrous metals shall be hot dip galvanized.

.11 Concrete. Where concrete piles are specified for post installation, the concrete shall conform to CW 2160 and be sulphate resistant type 50, minimum compressive strength of 25 MPa at 28 days, air content of 4% - 7%, maximum slump of 80 mm and a maximum size of course aggregate of 40 mm.

Part 3 Execution

3.1 GRADING

.1 Remove debris and correct ground undulations along fence line to obtain smooth uniform gradient between posts.

.1 Provide clearance between bottom of fence and ground surface of 25 mm (1”) to 50 mm (2”).

3.2 ERECTION OF FENCE

.1 Erect fence along lines as indicated.

.2 Excavate post holes to dimensions indicated.

.3 Space line posts 10 ft apart, measured parallel to ground surface.

.4 Space straining posts where and as indicated.

.5 Install corner post where and as indicated.

.6 Install end posts at end of fence where and as indicated.

.1 Install gate posts on both sides of gate openings.

.7 Place concrete in post holes then embed posts into concrete as indicated.

.1 Extend concrete ½ inch (12.5 mm) above ground level and slope to drain away from posts.

.2 Brace to hold posts in plumb position and true to alignment and elevation until concrete has set.

.8 Do not install fence fabric until concrete has cured minimum of 5 days or as directed by consultant.

.9 Install brace between end and gate posts and nearest line post.

.1 Install braces on both sides of corner and straining posts in similar manner.

.10 Install overhang tops and caps.

.11 Install top rail between posts and fasten securely to posts and secure waterproof caps and overhang tops.

.12 Install bottom tension wire, stretch tightly and fasten securely to end, corner, gate and straining posts with turnbuckles and tension bar bands.

.13 Lay out fence fabric. Stretch tightly to tension recommended by manufacturer and fasten to end, corner, gate and straining posts with tension bar secured to post with tension bar bands.

.1 Knuckled selvedge at bottom.

.2 Twisted selvedge at top.

.14 Secure fabric to top rails, line posts and bottom tension wire with tie wires at 450 mm (18 inch) intervals.

.1 Give tie wires minimum two twists.

3.3 INSTALLATION OF GATES

.1 Install man-gates in locations as indicated.

.1 Width 6’.
.2 Gate latch.
.3 Chain for locking.
.4 Locks to be provided by owner.

.2 Install vehicle gates in locations as indicated.

.1 Width – 10’
.2 Gate latch.
.3 Chain for locking.
.4 Locks to be provided by owner.

.3 Level ground between gate posts and set gate bottom approximately 40 mm above ground surface.

.4 Install swing gates over 7’ long with a swing gate wheel.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Materials and installation for water pumping, water piping and water storage.

1.2 MEASUREMENT PROCEDURES

.1 Well pumps will be measured per well installation including all connection and materials.

.2 Transfer pumps will be measured per pump including all connections and materials.

.3 Water storage tanks will be measured as a separate lump sum for each individual storage tank.

.4 Air compressor will be measured as a lump sum including compressed air distribution lines and controls for wells.

.5 Water distribution, conveyance, controls including tank controls will be measured as a lump sum.

1.3 REFERENCES

.1 National Plumbing Code of Canada 2015.

.2 American National Standards Institute (ANSI)/American Society of Mechanical Engineers International (ASME)

1.4 PRODUCT DATA

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

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Dispose of non-hazardous waste off site at an approved licensed facility.

.2 Dispose of hazardous materials at an approved licensed facility. Submit original disposal manifests to Departmental Representative.

.3 Contain waste soil in such a manner as to not contaminate any surrounding soils (i.e. soil bags). Test and classify waste soil prior to disposal to determine proper disposal. Submit copies of disposal manifest to Departmental Representative.

Part 2 Products

2.1 EXTRACTION WELL PUMPS AND FITTINGS

.1 Type: pneumatic (air driven).

.2 Nominal Diameter: less than 60mm.

.3 Bottom loading.

.4 Flow rate: not less that 3 LPM at 7.6 m of pumping head.

.5 Sampling port as indicated.

.6 Air supply line in accordance with manufacturer's instructions.

.7 Air exhaust line in accordance with manufacturer's instructions.

.8 Water discharge line in accordance with manufacturer's instructions.

.9 Well seal assembly in accordance with manufacturer's instructions.

2.2 TRANSFER PUMPS

.1 Flow rate and pressure rating: minimum 20 L/min at 415 KPa.

.2 Two pumps: one duty, one standby.

.3 Provide dry-run protection float switch in the Pumped water storage tanks.

.1 Float switch.

.4 Air cooled or sealed.

.5 Fittings as indicated.

2.3 BACKWASH PUMP

.1 Flow rate and pressure rating: minimum 75 L/min at 415 KPa.

.2 Provide dry-run protection float switch in the Treated Water Storage tank.

.1 Float switch.

.3 Air cooled or sealed.

.4 Fittings as indicated.

2.4 FOUL BACKWASH PUMPS

.1 Flow rate and pressure rating: minimum 20 L/min at 415 KPa.

.2 Provide dry-run protection float switch in the Pumped Foul backwash water storage.

.1 Float switch.

.3 Air cooled or sealed.

.4 Fittings as indicated.

2.5 WATER PIPE

.1 Material: Polyethylene.

.2 Sizes: as indicated.

.3 Pressure Rating: min. 100 psi

2.6 COMPRESSED AIR SUPPLY AND HEADER

.1 Distribution Line Material: Polyethylene.

.2 Sizes: as indicated and as per manufacturer's instructions.

.3 Pressure: 670 Kpa (100 psi) max.

.4 Compressor rating: minimum 510 L/min (18 cfm ACFM) at 670 Kpa (100 psi).

.5 Extra Air Receiver Tank:

- .1 Volume – 190 L (60 US gallons).
- .2 Isolation ball valve.
- .3 Condensate release valve
- .4 Pressure relief valve.
- .5 Pressure gauge.
- .6 Control valve controlled by float switch in water storage tank as indicated.
  - .1 Solenoid valve.
  - .2 Float switch.

2.7 WATER STORAGE TANKS

.1 Material: High Density Polyethylene (HDPE).

.2 Tank clean and free from material that could increase contaminant concentrations in processed water or stored treated water or waste water.

.3 Pumped water storage.

- .1 Provide 5 tanks with isolation valves as indicated.
- .2 Total capacity per tank– 25,000 L
- .3 Fittings:
  - .1 Bulkhead fitting (factory installed) and gate valve at bottom, min 38 mm (1.5 in) National Pipe Thread, as indicated.
  - .2 Bulkhead fitting (factory installed) and gate valve at top, min size 38 mm (1.5 in) National Pipe Thread, as indicated.
  - .3 Bulkhead fitting (factory installed) and gate valve at top for venting, min size 100 mm (4 in) National Pipe Thread, as indicated.
- .4 Connect tank vents to Granular Activated Carbon filter
- .5 Provide overfill protection and high/low level alarms.
- .6 Control Float valve as indicated.

.4 Treated water storage.

- .1 Provide 1 tank with isolation valves as indicated.

.2 Total capacity – 25,000 L

.3 Fittings:

.1 Bulkhead fitting (factory installed) and gate valve at bottom, min 38 mm (1.5 in) National Pipe Thread, as indicated.

.2 Bulkhead fitting (factory installed) and gate valve at top, min 38 mm (1.5 in) National Pipe Thread, as indicated.

.3 Bulkhead fitting (factory installed) and gate valve at top for venting, min size 100 mm (4 in) National Pipe Thread, as indicated.

.4 Vent Tank to Atmosphere

.5 Provide overfill protection and high/low level alarms.

.5 Foul backwash water storage.

.1 Provide 2 tanks with isolation valves as indicated.

.2 Flow to be directed to each tank in sequence.

.3 Total capacity per tank – capacity to be determined by the contractor based on the backwash frequency and volume to hold the water in one tank until laboratory testing results are received.

.4 Discharges: comply with applicable discharge limitations and requirements; discharge to infiltration gallery if meeting the discharge guidelines or recirculate through the WTU. Do not discharge backwash water to Site sewer systems that do not conform to or are in violation of such limitations or requirements. Obtain Departmental Representative's approval prior to discharge of backwash water.

.5 Fittings:

.1 Bulkhead fitting (factory installed) and gate valve at bottom, min 38 mm (1.5 in) National Pipe Thread, as indicated.

.2 Bulkhead fitting (factory installed) and gate valve at top, min 38 mm (1.5 in) National Pipe Thread, as indicated.

.3 Bulkhead fitting (factory installed) and gate valve at top for venting, min size 100 mm (4 in) National Pipe Thread, as indicated.

.6 Vent Tank to Atmosphere.

2.8 FITTINGS

.1 Material: Brass or Plastic (polyethylene, polypropylene, Poly Vinyl Chloride).

.2 Valves:

.1 Material: brass or plastic.

.2 Sizes: as indicated.

.3 Type: as indicated.

.3 Sizes as indicated.

.4 Camlock: aluminum or polypropylene.

.5 Gear clamps or compression clamps: stainless steel.

.6 Any curried connections or valves shall be plastic (polyethylene, polypropylene, Poly Vinyl Chloride) or corrosion protected to prevent sulfur corrosion.

Part 3 Execution

3.1 INSTALLATION

.1 Lay piping on the ground.

- .1 Secure pipe in place using sandbags.
- .2 Protect pipes that cross the access road from being damaged by vehicle traffic.

.2 Joints:

- .1 Seal using pipe joint compound or Teflon tape rated for drinking water.
- .2 Joints free from solvent based primer or glue.

.3 Install in accordance with National Plumbing Code of Canada 2015.

.4 Piping cut square, reamed, and free of cuttings and foreign material.

.5 Install and connect fittings:

- .1 Insert barb where necessary and as indicated.
- .2 Threaded adapters, bushings and nipples where necessary and as indicated.
- .3 Couplings, elbows and tee’s where necessary and as indicated.

.6 Assemble piping using fittings manufactured to American National Standards Institute standards and in accordance with manufacturer's instructions.

3.2 PUMPS

.1 Install and connect well pumps in wells as indicated.

.2 Install and connect transfer and backwash pumps as indicated.

3.3 PRESSURE TESTING

.1 Conduct Pressure Testing on water lines

- .1 Between tanks and pumping wells.
- .2 Between tanks and treatment system.

.2 Procedure

- .1 Testing fluid: clean water.
- .2 Lines free from air or bubbles.
- .3 Pressure: 100 psi.
- .4 Criteria for compliance: maintains pressure within 5% for 60 mins.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Materials and installation for infiltration gallery

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 31 32 21 - Geotextiles.

1.3 MEASUREMENT PROCEDURES

.1 Measure infiltration gallery as Lump Sum in accordance with Price Table.

1.4 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA B137 Series-[02], 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).

.2 CSA B137.1-[02], Polyethylene Pipe, Tubing, and Fittings for Cold-Water Pressure Services.

.3 CSA B1800-[02], Plastic Non-pressure Pipe Compendium - B1800 Series (Consists of B181.1, B181.2, B181.3, B181.5, B182.1, B182.2, B182.4, B182.6, B182.7, B182.8 and B182.11).

.4 CSA B182.2-[02], PVC Sewer Pipe and Fittings (PSM Type).

1.5 SUBMITTALS

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

.2 Submit to Departmental Representative 20 kg samples of granular materials at least 4 weeks prior to beginning Work.

.3 Submit to Departmental Representative copy of certification or licence of approved installers.

1.6 QUALITY ASSURANCE

.1 Use installers experienced in the installation of subsurface disposal systems.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Dispose of non-hazardous waste off site at an approved licensed facility.

.2 Dispose of hazardous materials at an approved licensed facility. Submit original disposal manifests to Departmental Representative.

.3 Contain waste soil in such a manner as to not contaminate any surrounding soils (i.e. soil bags). Test and classify waste soil prior to disposal to determine proper disposal. Submit copies of disposal manifest to Departmental Representative.

Part 2 Products

2.1 GRANULAR MATERIALS

.1 Granular material to following requirements:

.1 19 mm Clear Stone with 40% void ratio.

2.2 GEOTEXTILE COVER

.1 Geotextile cover: to Section 31 32 21 - Geotextiles.

2.3 PIPE FOR DISPOSAL FIELDS

.1 Straight Poly Vinyl Chloride pipe and fittings to CAN/CSA-B182.2. Perforated or unperforated as indicated.

.2 Straight Polyethylene pipe and fittings, to CSA-B137.1. Unperforated as indicated.

2.4 SOURCE QUALITY CONTROL

.1 If requested, provide Departmental Representative with certified copies of factory tests of pipe material.

Part 3 Execution

3.1 EXCAVATED SOILS

.1 Stockpile excavated soils beside infiltration gallery on a liner as directed by Departmental Representative.

.2 Place excavated soils on top of final grade of infiltration gallery as indicated.

3.2 INFILTRATION GALLERY INSTALLATION

.1 Rough grade to depths as indicated.

.2 Drape geotextile along the sides of the excavation as indicated.

.3 Place 19 mm (3/4”) (depending on local availability) clear stone with 40% void ratio as indicated.

.4 Do not operate construction equipment on infiltration gallery.

.5 Install connection between treated water holding tank and infiltration gallery. Water-tight connection.

.6 Install header for distribution pipe: set level, and water-tight.

.7 Connect lengths and place distribution pipe on stone material with perforations facing downward and cover with minimum 75 mm depth of clear stone material as indicated.

.8 Place geotextile over stone as indicated with 300 mm overlap at the top.

.9 Connect each distribution pipe individually to header as indicated.

.10 Cap or plug free ends of distribution lines as indicated.

.11 Maintain slope on distribution pipes as indicated.

.12 Do not cover disposal field area until pipe grade and alignment have been approved by Departmental Representative.

.13 Cover infiltration gallery as indicated. Material to be approved by Departmental Representative. Do not compact. Overfill to allow for settlement.

.14 Grade areas surrounding infiltration gallery to provide for diversion of surface runoff waters.

END OF SECTION