Fisheries and Oceans Canada | Pêches et Océans Canada

Canada

REAL PROPERTY, SAFETY AND SECURITY

Technical Specifications

PORT HARDY, BC

PORT HARDY CCG SAR – FLOAT REPLACEMENT

June 2020

TECHNICAL SPECIFICATIONS

END OF SECTION

1 General

1.1 Precedence

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

2 PWGSC's General Conditions and related contract documents form an integral part of this section.

1.2 Related Requirements

3	Section 01 11 01	Summary of Work
4	Section 01 35 29.06	Health and Safety Requirements
5	Section 01 35 43	Environmental Procedures
6	Section 02 20 60	Demolition of Structures
7	Section 03 30 00	Concrete
8	Section 05 12 33	Structural Steel Work
9	Section 06 10 00	Rough Carpentry
10	Section 26 05 01	Electrical General
11	Section 26 05 21	Wires, Cables and Connectors (0-1000V)
12	Section 26 05 28	Grounding – Secondary
13	Section 26 05 29	Hangers and Supports for Electrical Systems
14	Section 26 05 34	Conduit, Conduit Fastenings and Conduit Fittings
15	Section 26 12 17	Dry Type Transformers up to 600V Primary
16	Section 26 12 19	Luminaires
17	Section 26 24 16	Panelboard – Breaker Type
18	Section 26 27 16	Outdoor Equipment Enclosures
19	Section 26 27 26	Wiring Devices
20	Section 31 62 16	Steel Piles
21	Section 31 62 19	Timber Piles
22	Section 35 51 23	EPS Foam

1.3 Definitions

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

.1 Owner - Real Property, Safety and Security (Technical Support) of the Department of Fisheries and Oceans, 200-401 Burrard Street Vancouver B.C. V6C 3S4

.2 Contracting Authority – Public Services Procurement Canada (PSPC)

.3 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.

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

.5 Department - The Department of Fisheries and Oceans Canada and the Canadian Coast Guard.

.6 Harbour Authority – The waterlot is leased from the Port Hardy Harbour Authority, the CCG float is accessed via the Seagate Pier operated by the Port Hardy Harbour Authority.

1.4 Site Conditions

1 Familiarize with site before submitting tender. Make site visits, inquiries, or investigations necessary to become thoroughly acquainted with the site, soil, climatic, tidal conditions, and site access along with the nature and extent of the work.

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

3 All known discrepancies are to be brought to the attention of the Departmental Representative and are to be accounted for in the Contractor's Bid Price.

1.5 Work Covered by Contract Documents

1 Work covered under this Contract comprises of the furnishing of all labour, materials, tools, transportation, supervision and equipment necessary for the provision of completing the project as outlined in Section 01 11 01 Summary of Work.

2 Minimum standards

.1 In the absence of other standards specified in the Contract Documents, all work is to conform to, or exceed, the minimum standards of the Canadian Government Specifications Boards, the Canadian Standards Association, the American Society for Testing of Materials, or the National Building Code of Canada, whichever is applicable.

.2 All work to be done in accordance with Work Safe BC regulations.

1.6 Location of Site

1 The work is located at the Seagate Pier structure at the end of Granville Street in Port Hardy, BC on Vancouver Island.

1.7 Work Sequence

1 Coordinate Progress Schedule with Owners' timeline.

2 Required Stages:

.1 All off-site work may commence immediately upon award.

.2 No mobilization of crew or equipment to project site for Mandatory work before October 2nd, 2020.

.3 All work Items including clean-up and demobilization must be completed by December 18th, 2020.

3 The Contractor is expected to be familiar with the site including current and historical weather conditions and is to make allowances as necessary in order to complete the work as specified during the indicated work dates.

4 No allowance will be made for delay of work over and above the date of completion specified in the contract agreement on account of weather conditions that could have been reasonably predicted from a historical knowledge of site conditions.

1.8 Documents Required

1 Maintain one copy of each of the following documents at the construction site:

.1 Contract drawings.

.2 Contract specifications.

.3 Addenda to Contract documents.

.4 Reviewed shop drawings.

.5 Change orders.

.6 Other modifications to Contract.

.7 Professional Compliance test reports.

.8 Product data sheets.

.9 Supplier / Manufacturer's instructions / directions / application information.

.10 Material / Product Warranty information / agreements.

1.9 Work Schedule

1 The contractor shall provide to the Owner a Bar Chart (GANTT Chart) schedule of all works to be completed in the contract within 10 days of contract award, and within 5 days of owners request for updated schedules during construction should there be any approved change orders or extension of time.

2 The Contractor shall work whatever shifts required in order to ensure the work meet regulatory windows and is completed by the completion date of the contract.

3 The Contractor shall normally perform all work within the hours of daylight except in instances where the Contractor has requested and received approval for shift changes.

4 Complete Performance and Acceptance - Refer to clause 1.17.

1.10 Setting Out of Work

1 The Contractor shall provide layout and measurements for the location of new concrete float to comply with the design drawing.

1.11 Project Meetings

1 The Departmental Representative will arrange meetings, as required, throughout the Work. Meetings may be held on site, or by teleconference.

1.12 Record Documents

1 The contractor shall be responsible for compliance test reports by independent professional testing companies to inspect the work in accordance with the technical specifications that form a part of this contract document.

2 The compliance inspections must be carried out regularly, both before and after parts are covered up or embedded. The inspection reports and certificates must be copied to the owner regularly and must be readily available for the owners' review from time to time at the contractors' facility.

3 At completion, supply one complete set of as-built drawings and specifications with all deviations clearly marked and a complete document of professional certifications.

4 At completion provide all product, material and equipment warranties by the suppliers and manufacturers.

5 Progress Report

.1 The Contractor shall keep a daily record of progress of the work available for inspection by the Engineer.

.2 The daily record shall include particulars of weather conditions, number of workers, plant and equipment working and work performed.

1.13 Codes and Standards

1 Perform work in accordance with the Standards and codes identified in the technical specifications. Related Codes are CSA, National Building Code, and the National Fire Code.

2 The contractor must have good standing with the Work Safe B.C. and all federal, provincial and local regulators.

3 In any case of conflict or discrepancy between referenced codes, standards and regulations, the most stringent requirements shall apply.

4 Meet or exceed the requirements of specified standard, codes and referenced documents.

1.14 Environmental Protection

1 Comply with federal, provincial and municipal laws, orders and regulations concerning protection of the environment and the control and abatement of soil, water and air pollution at the manufacturers' facility during execution of this contract.

2 Do not dispose of debris, contaminated water or volatile materials such as oil, paint thinner or mineral spirits into waterways, storm or sanitary sewers, or the sea. Comply with all environmental regulations concerning the proper disposal of these materials and products.

3 Fires and burning of rubbish on site are not permitted unless proper permission by regulators has been granted to the manufacturer at his site.

4 Do not bury or dispose of rubbish and waste materials on site unless approved by the appropriate regulators.

5 The mitigation measures outlined in the 'Standard Mitigation Organized by Project Activity' will form part of the specification. The Contractor will keep a copy of the report on site.

1.15 Use of Site

1 Site Access

.1 The Contractor shall make his own arrangements subject to the approval of the Engineer, for access to the site. Site access shall be coordinated with the local Harbour Authority.

.2 The Contractor shall maintain routes of travel, the Engineer being the sole judge as to what may be deemed reasonable:

2 Barriers, Lights and Watching

.1 The Contractor shall erect and maintain barriers, fences, lights, warning devices, signage and other protective devices as may be required for prevention of theft or damage of goods and protection of the public and workers.

3 Hours of Work

.1 Perform work between normal hours of 07:00 to 18:00, Monday to Friday, except holidays and in accordance with local noise bylaws.

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

4 Night Work

.1 The Contractor shall keep proper lights each night between the hours of sunset and sunrise upon all floating plant and false-work, upon all ranges and other stakes where necessary, and upon all buoys of such size and in such locations as required by a governing authority. When work is done at night, maintain from sunset to sunrise such lights on or about the work and plant as necessary for the proper observation of the work and the efficient prosecution thereof.

5 Noise Bylaws

.1 The Contractor shall comply with the requirements of any local or other Noise By-Laws.

6 Construction Area

.1 The Contractor shall regulate construction traffic on public areas and comply with all local ordinances in connection therewith, including load limitation and removal of debris.

.2 Use of site: limited to immediate area of the work and areas assigned by the engineer for office storage, equipment, stock piles, sanitary facilities, etc.

.3 As there will be NO ACCESS to any of the buildings.

.4 Vehicles entering and left in designated work area must have Contractor’s logo/name clearly marked on the vehicle.

.5 Arrange parking in areas directed by Departmental Representative. Maintain construction parking area clean and free of construction related debris. Make good damage resulting from Contractor use of parking areas, at no cost to the Contract.

.6 Confine work and operations of employee to areas defined by the Contract Documents unless directed otherwise in writing by the Departmental Representative. Do not unreasonably encumber premise with products.

7 Interference with Operations

.1 The Contractor shall obey all navigation regulations and conduct operations so as to interfere as little as possible with the use of berthing spaces, fairways and passages. Install and maintain any and all protection to navigation as may be

required by any properly constituted authority or by the Engineer. During the course of construction and clean up, do not dispose of surplus, waste or demolished materials in navigable waters.

.2 The Contractor shall upon instruction of the Owner or Engineer, promptly remove any of the Contractor's equipment located outside the specified work area and obstructing any harbour operations.

8 Co-operations with Harbour Authorities and Others

.1 The contractor will give the owner a minimum 48 hours notice to Departmental Representative for work that may interrupt access to any part of the harbour. Provide and locate necessary buoys or markers to indicate active work areas as necessary.

.2 Notice of site work must be posted on a clearly visible sign, such that facility users can readily see it.

.3 The site shall be left in a safe condition at the completion of each work day.

.4 The Contractor should work together with the Harbour Authority and Engineer's Representative to set up risk management plan for the project. This aims to identify risk of individual work item, streamline communications and minimize the associated risk to safety and operation in the harbour. The plan may include but not limited to revision of schedule and methodology, close monitoring of weather condition, navigation management during construction. Failure to implement the risk management plan may cause liability to the Contractor for damages of the harbour property during construction.

.5 The cost for use of any Harbour Authority services are those of the Contractor and the cost of any such services should be included in the cost of this tender.

9 Protection of Existing Structures

.1 Existing structures, adjacent marine facilities, roads, services, piping or equipment within the work area which are not to be replaced shall be properly protected from any injury or damage, direct or indirect. Any damage that is caused as a result of the operations of the Contractor shall be repaired and made good at the Contractor's expense to the satisfaction of the Engineer.

10 Engineer's Access

.1 The Contractor shall provide access to the work for the Engineer's inspectors and surveyors as required.

1.16 Permits and Notifications

1 Permits and licenses required for the Contractors work are the responsibility of the Contractor and shall be for the Contractor's account. The Contractor shall have the appropriate business license.

2 Notify Environmental Protection Service and the local Fisheries Officer at least five days before the work commences.

1.17 Complete Performance

1 Provide a minimum of 5 days' notice to the Owner of the date of completion.

2 Markup the drawing to confirm as-built structure and locations.

3 Final Acceptance:

.1 All work shall have been completed including deficiencies and compliance inspected by the Owner's engineer. Contractor to provide a minimum of 5 working days before the requested date of inspection pursuant to the General Conditions. Real Properties and Technical Support and their representatives require time and effort to pre-plan acceptance. Incurred costs resulting from cancellation or delay notice by the manufacturer may be assessed against the contract.

4 The Contractor shall protect all finished work from injury, defacement, unauthorized entry, or trespass until such time as the work described in the Contract Documents is substantially complete.

1.18 Material and Equipment

1 General:

.1 Use new material unless otherwise specified.

.2 Record the following information for any or all materials and products proposed for supply:

.1 Name and address of manufacturer.

.2 Trade name, model and catalogue number.

.3 Performance, descriptive and test data.

.4 Manufacturer's installation/application instructions.

.5 Evidence of arrangements to procure.

.3 Provide equipment of specified design and quality, performing to published ratings and for which replacement parts are readily available.

.4 Use products of 1 manufacturer for equipment or material of the same type or classification unless otherwise specified.

2 Metric sized products:

.1 SI metric units of measurement are used exclusively on the drawings and in the specifications for the project.

.2 The contractor is required to provide metric products where specified in the sizes called for in the contract documents, except where a valid claim can be made that a particular product is not available on the Canadian market.

.3 Difficulties caused by the contractor's lack of planning and effort to obtain modular metric sized products which are available on the Canadian market will not be considered sufficient reason for claiming they cannot be provided.

.4 Claims for additional costs due to provision of specified modular metric sized products will not be considered.

3 Substitution after Contract award:

.1 No substitutions will be permitted without prior written approval of the Owner and the Contracting Authority

.2 Proposals for substitution may only be submitted after Contract award. Such request must include statements of respective costs of items originally specified and the proposed substitution.

.3 Proposals will be considered by the Owner if:

.1 Materials selected by tenderer from those specified are not available;

.2 Delivery date of materials selected from those materials specified would unduly delay completion of Contract, or

.3 Alternative materials to that specified, which is brought to the attention of and considered by the Owner as equivalent to the material specified, and will result in a credit to the Contract amount.

.4 Should the proposed substitution be accepted whether in part or in whole, assume full responsibility and costs when substitution affects other work on the project. Pay for design or drawing changes required as a result of substitution.

.5 Amounts of all credits arising from approval of substitutions will be determined by Engineer and the Contract price will be reduced accordingly.

4 Manufacturer's instructions:

.1 Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation methods.

.2 Notify Owner in writing of any conflict between these specifications and the manufacturer's instructions. The Owner will designate which document is to be followed.

5 Delivery and storage:

.1 Deliver, store and maintain packaged material and equipment with manufacturer's seals and labels intact.

.2 Prevent damage, adulteration and soiling of material and equipment during delivery, handling and storage. Immediately remove rejected material and equipment from site.

.3 Store material and equipment in accordance with suppliers' instructions.

.4 Touch-up damaged factory finished surfaces to comply with the specifications. Use coatings in accordance with the specifications. Do not paint over nameplates.

.5 Maintain fabrication equipment and plant in good operating order.

1.19 Interpretation

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

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

.1 The Plans and Specifications, the Specifications govern;

.2 The Plans, the Plans drawn with the largest scale govern;

.3 Figured dimensions and scaled dimensions, the figured dimensions govern; and

.4 Specifications, Plans and Appendices; The Specifications and Plans govern over the Appendices.

1.20 Requirements of Regulatory Agencies

1 Ensure work meets all applicable environmental regulations.

2 The contractor shall comply with municipal, provincial, and national regulatory agency regulations relating to the project.

3 Claims for extra costs resulting from all regulatory agency requirements including those referenced in Clause 1.22.2 will not be entertained by the Department.

4 The Contractor shall mark floating equipment with lights in accordance with Notice to Mariners CCG regulations.

5 The Contractor will ensure that a fuel / oil spill emergency action plan is in place at all times.

6 The Contractor shall comply with the “BC Marine and Pile Driving Contractors Association, Best Management Practices for Pile Driving and Related Operations”.

1.21 Temporary Facilities

1 Provide temporary facilities in order to execute work expeditiously.

2 Water can be arranged with the Harbour Authority for construction use. Department Representative will determine delivery points . Provide all equipment and temporary hoses to bring water to work, at no additional cost to the Contract. Exercise conservation whenever using water supply. Do not leave water running unattended.

3 Electrical power can be arranged with the Harbour Authority for construction use. Department Representative will determine delivery points. Connect to existing power supply in accordance with Canadian Electrical Code . Provide all equipment and temporary lines to bring power to work, at no additional cost to the Contract. Exercise conservation whenever using temporary electrical power supply.

4 Provide and maintain temporary fire protection equipment during performance of work required by governing codes, bylaws, and regulations. Conform to site plan where in effect.

5 Provide sanitary facilities for work force in accordance with governing regulations and ordinances. Locate where directed by Department Representative.

6 Remove any temporary services or facilities after completion of the work and make good any damage to conditions previously existing or to match new work as acceptable to the Engineer.

1.22 Material Disposal

1 All material designated to be removed will become the property of the Contractor and will be disposed of in an environmentally acceptable manner so that they neither become a menace to marine navigation nor a nuisance to the public on adjacent or any other property.

2 Unless otherwise specified, all existing material to be replaced or removed will be disposed of in accordance with 1.21.1 above.

3 Conduct cleanup and disposal operations to comply with local ordinances and anti-pollution laws.

4 At the request of the owner, the contractor shall provide copy of disposal receipt or tipping fee of disposed materials at no extra cost to the contract.

5 At all times the Contractor shall keep the site free from accumulation of waste material and debris and leave the site clean and tidy on completion.

6 At the owners' discretion, the following items shall be set aside for inspection and retained by owner for storage on site in a secure location approved by the owner:
.1 All existing furnished RC and TRC kiosks.

1.23 Weather

1 No work shall be undertaken by the Contractor when, in the opinion of the Engineer, the weather is unsuitable or unfavourable for a particular class of work. Time lost by the Contractor due to stoppage on account of adverse weather conditions may be allowed the Contractor, at the discretion of the Engineer, as an extension of time for the completion of the work over and above the date of completion specified in the contract agreement.

1.24 Soil Data and Existing Topography

1 The Contractor shall notify the Engineer of any subsurface conditions at the place of the work that may differ materially from those indicated in the Contract Documents.

1.25 Utilities and Services

.1 The Contractor shall be responsible for any damage to overhead, underwater and/or underground utilities and/or services caused by the Contractor's operations and shall repair and make good the repairs at the Contractor's own expense.
.2 The Contractor shall be responsible, unless otherwise agreed to by the Engineer, for all temporary or construction services and utilities, and first aid facilities.

1.26 Cutting, Fitting, and Work Fit Patching

.1 Execution cutting (including excavation), fitting and patching required to make the work properly fit together.
.2 Where new work connects with existing and where existing work is altered, cut, patch and make good to match existing work.

1.27 Owner Supplied Materials

.1 The following Owner supplied materials will be provided at the Port Hardy CCG SAR Station site.
.1 Float Safety Ladders w/ mounting hardware – 3 units.
.2 Zinc Pile Anodes – 6 units.

2 Products

Not Used

3 Execution

Not Used

END OF SECTION

1 General

.1 PWGSC's General Conditions and related contract documents form an integral part of this section.

2 Work Included

.1 The work under this contract shall include the supply of equipment, labour and materials for the performance of all work as required by the Contract Documents. All replaced items, cut-offs and waste material shall be disposed by the contractor in strict accordance with provincial, local, and municipal regulations and Part 8 of the National Building Code and the Canadian Construction Safety Code.

.2 The work to be carried out under this contract includes the construction and installation of a new 4.3 m by 31.6 m concrete mooring float and modification of existing access gangway and floats complete with vertical steel pipe dolphin piles. Modifications of the electrical service to the float including, lighting and power supply to the new float will be carried out under this contract. The work generally consists of, but is not limited to the following items:

Work Item Descriptions:

.1 Mobilisation/Demobilisation

Mobilisation / demobilisation for all work items, this shall include but not necessarily be limited to the supply of materials, equipment, tools, services, labour and all things necessary to complete the following:

.1 Moving all crew, equipment, and materials on and off the site.

.2 Site clean-up after completion of the work.

.3 Any necessary works not identified in other items.

.2 New Concrete Float Fabrication

Supply all new materials and construct a 4.267 m wide and 31.600 m long foam filled concrete float complete as shown on the drawings.

.3 New Concrete Float Installation

Deliver the completed concrete float to Port Hardy Harbour and install the float complete including supply and installation of three (3) 609.6x12.7 mm vertical steel pipe dolphin piles, as shown on the drawings. The existing 3.7 m by 25.4 m timber mooring float to be relocated about 0.5 m towards south.

.4 Relocate Existing Timber Floats

Remove and dispose of the existing CCG timber mooring float. Modify and relocate the existing gangway timber float and community timber float including supply and installation of three (3) 609.6x12.7 mm vertical steel pipe dolphin piles, as shown on the drawings.

.5 Relocate Existing Gangway

Relocate the existing 1.8 m by 22 m gangway complete including modifications of existing handrail along the approach and installation of a timber pile under the approach at the new gangway location, as shown on the drawings.

.6 Miscellaneous Float Works

Modify and reinstall the existing security fence as required to match the new concrete float and supply and install aluminium transition apron complete, as

shown on the drawings. Transfer all existing services, storage lockers and storage shed. Installation of Safety ladders and anodes.

.7 Electrical Reconstruction

Disconnect and removal of existing of existing electrical equipment on existing CCG float. Supply and installation of new TRC enclosure, distribution equipment, feeder cables, and luminaires complete as per drawings. This shall include but not necessarily be limited to the supply of materials, equipment, tools, services, labour and all things necessary to complete the following:

.1 TRC Kiosk enclosure and interior components (feeder cables, protective equipment, etc).

.2 Connection to existing electrical system to new equipment as indicated on the drawings.

.3 Feeder cables.

.4 Documentation including shop drawings, maintenance manuals and final mark-ups for "As-Built" drawings.

END OF SECTION

1 General

1.1 Related Requirements

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20	Section 35 51 23	EPS Foam

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

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

5 Submit copies of incident and accident reports.

6 Submit WHMIS MSDS - Material Safety Data Sheets.

7 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.

8 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.

9 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 Unforeseen 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

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

2 Products

2.1 Not Used.

3 Execution

3.1 Not Used.

END OF SECTION

1 General

1.1 Related Requirements

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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.

2 Products

2.1 Not Used

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 watersBefore 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.

.4 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.

.5 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.

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

2 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

1 General

.1 Where existing works are to be removed, they shall be removed and salvaged or disposed of to the satisfaction of the Departmental Representative.

.2 The Contractor shall furnish all labour, materials, tools, plant and services required incidental to the completion to the full extent of the drawings and specifications for the execution of all demolition salvage and protection work specified herein.

.3 Demolition and disposal shall be carried out in strict accordance with provincial, local, and municipal regulations and Part 8 of the National Building Code and with the Canadian Construction Safety Code.

.4 Demolition shall be carried out in accordance with the construction schedule as approved by the Departmental Representative.

2 Removal of Demolished Material

.1 All material, which are not to be salvaged, shall become the Contractor's property and the Contractor must remove it from the site.

.2 It shall be the Departmental Representative's decision as to which material shall be salvaged and which materials shall be disposed of.

.3 Piles shall be completely removed where possible. If it is not possible to remove a pile, the pile shall be broken off or cut below ground level.

3 Salvage

.1 Material to be salvaged for the Departmental Representative shall be stored as directed.

4 Protection

.1 The Contractor shall protect the remaining structural elements and adjacent structures against damage from falling debris or other causes.

.2 The Contractor shall take precautions to guard against movement or settlement of adjacent structures and remaining structural elements, provide and place shoring or bracing as required, and be responsible for the safety and support of such structures, be liable for any damage or injury caused thereby or resulting therefore. If at any time safety of any adjacent structure appears to be endangered; the Contractor shall cease operations and notify the Departmental Representative.

END OF SECTION

1 General

.1 All work shall be carried out in conformance with CSA Standard CAN3.A23.1-M.

2 Materials

.1 Cement to CAN/CSA-A3001, Type MS.

.2 Supplementary cementing materials: with 10% Type F fly ash replacement and 5% Type SF Silica Fume, by mass of total cementitious materials to CAN/CSA A3001. Total supplementary cementing materials not to exceed 15% by mass of total cementitious material.

.3 Water: to CSA-A23.1/A23.2.

.4 Reinforcing steel: to CAN/CSA-G30.18, bare or galvanized bars with silica fume.

.5 Welded wire fabric: to ASTM A185/A185M, coated (no epoxy).

.6 Hardware and miscellaneous materials: to CSA-A23.1/A23.2.

.7 Forms: to CSA-A23.4.

.8 Air entrainment admixtures: to ASTM C260.

.9 Fine aggregate shall conform to Clause 5.3 CSA Standard CAN3.A23.1-M.

.10 Coarse aggregate shall conform to Clause 5.4 CSA Standard CAN3.A23.1-M group 1. Max aggregate size to be 9.5 mm (3/8”).

.11 Water shall be clean and free from injurious amounts of oil, alkali, organic matter and deleterious materials.

3 Concrete Mixes

.1 Concrete to meet performance criteria in accordance with CAN/CSA-A23.1/A23.2.

.2 Durability and class of exposure: C-1.

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.3 Minimum compressive strength at 28 days: 40 MPa.

.4 Intended application: continuous water submersion and splash zone (frequent wetting and drying cycles)

.5 Volume stability: acceptable strain range due to shrinkage, creep and freeze thaw cycle is between 0.0002 and 0.0005.

.6 Provide quality management plan to ensure verification of concrete quality to specified performance, include concrete supplier's certification.

.7 Placement of deck and walls in one pour to allow concrete to shrink wrap onto foam and keel.

.8 Foam must be secured to keel to prevent foam movement

.9 Maximum water cement ratio shall be 0.40.

.10 Air content shall be between 5% and 8%.

.11 Set retarding admixtures shall not be used unless approved by the Departmental Representative.

.12 The concrete mix design shall be submitted to the Departmental Representative for approval prior to placing concrete. The mix design including admixtures shall not be changed without prior approval of the Departmental Representative.

4 Placing, Finishing and Curing Concrete

.1 All concrete shall be placed in accordance with the requirements of Clause 19 CSA Standard CAN3.A23.1-M and as indicated on the drawings.

.2 All concrete shall be placed continuously between start of placement and a control joint. Control joint locations shall be proposed by the contractor and are subject to prior approval by the Departmental Representative. Joint surfaces of cured concrete shall be roughened and thoroughly cleaned.

.3 Accurate records shall be maintained for all cast-in-place concrete including date of placement, location, quantity, temperature and test samples taken.

.4 The Departmental Representative shall be notified prior to commencement of concrete placement as specified in Clause 6.0.

.5 All defective concrete shall be removed and replaced as directed by the Departmental Representative.

.6 Concrete shall be vibrated adequately by means of mechanical vibrators. Rock pockets and honeycombing shall not be accepted.

.7 Surface texture: non-skid finish on top, steel trowel or form finish on sides and bottom.

.8 Cold and hot weather concrete work shall be carried out in conformance with Clause 21 of CSA Standard CAN3.A23.1-M. Procedures for this work shall be submitted to the Departmental Representative for approval.

.9 All concrete shall be protected and cured in accordance with CSA Standard CAN3.A23.1-M.

.10 Water pond cure for 7 days to prevent short and long term cracking.

5 Shop Drawings

.1 Submit shop drawings in accordance with CSA-A23.4.

6 Inspection and Testing

.1 Provide the Departmental Representative with certified copies of quality control tests related to this project as specified in CSA-A23.4 and CSA-G279.

.2 Provide records from in-house quality control programme based upon plant certification requirements for inspection and review.

.3 Upon request, provide Consultant with certified copy of mill test report of reinforcing steel supplied, showing physical and chemical analysis.

.4 The Departmental Representative shall be notified 24 hours prior to placement of concrete.

.5 Unless noted otherwise an inspection and testing firm appointed and paid for by the Contractor will collect and test a minimum of 3 concrete cylinders per concrete batch. One concrete cylinder shall be tested after 7 days. The remaining 2 cylinders shall be tested after 28 days. The test results shall be made available to the Departmental Representative.

.6 The Contractor shall permit the testing firm free access to all portions of the work and shall co-operate with the testing firm in carrying out the work.

7 Performance Requirements

.1 Tolerance of precast elements to CSA-A23.4.

.2 Length of precast elements not to vary from design length by more than plus or minus 50 mm (based on 31.6 m float lengths).

.3 Cross sectional dimensions of precast elements not to vary from design dimensions by more than plus or minus 5 mm.

.4 Deviations from straight lines not to exceed 12 mm in 10 m.

.5 Minimum concrete cover of 40mm on exterior surfaces, and minimum cover of 30mm on interior surfaces.

END OF SECTION

1 General

.1 All fabrication and erection of structural steel shall comply with CSA Standard CAN3-S16.1, latest revision.

2 Materials

.1 Hollow structural steel sections shall conform to CSA Standard G40.20/G40.21-M, Class "C", Grade 350W.

.2 All other rolled sections and miscellaneous plate shall be grade 300W, unless noted otherwise on the drawings, in conformance with CSA Standard G40.20/G40.21-M.

.3 All structural steel members shall be made of the size and weight shown on the drawings unless written approval for any change is first obtained from the Departmental Representative.

.4 Bolts, washers and nuts shall conform to ASTM specification A325.

3 Welding

.1 Welding practice and qualifications of welders and erectors of welded construction shall conform to the requirements of CSA Standards W47, W48, and W59 latest editions. The metallurgy of weld metal shall be similar to the parent material.

.2 Unless noted otherwise, all welds shall develop the full strength of the connected members, and shall be continuous seal welds with a minimum 6 mm leg length.

.3 Where on the drawings it is called for double sided welding; the welding details called for on the near side shall be duplicated on the far side if not called up otherwise.

4 Inspection

.1 The Contractor shall furnish all facilities for inspecting and testing the weight, dimensions and quality of workmanship at the shop where the material is fabricated.

.2 The Departmental Representative shall be notified well in advance of the start of work, in order to allow sufficient time for inspection of material and workmanship.

5 Shoop Drawings

.1 The Contractor shall prepare and submit shop drawings.

.2 The Contractor shall submit three prints or an electronic copy in PDF of the shop drawings for the Departmental Representative's review prior to commencing fabrication. If shop drawings are not to the Departmental Representative's satisfaction, they will be returned with the notation "Resubmit". Drawings that have been returned with the notation "Reviewed" would allow fabrication to commence.

.3 The review of shop drawings will be for size and arrangement of members and strength of connections. Any errors in dimensions shown on the shop drawings shall be the responsibility of the Contractor.

.4 Upon completion of the project, all reviewed shop drawings shall be submitted to the Departmental Representative along with the As-Built marked drawings. In addition, diskettes containing all shop drawings in AutoCAD format shall be submitted.

6 Coatings

.1 All miscellaneous steel, bolts, inserts, washers and nuts shall be hot dip galvanized in accordance with ASTM Specifications A-153 or A-123 or CSA G 164-M (minimum zinc coating 610 g/m^2).

.2 Damaged galvanized surfaces shall be coated with Galvacon immediately after the damage has occurred.

END OF SECTION

1 Scope of Work

.1 All work shall be carried out in accordance with Specification CAN/CSA 086.1-M, latest revision and in accordance with Best Management Practices (BMP) for the use of treated wood in aquatic environments.

.2 Lumber identification: by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

2 Product

.1 Lumber Material

.1.1 Lumber grades shall conform to the requirements of the N.L.G.A. Standard Grading Rules for Canadian Lumber, latest revision.

.1.2 All lumber shall be D.Fir-L(N), No. 2 Structural grade or better as called for on the drawings.

.1.3 All lumber, unless specified otherwise, shall be properly air dried and seasoned, containing not more than 19% moisture.

.2 Fasteners

.2.1 All bolts, nuts and washers shall be hot dip galvanised in accordance with Specification CAN/CSA G164-M.

.2.2 Bolt holes in timber shall be bored to provide driving fit. Holes for drift bolts shall be 2 mm undersize and longer than the drift bolts.

.2.3 All bolts to meet the requirements of Standard ASTM - A307.

.3 Wood Preservative

.3.1 All preservative treatment, inspection and re-treatment shall be in accordance with Specification CAN/CSA 080-M, latest edition.

.3.2 All lumber shall be given a ACZA preservative treatment in accordance with the Best Management Practices.

.3.3 All treated timbers shall be incised before treatment.

3 Execution

.1 All timber, which has been given a preservative treatment, shall be carefully handled to avoid breaking through the treated surfaces. Cant hooks and rafting dogs shall not be used on timbers. No spikes shall be driven into timbers except to tack the timbers in their final position. If spikes are used, they shall be fully driven and left in.

.2 Bolt holes and countersunk holes shall be filled with ACZA preservative and the bolts shall be dipped in ACZA preservative concentrate before the bolts are placed. Bolt holes with a final position at an elevation below water level shall be filled with approved mastic before the bolts are placed.

.3 Cut ends of timber with a final position at an elevation below water level shall be treated with one coat of approved mastic at least 5 mm thick. The mastic to be covered by a layer of heavy felt followed by a sheet of 1 mm annealed corrosion-resistant aluminium cut 100

mm larger than the dimensions of the flange timber. The overhanging edges shall be crimped and turned over and secured to the flange timber with aluminium roofing nails.

.4 All structural timber used in the work shall be carefully and accurately placed in accordance with the drawings.

END OF SECTION

1 General

1.1 Summary

.1 Documents

.1 This Division 26 Section, together with all other Sections forms part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts and Divisions.

1.2 Abbreviations

.1 The following project-specific equipment abbreviations have been used in these specifications:

.1 TRC: New Transformer Receptacle Cabinet with distribution panel section, receptacle panel, receptacles, and top light fixture.

.2 RPSS: Fisheries and Oceans Canada, Real Property, Safety and Security.

.2 Other abbreviations to CSA Z85.

1.3 Brief Summary of Work

.1 The work includes but is not limited to:

.1 Provision and installation of one TRC enclosure, distribution equipment and feeder cables.

.2 Disconnect and demolition of existing equipment to install previous item. See 1.9.8

.3 The provision of shop drawings to Engineer for approval prior to the purchase of electrical equipment to be installed.

.4 All planning, organizing, scheduling, managing and coordinating as required with CCG Officer in Charge, RPSS Project Manager.

.5 Completion of the deficiency list as compiled by RPSS Project Manager.

1.4 Phasing

.1 Phase the work to minimize service outages.

.2 Outages shall not exceed 24 hours. Schedule the work to reduce outage duration to less than 24 hours wherever possible.

.3 Prepare a detailed schedule of proposed shutdown of existing power services

.4 The Owner reserves the right to insist upon changes to the schedule of shutdowns without penalty or cost.

.5 Erect barricades and provide temporary signage and lighting as necessary to protect the public during construction activities. Do not leave tripping hazards or loose planks while wharf is unattended.

1.5 Codes, Standards, and Regulatory Requirements

.1 Any reference to Codes, Standards, and Regulations in these Specifications shall be taken as the latest or the most current in effect at time of tender.

.2 Comply with all requirements of the Canadian Electrical Code - Part I, including all Provincial and other amendments, Electrical Bulletins, and any local by-laws or rules regulating the installation of electrical equipment. In no instance, however, shall the

standards established by the Contract Documents be reduced by any of these Codes or Regulations.

.3 All materials shall bear the approval of the Canadian Standards Association and where applicable, the Underwriters' Laboratories of Canada or alternately shall bear local approval from the Electrical Inspection Department having jurisdiction. Include in the Tender all costs associated with obtaining local approvals.

.4 Operating voltages to CAN3-C235.

1.6 Permits, Fees, and Inspection

1 Before starting work submit the appropriate quantity of Drawings and Specifications to the Electrical Inspection Department and other authorities having jurisdiction and obtain all necessary approvals and permits. Include all costs of approvals and all permit fees in the tender.

2 Engineer will provide Drawings and Specifications required by the Contractor for submission to the Electrical Inspection Department, the Supply Authority, and other authorities having jurisdiction, at no cost.

3 Arrange for inspection of the work as the installation progresses and as further required (as well as attendance during verification) by all applicable authorities having jurisdiction.

4 Notify Engineer of changes required by Electrical Inspection Department prior to making changes.

5 Upon completion, and before final payment will be made, present to the Engineer a certificate of unconditional approval for all electrical work from the Electrical Inspection Department and other authorities having jurisdiction.

1.7 Quality of Work

1 Unless otherwise indicated, all materials supplied shall be new and of the quality indicated in these Specifications. Otherwise, they shall be of the best commercial quality obtainable for the purpose.

2 Manufacturers' directions shall be followed in all cases where the manufacturers of equipment or materials used in this work furnish directions covering points not shown on the Drawings or Specifications.

3 Unless otherwise directed, all installed materials or equipment exposed to view shall be plumb, true, square, and/or level as the case directs and, where applicable, located symmetrically.

1.8 Qualification of Tradesmen

1 The work shall be performed by qualified and certified tradesmen as set out in the Electrical Safety Regulation within the Electrical Safety Act.

2 Submit list showing names and qualifications of key supervisory personnel.

1.9 Responsibility and Coordination

1 Supply all labour, materials, equipment, tools, and incidentals necessary to provide a complete electrical installation as indicated on the Drawings and as set out in these Specifications.

2 The Drawings and Specifications complement each other and what is called for by one is binding as if called for by both. If there is any doubt as to the meaning or true intent due to a discrepancy between the Drawings and Specifications, obtain a ruling from the Engineer prior to tender closing. Failing this, the most expensive alternative is to be allowed for.

3 Advise the Engineer of any specified equipment, material, or installation of same which appears inadequate or unsuitable or which is in violation of laws, ordinances, rules, or regulations of authorities having jurisdiction. Provide all labour and materials which are obviously necessary or reasonably implied to be necessary to complete the work as if the work was shown on the Drawings and/or described in the Specifications.

4 Existing information within the drawing package is based on information provided by others, extracted from historical records, and site observations. Existing information is provided to facilitate the contractor in providing a fair and accurate tender bid, by providing a greater understating of the scope of work. By no means shall the contractor rely solely on the existing information provided to determine a complete and fully accurate scope of work as not all electrical equipment or devices that are required to be relocated, removed, or replaced may be noted. WSP strongly suggests that the contractor perform a site visit to determine the exact scope of work prior to providing their tender bid. Not all existing information is shown, particularly underneath the main structure. The contractor is expected to field verify all existing equipment and cables pertaining to this project and allow for changes to suite existing conditions on site in their tender pricing.

5 The contractor shall make good all existing surfaces, including but not limited to drywall, paint, and finishes, effected by the scope of this project.

6 Installation shall comply with any existing site standards (ex: labelling, colour coding of raceways, and boxes.

7 All cable routing shown on the drawing is for schematic purposes only. It is expected that the contractor shall route cables in the most efficient and economical manner to complete the project scope.

8 The existing single line diagram shown on drawing E005 is based on site observations. The contractor shall confirm the scope of disconnect and demolition, and notify the engineer if there are differences in the field to what is shown on project drawings.

1.10 Protection

1 Protect exposed live equipment during construction for personnel safety.

2 Shield and mark live parts "LIVE 120 VOLTS," or with appropriate voltage.

3 Arrange for installation of temporary covers for enclosures containing electrical distribution equipment. Keep these covers locked except when under direct supervision of electrician.

1.11 Drawings and Measurements

1 Drawings are generally diagrammatic and are intended to indicate the scope and general arrangement of work. Do not scale the Drawings.

2 The Drawings show approximate locations of outlets, equipment, and apparatus but the right is reserved to make such changes in location before installation of the work as may be necessary to meet the exigencies of construction in any way. No extra will be allowed and conversely, no credit shall be expected for such changes unless for each item of work the distance moved exceeds 3 m prior to final installation of same.

3 Take field measurements where equipment and material dimensions are dependent upon structure dimensions.

1.12 Materials and Equipment

1 Equipment and material to be new and CSA-certified. Where there is no alternative to supplying equipment which is not CSA-certified, obtain special approval from Electrical Inspection Department.

2 Factory assemble control panels and component assemblies.

1.13 Identification

1 Identify all pieces of electrical equipment other than conduits and conductors with engraved nameplates, having white characters on black or dark background, mechanically attached via rivets.

2 Nameplate wording shall be such as to indicate clearly the function of each piece of equipment so identified. Prior to manufacture of nameplates, obtain approval from the Engineer for wording intended.

3 Provide laminated plastic nameplates at indoor locations and inside equipment cabinets that normally remain closed.

4 Provide 316L polished lamcoid nameplates for all outdoor equipment, minimum 12 mm high engraved text with white baked-on enamel filling and black background. Four threaded studs welded at the back for mechanical attachment to outdoor equipment. Apply Secaflex or equal sealant on rear of nameplate to seal stud holes.

1.14 Approvals

1 Requests for approval of the substitution of materials pertaining to electrical work prior to awarding of any contract must be submitted to the Engineer in duplicate, so that they are received by the Engineer at least five working days prior to the close of tender or of bid depository, whichever is the earlier. ***Note that facsimile submittals will NOT be accepted*.**

.1 All submissions shall include the following information:

.2 Name and identification of specified item.

.3 Manufacturer, brand name, and catalogue number of the alternative item proposed.

.4 Detailed technical data and characteristics of alternative item such as dimensions, voltage, power requirements, performance characteristics, etc.

2 A list of any and all changes to the installation which may be required as a result of the substitution.

3 Review by the Engineer of alternate materials as permitted above is only a general approval in principal and shall not relieve the Contractor of his responsibility to ensure that any approved alternate materials perform in the same manner and with the same intent as the originally specified material would have otherwise performed.

4 Where such substitutions alter the design or space requirements indicated on the Drawings, include all material, labour, design, and engineering costs for the revised design and construction including costs of all other trades affected and those incurred by the Engineer.

5 It is the Contractor's responsibility to ensure substituted products are approved and that suppliers have written approval indicating conditions of any such approval. Alternate manufacturers who do not have such approval shall not be used in the work. If requested by the Engineer, the Contractor for Division 16 shall submit for inspection, samples of both the specified and the proposed substitute items on short notice.

1.15 Testing and Adjusting

1. Coordinate and pay for all tests specified herein including further tests as required by authorities having jurisdiction.

2. All testing shall be performed after each system installation has been completed and prior to the system being put into continuous operation unless otherwise noted.

3. Perform the testing, adjusting, and balancing only when conditions are commensurate with actual operating conditions for the given system.
4. Advise the Engineer 48 hours in advance of each test. Carry out tests in the presence of Engineer.
5. The Electrical Contractor shall use his own forces for the following tests:
   .1 Test phase relationships and polarity at all equipment and outlets and devices.
   .2 Test all circuits originating from branch distribution panels.
   .3 Provide ground resistance tests for all circuits.
6. Submit typed test reports to the Engineer. Include individual insulation resistance results for each feeder utilizing Type G-GC or Teck cable.

1.16 Cleaning and Repair

1. At the conclusion of the job and before the project will be accepted by the Owner, all panelboards and other electrical equipment shall be clean and free of dust, plaster, paint, and other foreign materials.
2. Repair, at no cost to the Owner, any equipment or structures damaged by the execution of Contract to its original condition.
3. Replace, at no cost to the Owner, any equipment or structures damaged by the execution of Contract which is irreparable.
4. Openings and cut-outs shall not be burned into panels. Oversized openings shall not be patched up with loose plates or oversized washers. Oversized openings shall be considered damage to the equipment and shall be treated as specified.

1.17 Guarantee

1. Use of installed equipment during construction shall not shorten or alter the guarantee.
2. Unless otherwise noted, the warranty period for all equipment shall commence on the date of Substantial Performance for the entire Construction Contract.

1.18 Fire Stopping

1. The contractor shall fire stop all penetrations through fire walls and smoke separations with an approved ULC-listed fire stopping system. All other penetrations shall be patched to suit wall materials.

1.19 Project Documentation

1. Shop Drawings
   .1 Submit one electronic plus three prints of all shop and setting drawings or diagrams to the Engineer 10 working days in advance of requirements to allow time for review and comment. One print will be forwarded to the Owner, one will be retained by the Engineer for their office use, one copy will be marked and returned to the Contractor for correction if necessary, further reproduction, and distribution as required.
   .2 Shop drawings shall be neatly drafted and shall be complete and detailed. This requirement is mandatory for such items as panelboards and custom-fabricated equipment panels, consoles, or enclosures.
   .3 Shop drawings shall:
      .1 Be numbered in consecutive order;
      .2 Indicate the specific name of the equipment and where it is to be installed;

.3 the name of the site/project where installation will occur;

.4 the name of the manufacturer, make, model, ratings;

.5 date of the drawing including notation of latest revision, if any;

.6 Indicate details of construction, dimensions, locations of cable terminations, capacities, weights and electrical performance characteristics of equipment and materials.

.4 Shop drawings shall be reviewed by the Contractor prior to submission to the Engineer. **Shop drawings not bearing Contractor's approval stamp, approval date, signature**, and project name will be returned without comment.

.5 Review of shop drawings by the Engineer is for the sole purpose of ascertaining conformance with the general design intent. The review shall not mean approval of the detail design inherent in the shop drawings, responsibility for which shall remain with the Contractor submitting same, and such review shall not relieve the Contractor of his responsibility for errors or omissions in the shop drawings or of his responsibility for meeting all requirements of the Contract Documents.

.6 The Contractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for coordination of the work of all sub-trades.

2. Maintenance Manuals

.1 Furnish to the Owner three complete bound sets of typewritten or blueprinted instructions for operating and maintaining all systems and equipment included in this Contract.

.2 Submit all instructions first in draft for approval prior to final issue.

.3 Manufacturers' advertising literature or catalogues will not be accepted for operating and maintenance instructions.

.4 Manufacturers' parts list shall be included in each Maintenance Manual.

.5 Each set shall consist of a 3-ring binder and a flyleaf with the name of the General Contractor, Electrical Subcontractor, and major equipment suppliers, or their local representatives if they are not local manufacturers, together with addresses and telephone numbers of all parties.

.6 Each system or piece of equipment shall have its own section separated from the next by a labelled divider. Shop drawings shall be included in the appropriate section. They shall be fastened into the book by means of a tab which will allow the drawings to be unfolded without being removed from the book.

.7 Include copies of all applicable guarantees, warranties, inspection approval certificates, and test certificates.

3. "As-Built" Drawings

.1 Refer to Division 1 of these Specifications.

.2 Maintain in the job site office in up-to-date condition, one complete set of whiteprints of each of the Electrical Contract Drawings and one set of Specifications, including Revision Drawings, marked clearly and indelibly in red, indicating "As-Built" conditions where such conditions deviate from the original directions of the Contract Documents, and indicating final installation of feeders and branch circuits.

.3 "As-Built" drawing markings shall include but shall not be limited to the following:

.1 All changes in circuiting

.2 Size and routing of all conduits for all branch circuits including power, lighting, and systems. Accurately record on "As-Built" drawings the size and routing of all installed raceways and cables.

.3 Number and size of conductors in raceways and cables

.4 Location of all junction and pull boxes

.5 All changes to electrical installation resulting from Addenda, Change Orders, and Field Instructions

.6 Exact location of all services left for future work

.7 Location by accurate horizontal and vertical dimensions of the routes and terminations of all raceways and cables installed underground. **"As-built" mark-ups for area below the Main Distribution Panel (MDP) shall include data on existing and new installation showing location and size of ducts, and number and size of conductors therein.**

4. Each "As-Built" drawing as defined above shall bear the Contractor's identification and signature, the date of record, and the notation: "*We hereby certify that these Drawings represent the condition as built*."

5. Deliver "As-Built" mark-up drawings to the Engineer at 'Substantial Completion' of the Contract for review and comment and, if necessary, revision. A holdback will be affected by the Engineer until "As-Built" drawing mark-ups are delivered in good order as required herein.

1.20 Loose Equipment

1. All loose and portable components and equipment to be provided shall be handed over to the Owner at Substantial Performance of the Contract and receipts obtained.

2. Copies of such receipts shall be given to the Engineer, with a copy included in Maintenance Manual.

1.21 Substantial Performance Inspection

1. Before the Engineer is requested to make a Substantial Performance inspection, submit written confirmation that:

.1 All equipment is operational, plumb, clean, and correctly labelled

.2 All Test Reports have been submitted

.3 All certificates of final acceptance from the authorities having jurisdiction have been received and submitted to the Engineer

.4 Equipment has been cleaned, touched up, or refinished as necessary to present a new appearance

.5 All loose equipment including spare parts and replacement parts have been turned over to the Owner and receipts obtained for same

.6 The Maintenance Manual has been submitted

.7 The "As-Built" drawing mark-ups have been submitted to the Engineer

2. Notwithstanding any other provisions of the Contract, failure to complete all of the above shall give cause to deny the issuance of a Substantial Performance Certificate.

1.22 Measurement and Payment

1. Notwithstanding any other provisions of this Contract, supply the following general information and any additional information as may be requested by the Engineer, as part of each Progress Claim. Indicate the labour cost and the material cost separately for each ***Item of Work***.

2. ***Items of Work*** includes the supply and installation of, and shall not necessarily be limited to the following:

   .1 Kiosk enclosure and interior components (feeder cables, protective equipment, etc).

   .2 Connection to existing electrical system to new equipment as indicated on the drawings.

   .3 Feeder cables.

   .4 Documentation including shop drawings, maintenance manuals and final mark-ups for "As-Built" drawings

   .5 Mobilization and demobilization including clean-up

1.23 Evaluation of Changes to the Contract

1. Notwithstanding other provisions of the Contract, this Contractor shall supply detailed information for the valuation of all changes to the Contract. Such information shall include, but not necessarily be limited to, the following:

   .1 Labour hours per unit of material or equipment to be added, deleted, or altered.

   .2 Units of material or equipment to be added or deleted.

   .3 Cost to the Contractor per unit of material, equipment, and labour broken down by category of labour and type of material or equipment.

   .4 Extensions of the above to arrive at total costs.

   .5 Other miscellaneous and identifiable charges as allowed in the General Conditions.

2. Include in the valuation of any change to the Contract the cost, if any, of recording such change on the "As-Built" drawings as previously specified.

2 Products

1. Not used

3 Execution

1. Not used

END OF SECTION

1 General

1.1 Section Includes

1. Teck armoured cable, RW90 XLP, G/GC portable power cable.
2. Wire connectors
3. Box connectors for cable

1.2 Related Work

1. Section 26 05 01 - Electrical General Requirements

1.3 References

1. Wires and Cables
   1 CSA C22.2 No. 0.3, Test Methods for Electrical Wires and Cables
   2 CSA C22.2 No. 65, Wire Connectors
   3 CAN/CSA C22.2 No. 131, Type Teck 90 Cable
2. Wire and Box Connectors
   1 CAN/CSA-C22.2 No. 18, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware
   2 CSA C22.2 No. 65, Wire Connectors

2 Products

2.1 Wire And Cable - General

1. Wire and cable shall be copper conductors, sized as indicated.
2. Except where otherwise directed or required by The Canadian Electrical Code or other applicable regulations, wire and cable insulation shall be Type RW90, cross-linked polyethylene insulated for 600 V and rated not less than 90°C.
3. All conductors #8 AWG and larger shall be stranded, Type RW90, cross-linked polyethylene insulated for 1000 V and rated not less than 90°C.
4. All conductors shall be run in conduit suitable for the application. All new conduits are to be planned and coordinated with PSPC departmental representative.

2.2 Teck Cable

1. Conductors
   1 Grounding and circuit conductors: copper, sized as indicated.
2. Insulation: chemically cross-linked thermosetting polyethylene rated RW90, 600 V.
3. Inner jacket: polyvinyl chloride material.
4. Armour: interlocking aluminum.
5. Overall covering: polyvinyl chloride material.
6. Connectors: watertight, approved for Teck cable installation.

2.3 Portable (FLexible) Power Cable

1. Approved for wet locations, for extra hard usage, 90°C, 2000 V insulation, ultraviolet-resistant black jacket.

2. Type G or Type G-GC, multi-conductor, with separate insulated ground check conductor and separate ground conductors.
3. Type W, single-conductor with separate polyester braid reinforcement between the insulation and jacket.

2.4 Wire and Box Connectors and Miscellaneous Materials

1. Connectors for wire and cable splices and taps: Unless otherwise directed, use 3M Co. 'Scotchlok,' Thomas & Betts PT Series, Buchanan 'B,' IDI Electric 'Super Nut,' or approved equal, for conductors #8 AWG or smaller; Burndy 'Servit' Type KSU or approved equal for conductors #1/0 AWG and smaller; and Burndy 'OKlip' Type KVSU or approved equal for conductors 750 MCM or smaller.
2. Clamps, glanding connectors, or box connectors for armoured cable as required.
3. Lugs, terminals, and screws used for wiring termination to be suitable for either copper or aluminum conductors.
4. Short barrel crimp-on copper compression type connectors as required.
5. Plastic electrical insulation tape: Scotch #88 or equivalent.
6. Kellums grips: double-eye, double-weave, stainless steel.

3 Execution

3.1 Installation - General

1. Perform all installation and provide new materials to match existing unless otherwise noted.

3.2 Installation of Wires and Cables - General

1. All wiring to transformer kiosk and to equipment on floats shall be Type G or Type G-GC unless specifically indicated otherwise.
2. Use no wire smaller than #12 AWG unless otherwise directed.
3. No splices, other than those shown, will be permitted. All splices must be made in junction boxes above water level.
4. Provide a 0.9 meter minimum loop between float sections as shown on drawings.
5. Coil an extra 1.5 meters of cable (mounted at low tide) on landing at bottom of gangway as shown on drawings.
6. All cables and cords shall be adequately supported to avoid strain on connections. Where cords and cables are suspended vertically, use stainless steel cable grips (Kellums or equal).

3.3 Installation of Wire and Box Connectors

1. Remove insulation carefully from ends of conductors and:
    1 Install mechanical pressure-type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CSA C22.2 No. 65.
    2 Install fixture type connectors and tighten. Replace insulating cap.
2. Wire and cable splices and taps shall be made with approved connectors used in accordance with the manufacturer's instructions.
3. Wrap connectors having exposed conductive surfaces after installation with self-fusing rubber electrical tape. Apply enough to provide uniform covering not thinner than the insulation of the

4. largest conductor connected and overlapping the insulation of each connected conductor by not less than 12 mm. Protect the rubber tape with a final overwrap of plastic tape.

END OF SECTION

1 General

1.1 Related Work

1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

1.2 Reference Standards

1 American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE)

2 Transformer grounding shall comply with CSA C22.2 No.41.

3 All grounding conductors to be stranded soft annealed copper unless otherwise noted.

4 Install complete grounding and bonding system for the new work in accordance with Canadian Electrical Code and local inspection authority requirements.

1.3 Testing Requirements

1 Perform ground continuity and resistance tests using method appropriate to site conditions. Provide results to engineer and owner.

2 Any third-party testing agency costs for the testing and reporting shall be included in the Electrical Division base tender and shall be carried out by a pre-approved testing agency.

2 Products

2.1 Materials

1 Grounding equipment to: CSA C22.2 No.41.

2.2 Equipment

1 Clamps for grounding of conductor, size as required.

2 System and circuit, equipment, grounding conductors, bare stranded copper, soft annealed, sized as indicated. Insulation where specified or required to be green.

3 Non-corroding accessories necessary for grounding system, type, size material as indicated, including but not necessarily limited to:

1 Grounding and bonding bushings.

2 Protective type clamps.

3 Bolted type conductor connectors.

4 Thermit welded type conductor connectors.

5 Bonding jumpers, straps.

6 Pressure wire connectors.

2.3 Standards of Acceptance

1 Acceptable manufacturers:

1 Burndy Corp, or approved equivalent.

2 Erico Inc, or approved equivalent.

3 Cadweld , or approved equivalent.

3 Execution

3.1 Installation - General

1 Install complete permanent, continuous bonding to ground system for new equipment from existing ground bar, including conductors, connectors, and accessories. Run bonding wire in every conduit.

2 Provide all grounding and bonding to conform with the latest edition of the Canadian Electrical Code and the latest grounding and bonding instructions of the Inspection Authority, with any further requirements as noted herein or on the drawings.

3 Bonding to ground and grounding conductors shall be as specified elsewhere and shall be bare copper or have green insulation with identification at all ends.

4 Neutral to ground conductors shall be copper conductor of size indicated with white insulation.

5 Install connectors in accordance with manufacturer's instructions.

6 Protect exposed grounding conductors from mechanical injury.

7 Use cable lugs for bonding non-current carrying metallic parts of electrical equipment to ground.

8 Soldered joints are not permitted.

3.2 Grounding Busses

1 Ground items of electrical equipment in electrical room to ground bus with individual bare stranded copper connections size 3/0 AWG or as indicated.

2 Copper or bronze lugs required for termination of all copper conductors at ground busses.

3.3 Post Mounted Luminaire Bonding

1 Provide #10 AWG bonding conductor with green RW90 X-link insulation to luminaire standards. Connect to luminaire corrosion resistant ground stud or ground clamp.

3.4 Field Quality Control

1 Perform tests in accordance with Section 26 05 01.

2 Perform ground continuity and resistance tests using method appropriate to site conditions.

3 Measure ground grid resistance with earth test megohmmeter and install additional ground rods and conductors as required until resistance to ground complies with Code requirements and is less than 1Ω.

4 Carry out all tests required by the Electrical Inspection Authority and provide all required reports and copied to the Consultant. Include all associated costs.

5 Ensure test results are satisfactory before energizing the electrical system.

END OF SECTION

1 General

2 Products

2.1 Support Channels

1 U shape, size 41 x 41 mm, 2.5 mm thick, surface-mounted.

3 Execution

3.1 Installation

1 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.

2 Fasten exposed conduit or cables to boardwalk, approach and wharf construction or support system using straps.

1 One-hole steel straps to secure surface conduits and cables 50 mm and smaller.

2 Two-hole steel straps for conduits and cables larger than 50 mm.

3 Beam clamps to secure conduit to exposed steel work.

3 Suspended support systems.

1 Support individual cable or conduit runs with 6 mm diameter threaded rods and spring clips.

2 Support 2 or more cables or conduits on channels supported by 6 mm diameter threaded rod hangers where direct fastening to building construction is impractical.

3 Support cables in galvanized cable tray where indicated.

4 For surface mounting of two or more conduits use channels at 1 m oc spacing.

5 Provide metal brackets, frames, hangers, clamps, cable tray and related types of support structures where indicated or as required to support conduit and cable runs.

6 Ensure adequate support for raceways and cables dropped vertically to equipment.

7 Do not use wire lashing or perforated strap to support or secure raceways or cables.

8 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Consultant.

9 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

10 Engage a structural engineer to advise and review seismic anchorage and restraint of all new electrical equipment or devices.

END OF SECTION

1 General

1.1 Section Includes

1 Conduits, conduit fastenings, and conduit fittings

1.2 References

1 CAN/CSA C22.2 No. 18, Outlet Boxes, Conduit Boxes, and Fittings and Associated Hardware

2 CSA C22.2 No. 56, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit

3 CSA C22.2 No. 211.2, Rigid PVC (Unplasticized) Conduit

1.3 Location of Conduit

1 Drawings do not indicate all conduit runs. Those indicated are in diagrammatic form only.

2 Coordinate with all other disciplines for installation of conduit on floats. Some of the scope of conduit is supplied by other disciplines, which the contractor is responsible for familiarizing themselves with to install a complete cable system.

2 Products

2.1 Conduits

1 Rigid PVC conduit: to CSA C22.2 No. 211.2

2 Rigid galvanized steel threaded conduit (RGS) to ANSI C80.1.

3 Flexible metal conduit: to CSA C22.2 No. 56, aluminium or zinc-coated steel, liquid-tight. “Spec-Flex” or equivalent.

2.2 Conduit Fittings

1 Fittings: manufactured for use with conduit specified.

2 Factory "ells" where 90° bends are required for 25 mm and larger conduits.

3 Liquid-tight fittings for liquid-tight flexible conduit: equivalent to T&B 'Super-Tite' 5000 Series. All connectors shall have insulated throats.

4 Nylon-Insulated Conduit Bushings: T&B or equal.

2.3 Conduit boxes

1 Cast FS or FD aluminum boxes with factory-threaded hubs and external mounting feet for surface wiring.

2.4 Pull Cord

1 For 25 mm or larger trade size conduit: 6 mm diameter nylon or polypropylene cord or other approved product.

3 Execution

3.1 Installation - General

1 Generally, and where permitted by the Canadian Electrical Code, use rigid PVC conduit for all wiring unless otherwise noted.

2 Do not install PVC where it may be subject to mechanical injury.

3 For any one conduit section, use the maximum possible conduit length. Installations which use partial lengths and/or excessive number of couplings shall not be acceptable and shall be replaced at Contractor's expense.

4 Install exposed conduits in close parallel groups wherever two or more conduits running in the same direction would otherwise be within 1800 mm of each other.

5 Install all conduits parallel or at right angles to structure lines, as the case directs.

6 Do not install conduit through structural members unless specific instructions are given.

7 Install a pull cord in all empty conduits.

END OF SECTION

1 General

1.1 Section Includes

1 Dry type transformers to 600 V.

1.2 Related Work

1 Section 26 05 01 - Electrical General Requirements

1.3 References

1 Canadian Standards Association (CSA International)

1 CSA C9, Dry-Type Transformers.

2 Electrical and Electronic Manufacturer's Association of Canada (EEMAC)

1 EEMAC GL1-3, Transformer and Reactor Bushings.

3 National Electrical Manufacturers Association (NEMA)

4 Transformers shall meet NEMA TP-1 (table 4.2) standards for energy efficiency.

2 Products

2.1 Transformers

1 Transformer provided for the transformer kiosk distribution:

1 ANN, NEMA/CSA Type 2 enclosure

2 Rating: As shown on drawing

3 Voltage taps standard +/- 2½% and +/- 5%

4 Insulation: Class H 220°C insulation

5 Windings: copper or aluminum

6 Basic Impulse Level (BIL): standard

7 Hi-pot: standard

8 Average sound level: 50 dBA maximum

9 Impedance at 170°C: standard

10 Epoxy Potted

2 Transformer shall meet the energy efficiency per CAN/CSA-C802.2-00, Minimum Efficiency Values for Dry-Type Transformers.

3 Transformer shall be manufactured and tested (production tests) in accordance with CSA C9 (current issue) incorporating modifications as specified herein.

4 Dry type transformer shall be as manufactured by Schneider Group, Cutler Hammer, CGE, Rex, Hammond, Delta, Tracon or approved equal.

3 Execution

3.1 Installation

1 Seismic restraint and structural support information shall be provided to the consultant when requested. Provide vibration isolation hangers to prevent transmission to building

structure. Transformer to be installed to ensure adequate air circulation is available on all four sides.

2 Install transformers in level upright position, complete with vibration isolation pads in the base.

3 Loosen isolation pad bolts until no compression is visible.

4 Make primary and secondary connections in accordance with wiring diagram. Conductors shall not enter the transformer through the top of the enclosure.

5 Make flexible aluminum conduit connections on secondary sides of all transformer.

6 Energize transformer after installation is complete.

END OF SECTION

1 General

1.1 Section Includes

1 Luminaires or bulbs

2 Fixtures or luminaire housings

3 Poles or light standards

1.2 Related Work

1 Section 26 05 01 - Electrical General Requirements

1.3 Shop Drawings

1 Submit drawings for product approval prior to purchase:

1 Luminaires used in TRC cabinet fixtures and in float light standard fixtures

2 Fixtures used on float mounted light standards

3 Three meter poles used as light standards installed on floats

4 Photocell installed on top of fixture on float light standards

2 Products

2.1 Luminaire

1 Use luminaire of one manufacturer for all lighting poles.

1 Type ‘A’ Phillips LUMEC SVS-54W16LED4K-T-LE2-UNIV-DMG-RC-WC10-GY3-PH8, pole mounted on 3m pole or equivalent upon approval by the Engineer.

2 Use LED canopy light for all receptacle cabinets and transformer cabinets on floats.

1 Cooper Lumark QD QuadCast # QDCAST1A or equivalent upon approval by the Engineer.

3 Photo control with integrated relay.

2.2 Luminaire Poles

1 Poles shall be 3 metres as required for mounting fixture type, marine grade die-cast aluminium alloy or hot dipped galvanized steel, square poles for float and concrete base mounted light standards. Provide a service door with stainless locking screw and chrome-free conversion coating with superior powdercoat finish in RAL colour to match fixture. Flange plate suitable for mounting on floats and concrete.

1 Type A: 4SS-10-03-0.1 c/w side mount tenon (2 3/8” OD)

3 Execution

3.1 Luminaire & Photocell

1 Mount as indicated on drawings inside lens at top of TRC’s and on floats.

2 As recommended by manufacturer.

END OF SECTION

1 General

1.1 Related Work

.2 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

1.2 Shop Drawings

1 Submit shop drawings in accordance with Section 26 05 01.

2 Shop drawings to include electrical detail of panel, branch breaker type, quantity, ampacity and enclosure dimension.

3 Shop drawings to include matching tub and trim details for factory installed low voltage relay cabinets where specified.

1.3 Plant Assembly

1 Install circuit breakers in panelboards before shipment from plant.

2 Install and prewire low voltage relays assemblies where indicated.

3 In addition to CSA requirements manufacturer's nameplate must show fault current that panel including breakers has been built to withstand.

4 All panelboards to be of a common manufacturer.

1.4 Finish

1 Panel finish in electrical and equipment rooms and closets to be standard ASA Grey baked enamel for normal power service. Confirm with Consultant prior to shop finishing panels.

2 Products

2.1 Panelboards, Doors and Trims

1 Panelboards: to CSA C22.2 No. 29 and product of one manufacturer.

2 Bus and breakers rated for 22 kA symmetrical, minimum, interrupting capacity or as indicated.

3 Tin plated aluminum bus with full size neutral.

4 Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number.

5 Mains, number of circuits and number and size of branch circuit breakers as indicated.

6 Provide all necessary connectors and mounting hardware in every space to facilitate installation of future breakers. Provide blank fillers for all spaces.

7 Concealed hinges and concealed trim mounting screws, hinged locking door with flush catch.

8 Panelboards to have flush doors. (Gasketted where required).

9 Provide two keys for each panelboard and key similar voltage panelboards alike.

10 Panel tubs to be typically 600mm [20”] wide.

11 Provide door within door trims where indicated to facilitate ease of service maintenance Each tub trim cover to be hinged and self-supporting and to swing out to expose breaker cable terminations and wireways. Hinged trim shall be secured with cover screws on opening side by concealed machine screws. Hinged breaker cover shall be recessed into the hinged overall tub cover. Breaker cover shall have latch type closures. Submit details on shop drawings prior to manufacturing.

2.2 Breakers

1 All breakers to be bolt on type, moulded case, non-adjustable and non-interchangeable trip, single, two and three pole, 120/208 (240)V or 347/600V and with trip free position separate from "On" or "Off" positions.

2 Two and three pole breakers to have common simultaneous trip and able to be located in any circuit position within the panelboard. Minimum interrupting rating of breakers to be as follows:

1 120/208V panelboards - 10,000 Amps at 250 volts.

3 Main breaker to be separately mounted at top or bottom of panel to suit cable entry. When mounted vertically, down position should open breaker.

4 Provide circuit breakers with indicated trip ratings as shown in the panelboard schedules.

5 Provide at least 10% spare 15 Amp single pole breakers whether indicated or not.

6 Provide GFI type breakers for all shore power receptacles.

2.3 Panelboard Identification

1 Provide equipment identification in accordance with Section 26 05 01.

2 Nameplate for each panelboard size 5 (2 line) engraved as indicated and include panel designation and voltage/phase.

3 Complete circuit directory with typewritten card(s) located in slide-in plastic pocket(s) fixed to the back of the related door. Directory card to indicate the panel designation, mains size, voltage/phase and the location and load controlled of each circuit. Include a “letter sized” paper copy of each directory in the project maintenance manual.

4 Provide a plasticized typewritten information card fixed to the back of each panel door. Information card to indicate the panel designation and location, feeder type and size and locations of any controlling contactors and feeder pullboxes. Include a “letter sized” paper copy of each information card in the project maintenance manual.

2.4 Standard of Acceptance

1 Siemens Canada, or approved equivalent.

2 Schneider Electric, or approved equivalent.

3 Eaton Cutler Hammer, or approved equivalent.

3 Execution

3.1 Installation

1 Locate panelboards as indicated and mount securely, plumb true and square, to adjoining surfaces.

2 Panelboards located in service rooms, mechanical rooms, and electrical rooms to be mounted on unistrut supports.

3 Mount panelboards to height given in Section 26 05 01 or as indicated.

4 Connect loads to circuits as indicated.

5 Connect neutral conductors to common neutral bus with respective neutral identified.

END OF SECTION

1 General

1.1 Shop Drawings and Product Data

1 Submit shop drawings and product data for enclosures and equipment including detailed fabrication drawings showing materials of construction and assembly.

2 Products

2.1 Equipment - General

1 Outdoor weatherproof enclosures constructed of marine grade aluminum and as shown on the drawings.

2 Removable enclosure panels with formed edges, external component fasteners removable only from inside enclosure.

3 Doors: hinged, with padlocking means.

4 Hinges: heavy duty, stainless steel, non-removable pin for secure compartments.

3 Execution

3.1 Installation

1 Verify that components are assembled inside enclosure in accordance with reviewed shop drawings. Adjust or revise assembly if required.

2 Obtain local CSA approval of completed assembly.

3 Install equipment in locations as per drawings.

END OF SECTION

1 General

1.1 Related Sections

1 Section 26 05 01 - Electrical General Requirements

2 Products

2.1 Receptacles

1 Use tamper resistant receptacles where required by Code and as indicated.

2 Receptacles of one manufacturer throughout project.

3 Receptacles in TRC interior shall be single, twist-lock, marine grade, with melamine body and nylon face. Receptacles shall be as follows:

1 20 A, L5-20R, Hubbell HBL 23CM10 or approved equivalent

2 30 A, L5-30R, Hubbell HBL 26CM10 or approved equivalent

3 50 A, 6-50R, Hubbell HBL 9367 or approved equivalent.

4 Alternate Manufactures: Pass & Seymour, Leviton, or approved equivalent.

2.2 Pin and Sleeve Receptacles

1 Receptacles mounted on the exterior of the kiosk shall be include all mounting plates/boxes as needed.

2 100A, 120V, Hubbell Pin and Sleeve receptacle HBL3100R4W or approved equivalent.

3 150A, 240V, Emerson Pin and Sleeve receptacle ADJA15034-200 or approved equivalent.

4 Alternative Manufacturers: Pass & Seymour, Leviton, Hubbell, Cooper or approved equivalent

3 Execution

3.1 Receptacles

1 Mount receptacles securely within and on enclosures as indicated.

END OF SECTION

1 Materials

.1 Steel pipe piles shall have minimum yield strength of 310 MPa meeting the requirements of the latest edition of at least one of the following specifications:

a) ASTM A252 Grade 3
b) API 5L Grade X46
c) CSA Z245.1-M with the following provisions:

i) Chemical analysis of material shall show the copper content.

ii) All welds shall be full strength and shall satisfy the requirements of either ASTM A53 or CSA Z245.1-M.

iii) Flattening tests for ductility shall be conducted in accordance with the procedure and frequency stipulated in CSA Standard Z245.1-M or ASTM Standard A53.

iv) Unless longitudinal welds are certified as conforming to the requirements of ASTM A252, CSA Z245.1-M or API 5L to the satisfaction of the Departmental Representative, welds shall be 100 percent inspected by ultrasonic or electromagnetic inspection according to the requirements of ASTM A53. This inspection shall be conducted at the Contractor's expense.

v) The Contractor shall bear the expense of repairing and re-inspecting all rejected welds.

vi) Allowable tolerance on dimensions shall meet the requirements of CSA Z245.1-M.

.2 The minimum length of a pile section used in the fabrication of piles shall be 3.0 m.

.3 Welded pipe splices shall have full strength welds.

.4 The Contractor shall provide necessary certification from a certifier acceptable to the Departmental Representative to demonstrate that the material meets the above standards.

2 Handling Piles

.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 Departmental Representative, shall be made good to his satisfaction or replaced.

3 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.

.3 Lengths to be joined shall be manipulated in jigs so that only down-hand welding is employed.

.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.

.5 The longitudinal welds of pipe pile lengths to be joined shall be staggered 90 degrees.

.6 The end profile of a pile section to be butt welded shall not have a deviation of more than 1.0 - 1.6 mm from a plane perpendicular to the axis of the pile.

.7 Maximum deviation of the line of the pile at the splices shall be 3 mm when measured with a 3.0 m straight edge.

.8 All pile splices shall be 100 percent inspected and tested. This inspection shall be conducted at the Contractor's expense.

.9 Inspections of pile splices shall be by non-destructive ultrasonic tests in accordance with the requirements of AWS D1.1; dynamic. The test results shall be made available to the Departmental Representative. 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 Departmental Representative. The cost of correcting defective welds and re-testing shall be borne by the Contractor.

4 Installation of Steel Piles

.1 Piles shall be installed in accordance with Best Management Practice for Pile Driving and Related Operations – BC Marine and Pile Driving Contractors Association – November; 2003.

.2 All piles may be installed with a vibratory hammer, a standard air, diesel, hydraulic or drop hammer to the pile tip elevation shown on the drawing. However, ground conditions may not allow the contractor to vibrate or drive the piles to the specified pile tip elevation. If bedrock is encountered before the specified tip elevation is reached, the piles shall be drilled or socketed into bedrock as shown on the drawings. Piles to be seated in the bedrock as shown on the drawings shall be drive to refusal with a standard air, diesel, hydraulic or drop hammer capable of providing an effective impact energy of at least 60 kNm (~45,000 ft-lb) or as approved by the Departmental Representative.

.3 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.

.4 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.

.5 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.

.6 The driving cap shall fit continuously over the top of the pile and shall project about 150 mm 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.

.7 Piles shall be driven in the positions shown on the drawings. Piles shall be driven and installed within a tolerance of +/- 50 mm in location and within 0.5% from the specified axial

alignment. The Departmental Representative may reject piles driven out of alignment or damaged in any way after inspection. Cost of remedial measures decided by the Departmental Representative shall be borne by the Contractor.

5 Steel Pile Cutting Shoes

.1 The requirements for using pile cutting shoes to be determined by the Contractor.

6 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 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.

7 Pile Driving Records

.1 The Contractor shall maintain an accurate record of pile driving. The Contractor shall submit a copy of the record to the Departmental Representative. The Contractor shall co-operate with the Departmental Representative in maintaining these records. The Contractor shall record for each pile:

- Pile number and location
- Date and time driven
- Length of pile driven
- Type of pile driving hammer
- Cut off elevation
- Penetration in overburden and in bedrock
- Tip elevation
- Final set and hammer energy

8 Temporary Restraint of Driven Piles

.1 The 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.

9 Corrosion Protection

.1 Steel pile piles shall be protected by sacrificial anodes. The anodes will be supplied by the Departmental Representative. Steel pipe piles shall not be painted.

END OF SECTION

1 General

.1 All work to be in accordance with Best Management Practices (BMP) for the use of treated wood in aquatic environments.

2 Material

.1 Pile Material

.1.1 All timber piles shall be round Douglas Fir with a minimum butt diameter of 305 mm (12”) and shall comply in quality with the requirements of Canadian Standard CAN/CSA 056, latest revision.

.2 Fasteners

.2.1 All bolts, nuts, washers, drift pins, spikes and nails shall be hot dip galvanised in accordance with Specification CAN/CSA G164-M.

.2.2 Bolt holes in timber piles shall be bored to provide driving fit. Holes for drift pins shall be 2 mm undersize and longer than the drift pins. Hole sizes of lag screws are to be as specified in Standard CAN/CSA 086.1-M, latest edition.

.2.3 Unless otherwise specified, connection bolts, lag screws or drift bolts shall be placed through the centre of the timber piles and shall not be less than seven times the bolt diameter from the end of the timber pile.

.2.4 Plate washers shall be used under the heads and nuts of all bolts against timber piles.

.2.5 All bolts to meet the requirements of Standard ASTM - A307.

.2.6 Nails, spikes and staples to meet the requirements of Standard CAN/CSA B111-M.

3 Protection

.1 Avoid dropping, bruising or breaking of wood fibres.

.2 Avoid breaking surfaces of treated piles.

.3 Do not damage surfaces of treated piles below cut-off elevation by boring holes or driving nails or spikes into them to support temporary material or staging. Support staging in rope slings carried over tops of piles or by attaching to pile clamps of approved design.

.4 Treat cuts, breaks or abrasions on surfaces of treated piles, bolt holes and field cuts in accordance with Standard CAN/CSA 080-M.

4 Execution

.1 Preparation

.1.1 Protect pile heads during driving and closely fit driving heads to top of pile. Where necessary protect pile heads by means of heavy steel straps or wrought iron rings.

.1.2 Protect treated piles to avoid breaking through the treated surface. Cant hooks and rafting dogs may be used only in the end of piles. No spikes shall be driven into the piles below high-water level. All cuts or breaks in the surfaces of creosote treated piles shall be treated with one coat of approved mastic.

.1.3 Bolt holes with a final position at an elevation above high water level shall be filled with ACZA preservative and the bolts shall be dipped in ACZA preservative concentrate before the bolts are placed. Bolt holes with a final position at an elevation below high water level shall be filled with approved mastic before the bolts are placed.

.1.4 Where timber piles have to be cut for plate washers, the cut surface shall be treated with two coats of ACZA preservative and a further coat of mastic before washers are placed.

.2 Installation

.2.1 Piles shall be installed in accordance with Best Management Practice for Pile Driving and Related Operations – BC Marine and Pile Driving Contractors Association – November; 2003.

.2.2 Piles shall be driven with standard equipment; vibrator, air, steam, diesel or drop hammer approved by the Departmental Representative. Piles shall be driven tip down.

.2.3 Prior to any pile driving, the Contractor shall inform the Departmental Representative about the equipment he intends to use. Based on the type and size of hammer, the Departmental Representative will determine the final set requirements.

.2.4 Piles shall be driven to refusal or to a minimum penetration of 7 m.

.2.5 Piles shall be installed with a maximum deviation of 100 mm at the seabed from the given location and not more than 0.5% off alignment.

.2.6 Timber piles shall be driven in such a way that they are not broken or split. The heads of piles shall be sniped and the tips shall be fresh if the driving is hard in the opinion of the Departmental Representative. A ring or wire mesh shall be used to prevent the head from splitting during hard driving. If the rings or wire mesh do not prevent splitting, steel tension bands 30 mm by 1 mm shall be used. These materials are to be supplied by the Contractor. After driving, the piles shall be cut off at the elevation shown on the drawings.

.2.7 Any pile which is split or otherwise damaged below the cut-off elevation or is driven out of position or location, so that in the opinion of the Departmental Representative it is unfit for the use for which it is intended, shall be removed and replaced with a sound pile, at the Contractor's expense.

.3 Treatment of Pile Tops

.3.1 The tops of all piles shall be treated with two separate coats of ACZA preservative and one coat of approved mastic at least 5 mm thick.

.3.2 In addition, the tops of all piles shall be covered with a sheet of 1 mm annealed corrosion-resistant aluminium cut 150 mm larger than the diameter of the pile top. The overhanging edges shall be crimped and turned down and secured to the piles with eight aluminium roofing nails and shall not be cut to facilitate fitting.

END OF SECTION

1 General

.1 EPS foam billets to have dimensions and be positioned to fill all voids inside the concrete float as shown in the plans and specifications. The foam shall be secured to ensure accurate location and dimensions of the concrete float.

2 Material

.1 All billets are to be fabricated of polystyrene as specified below.

.2 Polystyrene expanded with uniform cellular structure, free of voids. If a beaded product is to be used, beads shall be fused so that, when the product is broken by hand pressure, there is an excess of broken or sheared beads.

.3 Polystyrene properties:

- Minimum compressive strength at 10% deformation of 76 kPa.
- Minimum flexural strength of 124 kPa.
- Maximum water absorption by volume of 4%.
- Minimum density of 16 kg/m^3.

3 Inspection

.1 The Departmental Representative shall be notified at least 1 week prior to fabrication as well as 1 week prior to placing concrete for the float.

END OF SECTION