Public Works and Government Services Canada

Requisition No. EZ899-161731/A

SPECIFICATIONS
for
Pacific Rim National Park Sewage Lagoon Rehabilitation
Ucluelet, BC

Project No. R.067787.001
November 2015

APPROVED BY:

A/REPM Nov. 17/2015.
Regional Manager, AES Date

Construction Safety Coordinator 2015-11-12
Date

TENDER:

Project Manager 15/11/17
Date

Real Property Services Branch, Professional and Technical Services, Pacific Region
#219 - 800 Burrard Street, Vancouver, B.C. V6Z 0B9

Ucluelet, BC

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PRIME CONSULTANT CIVIL ENGINEER	 6 Nov /15

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PART 1 - GENERAL

1.1 Location of Site

.1 The work is located along the Pacific Rim Highway, 13.5km from Ucluelet, BC.

.2 The site of work is in Pacific Rim National park, located on federal land.

1.2 General Description of Work

.1 Work under this contract covers sludge removal and rehabilitation of the sewage lagoon located in Pacific Rim National Park. The sewage lagoon was built in 1972 to service a washroom, visitor center, and restaurant located off of Wickanninish road. A vacuum truck is contracted to haul other sewage generated in the park to the lagoon. The sewage is trucked from areas along long beach, trail heads, Greenpoint campground, and the administrative buildings. The lagoon has had minimal maintenance since its construction and has experienced a decrease in its functionality.

.2 Work to be performed under this contract includes but is not limited to, the following items covered in the contract documents:

.1 Remove, dewater, and dispose approximately 3050 m^3 of sludge from existing facultative cell.

.1 Clear, grub, and grade an area for the Geotubes to be placed.

.2 Supply and install dewatering Geotubes as required.

.3 Introduce a polymer to the slurry line prior to entering the Geotube to act as a flocculent and coagulant.

.4 Measure flow rates and volume pumped to the dewatering tubes with a flow meter.

.5 Sub-Contractor specializing in lagoon dewatering with Geotubes to be retained. Credentials and experience to be submitted along with bid submission. Valid Construction Safety Certificate of Recognition (COR) required.

.5 Repair sections of the berm to the original elevation.

.6 Armour berm at overflow and outflow locations.

.7 Replace dual 100mm overflow pipes with weir.

.8 Replace/Renovate the dosing and overflow system to the exfiltration lagoon.

.9 Construct sanitary truck dump station complete with trash rack and splash pad.

.10 Replace existing fencing with a new wildlife exclusion fence – wire mesh to BC MOTI **plus** offset 6-wire solar powered electric.

.1 Supply and installation of electric wire fence components to be done by a company specialized in electric fence installations.

.11 Clear a 4m wide ROW along 1.7 km of existing forcemain.

.12 Prepare site access road surface for paving.

.13 Clear lagoon perimeter to a distance of 4m beyond the existing chain link fence.

.3 Elements of Work not required to obtain Substantial Completion that are unable to be completed within the project schedule due to environmental concerns to be completed after June 15, 2015. An appropriate holdback will be retained. Possible elements include, but are not limited to:

.1 Chipping cleared and grubbed material along the forcemain right-of-way.

.2 Clearing and Grubbing sections of forcemain within sensitive areas within or adjacent to bogs and waterways.

1.3 Related Sections

.1 Section 01 35 33 – Health and Safety Requirements.

1.4 Codes and Standards

.1 Meet or exceed requirements of specified standards, codes and referenced documents.

1.5 Required Documents

.1 Maintain one copy at job site:

- .1 Contract drawings, Safety Plan and Waste Reduction Workplan.
- .2 Specifications.
- .3 Addenda
- .4 Change orders
- .5 Other modifications to contract
- .6 Copy of approved work schedule
- .7 Health and Safety plan.
- .8 Environmental Emergency Response Plan (including Spill Response Plan)

1.6 Drawings

.1 Contract Drawings:

- .1 Following contract award, four (4) full size sets of the drawings will be provided.

.2 Record Drawings:

- .1 Two sets of drawings and specifications will be provided for as-built purposes. Maintain accurate records on one set. At Substantial Completion, transfer all notations to the other set and submit it to the Departmental Representative.
- .2 Production of CAD Record Drawings not included within Contract.

1.7 Site Condition

.1 Make inquiries or investigations necessary to become thoroughly acquainted with site, soil, surface, stream and road access conditions, and the nature and extent of the work.

.2 Submission of a tender will be deemed confirmation that the Contractor is acquainted with the site and is conversant with all relevant conditions.

1.8 Ground Condition Data

.1 The Departmental Representative has no detailed ground condition data for this site.

.2 See Appendix A for the relevant Geotechnical Assessment Report.

1.9 Layout of Work

.1 Construction layout is the responsibility of Contractor.

.2 Point Files and survey data will be made available by the Departmental Representative.

.3 Notify Departmental Representative immediately if the work cannot be completed as shown in the plans and specifications.

1.10 Sequencing of Work

.1 Within 15 days of Contract award, Contractor to submit to the Departmental Representative for approval a plan clearly indicating proposed sequencing of Work.

.1 Include documents submittals warning Departmental Representative of forthcoming activities.

.2 Sequencing to ensure that full sanitary service is maintained to all areas affected by the Work throughout the duration of the project.

.3 Whenever a variation from the schedule in excess of 5 working days occurs or is expected to occur, request approval from Departmental Representative for the change in writing.

1.11 Assistance by the Contractor

.1 Provide access to the work areas as required for the Departmental Representative to perform their duties.

1.12 Time of Completion

.1 Complete all work, including all required submittals, under the contract within sixteen (16) weeks of award.

1.13 Use of Site

.1 Use of site is limited to work areas required for the work, including the storage of materials and equipment and to the access routes assigned by the Departmental Representative required for the completion of work as specified. Access keys will be provided to the contractor as required.

.2 Hours of work to comply with local bylaws.

.1 Perform work during normal hours, Monday to Friday, except holidays.

.2 Work may be performed after working hours, on weekends and holidays as approved by Departmental Representative.

1.15 Project Meetings

.1 The Departmental Representative will arrange project meetings and assume responsibility for setting times and recording and distributing minutes.

1.16 Location of Equipment and Fixtures

.1 Location of existing equipment and fixtures indicated or specified is to be considered as approximate.

1.17 Inspection Services

.1 Inspections will be carried out by Departmental Representative.

.2 Where inspections reveal that work is not in accordance with the contract requirements, additional inspections to confirm acceptability of the corrected work will be conducted at the expense of the Contractor.

1.18 Interpretation

.1 In interpreting the Contract, in the event of discrepancies or conflicts between anything in the Plans and Specifications and the General Conditions, the General Conditions govern.

.2 In interpreting the Plans and Specifications, in the event of discrepancies or conflicts between:

- .1 The Plans and Specifications, the Specifications govern;
- .2 The Plans, the Plans drawn with the largest scale govern; and
- .3 Figured dimensions and scaled dimensions, the figured dimensions govern.

1.19 Safe Companies Certification

.1 The Contractor must ensure that all works are performed by contractors who:

- .1 Have current WCB registration and clearance;
- .2 Have required WHIMIS training;
- .3 Have a Construction Safety Certificate of Recognition (COR)

END OF SECTION

PART 1 - GENERAL

1.1 General Information

.1 An assessment of the Pacific Rim National Park Sewage Lagoon was commissioned in 2015. A sludge survey estimated that approximately 3050 m^3 of wet volume sludge was contained within the facultative cell. This survey is included in the Appendices. Dewatering to be done using a floating dredge and Geotube technology. Sludge removed from the lagoon shall be dewatered and left onsite in the Geotubes.

1.2 References

.1 American Society for Testing and Materials International (ASTM)
- .1 ASTM D737, Air Flow
- .2 ASTM D3786, Mullen Burst Strength
- .3 ASTM D4355, UV Resistance
- .4 ASTM D4491, Water Flow Rate
- .5 ASTM D4533, Trapezoid Tear Strength
- .6 ASTM D4595, Wide Width Tensile Strength and Elongation
- .7 ASTM D4632, Grab Tensile Strength
- .8 ASTM D4751, Apparent Opening Size (AOS)
- .9 ASTM D4833, Puncture Strength
- .5 ASTM D4884, Factory Seam Strength
- .6 ASTM D5199, Thickness
- .7 ASTM D5261, Mass/Unit Area
- .8 ASTM D6241, CBR Puncture Strength
- .9 ASTM D6767, Pore Size Distribution

1.3 Related Sections

.1 01 35 33 - Health and Safety Requirements

.2 01 35 43 - Environmental Procedure

.3 01 74 21 – Construction/Demolition Waste Management and Disposal

1.4 Submittals

.1 Submit all required documentation in accordance with Section 01 33 00 – Submittal Procedures.

.2 Submit a Sludge Removal and Dewatering Plan with the bid documents.

.3 Shop drawings shall include, but not be limited to site plan, dewatering containment pad, connection details, manifold, Geotube container and piping layout, and polymer injection.

.4 All Geotube containers and ancillary products shall be the standard product of a manufacturer that has regularly engaged in the integral design, manufacture, and fabrication of the products, and whose product has been proven reliable in similar service for 5 years. The Geotube container manufacturer to be ISO 9001 certified. Quality Assurance from testing lab with A2LA accreditation required. Material to be inert to biological degradation and resistant to naturally encountered chemicals, alkalis, and acids.

.5 Contaminant Prevention Plan identifying potentially hazardous substances to be used during completion of the Work and intended actions to prevent introduction of such materials into air, water, or ground.

.6 Wastewater Management Plan identifying methods and procedures for managing discharge of wastewaters resulting from any activity.

.7 Final Cake: Contractor provided documentation using third party accredited laboratory

1.5 Drainage

.1 Storm Water Pollution Prevention Plan to supplement the Erosion and Sediment Control Plan.

.2 As required, provide temporary drainage and install temporary pumps to keep excavations and site free from water.

.3 Ensure all water pumped into waterways, sewers, or drainage systems is free of contaminants and suspended materials.

.4 Ensure all water or runoff containing contaminants or suspended materials is disposed of in accordance with local authorities.

PART 2 - EXECUTION

2.1 Sludge Extraction and Dewatering

.1 Contractor is responsible for pumping off excess water if necessary to access sludge blanket.

.2 Contractor shall ensure adequate mixing of sludge blanket to obtain a sufficient solids content for pumping.

.3 The use of slurry pumps and a dredge are expected to be necessary to facilitate mixing and removal of sludge over the total bottom area of the lagoon.

.4 Any freeboard and/or excess water is to be pumped to the adjacent Exfiltration Cell.

.5 Mobilization, de-mobilization, set-up, assembling and dismantling of pumps, piping and/or hoses, wash equipment, placement and removal of dredger in and out of cell, dewatered liquid management and all associated works is included.

.6 Contractor to furnish fully working package to confirm quantities, sample and test, extract, process, and dewater all solids in the lagoon cell.

.7 Contractor shall furnish all labour, materials, equipment, polymer feed system, and incidentals as shown, specified, and required in connection with sludge feed from Facultative Cell and filling of Geotube.

.8 The existing clay liner in the Facultative Cell must remain intact. Any damage to the clay liner must be repaired by the Contractor to the satisfaction of the Departmental Representative.

.9 The Geotube dewatering system shall be installed on a pad (gravel, sand, and sheet as per Manufacturer's Recommendations) in the Exfiltration Cell area. Contractor shall furnish the Geotube container with maximum slope 1% for the first 33m not to exceed 0.5% in the overall length direction of the Geotube.

.10 Sludge Pumping by Self-propelled Dredge procedure shall allow for compacted higher concentration sludge to the Geotube.

.11 The Contractor shall make necessary changes to the dewatered liquid stream containment and disposal system to promote even

dispersal throughout the Exfiltration Cell area. No additional payment shall be made by the Departmental Representative for managing dewatered liquid.

END OF SECTION

PART 1 - GENERAL

1.1 Administrative

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

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

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

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

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

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

.7 The review of the Environmental Emergency Response Plan by Departmental Representative is for sole purpose of ascertaining conformance with general concept.

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

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

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

1.2 Submittals

.1 Allow 5 days for Departmental Representative's review of each submission.

.2 Adjustments made to submitted plans 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.

.3 Make changes to submitted plan as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.

.4 Accompany submissions with transmittal letter, in duplicate, containing:

- .1 Date.
- .2 Project title and number.
- .3 Contractor's name and address.
- .4 Identification and quantity of each shop drawing, product data and sample.
- .5 Other pertinent data.

.5 Submissions shall include:

- .1 Date and revision dates.
- .2 Project title and number.
- .3 Name and address of:
  - .1 Subcontractor.
  - .2 Supplier.
  - .3 Manufacturer.
- .4 Contractor's stamp, signed by Contractor's authorized representative, certifying approval of submissions, verification of field measurements and compliance with Contract documents.

.5 Details of appropriate portions of work as applicable:

.1 Fabrication.

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

.3 Setting or erection details.

.4 Capacities.

.5 Performance characteristics.

.6 Standards.

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

.6 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, Work may proceed. If submitted plan is rejected, noted copy will be returned and resubmission of corrected plan, through same procedure indicated above, must be performed before Work may proceed.

.7 All submissions to be made electronically in Adobe Acrobat ".PDF" format.

1.3 Certificates and Transcripts

.1 Immediately after award of Contract, submit Workers' Compensation Board status.

1.4 Shop Drawings

.1 Shop drawings: original drawings or modified standard drawings provided by Contractor to illustrate details of portions of work which are specific to project requirements and/or as requested by the Department Representative.

.1 Format, as directed by the Department Representative

.1 Electronically in Adobe Acrobat ".PDF" format.

.2 6 prints, maximum size: 850 x 1050 mm.

.2 Cross-reference shop drawing information to applicable portions of the Contract documents.

1.5 Shop Drawings Review

.1 Review of shop drawings by Department Representative is for the

sole purpose of ascertaining conformance with the general concept.

.2 This review shall not mean that the Department Representative approves the detail design inherent in the shop drawings, responsibility for which shall remain with Contractor submitting same.

.3 This review shall not relieve the Contractor of responsibility for errors or omissions in the shop drawings or of responsibility for meeting all requirements of the construction and Contract documents.

.4 Without restricting the generality of the foregoing, the Contractor is responsible for:

.1 Dimensions to be confirmed and correlated at the job site.

.2 Information that pertains solely to the fabrication processes or to techniques of construction and installation.

.3 Coordination of the work of all the sub-trades.

1.6 Product Data

.1 Product data: manufacturers' catalogue sheets, MSDS sheets, brochures, literature, performance charts and diagrams, used to illustrate standard manufactured products or any other specified information.

.2 Delete information not applicable to project.

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

.4 Cross-reference product data information to applicable portions of Contract documents.

.5 Submit electronic PDF copies of product data.

1.7 Samples

.1 Samples: examples of materials, equipment, quality, finishes and workmanship.

.2 Reviewed and accepted samples will become the standard of workmanship and material against which installed work will be verified.

END OF SECTION

1.1 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) Falsework for Construction Purposes

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

.4 Province of British Columbia:

.1 Workers Compensation Act Part 3-Occupational Health and Safety.

.2 Occupational Health and Safety Regulation

1.2 Related Sections

.1 Refer to the following sections as required:

.1 General Instructions: Section 01 11 05

.2 Demolition for Minor Works: Section 02 41 99

.3 Earthworks for Minor Works: Section 31 00 99

1.3 Workers' 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.

1.4 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.

1.5 Submittals

.1 Submit to Departmental Representative submittals listed for review in accordance with Section 01 33 00 – Submittal Procedures.

.2 Work effected by submittal shall 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 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 shall 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.

1.6 Responsibility

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

.2 Comply with and enforce compliance by employees with safety requirements of Contract documents, applicable Federal, Provincial, Territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

.3 The Contractor is to assume the role of the "prime contractor" for the duration of the job

1.7 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.

1.8 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.

1.9 Filing of Notice

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

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

1.10 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 Inspection policy and procedures.

.7 Incident reporting and investigation policy and procedures.

.8 Occupational Health and Safety Committee/ Representative procedures.

.9 Occupational Health and Safety meetings.

.10 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 on site 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) shall 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.

1.11 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.

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

.1 Work at high angles.

.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.

.6 Workplaces where there are persons who require physical assistance to be moved.

.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.

1.12 Hazardous Products

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials, and regarding labelling 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 per Section 01 33 00.

.2 In conjunction with Departmental Representative, schedule to carry out work during "off hours" when tenants have left the building.

.3 Provide adequate means of ventilation in accordance with Section 01 51 00.

1.13 Fire Safety Requirements

.1 Store oily/paint-soaked rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.

.2 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.

1.14 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.

1.15 Posted Documents

.1 Post legible versions of the following documents on site:

.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) on site, 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 approved by the Departmental Representative.

1.16 Meetings

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

1.17 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".

END OF SECTION

PART 1 - GENERAL

1.1 Environmental Factors

.1 Ensure that operations meet all applicable environmental regulations and standards.

.2 Ensure no storm water runoff from the site of a deleterious nature is released into any storm sewers or water courses.

1.2 Disposal of Wastes

.1 Do not bury rubbish on site.

.2 Raw or uncured waste concrete must not be disposed of on site.

1.3 Fires

.1 Fires and burning on site is not permitted.

1.4 Work Adjacent to Waterways

.1 Do not operate construction equipment in waterways.

.2 Do not dump any waste material or debris in waterways.

1.5 Pollution Control

.1 Ensure all equipment is in proper working order.

.2 Control emissions from equipment to local authorities' emission requirements.

.3 Spill kits and containment materials must be maintained on-site and ready for deployment in case of spills.

.1 Spills kits are to contain sufficient quantities of absorbent material on site in close proximity to working machinery.

.2 During the work, there is to be trained and qualified personnel on site that ready to deploy spill kits when necessary.

.4 Equipment such as concrete mixers, wheel barrows, shovels, trowels and other tools used for cast in place concrete work should only be cleaned in areas approved by project manager. Cleaning equipment in or directly adjacent to any watercourse or intertidal area is prohibited

.5 If concrete wash water is produced during clean-up activities, it should be contained on site to allow sediment to settle out and to reach a neutral pH before being released to the environment

(typically 48 hours).

1.6 Submittals

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

.2 Submit an Environmental Emergency Response Plan, including spill response plan, to Department Representative for approval.

PART 2 - EXECUTION

2.1 Work Procedures

.1 Prior to the start of the work, the Environmental Response Plan is to be submitted to the Departmental Representative as per Section 01 33 00.

.2 Work on site will be conducted in accordance with the plans and specifications, the Environmental Response Plan and all other applicable regulations.

.3 Work on site to comply with the Environmental Effects Evaluation (EEE) Report. See Appendices.

.4 Clearly mark work areas and construction materials storage areas. The Contractor shall ensure that the environment beyond the work limits is not negatively impacted or damaged by workers' vehicles or construction machinery and shall instruct workers so that the "footprint" of the project is kept within defined boundaries

.5 Frequent communication and reporting between the Environmental Monitor, Crew Supervisor, Parks Canada staff, and Project Crew to identify issues, avoid delays, and to anticipate upcoming works is required. A pre-work meeting with all staff, Parks Canada representative(s), and the EM is mandatory to identify the requirements of the Environmental Protection Plan, and to discuss Emergency Response Plans. As well, a daily onsite meeting prior to the commencement of work (concurrent with the safety meeting) is recommended.

.6 Prior to the commencement of work, all areas to be cleared will be

walked by the Departmental Representative and Construction Supervisor to identify any environmental resources that need to be protected.

.7 Frequent communication and reporting between the Environmental Monitor

.8 Grubbing will be suspended during and immediately after intense rainstorms that have resulted in excessive run-off.

.9 All stockpiles of grubbed material within the specified clearing limits will be located so as not to obstruct the access or work of others or natural drainage patterns

.10 If significant historical or archaeological artefacts, black greasy soils containing shell fragments, or human remains are discovered, STOP WORK, report it immediately to the Departmental Representative, or Banff Dispatch at (403) 762-1473 and wait for instructions before proceeding with work.

END OF SECTION

1.1 Sections Include

.1 Inspection and testing, administrative and enforcement requirements.

.2 Equipment and system adjust and balance.

1.2 Related Sections

.1 Section 01 33 00 – Submittal Procedures.

.2 Section 01 78 00 – Closeout Submittals

1.3 Inspection

.1 Allow the Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.

.2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by the Departmental Representative instructions, or law of Place of Work.

.3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.

.4 Departmental Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction.

1.4 Independent Inspection Agencies

.1 Independent Inspection/ Testing Agencies will be engaged by the Departmental Representative for purpose of inspecting and/ or testing portions of Work. Cost of such services will be borne by Departmental Representative.

.2 Provide equipment required for executing inspection and testing by appointed agencies.

.3 Employment of inspection/ testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.

.4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain

full degree of defect. Correct defect and irregularities as advised by the Departmental Representative at no cost to the Departmental Representative. Pay costs for retesting and reinspection.

1.5 Access to Work

.1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.

.2 Co-operate to provide reasonable facilities for such access.

1.6 Procedure

.1 Notify appropriate agency and the Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.

.2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.

.3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.7 Rejected Work

.1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by the Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

.2 Make good other Contractor's work damaged by such removals or replacements promptly.

.3 If in opinion of the Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by the Departmental Representative.

1.8 Reports

.1 Submit inspection and test reports to the Departmental Representative in accordance with Section 01 33 00.

1.9 Equipment and Systems

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

.2 Mechanical – coordinate with mechanical division.

.3 Electrical – Coordinate with electrical division.

END OF SECTION

PART 1 - GENERAL

1.1 Related Sections	.1	Section 01 33 00 – Submittal Procedures.
	.2	Section 01 35 43 – Environmental Procedures.
1.2 Submittals	.1	Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
1.3 Installation and Removal	.1	Provide temporary utilities controls and trailers necessary in order to execute work expeditiously.
	.2	Remove from site all such work after use.
1.4 Dewatering	.1	Provide temporary drainage and pumping facilities to keep excavations and site free from standing water.
1.5 Water Supply	.1	Potable water for construction use will not be provided by PWGSC.
	.2	Arrange for connection with appropriate utility company and pay costs for installation, maintenance and removal.
1.6 Temporary Communication Facilities	.1	Provide and pay for any temporary telephone, fax, data hook up, lines, and equipment necessary for own use.
1.7 Fire Protection	.1	Provide and maintain temporary fire protection equipment during performance of Work required by governing codes, regulations and bylaws.
	.2	Burning rubbish and construction waste materials is not permitted on site.
1.8 Sanitary Facilities	.1	Provide, pay, and maintain for sanitary facilities for the duration of the work.

PART 2 - EXECUTION

2.1 Temporary Erosion and Sedimentation Control

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

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

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

END OF SECTION

1.1 References

.1 Departmental Representative's identification of existing survey control points and property limits.

1.2 Qualifications of Surveyor

.1 Professional surveyor acceptable to Departmental Representative.

.2 Employed by recognized land survey or engineering firm.

1.3 Survey Reference Points

.1 Existing base horizontal and vertical control points are designated on drawings.

.2 Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.

.3 Make no changes or relocations without prior written notice to Departmental Representative.

.4 Report to Departmental Representative when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

.5 Require surveyor to replace control points in accordance with original survey control

1.4 Survey Requirements

.1 Establish lines and levels, locate and lay out, by instrumentation.

.2 Stake for grading, fill placement.

.3 Establish pipe invert elevations.

.4 Establish lines and levels for all mechanical work.

1.6 Existing Services

.1 Before commencing work, establish location and extent of service lines in area of Work and notify Departmental Representative of findings.

.2 Remove abandoned service lines within 2 m of structures. Cap or otherwise seal lines at cut-off points as directed by Departmental Representative.

1.7 Location of Equipment and Fixtures

.1 Location of equipment, fixtures, and outlets indicated or specified are to be considered as approximate.

.2 Locate equipment, fixtures, and distribution systems to provide minimum interference and to maximize useable space in accordance with manufacturer's recommendations for safety, access, and maintenance.

.3 Inform Departmental Representative of impending installation and obtain approval for actual location.

.4 Submit field drawings to indicate relative position of various services and equipment when required by Departmental Representative.

1.8 Records

.1 Maintain a complete, accurate log of control and survey work as it progresses.

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

1.9 Submittals

.1 Submit all required documentation in accordance with Section 01 33 00.

.2 Submit name and address of Surveyor to Departmental Representative.

END OF SECTION

PART 1 - GENERAL

1.1 Waste Management Goals

.1 Prior to start of Work, submit for approval a written Waste Management plan to the Department Representative. Approval must be obtained prior to beginning onsite work.

.2 Accomplish maximum control of solid construction waste.

.3 Preserve environment and prevent pollution and environment damage.

1.2 Related Sections

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

.2 Section 32 31 25 – Wire-Fences and Gates.

.3 Section 33 05 13 – Manholes and Catch Basin Structures

1.3 Definitions

.1 Inert Fill: inert waste – exclusively asphalt and concrete.

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

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

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

.5 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

.6 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:

.1 Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.

.2 Returning reusable items including pallets or unused products to vendors.

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

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

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

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

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

1.4 Documents

.1 Maintain at job site, one copy of following documents:

.1 Waste Audit

.2 Waste Reduction Workplan

.3 Material Source Separation Plan.

.4 Schedules A & B completed for project

1.5 Submittals

.1 Submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Prepare and submit following prior to project start up:

.1 Submit 2 copies of completed Waste Audit (WA): Schedule A.

.2 Submit 2 copies of completed Waste Reduction Workplan (WRW): Schedule B.

.3 Submit 2 copies of Materials Source Separation Program (MSSP) description.

1.6 Waste Audit (WA)

.1 Conduct WA prior to project start-up.

.2 Prepare WA: Schedule A.

.3 Record, on WA – Schedule A, extent to which materials or products used consist of recycled or reused materials or products.

1.7 Waste Reduction Workplan (WRW)

.1 Prepare WRW prior to project start-up.

.2 WRW should include but not limited to:

- .1 Destination of materials listed.
- .2 Deconstruction/disassembly techniques and sequencing.
- .3 Schedule for deconstruction/disassembly.
- .4 Location.
- .5 Security.
- .6 Protection.
- .7 Clear labelling of storage areas.
- .8 Details on materials handling and removal procedures.
- .9 Quantities for materials to be salvaged for reuse or recycled and materials sent to landfill.

.3 Structure WRW to prioritize actions and follow 3R's hierarchy, with Reduction as first priority, followed by Reuse, then Recycle.

.4 Describe management of waste.

.5 Identify opportunities for reduction, reuse, and recycling of materials. Based on information acquired from WA.

.6 Post WRW or summary where workers at site are able to review content.

.7 Set realistic goals for waste reduction, recognize existing barriers and develop strategies to overcome these barriers.

.8 Monitor and report on waste reduction by documenting total volume and cost of actual waste removed from project.

1.8 Materials Source Separation Program (MSSP)

.1 Prepare MSSP and have ready for use prior to project start-up.

.2 Implement MSSP for waste generated on project in compliance with approved methods as reviewed by Departmental Representative.

.3 Provide on-site facilities for collection, handling, and storage of anticipated quantities of reusable and recyclable materials.

.4 Provide containers to deposit reusable and recyclable materials.

.5 Locate containers in locations, to facilitate deposit of materials without hindering daily operations.

.6 Locate separated material[s] in area[s] which minimize material damage.

.7 Collect, handle, store on-site, and transport off-site, salvaged materials in separate condition.

.1 Transport to approved and authorized recycling facility.

1.9 Storage, Handling And Protection

.1 Store, materials to be reused, recycled and salvaged in locations as directed by Departmental Representative.

.2 Unless specified otherwise, materials for removal become Contractor's property.

.3 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.

.4 Protect structural components not removed for demolition from movement or damage.

.5 Protect surface drainage, mechanical and electrical from damage and blockage.

.6 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.

.1 On-site source separation is recommended.

.2 Provide waybills for separated materials.

1.10 Disposal Of Wastes

.1 Do not bury rubbish or waste materials.

.2 Do not dispose of waste into waterways, storm, or sanitary sewers.

.3 Keep records of construction waste including:

.1 Number and size of bins.

.2 Waste type of each bin.

.3 Total tonnage generated.

.4 Tonnage reused or recycled.

.5 Reused or recycled waste destination.

.4 Remove materials from deconstruction as deconstruction/ disassembly Work progresses.

.5 Prepare project summary to verify destination and quantities on a material-by-material basis as identified in pre-demolition material audit.

1.11 Use Of Site And Facilities

.1 Execute work with least possible interference or disturbance to normal use of premises.

.2 Maintain security measures established by existing facility.

1.12 Scheduling

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

1.13 Application

.1 Do Work in compliance with WRW.

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

1.14 Cleaning

.1 Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.

.2 Clean-up work area as work progresses.

.3 Source separate materials to be reused/ recycled into specified sort areas.

1.15 Diversion of Materials

.1 From following list, separate materials from general waste stream and stockpile in separate piles or containers, as reviewed by Departmental Representative, and consistent with applicable fire regulations.

.1 Mark containers or stockpile areas.

.2 Provide instruction on disposal practices.

.2 On-site sale of materials IS NOT permitted.

.3 Demolition Waste:

Material Type	Recommended Diversion %	Actual Diversion %
Metals	100	
Rubble	100	
Wood (uncontaminated)	100	
Other		

.4 Construction Waste:

Material Type	Recommended Diversion %	Actual Diversion %
Cardboard	100	
Plastic Packaging	100	
Rubble	100	
Steel	100	
Wood (uncontaminated)	100	
Other		

1.16 Waste Audit .1 Schedule A – Waste Audit (WA):

Material Category	Material Quantity Unit	Estimated Waste %	Total Quantity of Waste (unit)	Generation Point	% Recycled	% Reused

1.17 Waste Reduction Workplan .1 Schedule B.

(1) Material Category	(2) Person(s) Responsible	(3) Total Quantity of Waste (unit)	(4) Reused Amount (units) Projected Actual	(5) Recycled Amount (unit) Project Actual	(6) Material Destination
Wood and Plastics Material Description					
Chutes					
Warped Pallet Forms					
Plastic Packaging					
Cardboard Packaging					
Wood					
Metal					
Other					

END OF SECTION

1.1 Related Sections

.1 Section 01 33 00 – Submittal Procedures.

.2 Section 01 78 00 – Closeout Submittals.

1.2 References

Not Applicable

1.3 Substantial Completion Inspection and Declaration Procedures

.1 Acceptance of Work Procedures:

.1 Notify the Departmental Representative in writing of satisfactory completion claim and request the Departmental Representative's inspection. A minimum of 7 days notice is required.

.2 Department Representative will complete an inspection and prepare a list of deficiencies and/or outstanding work.

.2 Completion Tasks: submit written certificates in English that deficiency tasks have been performed as follows:

.1 Work: completed and inspected for compliance with Contract Documents.

.2 Defects: corrected and deficiencies completed.

.3 Operation of systems: demonstrated to required personnel.

.4 Work: complete and ready for Final Inspection.

.3 Final Inspection:

.1 When completion tasks are done, request final inspection of Work by the Departmental Representative, and Contractor.

.2 When Work incomplete according to Departmental Representative.

.1 Complete outstanding items and request re-inspection.

.2 Incur all costs for re-inspection, including travel time for Department Representative.

.3 Declaration of Substantial Performance: when the Departmental Representative considers deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.

1.4 Final Cleaning

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Work site landscaping to be reinstated to pre-existing conditions or better.

.3 Waste Management: separate waste materials for reuse and recycling.

1.5 Total Performance Inspection and Declaration Procedures

.1 Acceptance of Work Procedures:

.1 Notify the Departmental Representative in writing of satisfactory completion claim and request the Departmental Representative's inspection.

.2 Department Representative will complete an inspection and prepare a list of deficiencies and/or outstanding work.

.2 Completion Tasks: submit written certificates in English that deficiency tasks have been performed as follows:

.1 Work: completed and inspected for compliance with Contract Documents.

.2 Defects: corrected and deficiencies completed.

.3 Final Inspection:

.1 When completion tasks are done, request final inspection of Work by the Departmental Representative, and Contractor.

.2 When Work incomplete according to Departmental Representative.

.1 Complete outstanding items and request re-inspection.

.2 Incur all costs for re-inspection, including travel time for Department Representative.

.3 Declaration of Total Performance: when the Departmental Representative considers deficiencies and defects corrected and requirements of Contract totally performed.

END OF SECTION

PART 1 - GENERAL

1.1 Related Requirements

.1 01 13 82 – Sludge Management
.2 03 30 00 – Cast-In-Place Concrete
.3 32 31 26 – Wire Fences and Gates
.4 33 05 13 – Manholes and Catch Basin Structures

1.2 Action and Informational Submittals

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
.2 Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, four final copies of operating and maintenance manuals in English.
.3 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.
.4 Provide evidence, if requested, for type, source and quality of products supplied.

1.3 Format

.1 Organize data as instructional manual.
.2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.
.3 When multiple binders are used correlate data into related consistent groupings.
    .1 Identify contents of each binder on spine.
.4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
.5 Arrange content by systems (i.e. utilities, controls) under Section numbers and sequence of Table of Contents.
.6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
.7 Text: manufacturer's printed data, or typewritten data.
.8 Drawings: provide with reinforced punched binder tab.

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

.9 Provide Record Drawings and Final Survey data.

1.4 Contents – Project Record Documents

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

.1 Date of submission; names.

.2 Addresses, and telephone numbers of Department Representative and Contractor with name of responsible parties.

.3 Schedule of products and systems, indexed to content of volume.

.2 For each product or system:

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

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

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

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

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

1.5 As Built Documents And Samples

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

.1 Contract Drawings.

.2 Specifications.

.3 Addenda.

.4 Change Orders and other modifications to Contract.

.5 Reviewed shop drawings, product data, and samples.

.6 Field test records.

.7 Inspection certificates.

.8 Manufacturer's certificates.

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

.1 Provide files, racks, and secure storage.

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

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

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

.1 Do not use record documents for construction purposes.

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

1.6 Recording Information On Project Record Documents

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

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

.3 Record information concurrently with construction progress.

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

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

.1 Measured depths of elements of foundation in relation to geodetic datum.

.2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

.3 Field changes of dimension and detail.

.4 Changes made by change orders.

.5 Details not on original Contract Drawings.

.6 References to related shop drawings and modifications.

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

.1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.

.2 Changes made by Addenda and change orders.

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

.7 Provide digital photos for site records.

1.7 Final Survey

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

1.8 Equipment And Systems

.1 For each item of equipment and each system include description of unit or system, and component parts.

.1 Give function, normal operation characteristics and limiting conditions.

.2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

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

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

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

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

. 6 Additional requirements: as specified in individual specification sections.

1.9 Maintenance Materials

.1 Spare Parts:

.1 Provide spare parts, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to site; place and store.

.4 Receive and catalogue items.

.1 Submit inventory listing to Departmental Representative.

.2 Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

.2 Special Tools:

.1 Provide special tools, in quantities specified in individual specification section.

.2 Provide items with tags identifying their associated function and equipment.

.3 Deliver to site; place and store.

.4 Receive and catalogue items.

.1 Submit inventory listing to Departmental Representative.

.2 Include approved listings in Maintenance Manual.

1.10 Delivery, Storage And Handling

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

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

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

.4 Store paints and freezable materials in a heated and ventilated room.

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

1.11 Warranties And Bonds

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

.2 Submit warranty management plan, 15 days before planned Substantial Completion, to Departmental Representative.

.3 Warranty management plan to include required actions and documents to assure that the Departmental Representative receives warranties to which it is entitled.

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

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

.1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.

.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.

.4 Verify that documents are in proper form, contain full information, and are notarized.

.5 Co-execute submittals when required.

.6 Retain warranties and bonds until time specified for submittal.

.6 Conduct joint 12 month warranty inspection, measured from time of acceptance, by Departmental Representative.

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

.1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.

.2 Provide list for each warranted equipment, item, feature of construction or system indicating:

.1 Name of item.
.2 Model and serial numbers.
.3 Location where installed.
.4 Name and phone numbers of manufacturers or suppliers.
.5 Names, addresses and telephone numbers of sources of spare parts.
.6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.
.7 Cross-reference to warranty certificates as applicable.
.8 Starting point and duration of warranty period.
.9 Summary of maintenance procedures required to continue warranty in force.
.10 Cross-Reference to specific pertinent Operation and Maintenance manuals.
.11 Organization, names and phone numbers of persons to call for warranty service.
.12 Typical response time and repair time expected for various warranted equipment.

.3 Contractor's plans for attendance at 12 month post-construction warranty inspections.

.4 Procedure and status of tagging of equipment covered by extended warranties.

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

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

1.12 Warranty Tags

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

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

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

.4 Indicate following information on tag:

.1 Type of product/material.

.2 Model number.

.3 Serial number.

.4 Contract number.

.5 Warranty period.

.6 Inspector's signature.

.7 Construction Contractor.

PART 2 - PRODUCTS

2.1 Not Used

.1 Not used.

PART 3 - EXECUTION

3.1 Not Used

.1 Not used.

END OF SECTION

PART 1 - GENERAL

1.1 Related Requirements

.1 01 13 82 – Sludge Management

.2 03 30 00 – Cast-In-Place Concrete

.3 32 31 26 – Wire Fences and Gates

.4 33 05 13 – Manholes and Catch Basin Structures

1.2 Administrative Requirements

.1 Demonstrate operation and maintenance of equipment and systems to Departmental Representative prior to date of final inspection.

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

.3 Preparation:

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

.2 Verify designated personnel are present.

.3 Ensure equipment has been inspected and put into operation in accordance with Manufacturer's Recommendations, Contract Specifications, and to the satisfaction of the Department Representative.

.4 Ensure testing, adjusting, and balancing has been performed as required and that equipment and systems are fully operational.

.4 Demonstration and Instructions:

.1 Demonstrate start-up, operation, control, adjustment, troubleshooting, servicing, and maintenance of each item of equipment at agreed upon times, at the equipment location.

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

.3 Review contents of manual in detail to explain aspects of operation and maintenance.

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

1.3 Action and Informational Submittals

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

.2 Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for Departmental Representative's approval.

.3 Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.

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

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

END OF SECTION

PART 1 - GENERAL

1.1 General

.1 This section specifies methods and procedures for demolishing, salvaging recycling and removing items designated to be removed in whole or in part.

1.2 Related Sections

.1 Section 01 35 33 – Health and Safety Requirements

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

1.3 References

.1 Canadian Federal Legislation

- .1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
- .2 Canadian Environmental Assessment Act (CEAA), 2012.
- .3 Transportation of Dangerous Goods (TDGA), 1992, c. 34.
- .4 Motor Vehicle Safety Act (MVSA), 1995.
- .5 CSA S350 M1980 (R1998), Code of Practice for Safety in Demolition of Structures.

1.4 Submittals

.1 Prior to beginning of Work on site submit detailed Waste Reduction Workplan in accordance with Sections 01 74 21 - Construction/ Demolition Waste Management and Disposal and 01 11 05 - General Instructions and indicate:

- .1 Descriptions of and anticipated quantities of materials to be salvaged reused, recycled and landfilled.
- .2 Schedule of selective demolition.
- .3 Number and location of dumpsters.
- .4 Anticipated frequency of tippage.
- .5 Name and address of waste facilities.

1.5 Waste Management And Disposal

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

1.6 Site Conditions

.1 Review Waste Reduction Workplan and take precautions to protect environment.

.2 Should material resembling spray or trowel applied asbestos or other designated substance listed as hazardous be encountered, stop work, take preventative measures, and notify Departmental Representative.

.3 Notify Departmental Representative before disrupting site access or services.

PART 2 - PRODUCTS

2.1 Not Used

PART 3 - EXECUTION

3.1 Preparation

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

.2 Locate and protect utilities using ground penetrating radar.

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

.4 Disconnect and Cap Designated Mechanical services.

.1 Underground Services: remove and dispose of as directed by Departmental Representative.

.2 Underground Tanks: remove of and dispose of as directed by Departmental Representative.

.5 Survey Markers and Monuments:

.1 Provide three reference points, established by a licenced land surveyor, for each marker or monument temporarily removed. Record locations and designations of survey markers and monuments prior to removal.

.2 Store removed markers and monuments during demolition work and replace upon completion of work. Re-establish survey markers and monuments in conformance with recorded

reference points. Forward letter to Departmental Representative, signed by a licensed land surveyor, verifying reestablishment of survey markers and monuments.

3.2 Removal of Hazardous Material

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

3.3 Removal Operations

.1 Remove items as indicated on drawings and directed by Department Representative.

.2 Protect existing items designated to remain and items designated for salvage. In event of damage to such items, immediately replace or make repairs to approval of Departmental Representative and at no cost to Departmental Representative.

.3 Remove existing utilities as indicated or uncovered by work and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the Departmental Representative. When utility lines are encountered that are not indicated on the drawings, the Departmental Representative shall be notified prior to further work in that area.

.4 Protect underlying and adjacent granular materials.

.5 Excavate at least 300mm below pipe invert when removing pipes.

.6 Structure Removal, Pipes:

.1 This item shall consist of removing the existing waste transfer pipes on the construction drawings. This includes the complete removal of the pipes.

.2 Approximate locations of piped to be removed are shown on the construction drawings. Actual locations shall be determined during the construction process.

.3 Salvage of the materials will be acceptable upon approval of the Departmental Representative.

.4 Materials not suitable to be buried or salvaged should be disposed of at on offsite disposal area of the contractors own choosing and at the contractor's own expense in accordance with provincial and local regulations.

5. Plastic and steel pipes must be removed from the site and properly disposed of.

.7 Obtain written approval of Departmental Representative prior to removal of trees not designated.

.8 Sell or donate trees that are suitable or marketable. Buck the trees up into 18" in lengths for Green Point firewoods.

.9 Stockpile topsoil for final grading and landscaping, ensuring proper erosion control if not immediately used.

.9 Backfill

.1 Backfill in areas as indicated.

.2 Backfill material and compaction to Section 31 00 99 – Earthworks for Minor Works

3.4 Salvage

.1 Remove items to be reused, store as directed by Departmental Representative and re install where specified.

3.5 Restoration

.1 Restore areas and existing works outside areas of demolition to match conditions of adjacent, undisturbed areas.

.2 Use soil treatments and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

3.6 Clean Up

.1 Progress Cleaning:

.1 Ensure work area is clean at end of each day.

.2 Use cleaning solutions and procedures which are not harmful to health, not injurious to plants, and do not endanger wildlife, adjacent water courses, or ground water.

.2 Final Cleaning: Upon completion of work remove surplus material, rubbish, tools, and equipment.

3.7 Disposal

.1 Dispose of removed materials to appropriate recycling facilities, except where specified otherwise, in accordance with authority having jurisdiction.

END OF SECTION

PART 1 - GENERAL

1.1 Related Sections

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

.2 Section 03 30 00 Cast-in-Place Concrete

1.2 References

.1 American Concrete Institute (ACI)

.1 ANSI/ACI 315, Details and Detailing of Concrete Reinforcement.

.2 ACI 315R, Manual of Engineering and Placing Drawings for Reinforced Concrete Structure.

.2 American Society for Testing and Materials International (ASTM)

.1 ASTM A185/A185M, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.

.2 ASTM A497/A497M, Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.

.3 Canadian Standards Association (CSA)

.1 CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of test and Standard Practices for Concrete.

.2 CSA-A23.3, Design of Concrete Structures.

.3 CAN/CSA-G30.18, Billet-Steel Bars for Concrete Reinforcement, A National Standard of Canada

.4 CSA-G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel /Structural Quality Steel.

.5 CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles.

.6 CSA W186, Welding of Reinforcing Bars in Reinforced Concrete Construction.

.3 Reinforcing Steel Institute of Canada (RSIC)

.1 Reinforcing Steel Manual of Standard Practice

1.3 Submittals

.1 Indicate on shop drawings, bar bending details, lists, quantities of reinforcement, sizes, spacing, and locations of reinforcement with identifying code marks to permit correct placement without reference to structural drawings. Indicate sizes, spacing and locations of chairs, spacers and hangers. Prepare reinforcement drawings in accordance with Reinforcing Steel Manual of Standard Practice - by Reinforcing Steel Institute of Canada . ANSI/ACI 315 and ACI 315R, Manual of Engineering and Placing Drawings for Reinforced Concrete Structure.

.2 Detail lap lengths and bar development lengths to CSA-A23.3, unless otherwise indicated.

1.4 Delivery, Storage And Handling

.1 Ship reinforcing steel in bundles with identifying tags or markings. Take necessary precautions to maintain identification after the bundles are broken.

.2 Store reinforcing steel above ground on platforms, skids, or racks and protect from prolonged exposure to weather.

PART 2 - PRODUCTS

2.1 Materials

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

.2 Reinforcing Steel: billet-steel deformed bars to CAN/ CSA-G30.18, Grade 400R, bearing identifying marks indicating size and grade.

.3 Cold-drawn annealed steel wire ties: to ASTM A497/A497M.

.4 Welded steel wire fabric: to ASTM A185/A185M. Provide in flat sheets only.

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

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

.7 Plain round bars: to CSA-G40.20/G40.21.

2.2 Fabrication

.1 Fabricate reinforcing steel in accordance with CSA-A23.1A23.2, ACI 315, and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.

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

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

.4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

2.3 Source Quality Control

.1 Upon request, provide Department Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 4 weeks prior to commencing reinforcing work.

.2 Upon request, inform Department Representative of proposed source of material to be supplied.

PART 3 - EXECUTION

3.1 Fabrication And Erection

.1 Fabricate reinforcing steel in accordance with CAN/CSA-A23.1 and RSIC Reinforcing Steel Manual of Standard Practice, unless indicated otherwise.

.2 Obtain the Departmental Representative's approval for locations of reinforcement splices other than shown on the Drawings.

3.2 Field Bending

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

.2 When field bending is authorized, bend without heat, applying a slow and steady pressure. Replace bars which develop cracks or splits.

3.3 Placing Of Reinforcement

.1 Place reinforcing steel as indicated on Drawings and in accordance with CAN/ CSA-A23.1. Ensure materials, before being placed, are free of loose scaly rust, dirt, oil, paint or other bond-breaking coating.

.2 Prior to placing concrete, obtain the Departmental Representative's approval of reinforcing steel placement. The Departmental Representative's approval indicates review for general conformance with the contract documents only and does not relieve the Contractor of his responsibility for the accuracy and correctness of the Work.

.3 Unless indicated otherwise on the Drawings, provide minimum concrete cover for reinforcement in cast-in-place concrete as follows:

.1 Cast against earth: 75 mm

.2 All other: 50 mm

.4 Tolerances for placing reinforcing steel shall be in accordance with CAN/CSA-A23.1 as applicable, except that concrete cover to reinforcing steel shall not be reduced by more than 6 mm.

END OF SECTION

PART 1 - GENERAL

1.1 Related Sections	.1	Section 03 20 00 – Concrete Reinforcing
	.2	Section 31 00 99 – Earthworks for Minor Works.
	.3	Section 33 05 13 – Manholes and Catch Basin Structures
1.2 References	.1	CAN/ CSA-A23.1 Concrete Materials and Methods of Concrete Construction (Including Notes and Appendices in the Standard)
	.2	CAN/ CSA-A23.2 Test methods and standard practices for Concrete
	.3	CAN/ CSA-S269.3 Concrete Formwork
	.4	CAN/ CSA A3000 Supplementary Cementing Materials, Building Materials and Products
	.5	ACI 305R Hot weather concreting
	.6	ACI 306R Cold weather concreting
	.7	ASTM C260 Standard Specification for Air-Entraining Admixtures for Concrete
	.8	ASTM C309 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
	.9	ASTM C494 Standard Specification for Chemical Admixtures for Concrete
	.10	Additional material and testing standards listed in CAN/ CSA-A23.1.
1.3 Submittals	.1	Submit concrete mix designs of any mix designed by the Contractor to the Departmental Representative for review 14 days prior to placement. Concrete mix design submittals shall include the mass in kilograms of fine aggregate, coarse aggregate, cement, fly ash, silica fume and water in each cubic metre of concrete. Concrete mix design submittals shall specify the properties of the concrete.
	.2	Submit copies of all test results to the Departmental Representative for review. Submission of test results will not relieve the Contractor from his obligation to interpret the test results and make necessary corrections or adjustments to his construction procedures or mix designs..
	3	At least four weeks prior to commencing work of this section, inform the Departmental Representative of proposed source of aggregates and provide access for sampling.
	.4	Submit a letter of assurance that the proposed aggregate source will not produce concrete that will be compromised by deleterious effects from alkali-aggregate reaction.

1.4 Quality Control Submittals	.1	Provide proof of certification that plant, equipment, and materials including aggregates to be used in concrete comply with requirements of CAN/ CSA-A23.1.
	.2	Submit test results based on trial mixes showing that concrete mix designs will produce concrete meeting the requirements of this section and that strength will comply with CAN/ CSA-A23.1.
	.3	Submit manufacturer's datasheets and printed instructions for joint sealant and primer proposed for use in the Work.
1.5 Quality Assurance	.1	Perform all concrete Work in accordance with the requirements of CAN/ CSA A23.1.
	.2	Concrete testing shall be performed by the Contractor, and results submitted to the Departmental Representative.

PART 2 - PRODUCTS

2.1 Concrete Materials	.1	Portland Cement and Supplementary Cementing Material : Type GU Portland cement to CAN/ CSA-A3000
	.2	Water: to CAN/ CSA-A23.1.
	.3	Aggregates: to CAN/ CSA-A23.1, normal density.
	.4	Air Entraining Admixtures: to ASTM C260.
	.5	Chemical Admixtures: to ASTM C494. Departmental Representative to approve type and use of accelerating or set-retarding admixtures during cold and hot weather placing.
	.6	Curing Compound: to CSA A23.1 and ASTM C309
2.2 Formwork Materials	.1	Formwork materials shall meet the requirements of CAN/ CSA-S269.3 and this section.
	.2	Contact surfaces or lining of formwork shall be suitably smooth to provide finished concrete surfaces meeting the requirements of this section.
	.3	Form Ties: threaded internal disconnecting type, leaving no holes larger than 1 in. diameter in concrete surface.
	.4	Form Release Agent: non-staining chemically active release agent, compatible with form material which will prevent adherence of concrete to forms.
2.3 Concrete Mixes	.1	Select concrete mix proportions in accordance with CAN/ CSA-A23.1 to

give the following properties for all cast-in-place concrete unless specified otherwise on design Drawings:

.1 Minimum Compressive Strength at 28 Days: 35 MPa.

.2 Maximum Water/Cementing Materials Ratio: 0.40.

.3 Exposure Class: C-1.

.4 Nominal Maximum Size of Coarse Aggregate: 20 mm.

.5 Slump at Time and Point of Discharge: 130 mm ± 25 mm.

.6 Air Content: 5% to 8%.

.2 Do not change concrete mix without prior approval of the Departmental Representative. Should change in material source be proposed, new mix design to be approved by the Departmental Representative.

2.4 Concrete Production

.1 Measure, batch and mix concrete in accordance with CAN/ CSA-A23.1.

.2 Before unloading concrete at the Site, furnish the Departmental Representative with a delivery ticket for each batch of concrete in accordance with CAN/ CSA-A23.1.

PART 3 - EXECUTION

3.1 General

.1 Prior to placing concrete, ensure that all reinforcing and other items to be embedded in concrete are in place, properly oriented, located, and secured. Verify that concrete may be placed to the lines and elevations shown on the Drawings with all required clearances and cover for reinforcement. Ensure that forms are clean and absolutely all debris has been removed.

.2 Obtain the Departmental Representative's approval before placing concrete. Provide 48 hours notice prior to placing of concrete.

.3 Prior to placing concrete, obtain the Departmental Representative's approval of proposed method for protection of concrete during placing and curing in adverse weather.

.4 Maintain accurate records of poured concrete items to indicate date, location of pour, quantity, air temperature and any Contractor's test samples taken.

3.2 Formwork

.1 Construct and erect formwork in accordance with CAN/ CSA-S269.3.

.2 Assemble forms to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CAN/ CSA-A23.1.

.3 Align form joints and make watertight. Use minimum number of form joints.

.4 Clean formwork in accordance with CAN/ CSA-A23.1 before placing concrete.

3.3 Preparation

.1 Set sleeves, anchor bolts and other inserts as indicated or specified elsewhere. Sleeves and openings greater than 100 mm and not indicated on structural Drawings must be approved by the Departmental Representative.

.2 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain approval of all modifications from the Departmental Representative before placing of concrete.

3.4 Placing of Concrete – General

.1 Handle, deposit and consolidate concrete in accordance with CAN/ CSA-A23.1 and ACI A309R. Take care not to disturb forms or reinforcing steel when depositing and consolidating concrete.

.2 Ensure that spare internal vibrators or external form vibrators are on hand during placing of concrete.

.3 Unless specified otherwise, where fresh concrete will be placed against hardened concrete, bond the fresh concrete to the hardened concrete in accordance with CAN/ CSA-A23.1.

3.5 Construction Joints

.1 Make construction joints in accordance with CAN/ CSA-A23.1.

.2 Locate construction joints as indicated on the Drawings or as approved by the Departmental Representative. Construction joints not indicated on the Drawings will not be permitted without the prior authorization of the Departmental Representative.

3.6 Finishing Unformed Surfaces

.1 Top surfaces of concrete which will ultimately receive additional concrete:

.1 Screed the surface across the grade strips or forms so that the resulting surface will have no irregularities greater than the maximum size aggregate.

.2 Roughen the surface with 6 mm amplitude.

.3 Prior to placing additional concrete, clean the surface of: laitance, dirt, excess water, and other deleterious material. Do not use hydro-milling until sufficient time has elapsed to prevent loosening of the top aggregate.

.2 Top Surface of Exposed Concrete:

.1 Initial Finishing: immediately after placing concrete, screed the surface to the indicated grade and Work the surface with a bull float, or with a darby and highway straight edge, in accordance with CAN/ CSA-A23.1. Complete initial finishing before any bleeding or free water is present on the concrete surface.

.2 Begin final finishing operations after the bleed water has disappeared and the concrete has stiffened sufficiently to prevent the working of excess mortar to the surface. Do not add water to facilitate finishing. Carry out final finishing operations in accordance with CAN/ CSA-A23.1.

.3 Unless noted otherwise, exterior surfaces shall receive a light broom finish, with broom striations approximately 2 mm deep.

.3 Finished surfaces shall conform to the slopes specified on the Drawings.

3.7 Finishing Formed Surfaces

.1 Finish formed surfaces in accordance with CAN/CSA-A23.1 and as specified below.

.2 Formed surfaces which may ultimately serve as forms for additional concrete pour or which will remain unexposed:

.1 The surface may contain shear keys, reinforcing steel, anchor bolts, or other embedments as indicated on the Drawings.

.2 Repair honeycomb concrete and fill form-tie holes. Remove fins and ridges from concrete surfaces.

.3 Clean the surface of laitance, dirt, excess water, and other deleterious material prior to applying waterproofing treatment or placing additional concrete.

3.8 Curing And Protection

.1 Cure and protect concrete in accordance with CAN/ CSA-A23.1 and as specified below.

.2 Cure topping concrete by the application of wetted burlap immediately after completion of finishing operations. Maintain burlap in a saturated condition using soaker hoses wrapped in burlap and installed on top of the deck surface. When the daily mean ambient temperature is above 5 deg. C, curing shall be continuous for a minimum of seven days or for the time necessary to attain 70% of the specified 28 day compressive strength.

.3 When the air temperature is at or above 27 deg. C, or when there is a probability of it rising to 27 deg. C during the placing period (as forecast by the nearest official meteorological office), conform also to the requirements of ACI 305R - Hot Weather Concreting.

.4 When the air temperature is at or below 5 deg. C, or when there is a probability of it falling below 5 deg. C within 24 hours of placing (as forecast by the nearest official meteorological office), conform also to the requirements of ACI 306R - Cold Weather Concreting.

3.9 Tolerances

.1 Tolerances for concrete Work as built shall conform to CAN/ CSA-A23.1 unless indicated otherwise.

.2 Finish tolerances for concrete topping shall meet the requirements for the conventional (non-slip) Class B surface of CAN/ CSA-A23.1 Table 16.

.3 The flatness of the topping surface will be determined by the straightedge method as outlined in CAN/ CSA-A23.1.

3.10 Field Quality Control

.1 Inspection and testing of concrete and concrete materials shall be carried out by a Testing Laboratory approved by Departmental Representative, engaged and paid for by the Contractor, in accordance with CAN/ CSA A23.1.A "test" shall consist of a slump test, an air entrainment test, and samples collected for compression testing.

.2 Pumped concrete shall be sampled both at the truck discharge and at the point of final placement to determine if any changes in the slump, air content or other significant mix characteristics occur. The concrete at the forms shall meet all the requirements of this section.

.3 Additional test cylinders shall be taken during cold weather concreting. Cure cylinders on job Site under same conditions as concrete which they represent.

.4 Inspection or testing by Departmental Representative will not augment or replace Contractor quality control nor relieve him of his contractual responsibility.

END OF SECTION

PART 1 - GENERAL

1.1 References

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

.1 ASTM C88-13, Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.

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

.3 ASTM C136-14, Method for Sieve Analysis of Fine and Coarse Aggregate.

.4 ASTM C117-13, Test Method for Material Finer than 0.075 mm Sieve in Mineral Aggregates by Washing.

.5 ASTM D1557-12, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort.

.2 Canadian Standards Association (CSA International)

.1 CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CAN/CSA-A3000, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.3 CSA-A3001, Cementitious Materials for Use in Concrete.

1.2 Regulations

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

.2 Not later than one week before backfilling or filling, provide to designated testing agency, 23 kg sample of backfill or fill materials proposed for use.

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

.4 Not later than 48 hours before backfilling or filling with approved material, notify the Departmental Representative so that compaction tests can be carried out by designated testing agency.

.5 Before commencing work, conduct, with the Departmental Representative, condition survey of existing structures, trees and other plants, lawns, fencing, service poles, wires, rail tracks and paving, survey bench marks and monuments which may be affected by work.

1.3 Tests and Inspections

.1 Testing of materials and compaction of backfill and fill will be carried out by a certified testing firm, retained by the Contractor and approved by the Departmental Representative.

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

.3 Not later than 48 hours before backfilling or filling with approved material, notify Departmental Representative so that compaction tests can be carried out by designated testing agency.

1.4 Buried Services

.1 Before commencing work, verify the location of all buried services on and adjacent to the site using ground penetrating radar.

.2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work. Pay costs of relocating services.

.3 Remove obsolete buried services within 2 m of foundations. Cap cut offs.

1.5 Protection

.1 Protect excavations from freezing.

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

.3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to the Departmental Representative's approval.

.4 Protect natural and manmade features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.

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

1.6 Controlled Density Concrete

.1 Controlled Density Fill

.1 Furnish and place controlled density fill in a fluid condition, that sets within the required time and, after curing, obtains the desired strength properties as evidenced by the laboratory testing of the specific mix design, at locations shown on the plans or as directed by the Departmental Representative.

.2 CDF fill shall have minimal subsidence and bleed water shrinkage. Evaporation of bleed water shall not result in shrinkage of more than 10.4 mm per m (1/8 inch per ft.) of CDF fill depth (for mixes containing high fly ash content). Measurement of a Final Bleeding shall be as measured in Section 10 of ASTM C 940 "Standard Test Method for Expansion and Bleeding of Freshly Mixed Grouts for Preplaced-Aggregate Concrete in the Laboratory

PART 2 - PRODUCTS

2.1 Materials

.1 Gravel to be composed of inert, durable material, reasonably uniform in quality and free from soft or disintegrated particles. In absence of satisfactory performance records over a five year period for particular source of material, soundness to be tested according to ASTM test procedure C-88 or latest revised issue. Maximum weight average losses for course and fine aggregates to be 30% when magnesium sulphate is used after five cycles.

.2 All crushed gravel when tested according to ASTM C-136 and ASTM C-117, or latest revised issue, to have a generally uniform gradation and conform to following sieve must have one or more fractured faces. Determination of the Ministry of Transportation and Highways' Specification I-11, Fracture Count for Coarse Aggregate, Method "A", which determines fractured faces by count. The Plasticity Index for crushed gravel to not exceed 6.0.

.3 Native material to be any workable soil free of organic or foreign matter; any material obtained within limits of Contract may be deemed native material for purposes of payment if it is approved by the Departmental Representative. Native material is not acceptable if it is impracticable to control its water content or compact to

specified density.

.4 Granular Pipe Bedding and Surround Material

Crushed or graded gravels: to conform to following gradation:

Sieve Designation	Percent Passing Type 1*	Type*2
25.0mm	100	100
19.0mm	90 - 100	90 - 100
12.5mm	65 - 85	70 - 100
09.5mm	50 - 75	--- ---
4.75mm	25 - 50	40 - 70
2.36mm	10 - 35	25 - 52
1.18mm	6 - 26	15 - 38
0.600mm	3 - 17	6 - 27
0.300mm	--- ---	3 - 20
0.075mm	0 - 5	0 - 8

*Type 1: standard gradation

*Type 2: to be used only in dry trench conditions and with Departmental Representative's prior approval.

.5 Top Soil for seeded areas: mixture of articulates, micro organisms and organic matter which provides suitable medium for supporting intended plant growth.

.1 Soil texture: The Canadian System of Soil Classification, to consist of 20 to 70 % sand, minimum 7 % clay, and contain 2 to 10 % organic matter by weight.

.2 Contain no toxic elements or growth inhibiting materials.

.3 Finished surface free from:

.1 Debris and stones over 50 mm diameter.

.2 Course vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.

.4 Consistencies: friable when moist.

.5 Controlled Density Fill

.1 Mix design shall produce a consistency that will result in a CDF product at the time of placement which does not require manual means to move it into place.

.2 Proportioned and mixed to provide:

.1 Maximum compressive strength of 0.4 MPa at 28 days.

.2 Maximum Portland cement content of 25 kg/m 3.

.3 Minimum strength of 0.07 MPa at 24 h.

.4 Concrete aggregates: to CSA-A23.1/A23.2

.5 Cement: to CAN/CSA-A3001, Type GU.

.6 Slump: 160 to 200 mm.

PART 3 - EXECUTION

3.1 Site Preparation

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

3.2 Clearing and Grubbing

.1 Remove trees, stumps, logs, brush, shrubs, bushes, vines, undergrowth, rotten wood, dead plant material, exposed boulders and debris within areas designated on drawings.

3.3 Excavation

.1 Topsoil stripping

.1 Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected.

.2 Strip topsoil over areas to be covered by new construction, over areas where grade changes are required, and so that excavated material may be stockpiled without covering topsoil.

.3 Dispose of topsoil as directed by the Departmental Representative.

.2 Excavate as required to carry out work, in all materials met. Do not disturb soil or rock below bearing surfaces. Notify the Departmental

Representative when excavations are complete. If bearings are unsatisfactory, additional excavation will be authorized in writing and paid for as additional work. Excavation taken below depths shown without Departmental Representative's written authorization to be filled with concrete of same strength as for footings at Contractor's expense.

.3 Excavate trenches to provide uniform continuous bearing and support for 100 mm thickness of pipe bedding material on solid and undisturbed ground. Trench widths below point 300 mm above pipe not to exceed diameter of pipe plus 600 mm.

.4 Excavate for slabs and paving to subgrade levels.

.1 In addition, remove all topsoil, organic matter, debris and other loose and harmful matter encountered at subgrade level.

.2 Proof roll on subgrade to the satisfaction of Departmental Representative required.

3.4 Backfilling

.1 Inspection: do not commence backfilling until fill material and spaces to be filled have been inspected and approved by the Departmental Representative.

.2 Remove snow, ice, construction debris, organic soil and standing water from spaces to be filled.

.3 Lateral support: maintain even levels of backfill around structures as work progresses, to equalize earth pressures.

.4 Compaction: place backfill to underside of required sub-base and base layers, and compact to following Modified Proctor densities in compliance with ASTM D1557.

.1 Boulevards and easements to minimum 90%

.2 Roads, driveways, shoulders, re-shaped ditches and sidewalks to minimum 95%.

.3 Use caution in pipe zone to ensure no damage to pipe.

.5 Under seeded and sodded areas: use site excavated material to bottom of topsoil except in trenches and within 600 mm of foundations.

.6 Blown rock material, not capable of fine grading, is not acceptable, imported material must be placed on this type of material.

.7 Against foundations (except as applicable to trenches and under slabs and paving): excavated material or imported material with no stones larger than 200 mm diameter within 600 mm of structures.

3.5 Contaminated Materials

.1 If contaminated materials are detected during excavation operations, immediately notify the Departmental Representative. Any contaminated materials to be disposed of using methods approved by the Departmental Representative.

3.6 Grading

.1 Grade so that water will drain away from walls and paved areas to catch basins and other disposal areas approved by the Departmental Representative. Grade to be gradual between finished spot elevations shown on drawings.

3.7 Topsoil Placement

.1 Place a minimum of 150 mm of top soil under all areas where grass seeding is indicated on the contract drawings.

.2 The Departmental Representative will inspect and test topsoil in place and determine acceptance of material, depth of topsoil and finish grading.

3.8 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 Related Sections

.1 01 35 33 - Health and Safety Requirements
.2 01 35 43 - Environmental Procedure
.3 01 74 21 – Construction/Demolition Waste Management and Disposal
.4 31 00 99 – Earthworks for Minor Works

1.2 Storage and Protection

.1 Prevent damage to fencing, trees, landscaping, natural features, bench marks, existing buildings, existing pavement, utility lines, site appurtenances, water courses, root systems of trees which are to remain.
.2 Repair any damaged items to approval of Departmental Representative. Replace any trees designated to remain, if damaged, as directed by Departmental Representative.

1.3 Felled Timber

.1 Consider felled timber from which saw logs, pulpwood, posts, poles, ties, or fuel wood can be produced as saleable timber.
.2 Trim limbs and tops, and saw into saleable lengths. Stockpile adjacent to site.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.1 Site Preparation

.1 Inspect site and verify with Departmental Representative, items designated to remain.
.2 Notify utility authorities before starting clearing and grubbing.
.3 Keep roads and walks free of dirt and debris.

3.2 Clearing

.1 Clearing includes felling, trimming and cutting of trees into sections and satisfactory disposal of trees and other vegetation designated for removal, including downed timber, snags brush and rubbish occurring within cleared areas.

.2 Clear as indicated on Contract Drawings and/or as directed by Departmental Representative, by cutting at a height of not more than 300 mm above ground. In areas to be subsequently grubbed, height of stumps left from clearing operations to be not more than 1000 mm above ground surface.

.3 Cut off branches and cut down trees overhanging area cleared as required for safety and/or as directed by Departmental Representative.

.4 Cut off branches and cut down trees overhanging area cleared as required for safety and/or as directed by Departmental Representative.

3.3 Close Cut Clearing

.1 Close-cut clearing consists of cutting off standing trees, brush, scrub, roots, stumps and embedded logs, removing at, or close to, existing grade and disposing of fallen timber and surface debris.

.2 Close cut clearing to ground level.

.3 Cut off branches down trees overhanging area cleared as directed by Departmental Representative.

.4 Cut off unsound branches on trees designated to remain as directed by Departmental Representative.

3.4 Isolated Trees

.1 Clearing isolated trees consists of cutting off to not more than specified height above ground of designated trees, and disposing of felled trees and debris.

.2 Cut off isolated trees as directed by Departmental Representative at height of not more than 300mm above ground surface.

.3 Grub out isolated tree stumps.

3.5 Underbrush Clearing

.1 Underbrush clearing consists of removal from treed areas of undergrowth, deadwood, and trees smaller than 50 mm trunk diameter and disposing of all fallen timber and surface debris.

.2 Clear underbrush from areas as indicated at ground level.

3.6 Grubbing

.1 Grubbing consists of excavation and disposal of stumps and roots boulders and rock fragments of specified size to not less than a specified depth below existing ground surface.

.2 Remove and dispose of roots larger than 7.5 cm in diameter, matted roots and designated stumps from indicated grubbing area.

.3 Grub out stumps and roots to not less than 200 mm below ground surface.

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

.5 Fill depressions made by grubbing with suitable material and to make new surface conform with existing adjacent surface of ground.

3.7 Removal and Disposal

.1 Chip cleared and grubbed materials and spread within the cleared forcemain right-of-way.

.1 Material to be stockpiled along the edge of the ROW until such time that environmental conditions allow for chipping equipment to access the site.

.2 Authorization from Departmental Representative required prior to chipping activities commencing.

.2 Cut timber greater than 125 mm diameter to 3000mm lengths and stockpile as directed by Departmental Representative. Unless otherwise notified, stockpiled timber becomes property of the Crown.

.3 Dispose of cleared and grubbed materials unable to be chipped offsite.

.4 Remove diseased trees identified by Departmental Representative and dispose of this material to approval of Departmental Representative.

3.8 Finished Surface

.1 Leave ground surface in condition suitable for immediate maintenance vehicle access, to approval of Departmental Representative.

3.9 Clean Up

.1 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes

.1 Materials and installation of polymeric geotextiles used in revetments, breakwaters, retaining wall structures, filtration, drainage structures, roadbeds and railroad beds purpose of which is to:
- .1 Separate and prevent mixing of granular materials of different grading.
- .2 Act as hydraulic filters permitting passage of water while retaining soil strength of granular structure.

1.2 Related Sections

.1 Section 01 33 00 – Submittal Procedures.
.2 Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
.3 Section 31 00 99 – Earthworks for Minor Works
.4 Section 31 37 00 – Rip-Rap

1.3 References

.1 American Society for Testing and Materials International, (ASTM):
- .1 ASTM D4491-99a(2009), Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
- .2 ASTM D4595-09, Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.
- .3 ASTM D4716-08(2013), Test Method for Determining the (In-Plane) Flow Rate Per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.
- .4 ASTM D4751-12, Standard Test Method for Determining Apparent Opening Size of a Geotextile.

.2 Canadian General Standards Board (CGSB):
- .1 CAN/CGSB-4.2 No. 11.2-M89(April 1997), Textile Test Methods - Bursting Strength - Ball Burst Test (Extension of September 1989).
- .2 CAN/CGSB-148.1, Methods of Testing Geotextiles and Complete Geomembranes.
  - .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.6.1-93, Methods of Testing Geotextiles and Geomembranes - Bursting Strength of Geotextiles Under No Compressive Load
  - .4 No.7.3-92, Methods of Testing Geotextiles and Geomembranes - Grab Tensile Test for Geotextiles

.5 No. 10-94, Methods of Testing Geosynthetics - Geotextiles - Filtration Opening Size

.3 Canadian Standards Association (CSA International):

.1 CAN/CSA-G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

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

.4 Ontario Provincial Standard Specifications (OPSS):

.1 OPSS 1860-[March 1998], Material Specification for Geotextiles.

.5 British Columbia Ministry of Health – British Columbia Onsite Sewage Association:

.1 Sewerage System Standard Practice Manual – Version 2, 21 September, 2007.

1.4 Submittals

.1 Submit to Departmental Representative 3 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.

1.5 Delivery, Storage and Handling

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

1.6 Waste Management and Disposal

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

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

PART 2 - PRODUCTS

2.1 Material

.1 Geotextile: non-woven synthetic fibre fabric, supplied in rolls:
- .1 Width: 2 m minimum.
- .2 Length: 200 m minimum.
- .3 Composed of: minimum 85% by mass of polypropylene with inhibitors added to base plastic to resist deterioration by ultra-violet and heat exposure for 60 days.

.2 Physical properties.
- .1 Thickness: to CAN/CGSB-148.1, No.3, minimum 1.2 mm.
- .2 Mass per unit area: to CAN/CGSB-148.1, No.2, minimum 155 g/m2.
- .3 Grab tensile strength and elongation: to ASTM D4632.
  - .1 Breaking force: minimum 35 lb, wet condition.
  - .2 Elongation at future: minimum 50%.
- .4 Puncture; to ASTM D4833: 10 lbs minimum.
- .6 Trapezoidal tear; to ASTM D4533: 11 lbs minimum.

.3 Hydraulic properties:
- .1 Apparent opening size (AOS): to ASTM D4751, US Sive # 20 minimum and 70 maximum.
- .2 Permitivity: to ASTM D4491, 100 gal/min/sq ft minimum.

.4 Securing pins and washers: to CAN/CSA-G40.21, Grade 300W, hot-dipped galvanized with minimum zinc coating of 600 g/m2to CAN/CSA G164

PART 3 - EXECUTION

3.1 Installation

.1 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated.

.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 600 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	Place and compact soil layers in accordance with Section 31 00 99 – Earthworks for Minor Works.
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 directly on geotextile.

END OF SECTION

PART 1 - GENERAL

1.1 Related Sections

.1 Section 03 30 00 – Cast in Place Concrete.

.2 Section 31 00 99 - Earthworks for Minor Works

1.2 General Requirements

.1 Meet or exceed requirements of specified standards, codes and referenced documents.

.2 Advise the Department Representative of sources of material to be utilized fourteen (14) days in advance of starting work. Submit for approval samples (>50 kg) of all materials to be incorporated into the Works. The Contractor shall assume all costs incurred in obtaining and shipping samples.

.3 All debris, vegetation cobbles and other non desired material shall be cleaned from the place where hauled rip rap material is to be stockpiled near construction site

1.3 References

.1 American Society for Testing and Materials (ASTM)

.1 ASTM Standard C-127, "Method of Test for Specific Gravity and Absorption of Coarse Aggregates"

.2 Canadian Standards Association (CSA)

.1 CSA Standard A23.2.2 -Test for Sieve Analysis of Fine and Coarse Aggregates.

PART 2 - PRODUCTS

2.1 Rip-Rap

.1 Rip rap shall consist of clean, free draining, sound dense, durable crushed rock; free of organics, roots, silt, sand, clay, snow, ice, or other deleterious material.

.2 Dense, sound, hard and durable fieldstone or quarried rock fragments. Quarried rock fragments shall have a specific gravity of at least 2.6 and a limit of 2% absorption.

.3 Rock shall be hard white durable limestone or dolomite with the following properties:

.1 Minimum bulk specific gravity of 2.6 (ASTM C 127)
.2 Maximum Los Angeles abrasion loss of 35% (ASTM C 131)
.3 Maximum soundness loss of 18% (ASTM C88)
.4 Maximum absorption of 2.5% (ASTM C127)

.4 Gradation
.1 As specified on Contract Drawings

2.2 Cement Mortar

.1 Cement : to CAN/CSA-A3000, Type 10
.2 Sand: to ASTM C144
.3 Mortar mix: to ASTM C270, 1 part by volume of cement to 3 parts sand, to consistency approved by Departmental Representative.

PART 3 - EXECUTION

3.1 General

.1 Prior to commencing rip-rap Works, eliminate uneven areas and depressions on the area to be rip-rapped by fine grading to a uniform even surface. Fill depressions with suitable material and compact to provide firm bed.
.2 Obtain Departmental Representative approval of finish slope prior to proceeding with rip-rap placement.

3.2 Stockpiling

.1 Temporarily stockpile all sand, gravel, and rock materials that have been processed by washing methods for a minimum of 48 hours to permit drainage of excess water. Do not place recently washed materials on top of or with drier stockpiled materials.
.2 Use equipment and methods that minimizes the amount of material handling, and that do not cause segregation or material breakdown.
.3 Do not stockpile materials where contamination with the underlying soils can occur.

3.3 Placing

.1 Place rip-rap as indicated on Drawings.
.2 Machine place. Do not dump at top of slope and spread.
.3 Intermix the rip rap material to uniformly distribute the larger size

material and utilize small size material to fill in the void spaces resulting in a well -keyed, void free, stable surface with a consistent gradation. Ensure the segregation does not occur during placement.

.4 Do not dislodge or tear geotextile fabric during the placement of rip- rap. Repair as an incidental to the Works.

.5 Ensure the completed rip-rap placed is stable with no tendency to slide.

.6 Hand place as required to provide a neat and uniform surface.

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes

.1 Materials and installation for wildlife exclusion fences and gates.

.2 Sustainability requirements for construction, verification and operation.

1.2 References

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

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

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

.3 ASTM B209M-07, Standard Specification for Aluminium and Aluminium Alloy Sheet and Plate.

.2 Canadian Standards Association (CSA International)

.1 CSA A23.1/ A23.2 09, Concrete Materials and Methods of Concrete Construction/Methods of test for Concrete.

.2 CAN/CSA-G164- Hot Dip Galvanizing of Irregularly Shaped Articles.

.3 CSA G42-1964(R1998), Galvanized (Zinc-Coated) Steel Farm-Field Wire Fencing.

.4 CAN/CSA-A3000- Cementitious Materials Compendium. Includes:

.1 CAN/CSA-A23.5- Supplementary Cementing Materials.

.4 The Master Painters Institute (MPI):

.1 Architectural Painting Specification Manual - 2010.

.5 American Architectural Manufacturers Association (AAMA):

.1 AAMA 2603 – Specifications for powder coated aluminium.

1.3 Related Sections

.1 Section 01 11 05 - General Instructions.

.2 Section 01 33 00 - Submittal Procedures.

.3 Section 01 35 33 - Health and Safety Requirements.

.4 Section 01 35 43 – Environmental Procedures

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

.6 Section 03 30 00 – Cast-in-Place Concrete.

.7 Section 31 00 99 – Earthworks for Minor Works.

1.4 Submittals

.1 Submittals to be in accordance with Section 01 33 00.

.2 Submit manufacturer's data sheets including:

.1 Fence fabric gauge and finish.

.2 Post and rail dimensions and finish.

.3 Gate frame dimension and finish.

.4 Required fittings and hardware.

.3 Manufactures specifications for all proposed fence materials to be submitted to departmental representative prior to construction.

.4 Manufacturer's instructions, printed product literature and data sheets for signage, including product characteristics, performance criteria, physical size, finish and limitations.

1.5 Health and Safety

.1 Do construction occupational health and safety in accordance with Section 01 35 33 – Health and Safety Requirements.

1.6 Waste Management and Disposal

.1 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.2 Collect and separate materials for disposal or recycling in accordance with the Waste Management Plan.

.3 Place materials defined as hazardous or toxic in designated containers.

.4 Divert unused metal and wiring materials from landfill to metal recycling facility as approved by Departmental Representative.

.5 Divert unused concrete materials from landfill as approved by Departmental Representative.

.6 Unused paint or coating material must be disposed of at official

hazardous material collections site as approved by Departmental Representative.

.7 Do not dispose of unused paint material into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.

.8 Fold up metal banding, flatten and place in designated area for recycling.

1.7 Storage and Protection

.1 Prevent damage to fencing, natural features, water courses, bench marks, lighting systems, roadways and all other equipment encountered during the completion of the work.

.2 Repair any damages to original condition.

PART 2 - PRODUCTS

2.1 Fence Products

.1 Concrete mixes and materials: in accordance with CAN/CSA-A23.1.

.1 Nominal coarse aggregate size: 20-5

.2 Compressive strength: 20 MPa minimum at 28 days.

.3 Additives: fly ash to CAN/CSA-A23.5

.2 Fence fabric:

.1 Mesh Fence:

.1 Height: 2.44 m

.2 Spacing: 150mm horizontal and graduated vertical from 7.62 cm at the bottom to 17.78 cm at the top.

.3 Gauge: 12.5 gauge high tensile with a twisted friction type joint at each horizontal/vertical contact point.

.4 Strength: 1234 MPa (horizontal)

.5 Galvanic Finish: Class 3 coating, 240 g/m2

.2 Electric wire:

.1 Style: 6-wire bear fence, as per Drawings.

.2 Gauge: 12.5 gauge high-tensile wire specially designed for electric fence use.

.3 Finish: Class 3 galvanized.

.4 Coating: Aluminium coated for coastal environment.

.3 Post Type: Posts may be wood or steel, except that: Steel posts shall be used:

.1 Where it is not possible to attain the required embedment for wood posts, such as where bedrock or boulders obstruct the post hole.

.2 On ground slopes exceeding 1.5 horizontal to 1 vertical (34°).

.3 In wetlands, in areas frequently under water, or in areas of soft organic soils.

.4 Where it is determined that wood posts are unsuitable for the existing ground conditions, topography or other environmental factors.

.4 Wood Posts: straight peeled jack pine or lodgepole pine

.1 Dimensions:

.1 Length: 4300 mm

.2 Diameter: Tip – 150 mm; Butt – 200 mm.

.2 Treatment:

.1 Round Posts: to CSA O80-97, and in particular, CSA O80.5-97 Preservative Treatment of Posts by Pressure Processes.

.2 Sawn timber posts and members shall be treated for ground contact in accordance with CSA O80-97, and in particular, CSA O80.2-97 Preservative Treatment of Lumber, Timber, Bridge Ties and Mine Ties by Pressure Processes.

.3 Field Cuts: to AWPA Standard M4. The colour of the preservative treatment used for protecting field cut wood and bolt holes shall match the original preservative treatment colour, where possible.

.5 Steel Posts: Schedule 40 galvanic steel to ASTM-A-53-89a

.1 Dimensions:

.1 Length: 3560 mm to 4500 mm according to installation conditions.

.2 End posts – 73mm dia.

.3 Line Posts - 60mm dia.

.4 Rails and braces - 41mm dia.

.2 Finish:

.1 Hot dipped galvanized to the requirements of CAN/CSA G164M Table 1.

.6 Electric Wire Configuration: Six (6) strands of alternating positive/negative, spaced as per Drawings.

.7 Lockable Access Gates: prefabricated in dimensions as shown on Drawings, adjusted and lubricated to swing and shut freely without binding in the field. Lock assemblies must be adjusted to work in the field.

.8 Bracing:

.1 Single "H style" bracing to meet or exceed British Columbia Ministry of Transport and Highways (MOTH) High Tensile Smooth bracing specifications.

.9 Grounding: galvanized steel rods, 2.2 m long, spaced according to manufacture recommendations.

.10 Solar/Battery Energizer: fully modular construction.

.1 Stored energy: Full Power 1.7 Joules

.2 Solar Panel: 10 watt c/w hardware

.3 Battery: 12V deep cycle rechargeable battery

.4 Power Consumption: 1.7 Watts

.5 Battery Consumption: High – 0.14 Amps @ 12V

.6 Case: high impact and UV resistant

.7 Operating Functions:

.1 Battery Check

.2 Off

.3 Full Power

.4 Half Power (0.8 J)

.8 Digital Readouts:

.1 Voltage

.2 Performance meter

.9 Lightning protection.

.10 Warranty: 2yr guarantee, including lightning.

.11 CUL/CSA listed.

.9 Warning Signs:

.1 Factory supplied.

.2 Material: painted aluminium.

.3 Display at 30 m intervals

.4 Lettering:

.1 "Authorized Person Only – Restricted Area" in both English and French.

.1 Dimensions: 750 mm x 600 mm

.2 Spacing: 1 per side and at main gate.

.2 "Warning Electric Fence"

.1 Dimensions: 300 mm x 225 mm

.2 Spacing: 30 m

.10 Miscellaneous:

.1 Insulators: Pin Lock or Claw Style

.2 Fibreglass Posts: 25 mm dia.

.3 Strain Insulators:

.1 High grade polycarbonate

.2 UV resistant

.3 Pre-attached stainless steel rope

.4 Warranty: 10 years

.4 Inline Spring & Inline Tensioner: Wheel or Daisy Style, galvanic, installed near the center of the total fence line span for an even pull in both directions for each span.

.5 Offsets:
- .1 Style: Wood Post Pinlock
- .2 Length: 125 mm
- .3 Material: High density polyethylene plastic
- .4 Finish: UV resistant, white
- .5 Warranty: 10 years

.6 Undergate and Leadout Cable:
- .1 Wire: 2.7 mm aluminium coated wire core.
- .2 Resistance: 11.5 Ohms per kilometre
- .3 Warranty: 10 years

.7 Gate Cut-Off Switches:
- .1 Fully sealed, weatherpoof and dirt resistant.
- .2 Made from impact resistant materials. Includes UV stabilized plastic.
- .3 Highly visible ON/OFF positions.

PART 3 - EXECUTION

3.1 Temporary Erosion and Sediment Control

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

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

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

3.2 Order of Replacement

.1 Complete all work as shown in the plans and specifications.

3.3 Existing Fence Removal

.1 Existing fencing to be removed and disposed of as directed in an

approved landfill location. Concrete foundations to be removed.

3.4 Fence Installation

.1 Grading:

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

.2 Ground line for the fence to be smooth and continuous for a minimum of 1 m on both sides of the fence. Minor ground undulations shall be corrected to obtain a smooth uniform grade, but appreciable grade depressions may be backfilled only with the permission of the Departmental Representative.

.3 Provide clearance between bottom of fence and ground surface of 30 mm to 50 mm.

.2 Erection of Fence:

.1 Erect fence along lines as indicated by the contract drawings, the Departmental Representative and to CAN/CGSB-138.3.

.2 Excavate post holes as shown on contract drawings and as directed by the Departmental Representative.

.3 Space line posts 3.5 m apart, measured parallel to ground surface.

.4 Brace Panels:

.1 Include intermediate brace panels, double intermediate brace panels consisting of two intermediate brace panels back to back and end post panels.

.2 Constructed and installed as shown on the Drawings.

.3 Cross wires shall be twisted to provide suitable tension, in the manner illustrated on the Drawings.

.4 Bracing wire must be galvanized and a minimum of 9 gauge.

.5 The spacing between adjacent intermediate brace panels, and between intermediate brace panels and end post panels, will not be more than 54 m, unless otherwise permitted by the Departmental Representative.

.6 Intermediate brace panels shall be installed where necessary to meet the foregoing requirement, and also where required at changes in vertical or horizontal alignment.

.7 Double brace panels will be used at corners and other sharp changes in the vertical or horizontal alignment, and at any other locations where they are, in the judgement of the Departmental Representative, required to maintain the integrity of the fence.

.8 End post panels will be installed where the fence ties in to structures or gates, at ungulate guards and at any other termination of the fence.

.5 Wood posts:

.1 To be installed plumb and to a depth of 1500 mm, as indicated on the Drawings. Posts may be either driven or set in excavated holes, provided that a rigid installation is achieved, capable of withstanding a horizontal load of 32 kg, applied 1.5 m above the ground, in any direction in the horizontal plane, without any movement in excess of 25 mm.

.2 The horizontal load test must be conducted after the post is installed but before the fabric wire is attached. It is the responsibility of the Contractor to conduct and record the horizontal load test. The results of the horizontal load test must be submitted to the Departmental Representative upon request.

.3 No cutting of pressure treated wood posts will be permitted without authorization of the Departmental Representative. When cutting is authorized, the cut must be only at the top of the post. All cuts must be resealed immediately with a preservative, conforming to CSA O80, having properties equal to or superior to the original pressure treatment solution and of a similar colour.

.6 Steel posts:

.1 To be installed plumb and to the specified depth, as indicated on the Drawings. Notwithstanding, anything to the contrary in the steel post embedment details shown on the Drawings, any part of the post embedment that is excavated will be backfilled entirely with well-compacted concrete conforming to Section 03 30 00 – Cast-in-Place Concrete.

.2 Posts set in organic or other soft soils shall have a total embedment length of 1800 mm. If the post is driven, the top 800 mm will be set in a concrete footing with a minimum diameter of 350 mm.

.3 Corner posts or brace panel posts in soft ground will also have an embedment length of 1800 mm. If the post is driven, the top 1250 mm will be set in concrete footings with a minimum diameter of 350 mm.

.4 Any damage to galvanized coatings must be repaired to meet CAN/CSA G164M Table 1.

.5 Posts will be installed with galvanized steel post caps.

.6 Posts set to provide a rigid installation capable of withstanding a horizontal load of 32 kg, applied 1.5 m above the ground, in any direction in the horizontal plane, without any movement in excess of 25 mm. The horizontal load test must be conducted after the post is installed but before the fabric wire is attached. It is the responsibility of the Contractor to conduct and record the horizontal load test. The results of the horizontal load test must be submitted to the Departmental Representative upon request.

.7 Fence Fabric:

.1 Wood Posts: the wire fence fabric shall be stapled to each post, using a maximum vertical spacing of 150 mm including both the top and bottom wires. Staples will be

barbed and galvanized steel, 3.5 mm in diameter with a driven length of at least 50 mm.

.2 Steel Posts: fence fabric will be attached with a minimum of four (4) galvanized muffler clamps (e.g. MC12300 P type); one on the top strand, one 0.60 m below the top strand, one 1.20 m below the top strand, and one on the bottom wire of the fence fabric. Intermediate connections will be made every 300 mm along the post with 3.5 mm galvanized wire twisted to form a tight connection.

.3 The wire fence fabric shall be tensioned to provide a uniform pull in order to minimize distortion of the fabric. Each run of fence fabric between brace panels will be tensioned before staples are set or clamps tightened. Stretch tightly to tension recommended by manufacturer and fasten to end, corner, gate and straining posts with tension bar secured to post with tension bar bands spaced at 300mm intervals.

.4 Tension of the fence fabric will be considered adequate when the fabric cannot be pulled more than 100 mm out of line with a 13.6 kg pull at any point from top to bottom between the posts. The allowable 100 mm will include any deflection of the post, should this occur.

.5 Where the fence crosses gullies or drainage channels, a specially fabricated section of fence will be cut to fit the opening and will be fastened to the bottom wire and the streambed as shown on the Drawings.

.8 Electric Fence:

.1 Install in accordance with Manufacturer's recommendations.

.2 Installation to be done by a Contractor specializing in wildlife exclusion (electric) fencing. Company name and experience to be submitted to Departmental Representative for approval.

.3 Positive wire will be secured at ends with turbo strain insulators knot tied. Negative wires will be secured by end knot tie, crimped, or "gripple".

.4 Wire tie tails will be utilized to make a nice clean minimal wire clamp connections.

.5 Each wire will have one permanent galvanized inline springs and mechanical inline (wheel or Daisy style) tensioner installed near the center of the total fence line span for an even pull in both directions for each span.

.6 Gate Crossings: electric fence

.1 Positive wire cables will be placed inside plastic water pipe before burying under gates with machinery/vehicle traffic over the cable for extra protection and for ease of replacement if required.

.2 All undergate and lead out cables will be trenched installed to a minimum depth of 0.6m.

.3 Connection Treatments at Structures:

.1 Fences must be securely attached to walls, abutments, ungulate guards and other structures to ensure stability of the fences and to prevent animals from passing between the fence and the structure.

.2 The fence must be attached as per BC MOTH DWG SP700-11 using rock bolts as per BC MOTH DWG SS 206.

.4 Repair deficient sections of fence as indicated to meet specifications.

3.5 Gate Installation

.1 Install gates in locations as indicated.

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

.3 Install gate stops where required.

3.6 Clean-Up

.1 Clean and trim areas disturbed by operations.

.2 Dispose of surplus material and restore areas adjacent to the new fence with native top soil.

END OF SECTION

PART 1 - GENERAL

1.1	Section Includes	.1	Removable bollards and ground sleeves.
1.2	Related Sections	.1	Section 01 33 00 – Submittal Procedures.
1.3	References	.1	Codes and standards referenced in this section refer to the latest edition thereof.
		.2	American Society for Testing and Materials (ASTM)
			.1 ASTM A513 Type 1 – bollard post
			.2 ASTM A513 Type 5 – bollard ground sleeve
1.4	Performance Requirements	.1	Bollard will remove completely from the ground sleeve and provide flush surface
		.2	Replace bollard with galvanized filler piece.
		.3	Follow manufacturer's specifications and installation instructions as required.
1.5	Submittals	.1	Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.
1.6	Quality Control	.1	Bollard and ground sleeves must be factory supplied to provide consistent quality in appearance and performance.
1.7	Delivery, Storage and Handling	.1	Inspect materials upon receipt to ensure that the correct materials have been received and that they are in good condition.
		.2	If not installing immediately, store units to avoid damage from other construction activities and the elements.

PART 2 - PRODUCTS

2.1 Materials

.1 Bollards supplied should be free from surface blemishes and defects where exposed to view in the finished installation.

.2 Steel Tube: ASTM A513 Type 1, ASTM A513, Type 5

.3 Minimum Standard

.1 TrafficGaurd RPT Series

2.2 Finishes

.1 All surfaces to be primed with rust & corrosion resistant, zinc rich primer w/ 5,000 hour salt spray performance.

.2 Standard finish, TGIC Polyester outdoor finish RAL1028 Yellow. TGIC Polyester powder definition; meets decorative and functional requirements for gloss retention, physical properties, chemical resistance and weatherability.

PART 3 - EXECUTION

3.1 Installation

.1 Comply with manufacturer provided instructions and drawings.

.2 Ground sleeves should be installed with the top of the sleeve set flush with the finished surface.

.3 Ensure that a minimum of a 75 mm gravel base is put down prior to installation to ensure drainage of the bollard, per installation details.

.4 Bollard should not be inserted into the ground sleeve until it is leveled and fully cured. Attach bollard per manufacturer instructions.

.5 If touch up painting in the field, ensure no paint impacts moving parts which may restrict the bollard's proper function.

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes

.1 Materials and installation for constructing new outfall structures, precast and cast-in-place manholes and catch basins.

1.2 Related Sections

.1 Section 01 11 05 – General Instructions.

.2 Section 03 30 00 – Cast-In-Place Concrete

.3 Section 31 00 99 – Earthworks for Minor Works

.4 Section 33 41 00 – Storm Utility Drainage Piping

1.3 References

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

- .1 M A48/A48M, Standard Specification for Gray Iron Castings.
- .2 ASTM C139, Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes.
- .3 ASTM C478M, Specification for Precast Reinforced Concrete Manhole Sections Metric

.2 Canadian General Standards Board (CGSB).

- .1 CAN/CGSB-8.1, Sieves, Testing, Woven Wire, Inch Series.
- .2 CAN/CGSB-8.2, Sieves, Testing, Woven Wire, Metric.

.3 Canadian Standards Association (CSA International).

- .1 CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.
- .2 CAN/CSA-G30.18-M92, Billet Steel Bars for Concrete Reinforcement.
- .3 CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles.

1.4 Submittals

.1 Submit manufacturer's test data and certification at least 4 weeks prior to beginning Work. Include manufacturer's drawings, information and shop drawings where pertinent.

1.5 Scheduling of

.1 Schedule work to minimize interruptions to existing services and to

Work

maintain existing flow during construction.

.2 Submit schedule of expected interruptions for approval and adhere to approved schedule.

PART 2 - PRODUCTS

2.1 Materials

.1 Cast-in-place concrete: to Section 03 30 00 - Cast-in-Place Concrete.

.2 Concrete reinforcement: to Section 03 20 00 - Concrete Reinforcement.

.3 Precast manhole units: to ASTM C478M, circular or oval. Top sections eccentric cone or flat slab top type with opening offset for vertical ladder installation.

.4 Precast catch basin sections: to ASTM C478M.

.5 Joints: to be made watertight using rubber rings.

.6 Mortar:

.1 Aggregate: to CSA A82.56.

.2 Cement: to CAN/CSA-A8.

.7 Ladder rungs: to CAN/CSA-G30.18, No.25M billet steel deformed bars, hot dipped galvanized to CAN/CSA-G164. Rungs to be safety pattern (drop step type).

.8 Adjusting rings: to ASTM C478M.

.9 Concrete Brick: to CAN3-A165 Series.

.10 Drop manhole pipe: to be same as sewer pipe.

.11 Steel gratings, I-beams and fasteners: as indicated.

.12 Frames, gratings, covers to dimensions as indicated and following requirements:

.1 Metal gratings and covers to bear evenly on frames. A frame with grating or cover to constitute one unit. Assemble and mark unit components before shipment.

.2 Gray iron castings: to ASTM A48/A48M, strength class 30B.

.3 Castings: coated with two applications of asphalt varnish or

cleaned and ground to eliminate surface imperfections.

.4 Manhole frames and covers: heavy duty municipal type for road service; Cover cast without perforations and complete with two 25 mm square lifting holes.

.13 Granular bedding and backfill meeting the following requirements:

.1 Crushed screed stone, gravel or sand.

.2 Granulations to be within limits specified when tested to ASTM C136. Sieve sizes to CAN/CGSB-8.1.

.3 TABLE

Sieve Designation	% Passing Stone/Gravel	Gravel/Sand
200 mm	-	-
75 mm	-	-
50 mm	-	-
38.1 mm	-	-
25 mm	100	-
19 mm	-	-
12.5 mm	65-90	100
9.5 mm	-	-
4.75 mm	35-55	50-100
2.00 mm	-	30-90
0.425 mm	10-25	10-50
0.180 mm	-	-
0.075 mm	0-8	0-10

.4 Concrete mixes and materials: in accordance with Section 03 30 00 - Cast-in-Place Concrete.

2.2 Pre-Cast Vaults and Chambers

.1 Manufacturer to have AASHTO recognized third party certification

.2 Detailed shop drawing in accordance with Section 01 33 00 – Submittal Procedures

.3 All miscellaneous fittings and materials to be rated for sanitary exposure and corrosion resistant.

.4 Dosing Siphon Chamber

1. Concrete chamber dimensions: 3.0 x 1.5 x 2 m.
2. Chamber to have ø635 mm access core as shown.
3. Knock out cores to be provided as required.
4. Unit to come with lifting insert.

5. Chamber c/w ladder rungs as required.
6. Each core to have additional reinforcement placed around the core, equal or greater than the steel area removed for the core.
7. Minimum 25mm cover for all reinforcing steel.
8. Approximate mass:
   - -top section: 7,380 kg
   - -bottom section: 6,325 kg
9. Minimum concrete strength: 35 mpa.
10. Minimum rebar yield strength: 414 mpa.
11. Rebar to be Hot-Dip Galvanized

.5 Sanitary Dump Station

1. Detailed shop drawing submission required
2. Concrete vault inside dimensions: 3.0x1.5x1.1m
3. Chamber c/w 254mm thick lid w/ triple door as shown on Contract Drawings.
4. Bottom chamber to have 0.3x0.3x1.5m trench c/w grate.
5. Unit c/w 102mmø drainage holes as shown.
6. Unit c/w rough cores for inlet/outlet as required.
7. Each core to have additional reinforcement placed around the core equal to or greater than the steel area removed for the core.
8. All reinforcement has a minimum of 25mm concrete cover.
9. Approximate mass:
   - -chamber (w/ trough): 7,000 kg
   - -lid (w/o hatch): 3,750 kg
10. Minimum concrete strength: 35 mpa
11. Minimum rebar yield strength: 414 mpa

PART 3 - EXECUTION

3.1 Excavation and Backfill

.1 Excavate and backfill in accordance with Section 31 00 99 – Earthworks for Minor Works and as indicated.

.2 Obtain approval of Departmental Representative before installing, manholes or catch basins.

3.2 Concrete Working

.1 Do concrete work in accordance with Section 03 30 00 - Cast-in-Place Concrete.

.2 Position metal inserts in accordance with dimensions and details as indicated.

3.3 Installation

.1 Construct units in accordance with details indicated, plumb and true to alignment and grade.

.2 Complete units as pipe laying progresses. Maximum of three units behind point of pipe laying will be allowed.

.3 Dewater excavation to approval of Departmental Representative and remove soft and foreign material before placing concrete base.

.4 Set precast concrete base on 150 mm minimum of granular bedding compacted to 100% corrected maximum dry density.

.5 Precast units:

.1 Set bottom section of precast unit in bed of cement mortar and bond to concrete slab or base. Make each successive joint watertight with Departmental Representative approved rubber ring gaskets, bituminous compound, cement mortar, epoxy resin cement, or combination thereof.

.2 Clean surplus mortar and joint compounds from interior surface of unit as work progresses.

.3 Plug lifting holes with precast concrete plugs set in cement mortar or mastic compound.

.6 Compact granular backfill to 95% corrected maximum dry density.

.7 Set frame and cover to required elevation on no more than 4 courses of brick. Make brick joints and join brick to frame with cement mortar. Purge and make smooth and watertight.

.8 Place frame and cover on top section to elevation as indicated. If adjustment required use concrete ring.

.9 Clean units of debris and foreign materials. Remove fins and sharp projections. Prevent debris from entering system.

.10 Install safety platforms in manholes having depth of 5 m or greater, as indicated.

3.4 Leakage Test

.1 Install watertight plugs or seals on inlets and outlets of each new manhole and fill manhole with water. Leakage not to exceed 0.3% per hour of volume of manhole.

.2 If permissible leakage is exceeded, correct defects. Repeat until approved by Departmental Representative.

.3 Departmental Representative will issue Test Certificate for each manhole passing test.

.4 Provide copy certification of leakage test acceptance to Departmental Representative. Include certification in Commissioning Manual.

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes

.1 Materials and installation for gravity sewers.

1.2 Related Sections

.1 Section 01 33 00 – Submittal Procedures.

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

.3 Section 03 30 00 – Cast in Place Concrete

.4 Section 31 00 99 – Earthworks for Minor Works

1.3 Measurement Procedures

.1 Measure supply and installation of sanitary sewer, including excavating and backfilling, thrust blocks, and granular bedding and surround, in metres of each type and size of pipe installed. Measurement will be made of actual length in place, through valves and fittings, after work has been completed.

1.4 References

.1 American National Standards Institute/American Water Works Association (ANSI/AWWA):

.1 ANSI/AWWA C900-2007, Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 Inch-12 Inch (100 mm-300 mm), for Water Distribution.

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

.1 ASTM D1557-12, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort.

.2 ASTM D2680-01(2009), Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly (Vinyl Chloride) (PVC) Composite Sewer Piping.

.3 ASTM D3034-08, Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

.4 ASTM D3350-12, Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.

.3 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.

.2 CAN/CGSB-8.2-M88, Sieves Testing, Woven Wire, Metric.

.3 CGSB 41-GP-25M-77, Pipe, Polyethylene, for the Transport of Liquids.

.4 Canadian Standards Association (CSA International):

.1 CSA B1800-11, 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).
.1 CSA B182.1-11, Plastic Drain and Sewer Pipe and Pipe Fittings.
.2 CSA B182.2-11, PVC Sewer Pipe and Fittings (PSM Type).
.3 CSA B182.6-11, Profile Polyethylene Sewer Pipe and Fittings for Leak-Proof Sewer Applications.
.4 CSA B182.11-11, Recommended Practice for the Installation of Thermoplastic Drain, Storm, and Sewer Pipe and Fittings.

.5 Department of Justice Canada (Jus):
.1 Canadian Environmental Protection Act, 1999 (CEPA).

.6 Transport Canada (TC):
.1 Transportation of Dangerous Goods Act, 1992 (TDGA).

1.5 Submittals

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

.2 Provide Departmental Representative at least 2 weeks prior to beginning Work, with proposed source of bedding materials and provide access for sampling.

.3 Submit manufacturer's test data and certification at least 2 weeks prior to beginning Work in accordance with Section 01 33 00 - Submittal Procedures.

.4 Certification to be marked on pipe.

.5 Submit manufacturers information data sheets and instructions in accordance with Section 01 33 00 - Submittal Procedures.

1.6 Delivery, Storage and Handling

.1 Deliver, store and handle materials in accordance with manufacturers' recommendations.

1.7 Waste Management and Disposal

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

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

PART 2 - PRODUCTS

2.1 Plastic Pipe

.1 Type PSM Polyvinyl Chloride (PVC): to ASTM D3034 or CSA-B182.2:
- .1 Standard Dimensional Ratio (SDR): 41.
- .2 Locked-in gasket and integral bell system.
- .4 Nominal lengths: 4 m.

.2 Acrylonitrile - Butadiene - Styrene (ABS): to ASTM D2680 or CSA-B182.2.

.3 Corrugated High Density Polyethylene (HDPE): to ASTM D3350 or CSA-B182.6.
- .1 180 kPa pipe stiffness.
- .2 Sewer class
- .3 Gasket and bell] or Mechanical non-gasket coupling system.

2.2 Pipe Bedding and Surround Materials

.1 Granular material to Section 31 00 99 – Earthworks for Minor Works and following requirements:
- .1 Crushed or screened stone, gravel or sand.
- .2 Gradations within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1 CAN/CGSB-8.2.

.2 Gradation Table.

Sieve Designation	% Passing Stone/Gravel	Gravel/Sand
200 mm	-	-
75 mm	-	-
50 mm	-	-
38.1 mm	-	-
25 mm	100	-
19 mm	-	-
12.5 mm	65-90	100
9.5 mm	-	-
4.75 mm	35-55	50-100
2.00 mm	-	30- 90
0.425 mm	10-25	10- 50
0.180 mm	-	-
0.075 mm	0- 8	0- 10

.3 Concrete mixes and materials for thrust blocks to Section 03 30 00 - Cast-in-Place Concrete.

2.3 Backfill Material	.1	As indicated.
2.4 Dosing Siphon	.1	Sanitary grade chemical resistant materials.
	.2	Siphon traps and bells to be moulded, one piece each, from black high density polyethylene. Vent piping to be constructed from schedule 40 PV pipe and fittings. All bolts and fittings to be stainless steel.
	.3	Rated for raw sewage.
	.4	Characteristics
		.1 Draw Down: 762mm
		.2 Average Discharge Rate: 28.4 L/s
		.3 Bottom of trap to bottom of discharge: 732mm
	.5	Dosing Siphon to be included as an integral component in Dosing Chamber shop drawing submittal.

PART 3 - EXECUTION

3.1 Preparation	.1	Pipes and fittings to be clean and dry.
	.2	Prior to installation, obtain Departmental Representative's approval of pipes and fittings.
3.2 Trenching	.1	Do trenching Work, in accordance with Section 31 00 99 – Earthworks for Minor Works.
	.2	Do not allow contents of any sewer or sewer connection to flow into trench.
	.3	Trench alignment and depth require approval from Departmental Representative prior to placing bedding material or pipe.
3.3 Granular Bedding	.1	Place granular bedding in unfrozen condition.
	.2	Place granular bedding material in uniform layers not exceeding 200 mm compacted thickness to depth as indicated.
	.3	Shape bed true to grade and to provide continuous, uniform bearing surface for pipe.
	.4	Shape transverse depressions as required to suit joints.
	.5	Compact each layer full width of bed to at least 95% Modified Proctor, to ASTM D1557.
	.6	Fill excavation below design elevation of bottom of specified bedding with common backfill.
3.4 Installation	.1	Lay pipes in accordance with manufacturer's recommendations.

.2 Join pipes in accordance with manufacturer's recommendations.
.3 Avoid damage to machined ends of pipes in handling and moving pipe.
.4 Lay pipes on prepared bed, true to line and grade, with pipe invert smooth and free of sags or high points.
  .1 Ensure barrel of each pipe is in contact with shaped bed throughout its full length.
.5 Begin laying at outlet and proceed in upstream direction with socket ends of pipe facing upgrade.
.6 Do not exceed maximum joint deflection recommended by pipe manufacturer.
.7 Do not allow water to flow through pipe during construction.
.8 Whenever Work is suspended, install removable watertight bulkhead at open end of last pipe laid to prevent entry of foreign materials.
.9 Install plastic pipe and fittings in accordance with CSA B182.11.
.10 Pipe jointing:
  .1 Install gaskets [in accordance with manufacturer's recommendations
  .2 Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.
  .3 Align pipes before joining.
  .4 Maintain pipe joints free from mud, silt, gravel and other foreign material
  .5 Avoid displacing gasket or contaminating with dirt or other foreign material. Gaskets so disturbed shall be removed, cleaned and lubricated and replaced before joining is attempted.
  .6 Complete each joint before laying next length of pipe.
  .7 Minimize joint deflection after joint has been made to avoid joint damage
  .8 At rigid structures, install pipe joints not more than [1.2] m from side of structure.
  .9 Apply sufficient pressure in making joints to ensure that joint is complete as outlined in manufacturer's recommendations.
.11 When stoppage of Work occurs, block pipes as directed by Departmental Representative to prevent creep during down time.
.12 Plug lifting holes with pre-fabricated plugs approved Departmental Representative, set in shrinkage compensating grout.

.13 Cut pipes as required for special inserts, fittings or closure pieces as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.

.14 Make watertight connections to manholes or plastic tanks.

.1 Use shrinkage compensating grout when suitable gaskets are not available

.15 Use prefabricated saddles or field connections approved by Departmental Representative, for connecting pipes to existing sewer pipes.

.1 Joints to be structurally sound and watertight.

3.5 Pipe Surround

.1 Place surround material in unfrozen condition.

.2 Upon completion of pipe laying, surround and cover pipes as indicated. Leave joints and fittings exposed until field testing is completed.

.3 Hand place surround material in uniform layers simultaneously on each side of pipe not exceeding 200 mm compacted thickness as indicated. Do not dump material within 2 m of pipe.

.4 Place layers uniformly and simultaneously on each side of pipe

.5 Compact each layer from pipe invert to mid height of pipe to at least 95% Modified Proctor, to ASTM D15578.

.6 Compact each layer from mid height of pipe to underside of backfill to at least 90% Modified Proctor, to ASTM D1557.

.7 When field test results are acceptable to Departmental Representative, place surround material at pipe joints.

3.6 Backfill

.1 Place backfill material in unfrozen condition.

.2 Place backfill material, above pipe surround in uniform layers not exceeding 200 mm compacted thickness up to grades as indicated.

3.7 Field Testing

.1 Repair or replace pipe, pipe joint or bedding found defective.

.2 When directed by Departmental Representative, draw tapered wooden plug with diameter of 95% of nominal pipe diameter through sewer to ensure that pipe is free of obstruction.

.3 Remove foreign material from sewers and related appurtenances by flushing with water.

.4 Perform infiltration and exfiltration testing as soon as practicable after jointing and bedding are complete, and service connections have been installed.

.5 Do infiltration and exfiltration testing as specified herein and as directed by Departmental Representative.

.1 Perform tests in presence of Departmental Representative.
.2 Notify Departmental Representative 24 hours in advance of proposed tests.

.6 Carry out tests on each section of sewer between successive manholes including service connections.

.7 Install watertight bulkheads in suitable manner to isolate test section from rest of pipeline.

.8 Exfiltration test.
.1 Fill test section with water to displace air in line. Maintain under nominal head for 24 hours to ensure absorption in pipe wall is complete before test measurements are begun.
.2 Immediately prior to test period add water to pipeline until there is head of 1 m over interior crown of pipe measured at highest point of test section or water in manhole is 1 m above static ground water level, whichever is greater.
.3 Duration of exfiltration test: 2 hours.
.4 Water loss at end of test period: not to exceed maximum allowable exfiltration over any section of pipe between manholes

.9 Infiltration test.
.1 Conduct infiltration test in lieu of exfiltration test where static ground water level is 750 mm or more above top of pipe measured at highest point in line to be used
.2 Do not interpolate a head greater than 750 mm to obtain an increase in allowable infiltration rate.
.3 Install watertight plug at upstream end of pipeline test section.
.4 Discontinue pumping operations for at least 3 days before test measurements are to begin and during this time, keep thoroughly wet at least one third of pipe invert perimeter
.5 Prevent damage to pipe and bedding material due to flotation and erosion.
.6 Place 90 degrees V-notch weir, or other measuring device approved by Departmental Representative in invert of sewer at each manhole.
.7 Measure rate of flow over minimum of 1 hour, with recorded flows for each 5 min interval

.10 Leakage: not to exceed following limits in litres per hour per mm of diameter per 100 m of sewer including service connections.
.1 Exfiltration, based on 600 mm head: 0.175 L

.2 Infiltration: 0.150 L.

.11 Repair and retest sewer line as required, until test results are within limits specified.

.12 Repair visible leaks regardless of test results.

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes

.1 Materials and installation for storm sewer.

1.2 Related Sections

.1 Section 31 00 99 – Earthwork For Minor Works

.2 Section 03 30 00 – Cast-in-Place Concrete

.3 Section 33 05 13 – Manholes and Catch Basin Structures

1.3 References

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

- .1 ASTM D3034, Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- .2 ASTM D2412, Standard Test Method for External Loading Properties of Plastic Pipe by Parallel-Plate Loading.
- .3 ASTM D3212, Specification for Joints for Drain and Sewer Plastic Pipes using Flexible Elastomic Seals.
- .4 ASTM F477, Specification for Elastomeric Seals (Gaskets) for joining Plastic Pipe.
- .5 ASTM D1557, Specification for Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures using 10 lb (4.54 kg) Rammer and 18 inch (475 mm) Drop.

.2 Canadian Standards Association (CSA International)

- .1 CSA B182.2, Large Diameter, Type PSM PVC Sewer Pipe and Fittings.
- .2 CSA B182.11, Recommended Practice for the Installation of Plastic Drain and Sewer Pipe and Pipe Fittings.

1.4 Definitions

.1 A pipe section is defined as length of pipe between successive catchbasins and/ or manholes.

1.5 Submittals

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

.2 Indicate proposed method for installing carrier pipe for undercrossings.

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

.4 Inform the Departmental Representative at least 4 weeks prior to beginning Work, of proposed source of bedding materials and provide access for sampling.

.5 Submit manufacturer's test data and certification at least 2 weeks prior to beginning Work.

.6 Ensure certification is marked on pipe.

.7 Submit manufacturers information data sheets and instructions in accordance with Section 01 33 00 – Submittal Procedures.

1.6 Scheduling

.1 Schedule Work to minimize interruptions to existing services and to maintain existing flow during construction.

PART 2 - PRODUCTS

2.1 Plastic Pipe

.1 Polyvinyl chloride pipe up to 1200 mm in diameter, DR35 Pipe to have minimum pipe stiffness (F/Y) of 320 kPa at 5.0% deflection, ASTM D2412. Pipe to be manufactured to specifications for pipe size ranges as follows: 100 mm dia. – 375mm dia. To ASTM D3034. Pipes to be certified by Canadian Standards Association to standards for pipe size ranges below. 100 mm dia. – 1200 mm dia. To CSA B182.2

.2 Joints: To conform to ASTM D3212; pipe to include integral bell and spigot ends with stiffened wall section and formed groove for a rubber gasket; elastomeric gaskets to ASTM F477.

.3 Maximum installed deflection not to exceed 7.5% of the base inside diameter.

2.2 Pipe Bedding And Surround Material

.1 Per section 31 00 99 – Earthworks for Minor Works.

2.3 Backfill Material	.1	Per section 31 00 99 – Earthworks for Minor Works.

PART 3 - EXECUTION

3.1 Preparation	.1	Clean pipes and fittings of debris and water before installation, and remove defective materials from site to approval of Departmental Representative.
3.2 Trenching	.1	Do not allow contents of storm sewer or storm connection to flow into trench.
	.2	Trench alignment and depth as shown on Contract Drawings.
	.3	Water jetting of backfill under haunches of corrugated steel pipe may be permitted if recommended by manufacturer and approved by the Departmental Representative.
3.3 Granular Bedding	.1	Place bedding in unfrozen condition.
	.2	Place granular bedding material in a uniform layer not exceeding 150 mm compacted thickness, surround material compacted with a hand compactor.
	.3	Shape bed true to grade and to provide continuous, uniform bearing surface for pipe. Do not use blocks when bedding pipes.
	.4	Compact each layer full width of bed to minimum 95% Modified Proctor Density in compliance with ASTM D1557.
	.5	Shape transverse depressions as required to suit joints.
	.6	Fill excavation below bottom of specified bedding adjacent to manholes or catch basins with compacted bedding material.
3.4 Installation	.1	Handle pipe in accordance with manufacturer's recommendations.

Do not use chains or cables passed through pipe bore so that weight of pipe bears upon pipe ends.

.2 Lay and join pipes to manufacturer's instructions and specifications except as noted otherwise herein. PVC pipe to CSA B182.11.

.3 Install Pipes to the following tolerances:
Horizontal tolerances: plus or minus 50 mm from specified alignment;
Vertical tolerances: plus or minus 10 mm from specified grade. Reverse grade is not acceptable.

.4 Lay pipes on prepared bed, true to line and grade. Ensure barrel of each pipe is in contact with shaped bed throughout its full length.

.5 Commence laying at outlet and proceed in upstream direction with socket ends of pipe facing upgrade.

.6 Pipes on curved alignments:

.1 Smooth profile PVC pipe: for 100 mm to 300 mm sizes conform to required curvature by bending pipe barrel. In no case is radius of curvature to be less than 300 times outside diameter of the barrel. Joint deflection not permitted for smooth profile PVC pipe.

.7 Keep jointing materials and installed pipe free of dirt, water and other foreign materials. Whenever work is stopped, install removable watertight bulkhead at open end of last pipe laid to prevent entry of water and foreign materials.

.8 Cut pipes as required, as recommended by pipe manufacturer, without damaging pipe and leave smooth end at right angles to axis of pipe.

.9 Joints:

.1 Install gaskets as recommended by manufacturer on all pipe unless specified otherwise.

.2 Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.

.3 Align pipes carefully before joining.

.4 Maintain pipe joints free from mud, silt, gravel and other foreign material.

.5 Avoid displacing gasket or contaminating with dirt or other foreign material. Remove disturbed or dirty gaskets; clean, lubricate and replace before joining is attempted.

.6 Complete each joint before laying next length of pipe.

.7 Minimize joint deflection after joint has been made to avoid joint damage.

.8 Apply sufficient pressure in making joints to ensure that joint is complete as outlined in manufacturer's recommendations.

.10 Ensure completed joints are restrained by compacting bedding material alongside and over installed pipes of as otherwise specified.

.11 When any stoppage of work occurs, restrain pipes in an approved manner to prevent "creep" during down time.

.12 Make watertight connections to manholes. Use shrinkage compensating grout when suitable gaskets are not available. Core neat circular holes in walls of existing manholes. Do not hammer or chip except as approved by the Departmental Representative.

3.5 Pipe Surround

.1 Place surround material in unfrozen condition.

.2 Upon completion of pipe laying, and after Engineer has inspected pipe joints, surround and cover pipes as indicated.

.1 Leave joints and fittings exposed until field testing is completed.

.3 Hand place surround material in uniform layers not exceeding 150 mm compacted thickness as indicated.

.1 Do not dump material within 1 m of pipe.

.4 Place layers uniformly and simultaneously on each side of pipe.

.5 Compact each layer from pipe invert to underside of pipe to at least 95 % Modified Proctor

.6 Surround material should be compacted with a hand compactor.

3.6 Backfill

.1 Place backfill material in unfrozen condition.

.2 Per section 31 00 99 – Earthworks for Minor Works.

3.7 Field Testing

.1 Repair or replace pipe, pipe joint or bedding found defective.

.2 Acceptable Ponding: Mainline PVC sewers; 300 mm diameter or less: 20 mm maximum ponding over 3m length of pipeline.

.3 Remove foreign material from sewers and related appurtenances by flushing with water.

.4 Television and photographic inspections:

.1 Carry out inspection of installed sewers by television camera, photographic camera or by other related means.

.2 Provide means of access to permit Departmental Representative to do inspections.

END OF SECTION

APPENDIX

A	Geotechnical Assessment – *Proposed Sewage Lagoon Rehabilitation- Pacific Rim National Park (Long Beach Unit)* – Ryzuk Geotechnical Engineering & Material Testing.	7 pages
B	Bio-Solids Survey – *Pacific Rim National Park – 2015 Lagoon survey results* – Lambourne Environmental Ltd.	2 pages
C	Environmental Effects Evaluation (EEE) Report	4 pages
D	Construction Sediment Management Plan – October 2015 – D.R. Clough Consulting Ltd.	7 pages
E	Environmental Monitoring Plan – October 2015 – D.R. Clough Consulting Ltd.	17 pages
F	Pre-Construction Hazard Assessment	4 pages

RYZUK GEOTECHNICAL
Engineering & Materials Testing

28 Crease Avenue, Victoria, BC, V8Z 1S3 Tel: 250-475-3131 Fax: 250-475-3611 www.ryzuk.com

October 5, 2015
File No: 8-2839-23

Public Works and Government Services Canada
641-800 Burrard Street
Vancouver, BC
V6Z 2V8
(By email: tom.dunphy@pwgsc-tpsgc.gc.ca)

Attn: Mr. Tom Dunphy, Senior Project Manager

Re: Proposed Sewage Lagoon Rehabilitation
Pacific Rim National Park (Long Beach Unit) – Ucluelet, BC

As requested, we have completed a geotechnical investigation of the soil conditions at the referenced site. The following letter summarizes the results of our investigation and associated recommendations as related to the proposed work. Our work in this regard has been carried out in accordance with our proposal, dated September 11, 2015.

PROPOSED WORKS

The site is located in the Long Beach Unit of the Pacific Rim National Park, some 1.2 kilometres northwest of the Pacific Rim Highway and Wick Road intersection. The geographic coordinates of the site expressed as latitude and longitude decimal fractions are 49.026286 and -125.652523. The sewage lagoon is rectangular shaped with an approximate area of 15,500 sq. metres, and divided into two separate cells. The northernmost facultative lagoon encompasses roughly two-thirds of the site with the remainder occupied by the southern exfiltration lagoon. Site access is by a single lane gravel road some 500 lineal metres in length, with gated access off the Pacific Rim Highway. The site is surrounded by a dense, heavily treed forest.

We have reviewed Wedler Engineering's draft letter dated August 27, 2015, and understand that a variety of upgrade/rehabilitation work is proposed for the sewage lagoon and ancillary components. The work covered in our scope of involvement, as outlined in our proposal, includes our geotechnical recommendations related to the installation of the dosing siphon chamber, dump station vault, and dump station road surfacing.

INVESTIGATION PROCEDURE

The office portion of our investigation consisted of the review of geological documentation for the Pacific Rim National Park area, and previously completed assessments of the site including Amec Foster Wheeler's geotechnical assessment dated January 14, 2015, and WSP's report dated April 2014.

The field portion of our investigation consisted of excavating six test pits with a track mounted mini excavator on September 19, 2015. The test pits were advanced in the vicinity of the proposed dosing siphon chamber (TP15-01), dump station vault (TP15-02), truck access route in the vicinity of the lagoon (TP15-03 through TP15-05), and to the south of the exfiltration lagoon (TP15-06). Soils were visually identified in the field as the excavation progressed. The approximate locations of the investigation work is indicated on the Location Plan, drawing 8-2839-23-1. The results obtained from the test pits are summarized on the enclosed Table 1: Summary of Test Pit Information

SURFACE AND SUBSURFACE CONDITIONS

At the time of our investigation, the elevation of the facultative lagoon effluent was nearing the crest of the surrounding berm, while the exfiltration lagoon appeared to be fully drained. The facultative berm also appeared to have rutting/depressions along the crest, which may have been caused by vehicle traffic or settlement of portions of the berm. We also noted water pooling at the toe of the outside slope of the berm in the northeastern corner of the property.

A gravel access road extends from the southeast corner of the site, along the eastern side of the exfiltration lagoon ending at the southeast corner of the facultative lagoon. Trucks utilize this road to offload effluent into the facultative lagoon. Due to the limited turning room at the offload location, trucks appear to perform a multi-point turn at the southeast corner of the faculative lagoon. It appears that the current truck turning area is not of a sufficient size as the repeated truck traffic has caused significant rutting to the crest of the facultative lagoon berm.

The site is located in the Estevan Coastal Plain which is generally comprised of interbedded layers of sand, gravel, silt, followed by a considerable thickness of clay. Subsurface soil conditions in the vicinity of the dosing siphon chamber and dump station vault generally consist of 2.4 metres of non-select fill atop native dense grey gravelly sand. The thickness of fill along the gravel road adjacent to the exfiltration lagoon decreased from a maximum of 2.4 metres (TP15-02) to 1.2 metres when progressing east away from the berm (TP15-05).

GEOTECHNICAL ASSESSMENT AND RECOMMENDATIONS

On the basis of our investigation, we do not anticipate any unique geotechnical issues relating to development as proposed at this site.

Dosing Siphon Chamber & Dump Station Vault Considerations

Soil conditions in the vicinity of the dosing siphon chamber and dump station vault generally consist of 2.4 metres of non-select fill atop native dense grey gravelly sand. The native soils present at the site are capable of providing long term stable support to these structures; however, the non-select fill is not suitable for support or as backfill material, and should be removed. The structures should be placed directly atop the native sand, or engineered fill placed on top of such. If engineered fill is required to achieve desired elevations, then such must extend horizontally away in all directions from the edge of the chamber and vault a distance equal to the thickness of fill placed. Engineered fill should consist of a well graded granular crushed rock product (or other material approved by a geotechnical engineer). Fill must be compacted to at least 95% of Standard Proctor Maximum Dry Density (SPMDD) value.

Given the proximity of the dosing siphon chamber and dump station vault to the banks of the existing lagoons, we understand it may be desired to backfill/reinstate the surficial clay to aid in preventing migration of effluent/water seepage. It may be difficult to suitably compact clay due to the assumed size/configuration of the excavations. As such, some settlement of the clay fill should be expected. If settlement is unacceptable, then we recommend utilizing a controlled density fill (CDF). Clays are moisture sensitive and care should be taken when placing clay if precipitation is expected. Clay should be placed immediately after the excavation from the borrow site such that the clay is close to its natural moisture content.

We expect excavations during construction will be on the order of 2.4 m. Given the soil conditions encountered, we expect cutslopes will be stable at the following configurations:

- 0.75 H : 1.0 V for the variable fill materials,
- 0.5 H : 1.0 V for native dense grey gravelly sand

Topsoil should be pulled back from the top of the excavations so as to eliminate any chance these materials might slough into the opening. According to WorkSafeBC guidelines, excavations deeper than 1.2 m must be inspected and approved by a qualified geotechnical professional.

Dump Station Road Considerations

The existing dump station road adjacent to the exfiltration lagoon consists of a surficial thickness of pit run some 0.6 to 0.9 metres thick, atop 1.2 to 1.8 metres of non-select fill followed by native dense grey gravelly sand. We are unsure of the past performance of the gravel road, but noted a stockpile of crushed rock material on the side of the access road, which appears to have been used to fill depressions in the gravel road in the past. We understand it may be desired to rehabilitate this road.

We recommend removing all existing fill to 525 mm below the proposed road surface elevation, and performing a proof roll test under the supervision of a geotechnical engineer. This test involves observing the passage of truck tires from a fully loaded tandem axle gravel truck to identify areas of excessive deflection or isostatic rebound. These areas, if such exist, can then be over excavated, suitably filled, and retested. The existing fill material would then be compacted followed by placement of a 300 mm sub-base course of 75 mm minus crushed rock. A base course consisting of 150 mm of 19 mm minus crushed rock would then be placed, followed by a 75 mm thickness of asphalt. The final configuration of slopes supporting the road structure should be sloped at 2H:1V or flatter for long-term stability.

It should be noted that in areas where the trucks are required to repeatedly turn their tires, the asphalt surface will likely prematurely experience rutting/cracking. This may be resolved by constructing a concrete slab on grade in the truck turning areas or possibly utilizing geogrid reinforcement to strengthen the sub-base/base materials.

CLOSURE

We trust the preceding is suitable for your purposes at present. Please contact our office if we can be of further assistance.

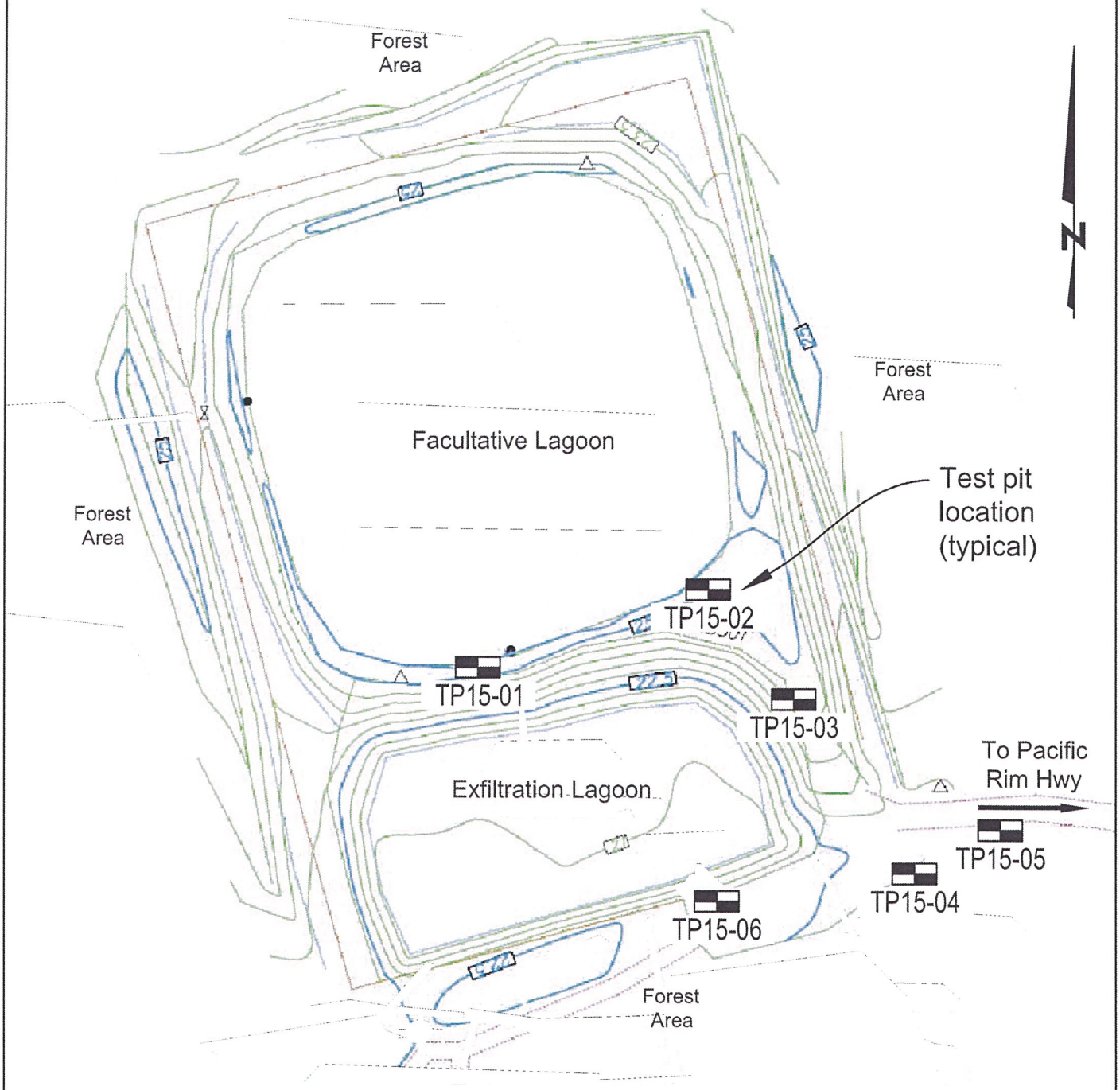
Yours truly,
Ryzuk Geotechnical

Christian J. Flanagan, EIT
Project Engineer

S. W. Moore, P.Geo.
Professional Geoscientist

Enclosures: Location Plan, drawing 8-2839-23-1
Table 1: Summary of Test Pit Information

cc: Wedler Engineering
Attn: Mr. Sam Rogers (by e-mail: srogers@wedler.com)



Notes:

1. Base plan from Kenyon Wilson, unknown date of survey.
2. Test pit locations are within +/- 2.0 metres.
3. All measurements shown in metres.

	Public Works and Government Services Canada	DRAWN CJF
	LOCATION PLAN Proposed Sewage Lagoon Rehabilitation Pacific Rim National Park (Long Beach Unit) Ucluelet, BC	DATE September, 2015 APPROVED SCALE 1:1000
	RYZUK GEOTECHNICAL **Engineering & Materials Testing**	DRAWING No. 8-2839-23-1

RYZUK GEOTECHNICAL
ENGINEERING & MATERIALS TESTING

Practical. Innovative. Experienced.

Project: Proposed Sewage Lagoon Rehabilitation
Pacific Rim National Park (Long Beach Unit) - Ucluelet, BC

Client: Public Works and Government Services Canada

Investigation Date: September 19, 2015 Inspector: CJF
Location: See Location Plan drawing 8-2839-23-1 Ryzuk Job Number: 8-2839-23

Table 1: Summary of Test Pit Information

Test Pit 15-01 (TP15-01) - Estimated elevation +25.0 m geodetic

Stratigraphy:

0.0	to	0.1 m	Topsoil – dark brown, roots, wet
0.1	to	0.5 m	Fill – grey, sand, medium to coarse grained, trace silt, wet
0.5	to	2.4 m	Fill – sand, silt, clay, reddish brown, wood debris, branches, organic layers
2.4	to	3.7 m	SAND – dense, grey, gravelly, trace silt, medium grained
	at	3.7 m	End of test pit – machine refusal at limit of machinery

Notes: Minor seepage observed at bottom of test pit.

Test Pit 15-02 (TP15-02) - Estimated elevation +25.0 m geodetic

Stratigraphy:

0.0	to	0.6 m	Fill – sand and gravel (pit run)
0.6	to	1.2 m	Fill – sand, brown, silty, organics, strong odour
1.2	to	2.0 m	Fill – sand and gravel, grey, silty, organics
2.0	to	2.4 m	Fill – silt and sand, reddish brown, organics, roots
2.4	to	3.4 m	SAND – dense, grey, gravelly, trace silt, medium grained
	at	3.4 m	End of test pit – desired material

Notes: No seepage observed.

Test Pit 15-03 (TP15-03) - Estimated elevation +24.5 m geodetic

Stratigraphy:

0.0	to	0.6 m	Fill – sand and gravel (pit run)
0.6	to	2.1 m	Fill – sand, brown, silty, gravelly, wood debris
2.1	to	2.7 m	SAND & GRAVEL – dense, grey, trace silt, medium grained
	at	2.7 m	End of test pit – desired material

Notes: Minor seepage observed at bottom of test pit.

Test Pit 15-04 (TP15-04) - Estimated elevation +22.5 m geodetic

Stratigraphy:

0.0	to	0.9 m	Fill – sand and gravel (pit run), wood debris
0.9	to	2.1 m	Fill – sand, reddish brown, silty, gravelly, wood debris
2.1	to	2.7 m	SAND & GRAVEL – dense, grey, trace silt, medium grained
	at	2.7 m	End of test pit – desired material

Notes: Minor seepage observed at bottom of test pit.

Test Pit 15-05 (TP15-05) - Estimated elevation +22.5 m geodetic

Stratigraphy:

0.0	to	0.15 m	Fill – sand and gravel (pit run)
0.15	to	0.9 m	Fill – sand, reddish brown, silty, gravelly, wood debris
0.9	to	1.5 m	SAND & GRAVEL – dense, grey, trace silt, medium grained
	at	1.5 m	End of test pit – desired material

Notes: Minor seepage observed at bottom of test pit.

Test Pit 15-06 (TP15-06) - Estimated elevation +22.0 m geodetic

Stratigraphy:

0.0	to	0.1 m	Topsoil – dark brown, roots, wet
0.1	to	1.8 m	Fill – sand, brown, silty, organics, strong odour
1.8	to	2.7 m	SAND & GRAVEL – dense, grey, trace silt, medium grained
	at	2.7 m	End of test pit – desired material

Notes: Minor seepage observed at bottom of test pit.

LAMBOURNE ENVIRONMENTAL Ltd.
51 Belich Crescent, Red Deer County, AB T4S 2K5

September 25, 2015

Re: Pacific Rim National Park – 2015 Lagoon survey results

Please find following the lagoon survey results for the two cells that we surveyed on September 1, 2015. Our survey process and methodology was as per our proposal.

Cell	Total Volume (m^3)	Sludge Volume (m^3)	Total Depth (m)	Max Sludge Depth (m)	Average Sludge Depth (m)
1	8,600	3,050	1.8	1.6	0.6

There was a significant amount of floating "islands" of grass and weeds on the cell. They were localized in the northwest portion of the cell. We also found that the solids in the cell were quite gritty with sand and small gravel present especially in the southeast corner where the trucks were unloading.

If you have any questions regarding this please do not hesitate to contact the undersigned.

Yours truly,
Lambourne Environmental Ltd.

Blair Benn
Sales Manager
403-348-8298 office
403-348-3208 mobile

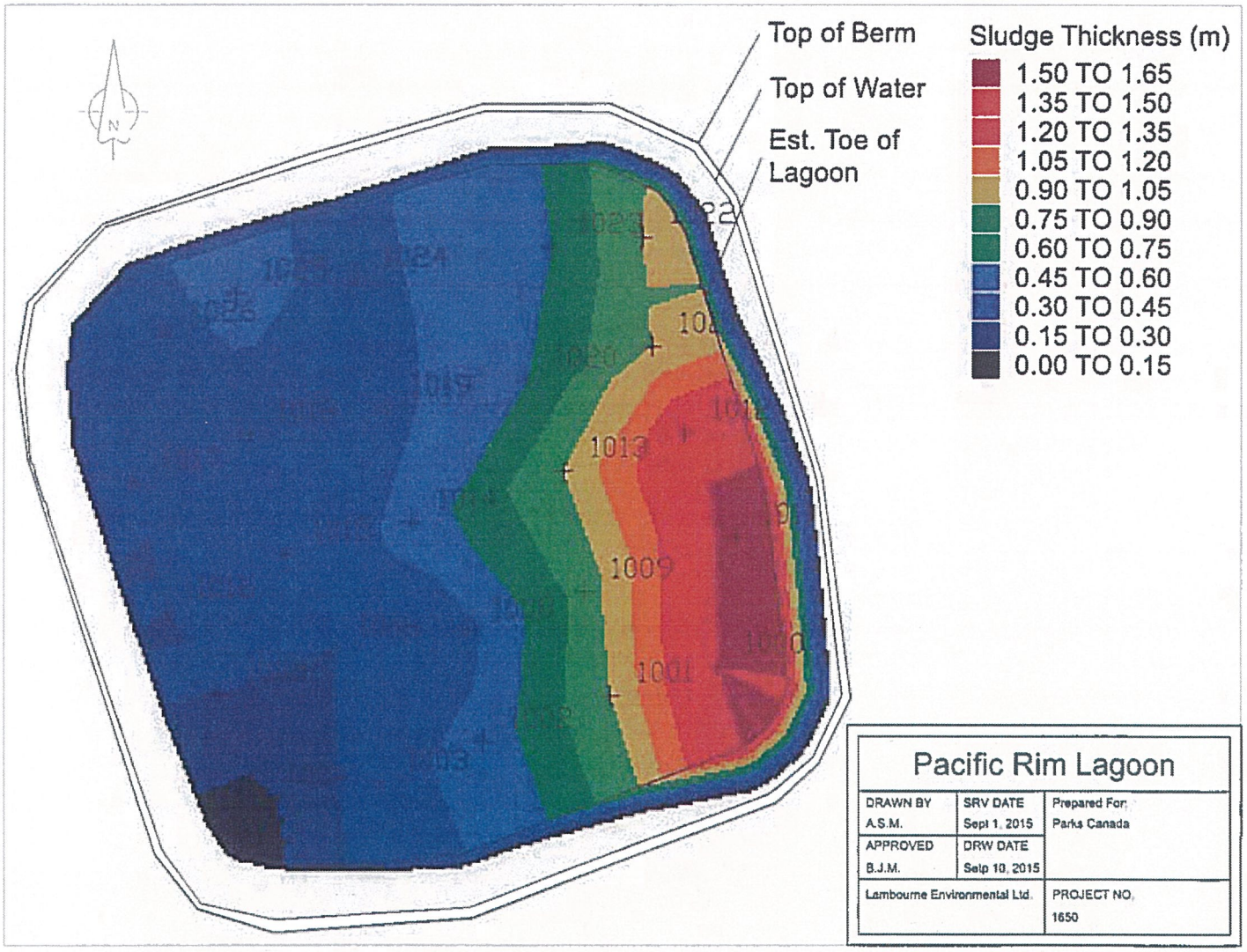

Top of Berm
Top of Water
Est. Toe of Lagoon
Sludge Thickness (m)
1.50 TO 1.65
1.35 TO 1.50
1.20 TO 1.35
1.05 TO 1.20
0.90 TO 1.05
0.75 TO 0.90
0.60 TO 0.75
0.45 TO 0.60
0.30 TO 0.45
0.15 TO 0.30
0.00 TO 0.15
1013
1009
1001
Pacific Rim Lagoon
DRAWN BY A.S.M.
SRV DATE Sept 1, 2015
Prepared For: Parks Canada
APPROVED B.J.M.
DRW DATE Sep 10, 2015
Lambourne Environmental Ltd.
PROJECT NO. 1650

Table 2.1 – 2.5: Potential Project / Valued Ecosystem Interactions and Mitigation Measures *(S.2(1))*

Table 2.1 Valued Ecosystem Component: Physical and Cultural Heritage; HAPA Significance				
Potential Effect: Harmful effects to HAPA, heritage or cultural resources				
Potential Interaction	**Mitigation**			
Excavation and clearing activities could result in the disturbance or destruction of heritage and cultural resources such as archaeological deposits (artifacts, burial sites, midden sites) or other culturally significant resources (i.e., culturally modified trees)	For the proposed Sewage Lagoon Project area, Golder (2014a) recommends ground disturbing activities operate under a Chance Find Procedure. In the event archaeological materials are observed, all work should stop and a qualified archaeologist be contacted.			
Magnitude	**Reversibility**	**Geographic Extent**	**Duration**	**Frequency**
Small	Irreversible	Immediate	Long-Term	Once
Residual Effects:	Significant			
Monitoring:	Ground disturbing activities should operate under a Chance Find Procedure. In the event archaeological materials are observed, all work should stop and a qualified archaeologist be contacted.			
Comments:				

Table 2.2 Valued Ecosystem Component – Fish; Water				
Potential Effect: Groundwater and surface water contamination, serious harm to fish.				
Potential Interaction	**Mitigation**			
Sedimentation or release of other deleterious substance to fish-bearing surface waters. Contamination of surface and groundwater from accident or mishap.	Machinery must be checked for leakage of lubricants or fuel and must be in good working order. Refueling must be done at least 30 m from any water body and on an impermeable surface. Secondary containment should be provided for fuel containers and small fuelled machinery (i.e., pumps, generators). Potential effects to fish and fish habitat due to the potential introduction of contaminants into the environment should be minimized through development and implementation of a site specific Erosion and Sediment Control Plan and Spill Prevention and Emergency Response Plan. All spills or leaks must be promptly contained, cleaned up and reported to the 24-hour environmental emergencies reporting system (1-800-565-1633). All waste materials must be disposed of in compliance with the requirements of the B.C. *Environmental Management Act* and associated regulations applicable to the chosen disposal site. The disposal site should be a licensed, off-site facility legally permitted to receive and dispose of the waste materialsPreventative measures should be implemented in anticipation of the potential generation and release of sediment-laden water during construction (e.g., silt fences, straw bales, check dams, interception ditches), and should be implemented and maintained as necessary in accordance with permits and approvals, Best Management Practices (i.e., B.C. MoE Instream works best management practices guidebook, http://env.gov.bc.ca/wld/instreamworks/generalBMPs.htm) and anticipated field conditions. These structures are to be left in place until vegetation is re-established and/or all exposed soils are stabilized. Clearing should take place immediately prior to excavation and earthworks to minimize the length of time that soils are exposed. Excavation soil, any construction waste or other substances deleterious to aquatic life should be disposed of, or placed in such a manner, so as to prevent their entry into nearby watercourses. Works should be suspended during intense rainfall events or whenever surface erosion occurs which may potentially affect aquatic receptors. Collect and contain all concrete wash water for disposal at an approved facility, off-site. Provide containment facilities for the wash-down water from concrete delivery trucks, concrete mixing or pumping equipment, and other associated tools and equipment. These facilities shall be sited a minimum of 30 m from any watercourse, water body or surface drainage features. All construction works involving the use of concrete, cement, mortars, grout and other Portland cement or lime-containing construction materials should be conducted so that sediments, debris, concrete, and concrete fines are not deposited, either directly or indirectly, into the environment. Do not dispose of excess concrete on-site.			

Magnitude	**Reversibility**	**Geographic Extent**	**Duration**	**Frequency**
Small	Reversible	Immediate	Short-term	Intermittent
Residual Effects:	Insignificant			
Monitoring:	Recommended.			

Comments: All workers should be trained to identify potentially contaminated materials. Erosion and sediment controls should be installed and implemented prior to the start of construction activities and must be maintained to be functional for the duration of the Project. Environmental monitoring of construction activities by qualified personnel can further significantly reduce the potential for adverse effects by helping to identify and mitigate potential concerns and by verifying that the implemented mitigation measures are effective.

Table 2.3 Valued Ecosystem Component – Birds, Wildlife and Wildlife Habitat				
Potential Effect: Disturbance to wildlife, direct harm to amphibians, loss of bird habitat.				
Potential	**Mitigation**			
Project activities may result in direct harm or disturbance to wildlife and their habitat. Adverse effects to native vegetation through the introduction or proliferation of exotic or invasive species	Retain natural vegetation as much as possible, particularly trees. Minimize disturbance to retained vegetation by physically delineating construction limits with snow fencing or other visible barrier during construction; Treat and/or properly dispose[2] of invasive plant species to prevent further invasion of naturally vegetated areas and to increase the chance of survival of future plantings. Machinery on-site should also be cleaned before moving from infested to uninfested areas and prior to leaving the site. Any imported fill material should be clean and free of any contaminants and invasive species; Plant and seed with native species and avoid planting of invasive, non-native species during landscape activities. Planting high quality, weed-free native grass seed mixes and native trees and shrubs will help to prevent importation and distribution of non-native noxious weeds and minimize the amount of watering and maintenance required. Re-vegetate disturbed areas as quickly as possible during site development. If possible, plan seeding and planting to allow establishment before the end of the growing season. If there is insufficient time remaining in the growing season for seeds to germinate, the site should be stabilized and vegetated the following spring. Use mulches and other organic stabilizers to minimize erosion until vegetation is established on sensitive soils Complete clearing and grubbing during the least risk window of August 1 to April 30 (MoE 2014e). However, nests may be occupied and active outside of this window, and some nests (i.e., eagles, herons) are protected year round under Provincial legislation. It is recommended that a breeding bird and raptor nest survey be conducted by a qualified wildlife biologist to confirm the presence and/or non-detection of active nest sites, including raptor nests. In the event that an active nest is encountered, clearing and site preparation activities should be re-scheduled to avoid potential effects and to avoid contravention of the *Canada Migratory Birds Convention Act* and the *B.C. Wildlife Act.* No raptor or heron stick nests or other raptor nests (i.e., owl, hawk) were identified within the study area. If raptor nests are identified prior to or during construction, appropriate setbacks should be established in accordance with Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia (MoE 2013). Potential effects to wildlife and wildlife habitat due to the potential introduction of contaminants into the environment should be minimized through development and implementation of a site specific Erosion and Sediment Control Plan and Spill Prevention and Emergency Response Plan. Due to the limited potential presence of and negligible impacts predicted to most identified wildlife species at-risk within the proposed development area, no species-specific mitigation is recommended. However, it is recommended that a survey be conducted of the areas directly affected by site preparation and construction for the potential presence of amphibians, and, if needed, "salvaged" and relocated to suitable nearby habitat.			
Magnitude	**Reversibility**	**Geographic Extent**	**Duration**	**Frequency**
Small	Reversible	Immediate	Short-term	Once
Residual Effects:	Insignificant			
Monitoring:	Pre-clearing amphibian and bird nest surveys are recommended.			
Comments: The potential exists for the disturbance of wildlife and birds due to an increase in noise and activity around the project site. Such effects are likely to be of short duration and confined to the project site and can be avoided through the application of effective mitigation measures.				

[2] Invasive species materials should be handled, treated and disposed of in compliance with B.C. Provincial (i.e., Weed Control Act) and municipal bylaw requirements, if applicable to the disposal site.

Table 2.4 Valued Ecosystem Component – Soil (Surface and Subsurface) Quality				
Potential Effect: Erosion and contamination of soils.				
Potential Interaction	**Mitigation**			
Disturbance to soil from heavy equipment use. Contamination of soil from accident or mishap Contamination of soil due to placement of contaminated fill.	Contaminated soils either encountered or generated must be assessed, remediated and disposed of in compliance with the *B.C. Environmental Management Act* and associated regulations. Contaminated soil must be stored on-site for the shortest time possible, covered, and be disposed of at an approved facility. Erosion control structures (temporary matting, geotextile filter fabric) are to be used, as appropriate, to prevent erosion and release of sediments and/or sediment laden water during the construction phase. These structures are to be left in place until vegetation is re-established and/or all exposed soils are stabilized. The exposed soil area must be minimized by limiting the area that is exposed at one time and by limiting the time that any one area is exposed. All stockpiled soil must be covered and/or dyked to prevent erosion and release of sediment laden water. Wherever possible, exposed soil is to be replanted or sodded to restabilize soils. Any imported fill material should be free of invasive species and contaminants (i.e., compliant with Canadian Environmental Quality Guidelines (CEQG) – Soil Quality Guidelines for the Protection of Environmental and Human Health; and/or the *B.C. Environmental Management Act* and Contaminated Sites Regulation criteria for parkland use. Native soils that are excavated should be reused on-site as backfill. Works should be suspended during intense rainfall events or whenever surface erosion occurs which may potentially affect aquatic receptors. No wastes are to be disposed of on-site (burned, buried uncontrolled discharge). Disposal of demolition, construction and non-recyclable waste shall occur off-site at a disposal facility licensed to accept the respective materials for disposal.			
Magnitude	**Reversibility**	**Geographic Extent**	**Duration**	**Frequency**
Small	Reversible	Immediate	Short-term	Intermittent
Residual Effects:	**Insignificant**			
Monitoring:	**None required**			
Comments: Construction activities could result in the mobilization of on-site soils, especially during precipitation events. Such runoff events are likely to be of short duration and confined to the project site. The implementation of effective mitigation measures can reduce such effects to insignificant levels.				

Construction Sediment Management Plan

for

Parks Canada Public Works Canada. Pacific Rim Pacific Rim National Park Sewage Lagoon Rehabilitation Project

Prepared By:
D.R. Clough Consulting

6966 Leland Road

Lantzville, B.C. V0R 2H0

250-390-2901

October, 2015

Introduction:

This report is a Construction Sediment Management Plan to address environmental protection during the Long Beach Sewer Lagoon Rehabilitation project. The plan was developed by Brad Remillard, RPBio. The design was completed by Wedler Engineering LLP. All works are to be completed following the BC Ministry of Environment Best Management Practices document: *Standards and Best Practices for Instream Works, 2004* as well as the *DFO Land Development Guidelines for the Protection of Aquatic Habitat*

An environmental monitor will be required to be on site to ensure safe practices are conducted with regard to work in or around water. Specific Environmental concerns are:

1. Introduction of silt and debris into the stream and the associated impacts on water quality and fish habitat below the construction site.

2. Containment of an oil and/or fuel spill during construction.

Project environmental description and location:

The sewage lagoon is located on the central west coast of Vancouver Island within the Pacific Rim National Park Reserve. It is located the Sandhill Creek (1179ha) sub basin of the Kennedy Flats[1] in the Coastal Western Hemlock very wet, hyper-maritime (CWHvh1) biogeoclimatic zone. The CWhvh1 zone is one of the wettest areas in B.C. with over 3,200mm of rainfall annually[2]. With this average amount of rainfall it is to be expected that the jobsite may potentially be shut down for multiple days in a row as the site will simply be too wet to work.

The lower reach of Sandhill Creek watershed supports, Coho, and Chum, as the well as Steelhead, and Cutthroat Trout. The proposed works are located approximately 2.5km from tidal. There are three separate channels in the vicinity of the sewer lagoon (Sandhill mainstem as well as east and west tributaries) as well as one floodplain channel located just to the east of the mainstem crossing. These sites are high fish use spawning and rearing habitat throughout the work area.

Schedule of Work

The work is scheduled to be completed throughout the fall/winter of 2015; there are four separate components all which pose its own set of challenges to the contractor. The work is scheduled to be outside of the general period of least risk for Vancouver Island (June 15-September 15th) and is expected to take approximately 10 weeks. The contractors should understand the environmental

[1] Restoration Plan; Kennedy Flats 2001. D.R. Clough, M. Leslie and W. Warttig

[2] Environment Canada

limitations and risks associated with this location. Work must assume rain events will occur and be working within their capabilities to protect the site environment. They must understand in advance the conditions, which indicate a weather shutdown is required for the site.

Expected Activities and Locations (From Engineering Design):

Access Road (from Highway gate to Sewer Lagoon)

- Mobilize over recently upgraded access road. Involves crossing over the eastern Sandhill tributary culvert.
- Construction erosion protection at the culvert crossing.

Force Main Clearing (From Sewer Lagoon to east bank of Sandhill Mainstem):

- Mobilize, clear and grub remaining vegetation up to a 4.0m wide right of way.
- Construct erosion protection along downstream slopes at mainstem and flood channel crossings of Sandhill Creek.
- The work within the 30m riparian area is expected to be completed during dry conditions, it is unknown where the water table is located.

Force Main Clearing (From Ocean Trail Road to west bank of Sandhill mainstem) :

- Mobilize, clear grub remaining vegetation
- Install sediment control (at western Sandhill tributary and throughout bog wetland areas as required)
- Construct a temporary winter machine crossing at the western tributary. This may include a temporary steel road plate/blast mats/conifer logs to clear the channel. The channel is approximately 1.8m wide and well confined within its banks. The substrates consisted of mostly small gravels and fines which will need protected in order to cross.
- The bog area has a high water table and soft and sensitive surface; recommend use of equipment with a low environmental impact (e.g. lightweight machinery on load spreading removable surface such as geotextile covered by puncheon) shall be used in order to reduce impacts to the soil and plant biota
- To the extent possible, maintain a narrow clearing width and avoid and minimize clearing and construction activities within the sensitive bog ecosystem.
- This work is expected to be completed during periods of dry weather while the channel/bog are at seasonal low flow. It is unknown how high the water table in the bog will be during construction.

Sewer Lagoon Improvements:

- Mobilize, remove electric fence clear and grub vegetation as per design
- Dewater sewer lagoon in a safe and controlled manner

- Install appropriate sediment control around the perimeter of work
- Re-grade vehicle access locations
- Rehabilitate exfiltration cell to improve function as per design
- Replace valves and replace overflow pipes with wider armoured spillway as per design
- Restore perimeter berms design elevation and armour as required
- Reestablish appropriate safety fencing and wildlife deterrents
- If invasive species are found they are to be disposed of in a preapproved location

Riparian Revegetation:

- Post construction (Fall 2016) the area is to be revegetated with native seed mix
- Protect and Retain right of way vegetation (especially shrubs and conifers) and then replant where possible.

The contractors should understand the environmental limitations and risks associated with this location. Work must assume rain events will occur and be working within their capabilities to protect the site environment. They must understand in advance the conditions, which indicate a weather shutdown is required for the site.

Construction Environmental Monitoring Plan Check List

Grubbing, Excavation, Stream Crossing and Construction Works

1. Pre-Work – A job safety and environmental pre-work meeting will be done to ensure that all workers understand the objectives and have clear written plans on their roles and responsibilities. Everyone will be made aware of the site environmental liabilities and rules. Environmentally sensitive areas must first be identified and flagged, fenced or noted to construction crew at each site. There will be no disturbance of fish habitat or addition of any deleterious substance into their habitat especially.
2. Monitoring – Weekly site environmental monitoring at the site will be conducted to ensure the environment is not disturbed outside of the construction zone. The monitors' role will be to identify sensitive areas to construction crews, advise and record procedures. They will also be empowered to stop work procedures and direct environmental protection measures to the site contractors. All sensitive work will be directed by on-site professionals and experienced parks staff. This work will primarily be the responsibility of Wedler Engineering, and DR Clough Consulting staff as well as Parks Canada personnel .
3. Spill Kits/ Erosion Control – All environmental safety material must be readily available. Spill kits will be on site. Erosion control coverings such as plastic, pumps, tarps and straw bales are to be on the job site (specifications below).

4. Weather – Wet weather shutdown applies, rainfall will be recorded. In any circumstance (whether raining or not) where a potential exists for release of sediment to offsite, the activity must be stopped. If rainfall exceeds 90mm in 48hours works should shut down and cover up any erodible surfaces.
5. Stream Channel Works – This project involves two winter crossings of the western tributary. This activity must be done to minimize sediment introduction and disturbance to the streambed. It will require installation of a temporary structure above water level and may include any of the following; steel road plates, blast mats, and or conifer logs.
6. Archeology– Chance and Find Procedure; if potential archeological items are discovered stop and contact the EM, parks staff and an approved archeologist.
7. Reporting – A completion report plus reporting of any milestones requested by agencies will be conducted by the site monitors.

Equipment and Fuel Handling Specifications in Sensitive Areas:

1. Construction will adhere to terms and conditions of the CEMP.
2. Fueling of heavy equipment will be conducted from vehicles equipped with Tidy Tanks in designated areas outside the environmentally sensitive area (>30m from channel).
3. Emergency spill response kits (one for each piece of equipment) will be on-site at all times. Absorbent pads will be kept on all equipment working near any stream crossings. An oil containment boom must be present at the work site before work commences. The contractor should have 50 m of 20 cm diameter oil boom on-site for this project. And oil absorbent pads (200 X 2 liter absorption capacity).
4. The designated environmental monitor will inspect all of the equipment before it is moved onto the construction site. Any equipment that is not approved will not be allowed on the worksite until it has been repaired to the satisfaction of the environmental monitor and the above mentioned guidelines.
5. Fuel will be stored in designated sites. Pick-up trucks with small TDG tanks must follow the statutory requirements and recommended practices outlined in the "Field Guide to Fuel Handling, Transportation and Storage, 2002."
6. All equipment must use biodegradable lubricants where possible.

Spill and Sediment Control Equipment:Emergency Response Plan:

In the event of an accidental spill, sorbent pads will be deployed to ground surfaces. In the event of accidental release of fuel or hydraulic oil to the stream, an oil spill response kit consisting of a coiled boom will be deployed immediately downstream of the spill area. Contaminated materials including sorbent pads, oil boom or soil will be placed in a sealed plastic drum following removal. Containment materials and equipment will be stored in a readily available area for immediate use and be of sufficient quantity to receive contaminants for later disposal at an acceptable location.

Heavy equipment will be inspected daily as a preventative measure to avoid unnecessary spills or leaks due to poor equipment maintenance. Equipment operators and laborers will be instructed as to emergency response procedures and assume full responsibility for containment in the event of an accidental spill. The Environmental Monitor, or equivalent, will provide direction and participate in the clean-up of contaminants, particularly where a spill to the aquatic environment occurs. The following spill response measures will be followed in the event of an accident:

1. Ensure worker and public safety
2. Control the spill source
3. Secure the spill site and eliminate potential ignition sources
4. Contain the spill and prevent contaminant entry into water
5. Report the incident
6. Clean-up, store and dispose of contaminants
7. Monitor downstream impacts to aquatic resources

Depending upon the severity of the spill (i.e. > 100 L of flammable liquids or oils), the Environmental Monitor, or equivalent, will report the details of the incident (location, substance, time and duration of spill, estimated volume, containment action) to the Provincial Emergency Program of MOE in the interest of public safety. Following successful containment of the spill, all contaminants and contaminated materials will be disposed of in a manner consistent with MOE policy. Spill response measures, as well as all construction measures will comply with any environmental management system developed on behalf of the construction contractor.

The contractor will have on-site at all time the following items to deal with activities on sensitive areas, erosion, sediment and drainage emergency situations that may arise during the course of construction. All materials should be scaled to scope of work anticipated, below are startup recommendations for each site, to be re-supplied as used up.

1. 50 m of 20 cm diameter oil containment boom
2. 200 x 2litre absorbent pads
3. Straw bales and or truck load bark mulch or clean gravel
4. 1000 sq ft Tarps or rolls of poly sheeting
5. One industrial spill kit on each piece of heavy equipment
6. Water Pumps/hoses for water bypass and sump removal.

General:

1. Water quality adjacent and within the construction area will be maintained by installing mitigative measures identified in this document as well as those determined by the Environmental Monitor.
2. Contractors will adhere to the "Wet Weather Shutdown Procedures".
3. All areas disturbed during construction will be covered during any rain event capable transporting material.
4. Native grass seed shall be applied at a rate of 40 kg per hectare.
5. Seeding should closely follow the final landscaping, weather permitting.

Personnel:

All personnel (including sub-contractors) on the project will be made aware of the Sediment Management Plan and what is required with regards to compliance with the plan.

Environmental Monitoring Plan

For

Parks Canada Public Works,
Pacific Rim National Park Reserve
Sewage Lagoon Rehabilitation Project

By

D.R. Clough Consulting
6966 Leland Road
Lantzville, B.C. V0R 2H0
250-390-2901

October 2015

Table of Contents

1. Introduction

The Environmental Monitoring Plan (EMP) described below was designed to address the operations around clearing and site preparation of the – Pacific Rim National Park Sewage Upgrade Project. This project is administered by Wedler Engineering LPP on behalf of Parks Canada Public Works. D.R. Clough Consulting is conducting the Environmental Services.

The public works objective of this project is to complete necessary clearing activities, site preparation and repairs of the sewer lagoon and associated force main.

This EMP provides direction for achieving accordance with the project Environmental Management Plan (EMP), applicable regulatory notices and permits, applicable environmental legislation, with Parks Canada environmental policy, and with the least impact to the environment.

The EMP was developed by review of the following documents;

- Environmental Effects Evaluation (EEE) Report Sections 67 of the Canadian Environmental Assessment Act, 2012. Sewage Treatment Lagoon Rehabilitation Pacific Rim Nation Park, Vancouver Island B.C. (Project Number: R.067787.001),

- Welder Engineering LPP, Sewage Lagoon Rehabilitation – Preliminary Design Report, Sep. 21, 2015. This diagram identifies all construction aspects and other technical information. It is to be used as the construction plan reference. The environmental locations and features reference this document content.

2. Communication/Responsibilities

Communication with Staff, Work Crews and Subcontractors
The contractor has yet to be determined. The successful contractor will undertake effective communication through its work plan, pre-work meetings and tailgate meetings and progress meetings/reports. The work plan will be reviewed every morning by the contractor prior to start up. At these meetings, the environmental monitor will inform the contractor about environmental aspect orientation. The contractor and environmental monitor will follow a checklist of each aspect. Each new employee on the job will be oriented on the worksite protocols before they start.

Work Practices
The environmental monitor and contractor will work together to implement appropriate work procedures, instructions and controls to prevent and/or reduce adverse environmental impacts. They will follow the requirements set out in the EMP. The environmental monitor will ensure the contractor restores the sites to a safe, clean and environmentally acceptable as per requirements as per Parks Canada specifications.

Reporting
The monitor will follow environmental reporting protocols with scheduled reports, as well as any environmental incident reports distributed to Parks Canada delegate.

Incidents
The contractor and environmental monitor will respond to emergencies and incidents immediately. All appropriate environmental agencies will be notified as per the spill reporting guidelines listed in Section 8 of this document.

3. Clearing, Brushing & Construction Environmental Procedures

Overview:
The project will begin with mechanical vegetation removal. The work will be conducted during the fall/early winter but the start date has yet to be determined. It is expected that this period or work will see heavy rainfall events.

Environmental Monitoring plans: The environmental concerns of machine clearing are related to maintaining work within specified boundaries as well as disturbance to soils. Heavy equipment must follow rainfall shutdown guidelines Environmental monitors will be on-site to inspect the operations to ensure ground exposure is not a sedimentation risk. The machinery will also be inspected for leaks and spill kit on board. The operators will have their copy of the area polygons in the cab of machine to know their areas of work. The monitors will be onsite to inspect that the machinery stays within its specified areas. The roughed surfaces may require straw covering, ditches, seeding to ensure any exposed soils are stabilized.

Danger Tree Removal
No danger trees have been identified at the time of writing this document. If they are identified they will be assessed at that time.

4. Access Management Plan

Public access in the work area will not be allowed, signs/fencing will be used as required as the project is completed. Signage will be hung up at entrances entry points to inform the public that they are in a construction zone. Road traffic control will be used at road crossings near the highway as required.

5. Water Quality Monitoring - Sediment and Erosion Control

Planning: The monitor and contractor will pre-walk the location and determine the environmental protection strategy. The description of strategies for Soil Management and Clearing identifies specific prescriptions for the activities.

Monitoring Records: The monitor will record the types environmental control (i.e. water quality testing) for the project areas being worked. The environmental procedures will be recorded by the monitor in their Environmental Field Notes **(Appendix 2)** and summarized in weekly reports. Prescriptions at specific milestones at Environmentally Sensitive Areas (ESA's) will be reviewed by the monitor and contractor (this may also include Parks and Wedler staff). Once the environmental prescription is determined it will be recorded and the site photographed by the monitor. Sites with specific environmental hazards encountered will have their prescriptions written and sketched into field books as well as photographed. The overall strategy, location of the control structures and progress will be recorded as the job progresses..

Rainfall Monitoring: Shut down rules will apply using the Coastal Rainfall Shutdown Criteria. Weather forecasts of potential rainfall to exceed 100mm in 24 hours will trigger an automatic shutdown. Generally this occurs before the event to provide time to cover work areas. Shutdown will also occur in instances where heavy rain has the potential to create sheet flow of soil surfaces which would result in adverse environmental effects.

Water Quality Monitoring:
Waters released to the environment, at a minimum, shall meet the BC Approved Water Quality Guidelines protective of Fresh Water Aquatic Life (BCWQGs). Turbidity of discharged water leaving the site must not change from background by more than 5 NTU at any time when background is 8 - 50 NTU during high flows or in turbid waters; or change from background by more than 10% when background is

>50 NTU at any time during high flows or in turbid waters. During prolonged or heavy rainfall the environmental monitors or construction supervisors have the responsibility to shut down operations at any time if there is the potential for environmental impacts.

Coverings: The contractor shall make use of coverings to minimize exposure to weather of any exposed erodible material that puts environmental aspects in jeopardy. The required materials will be stored on site close to working areas or kept in the operator's vehicles. Covering Materials may include;

- Tarps, Polyethylene Sheets
- Brush, forest duff
- Straw, Straw Mat
- Clean Gravel
- Geotextile filter fabric.
- Sediment fences

Filtration/Diversion: Depending on site conditions, the filtration mechanisms may include;

- Ditches
- Check Dams
- Sumps
- Vegetated Swales
- Gravel
- Geotextile Fabric
- Straw
- Diversion pumps/pipes

6. Spill Prevention, Response & Reporting Plan

Spill Prevention/Fuel Handling

- Every piece of working equipment shall have a spill kit on-board each excavator or other equipment operating in the ESA. The equipment spill kit must hold pads, oil boom, sorbent, gloves and plastic disposal bags. Additional material must be kept nearby to top-up after usage.
- Spills need to be immediately reported to the EM, Parks Canada staff, and the construction supervisor. Spills to the receiving environment are to be reported to the BC Provincial Emergency Program (1-800-663-3456) if they exceed the reportable limits (e.g. 100 liters of fuel or oil).
- Fuel Storage: All fuel jugs greater than 23L (5gallons) must be stored at least 30m from the ESA area.
- Fueling of heavy equipment shall occur on stable, flat ground at least 30m away from ESAs.
- The environmental monitor may request further setbacks than 30m for fuel handling near ESA sites depending on risk.
- Small plastic fuel containers must not leak. The containers must be 5 years or newer.
- The containers shall be properly labeled.
- Containers 23L or less shall be stored and transported within impermeable storage that is capable of containing the total quantity of fuel in the containers should it leak or spill.
- All toxic liquids or materials that may leach out toxic materials (rusting metal, acid rock, Creosote wood) will be contained and taken off site to a certified disposal site.
- Equipment repairs (except emergencies to abate risk) are to be undertaken at designated work areas offsite.
- Fuel storage and handling facilities shall be compatible with a Field Guide to Fuel Handling, Transportation and Storage (MWLAP and MOF 2002).

Table 6.1 Equipment Operator Maintenance

Inspect:
• Routinely: spill kits (replacing missing items), rainwater in tank containments, hoses and nozzles, oil/water separators, fuel lines (visual), drip tray collection containers, and shut-off valves.
Reduce, reuse, and recycle:
• (Including phase contractors) all material or dispose of it in a timely and environmentally sound matter. This includes: contaminated oil and oil / gas filters, petroleum containers, anti-freeze, lubrication tubes, scrap metal, wood, domestic garbage, batteries, solvent, paint cans, tires, rubber, plastic, spools and wire rope.
Keep:
• (The Operator) documented inspections of spill kits in service vehicles.

Fuel Spills Response
Fuel spill response will follow the contractors their Spill Response SOP. All personnel will have a copy of and understand the procedures.

Fuel Spills Reporting
Below is a summary of procedures.
In the event of a spill, the observer should ensure they are safe, the spill if possible can be abated and their co-workers in the vicinity notified (for safety), their supervisors and Environmental Monitor (following the notification procedures detailed on the Spill SOP).

Table 6.2 Typical Spill SOP (Operators Guidelines)

Spill Clean-Up Procedures:
• Safety First - Identify the substance and understand the hazards (well ventilated and no ignition sources). Use protective gear including rubber gloves and eye goggles. • Immediately notify the supervisor – substance, quantity of the spill, location • Stop work. Attend to the spill (i.e. stop leaks) until it is controlled. • Apply absorbent pads to the spill area. • Dyke around the affected area to keep the spill from spreading to water sources if necessary. • Follow emergency evacuation procedures if necessary
Report All Spills To Your Supervisor and Environmental Monitor:
• Small Spill - less than 100 liters on land (except anti-freeze). Clean-up and then report. • Large Spill - more than 100 liters (or any size spill entering waterbodies). Report and then clean up.

7. Material Storage and Waste Handling

Material Storage:

- No hazardous material is planned to be stored on-site.
- Portable fuel containers will be stored in impermeable bins in trucks except in use when there will be a spill pad placed under the container while fueling pumps/saws etc.
- Truck and machinery fuel is not planned to be stored on site. The tidy tanks used in the operator's vehicles must go back to the shop every night.

- The trucks when on-site will be parked at least 30m from any identified bodies of water (creeks or wetlands)
- The machinery used in the operations will be parked 30m or further away from bodies of water.
- Any paints, greases or other petroleum products will be kept in the operator's vehicles in a bin.

Waste Handling
There will be no waste disposed on the project area. Minor spills will be investigated by the Contractor and environmental monitor and the circumstances resolved as to cause. Minor spills will then be documented and reported to the Parks Canada Management or responsible delegate. Disposal of minor spills of oils/diesel/greases collected by rags, booms and pads must be stored in a bin or a drum. Disposal will then be sent to a registered facility with capability to accept petroleum products/soils.

Table 7.1 Typical Pollution Control SOP

• All general waste materials including: fuel, oil, chemical, aerosol or paint containers, cable, food and beverage packaging must be removed from the work site by the personnel responsible for creating the waste. Take to designated containers and storage sites. • Oil spill pads, used oil, oil / fuel filters, grease tubes, and water / oil mixes must be sent to licensed facilities for disposal with appropriate documentation. Disposal containers at the shops. • Follow safe fueling practices at fueling stations. Turn off engine; personnel must get out of the vehicles; vehicles must not be left unattended; the driver must know the emergency shutdown procedures. Know the location of the required spill kit. • Portable fuel and oil containers at roadside or on vehicles must be inspected daily when in use and replaced if leaking. • Ensure all containers are clearly marked. Consult supervisors regarding machine wash down (wash at shop). • Inspect equipment daily for leaks. Report to supervisor unusual exhaust emissions, leaks and abnormal fluid losses (repetitive daily additions, 20 liters / week of hydraulics, any loss of steering or final drive fluids) and all equipment or mechanical problems. Clean up all leaks/spills promptly and report to supervisor. Add fluids to machinery in a way that avoids spills.
PLEASE BRING BACK WHAT YOU TAKE OUT

Contaminated Materials Management
New ground excavation should result in no exposed contaminated materials. In the unlikely event of contaminated materials; discovery of contaminated or potentially contaminated soils or wastes will require immediate isolation of the site from further disturbance and prompt notification of the Environmental Monitor, and Parks Canada Management responsible delegate.

Suspect visibly stained or odorous materials are to be left in-situ and/or covered with/and upon poly sheeting until a full assessment of the material can be conducted.

8. Fish Habitat Protection

Work Area: There are three fish bearing waters expected to be encountered during this project. The area is in the Sandhill Creek Watershed and all three channels contain both salmon and trout populations.

The protection of fish habitat and water quality is to be addressed by the Contractor and Environmental Monitor. It will involve ensuring all construction personnel know where the Environmentally Sensitive Area (ESA's) through adequate marking. Field flags will be maintained as will use of the construction maps.

Work Plans: Pre-work inspections of the channels will determine the approach to work around the ESA's.

Filtration structures below the construction site may be required or in the edges leading to the ESA's with a row of straw bales and/or geotextile and gravel swales depending on site conditions (straw seals poorly on rough bottoms).

Clearing Limits: Disturbance of channel and riparian areas outside work areas must be avoided. Trees and shrubs are to be protected outside the design right of way (4.0 m).

Records: Records and photographs will be made of construction activities for the environmental monitoring weekly report.

9. Wildlife Resource and Habitat Protection and Mitigation

The best management plans for handling wildlife protection are in identifying the areas of known use and staying away from them. It is expected with the abundant adjacent cover, usually results in very little wildlife ever being observed. The invasive construction activity is being done in a lower risk period of the year (fall/winter) and the contractors must strive to complete the task quickly such that the period of disturbance is minimized.

Prior to work the site will be inspected for wildlife activity and any additional measures to protect the habitat/wildlife will be considered such as;

- All wildlife observations will be reported to the environmental monitor.
- Isolation of wildlife areas with flagging and restricting disturbance with machine free zones (MFZ).
- Accommodation of wildlife passage through the site should be considered if work can be isolated to one side at a time for lengthy projects or high wildlife use (this would warrant further discussion with Parks staff to determine the mitigation and construction parameters).
- Control of food waste and any materials that could attract wildlife.
- The project timing is planned to avoid bird nesting and amphibian reproduction in spring.
- Ungulate fall rut activity will be monitored and if wildlife are discovered work shut down applies.
- There will be no hunting by employees or the public for the safety of this project.
- Bear sightings will be discussed at pre-work meetings. Garbage, food waste and any other attractants will be avoided. Bear activity that becomes a nuisance or unsafe will be reported immediately to the environmental monitor, Parks staff and delegate.
- Wildlife vehicle collisions will be avoided. The operators of equipment will be asked to reduce speed if wildlife are spotted in their work travel areas.

If workers encounter wildlife they are to;

- Shut down equipment or back away to avoid disturbance
- Contact their supervisor or environmental monitor
- The environmental monitor will determine if the work can proceed based on whether the animal has left, is moving or the machinery must work in another area to avoid the wildlife until it moves on.

During work, any accidental disturbance to the habitat that can be repaired such as re-covering rocks, logs or replanting displaced shrubbery will be done.

- No garbage storage, toilets and vehicle parking shall be allowed in designated wildlife areas.

10. Clearing and Vegetation Management

Work Plan:
The Parks Canada environmental screening identified the potential of Blue-listed plant communities that included rare plant habitat for terrestrial or riparian areas. However, none were observed within 1km of the proposed work area.

The work sites will be identified by;

- Field flagging ribbon of clearing perimeters (colour to be determined)
- Where there are adjacent Falling Boundaries for clearing of the lagoon
- Pre-work field identification of the sites by the monitor and supervisor to the work crew.

The sites will be protected by;

- Reduced foot print in the areas of crossing and development.
- Identified flags, fencing or other barriers (logs, brush piles)
- Ground grubbing and earthworks shall be limited where possible.
- The environmental monitor will be onsite to inspect regularly the work progress
- Field equipment to be washed at the shop prior to arrival to remove any invasive plants
- Outside material and equipment will be inspected to avoid importing noxious weeds.
- Invasive plants will be identified by the EM and will be monitored with respect to clearing and disturbance. If disposal is required they will be disposed of at a Parks Approved Facility.
- Sites will be covered as quickly as possible to avoid establishment of invasive plants.
- No vegetation other than prescribed will be removed.

Rare Plants
A complete list of Rare Plant and Animal Species was completed in the parks screening which was referenced from the Conservation Data Centre (CDC). No rare plants were noted within 1.0km of the jobsite. The monitor and parks staff may identify and flag sites any protected plant areas prior to work commencing.

11. Air Quality & Noise Management

Air quality and noise management will be required to protect workers and wildlife from excessive amounts. There are no private residences in the area but noise or dust would scare or impact wildlife and their habitat.

Management to reduce dust generation and excessive noise;

- Maintaining low vehicle and equipment speeds as per the contractor Health and Safety Guidelines, which require all vehicles to be operated in a safe and controlled manner.
- Minimize vehicle movement
- Avoid excessive idling
- Maintain vehicle mufflers
- Water roads on dry days
- Cover dusty loads and piles of dirt
- Blasting is not anticipated. If so then blast mats will be advised
- Burning is not permitted.

12. Heritage Impact Management: Structure, site or thing that is of historical, archaeological, paleontological or architectural significance (HAPA)

No potential HAPA sites were identified in the Parks screening. The contractor must be aware of identifying potential Middens, CMT's, Petroglyphs, Burials and Bones.

Responses include:

- Respect the site – no photographs, no disturbance
- Re-cover the site if it appears to be bones
- Protect the site from further disturbance such as flagging or tarp
- Immediately notify the monitors/ parks supervisors/archeologist

13. Landscape Design and Site Restoration

The recovery of the site will include removal of signs of construction activity such as smoothing out any off site ruts and exposed soil then seeding or covering with straw. All construction roads will be deactivated with appropriate drainage installed. Areas of riparian disturbance where permitted will be re-planted with Native plants. Where opportunity is available during clearing, the native plants will be marked with flagging and then removed with root and soil attached to later replant on the backfilled route.

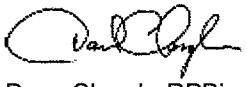
If needed as an interim measure grass seed will be spread in exposed soils using the Coastal revegetation mixture **(Appendix 4)** in a short term solution for smaller wet areas. Native seed in this area is likely not available, but where possible, forest duff may be transplanted to adjacent areas to encourage native plant regeneration. All excavated soils will remain on site and be buried in spoil pits or used as top dressing for revegetation purposes. Straw will be applied over seed and exposed soils to protect them from washing out and maintain moisture for germination.

Discussion

The work we have outlined in this report is meant to provide the tools to the work crew and demonstrate the ability to Parks Canada such that we can safely proceed with the rehabilitation of the sewage Lagoon and force main route.

The EMP may be changed along the way to adjust to new information, discoveries on the job and fine tuning of procedures. We will collaborate with the project team for the best outcomes for the environment. Any changes to the environmental work plan will be submitted in the biweekly environmental reports.

There are no foreseeable concerns to the environment with the exception of the ESA's identified.
Yours Truly,



Dave Clough, RPBio,
Project Environmental Monitor

List of Appendices

Appendix 1 –Pre-start Environmental Checklist
(1pp)

Appendix 2 –Daily Environmental Field Notes
(3pp)

Appendix 3 – Site Map

Appendix 4 – Grass Seed - Coastal Revegetation Mix
(1pp)

Appendix 1: Safety Meeting Form

Pre-Start Environmental Checklist

Date; _____ Personnel: _____

Contact List Card (Supervisors, monitors)	
Work site map (Drainages and ESAs, cutting boundaries, access, hazards)	
Spill and Fire Card	
Pre-work meeting: Work plan – Know location prescription (watercourses, culverts, spoil locations) Safety – Hazards, Location, Contact protocol Environment – Hazards, Locations, Procedures (ie – sediment/erosion control)	
Equipment pre-work inspection for cleanliness and leaks	
Check spill kit – on board and complete	
Check sediment and erosion control materials are available for work day	
Equipment fueling location and procedures – 30m from watercourse	
Store fuel off site over night	
Paints, greases, petroleum products stored in the operators vehicle in a bin	
No disposal of waste on site	
Stop work if discovery of contaminated materials (oils, acid rock, creosote)	
Stop work if rainfall exceeds 90mm in 48hrs	
Stop work to avoid environmental damage or sediment risk to watercourse areas	
Stop work if encounter wildlife (elk, frogs, snakes, nests, dens)	
Stop or adjust work if dust or noise is excessive	
Stop work for cultural features (middens, bones, CMTs, artifacts)	
Inspect all potential erosion sources for adequate protection before ending work	
Park equipment a minimum of 30m from a watercourse	
Other :	

Appendix 2: Daily Environmental Field Notes

REPORTING PERIOD DATE: _____
Recorded by:_____ **Weather:** _____

1.0 SUMMARY OF CONSTRUCTION ACTIVITIES:

DATE ON-SITE	SITE LOCATION	CONTRACTOR Personnel	ENVIRONMENTAL MONITOR	CONSTRUCTION ACTIVITY

2.0 SUMMARY OF ENVIRONMENTAL MONITORING ACTIVITIES:

2.1 Communication/Meetings:

DATE	PERSON(S) AT MEETING	BRIEF DESCRIPTION OF WHAT WAS DISCUSSED

2.1.2: Summary of Precipitation: _____ **mm**

2.2 On-site inspections and Findings:

Date, location, nature of environmental monitoring site visits undertaken

2.2.1 Sediment and Erosion Control:

2.2.2 Water Quality:

Observations:

2.3 Oil Spill Prevention and Emergency Responses:

2.2.4 Waste Management:

2.2.5 Air Quality and Noise Management:

2.2.6 Environmental Resource Protection:

2.2.7 Heritage Resource Protection (CMTs, middens, bones, artifacts, etc):

3.0 EMERGING ISSUES:

4.0 OUTSTANDING ISSUES:

Environmental Issue Tracking

Environmental Issue	Date Identified	Date Resolved	Description of Issue Resolution	Additional Info

Appendix 3: Site Map

Appendix 4: Grass Seed - Coastal Revegetation Mix

Annual Ryegrass	35%	Altaswede Red Clover	10%
Creeping Red fescue	21%	Alsike Clover	1%
Tall Fescue	15%	Brown Top Bentgrass	1%
Climax Timothy	14%	Orchard Grass	3%

Public Works and Government Services Canada | Travaux publics et Services gouvernementaux Canada

PRELIMINARY HAZARD ASSESSMENT FORM

Project Number:	**R. 067787.001**
Location:	**Pacific Rim National Park, Ucluelet, BC**
Date:	August 10, 2015
Name of PWGSC Departmental Representative and Senior Project Manager:	Tom Dunphy PH: (604) 775-6659
Name of Client:	PWGSC
Name of Client Project Co-ordinator	

Site Specific Orientation Provided at Project Location Yes ☐ No ●

Notice of Project Required Yes ● No ☐

NOTE:
PWGSC REQUIRES A Notice of Project FOR ALL CONSTRUCTION WORK RELATED ACTIVITIES

NOTE:
OHS law is made up of many municipal, provincial, and federal acts, regulations, bylaws and codes. There are also many other pieces of legislation in British Columbia that impose OHS obligations.

Important Notice: This hazard assessment has been prepared by PWGSC for its own project planning process, and to inform the service provider of actual and potential hazards that may be encountered in performance of the work. PWGSC does not warrant the completeness or adequacy of this hazard assessment for the project and the paramount responsibility for project hazard assessment rests with the service provider.

TYPES OF HAZARDS TO CONSIDER	Potential Risk for:				COMMENTS
Examples: Chemical, Biological, Natural, Physical, and Ergonomic	PWGSC, OGD's, or tenants		General Public or other contractors		Note: When thinking about this pre-construction hazard assessment, remember a **hazard** is anything that may cause harm, such as chemicals, electricity, working from heights, etc; the **risk** is the chance, high or low, that somebody could be harmed by these and other hazards, together with an indication of how serious the harm could be.
Listed below are common construction related hazards. Your project may include pre-existing hazards that are not listed. Contact the Regional Construction Safety Coordinator for assistance should this issue arise.	**Yes**	**No**	**Yes**	**No**	

Canada

Typical Construction Hazards					
Concealed/Buried Services (electrical, gas, water, sewer etc)	Yes		Yes		
Slip Hazards or Unsound Footing	Yes		Yes		
Working at Heights		No		No	
Working Over or Around Water	Yes		Yes		
Heavy overhead lifting operations, mobile cranes etc.	Yes		Yes		
Marine and/or Vehicular Traffic (site vehicles, public vehicles, etc.	Yes		Yes		
Fire and Explosion Hazards	Yes		Yes		
High Noise Levels	Yes		Yes		
Excavations	Yes		Yes		
Blasting		No		No	
Construction Equipment	Yes		Yes		
Pedestrian Traffic (site personnel, tenants, visitors, public)	Yes		Yes		
Multiple Employer Worksite	Yes		Yes		Example: Contractor working in an occupied Federal Employee space.
Electrical Hazards					**Comments**
Contact With Overhead Wires	Yes		Yes		
Live Electrical Systems or Equipment	Yes		Yes		
Other:					
Physical Hazards					
Equipment Slippage Due To Slopes/Ground Conditions	Yes		Yes		
Earthquake	Yes		Yes		
Tsunami	Yes		Yes		
Avalanche		No		No	
Forest Fires	Yes		Yes		
Fire and Explosion Hazards	Yes		Yes		
Working in Isolation		No		No	
Working Alone	Yes		Yes		
Violence in the Workplace	Yes		Yes		
High Noise Levels	Yes		Yes		
Inclement weather	Yes		Yes		
High Pressure Systems	Yes		Yes		
Other:					
Hazardous Work Environments					
Confined Spaces / Restricted Spaces	Yes		Yes		Review and provide confined space assessment(s) from PWGSC or client confined space inventories. Refer to PWGSC Standard on Entry into Confined Spaces. Contact the Regional Construction Safety Coordinator.
Suspended / Mobile Work Platforms	Yes		Yes		
Other:					

Biological Hazards					
Mould Proliferations	Yes		Yes		
Accumulation of Bird or Bat Guano	Yes		Yes		
Bacteria / Legionella in Cooling Towers / Process Water	Yes		Yes		
Rodent / Insect Infestation	Yes		Yes		
Poisonous Plants	Yes		Yes		
Sharp or Potentially Infectious Objects in Wastes	Yes		Yes		
Wildlife	Yes		Yes		
Chemical Hazards					
Asbestos Materials on Site		No		No	Limited to existing underground piping. Extent TBD. Contractor directed to follow procedures contained in Section 02 82 00.02 – Asbestos Abatement
Designated Substance Present		No		No	
Chemicals Used in work	Yes		Yes		
Lead in paint		No		No	
Mercury in Thermostats or Switches		No		No	
Application of Chemicals or Pesticides	Yes		Yes		
PCB Liquids in Electrical Equipment	Yes		Yes		
Radioactive Materials in Equipment		No	Yes		Nuclear Densometer for compaction testing.
Other:					
Contaminated Sites Hazards					
Hazardous Waste		No		No	
Hydrocarbons		No		No	
Metals	Yes		Yes		Steel fencing, pumps, misc.
Other:					

Security Hazards					**Comments**
Risk of Assault		No		No	
Other:					
Other Hazards					

Other Compliance and Permit Requirements[1]	YES	NO	Notes / Comments[2]
Is a Building Permit required?		No	
Is an Electrical permit required?			TBD
Is a Plumbing Permit required?			TBD
Is a Sewage Permit required?		Yes	
Is a Dumping Permit required?		Yes	
Is a Hot Work Permit required?	No		
Is a Permit to Work required?	Yes		
Is a Confined Space Entry Permit required?	Yes		
Is a Confined Space Entry Log required	Yes		
Discharge Approval for treated water required	Yes		

Notes:

(1) Does not relieve Service Provider from complying with all applicable federal, provincial, and municipal laws and regulations.

(2) TBD means To Be Determined by Service Provider.

Service Provider Acknowledgement: We confirm receipt and review of this Pre-Project Hazard Assessment and acknowledge our responsibility for conducting our own assessment of project hazards, and taking all necessary protective measures (which may exceed those cited herein) for performance of the work.			
Service Provider Name			
Signatory for Service Provider		**Date Signed**	
RETURN EXECUTED DOCUMENT TO PWGSC DEPARTMENTAL REPRESENTATIVE PRIOR TO ANY WORK COMMENCING			