

**Regional District of Nanaimo
25-031 Coats Marsh Dam Decommissioning**

**TECHNICAL SPECIFICATIONS
Issued for Tender, FINAL R0**

TECHNICAL SPECIFICATIONS

Regional District of Nanaimo
Coats Marsh Dam Decommissioning

Part 1 – General Requirements

Part 2 – Clearing and Demolition

Part 3 – Earthworks

Part 4 – Cast-in-Place Concrete

Part 5 – Site Restoration

Part 6 – Environmental and Water Management

Technical Specifications Submittal

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1.0 GENERAL

1.1 Supplemental Definitions

- .1 The *Consultant* refers to Northwest Hydraulic Consultants Ltd.
- .2 The *Biologist* refers to Environmental Dynamics Inc.
- .3 *Submittals* are drawings, diagrams, schedules, plans, product data, and other information provided by the *Contractor* to illustrate details of portions of the *Work*.
- .4 *Temporary Work* means temporary supports, structures, facilities, services, and other temporary items required for execution of the *Work* but not incorporated into the *Work*.

1.2 Submittals

- .1 The *Contractor* shall provide *Submittals* as required in the *Contract Documents* and when requested by the *Consultant*. The *Contractor* shall provide *Submittals* to the *Consultant* in the form specified and within the timelines specified, so as to cause no delay in the *Work*. Table 1.1 provides a schedule of submittals referenced in the Technical Specifications.
- .2 The *Consultant* shall review *Submittals* and provide written notice of acceptance or rejection within 2 business days of receipt. The *Consultant's* review is for conformity to the design intent and for general arrangement only. This review shall not relieve the *Contractor* of responsibility for errors or omissions in the *Submittal* or for meeting all requirements of the *Contract Documents*.
- .3 The *Contractor* shall, within 2 business days, provide revised *Submittals* to correct those which the *Consultant* rejects as inconsistent with the *Contract Documents*.

Table 1.1 Schedule of Submittals

Spec. No.	Description	Timeframe
1.3.1	Construction schedule and workplan	Within 10 business days after contract execution
1.6.3	Site access and traffic management plan	At least 10 business days before mobilisation
3.3.3	Soil testing data for granular fill	At least 5 business days before importing material
4.3	Cast in place concrete submittals	At least 10 business days before the concrete pour date
5.3.2	Seed mix report and testing data	At least 5 business days before importing material
5.3.4	Beaver exclusion works layout drawing	At least 5 business days before importing materials

Spec. No.	Description	Timeframe
6.3.4	Site isolation plan	At least 15 business days before mobilization
CEMP 7.6	Erosion and sediment control plan	At least 10 business days before mobilization

1.3 Work Plan and Schedule

- .1 Within 10 business days of Contract execution, the *Contractor* shall provide, as a *Submittal*, a detailed construction schedule and work plan detailing the *Contractor's* proposed operations for the duration of the Work. The schedule shall clearly indicate the length of construction periods, any interim dates set out in the Contract, and sequences of operations in sufficient detail so that the *Consultant* may determine its feasibility and monitor the progress of the Work. The schedule shall clearly identify the Contract milestones.

1.4 Survey and Layout

- .1 The *Contractor* shall lay out the *Work* by reference to publicly available survey control points, drawings, and locations of existing structures. The *Contractor* shall provide, fix and be responsible for the protection of all monuments, stakes, templates, benchmarks and other reference marks and lines.

1.5 Documents at the Site

- .1 The *Contractor* shall keep copies of all regulatory permits on site throughout construction. The *Consultant* shall provide the *Contractor* with digital copies of all regulatory permits.
- .2 The *Contractor* shall keep one copy of current *Contract Documents*, *Submittals*, reports, and records of meetings at the work site, in good order and available to the *Owner*, *Consultant*, and *Biologist*.

1.6 Mobilization and Site Access

- .1 The *Contractor* shall mobilize and demobilize all required equipment, materials, and personnel to the work site. The *Contractor* shall obtain all necessary road permits and authorizations for mobilization and demobilization.
- .2 Access to the work site is available via the RDN trail network, as shown in the *Drawings*. It is anticipated that there will be a public presence around the work site intermittently.
- .3 The *Contractor* is required to delineate the active work area and take all measures to protect the public and park values. This may include signage, fencing and safety personnel on site as required by best management practices. The *Contractor* shall provide, as a *Submittal*, a written Site Access and Traffic Management Plan a minimum of 10 Business Days prior to mobilisation. This plan shall describe the *Contractor's* methods

for managing vehicle and equipment traffic, and for managing public safety and site access during and outside of working hours.

1.7 Temporary Work

- .1 The *Contractor* shall have the sole responsibility for the design, erection, operation, maintenance, and removal of *Temporary Work*.
- .2 The *Contractor* shall engage and pay for registered professional engineering personnel skilled in the appropriate disciplines to perform those functions referred to in the preceding paragraph where required by law or by the *Contract Documents* and in all cases where such *Temporary Work* is of such a nature that professional engineering skill is required to produce safe and satisfactory results.

1.8 Protection of Work and Property

- .1 The *Contractor* shall protect the *Work*, the *Owner's* property, and property within and adjacent to the work site from damage which may arise as the result of the *Contractor's* operations under the *Contract*, and shall be responsible for such damage.
- .2 Before commencing any work, the *Contractor* shall determine the location of all underground utilities and structures indicated in the *Contract Documents*, that are reasonably apparent in the *Contractor's* inspection of the work site, and that are identified by BC 1 Call.
- .3 Should the *Contractor* in the performance of the *Contract* damage the *Work*, the *Owner's* property, or other property within or adjacent to the work site, the *Contractor* shall be responsible for making good such damage at the *Contractor's* expense and to the satisfaction of the *Owner*.

1.9 Fire Protection Requirements

- .1 The *Contractor's* operations shall comply at all times with activity restrictions and fire protection requirements set out by the Gabriola Volunteer Fire Department. Fire hazard ratings and activity restrictions are available at the following web link:
<https://www.gabriolafire.ca/fire-hazard-rating>
- .2 The *Contractor* shall check the current fire hazard rating and activity restrictions at the start of each work day and inform the *Owner* and *Consultant* of any change from the previous day.
- .3 If a fire occurs, the *Contractor* shall take all reasonable steps to suppress the fire using its available personnel and on-site equipment.
- .4 Changes to fire hazard rating and activity restrictions shall not give rise to claims for a change in contract price, additional reimbursement, or an extension to the *Contract* time.

1.10 Demobilization

- .1 Demobilization shall be considered complete when the *Contractor* has finalized the *Work* to the satisfaction of the *Owner*, including:
 - (a) Removal of all *Contractor's* equipment, waste, and excess materials
 - (b) Site cleanup and restoration

- (c) Delivery of as-built mark-up drawings and information

1.11 Quality Control

- .1 Dimensional tolerances shall be ± 0.2 m laterally and ± 0.05 m vertically unless otherwise stated.
- .2 The *Contractor* shall be solely responsible for the quality control of all activities associated with the *Work*. The *Consultant* will not be responsible for and will not have control, charge or supervision of construction means, methods, techniques, sequences, or procedures, or for safety precautions and programs required in connection with the *Work* in accordance with the applicable construction safety legislation, other regulations or general construction practice. The *Consultant* will not be responsible for the *Contractor's* failure to carry out the *Work* in accordance with the *Contract Documents*. The *Consultant* will not have control over, charge of or be responsible for the acts or omissions of the *Contractor*, subcontractors, suppliers, or their agents, employees, or any other persons performing portions of the *Work*.
- .3 The *Consultant* will have authority to reject work which in the *Consultant's* opinion does not conform to the requirements of the *Contract Documents*. Whenever the *Consultant* considers it necessary or advisable, the *Consultant* will have authority to require inspection or testing of work, whether or not such work is fabricated, installed or completed. However, neither the authority of the *Consultant* to act nor any decision either to exercise or not to exercise such authority shall give rise to any duty or responsibility of the *Consultant* to the *Contractor*, subcontractors, suppliers, or their agents, employees, or other persons performing any of the *Work*.
- .4 During construction, the *Consultant* will conduct periodic field reviews to verify conformance with the design scope and intent. Field reviews by the *Consultant* will not relieve the *Contractor* of his obligation to meet all requirements of the *Contract Documents*. By issuing any field review report, the *Consultant* does not guarantee the *Work* is correct or complete.
- .5 Following receipt of the *Contractor's* detailed work plan, the *Consultant* will specify "hold" and "witness" points to facilitate field review coordination with the *Contractor*. Hold points are mandatory verification points beyond which a work activity cannot proceed without the *Consultant's* approval. Witness points are points in the construction process where the *Consultant* may review or witness the work, but where work activities may proceed. The *Consultant* reserves the right to specify additional hold and witness points as construction progresses.
- .6 The *Contractor* shall provide the *Consultant* with 2 business days' notice in advance of hold and witness points. The *Contractor's* surveyor or grade man shall attend all hold and witness points and shall carry out topographic survey, elevation leveling, and dimensional measurements when requested by the *Consultant* to verify conformance to the *Contract Documents*.

- .7 If the *Contractor* covers, or permits to be covered, work that has been designated for hold point reviews before such reviews are made, the *Contractor* shall, if so directed, uncover such work, have the field review satisfactorily completed, and make good covering work at the *Contractor's* expense.
- .8 The *Contractor* shall pay the cost of making any test or inspection, including the cost of samples required for such test or inspection, if such test or inspection is designated in the *Contract Documents* to be performed by the *Contractor* or is designated by the laws or ordinances applicable to the place of work.

1.12 As-Built Drawings

- .1 The *Contractor* shall maintain a record of all changes and as-built information incorporated into the Work.
- .2 The *Contractor* shall provide an as-built redline drawing to the *Consultant* within 5 business days of substantial completion. The as-built drawing shall be in digital format.

1.13 Measurement and Payment

- .1 The payment amount for Part 1 – General Requirements shall be in accordance with the Form of Tender.
- .2 Payment for *Submittals* required under other sections of the specifications shall be paid under Part 1 – General Requirements.

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2.0 CLEARING AND DEMOLITION

2.1 Clearing

- .1 Clearing is defined as the complete removal and disposal of fallen trees, stumps, wood debris, vegetative growth, and accumulations of rubbish. Clearing shall also include the removal of existing post and wire mesh fencing within the work area.
- .2 Clear the site access route, the footprint of the *Work*, and any temporary work areas required for stockpiling, staging, and equipment access.
- .3 Prior to clearing verify the clearing limits with the *Consultant* and *Biologist*, who will designate existing vegetation to be preserved or protected. Procedures for the preservation and protection of existing vegetation are detailed separately in the Construction Environmental Management Plan. Delineate the clearing limits with stakes and flagging.
- .4 Identify and remove any danger trees or overhanging limbs outside the clearing limits that may impact site safety. Tree removal shall only be carried out with written approval from the *Owner*.
- .5 Wood debris approved for use in site restoration shall be stockpiled. Remove and dispose of all other debris off-site in accordance with the Construction Environmental Management Plan.

2.2 Demolition of Existing Structures

- .1 Demolish and remove components of the existing weir as indicated on the drawings.
- .2 Explosive blasting shall not be used for concrete demolition.
- .3 Dispose of all demolition waste off site in accordance with the Construction Environmental Management Plan.

2.3 Measurement and Payment

- .1 The payment amount for Part 2 – Clearing and Demolition shall be in accordance with the Form of Tender.

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3.0 EARTHWORKS

3.1 Common Excavation

- .1 Common excavation refers to all excavation that is not included under the definition of rock excavation.
- .2 Strip topsoil and organics and stockpile them for use in site restoration. All materials stockpile locations must be approved by the *Consultant* before use.
- .3 Excavate to the extents and grades shown in the drawings and as required to remove the existing soil and accommodate all material placement.
- .4 Dispose of approved excavated soils on-site as shown in the drawings. Dispose of loose rock, rubbish, deleterious substances encountered during excavation, and soil from areas with high-density reed canary grass off site in accordance with the Construction Environmental Management Plan.

3.2 Rock Excavation

- .1 Rock excavation includes the removal of solid rock in form of bedrock, masses, ledges, seams or layers that requires drilling or hydraulic/pneumatic breaking for removal. Excavation of dense tills, hardpan, partially cemented materials, and loose or fractured rock that do not require drilling or breaking for removal are not classified as rock excavation.
- .2 Explosive blasting shall not be used for rock excavation.
- .3 Carry out rock excavation to the extents and grades shown on the drawings. The finished rock surface shall be smooth and sound, with no localized protrusions and depressions.
- .3 Complete all rock excavation before any structural elements are installed within 15 m from the rock excavation area. Ensure ground vibrations do not shatter or crack the rock mass to remain.
- .4 Dispose of removed rock off site in accordance with the Construction Environmental Management Plan.

3.3 Granular Fill

- .1 Granular fill material shall be a clean, well-graded pit run sand and gravel, substantially free from clay lumps, organics, and extraneous material. No more than 8% of the material shall pass the 75µm (#200) sieve.
- .2 The material shall be free of deleterious substances and invasive plants, and be non-toxic to plant, human, and animal life in part or in concentration (leachate).
- .3 The *Contractor* shall provide, as a *Submittal*, soil testing data from an accredited third-party laboratory demonstrating that the material is below generic numerical soil standards to protect human health, as set out in the BC Contaminated Sites Regulation, Schedule 3.1, Residential Low Density classification.
- .4 Handle and transport material to avoid segregation, contamination, and degradation.

- .5 Place material in maximum 150 mm loose lift thickness and compact each lift to at least 80% Standard Proctor Density. A pre-approved compaction method is with one pass (each way) of a min. 300 kg vibratory plate compactor.

3.4 Topsoil and Manure

- .1 Topsoil shall be from Clark Pacific Excavating, which is currently stockpiled at Fawn & McCollum Rd., Gabriola, BC. Email: Ken@clarkpacificexcavating.com. Phone: (250) 714-8815.
- .2 Manure shall be “well composted animal manure” from Cresta Roca Farm, 1340 Cresta Roca Rd, Gabriola, BC V0R 1X7. Phone (250) 268-7161. Email: crestarocafarm@shaw.ca.
- .3 The *Contractor* shall provide receipts verifying that topsoil and manure were sourced from the locations noted.
- .4 Place and grade the topsoil over prepared granular fill. Allow to settle or compact by light rolling to no more than 85% Standard Proctor Density. Ensure at least 125 yards (19.2 m³) is placed within the boundaries of 1040 Coats Dr.
- .5 Spread manure over the topsoil with a suitable mechanical spreader. Manure shall only be placed within the boundary of 1040 Coats Dr.
- .6 The finished surface shall be smooth, uniform, and firm against deep footprinting with a fine loose surface texture.

3.5 Crushed Gravel

- .1 Material shall be a 75 mm minus crushed gravel conforming to the gradation of MMCD crushed granular sub-base.
- .2 Handle and transport material to avoid segregation, contamination, and degradation.
- .3 Place crushed gravel in a single lift and compact to a firm bearing.

3.6 Boulders

- .1 Boulders shall be hard and durable quarry rock of a quality that will not disintegrate on exposure to water or the atmosphere.
- .2 Material properties shall meet the 2025 BC MoTT Standard Specifications for Highways Construction, including low acid rock drainage and metal leaching potential.

3.7 Measurement and Payment

- .1 The payment amount for Part 3 – Earthworks shall be in accordance with the Form of Tender.
- .2 Changes to the contract price for change order work under Part 3 – Earthworks shall be in accordance with the earthworks unit rates included with the Form of Tender.

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4.0 CAST IN PLACE CONCRETE

4.1 General

- .1 The *Contractor* shall be responsible for quality control of all components of the concrete operation, including but not limited to, aggregate and component quality, proportioning, batching, mixing, transporting, placing, consolidating, finishing, curing, and all necessary quality control and verification testing of the components and the fresh and hardened concrete.

4.2 Applicable Standards

- .1 The following standards shall apply to all cast in place concrete work:
- (a) CSA A23.1 – Concrete materials and methods of concrete construction
 - (b) CSA A23.2 – Test methods and standard practices for concrete
 - (c) CSA A3000 – Cementitious Materials Compendium
 - (d) CAN/CSA S269.1 – Falsework and formwork
 - (e) CSA A283 – Qualification code for concrete testing laboratories

4.3 Submittals

- .1 The *Contractor* shall provide *Submittals* under this specification at least 10 business days prior to the anticipated concrete pour date.
- .2 Provide certification acceptable to the *Consultant* that mix proportions selected will produce concrete of specified quality, durability and yield and that strength will comply with this specification and CSA-A23.1.
- .3 Provide certification acceptable to the *Consultant* that all plant, equipment, and materials to be used in concrete production comply with requirements of CSA-A23.1.
- .4 Provide product data sheets from the manufacturer for all grouts proposed for use.
- .5 Provide a written description of the proposed concrete curing methodology.

4.4 Concrete Materials

- .1 Portland cement and supplementary cementing materials: to CSA A3000
- .2 Water: to CSA-A233
- .3 Aggregates: to CSA-A23
- .4 Air entraining admixture: to CSA-A266
- .5 Chemical admixtures: to CSA-A266
- .6 Proportion concrete materials to meet the design criteria specified on the drawings.

4.5 Reinforcement Materials

- .1 Reinforcing steel bars: grade 400R to CSA G30.18
- .2 Cold-drawn annealed steel wire ties: to CSA G30.3
- .3 Welded steel wire reinforcement mesh: to CSA G30.5

- .4 All reinforcement shall be epoxy-coated to ASTM A775/A775M or galvanized to CSA G164.
- .5 Chairs, bolsters, bar supports, and spacers: to CSA A23.1. Use only non-rusting, galvanized, plastic coated steel, or plastic materials.
- .6 Minimum reinforcing bar hook dimensions to CSA A23.1-14 CL6.6.2.4.
- .7 Minimum lap lengths and bar development lengths to CSA A23.3.

4.6 Formwork and Falsework

- .1 Formwork and falsework shall be designed, supplied, installed and removed in accordance with CAN/CSA S269.1 and shall also meet all requirements for formwork and falsework given in the BC Occupational Health and Safety Regulation.
- .2 Do not use sheets showing torn grain, worked edges, patches, holes from previous use, or defects which will impair the texture of the concrete.
- .3 Form ties shall be metal and of the type such that no metal is left within 25 mm from the concrete surface when the forms are removed.
- .4 Form release agents shall be approved by the *Biologist* before use and meet all requirements of the Construction Environmental Management Plan.

4.7 Grouts

- .1 Grouts shall be a pre-mixed, unsanded, non-metallic, and non-shrink cementitious grout containing silica fume.
- .2 Minimum 28-day compressive strength of 60 MPa when prepared to a flowable condition in accordance with the manufacturer's recommended practice.
- .3 A pre-approved product is Basalite Microsil Anchor Grout.

4.8 Waterstops

- .1 Waterstops shall be Sika SwellStop (25 mm width) or approved equal, installed with primer adhesive in accordance with the manufacturer's recommended practice.

4.9 Execution – Site Preparation

- .1 Remove loose rock and soil from the receiving bedrock surface and clean the surface using pressurized water followed by compressed air.
- .2 Clean out open bedrock joints to a depth equal to at least three times their width and fill with grout. Place grout at sudden variations in the bedrock surface including local depressions and open voids. Place grout to smooth all bedrock surfaces that will receive waterstops.

4.10 Execution – Bedrock Dowels

- .1 Drill holes to the locations, angles, and depths shown in the drawings. Drill holes shall be at least 50 mm deeper than the dowel embedment length shown on the drawings.

- .2 The diameter of drill holes shall be in accordance with the dowel or grout manufacturer's recommended practice. In the absence of such recommendations, the drill hole diameter shall be 12 mm larger than that of the dowel.
- .3 Clean out the finished drill holes of all water, grease, oil, cuttings, and other deleterious materials using a water and/or air jet as required. Carry out additional rock scaling and surface cleaning at ground surface if drilling fractures the surrounding rock. Ensure the drill hole is dry before placing grout.
- .4 Mix grout to a flowable consistency according to the manufacturer's published instructions.
- .5 Gravity feed grout using a grout tube extending to the bottom of the hole. The inserted end of the tube shall remain below the level of the grout in the hole to affect a continuous air free column. Grout shall be placed quickly and continuously to avoid overworking, segregation, bleeding, and disturbance of initial set. Grout that has stiffened due to a delay in placing shall not be used in the work and shall be disposed of in accordance with the Construction Environmental Management Plan.
- .6 Insert dowels into the drill holes and rotate slowly to expel air. Ensure the dowel is fully encapsulated in grout to the ground surface. Dowels must be centered within the hole, elevated 25 to 50 mm off the base of the hole, and supported until the grout has set. Remove excess grout (i.e., squeeze out) before it sets.

4.11 Execution – Formwork and Falsework

- .1 Formwork to conform to the shape, line, and dimensions of finished concrete shown on the drawings and as required to obtain accurate alignment, location, grades, level and plumb work in the finished structure.
- .2 Formwork to be substantial, sufficiently tight to prevent leakage of mortar, and braced and tied to maintain position and shape.
- .3 Wet down forms prior to placing concrete. Do not permit standing water to accumulate in forms.
- .4 Grease form tie bolts, if used, using silicone grease to facilitate removal without spalling of concrete.
- .5 Strip forms ensuring no damage to the concrete.

4.12 Execution – Reinforcement

- .1 Place reinforcing steel, mesh, and supports in accordance with CAN/CSA-A32.1.
- .2 Tie reinforcing bars and mesh securely to prevent displacement.
- .3 Field bending of reinforcement shall be done cold using purpose-made equipment. Do not bend partially embedded bars. Do not straighten or re-bend in a manner which will damage the material. Bars showing rust, cracks, or spalling will be rejected by the *Consultant*.

- .4 Touch up damaged parts and cut ends of epoxy coated or galvanized reinforcing steel with compatible finish to provide continuous coating.
- .5 All reinforcing steel and mesh shall have a minimum clear cover distance of 100 mm unless otherwise noted on the drawings.
- .6 The *Contractor* may, with approval of the *Consultant*, place additional reinforcing steel to support the primary reinforcement specified in the *Drawings*. The placement of such additional reinforcement shall not be considered a change in work and will not give rise to a change in the *Contract Price*.

4.13 Execution – Concrete

- .1 Obtain the *Consultant's* approval at least 2 business days prior to placing of concrete.
- .2 Concrete shipment is permitted only after the *Consultant's* approval of the mix design.
- .3 Concrete placement shall not proceed until the *Consultant* has reviewed a copy of the concrete delivery ticket.
- .4 Concrete placement shall occur in a single pour.
- .5 Comply with CSA A23.1 and ACI A305 for placing and curing of concrete when the air temperature is above 27°C. The maximum concrete temperature at placing shall be 25°C.
- .6 Ensure reinforcement and supports are not disturbed during the concrete placement.
- .7 Place and compact concrete in accordance with CSA A23.1 and maintain at least one spare vibrator on site during concrete placement.
- .8 If using immersion vibrators, place and consolidate the concrete in approximately 0.3 m thick layers, proceeding at a uniform rate and penetrating the preceding layer, so that cold joints between layers are not created. Ensure that vibrators work the concrete thoroughly around the reinforcement, embedded fixtures, and form corners. Do not apply vibration directly on or through the reinforcement. Do not use vibration to transport concrete within the forms.
- .9 Level and screed unformed surfaces to an even, uniform finish. Apply a 19 mm chamfer to all exposed concrete edges.
- .10 Curing of concrete shall conform the CSA A23.1. Curing shall begin immediately following the placing and finishing operations.
- .11 Curing shall be for 7 days at $\geq 10^{\circ}\text{C}$ or for the time necessary to obtain 70% of the specified 28-day compressive strength.
- .12 Protect all concrete from rain, flowing water, mechanical damage, and vandalism during the curing period.
- .13 Fill all surface defects larger than 12 mm and grind ridges flush with surrounding surfaces. Patch all shrinkage cracks larger than 1 mm wide.

4.14 Tolerances

- .13 Work not meeting the following tolerance limits is deemed defective and must be removed, rebuilt, or repaired at no extra cost to the *Owner*.
- (a) Dowel embedment length in bedrock: -0 mm, +200 mm
 - (b) Spacing between reinforcing bars: -100 mm, +0 mm
 - (c) Concrete cover for reinforcing steel, dowels, and mesh: -0 mm, +25 mm
 - (d) Top elevation of finished concrete: ± 25 mm
 - (e) Variation in length of finished concrete: ± 38 mm
 - (f) Variation from plumb of finished concrete: 19 mm

4.15 Measurement and Payment

- .1 The payment amount for Part 4 – Cast in Place Concrete shall be in accordance with the Form of Tender.

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5.0 SITE RESTORATION

5.1 Fence Restoration

- .1 Restore existing page wire fencing and gates along private property that is removed, damaged, or disturbed during construction.
- .2 Fence restoration shall use all new materials, with dimensions, arrangement, and material types to match the existing fencing.

5.2 Ground Treatment

- .1 Prepare all disturbed ground for treatment by scarifying the ground surface, achieved by running excavator teeth or track grouser in a perpendicular direction to the slope gradient.
- .2 Approved woody debris obtained in clearing and excavation shall be distributed over prepared ground to a maximum density of 75% surface coverage.
- .3 Excavated soil disposal shall only occur in the designated areas indicated on the drawings and approved by the *Biologist*. The minimum thickness of placed soil shall be 0.5 m. Allow soil to settle or compact such that it is firm against footprints. Do not compact the soil more than is necessary to meet this requirement.
- .4 Where excavated soil disposal is used to cover existing reed canary grass, the grass shall be flattened by trampling or other approved method. Grass shall be covered with 2 layers of approved clean, non-plasticized, cardboard or an approved biodegradable ground sheeting which is weighted with rocks or secured with wooden stakes. Overlap all covering joints by at least 0.3 m. Place soil over sheeting.

5.3 Revegetation

- .1 Apply a native coastal BC riparian restoration seed mix, tested as free of invasives, to all disturbed surfaces and bare topsoil unless otherwise indicated on the Drawings. The seeding rate shall be in accordance with the supplier's recommended practice. Seeding shall closely follow the ground treatment work, weather permitting.
- .2 The *Contractor* shall provide, as a *Submittal*, the seed mix report and a Certificate of Seed Analysis from an accredited testing laboratory. Any seed lot containing weed contaminants, prohibited, or noxious species will be rejected.
- .3 Carry out revegetation planting as specified on the drawings and in general compliance with Section 8.3 of the British Columbia Landscape Standard. Planting shall occur in the fall (October) during non-drought conditions.
- .4 The *Contractor* shall provide, as a *Submittal*, a drawing identifying the materials and layout for beaver exclusion fencing and guards.
- .5 The minimum required planting survival rate is 80% within the warranty period.

5.4 Test Pitting

- .1 Test pitting is required to support the feasibility assessment and design of habitat channels described in Section 5.5.
- .2 The *Contractor* shall excavate test pits at up to ten locations in the marsh identified by the *Consultant*. Test pitting shall be witnessed by the *Consultant*, who will specify the required excavation depths and rates of test pit advancement. The *Contractor* shall re-fill all test pits to their pre-disturbance grade.
- .3 Access to the marsh by equipment shall only proceed using swamp pads (rig mats) unless otherwise authorized by the *Biologist*.

5.5 Habitat Channels (PROVISIONAL)

- .1 The *Consultant* may specify construction of habitat channels, subject to subgrade conditions in the marsh. The *Contractor* shall not proceed with habitat channel construction unless authorized to do so by the *Consultant*.
- .3 If the *Consultant* determines that the subgrade conditions are suitable for habitat channel construction, he shall furnish the *Contractor* with final design drawings and specifications for the work. A preliminary concept is included with the Drawings for the purpose of developing tendered unit rates.
- .4 Habitat channel construction shall be carried out according to the technical specifications for Common Excavation included in Part 3 – Earthworks.
- .5 Access to the marsh by equipment shall only proceed using swamp pads (rig mats) unless otherwise authorized by the *Biologist*.
- .6 Disturbed marsh bottom areas shall be restored in accordance with the Construction Environmental Management Plan and sections 5.2 and 5.3.

5.6 Measurement and Payment

- .1 The payment amount for Part 5 – Site Restoration shall be in accordance with the Form of Tender.
- .2 Work under 5.5 – Habitat Channels is a provisional work item. If the work is authorized, the *Owner* shall issue a change order based on the unit rate for habitat channel excavation included with the Form of Tender. Measurement for such changes shall be based on a comparison of surveyed subgrade and finished grade topographic surfaces, carried out by the *Consultant*.
- .3 Changes to the contract price for revegetation planting work under Part 5 – Site Restoration shall be in accordance with the unit rates included with the Form of Tender.

END OF SECTION

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6.0 ENVIRONMENTAL AND WATER MANAGEMENT

6.1 General

- .1 The *Contractor* shall comply with all conditions of the project environmental permits.
- .2 The *Contractor* shall comply with and implement all requirements of the Construction Environmental Management Plan (CEMP). The CEMP sets out the following items which are provided here for reference:
 - (a) Local environmental features
 - (b) Environmental responsibilities of the project team
 - (c) Measures to mitigate and avoid environmental impacts
 - (d) Environmental incidents and spill response procedures
 - (e) Site restoration requirements

6.2 Authority of the Environmental Monitor

- .1 The *Owner* shall provide a qualified environmental monitor who will be on site as appropriate throughout the duration of the project. The environmental monitor will have the authority to recommend modifications or to halt construction and direct construction personnel and equipment to implement mitigation measures as necessary to conserve and protect environmental resources.

6.3 Site Isolation and Water Control

- .1 The *Contractor* shall draw his attention to the presence of an active beaver dam upstream of the work area, as indicated on the drawings.
- .2 The *Contractor* is required to design, set up, maintain, and remove a system for isolating the work site from flowing and standing water.
- .3 The site isolation system shall meet the following performance specifications and comply with requirements set out in the Construction Environmental Management Plan:
 - (a) All work activities must be conducted in isolation of flowing water.
 - (b) Standing water and seepage must be removed from the work area to facilitate work in dry conditions.
 - (c) Water levels upstream of the existing beaver dam may not be manipulated.
 - (d) If there is flow in the outlet creek prior to construction, it must be diverted around the weir structure to maintain continuous base flow rates to protect fish and other aquatic resources downstream of the site.
 - (e) There must be provisions to safely isolate and divert flow around the work site in the event of a flood.
 - (f) Where pumps are used for water control, a backup pump and generator of the same size must be kept on site at all times.
 - (g) Removal of the site isolation system must be done in a controlled manner which gradually re-introduces flow to the receiving stream and controls turbidity.
- .4 At least fifteen (15) Business Days prior to mobilization, the *Contractor* shall provide, as a *Submittal* a written site isolation plan which includes the following items.

- (a) Plan view sketch of the site isolation layout
- (b) Method statement for isolating the site from flowing water, identifying required materials, dimensions, and method of installation.
- (c) Method statement for dewatering the work area, including equipment, intake type and locations, discharge locations, and method for erosion control at the point of discharge.
- (d) Method statement for water diversions during normal flow and flood conditions, including intake locations, fish screening details, equipment requirements, conveyance system type and dimensions, discharge location, and method for erosion control at the point(s) of discharge.
- (e) Method statement for backup systems and contingency measures in the event of severe flooding or equipment failure.
- (f) Method statement for monitoring weather and streamflow conditions.
- (g) Method statement for removal of site isolation, identifying the work sequences and methods for flow and turbidity control.

6.4 Measurement and Payment

- .1 The payment amount for Part 6 – Environmental and Water Management shall be in accordance with the Form of Tender.

END OF SECTION