SO APPENDIX A – SCOPE OF WORK

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Section 01 11 00 – Summary of Work

Part 1 General

1.1 RELATED REQUIREMENTS

.1	Section 01 14 00	WORK RESTRICTIONS
.2	Section 01 31 19	PROJECT MEETINGS
.3	Section 01 35 29.06	HEALTH AND SAFETY REQUIREMENTS
.4	Section 01 35 43	ENVIRONMENTAL PROCEDURES
.5	Section 02 41 99	DEMOLITION FOR MINOR WORKS
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.14	Section 06 10 00.01	ROUGH CARPENTRY – SHORT FORM
.15	Section 31 00 99	EARTHWORK FOR MINOR WORKS
.16	Section 31 05 16	AGGREGATE MATERIALS, RIP-RAP AND RUBBLE MOUND BREAKWATER
.17	Section 31 62 16.13	SHEET PILES
.18	Section 31 62 16.19	PILES
.19	Section 35 20 24	DREDGING

1.2 DEFINITIONS

.1 Throughout contract documents, the words “Owner,” “Contracting Authority,” “Harbour Authority,” “Contractor,” “Engineer,” or “Department,” shall be defined as follows:

.1 Owner and Contracting Authority

Real Property, Safety and Security of the Department of Fisheries and Oceans,

200-401 Burrard Street Vancouver B.C. V6C 3S4

.2 Engineer/Departmental Representative

An employee of the Owner or Engineer assigned by the Owner as the Engineer for this project, or the Engineer’s representative assigned by the Engineer as his representative for the project.

.3 Contractor

The party accepted by the Owner with whom a formal contract is entered to complete the work of this project.

.4 Department

The Fisheries and Oceans Canada and the Canadian Coast Guard.

1.3 DRAWINGS

.1 DRAWING LIST AND KEY PLAN

NL-000 DRAWING LIST

1.4 LOCATION

.1 The Pacific Region sites have been split up into three zones, Zone A – Lower Mainland, Zone B – Vancouver Island and, Zone C – North Coast. See attached Drawing NL-000 for a detailed list of sites and zone definitions

Zone A – Lower Mainland/Southern Vancouver Island

Zone B – Northern Vancouver Island/Central Coast

Zone C – North Coast

1.5 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work covered under this Standing Offer Agreement comprises of the furnishing of all labour, materials, tools, transportation, supervision and equipment necessary for the provision of completing marine infrastructure projects for the various locations within each zone.

1.6 BASIS OF PAYMENT

.1 The following are in reference to items as detailed in Part 2 – Financial Proposal of the Request for Standing Offer document.

The hourly cost for each item shall include the supply of materials, equipment, tools, services, labour and all things described below:

.1 Site Superintendent

.1 Must have significant and recent experience managing marine construction projects.

.2 Construction experience completing the following work:

.1 Prepare, Review and Submit for review of all required Shop Drawings.

.3 Further sections outlining the requirements for this labour item are specified in:

.1	Section 01 14 00	WORK RESTRICTIONS
.2	Section 01 31 19	PROJECT MEETINGS
.3	Section 01 35 29.06	HEALTH AND SAFETY REQUIREMENTS
.4	Section 01 35 43	ENVIRONMENTAL PROCEDURES
.5	Section 02 41 99	DEMOLITION FOR MINOR WORKS
.6	Section 02 81 01	HAZARDOUS MATERIALS
.7	Section 02 83 10	LEAD-BASE PAINT ABATEMENT MINIMUM PRECAUTIONS
.8	Section 03 20 00	CONCRETE REINFORCING
.9	Section 03 30 00	CAST-IN-PLACE CONCRETE

.2 Certified Tugboat Operator

.1 Must meet current Transport Canada regulatory requirements for vessel type, vessel size and Work location, and is qualified to perform the Work.

.2 Proof of certifications of the operator must be provided.

.3 Must be qualified to pilot a tugboat equivalent or greater than the tugboats outlined in Section 01 11 00 1.6 1 19 Tug Boat 1 and Section 01 11 00 1.6 1 20 Tug Boat 2.

.3 Passenger Carrying Vessel Operator

.1 Must meet current Transport Canada regulatory requirements for vessel type, vessel size and Work location, and is qualified to perform the Work.

.2 Proof of certifications of the operator must be provided.

.3 Must be qualified to pilot a passenger carrying vessel equivalent or greater than the vessel outlined in Section 01 11 00 1.6 1 22 Passenger Carrying Vessel.

.4 Landing Workboat Operator

.1 Must meet current Transport Canada regulatory requirements for vessel type, vessel size and Work location, and is qualified to perform the Work.

.2 Proof of certifications of the operator must be provided.

.3 Must be qualified to pilot a landing boat equivalent or greater than the landing boat outlined in Section 01 11 00 1.6 1 21 Landing Workboat.

.5 Deckhand

.1 Must be certified to a minimum level of training in three areas:

.1 Marine first aid.

.2 Marine operator competency.

.3 Marine basic safety training.

.2 Must be qualified to perform the Work as specified by the Departmental Representative.

.6 Machine Operator

.1 Must have a minimum 5 years' machine operator and construction experience.

.2 Must be capable of providing labour support.

.3 Must be qualified to operate a machine equivalent or greater than the machines specified in the following sections:

.1	01 11 00 1.6 1.13	HE 200 Series Excavator or equivalent model
.2	01 11 00 1.6 1.14	CAT 910M Front End Loader or equivalent model
.3	01 11 00 1.6 1.15	Forklift
.4	01 11 00 1.6 1.16	Concrete Truck
.5	01 11 00 1.6 1.17	Rock Truck

.4 Further sections outlining the requirements for this labour item are specified in:

.1	02 41 99	DEMOLITION FOR MINOR WORKS
.2	31 00 99	EARTHWORK FOR MINOR WORKS
.3	31 05 16	AGGREGATE MATERIALS, RIP-RAP & RUBBLE MOUND BREAKWATER

.7 Crane Operator

.1 Must meet current regulatory requirements and be Red Seal Certified or Level A Certification in accordance with the BC Association for Crane Safety (BCACS) and qualified to perform the Work as directed by the CCG Representative.

.2 Proof of certifications of the operator must be provided.

.3 Must have a minimum 5 years' crane operator and construction experience.

.4 Must be qualified to operate a crane equivalent or greater than the cranes specified in the following sections:

.1	01 11 00 1.6 1 18	Truck-mounted Hydraulic Boom Crane
.2	01.11.00.1.6.1.27	Crawler Crane

.5 Further sections outlining the requirements for this labour item are specified in:

.1 31 62 16.13 SHEET PILING

.2 31 62 16.19 PILES

.8 Pile-driver/Driller Operator

.1 Must be qualified to operate a pile-driver/drill rig equivalent or greater than the pile-driver/drill rig defined in Section 01 11 00 1.6 1 28 Pile-driving/Drill Rig.

.2 Must have a minimum 5 years' pile-driver/driller operator and construction experience.

.3 Further sections outlining the requirements for this labour item are specified in:

.1 31 62 16.13 SHEET PILING

.2 31 62 16.19 PILES

.9 Welder/Fabricator

.1 Must have current structural weld certifications for both aluminum and steel.

.2 Must have a minimum 5 years' construction experience completing the following work:

.1 Repair of steel structures.

.2 Repair of Aluminum structures.

.3 Further sections outlining the requirements for this labour item are specified in:

.1 05 12 23 STRUCTURAL STEEL FOR BUILDINGS

.2 05 14 11 STRUCTURAL ALUMINUM FOR BUILDINGS

.3 31 62 16.13 SHEET PILING

.4 31 62 16.19 PILES

.10 Tradesperson

.1 Must be Red Seal Certified and qualified to perform the Work as directed by the CCG Representative.

.2 Further sections outlining the requirements for this labour item are specified in:

.1 02 41 99 DEMOLITION FOR MINOR WORKS

.2 03 20 00 CONCRETE REINFORCEMENT

.3 03 30 00 CAST IN PLACE CONCRETE

.4 06 10 00.01 ROUGH CARPENTRY – SHORT FORM

.11 Labourer

.1 Must have construction experience completing the following work:

.1 Site cleanups.

.2 Landscaping.

.3 Assist tradespeople.

.4 Miscellaneous Work-related tasks.

.2 Further sections outlining the requirements for this labour item are specified in:

.1 02 41 99 DEMOLITION FOR MINOR WORKS

.2 02 31 10 LEAD ABATEMENT – MINIMUM PRECAUTIONS

.3 03 20 00 CONCRETE REINFORCING

.4 03 30 00 CAST-IN-PLACE CONCRETE

.5 06 08 99 ROUGH CARPENTRY FOR MINOR WORKS

.12 Marine Surveyor

.1 Must have a minimum 5 years' expertise surveying construction sites.

.2 Must have certification from ABCLS, ASTTBC or other surveyor governing body approved by the Departmental Representative.

.3 Must have experience surveying in the marine environment.

.4 Must have experience completing bathometric surveys.

.2 All labour identified above may be switched for an equivalent with written approval from the departmental representative.

EQUIPMENT

.1 The unit rate cost for each item shall include the supply of materials, equipment, tools, services, labour and all things described below:

.13 HE 200 Series Excavator or equivalent model

.1 Must have minimum 140hp.

.2 Must have minimum 1 m^3 general purpose bucket.

.3 Must have 9.5m maximum reach.

.4 Must have thumb attachment.

.5 Must have hydraulic rock breaker attachment.

.14 CAT 910M Front End Loader or equivalent model

.1 Must have minimum 100hp.

.2 Must have minimum 1.9 m^3 bucket

.15 Forklift

.1 Must be capable of lifting a minimum 22.2kN (5000lbs) to a minimum height of 5m (16.4ft).

2. Must be capable of operating from the deck of the ramp barge specified in Section 01 11 00 1.6 1 23 Ramp Barge and the spud barge specified in Section 01 11 00 1.6 1 26 Spud Barge.

.16 Concrete Truck

.1 Must be capable of making and placing a minimum of minimum 6m^3 of concrete.

.2 Must be capable of being operated from the deck of the ramp barge specified in Section 01 11 00 1.6 1 23 Ramp Barge and the spud barge specified in Section 01 11 00 1.6 1 26 Spud Barge.

.3 Further sections outlining the requirements for this item are specified in:

.1 03 30 00 CAST-IN-PLACE CONCRETE

.17 Dump Truck

.1 Must be capable of transporting a minimum of 11m^3 (388ft^3).

.2 Must be capable of being operated from the deck of the ramp barge specified in Section 01 11 00 1.6 1 23 Ramp Barge and the spud barge specified in Section 01 11 00 1.6 1 26 Spud Barge.

.18 Truck-mounted Hydraulic Boom Crane

.1 Must have minimum lifting capacity rating of 17.3kN (3900lbs) while at an operating radius of 19.8m (65ft).

.2 Must be capable of being operated from the deck of the spud barge specified in Section 01 11 00 1.6 1 26 Spud Barge.

.3 Must have two load lines to support a man basket and a load simultaneously.

.4 Must meet all WorkSafe BC standards in relation to performing the Work which includes, but not limited to, only having the ability to lower work platforms under power.

.5 Must have been inspected and approved by a professional engineer to meet all applicable standards within 12 months from the start of Work.

.6 Must meet all Canadian federal and provincial regulatory requirements.

.7 Proof of certifications and inspections must be provided.

.19 Tugboat 1

.1 Must have twin screw propulsion.

.2 Must have minimum 800 horsepower.

.3 Must meet all Canadian federal and provincial regulations.

.4 Proof of vessel certifications must be provided.

.5 Tug operator and crew must be certified to meet current regulatory requirements and be qualified to perform the Work.

.6 Proof of operator and crew certifications and a copy of the Transport Canada Minister Certificate must be provided.

.20 Tugboat 2

.1 Must have minimum single screw propulsion.

.2 Must have minimum 400 horsepower.

.3 Must meet all Canadian federal and provincial regulations.

.4 Proof of vessel certifications must be provided.

.5 Tug operator and crew must be certified to meet current regulatory requirements and be qualified to perform the Work.

.6 Proof of operator and crew certifications and a copy of the Transport Canada Minister Certificate must be provided.

.21 Landing Workboat

.1 Must be self-propelled.

.2 Must have self-powered hydraulic ramp capable of supporting excavator specified in Section 01 11 00 1.6 1 13 HE 200 Series Excavator or equivalent model.

.3 Must have a vessel-mounted hydraulic crane with a minimum lifting capacity rating of 11.12kN (2500lbs) while at an operating radius of 6.1m (20ft). Vessel-mounted hydraulic crane must meet all Canadian federal and provincial regulatory requirements.

.4 Must be capable of accommodating operator, minimum 5 passengers, minimum 20m3 (700ft3) of material and excavator specified in Section 01 11 00 1.6 1 13 HE 200 Series Excavator or equivalent model.

.5 Must be capable of entering shallow waters to land equipment and passengers on rocky shoreline.

.6 Must meet all Canadian federal and provincial regulations.

.7 Proof of vessel certifications must be provided.

.22 Passenger Carrying Vessel

.1 Must be capable of carrying a minimum of 10 passengers inside enclosed heated cabin with seating.

.2 Must be capable of entering shallow waters and landing passengers on rocky shoreline.

.3 Must meet all Canadian federal and provincial regulations.

.4 Proof of vessel certifications must be provided.

.23 Ramp Barge

.1 Must have a minimum deck size of 15.3m x 54.9m (50ft x 180ft).

.2 Must be level, clean and free of debris and other material to allow for the safe operation of crew and machinery.

.3 Must be equipped with a self-powered ramp capable of:

.1 Safely loading and unloading machinery, crew and material.

.2 Safely supporting HE 200 Series Excavator or equivalent model while the ramp is on incline or decline between barge connection and shore to facilitate Work.

.3 Being monitored by Contractor at all times, especially if the Contractor is relying on friction resistance of the ramp end for stability requirements.

.4 Must have a minimum of two ladder access points from water to barge deck.

.5 Must meet all applicable Occupational Health and Safety regulations and code requirements including providing fall protection for workers on the barge by means of guard railing around the perimeter edge.

.6 Must meet all Canadian federal and provincial regulations.

.7 Proof of vessel certifications must be provided.

.24 Scow Barge 1

.1 Must have a minimum load capacity of 453,592kgs (500 tons).

.2 Deck must be level, clean and free of debris and other material.

.3 Must have a minimum of two ladder access points from water to barge deck.

.4 Must meet all Canadian federal and provincial regulations.

.5 Proof of vessel certifications must be provided.

.25 Scow Barge 2

.1 Must have a minimum load capacity of 1,360,777kgs (1500 tons).

.2 Deck must be level, clean and free of debris and other material.

.3 Must have a minimum of two ladder access points from water to barge deck.

.4 Must meet all Canadian federal and provincial regulations.

.5 Proof of vessel certifications must be provided.

.26 Spud Barge

.1 Must have a minimum load capacity of 90718.5kgs (100 tons).

.2 Must be capable of loading, unloading and accommodating crawler crane specified in Section 01 11 00 1.6 1 27 Crawler Crane plus Work materials.

.3 Must have a minimum of two vertical spuds.

.3 Must have minimum deck platform of 33.33m x 11.58m x 2.13m (110ft x 38ft x 7ft).

.4 Must be level, clean and free of debris and other material to allow for the safe operation of machinery and crew.

.5 Must have a minimum of two ladder access points from water to barge deck.

.6 Must meet all applicable Occupational Health and Safety regulations and code requirements including providing fall protection for workers on the barge by means of guard railing around the perimeter edge.

.7 Must meet all Canadian federal and provincial regulations.

.8 Proof of vessel certifications must be provided.

.27 Crawler Crane

.1 Must have a minimum lifting capacity of 555.82KN (50 tons).

.2 Must be operated from the deck of the spud barge specified in Section 01 11 00 1.6 1 26 Spud Barge.

.3 Must include a clamshell bucket for dredging.

.4 Must have two load lines to support a man basket and a load simultaneously.

.5 Must meet all WorkSafe BC standards in relation to performing the Work which includes, but not limited to, only having the ability to lower work platforms under power.

.6 Must have been inspected and approved by a professional engineer to meet all applicable standards within 12 months from the start of the Work.

.7 Must meet all Canadian federal and provincial regulatory requirements.

.8 Proof of certifications and inspections must be provided.

.9 Must not be equipped with free running boom and hoisting winches controlled only by brakes.

.28 Pile-driving Rig

.2 Must have minimum engine power 108kW (145hp).

.5 Must include vibe hammer, impact hammer, sheet pile attachment and pile drill capabilities.

.6 Pile-driving rig must be operated from the crawler crane specified in Section 01 11 00 1.6 1 27 Crawler Crane.

.7 Must be capable of installing steel sheet piles.

.29 Drill Rig

.1 Must have minimum torque of 60kN-m (6.74 ton-meter).

.2 Must have minimum engine power 108kW (145hp).

.3 Must have minimum drilling diameter range of 0.5–1.2m (1.64-3.94ft)

.4 Must be capable of minimum drilling depth of 40m (131ft).

.5 Must include vibe hammer, impact hammer, pile drill capabilities.

.6 Pile-driving rig must be operated from the crawler crane specified in Section 01 11 00 1.6 1 27 Crawler Crane.

.2 All equipment identified above may be switched for an equivalent with written approval from the Departmental Representative.

MATERIALS

.1 The unit rate cost for each item shall include the supply of materials, equipment, tools, services, labour and all things described below:

.30 Type 1 Gravel Backfill

.1 Crushed, pit run or screened stone, gravel or sand.

.2 Gradations to be within limits specified when tested to ASTM C117. Sieve sizes to CAN/CGSB-8.1.

.3 Table:

Sieve Designation	% Passing	
	Type 1	Type 2
75 mm	-	100
50 mm	-	-
37.5 mm	-	-
25 mm	100	-
19 mm	75-100	-
12.5 mm	-	-
9.5 mm	50-100	-
4.75 mm	30-70	22-85
2.00 mm	20-45	-
0.425 mm	10-25	5-30
0.180 mm	-	-
0.075 mm	3-8	0-10

.31 Type 2 Sand Backfill

.1 Hard, granular, sharp material, well graded form.

.2 Free of impurities, chemicals or organic matter.

.3 Table:

Sieve Designation	% Passing
5 mm	100
0.16 mm	0-5

.32 Type 3 Riprap Backfill

.1 Riprap backfill as specified in Section 31 05 16.01 Aggregate Materials, Riprap & Rubble Mound Breakwater.

.2 All items above may be switched out with an equivalent material with the written approval of the departmental representative.

.33 Steel Piles

.1 Straight seam painted steel piles, straight seem steel piles as specified in Section 31 62 16.19 Piles.

.2 Sheet piles as specified in Section 31 62 16.13 Sheet Piles.

.34 Timber Piles

.1 Green timber piles, creosote treated timber piles and ACZA treated timber piles as specified in Section 31 62 16.19 Piles.

.35 Rock Anchors / Rebar

.1 M25 rebar.

.2 Dywidag anchors.

.3 Structural steel as specified in Section 05 12 23 Structural Steel

.36 Concrete

.1 Further sections outlining the requirements for this item are specified in:

.1 03 30 00 CAST-IN-PLACE CONCRETE

.37 Lumber

.1 As specified in Section 02 50 00 Timber.

.38 Metal - Aluminum

.1 Structural aluminum as specified in Section 0514 11 Structural Aluminum.

.39 Metal - Steel

.1 Structural steel as specified in Section 05 12 23 Structural Steel.

.3 All materials identified above may be switched for an equivalent with written approval from the Departmental Representative.

MISCELLANEOUS

.40 Percent markup on miscellaneous equipment

.1 Percent markup on the supply of all other equipment related to this marine infrastructure standing offer that will not make up the majority of the equipment used. These may include but are not limited to:

.1 Specialty excavators (spider excavators).

.2 Equipment attachment and inserts (rock drills, grubbers etc.).

.3 Pile driving equipment and attachments.

.4 Rock Drills.

.5 Well drills.

.6 Slinging equipment and rigging.

.41 Percent markup on sub-trade work

.1 Percent markup on the supply of all other sub-trades related to this marine infrastructure standing offer that will not make up the majority of the trades hired. These may include but are not limited to:

.1 Pipe fitters.

.2 Electricians.

.3 Carpenters

.4 Divers

.5 Other Specialty trades.

.42 Percent Markup up on other Materials

.1 Percent markup on the supply of all other materials related to this marine infrastructure standing offer that will not make up the majority of the materials procured. These may include but are not limited to:

.1 Other backfill materials not specified.

.2 Timber or Steel pinning materials such as micro piles or cribbing.

.3 Steel, PVC and Concrete pipe fittings.

.4 Other forms of concrete reinforcement and inserts.

.5 Anchor bolts and fasteners including rock anchors.

.6 Miscellaneous steel or timber materials or equipment.

.2 Mobilization and the standby rate of all materials, labour and equipment identified in item .1 of 1.6 basis of payment will be billed at up to 50% of the individual call up value rate. The departmental representative may change this amount upon written notice and approval.

1.7 PROJECT ADMINISTRATION

1.7.1 GENERAL REQUIREMENTS

.1 The Contractor shall comply with the Work specific requirements as identified in the SOA Call-up.

1.7.2 COMMUNICATIONS AND MEETINGS

1.7.2.1 Communication

.1 If any communication with the User Departments results in the need for any change to the scope of Work, quality, cost or schedule, the Contractor shall inform the Departmental Representative, and seek written direction, before taking any action. No change is to be actioned without written direction from the Departmental Representative.

.2 Correspondence

.1 All correspondence from the Contractor shall be distributed to the Departmental Representative.

.2 There shall be no correspondence between DFO/CCG and the Contractor, unless directed by the Departmental Representative.

.3 The terms of the Work scope, budget or schedules must be authorized in writing by the Departmental Representative through an official Call-up Amendment as defined in the General Conditions of this SOA.

.4 All correspondence must carry the Call-up name, DFO/CCG Project title, DFO/CCG Project number, File number and date.

1.7.2.2 Meetings

.1 The Departmental Representative will arrange meetings, as required, throughout the Work.

.2 Meetings will be held on site, in the offices of the issuing representative.

1.7.2.3 Work Response Time

.1 It is a requirement of all Work that the key personnel of the Contractor are personally available to attend meetings or respond to inquiries within half a working day.

.2 During the Work, the Contractor's Key Personnel shall be:

.1 Available to attend meetings and respond to inquiries within one (1) working day notice

.2 Able to respond to urgencies within one (1) hour, including those occurring during off-hours and on weekends/ holidays.

.3 On occasion, there may be urgent, problem-solving meetings.

.1 The Contractor must be available to attend such meetings on the Work site within four (4) business hours.

1.8 ROLES AND RESPONSIBILITIES

1.8.1 CONTRACTOR

.1 The "Contractor's Team" must be eligible and registered to work in the province of British Columbia. The Contractor's Team is composed of the Contractor and designated employees along with Sub-Contractors and their designated employees.

.2 The Contractor and Sub-Contractors must perform the Work to a professional standard as outlined in the SOA and SOA Call-up.

.3 The Contractor shall:

.1 During the construction phases:

.1 Participate in construction meetings,

.2 Ensure sub-Contractors attend required meetings.

.3 Attend site inspection meetings.

1.8.2 DFO/CCG

.1 Pertaining to DFO/CCG Issued Call Ups

.1 The DFO/CCG Project Manager is the Departmental Representative and is responsible for conveying all User Department requirements to the Contractor.

.2 The Departmental Representative will schedule, record and distribute the record of decisions for all meetings.

.3 The Departmental Representative will facilitate discussions between the main stakeholders of the overall project including, but not limited to; DFO/CCG, the Consultant, the Contractor and User Department stakeholders.

1.8.3 USER DEPARTMENT

.1 The DFO/CCG Project Contact is responsible for communicating the interests of the DFO/CCG, in collaboration with the Departmental Representative.

.1 Unless directed otherwise, all communication is through the Departmental Representative within the Technical Support group.

.2 DFO/CCG is responsible for the resolution of all security issues.

1.9 SUBMITTALS

.1 Submit to Departmental Representative submittals listed for review.

.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 Copy of current construction safety manual including safe work procedures

.6 All working paper documents including Owner supplied materials, completed questionnaires or audit forms, field notes, design notes, and photographs

.7 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 (five) 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 certifications 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.

1.10 RESPONSIBILITY

.1 If one or more contractors are employed at the site, you may be requested to assume responsibility as the Prime Contractor for work under this contract and appoint a qualified coordinator for the purpose of ensuring the coordination of health and safety activities for the location in accordance with sections 118 and 119 of Part 3 of the Workers Compensation Act.

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

.3 Comply with and enforce compliance by employees with safety requirements of Contract documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan, control personnel, and temporary lighting as required.

1.11 HEALTH AND SAFETY COORDINATOR

.1 When required by Worksafe B.C. regulations the prime Contractor shall appoint a Health and Safety Coordinator who is a Registered Occupational Hygienist and shall:

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

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

.3 Be on site during execution of work.

1.12 GENERAL CONDITIONS

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

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

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

.2 Secure site after working hours in accordance with – Security Requirements.

1.13 UTILITY CLEARANCES

.1 The Contractor is solely responsible for all utility detection and clearances prior to starting the work.

.2 The Contractor will not rely solely upon the Reference Drawings or other information provided for utility locations.

1.14 PROJECT/SITE CONDITIONS

.1 Work at site involves:

.1 Contract will involve working in areas where DFO/CCG operational employees may be present, who are under supervision by DFO/CCG Technical Support Staff staff. The contractor and all employees under their control shall conform to all requirements pertaining to a CSC Institution.

.2 DFO/CCG operational staff.

1.15 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.

1.16 FILING OF NOTICE

.1 The Contractor/Prime Contractor is to complete and submit a Notice of Project (NOP) to the Provincial authorities. DFO/CCG requires a NOP to be filed for all work.

.2 Provide copy of all NOP's to the Departmental Representative.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 INDIVIDUAL CALL-UPS

.1 Each call-up will come with a set of construction drawings and specifications provided by the Departmental Representative these specifications will govern over the supplementary specifications following Section 01 11 00 in APPENDIX A.

.2 In an event that no specification or drawings are given Appendix A will be the minimum standard accepted by the Departmental Representative

3.2 BID REFERENCE

.1 Items in APPENDIX A are to be used as typical requirements for bidding purposes or as minimum standards. The Departmental Representative will provide design drawings and specifications for each individual call-up that will further refine the project scope.

.1 If the level of effort is above and beyond what is described in the subsequent sections of Appendix A then the contractor may approach the departmental representative with a new price proposal for review.

.2 The Departmental Representative may accept this proposal at their discretion.

END OF SECTION

Section 01 14 00 – Work Restrictions

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 11 00 – SUMMARY OF WORK

1.2 ACCESS AND EGRESS

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

1.3 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated.

.2 Maintain existing services to marine structures and provide for personnel and vessel access.

.3 Where security is reduced by work provide temporary means to maintain security.

.4 Accept liability for damage, safety of equipment and overloading of existing equipment and infrastructure.

.5 Closures: protect work temporarily until permanent enclosures are completed.

1.4 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING INFRASTRUCTURE

.1 Execute work with least possible interference or disturbance to infrastructure and normal use of premises. Arrange with Departmental Representative to facilitate execution of work.

1.5 EXISTING SERVICES

.1 Notify, Departmental Representative of intended interruption of navigational services and obtain required permission.

.2 Where Work involves breaking into or connecting to existing navigational services, give Departmental Representative 48 hours of notice for necessary interruption of navigational service throughout course of work. Keep duration of interruptions minimum.

.3 Provide for vessel traffic.

1.6 SECURITY

.1 Security requirements will be identified on an as-needed basis on each individual call-up.

1.7 SMOKING ENVIRONMENT

.1 Smoking is not permitted.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Section 01 31 19 – Project Meetings

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 11 00 – SUMMARY OF WORK

1.2 ADMINISTRATIVE

.1 Schedule and administer project meetings at the call of Owner.

.2 Prepare agenda for meetings.

.3 Distribute written notice of each meeting four days in advance of meeting date to all stakeholders.

.4 Provide physical space and make arrangements for meetings.

.5 Preside at meetings.

.6 Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.

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

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

1.3 PRECONSTRUCTION MEETING

.1 Within 15 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.

.2 Owner, The Engineer, Contractor, major Subcontractors, will be in attendance.

.3 Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.

.4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.

.5 Agenda to include:

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

.2 Schedule of Work to be provided as required.

.3 Schedule of submission of shop drawings, samples, colour chips.

.4 Delivery schedule of specified equipment.

.5 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.

.6 Owner provided products.

.7 Record drawings.

.8 Maintenance manuals.

.9 Take-over procedures, acceptance, warranties.

.10 Monthly progress claims, administrative procedures, photographs, hold backs.

.11 Appointment of inspection and testing agencies or firms.

.12 Insurances, transcript of policies.

1.4 PROGRESS MEETINGS

.1 During course of Work and 2 weeks prior to project completion, schedule progress meetings at regular intervals.

.2 Contractor, major Subcontractors involved in Work, the Engineer and the Owner are to be in attendance.

.3 Notify parties minimum 5 days prior to meetings.

.4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within 3 days after meeting.

.5 Agenda to include the following:

.1 Review, approval of minutes of previous meeting.

.2 Review of Work progress since previous meeting.

.3 Field observations, problems, conflicts.

.4 Problems which impede construction schedule.

.5 Review of off-site fabrication delivery schedules.

.6 Corrective measures and procedures to regain projected schedule.

.7 Revision to construction schedule.

.8 Progress schedule, during succeeding work period.

.9 Review submittal schedules: expedite as required.

.10 Maintenance of quality standards.

.11 Review proposed changes for effect on construction schedule and on completion date.

.12 Other business.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Section 01 35 29.06 – Health and Safety Requirements

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 11 00 – SUMMARY OF WORK
.2 Section 01 31 19 PROJECT MEETINGS
.3 Section 01 35 29.06 HEALTH AND SAFETY REQUIREMENTS
.4 Section 01 35 43 ENVIRONMENTAL PROCEDURES
.5 Section 02 41 99 DEMOLITION FOR MINOR WORKS
.6 Section 02 50 00 TIMBER
.7 Section 02 81 01 HAZARDOUS MATERIALS
.8 Section 02 83 10 LEAD-BASE PAINT ABATEMENT MINIMUM PRECAUTIONS
.9 Section 03 10 00 CONCRETE FORMING AND ACCESSORIES
.10 Section 03 20 00 CONCRETE REINFORCING
.11 Section 03 30 00 CAST-IN-PLACE CONCRETE
.12 Section 05 12 23 STRUCTURAL STEEL
.13 Section 05 14 11 STRUCTURAL ALUMINUM
.14 Section 06 10 00.01 ROUGH CARPENTRY ‑ SHORT FORM
.15 Section 31 00 99 EARTHWORK FOR MINOR WORKS
.16 Section 31 05 16 AGGREGATE MATERIALS, RIP-RAP AND RUBBLE MOUND BREAKWATER
.17 Section 31 62 16.13 SHEET PILES
.18 Section 31 62 16.19 PILES
.19 Section 35 20 24 DREDGING

1.2 REFERENCES

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

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.3 Province of British Columbia

.1 Workers Compensation Act, RSBC 1996 - Updated 2012.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:

.1 Results of site-specific safety hazard assessment.

.2 Results of safety and health risk or hazard analysis for site tasks and operations.

.2 Submit 3 copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative.

.3 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.

.4 Submit copies of incident and accident reports.

.5 Submit WHMIS MSDS - Material Safety Data Sheets.

.6 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 5 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative 5 days after receipt of comments from Departmental Representative.

.7 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

.8 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

1.4 FILING OF NOTICE

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

.2 Contractor shall be responsible and assume the Principal Contractor role for each work zone location and not the entire complex. Contractor shall provide a written acknowledgement of this responsibility within 3 weeks of contract award. Contractor to submit written acknowledgement to CSST along with Ouverture de Chantier Notice.

.3 Work zone locations include:

.1 As identified in the Zone Area Drawing. Departmental Representative to provide work zone locations upon call up.

.4 Contractor shall agree to install proper site separation and identification in order to maintain time and space at all times throughout life of project.

1.5 SAFETY ASSESSMENT

.1 Perform site specific safety hazard assessment related to project.

1.6 MEETINGS

.1 Schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of Work.

1.7 PROJECT/SITE CONDITIONS

.1 Work at site will involve contact with:

.1 Fisheries and Oceans Canada and Canadian Coast Guard Staff

.2 RPSS Consultants and other Contractors

.3 Local Communities and First Nations

1.8 GENERAL REQUIREMENTS

.1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.

.2 Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

1.9 RESPONSIBILITY

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

.2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.10 COMPLIANCE REQUIREMENTS

.1 Comply with Workers Compensation Act, B.C. Reg.

.2 Comply with R.S.Q., c. S-2.1, an Act respecting Health and Safety, and c. S-2.1, r.4 Safety Code for the Construction Industry.

.3 Comply with Occupational Health and Safety Regulations, 1996.

.4 Comply with Occupational Health and Safety Act, General Safety Regulations, O.I.C.

.5 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.11 UNFORSEEN HAZARDS

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

.2 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, advise the Health and Safety co-ordinator and follow procedures in accordance with Acts and Regulations of the Province having jurisdiction and advise Departmental Representative verbally and in writing.

1.12 HEALTH AND SAFETY CO-ORDINATOR

.1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:

.1 Have site-related working experience specific to activities associated with.

.2 Have working knowledge of occupational safety and health regulations.

.3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.

.4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.

1.13 POSTING OF DOCUMENTS

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

1.14 CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.

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

.3 Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

1.15 WORK STOPPAGE

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

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Section 01 35 43 – Environmental Procedures

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 11 00 – SUMMARY OF WORK
.2 Section 02 41 99 – DEMOLITION FOR MINOR WORKS
.3 Section 02 50 00 – TIMBER
.4 Section 03 30 00 – CAST-IN-PLACE CONCRETE
.5 Section 31 00 99 – EARTHWORK FOR MINOR WORKS
.6 Section 31 05 16.01 – AGGREGATE MATERIALS, RIPRAP & RUBBLE MOUND BREAKWATER
.7 Section 31 62 16.13 – SHEET PILES
.8 Section 31 62 16.19 – PILES
.9 Section 35 20 24 – DREDGING

1.2 REFERENCES

.1 Definitions:

.1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humans; or degrade environment aesthetically, culturally and/or historically.

.2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction.

1.3 IN WATER WORKS

.1 Construction equipment to be operated on land or from floating barge equipment.

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

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

1.4 NOTIFICATION

.1 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.

.2 Contractor: after receipt of such notice, Engineer of proposed corrective action and take such action for approval by Engineer.

.1 Take action only after receipt of written approval by Engineer.

.3 Engineer will issue stop order of work until satisfactory corrective action has been taken.

.4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 General Operations

.1 Federal and Provincial Legislation

.1 The following is a summary of some of the key federal environmental legislation that may apply to construction activities carried out on behalf of DFO or CCG:

.1 Canadian Environmental Assessment Act

.2 Canadian Environmental Protection Act

.3 Fisheries Act

.4 Species at Risk Act

.5 Migratory Birds Convention Act

.6 Navigation Protection Act

.7 Canada Shipping Act

.8 Transportation of Dangerous Goods Act

.2 The following is a summary of some of the key provincial environmental legislation that may apply to construction activities carried out on behalf of DFO or CCG:

.1 British Columbia Environmental Assessment Act

.2 Environmental Management Act

.3 Heritage Conservation Act

.4 Land Act

.5 Parks Act

.6 Water Sustainability Act

.7 Fish Protection Act

.8 Wildlife Act

.9 Waste Management Act

.10 Forest and Ranges Practices Act

.11 Dike Maintenance Act

.12 Drainage, Ditch and Dike Act

.2 Best Management Practices

.1 Permits

.1 Consult with appropriate Qualified Professionals, as needed, to confirm permitting requirements.

.2 Copies of all issued permits or approvals issued by regulatory agencies (e.g., DFO, Transport Canada and BC Ministry of Forests, Lands and Natural Resource Operations) must be kept on site (e.g., site trailer, construction barge, accommodation vessel) and readily available. This includes permits and approvals issued directly to DFO or CCG, as well as any issued to contractors or subcontractors.

.3 Construction-related restrictions, conditions or mitigation measures that are included in regulatory permits should be communicated to the field crew(s).

.2 Timing

.1 Choose appropriate timing of works (weather conditions, regional timing windows for species at risk). Have contingency plans designed and in place to address unforeseen weather events.

.2 Permits and approvals may include construction timing restrictions. Refer to regulatory permits to see if construction timing is restricted.

.3 In-water work should aim to occur within the DFO (DFO 2015) or Provincially (BC MOE 2017a) identified least-risk work window for the area, where practicable. Where in-water work cannot be conducted within the least-risk window, additional mitigation measures may be needed and should be developed in consultation with the appropriate regulatory authority.

.4 Construction timing should be planned to occur outside of the nesting periods for raptors, migratory birds and seabirds, whenever possible. General nesting periods of migratory birds in Canada are provided by Environment and Climate Change Canada (ECCC 2016a). Breeding seasons are provided by ECCC (ECCC 2016b) and Atlas of Breeding Birds of British Columbia (ABBBC n.d.). If unavoidable,

mitigation measures must reflect the necessary protocols for avoiding or mitigating harm to birds, nests, and fledglings (ECCC 2016c).

.3 Training

.1 Project personnel will be adequately trained and will use appropriate personal protective equipment.

.4 Tailgate Meetings

.1 Applicable Environmental Management Plans (EMP) and regulatory permit conditions will be reviewed by the Departmental Representative and Site superintendent.

.2 The author of the EMP (or the delegate) will provide a briefing to the crews.

.5 Stop Work

.1 Where an EM is onsite, they will have authority to issue a Stop Work Order where activities are harming, or may imminently harm the biophysical environment. The EM will make recommendations in the field as needed, to limit or avoid damage to the environment.

.2 Work will stop and the EM will be contacted for assistance prior to starting or continuing with activities that may pose any environmental or archaeological risk not addressed in project health, safety or environment documents (e.g., EMP, environmental regulatory permit requirements).

.6 Public Notice

.1 If applicable, proper notice should be given to transportation and navigation authorities to warn of potential disruptions during works.

.2 Construction areas will be clearly marked and, to the extent necessary, isolated from the public to prevent public access to the active construction site.

.7 Site Cleanliness

.1 Aesthetic effects created by construction activities will be short-term and localized. The site should be kept tidy during activities and left in a good condition at the end of the project.

.2 Garbage in the form of coffee cups, lunch wrappers, cigarette butts, and other such items will be placed in covered trash containers at all times.

.3 Waste or miscellaneous unused materials will be recovered for either disposal in a designated facility or placed in storage. Under no circumstances will materials be deliberately thrown into the aquatic or terrestrial environments.

.4 Where practicable, recyclable materials, such as drink containers, plastics and paper will be separated onsite and recycled at an appropriate offsite facility.

.5 Onsite personnel will make best efforts to prevent debris from entering the aquatic and terrestrial environment outside of the worksite.

.8 Wastewater

.1 Sewage from portable toilets will be disposed of in an approved sewage disposal facility on an as-needed basis.

.9 Contractors/Subcontractors

.1 Contractors and subcontractors must comply with the mitigation measures outlined in this bulletin and measures identified within applicable regulatory permits or approvals.

.10 Noise and Air Quality

.1 Machinery must be operated efficiently, to limit noise and air quality effects.

.2 Noise abatement fittings (e.g., mufflers) on equipment and machinery will be kept in good working order.

.3 Painting activities should be completed in such a way as to limit fumes entering the environment.

.4 Smoking will only be permitted in designated areas.

.5 Fire suppressing equipment must be present at designated smoking areas.

.6 Fires and burning of rubbish and vegetation is not permitted on work sites.

.7 Dust will be controlled via the application of water or similar dust control measures.

.8 Chemical dust suppressants are prohibited.

.9 To prevent unnecessary local air pollution, anti-idling measures should be put in place when vehicles and machines are not in use.

.11 Paint

.1 The amount of paint used should be limited and unused containers must be covered.

.2 Wash water from equipment should be contained and disposed of appropriately.

.12 Safety Data Sheets

.1 Chemical products must have their applicable Safety Data Sheets onsite and readily available to all construction crew members.

.13 Stock Piles/Laydown Areas

.1 Stockpiling of material will be conducted in accordance with Best Management Practices (BMPs) and limited to material staging areas and barges, where practicable.

.2 Stockpiles should remain covered during inclement weather.

.3 Temporary stockpiling areas located adjacent to the aquatic environment will be approved by the EM and materials will be removed prior to inundation by the tide or high water levels. These sites should be identified in advance of construction.

.14 Soils

.1 Care should be taken to prevent soils from being exposed and eroded into waterbodies.

.15 Deleterious Substances

.1 Harmful substances (e.g., fine sediments, hydrocarbons, contaminants) will not be deposited into aquatic environments.

.2 Storage of fuels and petroleum products will comply with safe operating procedures, including secondary containment devices (e.g., drip trays) in case of a leak or spill.

.3 Routinely inspect heavy equipment for lubricant and fuel leaks

.4 Onsite crews will have emergency spill equipment available and readily accessible, and will know how to use it properly.

.5 Refuel diesel-powered equipment at least 30m from the water.

.6 Work will be conducted such that no contaminated water or other effluent potentially harmful to aquatic life enters the marine environment. Examples of contaminated water or effluent may include silt laden water, wash water containing concrete, site run off, oil or fuel spills, and sewage.

.16 Sediment

.1 Where necessary, sediment control measures (e.g., silt curtains) will be used to limit the dispersal of sediments and sediment-laden waters beyond the immediate work area.

.2 Intertidal work should be conducted at low tide and in the dry where practicable.

.3 Prop wash should be limited in shallow aquatic environments in such a way to reduce disturbance of sediment.

.17 Power Washing

.1 Power washing should be limited to the immediate construction area.

18. Spudding/Anchoring

.1 Where practicable, crews will position barges and vessels in a way that minimizes damage to sensitive aquatic habitat (e.g., surfgrass, eelgrass, kelp beds, spawning gravels, large woody debris) and alternative methods will be employed (e.g., use of anchors instead of spuds, flat deck barge rather than spud barge) as needed. In the event that sensitive habitats cannot be avoided, the EM (or appropriate delegate) must approve the location of the spudding or anchoring to construction crews in order to limit disturbance.

.2 Prop-wash and scouring will be avoided within 30 m of kelp, eelgrass or surfgrass beds, where practicable.

.19 Grounding

.1 Barge grounding will be avoided to the extent practicable.

.2 Rock drilling must be conducted conservatively so that physical changes to rock remain small and localized.

.3 Rock drilling is to be done in the dry (i.e., not in-water).

.4 Dust and fines entering the water must be avoided (e.g., vacuum or otherwise collect fines and dust).

.20 Blasting

.1 Blasting will follow the *Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters* (Wright and Hopky 1998).

.2 In the marine environment, use a protection shield, such as a bubble curtain, around the blast area to limit shockwaves.

.3 In the terrestrial environment, place rubber mats over the blasting area to limit flying debris.

.4 Using a sounder, monitor fish movement; if schools of fish are present, blasting may be halted until the fish move out of the area.

.21 Water Quality

.1 Before allowing water to leave the work site, crews will verify that the following water turbidity criteria are achieved (MOE 2017b):

.2 Change from background of 8 NTU at any one time for a duration of 24 h in all waters during clear flows or in clear waters

.3 Change from background of 2 NTU at any one time for a duration of 30 d in all waters during clear flows or in clear waters

.4 Change from background of 5 NTU at any time when background is 8–50 NTU during high flows or in turbid waters

.5 Change from background of 10% when background is >50 NTU at any time during high flows or in turbid waters before allowing water to leave the work site, crews will verify that water is within the pH range of 7.0–8.7 pH units unless it can be demonstrated that such a pH is a result of natural processes (MOE 2017b).

.6 Before allowing water to leave the work site, crews will verify that water does not have detectable oil and grease (detectable by sight or smell).

.22 Flora and Fauna (General)

.1 Activities should be completed in such a way as to limit stress and disturbance to resident flora and fauna (aquatic or terrestrial).

.2 Construction footprints should be limited to the area necessary to safely complete the works, to reduce effects to nearby soils, vegetation, and resident species.

.3 Feeding of wildlife is not permitted.

.4 If dead, sick or injured animals are observed, report to the EM (or delegate) immediately. Also, contact DFO's Observe, Record, Report phone line (1800-465-4336).

.5 Site-access routes should consider resident flora and fauna, especially during times of the year when they are most sensitive.

.6 Foot traffic on riparian and foreshore areas will be limited to prevent trampling flora and fauna.

.7 All activities should be completed in a way that reduces stress and disturbance to resident flora and fauna.

.8 The project footprint should be clearly defined by construction crews. Equipment presence within the aquatic environment (e.g., intertidal, riparian areas, stream banks) will be restricted to the immediate work area. The establishment of

approved work areas will reduce disturbance and the potential to alter, damage, or destroy fish habitat.

.9 Locations where project activities may occur (e.g., Fixed Aid footprint, barge landing, laydown areas, watercourse crossings, or in-water components) should be inspected for sensitive habitats and species at risk before and during work.

.10 Work in and around the marine foreshore environment (e.g., tide pools, intertidal areas) that may be affected by project activities will be reviewed in consultation with a Qualified Professional.

.11 If intakes are used to withdraw water from the aquatic environment, they will be appropriately screened to prevent the entrainment and impingement of fish. Intake screens will be monitored every half hour while in use for fish entrainment and impingement.

.12 Any instances of fish kill must be reported to the EM promptly. It is the EMs responsibility to inform the relevant regulatory agency (DFO or Ministry of Forests, Lands and Natural Resource Operations)

.13 Site- or project-specific mitigation measures may be needed to limit or avoid damage to sensitive habitats or species (e.g., abalone presence, herring spawn in the marine environment; spawning gravels in the freshwater environment). A Qualified Professional should be consulted to identify sensitive habitats in advance of construction, where appropriate.

.23 Birds

.1 When travelling near seabird colonies, travel parallel to shore rather than approaching a colony directly.

.2 Avoid travelling through areas where concentrations of seabirds are observed on water.

.3 Avoid sharp loud noises, blowing whistles or horns, and maintain constant engine noise levels when within 300 m of seabird colonies.

.4 If breeding birds, seabird colonies or nests are encountered at the construction site, contact the EM (or delegate) for guidance. If work is expected to occur during the nesting window for raptors, migratory birds or seabirds, construction should not go ahead until given approval by the EM and, if required, under applicable regulatory permits. If allowable, work must be conducted as efficiently as possible and not disturb birds, nests, and their fledglings. Walk with care as nests and juveniles can be camouflaged on the ground.

.5 Site- or project-specific mitigation measures (e.g., no-disturbance buffers)) may be required where breeding birds, seabird colonies or nests are encountered at

the construction site; attempts should be made to identify these resources ahead of construction.

.24 Archaeological and Heritage Resources

.1 Archaeological and heritage sites in remote locations are not likely to have been previously identified. Care should be taken to avoid archaeological deposits while work is being completed. If an archaeological or heritage resource is encountered during construction, the work should be stopped in the vicinity of the find and the work crew the EM (or delegate) notified.

.2 Inspect the proposed construction site footprint (including laydown areas, temporary work areas, and barge landings) for archaeological evidence (e.g., rock art pictographs and petroglyphs) before construction activities (e.g., power washing, rock drilling, concrete pour). If project activities will impact an archaeological site, stop work and contact the EM (or delegate). Trees should be inspected for cultural modification prior to brushing or falling.

.3 The location of Aboriginal communities and information pertaining to their potential or established Aboriginal or Treaty rights can be found on ATRIS (INAC 2017).

3.2 Site Access

.1 General

.1 During planning stages, determine the most appropriate location for site access and estimate the proportion of land to be occupied by a road, structure or clearing (Berch et al., 2014).

.2 A detailed site map should be created to show access points, work zones, archeological sites, environmentally sensitive areas, and emergency response (e.g., spill kit) locations. Sensitive areas should be flagged off upon arrival on-site and avoided at all times.

.3 Site access practices must be undertaken with regard to personnel safety and protection of flora and fauna (CCG, 2009).

.4 Operations should only be conducted where it is necessary to reduce the effects on nearby vegetation, soil substrate and resident species (DFO, 2018).

.5 Reduce foot traffic on vegetation where possible to limit project impact, respect should be given to the natural environment (DFO, 2018).

.6 A species at risk search will identify if there are any sensitive habitats in the vicinity of the site. If there is sensitive flora or habitat in the access points or work zones, a protection plan may be required (i.e., rig-matting prior to using heavy equipment on site). Contact a qualified professional.

.2 Road Access

.1 Minimize vegetation clearing and soil disturbance to areas necessary for access (Berch et al., 2014).

.2 Keep to platforms and well-used paths (some wildlife burrow under bare or mossy ground in open areas or under forest canopies).

.3 If roads and access structures are temporary, rehabilitate the disturbed areas (Berch et al., 2014). Ensure proper drainage channels to avoid surface runoff flooding or pooling (Berch et al., 2014).

.3 Water Access

.1 When vessel or barge nears kelp beds, eel grass or surfgrass:

.1 Prop-wash and scouring will be avoided within 30 m, where practical.

.2 Water-borne equipment shall be positioned in a manner that limits damage to identified sensitive habitat. Where possible, alternative methods will be used (e.g., anchors instead of spuds).

.2 Seabirds

.1 Avoid travelling through areas with a high concentration of seabirds.

.2 When travelling near seabird colonies, travel parallel to shore rather than towards the colony directly.

.3 Avoid loud noises such as whistles or horns and maintain a consistent engine noise level when less than 300 m from seabird colonies.

.3 Marine Mammals

.1 Marine mammals are classified as “fish” under the Fisheries Act and additional regulations specific to these taxa are detailed in the Marine Mammal Regulations. Under Section 7 of the Marine Mammal Regulations, “disturbance” of marine mammals is prohibited except when fishing for them under the authority of the Regulations. The Regulations also prohibit moving a marine mammal from the immediate vicinity in which it is found (DFO, 2018).

.2 Acoustic monitoring is recommended if noise levels (decibels; dB) have the potential to exceed 160 dB re: 1 µPa (potentially altering behaviour of marine mammals; NOAA, n.d.). A hydrophone should be deployed by the EM to monitor noise levels.

.4 Tide pools may be impacted by work activity (site mob, barge ramp) and should be inspected for sensitive habitat or species (DFO, 2018).

.5 If work is to be conducted in areas where fish spawning is present the project must first be authorized via the Fisheries Protection Program to ensure compliance with the Fisheries Act. Authorization to proceed will also be required from the Departmental Representative. Once authorized, appropriate monitoring by a qualified professional will be undertaken to monitor spawn activity. Stop work if the project is disrupting the spawn activity (DFO, 2018).

.6 Any occurrence of fish kill must be reported to the Departmental Representative without delay (DFO, 2018).

3.3 Fixed Aid Maintenance and Replacement

.1 Best Management Practices

.1 Be familiar with, and adhere to, relevant Acts and Regulations.

.2 Equipment maintenance activities must be completed in a manner that prevents the deposit of foreign materials to the environment.

.3 An approach of “contain and recover” should be adopted. Drop sheets or other means should be used to prevent paint chips and other debris from entering the surrounding environment. Refuse should be stored and disposed of properly, at an approved facility.

.4 Painting activities should be completed in such a way as to limit fumes entering the environment.

.5 The amount of paint used should be limited and unused containers must be covered.

.6 Hazardous waste, such as used sorbent pads and washwater, should be collected and disposed of appropriately offsite, at an approved disposal facility.

3.4 Machinery Operation

.1 Best Management Practices

.1 Be familiar with, and follow, relevant Acts and Regulations.

.2 Limit the construction footprint to the area needed to safely complete the work, thus reducing effects on nearby soils, vegetation, and resident species.

.3 Machinery should be clean when it arrives on site and will be maintained free of fluid leaks, invasive species, and noxious weeds (DFO 2016).

.4 Machinery must be operated efficiently to limit noise and air quality issues.

.5 Carry out work during appropriate timing of works (weather conditions, species at risk regional timing windows) (BC MOE 2017a; DFO 2015).

.6 Have contingency plans designed and in place to address unforeseen weather events.

.7 Wash, refuel and service machinery and store fuel and other materials for the machinery in a way that prevents them from entering the water.

.8 Store fuels and petroleum products in accordance to safe operating procedures and have a spill response plan and emergency spill kits on-hand.

.9 In addition to the spill kits on site, each piece of mobile equipment (e.g., cranes, concrete trucks) should have a vehicle spill kit. The suggested contents of the spill kit include:

.1 25 x Oil Only/Marine Pads (White)

.2 2 x Oil Only/Marine Absorbent Socks (White)

.3 2 x Nitrile Gloves

.4 2 x Disposable Non-Latex Gloves

.5 2 x Splash Goggles

.6 2 x Waste Labels/Zip Ties

.7 2 x Hazmat Disposal Bags

.8 1 x Sharpie- Permanent Black Marker

.9 1 x Jug Universal or Oil Only/Marine Floor Dry (3lbs)

.10 1 x Hand Broom, Dustpan and Hand Shovel

.11 1 x 10 oz Plug'n'Dike

.12 1 Laminated Contents Listing Sheet

.10 Vehicles should not be operated below the line of Highest High Water in marine environments (BC MPDCA 2003) or the High Water Mark in freshwater environments (DFO 2016). Vehicles should be operated from the land, on ice, or on a floating vessel above the Highest High Water or the High Water Mark in a way that limits disturbance to the banks, shorelines, or bed of a water body.

.11 Avoid crossing a watercourse or water body with machinery to a one-time event (i.e., over and back), and only if no alternative crossing method is available. If repeated crossings of the watercourse are needed, build a temporary crossing structure (DFO 2016).

.12 Use temporary crossing structures or other practices to cross streams or waterbodies with steep and highly erodible (e.g., dominated by organic materials and silts) banks and beds. For fording equipment without a temporary crossing structure, use stream bank and bed protection methods (e.g., swamp mats, pads) if minor rutting is likely to occur during fording.

.13 Do not ford, place crossing materials, or operate machinery on the bed of a waterbody where Species at Risk Act (SARA)-listed shellfish occur, or critical habitat or residences of freshwater SARA-listed aquatic species occur.

.14 At the discretion of the Environmental Monitor (EM), or delegate, drip trays that can contain 150% of the fuel will be placed beneath machinery, equipment and fuel storage facilities that are within 30 m of the Highest High Water mark (or on vessels) or within 30 m of the High Water Mark in freshwater environments.

.15 Hydraulic hoses and couplings should be inspected and be kept free of leaks and excess hydrocarbons before use near aquatic environments.

.16 Containers will be sealed with a properly fitting cap or lid when not in use.

3.5 Power Washing

.1 Best Management Practices

.1 Pre-plan

.1 Be familiar with and adhere to relevant Acts and Regulations. Obtain necessary permits and approvals for wastewater disposal.

.2 Identify storm drains and natural watercourses and waterbodies in the area where runoff from power washing could enter.

.3 Determine appropriate wastewater containment, collection, and disposal methods in advance of power washing.

.2 Pre-clean and Site Preparation

.1 Dry sweep or spot clean (e.g., use oil absorbent pads for oily deposits) whenever possible to remove debris before power washing surfaces.

.2 Block, or otherwise protect, storm drains or natural watercourses that may be impacted by activities (e.g., using berms or storm drain covers).

.3 Washing

.1 Limit water usage and use bio-friendly products to the extent practicable.

.2 Avoid mixing hazardous and non-hazardous wastewater to limit disposal costs.

.3 Work will be conducted such that contaminated water or other effluent potentially harmful to aquatic life does not enter the aquatic environment. Contaminated water or effluent may include silt-laden water, oil or grease, detergents, and other chemicals.

.4 Limit and isolate the portion of the site subject to power washing.

.3 Collection

.1 Contain and collect wastewater using appropriate measures and equipment (e.g., berms, storm drain covers, vacuums, pumps).

.2 Harmful substances (e.g., fine sediments, hydrocarbons, paint, contaminants) will not be deposited into fish habitat.

.3 Use oil absorbent pads on top of collected wastewater to limit recontamination of cleaned surface.

.4 Avoid leaving behind residues and visible solids.

.4 Disposal

.1 Evaluate collected wastes and wastewater to determine appropriate disposal methods.

3.6 Pile Installation

.1 General Practices

.1 Be familiar with, and adhere to, relevant Acts and Regulations; appropriate permits and approvals should be in place.

.2 A Qualified Professional should be consulted in advance of conducting pile installation works.

.3 Properly maintain equipment and machinery to prevent leaking of fuel products.

.4 Store fuels and petroleum products in accordance with safe operating procedures. Have emergency spill kits on-hand.

.5 Use environmentally sensitive hydraulic oil, when feasible.

.6 Proper notice should be given to transportation/navigation authorities to warn of potential disruptions to navigation during works.

.7 During project planning for marine works, consider the best tidal conditions and review the project for appropriate installation methods.

.8 To the extent practicable, pile installation should be undertaken during low tide or dry conditions (EPA 2016).

.9 In-water works will be conducted during approved least-risk work windows, to the extent practicable.

.10 Vibratory pile installation method will be used rather than impact or hydraulic hammers to the extent practicable, to reduce noise to the surrounding area and aquatic environment.

.11 Where practicable, contractors will position water-borne equipment to limit damage to identified sensitive fish habitat (e.g., eelgrass). Where practicable, alternative methods will be employed (e.g., use of anchors instead of spuds).

.12 Any aggregate stockpiles will be covered in poly sheeting during inclement weather.

.13 Containment methods such as silt curtains and netting should be used to isolate the in-water work area where there is potential for increased turbidity levels.

.14 An Environmental Monitor (EM) is recommended to be on site during pile installation, removal and drilling activities.

.14 Acoustic monitoring during pile installation may be required; a Qualified Professional should be consulted in advance of pile installation.

.1 Pile Installation – Timber Piles

.1 Where practicable, new timber floats and timber piles will adhere to the BMPs for the Use of Treated Wood in Aquatic and Wetland Environments (WWPI 2011) and Guidelines to Protect Fish and Fish Habitat from Treated Wood Used in the Aquatic Environment in the Pacific Region (DFO 2000).

.2 If piles are treated with creosote, pilings will stand for a minimum of 45 days prior to installation. These requirements are for new pilings only and will not restrict the re-use of existing timber pilings. Re-used pilings will not be subject to additional treatments.

.3 Absorbent booms must be deployed around the perimeter of the work area and maintained during installation of all structures containing oil-borne wood treatments. These booms should remain in place and operational until such time as visible evidence of wood-treatment chemicals on the water surface is no longer apparent.

.4 Cutting and boring of treated wood should take place at a material staging area or on a work barge (where applicable); waste materials must be kept out of the aquatic environment and be properly disposed of offsite at an approved disposal facility. Where work must be complete in situ, it is to be fully contained so that no waste materials are deposited into the water, riparian areas, streambeds, or intertidal sediments.

.5 Treated cut wood, chips or sawdust that enters the aquatic environment is to be promptly collected, contained and later disposed of properly offsite.

.6 Creosote-treated waste will be stored in a water-proof container separate from other waste for appropriate offsite disposal.

.7 In situ application of wood-treatment chemicals is generally not acceptable. In the event that minor application of wood-treatment chemicals is required after construction of a treated wood structure, all application areas must be contained or underlain with tarpaulins so that no chemicals are deposited into the water or onto sediments.

.3 Pile Installation – Steel & Concrete Piles

.1 Sediment contained in the pile will be pumped to the surface and processed through an approved containment system and disposed of at an approved land-based facility.

.2 Potentially contaminated sediments will be tested and disposed of offsite at an appropriate land based facility.

.3 When cleaning out piles (i.e., air lifting), if the material that is to be removed inside the pile is non-toxic, then it shall be redistributed in a manner that will limit damage to the surrounding aquatic fish habitat (consult with DFO Fisheries Protection Program).

.4 Protective measures to reduce shock waves (e.g., bubble curtain, using vibratory hammer rather than impact hammer) are required if shock waves are anticipated to be in excess of 30 kPa.

.5 In the event that fish distress or kill occur during pile driving activities, work will stop and the Departmental Representative will be notified.

.6 Measures will be introduced to prevent fish from entering the potentially harmful shock wave area (e.g., monitoring of an appropriate exclusion zone, as determined by a Qualified Professional).

.4 Underwater Noise Monitoring - Fish

.1 During impact and hydraulic hammering, hydrophone and visual monitoring of the effects of shock waves on fish may be required; a Qualified Professional should be consulted.

.2 During pile driving, visually monitor the effects on fish. If pile installation activities are causing fish kill, work must cease immediately and a DFO biologist will be notified. Contractors will be responsible for discussing additional mitigation measures with DFO prior to recommencing work.

.3 If preventive measures and further visual/hydrophone monitoring reveals unacceptable conditions (fish kill or sound pressure over 30 kPa), work will stop immediately and methods will be reviewed and corrected.

.4 Cease work immediately if fish kill or sound pressures over 30 kPa occurs during pile installation and introduce effective means of reducing the level of shock waves or measures that will protect fish from entering the potentially harmful shock wave area. For example, deploy a bubble curtain over the full length of the wetted pile that would defuse the shock waves to an acceptable level.

.5 Any instances of fish kill must be reported to the Departmental Representative without undue delay. In turn, the Departmental Representative must report any unauthorized fish kills to the relevant regulator (e.g., DFO Fisheries Protection Program) and suspend work or modify it so as to prevent further fish kill.

.6 If, after preventive measures are introduced, visual monitoring reveals unacceptable conditions (fish kill), then work will stop immediately and the system reviewed and corrected.

.5 Marine Mammals-Underwater Noise Monitoring and Exclusion Zone

.1 Acoustic monitoring is recommended if noise levels (decibels; dB) have the potential to exceed 160 dB re: 1 µPa (potentially altering behaviour of marine mammals; NOAA, n.d.). A hydrophone should be deployed by the EM during pile driving to monitor noise levels.

.2 A hydrophone should be deployed by the EM during pile driving (e.g., impact hammer) to monitor noise levels.

.3 Acoustic monitoring may not be required for vibratory pile installation; however, a Qualified Professional should be consulted.

.4 The mitigation measures related to underwater noise is very project-specific, consultation with a Qualified Professional is required.

.5 Prior to impact/drop hammer pile installation, a Qualified Professional should be consulted to establish a marine mammal exclusion zone radius around the work area. This exclusion zone may be refined during the work, and will be monitored by an EM.

.6 The exclusion zone will typically be the area within which underwater noise is expected to exceed 160 dB re: 1 µPa (NOAA, n.d.)

.7 Field verification of underwater noise levels will be conducted when there are changes to impact pile driving equipment (e.g., hammer size, pile size) to allow for adjustments to the radius of the marine mammal exclusion zone.

.8 Prior to impact/drop hammer pile installation, the EM should conduct visual observations of the surrounding area to determine if marine mammals are within the exclusion zone. If a marine mammal is present in the exclusion zone prior to the start of pile driving, that activity will be delayed until the marine mammal has left the exclusion zone.

.9 Use a soft start technique, where equipment allows, to slowly build up power to give adequate time for marine mammals to leave the vicinity before exposed to maximum

sound pressure. This should be conducted when marine mammals are suspected or known to be present outside of the exclusion zone.

.10 Visual monitoring of the marine mammal exclusion zone will be conducted during impact pile driving. If a cetacean or marine mammal species at risk is observed within the exclusion zone, impact pile driving will be temporarily suspended (or rescheduled if deemed necessary) until the marine mammal(s) has left the exclusion zone or does not reappear within 30 minutes.

.11 If a marine mammal enters the exclusion zone during impact/drop hammer pile driving, work will stop until the marine mammal leaves the exclusion zone or a minimum of 15 minutes has elapsed since it was last sighted in the exclusion zone.

.12 Impact/drop hammer pile installation should not resume until the marine mammal is outside the exclusion zone.

.13 Impact/drop hammer pile installation should be restricted to daylight hours and wind conditions below 25 knots in order to monitor for marine mammals.

.14 If observable impacts to marine mammals are noted during pile driving, work will stop and procedural changes and/or additional mitigation measures (e.g., bubble curtain) will be required.

3.7 Pile Removal

1. General Practices

.1 Remove the pile slowly to reduce turbidity in the water column.

.2 Extraction equipment (e.g., bucket, cable, vibratory hammer) should be kept out of the water to avoid a creosote release (i.e., avoid pinching the creosote pile below the water line).

.3 If excavation of sediment around the base is necessary, hydraulic jetting devices should be avoided to limit turbidity. Sediment contamination levels should be determined during planning phase in order to incorporate appropriate mitigation measures, if necessary.

.4 Sediment blocks attached to the pile will not be returned to the marine environment. Instead, they will be collected, contained and disposed of appropriately offsite.

.5 The operator must limit damage to treated wood during removal to reduce the release of chemicals (e.g., creosote).

.6 Avoid intentionally breaking the pile by twisting and bending as this can cause a creosote release into the water column.

.7 Pile removal will stop and an Environmental Monitor (EM) will be notified if any piles removed harbour fish eggs (e.g., Pacific herring spawn). The EM will consult with the appropriate regulators (e.g., DFO) prior to commencing work.

.8 When demolition is required on timber pile structures, the contractor will remove the piling by mechanical means and avoid breaking the piling at the mud line or below. All demolition operations should be monitored to control and contain the construction debris. The four methods, in order of preference, are:

.1 Vibratory extraction

.2 Direct pull

.3 Clamshell removal

.4 Pile cut-off

.2 Vibratory Extraction

.1 Vibratory extraction of piling causes the least sediment disturbance and usually allows for complete removal of piling by breaking its bonds with the surrounding sediment.

.2 There should be little to no material attached to the pile during withdrawal.

.3 The vibratory hammer should be turned off when the end of the pile reaches the mudline.

.3 Direct Pull

.1 Direct pull may be used in the event that vibratory extraction is unsuccessful and the contractor deems the technique is appropriate.

.2 Removal of the piling should be conducted by directly pulling upward using a crane or other large machinery.

.4 Clamshell Removal

.1 A clamshell bucket may be used in the event that vibratory extraction and direct pull are both unsuccessful and the contractor deems the technique is appropriate.

.2 When using a clamshell bucket attached to a crane, the piling stub should be grasped and pulled directly upwards.

.3 The size of the clamshell bucket should be limited to reduce turbidity levels in surrounding waters.

.5 Pile Cut-off

.1 Every attempt should first be made to remove the entire pile; however, if a pile has broken off below the waterline or existing substrate, pile cut-off is acceptable. Consider

mudline elevation, slope, stability, and presence of contaminants in sediment when determining methods.

.2 A pneumatic underwater chainsaw or shearing equipment should be used to cut the pile.

.3 If sediments are contaminated, consideration should be given whether to leave pile stub or to cut below mudline.

.4 In intertidal areas, where work can be accomplished at low-tide, cut off the piling at least 0.6 m below the mudline to limit exposure.

.5 Piling broken greater than 0.3 m below the mudline may remain in subtidal waters.

.6 Any piling left in place must be mapped with GPS and reported to appropriate regulatory authorities (e.g., Transport Canada, DFO, BC Ministry of Environment).

.6 Handling and Disposal

.1 At the discretion of the EM, a floating surface boom shall be installed to capture floating surface debris where practicable.

.2 Use a containment basin on a barge, pier, or upland area. Verify the effectiveness of containment and check that no seepage into surrounding environments has occurred

.3 Upon removal, move pile directly to the containment basin. Do not shake or wash off adhering materials from the pile to capture sediment, debris, and chemicals

.4 A containment area (e.g., sediment control hay bales, silt fences, geotextile fabric, plastic sheeting) for recovered piles and adhering sediment shall be included on the work surface (e.g., laydown area, barge deck)

.5 Recover waste materials from piling, construction debris, and in containment basin

.6 Ensure creosote treated piles temporarily stored in the staging area are wrapped in poly sheeting

.7 Creosote-treated waste will be stored in a water-proof container separate from other waste for appropriate offsite disposal

.8 Dispose of wastes in a designated waste facility or storage location

3.8 Concrete Works

.1 Mixing and Pouring

.1 Schedule concrete work during dry weather, when feasible.

.2 Carefully estimate the quantity of concrete required to avoid excess waste.

.3 Consider alternative foundations that may require less concrete (e.g., pre-cast concrete systems).

.4 Limit the use of chemical additives.

.5 If concrete is to be mixed on the worksite, store cement bags in a leak-proof, covered container to provide protection from wind or rain/snow and other influences (e.g., waves).

.6 During mixing operations, once cement bags are opened, take all necessary precautions to limit dispersal of dry cement by the wind.

.7 When pouring concrete, spills of fresh concrete must be prevented. If concrete is discharged from the transit mixer directly to the form work or placed by wheelbarrow, proper sealed chutes should be constructed to avoid spillage. If the concrete is being placed with a concrete pump, all hose and pipe connections must be sealed and locked properly to limit the chance of leaks or uncoupling.

.8 If concrete is transported and discharged by crane and hopper, hopper will be inspected for structural integrity prior to being elevated by crane.

.9 Crews will monitor that concrete forms are not filled to overflowing.

.10 If scribe work is required, crew will ensure that forms are fitted tight to the rock surface to avoid concrete escape from the bottom of the form.

.2 Pouring Concrete Near Water

.1 In the marine environment, concrete pouring work that must occur below the Highest High Water Mark should be scheduled to occur during periods of low tide, when the site is exposed or dry.

.2 In freshwater environments, concrete pouring work that must occur below the High Water Mark should be scheduled to occur during periods of low water levels (e.g., summer low flows).

.3 Operators should be familiar with spill response procedures, and have the appropriate spill response equipment on hand, in case of an environmental emergency to limit any deleterious impact on the surrounding environment.

.4 Prevent water (e.g., rain/snow) that contacts uncured or partly cured concrete (during activities such as exposed aggregate wash-off, wet curing, or equipment washing) from entering aquatic environments (directly or indirectly).

.5 Once pouring has ceased, forms should be wrapped in plastic for two tidal cycles or until cured (e.g., 72 hours) to isolate the wet/setting concrete from weather (e.g., rain and snow).

.6 Concrete forms will be constructed and sealed in a manner which will prevent fresh concrete or cement laden water from leaking into surrounding water.

.7 The integrity of the form work should be routinely inspected prior to, during and immediately after the pour. Deficiencies should be addressed immediately.

.8 Keep a CO2 tank with regulator, hose and gas diffuser available and train staff to neutralize spills.

.9 Monitor runoff for acceptable pH levels and contain and neutralize, if necessary. (Ensure a pH monitor is accessible to measure the pH levels.)

.10 Onsite concrete tests (e.g., slump tests) will be conducted in a contained area (e.g., a leak proof tray) to prevent the deposition of deleterious substances into the aquatic environment.

.3 Spills

.1 Accidental release of concrete will be, appropriately, cleaned up prior to curing.

.2 Spill clean-up materials, such as tarps and shovels should be readily available on site.

.3 Immediately report any spills of uncured concrete, concrete fines, wash or contact water of reportable quantities to the onsite Site Superintendent and Departmental Representative. It is the contractor's legal responsibility to notify the BC Environmental Emergency Management Branch of any reportable spills, hotline 1-800-663-3456.

.4 Immediately implement emergency mitigation and clean-up measures (such as use of carbon dioxide gas, if required, and immediate removal of the material).

.4 Washwater Recycling, Treatment and Disposal

.1 The cleaning of concrete and cement laden materials (e.g., tools and equipment) must be conducted in a contained area to prevent the release of deleterious substances (e.g., washwater) into the marine and terrestrial environments.

.2 Collect and contain washwater from tools, pumps, pipes, hoses and trucks in leak proof containers. Workers will be made aware of all washout locations and will be watchful for improper dumping of material.

.3 Tools, pumps, pipes, hoses and trucks used for finishing, placing or transporting fresh concrete must be washed off in such a way as to prevent the wash off water from entering the aquatic environment.

.4 Sealed, leak-proof containers for washwater from concrete delivery trucks, concrete pumping equipment, and other tools and equipment must be provided to prevent the release of deleterious substances into the receiving environment.

.5 Water that contacts uncured or partly cured concrete shall be isolated and held until the pH is between 7.0 and 8.7 and the turbidity is less than 100 nephelometric turbidity units (NTU), or other level approved by the onsite EM, before being released into waters frequented by fish and other marine organisms.

.6 Do not completely fill washwater containment basins; allow for sufficient freeboard. Washout containers will not exceed 75 percent capacity to prevent overflows.

.7 Filtered washwater can be reused for making concrete or to continue cleaning equipment. Concrete washwater will be contained and removed offsite to a designated facility or at the manufacturer's place of business. In the event that the washwater must be disposed of on site, the washwater must be neutralized (e.g., Carbon dioxide tank with regulator, hose and gas diffuser) and filtered through a sediment control device, under the supervision of an EM.

.5 Waste Control

.1 Filtered aggregate can be reused in making fresh concrete at the construction site or returned to the concrete mixing facility.

.2 If concrete cutting occurs on site, concrete dust will be collected (e.g., vacuum, wet sweeping) and disposed of appropriately.

.3 Excess/unused concrete will be removed from the site and disposed of/recycled offsite, appropriately, at an approved facility.

.4 Collect and dispose of concrete chips at an approved disposal site. Other waste materials collected during the concrete pouring operations should be retained for disposal at a municipal landfill. Waste materials must not be deposited into the aquatic environment, including riparian zones and marine foreshore.

.5 Waste deposited in exposed (dry) intertidal areas will be collected daily before the area is inundated by the tide.

.6 Depositing of concrete waste into the unexposed (wet) subtidal areas during demolition will be avoided, and deposited waste will otherwise be recovered from these areas where safely possible.

.7 Cured concrete waste, such as waste created during base demolition, will be collected and disposed of at an appropriate offsite facility.

3.9 In-Water Works

.1 Definitions of Aquatic Environments

.1 Stream: A stream is any natural watercourse or source of water, containing water or not, and a river, lake ravine, creek, spring, swamp, or gulch. Channelized streams and ditches that provide fish habitat are also considered streams (BC MOE, 2005).

.2 Lake: Lakes are bodies of freshwater that may occur along widened portions of watercourses, but lack current.

.3 Marine: Marine aquatic environments are waters that are saline and subject to tidal influence (i.e., those that are part of the sea).

.4 Estuarine: Estuarine environments form in partially enclosed coastal bodies of water where one or more watercourses flow into the sea. Estuaries represent transition zones between freshwater and marine environments and are influenced by variable salinity, temperatures, sediment load, tides and currents.

.5 High water mark (HWM): The high water mark is a visual reference line that has been left by the presence or action of frequent and sustained presence and action of water in any lake, stream, wetland or other body of water where the presence (e.g., a natural line or mark impressed on the bank or shore, evidence of erosion, shelving, changes in soil characteristics, destruction of terrestrial vegetation). The area below the high water mark includes the active floodplain, where seasonal or periodic submergence may be expected.

.6 Higher high water large tide (HHWLT): The higher high water large tide is an elevation that marks the average of the highest high waters over a 19-year nodal modulation cycle. Where vegetation is present, the level may be inferred by the tree line. Areas below this level may be submerged on a frequent, occasional or rare basis.

.2 General Practices

.1 Be familiar with and adhere to relevant Acts and Regulations.

.2 Consider timing to limit effects on fish species, nesting birds, and species at risk.

.3 Site or project specific mitigation measures may be required to limit or avoid damage to sensitive habitats or species (e.g., abalone presence, herring spawn in the marine environment; spawning gravels in the freshwater environment). A Qualified Professional should be consulted to identify sensitive habitats in advance of construction, where appropriate.

.4 Works should be scheduled, where practicable, within fisheries least risk timing windows for in-water works (DFO 2015).

.5 Position equipment in a way that limits impacts to identified fish habitats. Use alternative methods where possible (BC MPDCA, 2003).

.6 Avoid in-water activities or associated in-water structures that may interfere with fish passage, constrict channel width, reduce flows, or result in the stranding or death of fish (DFO 2016).

.7 Limit the removal of natural woody debris, rocks, sand or other materials from the banks, the shoreline, or the bed of the waterbody below the ordinary high water mark. If

material is removed from the waterbody, set it aside and return it to the original location once construction activities are completed (DFO 2016).

.8 Equipment will be maintained to prevent leaking of hazardous substances (BC MPDCA, 2003).

.9 Store fuels and petroleum products in accordance with safe operating procedures and have emergency spill kits on-hand (BC MPDCA, 2003).

.10 If fuel-containing equipment are stored within 30m of the water, place drip trays under the equipment.

.11 In-water construction activities should be monitored full-time and reported on by a Qualified Professional (BC MWLAP, 2004) (e.g., Environmental Monitor (EM)).

.12 If necessary, isolate work area from flowing water and temporarily divert water around to discharge immediately downstream (BC MWLAP, 2004).

.13 A fish and amphibian salvage exercise should be conducted by a Qualified Professional if any portion of a wetted channel is to be dewatered (BC MWLAP, 2004).

.14 Notify an aquatic archaeologist in the event of discovered artifacts and arrange for appropriate consultation (BC MPDCA, 2003).

.15 Consult a Qualified Professional to determine whether there are likely to be adverse effects on fish or fish habitat.

.16 Restore damaged habitat to its original state at completion of project, in accordance with guidelines or permit conditions.

.3 Works using Vessels

.1 Vessels and barges will be kept in good operating condition, free of excess oil and grease, and will contain an appropriate spill kit onboard.

.2 Drip trays should be placed beneath fuel-containing machinery that are stored outdoors.

.3 Vessels should be suited with the appropriate spill response equipment

.4 When using vessels and barges, anchoring and spudding will be limited where practicable.

.5 Barge grounding on shorelines should be avoided where practicable.

.6 Prop wash should be limited while in shallow aquatic environments in such a way to reduce disturbance of sediment.

.4 Sediment Control

.1 If excavation of sediment is necessary, hydraulic jetting devices should not be used in order to limit turbidity (EPA, 2016).

.2 Operate machinery from the bank rather than in the stream channel (BC MWLAP, 2004).

.3 Limit sediment disturbance and stabilize excavated materials away from the watercourse (BC MWLAP, 2004).

3.10 CLEANING

.1 Leave work area clean at end of each day.

.2 Ensure public waterways, storm and sanitary sewers remain free of waste and volatile materials disposal.

.3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment to the approval of the Owner.

END OF SECTION

Section 02 41 99 – Demolition for Minor Works

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 11 00 – SUMMARY OF WORK

.2 Section 01 35 43 – ENVIRONMENTAL PROCEDURES

1.2 REFERENCE STANDARDS

.1 CSA International

.1 CSA S350-[M1980(R2003)], Code of Practice for Safety in Demolition of Structures.

.2 National Research Council Canada (NRC)

.1 National Building Code of Canada 2015(NBC).

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

.3 U.S. Environmental Protection Agency (EPA)/Office of Water

.1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.3 SITE CONDITIONS

.1 If available, review "Designated Substance Report" and take precautions to protect environment.

.2 If 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 immediately.

.1 Proceed only after receipt of written instructions have been received from Departmental Representative.

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

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 EXAMINATION

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

.2 Locate and protect utilities. Preserve active utilities traversing site in operating condition.

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

.4 Disconnect, cap, plug or divert, as required, existing public utilities within the property where they interfere with the execution of the work, in conformity with the requirements of the authorities having jurisdiction. Mark the location of these and previously capped or plugged services on the site and indicate location (horizontal and vertical) on the record drawings. Support, shore up and maintain pipes and conduits encountered.

.1 Immediately notify Departmental Representative and utility company concerned in case of damage to any utility or service, designated to remain in place.

.2 Immediately notify the Departmental Representative should uncharted utility or service be encountered, and await instruction in writing regarding remedial action.

3.2 PREPARATION

.1 Protection of In-Place Conditions:

.2 Prevent movement, settlement, or damage to adjacent infrastructure to remain in place. Provide bracing and shoring required.

.3 Keep noise, dust, and inconvenience to occupants to minimum.

.4 Protect infrastructure systems, services and equipment.

.5 Provide temporary dust screens, covers, railings, supports and other protection as required.

.6 Do Work in accordance with Section 01 35 29.06- HEALTH AND SAFETY REQUIREMENTS.

.7 Demolition/Removal:

.1 Remove items as indicated.

3.3 CLEANING

.1 Progress Cleaning: Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

END OF SECTION

Section 02 50 00 – Timber

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 11 00 SUMMARY OF WORK

Part 2 Products

2.1 GENERAL

.1 Except as otherwise noted, only new materials will be used in, and remain an integral part of the structures.

.2 The Departmental Representative may inspect materials and products at all stages of manufacture and transportation to the Project Site. Satisfactory inspection at any stage does not preclude future rejection if the materials or products are subsequently found to lack uniformity or fail to conform to the requirements specified.

.3 Acceptance will not be made until the materials or products are satisfactorily installed in the completed structures specified.

.4 The Contractor shall be responsible to repair all materials damaged through their handling, storage and/or installation.

.5 Except as otherwise noted, salvaged materials deemed to be reusable by the Departmental Representative shall remain property of the Departmental Representative.

2.2 TIMBER

.1 All timber for the purpose intended shall conform to the requirements of the N.L.G.A. Standard Grading Rules for Canadian Lumber.

.2 All framing shall conform to the BC Building Code.

.3 All materials shall conform to the current version of CSA Standard CSA/CAN-086.

.4 Refer to drawings and specifications for timber dimensions and treatment.

.5 All timber shall be Coast Douglas Fir. No 1 Structural Grade or better, unless specified otherwise.

.6 All decking shall be S1S2E (rough cut), heart side down.

.7 All joists, cross-ties, stringers, blocking, bullrail, risers and fascia boards shall be S2E (rough cut).

.8 Plywood shall be Douglas Fir conforming to CSA O121

.9 Timber will be graded in the following classes:

.1 Joists and Planks

.2 Beams and Stringers

.3 Posts and Timbers

.4 Pilings

.10 All timber shall be free of heart centre with no sap.

.11 All treated timber shall be S4S precut and bored, to specified dimensions, before treating.

.12 Rub boards and all timber at or above deck level shall be salt-treated. All timber below deck level, except rub boards, shall be creosote treated.

.13 All bottom plates in contact with concrete shall use treated lumber, otherwise, sill gasket is to be provided.

.14. All decking lumber shall be surfaced lumber meeting grading S1S2E, Surfaced on the heart side and two edges, heart side down.

2.3 TREATMENT OF MATERIAL

.1 Lumber exposed to moisture or the weather and all lumber in contact with concrete shall be pressure treated with inorganic salt preservative in accordance with CSA O80.

.2 Creosote-treated Materials:

.1 Will not be accepted for any portion of this work.

.3 Salt-treated Materials:

.1 All salt-treated timber to be treated in accordance with CSA 080-1989, “Wood Preservation”, and its current amendments CSA 080.14, for materials in contact with ground or water. (Only non-leachable ACA salts will be accepted).

.2 All salt treatment will follow the Best Management Practices for ACA and ACZA as outlines in “Best Management Practices for the use of Treated Wood in Aquatic Environments”.

.3 All salt-treated timber will have a minimum retention of 6.4 kg/m3 (0.40 lb. Per cubic foot) and a depth of penetration of 10mm as specified in CSA 080.14.

.4 Testing:

.1 The Engineer will carry out testing of materials including core sampling at the treatment plant. Data will be made available to the Contractor for information only.

.2 Notwithstanding the Engineer's testing program, the Contractor will ensure the materials meet the specified requirements in all respects. The Engineer reserves the right to reject materials on site.

2.4 FIELD TREATING

.1 Salt-treated timber members that have fresh cut surfaces exposed in the structure shall be treated as specified:

.1 All field cut surfaces to be treated with two (2) coats of Copper Naphthenate.

.2 When field treating by brushing, spraying, dipping or soaking do so in such a manner that the preservative does not drip into the water or onto the ground.

.2 Ensure preservatives are properly stored and protected in case of spillage.

2.5 STEEL HARDWARE

.1 Contractor will supply all hardware to complete the timber work including nails and connections.

.2 Bolts and lag screws shall conform to ASTM A307 hot dip galvanized meeting ASTM A153.

.3 All nails and miscellaneous hardware shall be hot dip galvanized meeting ASTM A153.

2.6 TIMBER PILE SHOES

.1 Boot/point-type specially fabricated for purpose and product of manufacturer regularly engaged in manufacture of pile fittings.

.2 Provide size to fit tip as specified by Departmental Representative.

.3 Fabricate boot-type of 5mm carbon steel fully welded, with minimum 3 straps, each with 5mm nail hole.

.4 Fabricate point type of 5mm steel plates, fully welded and sized to adequately cover full pointed area of pile. Provide each plate with 5mm nail hole.

2.7 TIMBER PILE ACCESSORIES

.1 Wire nails, spikes, staples: to CSA B111.

.2 Bolts, nuts and washers: to ASTM A307.

.3 Hot dip galvanize bolts, nuts and washers and unless otherwise specified, staples, cable clamps, pipe sleeves, spikes and nails: to ASTM A153/A153M.

.4 Other hardware to be galvanized to ASTM A123/A123M.

Part 3 Execution

3.1 HANDLING OF MATERIALS

.1 Treated material will not be accepted if damaged in any manner in handling, including damage from strapping or slings.

.2 The Contractor shall be responsible to repair or replace all materials damaged by handling, storage and/or installation of materials.

3.2 EXISTING STRUCTURES

.1 Any structures damaged by the Contractor during the works shall be repaired and made good at the Contractor's expense to the satisfaction of the Departmental Representative.

END OF SECTION

Section 02 81 01 – Hazardous Materials

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 11 00 – SUMMARY OF WORK
.2 Section 02 41 99 – DEMOLITION FOR MINOR WORKS

1.2 REFERENCE STANDARDS

.1 Canadian Environmental Protection Act,1999 (CEPA 1999)

.1 Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations (SOR/2005-149).

.2 Department of Justice Canada (Jus)

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

.2 Transportation of Dangerous Goods Regulations (T-19.01-SOR/2001-286).

.3 Green Seal Environmental Standards (GS)

.1 GS-11-2008, 2nd Edition, Paints and Coatings.

.2 GS-36-00, Commercial Adhesives.

.4 Health Canada / Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.5 National Research Council Canada (NRC)

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

.6 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards

.1 SCAQMD Rule 1113-A2007, Architectural Coatings.

.2 SCAQMD Rule 1168-A2005, Adhesive and Sealant Applications.

1.3 DEFINITIONS

.1 Dangerous Goods: product, substance, or organism specifically listed or meets hazard criteria established in Transportation of Dangerous Goods Regulations.

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

.3 Hazardous Waste: hazardous material no longer used for its original purpose and that is intended for recycling, treatment or disposal.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit product data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for hazardous materials and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit two copies of WHMIS MSDS for each hazardous material required prior to bringing hazardous material on or off site.

.3 Submit hazardous materials management plan that identifies hazardous materials, usage, location, personal protective equipment requirements, and disposal arrangement to Departmental Representatives.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Transport hazardous materials and wastes in accordance with Transportation of Dangerous Goods Act, Transportation of Dangerous Goods Regulations, and applicable provincial regulations.

.1 When exporting hazardous waste to another country, ensure compliance with Export and Import of Hazardous Waste and Hazardous Recyclable Materials Regulations.

.4 Storage and Handling Requirements:

.1 Co-ordinate storage of hazardous materials with Departmental Representative and abide by internal requirements for labelling and storage of materials and wastes.

.2 Store and handle hazardous materials and wastes in accordance with applicable federal and provincial laws, regulations, codes, and guidelines.

.3 Store and handle flammable and combustible materials in accordance with National Fire Code of Canada (NFC) requirements.

.5 Store flammable and combustible liquids in approved safety cans bearing the Underwriters' Laboratory of Canada or Factory Mutual seal of approval.

.6 Storage of quantities of flammable and combustible liquids exceeding 45litres for work purposes requires the written approval of the Departmental Representative.

.7 Transfer flammable and combustible liquids away from open flames or heat-producing devices.

.8 Solvents or cleaning agents must be non-flammable or have flash point above 38 degrees C.

.9 Store flammable and combustible waste liquids for disposal in approved containers located in safe, ventilated area. Keep quantities to minimum.

.10 Observe smoking regulations, smoking is prohibited in areas where hazardous materials are stored, used, or handled.

.11 Storage requirements for quantities of hazardous materials and wastes in excess of 5 kg for solids, and 5 litres for liquids:

.1 Store hazardous materials and wastes in closed and sealed containers.

.2 Label containers of hazardous materials and wastes in accordance with WHMIS.

.3 Store hazardous materials and wastes in containers compatible with that material or waste.

.4 Segregate incompatible materials and wastes.

.5 Ensure that different hazardous materials or hazardous wastes are stored in separate containers.

.6 Store hazardous materials and wastes in secure storage area with controlled access.

.7 Maintain clear egress from storage area.

.8 Store hazardous materials and wastes in location that will prevent them from spilling into environment.

.9 Have appropriate emergency spill response equipment available near storage area, including personal protective equipment.

.10 Maintain inventory of hazardous materials and wastes, including product name, quantity, and date when storage began.

.11 When hazardous waste is generated on site:

.1 Co-ordinate transportation and disposal with Departmental Representative.

.2 Comply with applicable federal, provincial and municipal laws and regulations for generators of hazardous waste.

.3 Use licensed carrier authorized by provincial authorities to accept subject material.

.4 Before shipping material obtain written notice from intended hazardous waste treatment or disposal facility it will accept material and it is licensed to accept this material.

.5 Label containers with legible, visible safety marks as prescribed by federal and provincial regulations.

.6 Only trained personnel handle, offer for transport, or transport dangerous goods.

.7 Provide photocopy of shipping documents and waste manifests to Departmental Representative.

.8 Track receipt of completed manifest from consignee after shipping dangerous goods. Provide photocopy of completed manifest to Departmental Representative.

.9 Report discharge, emission, or escape of hazardous materials immediately to Departmental Representative and appropriate provincial authority. Take reasonable measures to control release.

.10 Ensure personnel have been trained in accordance with Workplace Hazardous Materials Information System (WHMIS) requirements.

.11 Report spills or accidents immediately to Departmental Representative . Submit a written spill report to Departmental Representative within 24 hours of incident.

.12 Packaging Waste Management: remove for reuse by manufacturer and return of crates, pallets, packaging materials, padding.

Part 2 Products

2.1 MATERIALS

.1 Description:

.1 Bring on site only quantities hazardous material required to perform Work.

.2 Maintain MSDS in proximity to where materials are being used. Communicate this location to personnel who may have contact with hazardous materials.

.3 Sustainability Characteristics:

.1 Adhesives and Sealants: maximum VOC limit to SCAQMD Rule 1168.

.4 Paints, Coatings, Primers in accordance with manufacturer's recommendations for surface conditions.

.1 Primer: maximum VOC limit to SCAQMD Rule 1113.

.2 Paints: maximum VOC limit to SCAQMD Rule 1113.

.3 Coatings: maximum VOC limit to SCAQMD Rule 1113.

Part 3 Execution

3.1 CLEANING

.1 Progress Cleaning:

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

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

.1 Dispose of hazardous waste materials in accordance with applicable federal and provincial acts, regulations, and guidelines.

.2 Recycle hazardous wastes for which there is approved, cost effective recycling process available.

.3 Send hazardous wastes to authorized hazardous waste disposal or treatment facilities.

.4 Burning, diluting, or mixing hazardous wastes for purpose of disposal is prohibited.

.5 Disposal of hazardous materials in waterways, storm or sanitary sewers, or in municipal solid waste landfills is prohibited.

.6 Dispose of hazardous wastes in timely fashion in accordance with applicable provincial regulations.

.7 Minimize generation of hazardous waste to maximum extent practicable. Take necessary precautions to avoid mixing clean and contaminated wastes.

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

.1 Hazardous wastes recycled in manner constituting disposal.

.2 Hazardous waste burned for energy recovery.

.3 Lead-acid battery recycling.

.4 Hazardous wastes with economically recoverable precious metals.

END OF SECTION

Section 02 83 10 – Lead-Base Paint Abatement – Minimum Precautions

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 35 29.06 – HEALTH AND SAFETY REQUIREMENTS
.2 Section 01 35 43 – ENVIRONMENTAL PROCEDURES

1.2 SUMMARY

.1 Comply with requirements of this Section when performing following Work:

.1 Removal of lead-containing coatings with a chemical gel or paste and fibrous laminated cloth wrap on structural steel stair shaft framing, stairwell, landings and deck soffit

.2 Removal of lead-containing coatings or materials using a power tool with an effective dust collection system equipped with a HEPA filter on structural steel stair shaft framing, stairwell, landings and deck soffit

.3 Removal of lead-containing coatings or materials with non-powered hand tool, other than manual scraping and sanding on structural steel stair shaft framing, stairwell, landings and deck soffit

1.3 REFERENCES

.1 Department of Justice Canada

.1 Canadian Environmental Protection Act, 1999 (CEPA)

.2 Health Canada

.1 Workplace Hazardous Materials Information System (WHMIS), Material Safety Data Sheet (MSDS)

.3 Human Resources and Social Development Canada (HRSDC)

.1 Canada Labour Code Part II, - SOR 86-304 – Occupational Health and Safety Regulations

.4 Transport Canada (TC)

.1 Transportation of Dangerous Goods Act, 1992 (TDGA)

.5 U.S. Environmental Protection Agency (EPA)

.1 EPA 747-R-95-007-1995, Sampling House Dust for Lead

.6 U.S. Department of Health and Human Services/Centers for Disease Control and Prevention/National Institute for Occupational Safety and Health (NIOSH)

.1 NIOSH 94-113-NIOSH Manual of Analytical Methods (NMAM), 4th Edition (1994)

.7 U.S. Department of Labour – Occupational Safety and Health Administration (OSHA) – Toxic and Hazardous Substances

.1 Lead in Construction Regulation – 29 CFR 1926.62-1993

.8 Underwriters' Laboratories of Canada (ULC)

1.4 DEFINITIONS

.1 HEPA vacuum: High Efficiency Particulate Air filtered vacuum equipment with a filter system capable of collecting and retaining fibres greater than 0.3 microns in any direction at 99.97% efficiency

.2 Authorized visitors: Departmental Representative, Consultant or designated representative

.3 Polyethylene: polyethylene sheeting or rip-proof polyethylene sheeting with tape along edges, around penetrating objects over cuts and tear, and elsewhere as required to provide protection and isolation. For protection of underlying surfaces from damage and to prevent lead dust entering the clean area

.4 Sprayer: garden reservoir type sprayer or airless spray equipment capable of producing mist or fine spray. Must be appropriate capacity for scope of work

.5 Action level: employee exposure, without regard to use of respirators, to airborne concentration of lead of 50 micrograms per cubic meter of air (50 ug/m^3) calculated as 8-hour time-weighted average (TWA). Minimum precautions for lead abatement are based on airborne lead concentrations less than 0.05 milligrams per cubic meter of air for removal of lead based paint by methods noted in paragraph 1.1

.6 Competent person: Individuals capable of identifying existing lead hazards in workplace taking corrective measures to eliminate them

.7 Lead dust: wipe sampling on vertical surfaces and/or horizontal surfaces, dust and debris is considered to be lead contaminated if it contains more than 40 micrograms of lead in dust per square foot

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide proof satisfactory to Departmental Representative that suitable arrangements have been made to dispose of lead based paint waste in accordance with requirements of authority having jurisdiction.

.2 Provide proof of Contractor's General and Environmental Liability Insurance.

.3 Quality Control:

.1 Provide Departmental Representative necessary permits for transportation and disposal of lead based paint waste and proof that lead based paint waste has been received and properly disposed.

.2 Provide proof satisfactory to Departmental Representative that employees have had instruction on hazards of lead exposure, respirator use, dress, and aspects of work procedures and protective measures.

1.6 QUALITY ASSURANCE

.1 Regulatory Requirements: comply with Federal, Provincial/Territorial and local requirements pertaining to lead paint, provided that in case of conflict among those requirements or with these specifications more stringent requirement applies. Comply with regulations in effect at time work is performed.

.2 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.2 Safety Requirements: worker and visitor protection.

.1 Protective equipment and clothing to be worn by workers and visitors in work Area include:

.1 Respirator NIOSH approved and equipped with replaceable HEPA filter cartridges with an assigned protection factor of 10, acceptable to Authority having jurisdiction. Suitable for type of lead and level of lead dust exposure. Provide sufficient amount of filters.

.2 Half mask respirator: half-mask particulate respirator with P - series filter, and 100 % efficiency could be provided.

.2 Eating, drinking, chewing, and smoking are not permitted in work area.

.3 Ensure workers wash hands and face when leaving work area

.4 Visitor Protection:

.1 Provide approved respirators to Authorized Visitors to work areas.

.2 Instruct Authorized Visitors procedures to be followed in entering and exiting work area.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for disposal

.2 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional and Municipal regulations.

.3 Disposal of lead waste generated by removal activities must comply with Federal, Provincial, Territorial and Municipal regulations. Dispose of lead waste in sealed double thickness 6 ml bags or leak proof drums. Label containers with appropriate warning labels.

.4 Provide manifests describing and listing waste created. Transport containers by approved means to licensed landfill for burial.

1.8 EXISTING CONDITIONS

.1 Reports and information pertaining to lead based paint to be handled, removed, or otherwise disturbed and disposed of during this Project are available on request.

.2 Notify Departmental Representative of lead based paint discovered during Work and not apparent from drawings, specifications, or report pertaining to Work. Do not disturb such material until instructed by Departmental Representative.

1.9 SCHEDULING

.1 Not later than two days before beginning Work on this Project notify following in writing:

.1 Appropriate Regional or Zone Director of Medical Services Branch, Health Canada.

.2 Provincial Ministry of Labour.

.3 Disposal Authority.

.2 Inform sub trades of presence of lead-containing materials identified in Existing Conditions.

.3 Provide Departmental Representative copy of notifications prior to start of Work.

1.10 PERSONNEL TRAINING

.1 Provide Departmental Representative satisfactory proof that every worker has had instruction and training in hazards of lead exposure, in personal hygiene, in aspects of work procedures, and in use, cleaning, and disposal of respirators.

.2 Instruction and training related to respirators includes, at minimum:

.1 Proper fitting of equipment.

.2 Inspection and maintenance of equipment.

.3 Disinfecting of equipment.

.4 Limitations of equipment.

.3 Instruction and training must be provided by competent, qualified person.

.4 Supervisory personnel to complete required training.

Part 2 Products

2.1 MATERIALS

.1 Polyethylene 0.15 mm thick unless otherwise specified; in sheet size to minimize joints.

.2 Tape: fibreglass - reinforced duct tape suitable for sealing polyethylene under dry conditions and wet conditions using amended water.

.3 Slow - drying sealer: non-staining, clear, water - dispersible type that remains tacky on surface for at least 8 hours and designed for purpose of trapping residual lead paint residue.

.4 Lead waste containers: metal type acceptable to dump operator with tightly fitting covers and 0.15 mm thickness sealable polyethylene liners.

.1 Label containers with pre-printed bilingual cautionary Warning Lead clearly visible when ready for removal to disposal site.

Part 3 Execution

2.1 SUPERVISION

.1 One Supervisor for every ten workers is required.

.2 Supervisor must remain within work area during disturbance, removal, or handling of lead based paints.

2.2 PREPARATION

.1 Remove and store items to be salvaged or reused.

.1 Protect and wrap items and transport and store in area specified by Departmental Representative.

.2 Work Area:

.1 Protect all surfaces with a plywood and wood frame platform for a distance of 10 feet past the circumference of the work area, adjacent structures and marine environment. Ensure that the platform can retain all paint particles dislodged from the structure.

.2 The platform shall support the scaffold and shall be dyked at the perimeter to retain the paint particles. It shall be designed by a Structural Engineer licensed to practice in British Columbia. Submit shop drawings for review by the Departmental Representative.

.3 Install the scaffolding and shrink wrap.

.4 Where water application is required for wetting lead containing materials, provide temporary water supply appropriately sized for application of water as required.

.5 If required, Provide electrical power and shut off for operation of powered tools and equipment. Provide 24 volt safety lighting and ground fault interrupter circuits on power source for electrical tools, in accordance with applicable CSA Standard. Ensure safe installation of electrical cables and equipment.

.3 Do not start work until:

.1 Arrangements have been made for disposal of waste.

.2 Tools, equipment, and materials waste containers are on site.

.3 Arrangements have been made for building security.

.4 Notifications have been completed and preparatory steps have been taken.

2.3 LEAD ABATEMENT

.1 Removal of lead-containing coatings with a chemical gel or paste and fibrous laminated cloth wrap; or removal equipped with HEPA filters; or removal with using power tools non-powered hand tool, other than manual scraping and sanding.

.2 Remove lead based paint in small sections and pack as it is being removed in sealable 0.15 mm plastic bags and place in labelled containers for transport.

.3 Seal filled containers. Clean external surfaces thoroughly by wet sponging. Remove from immediate working area to staging area. Clean external surfaces thoroughly again by wet sponging. Wash containers thoroughly pending removal to outside. Ensure containers are removed by workers who have entered from uncontaminated areas dressed in clean coveralls.

.4 After completion of stripping work, wire brush and wet sponge surface from which lead based paint has been removed to remove visible material. During this work keep surfaces wet.

.5 After wire brushing and wet sponging to remove visible lead based paint, and after encapsulating lead containing material impossible to remove, wet clean entire work area, and equipment used in process.

2.4 INSPECTION

.1 Perform inspection to confirm compliance with specification and governing authority requirements. Deviations from these requirements not approved in writing by Departmental Representative will result in work stoppage, at no cost to Departmental Representative.

.2 Departmental Representative will inspect work for:

.1 Adherence to specific procedures and materials.

.2 Final cleanliness and completion.

.3 No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.

2.5 LEAD SURFACE SAMPLING – WORK AREAS

.1 Final lead surface sampling to be conducted as follows:

.1 After work area has passed a visual inspection for cleanliness approved and accepted by Departmental Representative. Apply coat of lock-down agent to surfaces within enclosure, and appropriate setting period of 8 hours has passed, Departmental Representative will perform lead wipe sampling.

.1 Final lead wipe sampling results from horizontal and vertical surfaces must show lead levels of less than 40 micrograms of lead in dust per square foot. Samples collected and analyzed in accordance with EPA 747-R-95-007.

.2 If wipe sampling results show levels of lead in excess of 40 micrograms per square foot, re-clean work area at contractor's expense and apply another acceptable coat of lock-down agent to surfaces.

.3 Repeat as necessary until fibre levels are less than 40 micrograms per square foot.

2.6 FINAL CLEANUP

.1 Following cleaning and when lead wipe surfaces sampling are below acceptable concentrations, proceed with final cleanup.

.2 Remove filter fabric sheet by rolling it up to encapsulate all paint particles. Vacuum visible lead containing particles observed during cleanup, immediately, using HEPA vacuum.

.3 Place filter fabric, tape, cleaning material, clothing, and contaminated waste in plastic bags and sealed labelled waste containers for transport.

.4 Conduct final check to ensure no dust or debris remains on surfaces as result of dismantling operations.

2.7 RE-ESTABLISHMENT OF OBJECTS AND SYSTEMS

.1 Repair or replace objects damaged in course of work to their original state or better, as directed by Departmental Representative.

END OF SECTION

Section 03 10 00 – Concrete Forming and Accessories

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 03 20 00 – CONCRETE REINFORCING
.2 Section 03 30 00 – CAST-IN-PLACE CONCRETE

1.2 REFERENCE STANDARDS

.1 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 CSA O121, Douglas Fir Plywood.

.3 CAN/CSA-S269.3, Concrete Formwork, National Standard of Canada.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit WHMIS MSDS - Material Safety Data Sheets.

.2 Co-ordinate submittal requirements and provide submittals.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Store and manage hazardous materials.

.2 Waste Management and Disposal:

.1 Separate waste materials for recycling.

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

.3 Divert wood materials from landfill to a recycling facility as approved by Departmental Representative.

.4 Divert plastic materials from landfill to a recycling facility as approved by Departmental Representative.

.5 Divert unused form release material from landfill to an official hazardous material collections site as approved by the Departmental Representative.

Part 2 Products

2.1 MATERIALS

.1 Formwork materials:

.1 For concrete without special architectural features, use wood and wood product formwork materials to CSA-O121.

.2 Form ties:

.1 For concrete not designated 'Architectural', use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm diameter in concrete surface.

.3 Form liner:

.1 Plywood: Douglas Fir to CSA O121 square edge.

.4 Form release agent: biodegradable, low VOC, non-toxic. .

.5 Form stripping agent: colourless mineral oil, non-toxic, biodegradable, low VOC, free of kerosene, with viscosity between 15 to 24 mm2/s at 40 degrees C, flashpoint minimum 150 degrees C, open cup.

Part 3 Execution

3.1 FABRICATION AND ERECTION

.1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.

.2 Obtain Departmental Representative's approval for use of earth forms framing openings not indicated on drawings.

.3 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.

.4 Provide site drainage to prevent washout of soil supporting mud sills and shores.

.5 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA-A23.1/A23.2.

.6 Align form joints.

.1 Keep form joints to minimum.

.7 Use 20 mm chamfer strips on external corners, unless specified otherwise.

.8 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.

.9 Build in anchors, sleeves, and other inserts required to accommodate work specified in other sections.

.1 Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.

.10 Clean formwork in accordance with CSA-A23.1/A23.2, before placing concrete.

END OF SECTION

Section 03 20 00 – Concrete Reinforcing

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 45 00 – QUALITY CONTROL
.2 Section 03 10 00 – CONCRETE FORMING AND ACCESSORIES
.3 Section 03 30 00 – CAST-IN-PLACE CONCRETE

1.2 REFERENCES

.1 American Concrete Institute (ACI)

.1 SP-66-04, ACI Detailing Manual 2004.

.2 ASTM International

.1 ASTM A82/A82M-07, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.

.3 CSA International

.1 CSA-A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.2 CAN/CSA-A23.3-14, Design of Concrete Structures.

.3 CSA-G30.18-09, Carbon Steel Bars for Concrete Reinforcement.

.4 CSA-G40.20/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.4 Reinforcing Steel Institute of Canada (RSIC)

.1 RSIC-2004, Reinforcing Steel Manual of Standard Practice.

1.3 QUALITY ASSURANCE

.1 Submit:

.1 Mill Test Report: upon request, provide Consultant with certified copy of mill test report of reinforcing steel, minimum 2 weeks prior to beginning reinforcing work.

.2 Upon request submit in writing to Consultant proposed source of reinforcement material to be supplied.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials off ground and in accordance with manufacturer's recommendations in clean area.

.2 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan. Waste Reduction Workplan related to Work of this Section.

Part 2 Products

2.1 MATERIALS

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

.2 Reinforcing steel: billet steel, grade 400, deformed bars to CSA-G30.18, unless indicated otherwise.

.3 Cold-drawn annealed steel wire ties: to ASTM A82/A82M.

.4 Deformed steel wire for concrete reinforcement: to ASTM A82/A82M.

.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-A23.1/A23.2 Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.

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

.3 Upon approval of Departmental 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 Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 2 weeks prior to beginning reinforcing work.

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

Part 3 Execution

3.1 FIELD BENDING

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

.2 When field bending is authorized, bend without heat, applying slow and steady pressure.

.3 Replace bars, which develop cracks or splits.

3.2 PLACING REINFORCEMENT

.1 Place reinforcing steel as indicated on placing drawings in accordance with CSA-A23.1/A23.2.

.2 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.

.3 Ensure cover to reinforcement is maintained during concrete pour.

3.3 CLEANING

.1 Progress Cleaning:

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

.3 Waste Management: separate waste materials for recycling.

END OF SECTION

Section 03 30 00 – Cast-In-Place Concrete

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 35 29.06 – HEALTH AND SAFETY REQUIREMENTS

.2 Section 01 35 43 – ENVIRONMENTAL PROCEDURES

.3 Section 03 10 00 – CONCRETE FORMING AND ACCESSORIES

.4 Section 03 20 00 – CONCRETE REINFORCING

1.2 REFERENCE STANDARDS

.1 All concrete work shall conform to the requirements of the latest edition of the standards listed below

.1 ASTM International

.1 ASTM C260/C260M-10a, Standard Specification for Air-Entraining Admixtures for Concrete.

.2 ASTM C494/C494M-10a, Standard Specification for Chemical Admixtures for Concrete.

.3 ASTM C1017/C1017M-10a, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.

.2 CSA International

.1 CSA A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

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

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

.4 CSA A283-06, Qualification Code for Concrete Testing Laboratories.

.5 CSA A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

1.3 ABBREVIATIONS AND ACRONYMS

.1 Portland Cement: hydraulic cement, blended hydraulic cement (XXb - b denotes blended) and Portland-limestone cement.

.1 Type GU, GUb and GUL - General use cement.

.2 Fly ash:

.1 Type F - with CaO content less than 15%.

.2 Type CI - with CaO content ranging from 15 to 20%.

.3 Type CH - with CaO greater than 20%.

.3 GGBFS - Ground, granulated blast-furnace slag.

1.4 DEFINITIONS

.1 Tremie concrete: concrete placed underwater through tube called tremie pipe.

.2 Tremie pipe: pipe has hopper at upper end and may be open ended or may have foot valve, plug or travelling plug to control flow of concrete. Pipe has diameter of 200 mm minimum, constructed from sections with flange couplings fitted with gaskets.

.3 Concrete is placed in hopper and sufficient head of concrete is maintained in tremie pipe to provide desired rate of flow.

.4 Pumped concrete method: method of placing concrete underwater uses concrete pump with discharge line used in similar manner to tremie pipe.

.5 Bottom-dump bucket method: method of placing concrete underwater requires use of bucket designed to discharge from bottom after it has contacted foundation or surface of previously placed concrete.

.6 Bagged concrete method: method of placing underwater concrete consists of diver placing bags partially filled with dry concrete mix.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit concrete mix designs for review by Consultant minimum 4 weeks prior to starting concrete work.

.2 Concrete pours: provide accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken as described in PART 3 - FIELD QUALITY CONTROL.

.3 Provide testing reports for review by Departmental Representative and do not proceed without written approval when deviations from mix design or parameters are found.

.4 Concrete to be placed in forms within 120 minutes after batching unless directed in writing by Departmental Representative.

.5 Provide two copies of WHIMIS MSDS Material Safety Data Sheets.

1.6 QUALITY ASSURANCE

.1 Provide Departmental Representative, minimum 4 weeks prior to starting concrete work, with concrete mix designs and methodology for preparing concrete on site.

.1 Provide test data and certifications by qualified independent inspection and testing laboratory that materials and mix designs used in concrete mixture will meet specified requirements.

.2 Minimum 4 weeks prior to starting concrete work, provide proposed quality control procedures for review by Departmental Representative on following items:

.1 Hot weather concrete.

.2 Cold weather concrete.

.3 Curing.

.4 Finishes.

.5 Joints.

Part 2 Products

2.1 DESIGN CRITERIA

.1 Alternative 1 - Performance: to CSA A23.1/A23.2, and as described in MIXES of PART 2 - PRODUCTS.

2.2 MATERIALS

.1 Portland Cement: to CSA A3001, Type GU.

.1 Reduction in cement from Base Mix to Actual Supplementary Cementing Materials (SCMs) Mix, as percentage.

.2 Blended hydraulic cement: Type GUb to CSA A3001.

.3 Supplementary cementing materials: with minimum 20% fly ash replacement, by mass of total cementitious materials to CSA A3001.

.4 Water: to CSA A23.1.

.5 Aggregates: to CSA A23.1/A23.2.

.6 Admixtures:

.1 Air entraining admixture: to ASTM C260.

.2 Chemical admixture: to ASTM C494/ASTM C1017. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.

.7 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents to CSA A23.1/A23.2.

.1 Compressive strength: 50MPa at 28 days, unless noted otherwise.

2.3 MIXES

.1 Alternative 1 - Performance Method for specifying concrete: to meet Departmental Representatives performance criteria to CSA A23.1/A23.2.

.1 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as in Quality Control Plan.

.2 Provide concrete mix to meet following hard state requirements:

.1 Types 1&2 not used

.2 Type 3:

.1 Durability and class of exposure: C1

.2 Compressive Strength at 28 days age: 35 MPa minimum

.3 Intended application: All concrete

.4 Aggregate size 20mm maximum

.5 Slump: 80 mm ±20

.6 Air content category: 1

.3 Provide quality management Plan to ensure verification of concrete quality to specified performance.

.4 Concrete suppliers certification: both batch plant and materials meet CSA A23.1 requirements.

.2 Alternative 2 – Underwater placed concrete, use Alternative 1 mix design with the following concrete mix amendments:

.1 Maximum water cement ratio by mass: 0.45.

.2 Cement content for mixtures: 390kg/m^3 minimum.

.3 Air dry density: 1.50-2.25

.3 Admixtures: as approved in writing by Departmental Representative. Use admixtures to correct deficiencies in mix or to improve placement of concrete.

.4 Departmental Representative may withdraw prior approval of admixture if conditions encountered during course of work indicate unsatisfactory results.

.5 Do not use calcium chloride or materials containing calcium chloride.

.6 Submit admixtures to produce self consolidating concrete to Departmental Representative for review.

Part 3 Execution

3.1 PREPARATION

.1 Excavations shall be kept free of surface and/or groundwater at all times by providing suitable dewatering of the area required.

.2 Should water enter the excavation prior to placing the concrete, all softened soil shall be hand removed from the bearing interface of the unstable soil.

.3 No concrete shall be poured against frozen ground. All frozen concrete shall be removed and replaced.

.4 Obtain Departmental Representative's written approval before placing concrete.

.1 Provide 72 hours minimum notice prior to placing of concrete.

.5 Place concrete reinforcing in accordance with Section 03 20 00- Concrete Reinforcing.

.6 During concreting operations:

.1 Development of cold joints not allowed.

2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.

.7 Pumping of concrete is permitted only after approval of equipment and mix.

.8 Ensure reinforcement and inserts are not disturbed during concrete placement.

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

.10 Protect previous Work from staining.

.11 Clean and remove stains prior to application for concrete finishes.

.12 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.

.13 Do not place load upon new concrete until authorized by Departmental Representative.

3.2 INSTALLATION/APPLICATION

.1 Do cast-in-place concrete work to CSA A23.1/A23.2.

.2 Testing of concrete shall be performed, with cylinder and mix design only, in accordance with CAN/CSA A23.1 by an independent agency.

.3 Sleeves and inserts:

.1 Where approved by Departmental Representative, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere.

.2 Sleeves and openings greater than 100 x 100 mm, must be reviewed by Departmental Representative.

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

.4 Confirm locations and sizes of sleeves and openings shown on drawings.

.5 Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete.

.4 Anchor bolts:

.1 Set anchor bolts to templates in co-ordination with appropriate trade prior to placing concrete.

.5 Grout under base plates using procedures in accordance with manufacturer's recommendations which result in 100% contact over grouted area.

.6 Finishing and curing:

.1 Finish concrete to CSA A23.1/A23.2.

.2 Use procedures as reviewed by Departmental Representative to remove excess bleed water. Ensure surface is not damaged.

.3 Finish concrete floor to CSA A23.1/A23.2 Class A.

.4 Provide steel-trowelled finish unless otherwise indicated.

.5 All concrete shall be properly cured by means of moisture and/or application of an approved curing membrane.

.6 All exposed concrete surfaces shall be kept moist for minimum of 7 days after placing concrete or until concrete attains 70% of specified compressive strength.

.7 Rub exposed sharp edges of concrete with carborundum to produce 3 mm minimum radius edges unless otherwise indicated. All exposed edges of concrete shall have 25mm chamfers, unless noted otherwise.

3.3 SURFACE TOLERANCE

.1 Concrete tolerance to CSA A23.1 Straightedge Method FF = 20 : FL = 15 Index Method to tolerance schedule as indicated.

3.4 FIELD QUALITY CONTROL

.1 Site tests: conduct the following tests:

.1 Concrete pours.

.2 Slump.

.3 Air content.

.4 Compressive strength at 7 and 28 days.

.5 Air and concrete temperature.

.2 Inspection and testing of concrete and concrete materials will be carried out by testing laboratory designated by Departmental Representative for review to CSA A23.1/A23.2.

.1 Ensure testing laboratory is certified to CSA A283.

.3 Departmental Representative will pay for costs of tests.

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

3.5 INSTALLATION OF UNDERWATER PLACED CONCRETE

.1 Do concrete work in accordance with CSA A23.1/A23.2. Testing for concrete to CSA A23.1/A23.2.

.2 Where concrete placement extends above water surface, protect concrete from direct contact with air at temperature below 5 degrees C for 24 hours.

.3 Place concrete in one continuous operation to full depth required.

.4 Supply complete equipment for every phase of operation.

.5 Provide sufficient supply of concrete to complete pour without interruption.

.6 Tremie method:

.1 Provide water-tight tremie pipe sized to allow free flow of concrete. Diameter of tremie pipe to be minimum 190 mm and minimum eight times maximum size of coarse aggregate.

.2 Provide hopper at top of tremie pipe and means to raise and lower tremie pipe.

.3 Provide plug or foot valve at bottom of tremie pipe to permit filling pipe with concrete initially.

.4 Provide minimum of one tremie pipe for every 30m2 of plan area and to maximum spacing of 6m centre to centre. Do not move tremie pipes laterally through concrete.

.5 Start placement with tremie pipe full of concrete. Keep bottom of pipe buried minimum 900mm in freshly placed concrete.

.6 If seal is lost, allowing water to enter pipe, withdraw pipe immediately. Refill pipe, and continue placing as specified.

.7 If tremie operation is interrupted so that horizontal construction joint has to be made, cut surface laitance by jetting, within 24 to 36 hours and remove loose material by pumping or air lifting before placing next lift.

.8 Do not place concrete in flowing water when current exceeds 3 m/min. Do not vibrate, disturb or puddle concrete after placement.

.7 Pumped concrete method:

.1 Follow procedures as for tremie method in placing concrete using discharge line from concrete pump as tremie pipe.

.2 Pump discharge line diameter: 125mm minimum.

.8 Bottom-dump bucket method:

.1 Fill bucket with concrete, cover top surface and lower slowly through water to prevent backwash.

.2 Discharge concrete only when bucket is in contact with surface on which concrete is to be deposited.

.3 Withdraw bucket until it is above concrete to maintain still water at point of discharge to approval of Departmental Representative.

.4 Do not place concrete in flowing water when current exceeds 3m/min. Do not vibrate, disturb or puddle concrete after placement.

.9 Bagged concrete method:

.1 Use bags made of coarsely woven material to allow concrete to bond between bags.

.2 Fill bags with dry concrete mix not more than 80% full before placing.

.3 Place each concrete bag individually so that bag is stable and securely resting on foundation material or previously placed bags.

3.6 UNDERWATER EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for concrete placement installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied [and after receipt of written approval to proceed from Departmental Representative.

3.7 UNDERWATER PREPARATION

.1 Where concrete must bond to existing surfaces, clean surfaces before starting concrete placement.

.2 Use water jets, mechanical scrapers or other means, [and when quantities of mud or rock cuttings are present, remove by air lift].

3.8 CLEANING

.1 Progress Cleaning:

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

.3 Waste Management: separate waste materials for recycling.

.1 Divert unused admixtures and additive materials (pigments, fibres) from landfill to official hazardous material collections site as approved by Departmental Representative.

.2 Do not dispose of unused admixtures and additive materials into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.

.3 Prevent admixtures and additive materials from entering drinking water supplies or streams.

.4 Using appropriate safety precautions, collect liquid or solidify liquid with inert, non-combustible material and remove for disposal.

.5 Dispose of waste in accordance with applicable local, Provincial/Territorial and National regulations.

END OF SECTION

Section 05 12 23 – Structural Steel

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 11 00 – SUMMARY OF WORK

1.2 REFERENCE STANDARDS

.1 ASTM International Inc.

.1 ASTM A36/A36M-08, Standard Specification for Carbon Structural Steel.

.2 ASTM A193/A193M-08, Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature or High-Pressure Service and Other Special Purpose Applications.

.3 ASTM A307-07b, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.4 ASTM A325-07a, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

.5 ASTM A325M-08, Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Minimum Tensile Strength[Metric].

.6 ASTM A490M-04ae, Standard Specification for High-Strength Steel Structural Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints [Metric].

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-85.10-[99], Protective Coatings for Metals.

.3 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturers Association (CPMA).

.1 Handbook of the Canadian Institute of Steel Construction.

.2 CISC/CPMA Standard 2-75, Quick-Drying Primer for use on Structural Steel.

.4 Canadian Standards Association (CSA International)

.1 CSA G40.20/G40.21-04, 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.

.3 CAN/CSA-S16-01(R2007), Limit States Design of Steel Structures.

.4 CAN/CSA-S136-07, North American Specifications for the Design of Cold Formed Steel Structural Members.

.5 CSA W47.1-03, Certification of Companies for Fusion Welding of Steel.

.6 CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding.

.7 CSA W55.3-1965(R2003), Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.

.8 CSA W59-03, Welded Steel Construction (Metal Arc Welding).

.5 Master Painters Institute

.1 MPI-INT 5.1-08, Structural Steel and Metal Fabrications.

.2 MPI-EXT 5.1-08, Structural Steel and Metal Fabrications.

.6 The Society for Protective Coatings (SSPC) and National Association of Corrosion Engineers (NACE) International

.1 NACE No. 3/SSPC SP-6-06, Commercial Blast Cleaning.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Storage and Handling Requirements:

.1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

.1 Structural steel: to CAN/CSA-S136.

.2 Anchor bolts: to CSA-G40.20/G40.21.

.3 High strength anchor bolts: to ASTM A193/A193M.

.4 Bolts, nuts and washers: to ASTM A307.

.5 Welding materials: to CSA W59 and certified by Canadian Welding Bureau.

.6 Shop paint primer: to CISC/CPMA2-75.

.7 Hot dip galvanizing: galvanize steel, where indicated, to CAN/CSA-G164, minimum zinc coating of 600g/m2.

.8 Shear studs: to CSA W59, Appendix H.

2.2 FABRICATION

.1 Fabricate structural steel in accordance with approved shop drawings from Departmental Representative.

.2 Install shear studs in accordance with CSA W59.

2.3 SHOP PAINTING

.1 Clean, prepare surfaces and shop prime structural steel in accordance with CAN/CSA-S136.

.2 Clean members, remove loose mill scale, rust, oil, dirt and foreign matter. Prepare surface according to NACE No.3/SSPC-SP-6.

.3 Apply one coat of primer in shop to steel surfaces to achieve minimum dry film thickness of as specified by the Departmental Representative.

.1 Surfaces to be encased in concrete.

.2 Surfaces to receive field installed stud shear connections.

.3 Surfaces and edges to be field welded.

.4 Faying surfaces of slip-critical connections.

.5 Below grade surfaces in contact with soil.

.4 Apply paint under cover, on dry surfaces when surface and air temperatures are above 5 degrees C.

.5 Maintain dry condition and 5 degrees C minimum temperature until paint is thoroughly dry.

.6 Strip paint from bolts, nuts, sharp edges and corners before prime coat is dry.

2.4 STEEL BOLTS

.1 Small fastenings will conform to the standard for Wire Nails, Spikes, and Staples, Canadian Standards Association (CSA) B-111-1974.

.2 Drift bolts, machine bolts, washers, and miscellaneous iron will conform to the standard for General Purpose Structural Steel of the CAN3-G40.21-M81.

.3 Items manufactured or fabricated from scrap steel of unknown chemical or physical properties are not acceptable.

.4 All bolts will be of the full dimension specified or shown on the plan. Unless otherwise specified, all machine bolts will be provided with steel DPW washers under head and nut. The steel DPW washers shall be round unless specified square.

.5 All bolts shall be 19mm (3/4”) National course thread, unless shown otherwise.(NIC)

.6 Holes for machine bolts will be bored to provide a driving fit.

2.5 HARDWARE

.1 All hardware including bolts, drift bolts, carriage bolts, lag bolts, pipe sleeves, nuts and washers etc. will be hot dipped galvanized in accordance with the ASTM A153. Galvanize to 610g/m2 (2oz/ft2).

.2 All bolts will be of the full dimension specified or shown on the plan.

.3 Unless otherwise specified, all machine bolts will be provided with round steel plate washers under head and nut.

.4 All bolts shall be 19mm (3/4”) National course thread, unless shown otherwise.

.5 All 19mm washers shall be 6mm thick and 75mm diameter galvanized steel.

.6 All 25mm washers shall be a minimum of 8mm thick and 100mm diameter galvanized steel.

.7 All bolts to have 100mm (4”) of thread unless shown otherwise.

Part 3 Execution

3.1 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 GENERAL

.1 Structural steel work: in accordance with CAN/CSA-S136

.2 Welding: in accordance with CSA W59.

.3 Companies to be certified under Division 1 or 2.1 of CSA W47.1 for fusion welding of steel structures and/or CSA W55.3 for resistance welding of structural components.

3.3 CONNECTION TO EXISTING WORK

.1 Verify dimensions and condition of existing work, report discrepancies and potential problem areas to Departmental Representative for direction before commencing fabrication.

3.4 ERECTION

.1 Erect structural steel, as indicated and in accordance with CAN/CSA-S136 and in accordance with approved erection drawings from Departmental Representative.

.2 Field cutting or altering structural members: to approval of Departmental Representative .

.3 Clean with mechanical brush and touch up shop primer to bolts, rivets, welds and burned or scratched surfaces at completion of erection.

.4 Continuously seal members by continuous welds where indicated. Grind smooth.

3.5 FIELD QUALITY CONTROL

.1 Inspection and testing of materials and workmanship will be carried out by testing laboratory designated by Departmental Representative.

.2 Provide safe access and working areas for testing on site, as required by testing agency and as authorized by Departmental Representative.

.3 Test shear studs in accordance with CSA W59.

3.6 FIELD PAINTING

.1 Paint as directed by Departmental Representative.

.1 Touch up damaged surfaces and surfaces without shop coat with primer to NACE No.3/SSPC-SP-6 except as specified otherwise. Apply in accordance: MPI Architectural Painting Specification Manual.

3.7 ASSEMBLY

.1 All bolts shall be tightened to 100 Newton Meters (80 lbs-ft).

.2 Care shall be taken not to damage the treated wood finish.

.3 Pre-drilling:

.1 All ends of timbers not fastened by bolts shall be predrilled prior to installation to prevent splitting.

.4 Holes for machine bolts will be bored to provide a driving fit.

3.8 CLEANING

.1 Progress Cleaning:

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

END OF SECTION

Section 05 14 11 – Structural Aluminum

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 11 00 – SUMMARY OF WORK

1.2 REFERENCE STANDARDS

.1 Aluminum Association (AA)

.1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.

.2 ASTM International

.1 ASTM A307-07b, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.2 ASTM A325-09, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

.3 ASTM A325M-09, Standard Specification for Structural Bolts, Steel, Heat Treated, 830 MPa Minimum Tensile Strength.

.4 ASTM A490-09, Standard Specification for Structural Bolts Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength.

.5 ASTM A490M-09a, Standard Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3 for Structural Steel Joints.

.6 ASTM B209M-07, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

.7 ASTM B210M-05, Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes.

.8 ASTM B211M-[03], Standard Specification for Aluminum and Aluminum Alloy Bar, Rod and Wire.

.9 ASTM F593-02(2008), Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.

.3 American Welding Society (AWS)

.1 AWS - A5.10/A5.10M1999(R2007), Specification for Bare Aluminum and Aluminum Alloy Welding Electrodes and Rods.

.4 CSA International

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

.2 CAN/CSA-S157/S157.1-05, Strength Design in Aluminum/Commentary on CAN/CSA-S157, Strength Design in Aluminum.

.3 CSA W47.2-M1987(R2008), Certification of Companies for Fusion Welding of Aluminum.

.4 CSA W59.2-M1991(R2008), Welded Aluminum Construction.

.5 Health Canada / Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.6 Master Painters Institute (MPI)

.1 MPI - EXT 5.5D, Bituminous Finish.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Storage and Handling Requirements:

.1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect structural aluminum from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

.1 Aluminum bar, rod, wire: to ASTM B211M.

.2 Aluminum and Aluminum-Alloy Extruded Bar, Rods, Wire, Shapes, and Tubes: to ASTM B221M.

.3 Aluminum sheet or plate: to ASTM B209M.

.4 Aluminum drawn tubes: to ASTM B210M.

.5 Aluminum bolts and rivets: to ASTM B316M.

.6 Aluminum welding wire: to AWS - A5.10/A5.10M.

.7 Stainless steel bolts: to ASTM F593.

.8 Steel bolts: to ASTM A325M.

.9 Bituminous paint: MPI - EXT 5.5D, without thinner.

.10 Galvanizing: hot dip galvanize steel bolts to CAN/CSA-G164, minimum zinc coating of 600g/m2.

2.2 FABRICATION

.1 Fabricate to CAN/CSA-S157 and in accordance with approved shop drawings from Departmental Representative.

2.3 FINISHES

.1 Finish exposed surfaces of aluminum components to Aluminum Association (AA), Designation System for Aluminum Finishes.

.1 Clear anodic finish: as specified by Departmental Representative.

.2 Integral colour anodic finish: as specified by Departmental Representative.

.3 Impregnated colour anodic finish: as specified by Departmental Representative.

.4 Electrolytically deposited colour anodic finish: as specified by Departmental Representative.

.2 Finish: as indicated on drawings.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for structural aluminum installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative

3.2 INSTALLATION

.1 Do structural aluminum work: to CAN/CSA-S157.

.2 Do welding: to CSA W59.2.

.3 Companies to be certified under Division 1 or 2.1 of CSA W47.2 for fusion welding of aluminum CSA W55.3 for resistance welding of structural components.

3.3 CONNECTION TO EXISTING WORK

.1 Verify dimensions and condition of existing work, report discrepancies and potential problem areas to Departmental Representative for direction before starting fabrication.

3.4 ERECTION

.1 Erect structural aluminum as indicated and to CAN/CSA-S157 and Departmental Representative approved erection drawings.

.2 Field cutting or altering structural members: to approval of Departmental Representative.

3.5 FIELD QUALITY CONTROL

.1 Inspection and testing of materials and workmanship will be carried out by testing laboratory designated by Departmental Representative.

.2 Provide safe access and working areas for testing on site, as required by testing agency and as authorized by Departmental Representative.

3.6 JOINT SEALING AND PAINTING

.1 Surface preparation of aluminum in contact with or embedded in dissimilar materials: to CAN/CSA-S157. Treat locations as if there is moisture present.

.2 Paint to CAN/CSA-S157.

3.7 FIELD PAINTING

.1 Paint as directed by Departmental Representative.

.2 Touch up damaged surfaces with 1 coat of zinc chromate primer followed by 1 coat of compatible paint.

3.8 CLEANING

.1 Progress Cleaning:

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment

3.9 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by structural aluminum for buildings installation.

END OF SECTION

Section 06 10 00.01 – Rough Carpentry – Short Form

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 11 00 SUMMARY OF WORK
.2 Section 05 12 23 – STRUCTURAL STEEL

1.2 REFERENCES

.1 ASTM International

.1 ASTM A123/A123M-09, Standard Specification for Zinc Hot-Dip Galvanized Coatings on Iron and Steel Products.

.2 CSA International

.1 CSA B111-1974 (R2003), Wire Nails, Spikes and Staples.

.2 CSA O141-05(R2009), Softwood Lumber.

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.4 National Lumber Grades Authority (NLGA)

.1 Standard Grading Rules for Canadian Lumber 2010.

1.3 ACTION AND INFORMATION SUBMITTALS

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

.2 Sustainable Design Submittals:

.1 Construction Waste Management:

.1 Submit project Waste Management Plan and Waste Reduction Workplan highlighting recycling and salvage requirements.

1.4 QUALITY ASSURANCE

.1 Lumber identification: by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling.

Part 2 Products

2.1 LUMBER MATERIAL

.1 Lumber: unless specified otherwise, softwood, S4S, moisture content 19% or less in accordance with following standards:

.1 CSA O141.

.2 NLGA Standard Grading Rules for Canadian Lumber.

.2 Blocking and nailing strips:

.1 Board sizes: "standard" or better grade.

.2 Dimension sizes: Select Structural grade.

2.2 ACCESSORIES

.1 Nails, spikes and staples: to CSA B111.

.2 Bolts: 12.5 mm diameter unless indicated otherwise, complete with nuts and washers.

.3 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, recommended for purpose by manufacturer.

2.3 FINISHES

.1 Galvanizing: to ASTM A653/A653M, use galvanized bolts except as otherwise specified in Section 2.3.2 where connected to pressure treated timber framing.

.2 Stainless steel: use stainless steel A151316 alloy for the following:

.1 Wood nails and screws.

.2 Anchor bolts for aluminum stairs.

.3 Aluminum stair tread fasteners.

2.4 WOOD PRESERVATIVE

.1 Lumber

.1 Wood preservatives shall conform to and be applied in accordance with CSA-080M.

.2 Wood preservatives shall be either:

.1 Alkaline copper quaternary (ACQ-B or ACQ-D).

.2 Copper Azole (CA).

.3 Maximum VOC limit 350 g/L.

.2 Surface-applied wood preservative: copper naphthenate or 5% pentachlorophenol solution, water repellent preservative.

.3 Pentachlorophenol use is restricted to building components that are in ground contact and subject to decay or insect attack only. Where used, pentachlorophenol-treated wood must be covered with two coats of an appropriate sealer.

.4 Structures built with wood treated with pentachlorophenol and inorganic arsenicals must not be used for storing food nor should the wood come in contact with drinking water.

Part 3 Execution

3.1 PREPARATION

.1 Pressure treat surfaces of material with wood preservative, prior to transportation to site.

.2 Field treatment shall be limited to drilled holes and cut ends.

.3 Re-treat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative before installation.

.4 Treat all material.

3.2 INSTALLATION

.1 Install nailers and linings to rough openings as required to provide backing for frames and other work.

.2 Install nailers and other wood supports as required and secure using galvanized or stainless steel fasteners.

3.3 ERECTION

.1 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.

.2 Countersink bolts where necessary to provide clearance for other work.

END OF SECTION

Section 31 00 99 – Earthwork for Minor Works

Part 1 General

RELATED REQUIREMENTS

.1 Section 01 11 00 SUMMARY OF WORK

REFERENCE STANDARDS

.1 ASTM International

.1 ASTM D698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3) (600kN-m/m3).

.2 CSA International

.1 CSA A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.3 U.S. Environmental Protection Agency (EPA)/Office of Water

.1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

Part 2 Products

2.1 MATERIALS

.1 Granular as specified by Departmental Representative and Section 01 11 00 Summary of Work.

.2 Gravel and sand as specified by Departmental Representative and Section 01 11 00 Summary of Work.

.3 Riprap as specified by Departmental Representative and Section 01 11 00 Summary of Work.

.4 Unshrinkable fill: concrete to CSA A23.1/A23.2.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions:

.1 Examine soil, archaeology and environmental reports if available.

.2 Before commencing work verify and establish locations of buried services on and adjacent to site.

.2 Evaluation and Assessment:

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

.2 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.

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

3.2 EXCAVATION

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

.2 Excavate as required to carry out work, in all materials met.

.1 Do not disturb soil or rock below bearing surfaces. Notify Departmental Representative when excavations are complete.

.3 Excavate for slabs and paving to subgrade levels.

3.3 SITE QUALITY CONTROL

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

3.4 BACKFILLING

.1 Start backfilling only after inspection and receipt of written approval of fill material and spaces to be filled from Departmental Representative.

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

.3 Placing:

.1 Place backfill, fill and basecourse material in 150 mm lifts. Add water as required to achieve specified density.

.2 Place unshrinkable fill in areas as indicated. Consolidate and level unshrinkable fill with internal vibrators.

.4 Compaction: compact each layer of material to following densities for material to [ASTM D698]:

.1 To underside of basecourses: 95%.

.2 Basecourses: 100%.

.3 Elsewhere: 90%.

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

3.5 GRADING

.1 Grade to ensure that water will drain away from buildings, walls and work areas, to designated water treatment catch basins and other disposal areas approved by Departmental Representative. Grade to be gradual between finished spot elevations as indicated.

3.6 CLEANING

.1 Progress Cleaning:

.1 Dispose of cleared and grubbed material off site daily.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

END OF SECTION

Section 31 05 16.01 – Aggregate Materials and Riprap

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 11 00 SUMMARY OF WORK

1.2 REFERENCE STANDARDS

.1 For Aggregate:

.1 ASTM International

.1 ASTM D4791-10, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

.2 U.S. Environmental Protection Agency (EPA)/Office of Water

.1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

.2 For Riprap:

.1 American Society for Testing and Materials (ASTM)

.1 ASTM C144-99, Standard Specification for Aggregate for Masonry Mortar.

.2 ASTM C618-00, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.

.2 Canadian Standards Association (CSA)

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

.2 CAN/CSA-A3000-98, Cementitious Materials Compendium.

.3 For Rubble Mound Breakwater

.1 ASTM International

.1 ASTM C117-2004, Standard Test Method for Material Finer than 0.075 mm Sieve in Mineral Aggregates by Washing.

.2 ASTM C136-2006, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.2 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.

1.3 MEASUREMENT PROCEDURES

.1 For Aggregate:

.1 Not Used

.2 For Riprap:

.1 Measure riprap without cement mortar in cubic metres of material placed.

.2 Measure riprap with cement mortar in cubic metres in place.

1.4 DELIVERY, STORAGE AND HANDLING

.1 For Aggregate:

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Transportation and Handling: handle and transport aggregates to avoid segregation, contamination and degradation.

.3 Storage: store washed materials or materials excavated from underwater 24 hours minimum to allow free water to drain and for materials to attain uniform water content.

.2 For Riprap:

.1 Not Used

.3 For Rubble Mound Breakwater:

.1 Replace defective or damaged materials with new.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials

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

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

.4 Divert left over aggregate materials from landfill to local facility for reuse as approved by Departmental Representative.

.5 Divert left over hardened cement materials from landfill to local facility for reuse as approved by Departmental Representative.

.6 Divert left over geotextiles to local plastic recycling facility Departmental Representative.

Part 2 Products

2.1 MATERIALS FOR AGGREGATE

.1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, free from adherent coatings and injurious amounts of disintegrated pieces or other deleterious substances.

.2 Flat and elongated particles of coarse aggregate: to ASTM D4791.

.1 Greatest dimension to exceed 5 times least dimension.

.3 Fine aggregates satisfying requirements of applicable section to be one, or blend of following:

.1 Screenings produced in crushing of quarried rock, boulders, gravel or slag.

.2 Reclaimed asphalt pavement.

.3 Reclaimed concrete material.

.4 Coarse aggregates satisfying requirements of applicable section to be one of or blend of following:

.1 Crushed rock.

.2 Gravel and crushed gravel composed of naturally formed particles of stone.

.3 Light weight aggregate, including slag and expanded shale.

.4 Reclaimed asphalt pavement.

.5 Reclaimed concrete material.

2.2 MATERIALS FOR RIP-RAP

.1 Stone

.1 Hard, dense, durable quarry stone, free from seams, cracks or other structural defects, to meet following size distribution for use intended:

. 2 Armour riprap:

.1 Not more than 10% of total volume of stones with individual volume less than 30dm3.

.2 Not less than 50% of total volume of stones with individual volume of 225dm3or more.

.3 Remaining percentage of total volume to have uniform distribution of stones between 30 and 225dm3size.

.3 Heavy riprap:

.1 Not more than 10% of total volume of stones with individual volume less than 30dm3.

.2 Not less than 50% of total volume of stones with individual volume of 140dm3or more.

.3 Remaining percentage of total volume to have uniform distribution of stones between 30 and 140dm3size.

.4 Random riprap:

.1 Not more than 10% of total volume of stones with individual volume less than 15dm3.

.2 Not less than 50% of total volume of stones with individual volume of 85dm3or more.

.3 Remaining percentage of total volume to have uniform distribution of stones between 15 and 85dm3size.

.5 Hand placed riprap:

.1 Minimum size of individual stones 10dm3.

.2 Not less than 75% of total volume of stones with individual volume of 25dm3or more.

.3 Supply rock spalls or cobbles to fill open joints.

.6 Cement Mortar

.1 Cement: to CAN/CSA-A3000, type10.

.2 Sand for mortar: to ASTM C144.

.3 Mortar mix: 1 part by volume of cement to 3 parts sand, to consistency approved by Departmental Representative.

.4 Fly ash cement with 40 % fly ash replacement: to ASTM C618.

2.3 MATERIALS FOR RUBBLE MOUND BREAKWATER

.1 Rock materials:

.1 Obtain from site indicated.

.2 Free from cracks, seams and other defects which may impair durability; relative density (formally specific gravity) minimum 2.64; slate and shale not acceptable.

.3 Crushed stone mattress: To following requirements:

.1 Gradations to be within limits specified when tested to [ASTM C136]and [ASTM C117]. Sieve sizes to [CAN/CGSB-8.2] [CAN/CGSB-8.1].

Sieve Designation	% Passing
200 mm	-
75 mm	100
50 mm	-
38.1 mm	-
25 mm	-
19 mm	30-70
12.5 mm	-
9.5 mm	-
4.75 mm	10-40
2.00 mm	-
0.425 mm	-
0.180 mm	-
0.075 mm	0-8

.2 Core stone: quarried rock with percent by mass passing 12.5mm sieve not to exceed 10.

.3 Filter layer stone quarried rock:

.1 Greatest dimensions of each stone not to exceed two-times least dimension.

.2 First filter layer stone sizes to be provided by Departmental Representative

.3 Second filter layer stone sizes to be provided by Departmental Representative

.4 Toe protection stone:

.1 Greatest dimension of each stone not to exceed [2]times least dimension.

.2 Stone sizes to be provided by Departmental Representative

.5 Armour stone: quarried rock:

.1 Greatest dimension of each stone not to exceed [2]times least dimension.

.2 Stone sizes to be provided by Departmental Representative

.2 Precast concrete armour:

.1 To dimensions and details indicated.

.2 Concrete: in accordance with Section 03 30 00- Cast-in-Place Concrete.

.3 Reinforcing steel: in accordance with Section 03 20 00- Concrete Reinforcing.

2.4 SOURCE QUALITY CONTROL

.1 Inform Departmental Representative of proposed source of aggregates and provide access for sampling 4 weeks minimum before starting production.

.2 If materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate alternative source.

.3 Advise Departmental Representative 4 weeks minimum in advance of proposed change of material source.

.4 Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.

Part 3 Execution

3.1 PREPARATION OF AGGREGATE

.1 Aggregate source preparation:

.1 Prior to excavating materials for aggregate production, clear and grub area to be worked, and strip unsuitable surface materials. Dispose of cleared, grubbed and unsuitable materials as directed by Departmental Representative.

.2 Where clearing is required, leave screen of trees between cleared area and roadways as directed.

.3 Clear, grub and strip area ahead of quarrying or excavating operation sufficient to prevent contamination of aggregate by deleterious materials.

.4 When excavation is completed dress sides of excavation to nominal 1.5:1 slope, and provide drains or ditches as required to prevent surface standing water.

.5 Trim off and dress slopes of waste material piles and leave site in neat condition.

.6 Provide silt fence or other means to prevent contamination of existing watercourse or natural wetland features.

.2 Processing:

.1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.

.2 Blend aggregates, as required, including reclaimed materials that meet physical requirements of specification is permitted in order to satisfy gradation requirements for material and, percentage of crushed particles, or particle shapes specified.

.3 Use methods and equipment approved in writing by Departmental Representative.

.4 When operating in stratified deposits use excavation equipment and methods that produce uniform, homogeneous aggregate gradation.

.5 Where necessary, screen, crush, wash, classify and process aggregates with suitable equipment to meet requirements.

.1 Use only equipment approved in writing by Departmental Representative

.3 Stockpiling:

.1 Stockpile aggregates on site in locations as indicated unless directed otherwise by Departmental Representative.

.2 Do not stockpile on completed pavement surfaces.

.3 Stockpile aggregates in sufficient quantities to meet project schedules**.**

.4 Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.

.5 Except where stockpiled on acceptably stabilized areas, provide compacted sand base not less than 300mm in depth to prevent contamination of aggregate. Stockpile aggregates on ground but do not incorporate bottom 300mm of pile into Work.

.6 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.

.7 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by Departmental Representative within 48 hours of rejection.

.8 Stockpile materials in uniform layers of thickness as follows:

.1 Maximum 1.5m for coarse aggregate and base course materials.

.2 Maximum 1.5m for fine aggregate and sub-base materials.

.3 Maximum 1.5m for other materials.

.9 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.

.10 Do not cone piles or spill material over edges of piles.

.11 Do not use conveying stackers.

.12 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

3.2 PLACING OF RIP-RAP

.1 Where riprap is to be placed on slopes, excavate trench at toe of slope to dimensions as indicated.

.2 Fine grade area to be rip-rapped to uniform, even surface. Fill depressions with suitable material and compact to provide firm bed.

.3 Place riprap to thickness and details as indicated by Departmental Representative.

.4 Place stones in manner approved by Departmental Representative to secure surface and create a stable mass. Place larger stones at bottom of slopes.

.5 Hand placing:

.1 Use larger stones for lower courses and as headers for subsequent courses.

.2 Stagger vertical joints and fill voids with rock spalls or cobbles.

.3 Finish surface evenly, free of large openings and neat in appearance.

.6 Mortar:

.1 Use mortar within one hour after water has been added. Do not add additional water after initial mixing.

.2 Begin applying mortar and work upwards completely filling voids except for sub drainage relief holes as indicated and leaving outer faces of stones exposed. Remove excess mortar to expose faces of stones as indicated by Departmental Representative.

.3 Cure and protect mortar in accordance with CAN/CSA-A23.1.

3.3 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for rubber marine fender installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.4 INSTALLATION OF RUBBLE MOUND BREAKWATER

.1 Install in accordance with manufacturer's instructions and as indicated.

.2 Alter system components in accordance with written permission of Departmental Representative.

3.5 CLEANING

.1 Leave Work area clean at end of each day.

.1 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

.2 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

.3 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.

.4 Leave any unused aggregates in neat compact stockpiles as directed by Departmental Representative.

.5 For temporary or permanent abandonment of aggregate source, restore source to condition meeting requirements of authority having jurisdiction.

END OF SECTION

Section 31 62 16.13 – Sheet Piles

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 11 00 – SUMMARY OF WORK
.2 Section 05 12 23 – STRUCTURAL STEEL

1.2 MEASUREMENT PROCEDURES

.1 Measure supply of steel sheet piling in square metres of piling authorized by Departmental Representative and delivered to site.

.1 Calculate area by multiplying lengths of piles by widths.

.2 Width of steel sheet pile section is defined as centre to centre distance between pile interlocks measured along a plane parallel to finished wall.

.2 Measure supply and installation of sheet piling in square metres of piling remaining in place after cut-off.

.1 Piling will be measured in plane of bulkhead,

.3 Measure splicing of piles by number of splices made.

.4 Measure tie rods, nuts, sleeve nuts, turnbuckles, pipe sleeves, bearing plates, washers, transfer bolts, steel wales and other associated hardware supplied and incorporated in Work, as indicated, in kilograms.

.5 Measure toe pins and sleeves, including drilling and grouting holes into rock

.6 Measure drilling and blasting of toe trench in metres of trench length.

.7 Measure backfill in cubic metres of backfill placed to dimensions as indicated and incorporated in completed work.

.8 Pile caps will not be measured separately.

.9 Mobilization and de-mobilization of equipment for installation of steel sheet piling will be by fixed price.

1.2 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM A6/A6M-11, Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.

.2 ASTM A307-10, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile.

.3 ASTM A615/A615M-09b, Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

.4 ASTM A1011/A1011M-10, Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, and Ultra High Strength.

.5 ASTM A328/A328M-07, Standard Specification for Steel Sheet Piling.

.6 ASTM A857/A857M-07, Standard Specification for Steel Sheet Piling, Cold Formed, Light Gage.

.2 CSA International

.1 CSA G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.2 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel Structures.

.3 CSA W59-03(R2008), Welded Steel Construction (Metal Arc Welding).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for piles and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in British Columbia, Canada.

.3 Certificates:

.1 Submit 2 weeks prior to fabrication, 2 copies of steel producer certificates in accordance with [ASTM A1011/A1011M], and mill test reports in accordance with [CSA G40.20/G40.21].

.2 Submit copy of certification for fusion welding in accordance with [CSA W47.1].

1.4 QUALITY ASSURANCE

.1 Inspection and testing of steel sheet piling material will be carried out by testing laboratory designated by Departmental Representative at any time during course of Work.

.2 Materials inspected or tested by Departmental Representative which fail to meet contract requirements will be rejected.

.3 Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, Contractor to pay costs for additional tests or inspections. Departmental Representative to approve corrected work.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect sheet piles from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Use slings for lifting piling make sure mass is evenly distributed and piling is not subjected to excessive bending stresses.

.5 Store sheet piling on level ground or provide supports so that sheet piling is level when stored.

.1 Provide blocking at spacing not exceeding 5m so that there is no excessive sagging in piling.

.2 Overhang at ends not to exceed 0.5m.

.3 Block between lifts directly above blocking in lower lift.

.6 If material is stock-piled on structure, ensure structure is not overloaded.

.7 Develop Construction Waste Management Plan related to Work of this Section

.8 Packaging Waste Management: remove for reuse as specified by Construction Waste Management Plan

Part 2 Products

2.1 MATERIALS

.1 Steel sheet piles: to [CSA G40.21], grade [350W], and following:

.1 Continuous interlocking flat web with minimum web thickness as specified on provided drawings.

.2 Continuous interlocking [Z] [trough]section:

.1 Minimum effective section modulus: Site specific

.2 Minimum flange thickness: Site specific

.3 Minimum web thickness: Site specific

.2 Sheet piling: section modulus: Site specific

.1 Minimum interlocked joint strength in direct tension: Site specific

.2 Minimum thickness of any portion web:12.7mm.

.3 Special corners:provide fabricated special corners as specified by manufacturer for type of sheet piling supplied.

.4 Interlocks: to be such that section of interlock bar of [1]m minimum length will pass along full length of pile without binding.

.5 Mark each piece of sheet piling legibly by stencilling or die-and-stamping with information as follows:

.1 Heat number.

.2 Manufacturer's name.

.3 Length and section number.

.6 Do not precut lifting or slinging holes in sheet piles.

.3 Structural steel for wales, bearing plates, wales splices, capping channels, support angles and miscellaneous steel: to CSA G40.21, Grade 300 W.

.4 Tie rods, sleeve nuts and turnbuckles:

.1 Tie rods: to [ASTM A615],

.2 Tie rods: to continuously threaded bar with double corrosion protection].

.3 Sleeve nuts, and connector sleeve]: to have load capacity in excess of capacity of tie rod.

.4 Preassemble, mark and test tie rod assemblies in shop. Align threaded connection to following tolerances at sleeve nut or connector sleeve: 1/80 of normal rod diameter, deviation of centreline, 1 in 160.

.5 Nuts and bolts: hexagon nuts, bolts, and washers: to ASTM A307.

.6 Backfill material: to Section [31 23 33.01- Excavating, Trenching and Backfilling].

2.2 SOURCE QUALITY CONTROL: HOT ROLLED SHEET STEEL PILING

.1 Provide results of tests of sheet piling material to be used on project as directed by the Departmental Representative.

.2 Tension tests in accordance with CSA G40.20/G40.21.

.1 Bend tests: to ASTM A6/A6M.

2.3 SOURCE QUALITY CONTROL: COLD FORMED STEEL SHEET PILING

.1 Provide results of tension tests of sheet piling material to be used as directed by the Departmental Representative.

.2 Tension tests: to CSA G40.20/G40.21.

.3 Provide results of bend tests of sheet piling material to be used on project as directed by the Departmental Representative.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for steel sheet piles installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative

3.2 INSTALLATION

.1 Do pile installation Work as specified by Departmental Representative.

.2 Do welding in accordance with CSA W59.

.3 Do not begin pile installation until required quality control tests have been completed and test results approved by Departmental Representative.

.4 Submit full details of method and sequence of installation of piling to Departmental Representative for approval prior to start of pile installation work. Details must include templates, bracing, setting and driving sequence and number of piles in panels for driving.

.5 When installing sheet piles in bulkhead wall, use procedure as follows:

.1 Provide temporary templates or bracing to hold piles in alignment during setting and driving.

.2 Drive piles two at a time. Drive first double pile to full depth, then place panel of five to eight double sheet piles in templates and secure last (end) double pile in location to prevent spreading of piles in panel.

.3 Drive end double pile in panel sufficiently deep into ground to ensure that it will remain plumb, then, drive remaining double piles in panel to full depth beginning with double pile next to end double pile and finishing with double pile next to double pile first driven.

.4 After one panel has been driven, place and drive succeeding panels in similar manner. Complete driving of end double pile of first panel after double piles of second panel have been driven.

.6 When installation is complete, face of wall at top of sheet piles to be within 75 mm of location as indicated and deviation from vertical not to exceed 1 in 100.

.7 Cut drain holes and install steel pipe elbows as indicated. Include filter material in area of drain holes as indicated.

3.3 OBSTRUCTIONS

.1 If obstruction encountered during driving, leave obstructed pile and proceed to drive remaining piles. Return and attempt to complete driving of obstructed pile later.

.2 Advise Departmental Representative immediately if impossible to drive pile to full penetration, and obtain direction from Departmental Representative on further steps required to complete Work.

3.4 HOLES

.1 Patch holes in sheet pile wall, except where permanent holes are indicated.

.1 Weld to develop full strength of plate.

.2 Drill any required holes in piling. Do not use flame cutting without permission of Departmental Representative.

3.5 CUTTING

.1 When flame cutting tops of piles, and flame cutting holes in piles approved by Departmental Representative, use following procedure:

.1 When air temperature is above 0 degrees C, no pre-heat is necessary.

.2 When air temperature is below 0 degrees C, pre-heat until steel 25 mm on each side of line of cut has reached a temperature very warm to hand (approximately 35 degrees Celsius). Tempil sticks/temperature indicating crayon marks may be used to measure temperature.

.3 Use torch guiding device to ensure smooth round holes or straight edges.

.4 Make cut smooth and free from notches throughout thickness. If grinding is employed to remove notch or crack, finished radius to be minimum 5 mm.

3.6 SPLICING

.1 Use full length piles unless splicing is indicated by Departmental Representative.

3.7 TIE ROD ANCHORAGE SYSTEM

.1 Do not place backfill behind anchored bulkhead or remove material from in front of bulkhead until piles have been completely driven, adjusted and secured in final position by anchorage system.

.2 Support tie rods at intervals along their length as indicated.

.3 Fit and adjust tie rod systems so that connections at waling and anchor end of tie rods are tight before backfilling.

.4 Brace steel sheet pile with waling strips in accordance with shop drawings. Make wales one length between corners and bolt to piles.

3.8 TOE PINNING

.1 Drive sheet piling at pinned sections to bedrock [hard pan] contact.

.2 Pin sheet piling at toe in locations as indicated. Use pipe sleeves for alignment.

.3 Secure pins with grout in accordance with dimensions as indicated.

3.9 TOE TRENCHING

.1 Drill and blast toe trench in rock as indicated.

.2 Do not remove blasted rock.

.3 Use blasting techniques which result in rock being broken sufficiently to permit driving piles to bottom of blasted trench.

3.10 BACKFILLING

.1 Backfill as indicated by Departmental Representative.

.2 Protect piling tie rods and anchorage systems from damage or displacement during backfilling operations.

3.11 CLEANING

.1 Progress Cleaning:

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment

.3 Waste Management: separate waste materials for recycling

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Section 31 62 16.19 – Piles

Part 1 General

1.1 RELATED REQUIREMENTS

.1 SECTION 01 11 00 – SUMMARY OF WORK

.2 SECTION 01 35 43 – ENVIRONMENTAL PROCEDURES

.3 SECTION 02 50 00 – TIMBER

.4 SECTION 03 10 00 – CONCRETE FORMING & ACCESSORIES

.5 SECTION 03 20 00 – CONCRETE REINFORCING

.6 SECTION 03 30 00 – CAST-IN-PLACE CONCRETE

.7 SECTION 05 12 23 – STRUCTURAL STEEL

1.2 PILE DRIVING RECORDS

.1 The Contractor shall maintain an accurate record of pile driving. The Contractor shall submit a copy of his record to the Consultant. The Contractor shall co-operate with the Consultant in maintaining these records.

.2 The Contractor shall record for each pile:

.1 Pile number and location.

.2 Cut off elevation.

.3 Date and time driven.

.4 Soil penetration.

.5 Length of pile driven.

.6 Tip elevation.

.7 Type of pile driving hammer.

.8 Final set and hammer energy.

1.3 PILE TEST MEASUREMENT PROCEDURES

.1 Measure pile tests by number of piles tested.

.2 Unit price is to include supply and removal of all apparatus and equipment required for testing procedure, costs for specialist required for testing and cost of temporary protective structures and lighting.

1.4 PILE TEST REFERENCE STANDARDS

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

.1 ASTM D1143-81(1994)e1, Standard Test Method for Piles Under Static Axial Compressive Load.

.2 ASTM D4945-00, Standard Test Method for High-Strain Dynamic Testing of Piles.

1.5 MEASUREMENT PROCEDURES FOR STEEL PILES & TIMBER PILES

.1 Method 1:

.1 Measure supply of piles in metres delivered to site, in lengths as indicated by Departmental Representative.

.2 Measure installation of piles in number of piles and lengths actually driven, and approved by Departmental Representative including those for test purposes.

.3 Load tests: as directed by Departmental Representative.

1.6 MEASUREMENT PROCEDURES FOR PRECAST CONCRETE PILES

.1 Measure cast-in-place concrete in cubic metres calculated from neat dimensions authorized in writing by Departmental Representative.

1.7 MEASUREMENT PROCEDURES FOR BORED AND SOCKETED PILES

.1 Measure caissons in total linear metres of length incorporated into Work.

.2 Measure caisson material added or deducted in event actual bearing is below or above specified depth indicated in metres.

.3 Measure load test as directed by Departmental Representative.

.4 Actual number and lengths of piles installed will be established by Departmental Representative from piling records.

.5 Measurement for piles will be in metres measured from base elevation to cut-off including rock-socket elevation at pile cap.

1.8 BORED AND SOCKETED PILES REFERENCE STANDARDS

.1 ASTM International

.1 ASTM A53/A53M-10, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

.2 ASTM A252-10, Standard Specification for Welded and Seamless Steel Pipe Piles.

.3 ASTM A1008/A1008M-11, Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.

.2 CSA International

.1 CSA A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.2 CSA G30.18-09, Carbon and Steel Bars for Concrete Reinforcement.

.3 CSA G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.4 CSA S16-09, Design of Steel Structures.

.5 CAN/CSA-S6-06, Canadian Highway Bridge Design Code.

.6 CSA W59-03(R2008), Welded Steel Construction (Metal Arc Welding).

1.9 ROCK SOCKETS FOR PILES MEASUREMENT PROCEDURES

.1 Measure removal of material from interior of pipe piles by number of piles cleaned out to tip of pile in final position.

.2 Measure drilling of sockets for rock dowels in metres from bottom of steel pipe pile to bottom of drilled hole.

.3 Consider socket clean-out, sounding and pile redriving incidental to work and will not be measured separately.

.4 Measure anchor [rods] [dowels]for rock sockets in tonnes of steel of anchors [rods] [dowels]acceptably placed and remaining in completed Work as indicated [and specified].

.5 Consider spiders and spacers incidental to work and will not be measured separately.

.6 Measure grout in cubic metres properly placed in rock anchor for each pile socketed in rock as SPECIFIED BY Departmental representative.

.7 Consider sounding and diver inspection incidental to Work and will not be measured separately.

.8 Measure tests on socketed piles for each pile actually tested in accordance with plans and specifications provided by Departmental Representative.

.9 Actual number of rock sockets installed established by Departmental Representative.

1.10 ROCK SOCKETS FOR PILES REFERENCE STANDARDS

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

.1 ASTM A252-[98(2002)], Standard Specification for Welded and Seamless Steel Pipe Piles.

.2 Canadian Standards Association (CSA International)

.1 CSA W47.1-03, Certification of Companies for Fusion Welding of Steel Structures.

.2 CSA W59-03, Welded Steel Construction (Metal Arc Welding).

.3 CAN/CSA-G30.18-M92(R2002), Billet-Steel Bars for Concrete Reinforcement.

.4 CSA-G40.20/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steels.

Part 2 Products

2.1 MATERIALS FOR STEEL PILES

.1 Steel pipe piles shall be 610mm O.D. x 12.7mm thick, painted straight seam weld steel pipe pile as shown on contract drawings NL-IRB-003 and NL-IRB-009.

.2 Steel pipe piles shall have minimum yield strength of 344 MPa meeting the requirements of the last edition of at least one of the following specifications:

.1 ASTM A572 Grade 50

.3 The minimum length of a pile section used in the fabrication of piles shall be 3.0 m.

.4 Welded steel piles shall have full strength welds.

.5 The Contractor shall provide necessary certification to demonstrate that the material meets the above standards.

2.2 MATERIALS FOR TIMBER PILES

.1 Pile branding: brand treated piles to indicate producer, in accordance with AWPA M6.

.2 Round wood piles: to ASTM D25, with minimum butt size as specified by Departmental Representative.

.3 Order length of piles as specified by Departmental Representative.

.4 Type of peeling as specified by Departmental Representative.

.5 Pile species as specified by Departmental Representative.

.6 Pile caps and brace timbers to be treated as specified by Departmental Representative.

.7 Piles must be one piece, splices not permitted.

.8 Departmental Representative will be sole judge of quality and dimension of piles.

2.3 MATERIALS FOR PRE-CAST CONCRETE PILES

.1 Cementitious materials: in accordance with Section 03 30 00 - CAST-IN-PLACE CONCRETE.

.2 Prestressing steel: seven-wire stress relieved strand to ASTM A416/A416M.

.1 Prestressing steel: free of grease, oil, wax, paint, soil, dirt, and loose rust.

.2 Do not use prestressing strands or wire having kinks, bends, or other defects.

.3 Reinforcing steel: in accordance with Section 03 20 00- CONCRETE REINFORCING.

.4 Weld reinforcing steel in accordance with AWS D1.4/D1.4M.

.5 Ties: in accordance with ASTM A615/A615M.

.6 Spirals: in accordance with ASTM A82/A82M.

.7 Provide appropriate anchorages and end fittings.

.8 Provide cement grout piles using materials in accordance with Section 03 33 00 - CAST-IN-PLACE CONCRETE.

.9 H-pile extensions for composite concrete-steel piles: steel to ASTM A572/A572M.

.10 Pile driving points as specified by Departmental Representative.

.11 Pile connections must be capable of providing positive means to hold pieces together, maintaining alignment for full depth and transmitting full design load.

2.4 MATERIALS FOR BORED AND SOCKETED PILES

.1 Straight seam welded steel pipe caisson shell to diameters and wall thickness as directed by Departmental Representative.

.2 High carbon steel pile shoe: to ASTM A53, welded to bottom of first pipe shell.

.3 Wide welded plate sleeves: to ASTM A1008/A1008M, and as indicated, external 300mm forming connections between lengths of steel pipe shell formed from flat plate.

.4 Welding materials: to CSA W59.

.5 Concrete mixtures and materials Section 03 30 00 - CAST-IN-PLACE CONCRETE.

.6 Grout to Section 03 30 00 - CAST-IN-PLACE CONCRETE.

.7 Reinforcing steel to Section 03 30 00 - CAST-IN-PLACE CONCRETE

.8 Steel core sections to CSA G40.20/G40.21.

2.5 ROCK SOCKETS FOR PILES MATERIALS

.1 Grout in accordance with Section 03 30 00 - CAST-IN-PLACE CONCRETE.

.2 Underwater concreting in accordance with Section 03 37 26 - UNDERWATER PLACED CONCRETE.

.3 Material for anchor dowels as specified by Departmental Representative.

.4 Anchor dowels as indicated by Departmental Representative.

.5 Additional material, including spiders, spacers and anchor dowels installation guides as reviewed by Departmental Representative.

2.6 HANDLING

.1 Piling shall be handled and stored so as to avoid over stressing or injury, and any piles bent or damaged, or in any way made defective in the opinion of the Engineer, shall be made good to his satisfaction or replaced.

Part 3 Execution

3.1 GENERAL

.1 Allowable design load capacity of pile at as specified by Departmental Representative.

.2 Provide Departmental Representative with outline of test method to be employed.

.3 Include drawings showing details of test set up.

.4 Supply and erect equipment and temporary structures necessary for making tests.

.5 Departmental Representative to select piles for testing.

.6 Test to be performed in presence of Departmental Representative.

.7 Provide shelter, enclosures and lighting for observation, testing and recording of data.

3.2 TESTING

.1 Do compression pile tests and prepare reports as specified by Departmental Representative.

.2 Do tension tests and prepare reports as specified by Departmental Representative.

.3 Do lateral tests and prepare reports as specified by Departmental Representative.

.4 Do dynamic tests and prepare reports as specified by Departmental Representative.

.5 Test concrete piles as specified by Departmental Representative.

.6 Test anchor piles as specified by Departmental Representative.

.7 Maintain ground water at relatively constant elevation.

.8 Remove apparatus and equipment and anchor piles on completion of test.

.9 Re-drive and cut off anchor piles as directed by Departmental Representative.

.10 Provide copies of test report as directed by Departmental Representative.

.11 Accuracy of Testing: use load cells or equivalent devices in testing.

3.3 TEST EVALUATION

.1 Departmental Representative to interpret results for predicting pile performance and capacity.

.2 Pile fails test if sudden unexpected settlement occurs during test.

.3 Pile fails test if "failure", as defined in ASTM D1143, occurs.

.4 Carry out additional load tests as directed by Departmental Representative if pile fails to sustain test load.

.5 Test determined by Departmental Representative.

3.4 STEEL PILES FABRICATION

.1 Welding practice and qualifications of fabricators and erectors of welded construction shall conform to the requirements of CSA Standards W47, W48, and W59, latest editions.

.2 Piles shall be spliced to the required lengths in a workshop or similar suitable place that will ensure good quality splices.

.1 Lengths to be joined shall be manipulated in jigs so that only down-hand welding is employed.

.3 Fabricate full length piles from pipe conforming to ASTM A572 Grade 50 (fy=50ksi). Supplementary testing of ASTM A572 pipe chemistry and welds will be required prior to pipe acceptance. Splice using full penetration full groove welds with backing plate and procedures conforming to CSA W59.

.4 The splice shall be complete joint penetration welds and shall develop the full strength of the pile section. Splices shall be made in a manner that will ensure good alignment of the spliced parts. The number of splices shall be held to a minimum.

.1 The longitudinal welds of pipe pile lengths to be joined shall be staggered 90 degrees.

.5 The end profile of a pile section to be butt welded shall not deviate more than 1.0 - 1.6 mm from a plane perpendicular to the axis of the pile.

.1 Maximum deviation of the line of the pile at the splices shall be 3 mm when measured with a 3.0 m straight edge.

.6 All pile splices shall be 100 percent inspected and tested. This inspection shall be conducted at the Contractor's expense.

.7 Inspection of pile splices shall be by non-destructive ultrasonic tests in accordance with the requirements of AWS D1.1-75. If the inspection of a weld should indicate poor alignment of the pile sections, insufficient penetration of the weld, lack of fusion, slag inclusions, porosity or any such defects, the Contractor shall take the necessary corrective measures to provide a full strength weld to the satisfaction of the Consultant. The cost of correcting defective welds and re-testing shall be borne by the Contractor.

3.5 STEEL PILES INSTALLATION

.1 All piles shall be driven to the pile tip elevation shown on the drawing. All piles may be installed to final tip elevation with a standard air, diesel, hydraulic, drop or vibratory hammer.

.2 All pile driving equipment shall be in good mechanical condition and shall be capable of delivering the manufacturer's rated energy output and shall be operated in accordance with the manufacturer's instructions.

.3 Pile driver leads shall be constructed in a manner which affords freedom of movement of the hammer and they shall be held in position by guys, stiff braces or by attaching to cranes or derricks so as to ensure proper support for the pile during driving. Hammer blows at all times shall be in direct line with the axis of the pile.

.1 Steel piles shall be driven without excessive deformation of the head of the pile. The head of the pile shall be cut square and a driving cap shall be provided to hold the axis of the pile in line with the axis of the hammer.

.4 The driving cap shall fit continuously over the top of the pile and shall project approximately 150mm down over/into the pile and shall be such that the pile is held properly in line with the leads. A cushion of hardwood, fibre, plywood or other suitable material shall be placed between the driving cap and the hammer. The cushion shall be replaced if so directed by the Departmental Representative.

.5 Piles shall be driven in the positions shown on the drawings. Piles shall be driven and installed within a tolerance as shown in drawings and within 0.5% from the specified axial alignment. The Consultant may reject piles driven out of alignment or damaged in any way after inspection. Cost of remedial measures decided by the Consultant shall be borne by the Contractor.

3.6 STEEL PILE SOCKETING INTO BEDROCK

.1 If piles do not meet pile test requirements, rock socketing into bedrock will be required. If available overburden is less than 9m, pile will have to be socketed into bedrock as outlined in Table 1 below.

Table 1. Rock Penetration for 610 x 12.7 Pipe Piles

Penetration Obtained in Overburden	Required Additional Penetration into Bedrock
9m or more	Not Required
8m	1.5m
6m	2.0m
4m	2.5m
3m or less	3.0m

.2 Additional penetration is in addition to the overburden depth.

.3 Rock socket diameter must be approximately the same diameter as the outside diameter of the pile. The pile must be a tight fit with the hole diameter being no larger than ¼" + pile diameter.

.4 Additional rock penetration depth to start once tight hole diameter requirement achieved not at contact with rock.

.5 Penetration schedule to be site specific and reviewed and verified by the Departmental Representative before completion of the pile driving.

3.7 STEEL PILE CUTTING SHOES

.1 Pile cutting shoes will not be required.

3.8 STEEL PILE CUT OFFS

.1 After driving, piles shall be cut off at the elevations shown on the plans. In driving, sufficient length above cut off shall be allowed so that no part of the head of the pile damaged or deformed during driving remains in the work.

.2 Piles shall be cut in a flat horizontal plane. A suitable guide shall be used to aid in cutting piles so that the cut off plane is within specified butt weld splice tolerances. If a satisfactory hand-held cut cannot be obtained, the Contractor shall cut the pile with an automatic cutter.

3.9 STEEL PILE TEMPORARY RESTRAINT OF DRIVEN PILES

.1 Contractor shall furnish sufficient labour and materials to adequately secure the piles of any given group against motion relative to others in the group.

.2 Temporary restraints once erected and approved shall be maintained in good order until completion of the structure.

3.10 STEEL PILE CORROSION PROTECTION

.1 The outside surface of the pipe piles shall be painted. Painting shall be in accordance with the requirements of Section 09 97 19 STEEL PILE PAINTING.

3.11 TIMBER PILE PREPARATION

.1 Select piles in each group bent for uniformity of size and straightness to facilitate placing of brace timbers.

.2 Submit details of proposed method of pile head and tip protection during driving to Departmental Representative for approval.

.3 Protect piles by steel straps.

.4 Steel strapping and clip joints to develop tensile strength as directed by Departmental Representative.

3.12 TIMBER PILE INSTALLATION

.1 Install piles as directed by Departmental Representative.

.2 Restrain lateral movement of piling, during driving at intervals not exceeding 6m over length between ground surface and driving head.

.3 Treat exposed ends of cut off piles as directed by Departmental Representative, allowing sufficient interval between applications to permit total absorption.

.4 Partially drive 75mm deep metal ring of diameter slightly less than diameter of pile into cut off end to form reservoir.

.5 Fill ring with preservative treatment to depth of at least 50mm and allow for complete absorption.

.1 Remove ring after use.

.6 Install metal pile coverings, where indicated, on tops of piles immediately after treatment; bend edges down over sides of pile, neatly trim and fasten with 8 large headed roofing nails.

.7 Protection: treat end cut-offs and bolt holes with preservative.

3.13 TIMBER PILE BRACING

.1 Install bracing as indicated.

3.14 TIMBER PILE APPLICATION / DRIVING

.1 Place cap and cushion block combination/driving helmet capable of protecting pile head between top of pile and ram to prevent impact damage to pile.

.1 Block helmet: uniformly transmit energy to pile and minimum loss of energy.

.2 Replace block if it is damaged, split, highly compressed, charred or burned or has become spongy or deteriorated, with a new block.

3.15 TIMBER PILE TOLERANCES IN DRIVING

.1 Variation of not more than 13mm per 300mm of pile length from required angle for batter piles permitted.

.2 Center of butts: within 100mm of location indicated.

.3 Manipulation of piles is not be permitted.

.4 In addition to complying with stated tolerances, clear distance between pile heads and pile cap edges minimum of 125mm.

.5 Provide additional reinforcement and concrete to maintain required minimum clear distance with prior approval of Departmental Representative.

.6 Redesign of pile caps or additional work required due to improper location of piles is responsibility of Contractor as reviewed by Departmental Representative.

.7 Re-drive heaved piles to required tip elevation.

.8 Remove and replace damage piles, mis-located piles, driven out of alignment piles and provide additional piles, driven as directed.

3.16 CONCRETE PILES FABRICATION

.1 Fabricate precast concrete piles as indicated.

.2 Fabricate piles to finish tolerances as specified by Departmental Representative.

.1 Wall thickness of hollow sections: minus 5mm to plus 10mm.

.2 Solid sections: minus 5mm to plus 10mm.

.3 Deviation from straight line: not more than 3mm/m of length, 10mm in full length.

.4 Deviation of internal core or void from true position: 10mm.

.5 Pile head: 10mm/m from true right-angle plane.

.1 Surface irregularities 3mm.

.6 Location of reinforcing steel main reinforcing cover: minus 3mm to plus 5mm; spiral: 10mm.

.3 Pre-stress piles in accordance with Section [03 41 00- Precast Structural Concrete].

.1 Measure strand elongation to determine stressing force and measure hydraulic pressure at jack.

.2 Stressing force as measured by both methods to be within 5%.

.4 Quality and dimensions of piles will be determined by Departmental Representative.

.1 Remove rejected piles from site.

3.17 CURING OF CONCRETE PILES

.1 Cure piles using moist or accelerated curing in accordance with PCI MNL-116.

.2 Moist cure using moist burlap coverings, plastic sheeting, or membrane curing compound until minimum strength to detension is achieved.

.3 After placement of concrete, moist cure for period of 4 hours.

.4 Accelerated cure until concrete has reached specified release strength.

.5 Enclose casting bed for accelerated curing with suitable enclosure.

.1 During application of steam or heat, increase air temperature at rate not to exceed 15.5 degrees Celsius per hour.

.2 Cure at maximum temperature of 74 degrees Celsius until concrete has reached specified release strength.

.3 Reduce temperature at rate not to exceed 15.5 degrees Celsius per hour until temperature of 6 degrees Celsius above ambient air temperature is reached.

.4 After accelerated curing, moist cure using either water or membrane curing until total accelerated and moist curing time of 72 hours is achieved.

3.18 DETENSIONING CONCRETE PILES

.1 Do detensioning in accordance with PCI MNL-116.

.2 Gradually release tension in strands from anchorage.

.3 Detension after approval by pile manufacturer's quality control representative.

3.19 PRE-CAST CONCRETE PILE EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for steel sheet piles installation in accordance with manufacturer's written instructions.

.2 Visually inspect substrate in presence of Departmental Representative.

.3 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.4 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.20 PRE-CAST CONCRETE PILE INSTALLATION

.1 Do pile installation Work as specified by Departmental Representative.

.2 Do welding in accordance with CSA W59]

.3 Do not begin pile installation until required quality control tests have been completed and test results approved by Departmental Representative.

.4 Submit full details of method and sequence of installation of piling to Departmental Representative for approval prior to start of pile installation work. Details must include templates, bracing, setting and driving sequence and number of piles in panels for driving.

3.21 PRE-CAST CONCRETE PILE OBSTRUCTIONS

.1 If obstruction encountered during driving, leave obstructed pile and proceed to drive remaining piles. Return and attempt to complete driving of obstructed pile later.

.2 Advise Departmental Representative immediately if impossible to drive pile to full penetration, and obtain direction from Departmental Representative on further steps required to complete Work.

3.22 PRE-CAST CONCRETE PILE HOLES

.1 Patch holes in sheet pile wall, except where permanent holes are indicated.

.1 Weld to develop full strength of plate.

.1 Drill any required holes in piling. Do not use flame cutting without permission of Departmental Representative.

3.23 PRE-CAST CONCRETE PILE CUTTING

.1 When flame cutting tops of piles, and flame cutting holes in piles approved by Departmental Representative, use following procedure:

.2 When air temperature is above 0 degrees Celsius, no pre-heat is necessary.

.3 When air temperature is below 0 degrees Celsius, pre-heat until steel 25 mm on each side of line of cut has reached a temperature very warm to hand (approximately 35 degrees Celsius). Tempil sticks/Temperature indicating crayon marks may be used to measure temperature.

.4 Use torch guiding device to ensure smooth round holes or straight edges.

.5 Make cut smooth and free from notches throughout thickness. If grinding is employed to remove notch or crack, finished radius to be minimum 5 mm.

3.24 PRE-CAST CONCRETE PILE TIE ROD ANCHORAGE SYSTEM

.1 Do not place backfill behind anchored bulkhead or remove material from in front of bulkhead until piles have been completely driven, adjusted and secured in final position by anchorage system.

.2 Support tie rods at intervals along their length as indicated. Piles used for this purpose to be in accordance with Departmental Representative.

.3 Fit and adjust tie rod systems so that connections at waling and anchor end of tie rods are tight before backfilling.

.4 Brace steel sheet pile with waling strips in accordance with shop drawings. Make wales one length between corners and bolt to piles.

3.25 PRE-CAST CONCRETE PILE TOE PINNING

.1 Drive sheet piling at pinned sections to bedrock [hard pan] contact.

.2 Drilling of holes for toe pins as specified by Departmental Representative.

.3 Pin sheet piling at toe in locations as indicated. Use pipe sleeves for alignment.

.4 Secure pins with grout in accordance with dimensions as indicated.

3.26 PRE-CAST CONCRETE PILE TOE TRENCHING

.1 Drill and blast toe trench in rock as indicated.

.2 Do not remove blasted rock.

.3 Use blasting techniques which result in rock being broken sufficiently to permit driving piles to bottom of blasted trench.

3.27 BORED AND SOCKETED PILES EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for pile installation in accordance with manufacturer's written instructions.

.2 Visually inspect substrate in presence of Departmental Representative.

.3 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.4 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.28 BORED AND SOCKETED PILES INSTALLATION

.1 Drive caisson shells to bedrock as specified by Departmental Representative.

.2 Drive shell with steel head having ring projecting to Departmental Representative’s specification.

.3 Splice shells, if required, by welding piles together [to details as indicated by Departmental Representative.

.4 Ensure top member is held in vertical alignment during splicing operation.

.5 Remove material from inside of shell by method approved by Departmental Representative.

.6 Remove drilled material from rock socket as directed by Departmental Representative.

.7 Perform internal visual inspection of steel shell, joints and rock socket before placing concrete as directed by Departmental Representative.

.8 Ensure loose material is removed, caisson is free from foreign matter and there are no faults in bedrock or bearing strata directly below caisson.

.9 Star drill as directed by Departmental Representative.

3.29 BORED AND SOCKETED PILES REINFORCING STEEL

.1 Make reinforcement into cages sufficiently rigid enough to resist damage or displacement during handling.

.2 When reinforcement is made up from more than one segment, include sufficient bar length required to lap splice.

.1 Weld lap splicing.

.2 Weld stirrups, lateral ties or spiral ties to main bars.

.3 Welders required to be certified by Canadian Welding Bureau (CWB) certified to perform the Work.

3. Use spacers specifically designed to achieve accurate placement of reinforcement as approved by Departmental Representative.

4. Proceed with reinforcement placement only after receipt of written approval from Departmental Representative.

3.30 BORED AND SOCKETED PILES CONCRETE PLACEMENT

.1 Concrete and placement methods: to Section 03 30 00- Cast-in-Place Concrete.

3.31 BORED AND SOCKETED PILES DEFECTIVE CAISSONS

.1 Replace, repair or modify caissons in accordance with written instructions from Departmental Representative.

3.32 BORED AND SOCKETED PILES LOAD TESTING

.1 Test pile in accordance with method approved by Departmental Representative.

.1 Piles driven before completion of satisfactory confirmation test on test piles will be at Contractor's risk.

3.33 ROCK SOCKETS FOR PILES PREPARATION/PILE CLEAN-OUT

.1 After pile is driven to bedrock, remove overburden inside pile down to tip of pile.

.2 Protect open piles from intrusion of foreign materials.

3.34 ROCK SOCKETS FOR PILES INSTALLATION /SOCKETS

.1 Secure equipment in position during drilling.

.2 Drill sockets into sound bedrock as indicated.

.3 Departmental Representative to determine elevation of top of sound rock and depth of socket required.

.4 Drill socket to minimum depth as indicated.

.5 After drilling is completed, clean out socket.

.6 After socket has been cleaned out and inspected, allow to stand for 24 hours and inspect again for intrusion of material.

.7 Re-drive pile, as required to seal socket and repeat drilling, cleaning out and inspection process.

3.35 ROCK SOCKETS FOR PILES INSTALLATION/ANCHOR DOWEL

.1 Install fabricated anchor dowels in drilled socket and in pile.

.2 Locate relative to pile tip as indicated.

.3 Use locating devices for centering anchor dowels in pile and rock socket.

3.36 ROCK SOCKETS FOR PILES WELDING

.1 Weld in accordance with CSA W59.

.2 Welding certification of companies in accordance with CSA W47.1.

3.37 ROCK SOCKETS FOR PILES GROUTING

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

2. Grout anchor dowels inside pipe piles, in drilled socket and up to elevation as indicated, as soon as possible after installing anchor dowels.

.3 Use grout mix that has been demonstrated to produce required strength at temperature prevailing in socket and pile in specified time.

.4 Grout mix and grouting pressure to approval of Departmental Representative.

.5 Hold pile securely in position so that it does not move during grouting and until grout has attained specified strength.

.6 Place grout in one continuous operation to fill socket and pile up to specified level.

3.38 ROCK SOCKETS FOR PILES FIELD QUALITY CONTROL

.1 Site Tests and inspection as directed by Departmental Representative.

3.39 CLEANING

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

END OF SECTION

Section 35 20 24 – Dredging

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 11 00 – SUMMARY OF WORK

.2 Section 01 35 43 – ENVIRONMENTAL PROCEDURES

1.2 REFERENCE STANDARDS

.1 Justice Canada
  .1 Canada Shipping Act - Collision Regulations (C.RC., c.1416).

1.3 DEFINITIONS

.1 Average of Instantaneous Plan: hydrographic survey plan in which average sounding in an appropriate group of matrix blocks is plotted.

.2 Box Cut: dredging channel area with vertical side slopes and allowing side slope of excavation collapse to a natural equilibrium slope.

.3 Class A Material: solid rock requiring drilling and blasting to loosen, and boulders or rock fragments of individual volumes 1.5m^3 or more.

.4 Class B Material: loose rock or shale, silt, sand, quick sand, mud, shingle, gravel, clay, sand, gumbo, boulders, hardpan and debris of individual volumes less than 1.5m^3.

.5 Chart Datum: permanently established plane from which soundings or tide heights are referenced, usually Lowest Normal Tide (LNT).

.6 Cleared Area: area of dredging accepted as complying with plans and specifications.

.7 Co-ordinates:

  .1 U.T.M.: Universal Transverse Mercator projection.
  .2 M.T.M.: Modified Transverse Mercator projection.
  .3 U.T.M. or M.T.M. Co-ordinates: plane rectangular co-ordinates used in grid system in which grid network is applied to U.T.M. or M.T.M. projection. Horizontal control information as indicated.

.8 Debris: pieces of wood, wire rope, scrap steel, pieces of concrete and other waste materials.

.9 Dredging: excavating, transporting and disposing of underwater materials.

.10 Estimated Quantity:

  .1 Volume of material calculated to be above sub-grade and within specified side slopes unless otherwise specified.
  .2 Areas in square metres of material calculated horizontally to exist above grade and within dredge limits, unless otherwise specified.

.11 Grade: plane above which material is to be dredged.

.12 Hydraulic Dredging Plant: equipment that uses the movement of water to excavate and transport underwater materials such as cutter suction dredger, suction dredger or trailing suction hopper dredger.

.13 Instantaneous Mode: mode of operation of hydrographic survey equipment where only sounding observed at predetermined distance interval is retained in memory.

.14 Least of Minimum Plan: hydrographic survey plan in which least sounding in grouping of matrix blocks is plotted.

.15 Lowest Normal Tide (LNT): plane so low that tide will seldom fall below it.

.16 Matrix Block: each dredge area is presented as number of 1.2 x 10m long blocks. Dependent on position of sounding, block may have 0 to 4soundings contained within it.

.17 Measurements:

.1 CMPM: cubic metres place measurement at dredging site.

.2 CMSM: cubic metres scow measurement.

.3 SQM: area in square metres projected on horizontal plane.

.18 Mechanical Dredging Plant: equipment comprising of the following: clamshell, dragline, dipper or backhoe dredge with dump scows.

.19 Mechanical Sweep: clearing dredged areas to grade depth using a mechanical device suspended from barge.

.20 Minimum Mode: mode of operation of hydrographic survey equipment where minimum sounding over length of travel between position updates will be retained in memory. Soundings taken in this mode may be shallower than actual bottom elevations due to variations in water depths due to wave action.

.21 Obstructions: material other than class A, having individual volumes of 1.5m^3or more.

.22 Side slope: inclined surface or plane from subgrade at side limit of dredging area to intersect original ground line outside of side limit and to be expressed as ratio of horizontal to vertical.

.23 Sub-grade: plane parallel to and 300mm below grade.

.24 Universal Transverse Mercator Projection (UTM) or Modified Transverse Mercator Projection (MTM) Co-ordinates: plane rectangular coordinates used in grid system in which grid network is applied to UTM. or MTM. projection. Horizontal control information as indicated.

1.4 QUALITY ASSURANCE

.1 Regulatory agency sustainability approvals:

.1 Comply with municipal, provincial and national codes and regulations relating to project.

.2 Mark floating equipment with lights in accordance with Transport Canada Regulations.

.1 Maintain VHF marine radio (Channel 16) on board floating equipment.

.2 Floating plant:

.1 Dredges or other floating plants to be employed on this Work, to be of Canadian registry, make or manufacture, or, must receive certificate of qualification from Industry Canada, Aerospace, Defence and Marine Branch and this certificate to accompany Tender submission.

.2 Requests for certification in format of attached questionnaire to be directed to Director Aerospace, Defence and Marine Branch, Industry Sector, Industry Canada, 235 Queen Street, 7th Floor, East Tower, Ottawa, Ontario, K1A 0H5, and to be received there not less than 14 days prior to bid closing.

1.5 DREDGING SEQUENCE

.1 Sequence of dredging will be in the following order:

.1 Dredge in the direction from upstream to downstream commencing at cut nearest to centreline of channel and completion at channel limit including side slope material.

.2 Supply Departmental Representative.

.3 Departmental Representative may direct Contractor to alter sequence of dredging areas.

1.6 DREDGING PLANT

.1 Dredging plant used for work to be mechanical or hydraulic of sufficient capacity and in good operating condition to satisfactory complete Work within time schedule and in accordance with specifications.

Part 2 Products

2.1 DREDGING EQUIPMENT

.1 Contractor to determine required equipment necessary to dredge material specified and to dispose of dredged material at locations indicated.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of location:

.1 Work comprises dredging of areas as indicated by Departmental Representative.

.2 Surveys and acceptance of work:

.1 As soon as practical after Contract award, Departmental Representative will complete pre-dredge survey of dredge area locations.

.2 No area will be dredged prior to Departmental Representative's and Contractor's mutual acceptance of pre-dredge survey for that area.

.3 Post-dredge survey will be undertaken by Departmental Representative upon completion of dredging. Survey will confirm if dredging is completed as specified and whether area can be considered cleared area.

.4 Contractor to redredge as necessary to remove all material within dredge areas as directed by the Departmental Representative.

.5 One additional survey will be undertaken at Departmental Representative's cost, for those areas not meeting acceptance criteria for dredging. Additional surveys required to clear areas will be undertaken by Departmental Representative at Contractor's cost.

.6 Departmental Representative will take average of instantaneous soundings simultaneously with least of minimum soundings.

.7 All elevations obtained in minimum mode within specified areas of dredging must be at or deeper than directed by Departmental Representative.

3.2 LAYOUT OF WORK

.1 Immediately upon entering site for purpose of beginning work on this project, locate reference points and take proper action necessary to prevent their disturbance.

.2 Departmental Representative will meet with Contractor and survey staff to identify established horizontal control consisting of a baseline]and vertical control consisting of water level gauge.

.3 Maintain established horizontal and vertical control and lay out work from these established references. Be responsible for accuracy of work relative to established references. Provide and maintain electronic position fixing and distance measuring equipment as required for accurate dredging control. Provide at own expense, survey vessel, equipment and crew to set up and maintain control for location of dredge limits.

.4 Contractor's electronic positioning system must be made accessible to Departmental Representative or their representative upon request. It must provide a continuous automatic update of position in all weather conditions. Minimum accuracy of positioning to be ±1 metre. An on-line graphics display of position and hard copy capability is required. Positioning system is subject to Departmental Representative's approval.

.5 Install and maintain water level gauge[s] or tide boards in vicinity of worksite in order that proper depth of dredging can be determined. Locate tide boards or gauges so as to be clearly visible.

.6 Establish and maintain additional temporary targets, markers and buoys for location and definition of designated dredge area limits as required. Remove on completion of work.

3.3 DREDGING

.1 Mark floating equipment with lights in accordance with Transport Canada Regulations and maintain VHF (Channel 16) radio watch on board.

.2 Place and maintain buoys, ranges, markers and lights required to define work and disposal areas.

.3 Lay out Work from benchmarks and base lines established by Departmental Representative. Be responsible for accuracy of Work relative to established benchmarks and baseline. Provide and maintain electronic position fixing and distance measuring equipment, laser transits and such other equipment as normally required for accurate dredging control.

.4 Areas to be dredged are to be referenced to vertical benchmarks for each location of dredging as indicated.

.5 Establish and maintain tide board or water level gauges in order that proper depth of dredging can be determined. Locate tide boards and gauges so as to be clearly visible.

.6 Establish and maintain on-land targets for location and definition of designated dredge area limits. Targets to be suitable for control of dredging operations and locating soundings. Remove targets on completion of Work.

.7 Remove materials above specified grade depths, within limits indicated. Material removed from below subgrade depth or outside specified area or side slope is not part of Work.

.8 Remove spillage or shoaling which occurs as result of Work at no expense to Departmental Representative.

.9 Remove material cast-over on surrounding area and dispose of it as dredged material. Do not cast-over material unless authorized in writing by Departmental Representative.

.10 Remove infilling in dredge areas which occurs prior to acceptance by Departmental Representative

.11 Immediately notify Departmental Representative upon encountering object which might be classified as obstruction. By-pass object after clearly marking its location and continue Work.

.12 Tolerances:

.1 Do not dredge material from areas as specified by Departmental Representative.

3.4 CLASS 'A' REMOVAL

.1 Complete removal of Class 'B' material and obstructions in area before blasting for Class 'A'. Work toothed buckets over area to remove Class 'B' material until Departmental Representative is satisfied that further removal cannot be accomplished without blasting.

.2 Provide specialist with qualifications acceptable to Departmental Representative to program and supervise blasting.

.3 Submit to Departmental Representative for approval 4 weeks prior to blasting, details of proposed blasting operations showing types and quantities of explosives, loading charges and patterns, type of blasting caps, blasting techniques, blast protection measures, time of blasting and pertinent details.

.1 Submit subsequent changes to Departmental Representative.

.4 Departmental Representative will retain specialist company to carry out seismographic survey before rock excavation is started, to determine maximum charges that can be used at different locations in area of rock excavation. Following survey, full report detailing control requirement throughout Project will be made available. Report or any part of it will not over-rule requirements of local authority having jurisdiction unless report requirements are more conservative.

.5 Seismographic blast monitoring will be provided by Departmental Representative during entire progress of blasting operations.

.6 Submit to Departmental Representative complete photographic and descriptive record of buildings, roads and structures in general area of project work, before blasting is started. Describe buildings both inside and out. Record existing cracks in walls or structural components.

3.5 SOUNDING SURVEYS

.1 Contract drawings are based on latest soundings taken by Departmental Representative.

.2 Pre-dredging and post dredging sounding survey will be taken by Departmental Representative.

.3 No area will be dredged prior to Departmental Representative's and Contractor's mutual acceptance of pre-dredge survey for that area.

.4 Departmental Representative will conduct post dredging survey of dredging site at no cost to Contractor.

.5 Results of pre and post dredging surveys will be distributed to Contractor by Departmental Representative upon completion of the work.

.6 Contractor will be notified of post dredging survey results within 4 working days of survey completion and given subsequent release if successfully fulfilled requirements of Work.

3.6 DISPOSAL OF DREDGED MATERIALS

.1 Dispose of dredged material by depositing in designated open lake disposal site as indicated and in manner approved by Departmental Representative.

.2 Departmental Representative will define disposal site with temporary markers. Supply and install additional markers/buoys necessary for guiding vessels to disposal site. Maintain markers and buoys for duration of contract. Remove markers and buoys upon notification by Departmental Representative that disposal site has been surveyed and meets requirements.

.3 Deposit dredged material evenly throughout entire disposal site. Do not concentrate in one area.

.4 Ensure dump scows are sealed and do not leak dredged material during transportation between dredging site and transfer area of containment facility. If spillage or leakage of dredged material occurs, stop work until remedial measures are taken.

.5 Truck boxes to be tightly closed to prevent spillage of material during transit from transfer area to cell. Clean up spillage as directed and take necessary action to prevent reoccurrence.

.6 Contractor to pump dredged material directly from dump scows to disposal cell. Provide discharge pipeline and booster pumps as required to transport dredged material from scows to cell. Maintain pipeline during work and repair leaks. Provide Departmental Representative with details of this alternative for review and approval.

.7 Do not permit dredged material to spill or flow into waterways during disposal of dredged material activities.

.8 Provide drainage ditch alongside inner edge of dyke upon completion of contract as indicated.

.9 Maintain dyke roadways and transfer area in a clean manner throughout duration of contract. Repair damages caused by Contractor's operation at no additional cost. Restore surfaces to original condition upon completion of work.

3.7 DISPOSAL OF DEBRIS

.1 Do not dispose of debris in open lakes or streams.

.2 Dispose of debris in containment facility identified or at approved land disposal site.

3.8 DREDGING IN VICINITY OF STRUCTURES

.1 Do not dredge material from areas as specified by Departmental Representative.

3.9 SWEEPING AND ACCEPTANCE OF WORK

.1 On completion of dredging Contractor will conduct in presence of Departmental Representative a mechanical sweep of dredged areas to confirm that grade depth has been achieved. Provide details of sweep system including horizontal and vertical control methods within 15 days after contract award.

.2 Sweeping equipment to consist of heavy steel beam suspended from a barge at required depth. Beam to be capable of adjustment and calibration.

.3 Upon successful completion of mechanical sweep as determined Departmental Representative provided that no high spots were encountered, the Departmental Representative will conduct a post dredging survey.

.4 Provide a minimum of 48 hours notice to Departmental Representative for commencement of mechanical sweeping of site.

.5 Post dredging sounding survey takes precedence over mechanical sweep for pay quantity purposes.

3.10 RE-DREDGING

.1 Re-dredge unsatisfactory work and verify depths with additional sounding or mechanical sweeping to approval of Departmental Representative.

3.11 SITE QUALITY CONTROL

.1 Site test and inspections:

.1 Co-operate with Departmental Representative on inspection of Work and provide assistance requested.

.2 Upon request of Departmental Representative, furnish use of such boats, equipment, labour and materials forming ordinary and usual part of dredging plant as may be reasonably necessary to inspect and supervise Work. Volume of material transported in partially filled scows will be determined by Departmental Representative.

.3 Beginning and end of each inspection shift which occurs between sunset and sunrise.

.4 When PSPC vessel is deemed to be inoperable for whatever reason.

.5 During poor weather and emergency situations affecting health and safety of personnel.

.6 Sweep dredged areas on completion of dredging to confirm that grade depth has been achieved.

.7 Sweeping equipment to consist of heavy steel beam suspended from scow at required grade depth. Beam to be capable of adjustment and calibration and approved by Departmental Representative.

.2 Non-conforming work:

.1 If, as result of incomplete Work, additional verification of depths by sounding or sweeping becomes necessary, additional costs involved shall be paid by Contractor.

.2 Re-dredge unsatisfactory Work and verify depths with additional sounding or sweeping to approval of Departmental Representative.

3.12 CLEANING

.1 Progress Cleaning:

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment

.3 Waste Management: separate waste materials for recycling

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

.2 Contaminated sediments must be disposed of in confined disposal facility.

.3 Metals, wood and recyclable materials removed during the dredging activities must be diverted appropriate recycling facilities.

.4 Dispose of dredged material by depositing in disposal areas indicated in manner approved by Departmental Representative.

.5 Define area of disposal site with marker buoys and maintain minimum depth of water.

END OF SECTION