

Bella Bella

Small Craft Harbour

Electrical System Construction

Specifications

Plans

October 17th, 2017

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1 General

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1.2 LOCATION

1.2.1 The Bella Bella Small Craft Harbour is located in Martins Cove, Bella Bella, B.C.

1.3 DESCRIPTION OF WORK

1.3.1 For Summary of Work and additional requirements, refer to Section 26 05 01 - Electrical General Requirements.

1.4 DOCUMENTS REQUIRED

1.4.1 Maintain one (1) copy each of the following at the job site:

1.4.1.1 Contract drawings.

1.4.1.2 Contract specifications.

1.4.1.3 Addenda to Contract documents.

1.4.1.4 Reviewed shop drawings.

1.4.1.5 Change orders.

1.4.1.6 Other modifications to Contract.

1.4.1.7 Field test reports.

1.4.1.8 Copy of approved work schedule.

1.4.1.9 Manufacturer's installation and application instructions.

1.5 TIME OF COMPLETION

1.5.1 Work is required to be completed by March 15, 2018.

1.6 WORK SCHEDULE

1.6.1 Within seven (7) working days after Contract award, provide a schedule showing anticipated progress stages and final completion of the work within the time period required by Contract documents.

1.6.2 Interim reviews of work progress based on work schedule will be conducted as decided by Engineer and schedule updated by Contractor in conjunction with and to approval of Engineer.

1.7 COST BREAKDOWN

1.7.1 Before submitting first progress claim, submit breakdown of Contract price in detail as directed by Engineer and aggregating contract price. After approval by Engineer, cost breakdown will be used as basis for progress payment.

1.8 CONTRACTOR'S USE OF SITE

1.8.1 Cooperate with other users and contractors on site to minimize interference.

1.8.2 Do not unreasonably encumber site with materials or equipment.

1.8.3 Move stored products or equipment which interferes with operations of the Engineer, harbour master, other contractors, or Harbour users.

1.8.4 Obtain and pay for the use of additional storage or work areas needed for operations.

1.8.5 Hours of work:

1.8.5.1 Perform work during normal working hours of the wharf occupants, Monday through Friday (except holidays). Provide schedule for prior approval by Engineer, harbour master and owner.

1.8.5.2 Work may be performed on weekends and holidays with the prior approval of the Engineer, harbour master and owner.

1.8.6 Do not interfere with harbour operations.

1.9 CODES AND STANDARDS

1.9.1 Perform work in accordance with:

1.9.1.1 Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.9.1.2 Fire Commissioner of Canada (FCC):

1.9.1.2.1 FCC No. 301-1982, Standard for Construction Operations.

1.9.1.2.2 FCC No. 302-1982, Standard for Welding and Cutting.

1.9.1.3 National Research Council (NRC):

1.9.1.3.1 National Building Code of Canada (NBC) 2015.

1.9.1.4 Province of British Columbia:

1.9.1.4.1 Workers Compensation Act (Occupational Health and Safety), Amendment Act, B.C. Reg. 185/99, herein referred to as the Workers Compensation Act (WCA).

1.9.1.5 CSA C22.1-15 Canadian Electrical Code.

1.9.2 If there is a conflict between codes or standards the more stringent requirement shall apply.

1.10 LOCATION OF EQUIPMENT AND FIXTURES

1.10.1 Locations of equipment, fixtures, and outlet equipment as indicated or specified are to be as shown. If not detailed, locations are approximate.

1.10.2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with the manufacturer and owner's recommendations for safety, access and maintenance.

1.10.3 Inform Engineer and owner of impending installation and obtain approval for actual location.

1.10.4 Submit field drawings to indicate position of various services and equipment when required by Engineer.

1.11 SAFETY REGULATIONS AND MEASURES

1.11.1 Construction safety:

1.11.1.1 Observe and enforce construction safety measures required by the following:

1.11.1.1.1 NBC 2015, Part 8 - Safety Measures at Construction and Demolition Sites.

1.11.1.1.2 B.C. Provincial Government.

1.11.1.1.3 Workers' Compensation Board of B.C.

1.11.1.1.4 Municipal statutes and authorities.

1.11.1.2 In event of conflict between any provisions of the above authorities, the most stringent provision will apply.

1.11.1.3 Ensure no part of work is subjected to a load which will endanger its safety or will cause permanent deformation.

1.11.2 Workers' Compensation Board coverage:

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

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

1.11.3 Compliance with regulations:

1.11.3.1 Small Craft Harbours (SCH) may terminate the Contract without liability to SCH where the Contractor, in the opinion of SCH, refuses to comply with a requirement of the Workers' Compensation Act or the Occupational Health and Safety Regulations.

1.11.3.2 It is the Contractor's responsibility to ensure that all workers are qualified, competent and certified to perform the work as required by the Workers' Compensation Act or the Occupational Health and Safety codes, standards and regulations.

1.11.4 Electrical safety requirements:

1.11.4.1 Comply with local authorities and ensure that, when installing new facilities or modifying existing facilities, all electrical personnel are completely familiar with existing and new electrical circuits and equipment and their operation.

1.11.4.2 Before undertaking any work, coordinate required energizing and de-energizing of new and existing circuits with the Engineer.

1.11.4.3 Maintain electrical safety procedures and take necessary precautions to ensure safety of all personnel working under this Contract, as well as safety of other personnel on site.

1.11.5 Electrical lock-out:

1.11.5.1 Develop, implement and enforce use of established procedures to provide electrical lock-out and to ensure the health and safety of workers for every event where work must be done on any electrical circuit or facility.

1.11.5.2 Prepare lock-out procedures in writing, listing step-by-step processes to be followed by workers, including how to prepare and issue the request/authorization form. Have the procedures available for review upon request by Engineer.

1.11.5.3 Keep documents and lock-out tags at the site and list in a log book for the full duration of the Contract. Upon request, make such data available for viewing by the Engineer or by any authorized safety representative.

1.12 CONCEALMENT

1.12.1 Conceal pipes, ducts, cables, and wiring in construction of finished areas and floats except where indicated otherwise.

1.13 CUTTING, FITTING AND PATCHING

1.13.1 Execute cutting (including excavation), fitting, and patching required to make work fit properly together.

1.13.2 Where new work connects with existing and where existing work is altered, cut, patch, and make good to match existing work.

1.13.3 Obtain Engineer's approval before cutting.

1.13.4 Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly.

1.13.5 Where work requires the removal and replacement of timbers, including decking, do not cut timbers. Remove fasteners separately and remove and replace timbers as existing.

1.14 EXISTING CONNECTING SERVICES

- 1.14.1 Where work involve breaking into or connecting to existing services, carry out work at times directed by governing authorities, with minimum of disturbance to pedestrian and vehicular traffic.
- 1.14.2 Before starting work, establish location and extent of service lines in areas of work and notify Engineer of findings.
- 1.14.3 Submit schedule to and obtain approval from Engineer for any shutdown or closure of active service or facility. Adhere to the approved schedule and provide notice to affected parties.
- 1.14.4 Where unknown services are encountered, immediately advise Engineer and confirm findings in writing.
- 1.14.5 Remove abandoned service lines. Cap or otherwise seal lines at cut-off points as directed by Engineer.
- 1.14.6 Record locations of maintained, re-routed and abandoned service lines.

1.15 ALTERATIONS TO EXISTING BUILDING

- 1.15.1 Execute work with least possible interference or disturbance to occupants, public and normal use of premises. Arrange with Engineer, harbour master and owner to facilitate execution of work.
- 1.15.2 Where security has been reduced by work of Contract, provide temporary means to maintain security.
- 1.15.3 Provide warning signs in locations where renovation and alteration work is adjacent to areas used by public or government staff.

1.16 DRAWINGS

- 1.16.1 The drawings and documents listed in Section 00 01 10 shall be considered part of this contract. These drawings shall be used as a reference; the Contractor shall ensure correct dimensions.
- 1.16.2 The Engineer may furnish additional drawings to assist proper execution of the work. These drawings will be issued for clarification only and have the same meaning and intent as if they were included with plans referred to in Contract Documents.

1.17 AS-BUILT DRAWINGS

- 1.17.1 As work progresses, maintain accurate records to show all deviations from the Contract Drawings. Note on as-built drawings as changes occur, and, at completion, supply one (1) set of all drawings and specifications with all deviations clearly marked.

1.18 MATERIAL AND EQUIPMENT

- 1.18.1 Use new material and equipment unless otherwise specified.
- 1.18.2 Within seven (7) days of Engineer's written request, submit the following information for any or all materials and products proposed for supply:

- 1.18.2.1 Name and address of manufacturer.
- 1.18.2.2 Trade name, model and catalogue number.
- 1.18.2.3 Performance, descriptive and test data.
- 1.18.2.4 Manufacturer's installation or application instructions.
- 1.18.2.5 Evidence of arrangements to procure.
- 1.18.3 Provide material and equipment of specified design and quality, performing to published ratings and for which replacement parts are readily available.
- 1.18.4 Use products of one manufacturer for equipment or material of same type or classification unless otherwise specified.
- 1.18.5 Contractor's options for selection of materials for tendering:
 - 1.18.5.1 Materials specified by "**Prescriptive**" or "**Performance**" specifications: select any material meeting or exceeding specifications.
 - 1.18.5.2 Materials specified by **referenced standard**: select any material meeting or exceeding the specified standard.
 - 1.18.5.3 Materials specified to be listed on the **CGSB Qualified Products List**: select any listed manufacturer.
 - 1.18.5.4 Materials specified to meet particular design requirements or to match the existing materials: use only material specified as "**Approved Material**".
 - 1.18.5.4.1 If alternative materials are approved, an addendum to the tender documents will be issued.
 - 1.18.5.5 Materials specified under "**Acceptable Materials**": select any one (1) of the indicated manufacturers, or any other manufacturer meeting or exceeding Prescriptive specifications.
 - 1.18.5.6 When materials are specified by a **referenced standard** or by **Prescriptive** or **Performance** specifications, upon request of Engineer obtain from manufacturer a report from an independent laboratory showing that the material or equipment meets or exceeds the specified requirements.
- 1.18.6 Substitution after Contract award:
 - 1.18.6.1 No substitutions will be permitted without prior written approval of the Engineer.
 - 1.18.6.2 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.
 - 1.18.6.3 Proposals will be considered by Engineer if:

- 1.18.6.3.1 Materials selected by tenderer from those specified are not available;
- 1.18.6.3.2 Delivery date of materials selected from those materials specified would unduly delay completion of Contract; or
- 1.18.6.3.3 Alternative material to that specified, which is brought to the attention of and considered by Engineer as equivalent to the material specified, and will result in a credit to the Contract amount.
- 1.18.6.4 Should the proposed substitution be accepted either 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 result of substitution.
- 1.18.6.5 Amounts of all credits arising from approval of substitutions will be determined by the Engineer, and the Contract price will be reduced accordingly.
- 1.18.7 Manufacturer's instructions:
- 1.18.7.1 Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation methods.
- 1.18.7.2 Notify Engineer in writing of any conflict between these specifications and manufacturer's instructions. Engineer will designate which document is to be followed.
- 1.18.8 Fastenings, general:
- 1.18.8.1 Provide metal fastenings and accessories in same texture, colour, and finish as base metal in which they occur. **Prevent electrolytic action between dissimilar metals.** Use non-corrosive fasteners, anchors, and spacers for securing exterior work.
- 1.18.8.2 Space anchors within limits of load bearing or shear capacity; ensure they provide positive permanent anchorage. Wood plugs are not acceptable.
- 1.18.8.3 Keep exposed fastenings to a minimum. Space evenly and lay out neatly.
- 1.18.8.4 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.
- 1.18.9 Fastenings, equipment:
- 1.18.9.1 Use fastenings of standard commercial sizes and patterns with material and finish **suitable for service in a marine environment.**
- 1.18.9.2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel or hot dip galvanized for exterior areas.
- 1.18.9.3 Bolts may not project more than 1 diameter beyond nuts.
- 1.18.10 Delivery and storage:

- 1.18.10.1 Deliver, store and maintain packaged material and equipment with manufacturer's seals and labels intact.
- 1.18.10.2 Prevent damage, adulteration, and soiling of material and equipment during delivery, handling and storage. Immediately remove rejected material and equipment from site.
- 1.18.10.3 Store material and equipment in accordance with suppliers' instructions.
- 1.18.10.4 Touch-up damaged factory finished surfaces to Engineer's satisfaction. Use primer or enamel to match original. Do not paint over nameplates.

1.19 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

- 1.19.1 Submit shop drawings, product data and samples specified to Engineer for review.
- 1.19.2 Shop drawings:
 - 1.19.2.1 Prepared by Contractor, subcontractor, supplier, or distributor.
 - 1.19.2.2 Illustrate appropriate portion of work, showing fabrication, layout, setting, or erection details as specified in appropriate sections.
- 1.19.3 Product data:
 - 1.19.3.1 Certain specification sections specify that manufacturer's standard schematic drawings, catalogue sheets, diagrams, schedules, performance charts, illustrations and other standard descriptive data will be accepted in lieu of shop drawings, provided that product concerned is clearly identified.
 - 1.19.3.2 Submit in sets, not as individual submissions.
- 1.19.4 Samples: submit in sizes and quantities specified.
- 1.19.5 Submission requirements:
 - 1.19.5.1 Schedule submissions at least five (5) days before dates reviewed submissions will be needed.
 - 1.19.5.2 Submit number of copies of product data and shop drawings which Contractor requires for distribution plus copies which will be retained by Engineer.
 - 1.19.5.3 Accompany submissions with transmittal letter in duplicate.
- 1.19.6 Coordination of submissions:
 - 1.19.6.1 Review shop drawings, product data, and samples before submission.
 - 1.19.6.2 Coordinate with field construction criteria.
 - 1.19.6.3 Verify catalogue numbers and similar data.

- 1.19.6.4 Coordinate each submittal with requirements of the work of all trades and the Contract documents.
- 1.19.6.5 Responsibility for errors and omissions in submittals is not relieved by Engineer's review of submittals.
- 1.19.6.6 Responsibility for deviations in submittals from requirements of Contract documents is not relieved by Engineer's review of submittals, unless Engineer gives written acceptance of specified deviations.
- 1.19.6.7 Notify Engineer in writing, at time of submission, of deviations in submittals from the requirements of the Contract documents.
- 1.19.6.8 After Engineer's review, distribute copies.

1.20 OPERATION AND MAINTENANCE MANUAL

- 1.20.1 On completion of project submit to Engineer three (3) copies of the operation and maintenance data as specified in various sections.

1.21 ENVIRONMENTAL PROTECTION

- 1.21.1 Fires and burning of rubbish on site not permitted.
- 1.21.2 Do not bury rubbish and waste materials on site unless approved by Engineer.
- 1.21.3 Do not dispose of waste or volatile materials such as oil, paint thinner or mineral spirits into waterways, storm, or sanitary sewers.
- 1.21.4 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.
- 1.21.5 Control the disposal of run-off of water containing suspended materials or other harmful substances in accordance with local authority requirements.
- 1.21.6 Protect trees and plants on site and adjacent properties as designated by the Engineer.
- 1.21.7 Cover or wet down dry materials and rubbish to prevent blowing dust and debris.

1.22 CLEANING

- 1.22.1 Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.

1.23 REGULATORY REQUIREMENTS

- 1.23.1 Pay all fees and obtain all permits.
- 1.23.2 Provide inspection authorities with such plans and information as may be required for issue of acceptance certificates.

1.23.3 Furnish inspection certificates in evidence that work installed conforms with requirements of the authority having jurisdiction.

1.24 TEMPORARY FACILITIES

1.24.1 Access:

1.24.1.1 Provide and maintain adequate access to project site.

1.24.1.2 If authorized to use existing roads for access to project site, maintain such roads for duration of Contract. Make good any damage resulting from Contractor's use of roads.

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

1.24.3 Electrical power: available on site.

1.24.4 Scaffolding:

1.24.4.1 Construct and maintain in a rigid, secure, and safe manner.

1.24.4.2 Erect independent of walls.

1.24.4.3 Remove promptly when no longer required.

1.24.5 Remove temporary facilities from site when directed by the Engineer, or harbour master, or owner.

1.25 CONDITION OF STRUCTURE

1.25.1 This structure was constructed many years ago. Many of the bracings, caps and other members are deteriorated from severe marine conditions. The contractor shall take precautions when removing timbers to ensure safety of workmen and the surrounding structure.

END OF SECTION

1 General

1.1 RELATED SECTIONS

1.1.1 The following shall be deemed to be part of all Sections of the Specifications and shall be read in conjunction therewith:

1.1.1.1 Call Up Against a Standing Offer

1.1.1.2 Drawings and Specifications

1.1.1.3 Addenda and Appendices

1.1.2 In addition the following shall be deemed to be part of all Specifications and shall be read in conjunction therewith:

1.1.2.1 Drawing 100247-E1: Harbour Plan and Details

1.1.2.2 Drawing 100247-E2A: Single Line Diagrams

1.1.2.3 Drawing 100247-E2B: Electrical Distribution Diagram

1.1.2.4 Drawing 100247-E3: Receptacle Cabinet Details

1.1.2.5 Drawing 100247-E4: Aluminum Kiosk Details

1.1.2.6 Drawing 100247-E5: Aluminum Kiosk Details

1.1.2.7 Drawing 100247-E6: Aluminum Kiosk Details

1.1.2.8 Drawing 100247-E7: Aluminum Kiosk Details

1.1.2.9 Drawing 100247-E8 Main Service & Distribution Panel, Layout

1.1.2.10 Drawing 100247-S1: Electrical Enclosure Support, Sections and Details

1.1.2.11 Drawing 100247-S2: Steel Bracket Detail, for Cable Support at Float

1.1.3 SeaForce Drawings

1.1.3.1 Drawing 4207-D-02.3 General Arrangement – Float Reconstruction

1.1.3.2 Drawing 4207-D-10.3 Floats A, D & F Layout – Float Reconstruction

1.1.3.3 Drawing 4207-D-20.3 Floats B Layout – Float Reconstruction

1.1.3.4 Drawing 4207-D-30.3 Floats C Layout – Float Reconstruction

1.1.3.5 Drawing 4207-D-40.3 Float E Layout – Float Reconstruction

1.1.3.6 Drawing 4207-D-50.3 Pile Dolphin Details – Float Reconstruction

1.1.3.7 Drawing 4207-D-60.3 Float Connection Details (Typical)

1.1.3.8 Drawing 4900-D-01.3 Walkway Tread Typical Detail

1.1.4 DFO Structural Drawings:

1.1.4.1 Drawing FM9-END-200 Rev.G 2.743m Wide Float Module 2011 Revision

1.1.4.2 Drawing FM9-ST-000 Rev.H 2.743m Wide Float Module 2011 Revision

1.1.4.3 Drawing FM12-END-200 Rev.J 3.65m Wide Float Module 2011 Revision

1.1.4.4 Drawing FM12-ST-000 Rev.I 3.657m Wide Standard Float Module Assembly 2011

Revision

1.2 DEFINITIONS

1.2.1 The following terminology is used in these specifications and the intent of their meaning and use is as follows:

1.2.1.1 The words ***Fisheries & Oceans Canada*** or ***Small Craft Harbours*** or ***DFO*** or ***SCH*** or ***Owner*** and their derivatives shall be taken to mean the person or persons employed by ***Fisheries & Oceans Canada*** and directly involved in the execution of this project.

1.2.1.2 The words ***Engineer*** or ***Consultant*** or ***Owner's Representative*** and their derivatives shall be taken to mean the person or persons with a professional designation registered in the Province of B.C. and in good standing. The Engineer acts on behalf of and in the best interests of the Owner. The primary consultant on this project is ***Ausenco***.

1.2.1.3 The words ***Departmental Representative*** and their derivatives shall be taken to mean the person or persons in the employ of the Owner who oversees the project and has final decision-making power with respect to the project and the contract.

1.2.1.4 The words ***Contractor*** or ***SubContractor*** and their derivatives shall be taken to mean the company that tenders and is subsequently contracted to provide the equipment and services required as defined in these Tender documents, including the assumption of all contracts necessary for the completion of the work described. ***Contractor*** or ***SubContractor*** also includes those persons directly or indirectly employed or contracted or responsible to the company or companies involved in the execution of this project.

1.2.1.5 The words ***Person-in-Charge*** or ***PIC*** and their derivatives shall be taken to mean the person who is assigned by the Contractor as the on-site project supervisor and who is qualified with the requirements of the Electrical Safety Act, in good standing and approved to perform the duties of an Class A Accredited Representative in the Province of BC.

1.2.1.6 The words ***Authorities Having Jurisdiction*** or ***AHJ*** and their derivatives shall be taken to mean those persons or organizations that are responsible for approving equipment, procedures,

and installation methods and can enforce requirements necessary for the safe use, procedures, installation and documentation of work.

- 1.2.1.7 The word **Others** and their derivatives shall be taken to mean the company(s) or person(s) that are working for the Owner on site on the project or other projects. The Contractor shall take the initiative to communicate and coordinate with Others the work to be completed in this Project.
- 1.2.1.8 The words **provide** or **install** and their derivatives shall be taken to mean the procurement, supply, delivery, receipt, storage, placement, fit, connection, installation, seismically fastening, testing and commissioning of the equipment and all miscellaneous work, equipment and materials required to complete the project as stated in the contract documents.
- 1.2.1.9 The words **remove** and their derivatives shall be taken to mean electrical isolation of the device(s) following all safety procedures to ensure de-energization of the device, notification to Owner & Others working on the project or in the area, disconnecting all connections, proper termination & labelling of disconnected conduit/cables/boxes, detaching the isolated device from the circuit, and proper disposal to an Owner-approved depot.
- 1.2.1.10 The word **replace** and its derivatives shall be taken to mean to provide new and remove existing devices as required to complete the project.
- 1.2.1.11 The words **work** or **contract** or **project** and their derivatives shall be taken to mean all the work required to plan, permit, manage, execute and sign-off the work as stated in the contract documents.
- 1.2.1.12 The words **feed, feeder, conduit/cable** and their derivatives shall be taken to mean the conduit and cable system complete with all necessary fittings, boxes, seismic attachments, fastenings, grounding and bonding requirements, roofing penetration requirements, fire ratings, and fire-stopping approved and rated for continuous use in the electrical system as described in the project.
- 1.2.1.13 The words **Receptacle Cabinet** or **RC** and/or **pedestal** or **kiosk** and their derivatives shall be taken to mean the complete cabinet including its panel, receptacles, luminaire, fixture, and all conduit, wiring, cabling, fasteners, fittings, attachments and labels.

1.3 BACKGROUND

- 1.3.1 Fisheries and Oceans Canada, Small Craft Harbours will be upgrading their existing electrical system serving the floats located in Martins Cove, Bella Bella, British Columbia.
- 1.3.2 The existing 120/240V 175A fused service and system is powered by BC Hydro. The existing service 400A disconnect switch and 175A fuses, the associated enclosure and service drop shall be removed and replaced with a new 120/240V 3-wire 400A service drop and main distribution panel (MDP) as indicated on the drawings.
- 1.3.3 The existing 225A rated 120/240V single phase main distribution panelboard (located at the far end of the approach wharf) is currently supplied by the 400A disconnect switch and 175A fuses located in the existing main service entrance enclosure at the head end of the approach wharf.

This panelboard will be renamed "sub-panel" as shown on the Drawings shall be disconnected from the old power supply and re-fed by a 100A branch circuit breaker from the new MDP.

- 1.3.4 The existing six (6) receptacle cabinets (RCs) are currently supplied from the 225A distribution panelboard (sub panel) located at the far end of the approach wharf. These RCs will be replaced with new RCs as shown on the drawings and fed from the new MDP. Three (3) new RCs will be added to Float E and power shall be supplied by the new MDP.
- 1.3.5 The existing RCMP boat-shed located on the N side of Float A, and two house-boats located on the S side of Float A will continue to be supplied by the 225A rated subpanel.
- 1.3.6 The existing HEDC boat-shed will be relocated by Others.
- 1.3.7 The current work is to provide 400A service and single phase distribution system equipment to replace the existing in-use 175A service and single phase distribution system equipment.
- 1.3.8 The existing in-use 175A single phase supply and distribution system shall remain in operation until the new distribution system is constructed and ready to be energized.
- 1.3.9 The Contractor shall provide temporary power to the existing (now called) subpanel, if outages will exceed 4 hours.

1.4 SUMMARY OF WORK

- 1.4.1 Notwithstanding the scope of work stated within the drawings and all sections of this contract, the Contractor is not exempt from and is fully responsible for details omitted or forgotten that contribute to the safe preparation, execution and completion of the Work to a fully functioning, safe, and permanently operational marina electrical system.
- 1.4.2 Provision of temporary power supply as required by SCH during the project.
 - 1.4.2.1 Shutdowns may be required when installing the new electrical equipment on the floats.
- 1.4.3 Provide shop drawings of all new equipment to be provided, for review by Engineer seven (7) working days prior to procurement.
- 1.4.4 RC's enclosures, supplied free issue in Richmond, BC by DFO complete with all components and wiring, shall be received, transported, placed and installed by the Contractor as indicated on the drawings and specifications. Contractor shall take delivery in Richmond, BC and transport and install as required for a safe and fully functioning RC shore power kiosks.
- 1.4.5 Replacement of all float decking removed to install RC's and cables.
- 1.4.6 Provide 400A MDP and enclosure and install adjacent to the existing MDP. Disconnect power from existing sub panel and reconnect from 400A MDP. Provide conduit mast and weather head for BC Hydro connection between its O/H triplex and 400A MDP.
- 1.4.7 Disconnect and remove existing RCs and power supply and remove related junction boxes. Provide all new lighting fixtures and wiring for approach wharf and floats as indicated on the drawings.

1.5 WORK IN PROGRESS

- 1.5.1 Coordination with DFO/SCH operations and other construction work in progress may be required during the execution of this Work.
- 1.5.2 Shutdowns shall require the authorization of the Owner and shall be scheduled five (5) working days in advance with the Owner. The Owner reserves the right to re-schedule shutdowns at any time due to their operations.

1.6 WORK COVERED BY CONTRACT DOCUMENTS

- 1.6.1 Work of this Contract includes, but is not limited by:
 - 1.6.1.1 All precautions necessary to ensure that preparation and shutdown work shall be safely executed while other equipment is energized in the vicinity.
 - 1.6.1.2 Provision of all required equipment, materials, and services for this project as described to properly manage, schedule and coordinate the work in a manner that minimizes the risk of unplanned outages to DFO/SCH and ensures the safety of DFO/SCH personnel, equipment and the public.
 - 1.6.1.3 Provision of a Schedule and Work Plan for the execution of the work in a phased manner such as to minimize the disruption of operations and use by the public and DFO/SCH staff at the site.
 - 1.6.1.4 Receipt and shipping of nine RC enclosure assemblies and installation as required for safe and fully functioning RC shore power kiosks. The provided components include the RC panelboards, main and branch breakers, locking receptacles, luminaire, photocell and internal inter-device wiring.
 - 1.6.1.4.1 **The Owner will supply nine (9) RC enclosures**, which are available for retrieval by the Contractor from Steveston Harbour (Paramount site - 12740 Trites Road, Richmond, BC V7E 3R8) following award of the contract. Each has an RC panel (RCP-1 thru RCP-9) with GFCI breakers, locking receptacles and luminaire integral to it, forming RC-1, to RC-9 shore power kiosks.
 - 1.6.1.5 Provision of Seismic Engineering services including Engineered shop drawings showing seismic anchoring and bracing required for MDP enclosure, mounting of RC's, luminaire bases on Floats and wharfs, and cable trays.
 - 1.6.1.6 Provision of approved seismic attachments, fittings and fasteners as described/directed by the Contractor's Seismic Engineer.
 - 1.6.1.7 Handle all products at site, including un-crating and storage. Protect from damage and exposure to elements during the project.
 - 1.6.1.8 Repair or replace items damaged by Contractor or by Others during pick-up, delivery, off-loading, storage, or installation on site during project duration.

- 1.6.1.9 Install RC's as per this Contract, including all fittings, wiring, connections, fasteners, finishes, adjustments, etc., as required for a safe and continuously energized unit securely fastened to the floats.
- 1.6.1.10 Not Applicable
- 1.6.1.11 Allow inspections as required by Owner, Engineer and AHJ's.
- 1.6.1.12 Provision of all distribution feeder junction and/or pull boxes as required.
- 1.6.1.13 Provision of all required testing, commissioning and training services.
- 1.6.1.14 Provision of all shop drawings, O&M manuals and As Built drawings.
- 1.6.1.15 Provision for tool lockups and job site security.
- 1.6.2 Work of the Contract comprises the provision of all permits, approvals, written instructions, schedules, plans and submitting of same to the Owner, Engineer, and to the AHJ as required, prior to, during and after the execution of the work.

1.7 PERSON-IN-CHARGE (PIC)

- 1.7.1 Provide a full-time on-site qualified and experienced Person-in-Charge (PIC) who is an employee of the Contractor and is acceptable to the Owner for the duration of the Project. The PIC shall be tasked with:
 - 1.7.1.1 Overall responsibility for site planning, coordination, and execution of the Project Work, including shutdowns;
 - 1.7.1.2 Site coordination with the Owner, Engineer, Contractors, and others as necessary to complete the work in an orderly and timely fashion;
 - 1.7.1.3 Provision of shop drawings in a timely manner to the Engineer for approval prior to equipment purchase.
 - 1.7.1.4 Attend all Project Meetings and inspections as required by the Owner and Engineer.
- 1.7.2 The Contractor shall:
 - 1.7.2.1 Provide their PIC with support personnel and services as necessary to enable the Project Work to be completed within a reasonable time;
 - 1.7.2.2 Not replace or substitute their PIC with another PIC during the execution of the work. Should replacement be required under extraneous circumstances, request to do so shall be made in writing and shall be approved by the Owner prior to replacement.

1.8 SHUTDOWN WORK

- 1.8.1 For all Shutdown work, the Contractor shall assign a "Person-in-Charge (PIC)" for the shutdown:

- 1.8.1.1 The PIC shall hold a Safety meeting immediately prior to scheduled Shutdown and obtain signatures of those present.
- 1.8.1.2 The PIC shall be on site at the scene of the work during the entire shutdown and shall be the focal point for communications among the Owner, the Engineer, the Contractor, SubContractors, BC Hydro, other Contractors on site, and other AHJs.
- 1.8.1.3 The PIC shall explain the work to be executed to all present including other Contractors on site, and ensure all safety procedures are followed by those working on-site including lock & tag-out procedures.
- 1.8.1.4 Only those present and signed-in during the safety meeting shall be allowed in the vicinity of the shutdown work to be executed;
- 1.8.1.5 The signed safety meeting agenda shall be submitted to the Owner and Engineer prior to the shutdown being executed.

1.9 WORK BY OTHERS

- 1.9.1 Cooperate and coordinate work with that of other Contractors on-site. If any part of work under this Contract depends for its proper execution or result upon work of another Contractor, report promptly to Owner and Engineer in writing, any defects which may interfere with proper execution of work.
- 1.9.2 Work of Project executed prior to start of, or during the work of this Contract, and which is specifically excluded from this Contract.
 - 1.9.2.1 BC Hydro extension of overhead lines, provision of BC Hydro pole, provision of BC Hydro polemount transformers provision of BC Hydro secondary cables and connection to the DFO Main Disconnect, provision of BC Hydro metering equipment and enclosures

1.10 CONSTRUCTION TIME, SEQUENCE AND PERFORMANCE

- 1.10.1 The Contractor shall provide and maintain in full operation at all times during the work, a sufficient crew of labourers, trades people, and foremen to execute the work with dispatch.
- 1.10.2 All work shall be performed by skilled certified trades people, experienced in their trade, according to the rules and customs for best trade practices for first class work and according to the various trade standards.
- 1.10.3 During work maintain fire extinguisher and fire hose bib connections access/control. Notify the Owner of all work that impacts the access or operation of the existing fire system.
- 1.10.4 The work may be deemed substantially complete when the following are completed, submitted and accepted as such by the Owner and Engineer:
 - 1.10.4.1 All shop drawings and equipment manuals;
 - 1.10.4.2 All deficiency list items completed;
 - 1.10.4.3 All related documentation.

1.11 CONTRACTOR USE OF PREMISES

- 1.11.1 Contractor must adhere to security arrangements as required by the Owner.
- 1.11.2 Limit use of premises for work, for storage and for access, to allow:
 - 1.11.2.1 Owner occupancy;
 - 1.11.2.2 Work by other Contractors;
 - 1.11.2.3 Public usage.
- 1.11.3 Construct work in stages if necessary to provide for continuous public and staff usage. Do not close off public or staff usage of facilities. Coordinate with Owner any work that may interfere with public usage or staff operations.
- 1.11.4 Obtain and pay for use of additional storage or work areas off-site if needed for operations under this Contract.
- 1.11.5 Remove or alter work to prevent injury or damage to portions of existing premises which remain.
- 1.11.6 Repair or replace portions of existing premises which have been altered during construction to match adjoining work, as directed by client and engineer.
- 1.11.7 At completion of operations the condition of original premises shall be equal to or better than that which existed before work started.

1.12 OWNER OCCUPANCY

- 1.12.1 Owner will occupy premises during entire construction period for execution of normal operations.
- 1.12.2 Cooperate with Owner in scheduling operations to minimize conflict and to facilitate Owner usage.

1.13 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

- 1.13.1 Execute work with least possible interference or disturbance to Owner's staff, public and normal use of premises. Arrange with Owner and Engineer to facilitate execution of work.

1.14 EXISTING SERVICES

- 1.14.1 Notify Owner, Engineer and utility companies of intended interruption of services and obtain required permission.
- 1.14.2 Where work involves breaking into or connecting to existing services, provide five (5) working days' notice to Owner and Engineer for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to Owner operations.

- 1.14.3 Where work impacts existing entrance and egress routes, provide alternative routes for personnel, pedestrian and vehicular traffic.
- 1.14.4 Establish location and extent of service lines in area of work before starting work. Notify Owner and Engineer of findings.
- 1.14.5 Submit schedule to and obtain approval from Owner and Engineer for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.
- 1.14.6 Provide temporary services as directed by Owner and Engineer to maintain critical building and marina systems.
- 1.14.7 Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic. Provide safety barricades as necessary to prevent public from access to areas under construction.
- 1.14.8 Where unknown services are encountered, immediately advise client and engineer and confirm findings in writing.
- 1.14.9 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by the AHJ.

1.15 DOCUMENTS REQUIRED

- 1.15.1 Maintain at job site, one copy each document as follows
 - 1.15.1.1 Contract Drawings
 - 1.15.1.2 Specifications
 - 1.15.1.3 Addenda
 - 1.15.1.4 Reviewed Shop Drawings
 - 1.15.1.5 List of Outstanding Shop Drawings
 - 1.15.1.6 Change Orders
 - 1.15.1.7 Field Test Reports
 - 1.15.1.8 Copy of Approved Work Schedule
 - 1.15.1.9 Health and Safety Plan and Other Safety Related Documents
 - 1.15.1.10 Other documents as specified.

END OF SECTION

1 General

1.1 SECTION INCLUDES

- 1.1.1 Health and safety considerations required to ensure that PWGSC shows due diligence towards health and safety on construction sites, and meets the requirements laid out in PWGSC/RPB Departmental Policy DP 073 - Occupational Health and Safety - Construction.

1.2 REFERENCES

- 1.2.1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations
- 1.2.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- 1.2.2.1 Material Safety Data Sheets (MSDS).
- 1.2.3 Province of British Columbia
- 1.2.3.1 Workers Compensation Act, RSBC 1996 - Updated 2006.
- 1.2.3.2 Occupational Health and Safety Act, S.N.S. [1996].

1.3 SUBMITTALS

- 1.3.1 Make submittals in accordance with Section 01 00 10 – General Requirements.
- 1.3.2 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:
- 1.3.2.1 Results of site specific safety hazard assessment.
- 1.3.2.2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.
- 1.3.2.3 Risk Management and Safety Procedure for possible events including but not limited to storm, fire, and fall.
- 1.3.3 Submit one copy of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative weekly.
- 1.3.4 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.
- 1.3.5 Submit copies of incident and accident reports.
- 1.3.6 Submit WHMIS MSDS - Material Safety Data Sheets if requested.
- 1.3.7 Departmental Representative may 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 within 5 days after receipt of comments from Departmental Representative.

- 1.3.8 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.
- 1.3.9 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Departmental Representative.
- 1.3.10 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

1.4 FILING OF NOTICE

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

1.5 SAFETY ASSESSMENT

- 1.5.1 Perform site specific safety hazard assessment related to project.

1.6 MEETINGS

- 1.6.1 Schedule and administer Health and Safety meeting prior to commencement of Work.

1.7 PROJECT/SITE CONDITIONS

- 1.7.1 Work at site will involve contact with:
 - 1.7.1.1 Harbour Manager.
 - 1.7.1.2 Departmental Representative.

1.8 GENERAL REQUIREMENTS

- 1.8.1 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.
- 1.8.2 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

- 1.9.1 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.

- 1.9.2 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

- 1.10.1 Comply with Workers Compensation Act, B.C.
- 1.10.2 Comply with Occupational Health and Safety Regulations.
- 1.10.3 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.11 UNFORSEEN HAZARDS

- 1.11.1 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 Province having jurisdiction and advise Departmental Representative verbally and in writing.

1.12 HEALTH AND SAFETY CO-ORDINATOR

- 1.12.1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:
- 1.12.1.1 Have site-related working experience specific to activities associated with dredging and material transportation.
- 1.12.1.2 Have working knowledge of occupational safety and health regulations.
- 1.12.1.3 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.
- 1.12.1.4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.
- 1.12.1.5 Be on site during execution of Work.

1.13 POSTING OF DOCUMENTS

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

1.14 CORRECTION OF NON-COMPLIANCE

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

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

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

1.15 WORK STOPPAGE

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

END OF SECTION

1 General

1.1 SUMMARY

1.1.1 Documents

1.1.1.1 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.

1.1.2 This section includes:

1.1.2.1 1.2 ABBREVIATIONS

1.1.2.2 1.3 BRIEF SUMMARY OF WORK

1.1.2.3 1.4 PHASING

1.1.2.4 1.5 CODES, STANDARDS, AND REGULATORY REQUIREMENTS

1.1.2.5 1.6 PERMITS, FEES, AND INSPECTION

1.1.2.6 1.7 QUALITY OF WORK

1.1.2.7 1.8 QUALIFICATION OF TRADESMEN

1.1.2.8 1.9 RESPONSIBILITY AND COORDINATION

1.1.2.9 1.10 PROTECTION

1.1.2.10 1.11 DRAWINGS AND MEASUREMENTS

1.1.2.11 1.12 MATERIALS AND EQUIPMENT

1.1.2.12 1.13 IDENTIFICATION

1.1.2.13 1.14 APPROVALS

1.1.2.14 1.15 TESTING AND ADJUSTING

1.1.2.15 1.16 CLEANING AND REPAIR

1.1.2.16 1.17 GUARANTEE

1.1.2.17 1.18 PROJECT DOCUMENTATION: SHOP DRAWINGS, MAINTENANCE MANUALS, "AS-BUILT" DRAWINGS

1.1.2.18 1.19 LOOSE EQUIPMENT

1.1.2.19 1.20 SUBSTANTIAL PERFORMANCE INSPECTION

1.1.2.20 1.21 MEASUREMENT AND PAYMENT

1.1.2.21 1.22 EVALUATION OF CHANGES TO THE CONTRACT

1.2 ABBREVIATIONS

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

1.2.1.1 RC: New Receptacle Cabinet with receptacle panel, receptacles, and top light fixture.

1.2.1.2 Not Used

1.2.1.3 SCH: Fisheries and Oceans Canada, Small Craft Harbours, the Project Owner.

1.2.2 Other abbreviations to CSA Z85.

1.3 BRIEF SUMMARY OF WORK

1.3.1 Refer to Section 01 00 11 Summary of Work.

1.3.2 The work includes but is not limited to:

1.3.2.1 Acceptance, delivery, placing and installation of Contractor supplied RC's.

1.3.2.2 Provision of shop drawings to Engineer for approval prior to the Contractor's purchase of electrical equipment to be installed.

1.3.2.3 Provision of all components required for the installation and safe and continuous operation of RC's.

1.3.2.4 All planning, organizing, scheduling, managing and coordinating as required with BC Hydro, SCH Harbour Manager, SCH Project Manager and the Engineer.

1.3.2.5 Completion of work not completed per deficiency list as compiled by SCH Project Manager and Engineer.

1.4 PHASING

1.4.1 Phase the work to minimize service outages.

1.4.2 Outages shall not exceed 24 hours. Schedule the work to reduce outage duration to less than 4 hours wherever possible.

1.4.3 Prepare a detailed schedule of proposed shutdown of existing power services giving date, time, duration of each shutdown and the services affected and submit to the Engineer and Owner for comment and necessary changes. Provide 2 weeks' notice of proposed shutdown.

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

- 1.4.5 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

- 1.5.1 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.
- 1.5.2 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.
- 1.5.3 All materials shall bear the approval label of the Canadian Standards Association and where applicable, the Underwriters' Laboratories of Canada or alternately shall bear the approval label of another testing agency recognized by the Standards Council of Canada and AHJ or local approval from the Electrical Inspection Department having jurisdiction. Include in the Tender all costs associated with obtaining local approvals.
- 1.5.4 Operating voltages to CAN3-C235.

1.6 PERMITS, FEES, AND INSPECTION

- 1.6.1 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.
- 1.6.2 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.
- 1.6.3 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.
- 1.6.4 Notify Engineer of changes required by Electrical Inspection Department prior to making changes.
- 1.6.5 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

- 1.7.1 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.

1.7.2 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.

1.7.3 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

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

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

1.9 RESPONSIBILITY AND COORDINATION

1.9.1 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.

1.9.2 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.

1.9.3 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.

1.10 PROTECTION

1.10.1 Protect exposed live equipment during construction for personnel safety.

1.10.2 Shield and mark live parts "LIVE 208 VOLTS," or with appropriate voltage.

1.10.3 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

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

1.11.2 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.

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

1.12 MATERIALS AND EQUIPMENT

1.12.1 Equipment and material to be new and CSA or other Canadian recognized equivalent-certified. Where there is no alternative to supplying equipment which is not CSA or acceptably-certified, obtain special approval from Electrical Inspection Department.

1.12.2 Factory assemble service and MDP enclosure, control panels and component assemblies.

1.13 IDENTIFICATION

1.13.1 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.

1.13.2 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.

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

1.13.4 Provide 316L polished lamcooid 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

1.14.1 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 (5) working days prior to the close of tender or of bid depository, whichever is the earlier. *Note that facsimile submittals will NOT be accepted.*

1.14.2 All submissions shall include the following information:

1.14.2.1 Name and identification of specified item.

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

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

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

1.14.3 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.

- 1.14.4 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.
- 1.14.5 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

- 1.15.1 Coordinate and pay for all tests specified herein including further tests as required by authorities having jurisdiction.
- 1.15.2 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.
- 1.15.3 Perform the testing, adjusting, and balancing only when conditions are commensurate with actual operating conditions for the given system.
- 1.15.4 Advise the Engineer 72 hours in advance of each test. Carry out tests in the presence of Engineer.
- 1.15.5 The Electrical Contractor shall use his own forces for the following tests:
- 1.15.5.1 Test phase relationships and polarity at all equipment and outlets and devices.
- 1.15.5.2 Test all circuits originating from branch distribution panels.
- 1.15.5.3 Provide ground resistance tests for all circuits.
- 1.15.6 Submit typed test reports to the Engineer. Include individual insulation resistance results for each feeder utilizing Type G-GC and Teck cable.

1.16 CLEANING AND REPAIR

- 1.16.1 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.
- 1.16.2 Repair, at no cost to the Owner, any equipment or structures damaged by the execution of Contract to its original condition.
- 1.16.3 Replace, at no cost to the Owner, any equipment or structures damaged by the execution of Contract which is irreparable.

1.16.4 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

1.17.1 Use of installed equipment during construction shall not shorten or alter the guarantee.

1.17.2 Unless otherwise noted, the warranty period for all equipment shall commence on the date of Substantial Performance for the entire Construction Contract.

1.17.3 Within a period of one year from the date of final acceptance of work, replace or repair at own expense any defect in workmanship or material.

1.18 PROJECT DOCUMENTATION

1.18.1 Shop Drawings:

1.18.1.1 Submit one electronic plus three (3) prints of all shop and setting drawings or diagrams to the Engineer ten (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.

1.18.1.2 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.

1.18.1.3 Shop drawings shall:

1.18.1.3.1 Be numbered in consecutive order;

1.18.1.3.2 Indicate the specific name of the equipment and where it is to be installed;

1.18.1.3.3 The name of the site/project where installation will occur;

1.18.1.3.4 The name of the manufacturer, make, model, ratings;

1.18.1.3.5 Date of the drawing including notation of latest revision, if any;

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

1.18.1.4 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.

1.18.1.5 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.

- 1.18.1.6 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.

1.18.2 Maintenance Manuals

- 1.18.2.1 Furnish to the Engineer three (3) complete bound sets of typewritten or blueprinted instructions for operating and maintaining all systems and equipment included in this Contract.
- 1.18.2.2 Submit all instructions first in draft for approval prior to final issue.
- 1.18.2.3 Manufacturers' advertising literature or catalogues will not be accepted for operating and maintenance instructions.
- 1.18.2.4 Manufacturers' parts list shall be included in each Maintenance Manual.
- 1.18.2.5 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.
- 1.18.2.6 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.
- 1.18.2.7 Include copies of all applicable guarantees, warranties, inspection approval certificates, and test certificates.

1.18.3 "As-Built" Drawings

- 1.18.3.1 Refer to Division 1 of these Specifications.
- 1.18.3.2 Maintain in the job site office in up-to-date condition, one (1) complete set of whiteprints of each of the Electrical Contract Drawings and one (1) 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.
- 1.18.3.3 "As-Built" drawing markings shall include but shall not be limited to the following:
- 1.18.3.3.1 All changes in circuiting
- 1.18.3.3.2 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.

- 1.18.3.3.3 Number and size of conductors in raceways and cables
 - 1.18.3.3.4 Location of all junction and pull boxes
 - 1.18.3.3.5 All changes to electrical installation resulting from Addenda, Change Orders, and Field Instructions
 - 1.18.3.3.6 Exact location of all services left for future work
 - 1.18.3.3.7 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.**
- 1.18.3.4 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."*
- 1.18.3.5 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 effected by the Engineer until "As-Built" drawing mark-ups are delivered in good order as required herein.

1.19 LOOSE EQUIPMENT

- 1.19.1 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.
- 1.19.2 Copies of such receipts shall be given to the Engineer, with a copy included in Maintenance Manual.

1.20 SUBSTANTIAL PERFORMANCE INSPECTION

- 1.20.1 Before the Engineer is requested to make a Substantial Performance inspection, submit written confirmation that:
 - 1.20.1.1 All equipment is operational, plumb, clean, and correctly labelled
 - 1.20.1.2 All Test Reports have been submitted
 - 1.20.1.3 All certificates of final acceptance from the authorities having jurisdiction have been received and submitted to the Engineer
 - 1.20.1.4 Equipment has been cleaned, touched up, or refinished as necessary to present a new appearance
 - 1.20.1.5 All loose equipment including spare parts and replacement parts have been turned over to the Owner and receipts obtained for same

1.20.1.6 The Maintenance Manual has been submitted

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

1.20.2 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.

1.21 MEASUREMENT AND PAYMENT

1.21.1 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 Monthly Progress Claim. Indicate the labour cost and the material cost separately for each *Item of Work*.

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

1.21.2.1 MDP located in the electrical room of the Harbour Manager's office including connections to new office panel.

1.21.2.2 MDP-2 enclosure and interior components.

1.21.2.3 RC enclosures and interior components.

1.21.2.4 Lighting fixtures, luminaire, photocell, wiring, fitting and components.

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

1.21.2.6 Mobilization and demobilization including clean-up.

1.21.3 Progress claims will not be certified nor payment made beyond 95% before holdback is applied for each item of work as previously defined or on the overall contract until commissioning and verification of the systems have been completed. This procedure is to allow for any necessary deficiency holdbacks on items which do not become apparent until the systems have been fully commissioned and are operational.

1.21.4 Format for Monthly Progress Draws shall be similar to the sample shown at the end of this section.

1.21.5 For each Monthly Progress Draw, change orders shall be listed separately.

1.22 EVALUATION OF CHANGES TO THE CONTRACT

1.22.1 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:

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

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

- 1.22.1.3 Cost to the Contractor per unit of material, equipment, and labour broken down by category of labour and type of material or equipment.
- 1.22.1.4 Extensions of the above to arrive at total costs.
- 1.22.1.5 Other miscellaneous and identifiable charges as allowed in the General Conditions.
- 1.22.2 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

2.1 NOT USED

3 Execution

3.1 NOT USED

END OF SECTION

Draw No.	For the Month of:	19	Project:	Prepared by			
					Contract	To Date	Previous Claim
Item	Labour \$	Material \$	Labour \$	Material \$	Labour \$	Material \$	Notes
These items are to be as generally listed in the Specification and as specifically agreed with the Consultant.							
Sample							
Total							
Total Labour/Material							
							Less 10% Lien Holdback
							Total Claim This Month

Provide the following information with each progress draw:

- A. Material on hand (not installed) previous claim \$ _____
- B. Material from "A" installed this claim \$ _____
- C. Material from "A" not installed this claim (A-B) \$ _____
- D. Material on hand (not installed) added since last claim \$ _____
- E. Total material on hand (not installed) this claim (C+D) \$ _____

1 General

1.1 SECTION INCLUDES

1.1.1 Teck armoured cable, RW90 XLP, G/GC portable power cable

1.1.1 Wire connectors

1.1.2 Box connectors for cable

1.2 RELATED WORK

1.2.1 Section 26 05 01 - Electrical General Requirements

1.3 REFERENCES

1.3.1 Wires and Cables:

1.3.1.1 CSA C22.2 No. 0.3, Test Methods for Electrical Wires and Cables

1.3.1.2 CSA C22.2 No. 65, Wire Connectors

1.3.1.3 CAN/CSA C22.2 No. 131, Type Teck 90 Cable

1.3.2 Wire and Box Connectors:

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

1.3.2.2 CSA C22.2 No. 65, Wire Connectors

2 Products

2.1 WIRE AND CABLE - GENERAL

2.1.1 Unless otherwise directed, wire and cable shall be copper conductors, sized as indicated.

2.1.2 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 with cable assembly rated not less than 90°C, FT-4, SR and XP.

2.1.3 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.

2.2 TECK CABLE

2.2.1 Conductors:

2.2.1.1 Grounding conductor: copper

2.2.1.2 Circuit conductors: copper, size as indicated.

2.2.2 Insulation: chemically cross-linked thermosetting polyethylene, rated type RW90, 600 V.

2.2.3 Inner jacket: polyvinyl chloride material.

2.2.4 Armour: interlocking aluminum.

2.2.5 Overall covering: polyvinyl chloride material and assembly rated FT-4, SR and XP.

2.2.6 Connectors: watertight, approved for Teck cable installation.

2.3 PORTABLE POWER CABLE

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

2.3.2 Type G or Type G-GC, multi-conductor, with separate insulated ground check conductor and separate ground conductors.

2.3.3 Type W, single-conductor with separate polyester braid reinforcement between the insulation and jacket.

2.4 WIRE AND BOX CONNECTORS AND MISCELLANEOUS MATERIALS

2.4.1 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.

2.4.2 Clamps, glanding connectors, or box connectors for armoured cable as required.

2.4.3 Lugs, terminals, screws used for termination of wiring to be suitable for either copper or aluminum conductors.

2.4.4 Copper, short barrel crimp-on compression type connectors as required, sized for conductors.

2.4.5 Plastic electrical insulation tape: Scotch #88 or approved equal.

- 2.4.6 Kellums grips: double-eye, double-weave, stainless steel, hang-distance between support and grip-weave 250mm to 350mm.

3 Execution

3.1 INSTALLATION - GENERAL

- 3.1.1 Unless noted otherwise, perform all installation and provide new materials to match existing.

3.2 INSTALLATION OF WIRES AND CABLES - GENERAL

- 3.2.1 Unless specifically indicated otherwise, all wiring to MDP and to RCs on floats shall be Type G or Type G-GC.
- 3.2.2 All wire from MDP or from RC to luminaires on float light standards to be Teck 90 600V cable.
- 3.2.3 Use no wire smaller than #12 AWG, unless otherwise directed.
- 3.2.4 No splices, other than those shown, will be permitted. All splices must be made in junction boxes above water level.
- 3.2.5 Between float sections provide a 0.9 meter minimum loop as shown on drawings.
- 3.2.6 Coil extra 1.5 meters of cable (mounted at low tide) on landing at bottom of gangway as shown on drawings.
- 3.2.7 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

- 3.3.1 Remove insulation carefully from ends of conductors and:
- 3.3.1.1 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.
- 3.3.1.2 Install fixture type connectors and tighten. Replace insulating cap.
- 3.3.2 Wire and cable splices and taps shall be made with approved connectors used in accordance with the manufacturer's instructions.
- 3.3.3 Wrap connectors having exposed conductive surfaces after installation, with self-fusing rubber electrical tape, applying enough servings to provide uniform covering not thinner than the

insulation of the 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

1.1.1 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

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

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

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

1.2.4 Install complete grounding and bonding system in accordance with Canadian Electrical Code and local inspection authority requirements.

1.3 Testing Requirements

1.3.1 Perform ground continuity and resistance tests using method appropriate to site conditions. Measure ground grid resistance.

1.3.2 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

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

2.2 EQUIPMENT

2.2.1 Clamps for grounding of conductor, size as required.

2.2.1.1 Rod electrodes, copper clad steel 20mm [3/4"] dia by 3m [10'] long or as indicated.

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

2.2.3 Ground bus: copper, size as indicated, complete with insulated supports, fastenings, connectors.

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

2.2.4.1 Grounding and bonding bushings.

2.2.4.2 Protective type clamps.

2.2.4.3 Bolted type conductor connectors.

2.2.4.4 Thermit welded type conductor connectors.

2.2.4.5 Bonding jumpers, straps.

2.2.4.6 Pressure wire connectors.

2.3 STANDARDS OF ACCEPTANCE

2.3.1 Acceptable manufacturers:

2.3.1.1 Burndy Corp.

2.3.1.2 Erico Inc.

2.3.1.3 Cadweld.

3 Execution

3.1 INSTALLATION - GENERAL

3.1.1 Install complete permanent, continuous bonding to ground system, including conductors, connectors, and accessories. Run bonding wire in every conduit. Bond cable trough to ground.

3.1.2 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.

3.1.3 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.

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

3.1.5 Install connectors in accordance with manufacturer's instructions.

3.1.6 Protect exposed grounding conductors from mechanical injury.

- 3.1.7 Use cable lugs for bonding non-current carrying metallic parts of electrical equipment to ground.
- 3.1.8 Connections to switchboards, ground buses, and other equipment.
- 3.1.9 Soldered joints are not permitted.

3.2 GROUNDING BUSSES

- 3.2.1 Provide a ground bus in the MDP. Ground bus shall consist of suitable length of 50mm x 6mm [2"x ¼"] copper bus mounted on a 25mm [1"] insulating standoffs. This bus shall be drilled and tapped to receive all the grounding conductors indicated and an engraved nameplate or tag installed above or below individual conductors indicating their function.
- 3.2.2 Ground items of electrical equipment in MDP to ground bus with individual bare stranded copper connections size 3/0 AWG or as indicated.
- 3.2.3 Copper or bronze lugs required for termination of all copper conductors at ground busses.

3.3 POST MOUNTED LUMINAIRE BONDING

- 3.3.1 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

- 3.4.1 Perform tests in accordance with Section 26 05 01.
- 3.4.2 Perform ground continuity and resistance tests using method appropriate to site conditions.
- 3.4.3 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.
- 3.4.4 Carry out all tests required by the Electrical Inspection Authority and provide all required reports and copied to the Consultant. Include all associated costs.
- 3.4.5 Ensure test results are satisfactory before energizing the electrical system.

END OF SECTION

1 General

1.1 NOT USED

2 Products

2.1 HARDWARE

2.1.1 All hardware shall be stainless steel.

2.1.2 Threaded hanger rods and fittings shall be stainless steel.

2.2 SUPPORT CHANNELS

2.2.1 U shape, size 41 x 41 mm, 2.5 mm thick, surface-mounted, Stainless Steel (SS).

2.3 CABLE TROUGH

2.3.1 Ventilated cable trough, marine-grade stainless steel (316 or better). 900mm wide, 70mm minimum usable load depth, nominal 100mm minimum side rails fabricated as I-Beams, all straight sections shall be supplied in standard 3m lengths. Inside bend radius minimum 300mm. To provide proper cable ventilation in the trough type tray, the valleys of the corrugated bottom shall have manufactured nominal 20mm by 100mmL rectangular de-burred holes punched along the width of the bottom, at appropriate regular intervals along the length axis.

3 Execution

3.1 INSTALLATION

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

3.1.2 Fasten exposed conduit or cables to boardwalk, approach and wharf construction or support system using manufactured pre-formed straps.

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

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

3.1.2.3 SR rated non-metallic beam clamps to secure conduits and cables to exposed aluminium work.

- 3.1.3 Suspended support systems.
 - 3.1.3.1 Support individual cable or conduit runs with 9 mm diameter SS threaded rods and SS spring clips.
 - 3.1.3.2 Support two (2) or more cables or conduits on SS channels supported by 6 mm diameter threaded rod hangers where direct fastening to building construction is impractical.
- 3.1.4 For surface mounting of two or more conduits use support channels at 1 m oc spacing.
- 3.1.5 Provide stainless steel metal brackets, frames, hangers, clamps, cable tray/trough and related types of support structures where indicated or as required to support conduit and cable runs.
- 3.1.6 Bends in cable tray and trough shall be supported at each end and the centre of the bend when over 300mm wide.
- 3.1.7 Ensure adequate support for raceways and cables dropped vertically to equipment.
- 3.1.8 Do not use wire lashing or perforated strap to support or secure raceways or cables.
- 3.1.9 Do not use supports or equipment installed for other trades for cable tray, conduit or cable support except with permission of other trade and approval of Consultant.
- 3.1.10 Install stainless steel fastenings and supports as required for each type of equipment cables conduits and cable tray, and in accordance with manufacturer's installation recommendations.

END OF SECTION

1 General

1.1 SECTION INCLUDES

1.1.1 Conduits, conduit fastenings, and conduit fittings.

1.2 REFERENCES

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

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

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

1.3 LOCATION OF CONDUIT

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

2 Products

2.1 CONDUITS

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

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

2.1.3 Flexible metal conduit: to CSA C22.2 No. 56, aluminium liquid-tight. "Spec-Flex" or equivalent.

2.2 CONDUIT FITTINGS

2.2.1 Fittings: manufactured for use with conduit specified.

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

2.2.3 Factory couplings and Bell-ends.

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

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

2.3 CONDUIT BOXES

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

2.4 PULL CORD

- 2.4.1 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

- 3.1.1 Generally, and where permitted by the Canadian Electrical Code, use rigid PVC conduit for all wiring unless otherwise noted.
- 3.1.2 Do not install PVC where it may be subject to mechanical injury.
- 3.1.3 For any one conduit section, use the longest standard manufactured 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.
- 3.1.4 Install exposed conduits in close parallel groups wherever two or more conduits running in the same direction that would otherwise be within 1800 mm of each other.
- 3.1.5 Install all conduits parallel or at right angles to structure lines, as the case directs.
- 3.1.6 Do not install conduit through structural members unless specific instructions are given.
- 3.1.7 Install a pull cord in all empty conduits.

END OF SECTION

1 General

1.1 SECTION INCLUDES

- 1.1.1 Luminaires or bulbs
- 1.1.2 Fixtures or luminaire housings
- 1.1.3 Poles or light standards

1.2 RELATED WORK

- 1.2.1 Section 26 05 01 - Electrical General Requirements

1.3 SHOP DRAWINGS

- 1.3.1 Submit drawings for product approval prior to purchase:
 - 1.3.1.1 Luminaires used in RC cabinet fixtures and in float light standard fixtures
 - 1.3.1.2 Fixtures used on float mounted light standards
 - 1.3.1.3 Three meter poles used as light standards installed on floats
 - 1.3.1.4 Photocell installed on top of fixture on float light standards

2 Products

2.1 LUMINAIRE

- 2.1.1 Use luminaire of one manufacturer for all lighting poles.
 - 2.1.1.1 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.
 - 2.1.1.2 Type 'B' Phillips LUMEC RFL-180W80LED4K-T-R3S-HVU-DMG-RCD-PH8-GY3 pole mounted on 7.5m pole c/w new concrete base or equivalent upon approval by the Engineer. Provide HVU Voltage package.
 - 2.1.1.3 Type 'C' Phillips LUMEC, RFL-180W80LED4K-T-R3S-HVU-DMG-RCD-PH8-GY3, Type III short throw pole mounted on new 7.5m pole or equivalent upon approval by the Engineer. Provide HVU Voltage package.
- 2.1.2 Use LED canopy light for all receptacle cabinets and cabinets on floats.
 - 2.1.2.1 Cooper Lumark QD QuadCast # QDCAST1A or equivalent upon approval by the Engineer.
- 2.1.3 Photo control with integrated relay.

2.2 LUMINAIRE POLES

2.2.1 Poles shall be 3 and 7.5 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. Service door with stainless locking screw. Chrome-free conversion coating with superior powdercoat finish in RAL colour to match fixture. Flange plate suitable for mounting on floats and concrete.

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

2.2.1.2 Type B: WCE part number# 10050-04 25X8 Galvanized single davit pole.

2.2.1.3 Type C: WCE part number# 10050-04 25X8 Galvanized single davit pole.

3 EXECUTION

3.1 LUMINAIRE & PHOTOCCELL

3.1.1 Mount as indicated on drawings inside lens at top of RC's and on floats.

3.1.1.1 As recommended by manufacturer.

END OF SECTION

1 General

1.1 RELATED WORK

1.1.1 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 SHOP DRAWINGS

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

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

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

1.3 PLANT ASSEMBLY

1.3.1 Install circuit breakers in panelboards before shipment from plant.

1.3.2 Install and prewire low voltage relays assemblies where indicated.

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

1.3.4 All panelboards to be of a common manufacturer.

1.4 FINISH

1.4.1 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

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

2.1.2 Bus and breakers rated for 22 KA symmetrical, minimum, interrupting capacity or as indicated.

2.1.3 Tin plated aluminum bus with full size neutral.

- 2.1.4 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.
- 2.1.5 Mains, number of circuits and number and size of branch circuit breakers as indicated.
- 2.1.6 Provide all necessary connectors and mounting hardware in every space to facilitate installation of future breakers. Provide blank fillers for all spaces.
- 2.1.7 Concealed hinges and concealed trim mounting screws, hinged locking door with flush catch.
- 2.1.8 Panelboards shall have flush doors. (Gasketed where required).
- 2.1.9 Provide two keys for each panelboard and key similar voltage panelboards alike.
- 2.1.10 Panel tubs to be typically 600mm [20"] wide.
- 2.1.11 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

- 2.2.1 All branch 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.
- 2.2.2 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:
- 2.2.3 120/240V panelboards – 22,000 amps at 240 volts. Main breaker to be separately mounted at top or bottom of panel to suit cable entry. When mounted vertically, down position should open breaker.
- 2.2.4 Provide circuit breakers with indicated trip ratings as shown in the panelboard schedules.
- 2.2.5 Provide at least 10% spare 15 Amp single pole breakers whether indicated or not.
- 2.2.6 Provide GFI type breakers for all shore power receptacles
- 2.2.7 Provide means for pad-locking for each breaker.

2.3 PANELBOARD IDENTIFICATION

- 2.3.1 Provide equipment identification in accordance with Section 26 05 01.
- 2.3.2 Nameplate for each panelboard size 5 (2 line) engraved as indicated and include panel designation and voltage/phase.
- 2.3.3 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.
- 2.3.4 Provide a plasticized typewritten information card fixed to the back of the 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

- 2.4.1 Siemens Canada.
- 2.4.2 Schneider Electric.
- 2.4.3 Eaton Cutler Hammer.
- 2.4.4 Square D.

3 Execution

3.1 INSTALLATION

- 3.1.1 Locate panelboards as indicated and mount securely, plumb true and square, to adjoining surfaces.
- 3.1.2 Panelboards located in service rooms, mechanical rooms, and electrical rooms to be mounted on unistrut supports.
- 3.1.3 Mount panelboards to height given in Section 26 05 01 or as indicated.
- 3.1.4 Connect loads to circuits as indicated.
- 3.1.5 Connect neutral conductors to common neutral bus with respective neutral identified.

END OF SECTION

1 General

1.1 REFERENCES

- 1.1.1 CSA C22.2 No. 5, Moulded-Case Circuit Breakers, Moulded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, tenth edition, and the second edition of NMX-J-266-ANCE).
- 1.1.2 Section 26 24 16 – Panelboards Breaker Type.

1.2 PLANT ASSEMBLY

- 1.2.1 Assemble panelboard interior and install circuit breakers before shipment.
- 1.2.2 Panelboards to fit available space within electrical enclosures.

2 Products

2.1 MAIN DISTRIBUTION PANEL (MDP) ENCLOSURE

- 2.1.1 Enclosure (kiosk) shall be sized to fit the 120/240V (600VAC rated), 400A panelboard, main circuit breaker, CT/PT compartment, utility metering, gutter box or wireway, isolated neutral and ground busses and all required conduit and cable connections.
- 2.1.2 Kiosk shall be 12 gauge stainless steel or 3.2mm marine grade aluminium 5052-H32 powder coated ASA grey, to NEMA 4X requirements.
 - 2.1.2.1 Bullet style grease-able hinges;
 - 2.1.2.2 Drip edge on top and sides of doors;
 - 2.1.2.3 Weather strip around all doors.
 - 2.1.2.4 Roof overhang on front;
 - 2.1.2.5 Gutter box for bottom cable entry & exit;
 - 2.1.2.6 Corrosion proof 3 point latch on each door with 9mm pad lock loop and hasp;
 - 2.1.2.7 All hardware shall be stainless steel.
- 2.1.3 Submit shop drawing of kiosk and all components to Engineer for approval prior to procurement.

- 2.1.4 Panelboard, main breaker or safety switch, and other components mounted to backboard inside kiosk. Ground bus and neutral bus mounted to backboard on insulated standoffs.
- 2.1.5 Kiosk shall be complete with C4 support channel front and rear that shall be bolted to wharf deck support steel with minimum half inch galvanized steel bolts, minimum two per support (Net six).
- 2.1.6 Nameplates shall be black lamacoid with white lettering, sized per Drawings. SS machine-screw fixed to kiosk door.
- 2.1.7 Supplier shall be Valid Manufacturing Ltd. or approved equal.

2.2 MAIN DISTRIBUTION PANELBOARD

- 2.2.1 Panelboard shall be rated 600VAC, 400A with 400A main lugs only (through feed), branch breakers, 100% neutral and lugs to fit cables from service entrance supply and to loads.
- 2.2.2 Panelboard shall be mounted on backboard inside kiosk and shall be CSA NEMA Type 12 construction. Submit shop drawings to Engineer for approval.
- 2.2.3 Panels shall be moulded-case, circuit breaker type, 25 kA interrupting rating.
- 2.2.4 Main bus bars shall be of tin-plated copper and equipped with pressure type solderless lugs. All bus work shall be suitably supported to withstand maximum short circuit current of 25 kA RMS amperes symmetrical.
- 2.2.5 Unused circuit positions shall be closed with substantial covers which require tools for removal.
- 2.2.6 Panelboards shall be fitted with a branch circuit grounding terminal bus firmly bonded to the inside of the panel enclosure consisting of a copper grounding bus with one terminal for each circuit position available in the panel. Branch circuit equipment grounding conductors shall terminate at this ground bus. This ground bus shall be connected to the isolated ground bus mounted outside the panelboard.
- 2.2.7 The neutral bus shall be attached but isolated from the panelboard enclosure. Branch circuit neutrals shall terminate on this neutral bus. The neutral bus shall be connected to the isolated neutral bus mounted outside the panelboard.
- 2.2.8 All breakers shall be of the same manufacturer.
- 2.2.9 Breakers shall be bolt-on. Plug-in type circuit breakers shall not be used.
- 2.2.10 Two-pole circuit breakers shall have a common tripping mechanism and single handle. Handle ties are not acceptable.
- 2.2.11 Each breaker shall have provision for pad-locking.

- 2.2.12 Panelboards shall be as manufactured by Siemens Canada, Schneider Electric, Eaton Cutler Hammer, Square D or approved equal.

3 Execution

3.1 INSTALLATION

- 3.1.1 Bolt panels securely to backplane inside electrical kiosk.
- 3.1.2 Connect the isolated neutral bus to the CSA approved isolated ground bus mounted outside the panelboard. Connect the isolated (system) ground bus to the earth ground electrode. Identify all ground bus wiring connections.
- 3.1.3 Upon completion of testing and commissioning, install permanent engraved circuit directory on the inside face of the panelboard.

END OF SECTION

1 General

1.1 REFERENCES

- 1.1.1 CSA C22.2 No. 5, Moulded-Case Circuit Breakers, Moulded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, tenth edition, and the second edition of NMX-J-266-ANCE).
- 1.1.2 Section 26 24 16 – Panelboards Breaker Type.

1.2 PLANT ASSEMBLY

- 1.2.1 Assemble custom RC enclosures from aluminium as per drawings Series AK and Series ATK.
- 1.2.2 Assemble and installed all components inside RC enclosures listed below prior to shipment.
- 1.2.3 Panelboards to be custom-fabricated to fit available space within RC enclosures. Panels to be custom fabricated. Contractor shall coordinate with panelboard manufacturer. Provide 365mm wide and 140mm long panelboard to fit in Receptacle Cabinets (RC's).

2 Products

2.1 PANELBOARDS

- 2.1.1 Panelboards for RC's: 100A 120/240V 1 phase 3 wire 12 circuit 365mm wide with no main breaker.
- 2.1.2 Final assembly of cabinet housing panelboards shall be of CSA NEMA Type 3R construction.
- 2.1.3 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 and phase.
- 2.1.4 Neutral bus of same ampere rating as phase buses.
- 2.1.5 Panelboards shall be stainless steel or non-metallic enclosures with gasketed covers.
- 2.1.6 Main bus bars shall be of tin-plated EC and equipped with pressure type solderless lugs. All bus work shall be suitably supported to withstand maximum short circuit current of 25 kA RMS amperes symmetrical.
- 2.1.7 Panelboards shall be moulded-case, circuit breaker type, with 10kA rated breakers.
- 2.1.8 Provide all necessary jumpers, connectors, etc., for simple field installation of future circuit breakers.
- 2.1.9 Unused circuit positions shall be closed with substantial covers which require tools for removal.

- 2.1.10 All panelboards shall have a branch circuit grounding terminal bus firmly bonded to the inside of the panelboard case consisting of a length of copper grounding bus with one terminal for each circuit position available in the panel. Branch circuit equipment grounding conductors shall terminate at this ground bus.
- 2.1.11 The neutral bus shall be attached but isolated from the enclosure and not connected to the local ground bus. Branch circuit neutrals and the transformer secondary neutral (where applicable) shall terminate on this neutral bus. The neutral bus shall be wired to connect to the MDP neutral bus on shore.
- 2.1.12 All breakers in panelboards shall be of the same manufacturer as panelboard.
- 2.1.13 All breakers for RC's shall be GFCI Class 'A' protected.
- 2.1.14 Plug-in type circuit breakers shall not be used.
- 2.1.15 Two-pole circuit breakers shall have a common tripping mechanism and single handle. Handle ties are not acceptable.
- 2.1.16 Panelboards shall be as manufactured by Siemens Canada, Schneider Electric, Eaton Cutler Hammer, or approved equal.

2.2 BREAKERS

2.2.1 Typical RC (Type A):

- 2.2.1.1 8 x 1P30A GFCI breakers for 30A twist lock receptacles
- 2.2.1.2 2 x 1P15A GFCI breakers for cabinet lighting and float lighting.
- 2.2.1.3 2 x 1P15A SPARE breakers used as panel spacers.

2.2.2 Typical RC (Type B – c/w welding receptacle):

- 2.2.2.1 1 x 2P50A GFCI breaker for 50A twist lock welding receptacle.
- 2.2.2.2 7 x 1P30A GFCI breakers for 30A twist lock receptacles
- 2.2.2.3 2 x 1P15A GFCI breakers for cabinet lighting and float lighting.
- 2.2.2.4 2 x 1P15A SPARE breakers used as panel spacers.

2.3 CABLES

- 2.3.1 Cables for 20A receptacles: 2C #10 AWG Cu RW90 XLPE + #12 AWG Cu bond.
- 2.3.2 Cabinet light fixture: 2C #12 AWG Cu RW90 XLPE + #12 AWG Cu bond.
- 2.3.3 Cables as per Section 26 05 21 WIRES, CABLES, & CONNECTORS 0-1000 V

2.4 RECEPTACLES (Supplied by the Owner)

2.4.1 Provide eight (8) 20A twist lock receptacles in each RC as per section 26 27 26 Wiring Devices.

2.4.2 Provide one (1) 50A and seven (7) 20A twist lock receptacles in each Welding RC as per section 26 27 26 Wiring Devices.

2.5 ENCLOSURE

2.5.1 Receptacle Cabinet (RC): provide custom manufactured aluminium enclosure as per drawings.

2.6 LABELS

2.6.1 Provide lamicoid labels indicated on drawings for receptacle cabinets RC-1 through RC-9 as per section 25 05 01 1.12.

2.7 CSA certification

2.7.1 Provide CSA certification for entire assembly as per 25 05 01 1.11.

3 Execution

3.1 INSTALLATION

3.1.1 Provide all required steel supports for RC enclosures.

3.1.2 Connect neutral conductor to common neutral bus with respective neutral conductor identified with respect to ungrounded conductor.

3.1.3 Anchor the enclosure to the float as directed by the Contractor's seismic engineer.

3.1.4 Upon completion of testing and commissioning, install permanent engraved circuit directory on the inside face of each panelboard.

3.1.5 Panel schedules for RCs shall show phases, breaker ratings, panel ratings, and description of branch circuit loads. Description of circuits feeding receptacles shall include the receptacle CSA configuration designation.

END OF SECTION

1 General

1.1 SHOP DRAWINGS AND PRODUCT DATA

- 1.1.1 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

- 2.1.1 Outdoor weatherproof enclosures constructed of marine grade aluminum and as shown on the drawings.
- 2.1.2 Removable enclosure panels with formed edges, external component fasteners removable only from inside enclosure.
- 2.1.3 Doors: hinged, with padlocking means.
- 2.1.4 Hinges: heavy duty, stainless steel, non-removable pin for secure compartments.

2.2 MDP ENCLOSURE

- 2.2.1 Provide enclosure with cable entry, wireway, panelboard, isolated neutral bus, isolated ground bus and all fittings required for a safe and functioning service breaker, utility metering transformer enclosure, and main distribution panel with service neutral grounding and bond-to-ground systems.

2.3 RC ENCLOSURES (Supplied by Owner in Steveston Harbour - Richmond, BC)

- 2.3.1 Nine (9) RC enclosures shall be supplied by SCH, complete with all components, as specified and indicated on Kiosk drawings, for collection by the contractor from the storage site - at Steveston Harbour (Paramount site - 12740 Trites Road, Richmond, BC V7E 3R8) following award of the contract.
- 2.3.2 Internal components include panel, breakers, receptacles, luminaires, all fittings and connections.

3 Execution

3.1 INSTALLATION

- 3.1.1 Verify that components are assembled inside enclosure in accordance with the drawings. Adjust or revise assembly if required.
- 3.1.2 Obtain local CSA or other AHJ approval of completed assembly.
- 3.1.3 Install equipment in locations as per drawings.

END OF SECTION

1 General

1.1 RELATED SECTIONS

1.1.1 Section 26 05 01 - Electrical General Requirements

2 Products

2.1 RECEPTACLES

2.1.1 All receptacles shall be twist-lock, marine grade, yellow colour.

2.1.2 Receptacles in RC interiors shall be single, twist-lock, marine grade, with melamine body and nylon face. Receptacles shall be as follows:

2.1.2.1 20 A, L5-20R, Hubbell HBL 23CM10 or approved equal

2.1.2.2 30 A, L5-30R, Hubbell HBL 26CM10 or approved equal

2.1.2.3 50 A, L5-50R, Hubbell HBL 63CM70 or approved equal.

2.2 PIN AND SLEEVE RECEPTACLES

2.2.1 [Not used]

2.2.2 20A, 120V, Bryant Pin and Sleeve receptacle c/w unfused mechanical interlock and custom stainless steel stand or approved equal.

3 Execution

3.1 RECEPTACLES

3.1.1 [Not Used]

END OF SECTION