

- 1 Related Work
- .1 Refer to other specification sections for related work.
 - .2 Refer to Section 01 33 00 for Shop Drawings/Submission requirements.
- 2 Codes and Standards
- .1 Do complete installation to CSA C22.1-2015 except where specified otherwise.
 - .2 CSA Electrical Bulletins in force at time of tender submission, while not identified and specified by number in this Division, are to be considered as forming part of related CSA Part II standard and must be complied with.
- 3 Permits, Fees
- .1 Submit to Electrical Inspection Department and Supply Authority the necessary number of drawings and specifications for examination and approval prior to commencement of work.
 - .2 All bidders to carry a lump sum \$2,500.00 (two thousand, five hundred dollars) allowance for all costs levied by the power utility.
 - .1 Utility invoices are to be submitted to the Departmental Representative as proof of payment.
 - .2 All utility costs in excess of \$2,500.00 will be addressed as an extra change order to the contract.
 - .3 Pay all fees levied by the Supply Authority for upgrade and extension of power to the site and/or connection of the project to their system; for existing redundant overhead power cable removals; for pole adjustments and removals, and all other costs levied by utility for completion of project.
 - .4 Co-ordinate and meet requirements of power supply authority. Ensure availability of power when required.
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- 4 As-Built Drawings .1 During progress of the work keep a record of all variations from the working drawings. At completion of the project submit a set of prints showing variations neatly marked in red to the Departmental Representative. Refer to Section 01 33 00 for more specific requirements.
- 5 Work Included .1 Provide all labour and materials and everything that is required for a complete electrical installation, all in accordance with but not necessarily restricted to the specification and the accompanying drawings.
- .2 The work is to include but not necessarily be limited to:
- .1 Installation of new luminaires(3) on existing aluminum poles on the existing stem wharf. Wiring and control of luminaires.
 - .2 Installation of new woodpoles (2) on the Ell wharf with luminaires. Wiring and control of luminaires.
 - .3 Installation and wiring of receptacle (1)on the extension of the ELL wharf.
 - .4 Installation of new poles(2)in the Service Area with luminaires. Wiring and control of luminaires.
 - .5 Installation of direct buried pvc conduits.
 - .6 Installation of surface mounted RGS conduit.
 - .7 Construction of an above grade junction box at intersection of the Stem and ELL wharves.
 - .8 Removal of existing overhead lighting circuit by NSPI as outlined on drawing E-1.
- 6 Minimum Standards .1 The standard established by the drawings and specifications shall not be reduced by any of the codes referred to in 2, and in no instance, will a standard be accepted lower than that established by the Canadian Electrical Code.
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- .2 As a "standard of quality" "acceptable manufacturers" catalogue designations are included in portions of this specification and on plans. These catalogue designations and descriptions are not necessarily listed in order of preference and all manufacturer's meeting this "standard of quality" may not be listed.

7 Supervision

- .1 The Contractor shall provide supervision and a sufficiently qualified foreman to insure that the job proceeds in a proper and efficient manner. If in the opinion of the Departmental Representative, such personnel are not competent to carry out their work, the Contractor shall replace these men immediately upon written request of the Departmental Representative.

8 Materials and Equipment

- .1 All material shall be new unless designated existing to be reused, of the best available quality and CSA/ULC approved for their respective use.
- .2 Where there is no alternative to supplying equipment which is not CSA certified, obtain and pay for special approval from an authorized and approved testing and certification agency.

9 Tests

- .1 Test all wiring, included in the contract, to ensure there are no shorts or grounded conductors and that insulation values are as required by the Canadian Electrical Code.
- .2 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
- .3 Submit test results for Departmental Representatives review.
- .4 Megger line voltage circuits, feeders and equipment up to 350 V with 500 V instrument.
- .5 Replace conductors that fail insulation test.

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10 Protective
Devices

- .1 Ensure circuit protective devices such as over-current trips, relays, and fuses are installed to values and settings as indicated, or required by the Canadian Electrical Code, Part I.

11 Nameplates

- .1 Lamacoid nameplates shall be permanently fixed to loadcentre, junction and pull boxes, enclosures and receptacles.
- .2 Nameplates:
.1 Lamacoid 2 mm thick plastic engraving sheet, black face, white core, mechanically attached.
- .3 Identification to be English and French. Provide one nameplate for each language.
- .4 Size 2 nameplates for pull boxes and junction boxes to indicate circuit numbers contained within.
- .5 Affix Size 2 nameplates to enclosures to identify pole # and or load.
- .6 Affix Size 5 nameplates to backboards adjacent to receptacles according to receptacle designation and circuit number as indicated on drawing.
- .7 Affix Size 5 nameplate, red face, white core, to junction boxes over receptacles to read "Receptacles for Ship to Shore Power Use Only. Improper use is extremely hazardous".

Nameplate Sizes:

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|--------|-------------|---------|--------------------|
| Size 1 | 10 x 50 mm | 1 line | 3 mm high letters |
| Size 2 | 12 x 70 mm | 1 line | 5 mm high letters |
| Size 3 | 12 x 70 mm | 2 lines | 3 mm high letters |
| Size 4 | 20 x 90 mm | 1 line | 8 mm high letters |
| Size 5 | 20 x 90 mm | 2 lines | 5 mm high letters |
| Size 6 | 25 x 100 mm | 1 line | 12 mm high letters |
| Size 7 | 25 x 100 mm | 2 lines | 6 mm high letters |

- 12 Removals and Relocations
- .1 Unless designated otherwise equipment designated for removal other than equipment belonging to the local utility, will become the property of the Contractor and be promptly removed from the site.
 - .2 Coordinate removals and relocations of utility owned equipment with local authority.
 - .3 Pay all associated utility fees for removal, relocation, and/or temporary storage.
 - .4 Relocate and/or install guy wires as required to meet utility standards.
- 13 Cutting, Patching & Painting
- .1 The Contractor shall perform all cutting, patching, and painting necessary for the proper installation of the work and shall repair any damage done, employing only the services of skilled workmen.
- 14 Wiring Identification
- .1 Maintain phase sequence and colour coding throughout.
 - .2 Colour code to CSA C22.1 1998.
- 15 Wiring Terminations
- .1 Lugs, terminals, screws used for termination of wiring to be suitable for copper conductors.
- 16 Manufacturers and CSA Labels
- .1 Manufacturers nameplates and CSA labels to be visible and legible after equipment is installed.
- 17 Completion of Work
- .1 On completion of the project, the Contractor shall remove all debris, and equipment made redundant by new work, and leave the site neat and tidy. Equipment shall be checked for proper fitting and alignment, adjusted as required, cleaned and repainted where necessary.
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- .2 Furnish a Certificate of Acceptance from the local inspection authority on completion of work to the Eastern Passage Harbour Authority.

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PART 1 - GENERAL

- 1.1 Related Work .1 General Instructions: Division 1
- .2 Common Works Results - Section 26 05 01
Electrical

PART 2 - PRODUCTS

- 2.1 Wire & Cable .1 Wire and cable shall conform fully to the latest specifications of the Canadian Standards Association (CSA), Electrical & Electronic Manufacturers Association of Canada, (EEMAC) the Insulated Power Cable Engineers Association (IPCEA), and the American Society of Testing Materials (ASTM).
- .2 Wiring on circuits exceeding 50 V to ground shall be of solid copper of 98% conductivity and of full size AWG gauge, minimum #12. Insulation shall be cross linked polyethylene rated 600 V on conductors smaller than No 8 and 1000 volts larger than No. 10. Wiring shall be colour coded as follows:
Phase A - Black
Phase B - Red
Neutral - White
Ground - Green
- .3 Copper conductors sized as indicated with 600 V insulation of Chemically cross-linked thermosetting polyethylene material rated RW 75: to CSA C22.2 No. 75-M1983.
- .4 Teck Cable; Rated 90°C:
.1 Conductor: Class B stranded soft copper.
.2 Insulation: cross-linked polyethylene or ethylene propylene rubber, as approved by CSA on Types RW75, X-LINK, Minus 40°C per CSA C22.2, No. 131 (and IPCEA).
.3 Identification: Surface color coding for sizes up to and including #2 AWG. For sizes larger than #2 AWG; number coding.
.4 Grounding Conductor: grounding conductor included in the cable assembly.
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- .5 Multiple conductor cables assembled with suitable fillers and binder tape.
- .6 Inner Jacket: Polyvinyl Chloride (PVC) heat, flame and moisture resistant jacket, suitable for installation in temperatures down to Minus 40°C.
- .7 Armour: Aluminum interlocking armour.
- .8 Outer Jacket: Polyvinyl Chloride (PVC) heat, flame and moisture resistant jacket, black, suitable for installation in temperatures down to Minus 40°C.
- .9 Size and number of conductors as indicated on the drawings.

- .5 Type SOOW Service Cord
 - .1 Designed for outdoor/ indoor use with marine dockside power and mining applications.
 - .2 Multiconductor cables of bare annealed copper ASTM B-3 flexible bunch strands with colour coded synthetic rubber insulation.
 - .3 Temperature Range: -40C to +90C.
 - .4 Voltage rating: 600 V.
 - .5 Approvals: CSA C22.2 No.49 FT1/FT2, UL-62.
 - .6 Bond wire listed as a conductor, used for grounding purposes only.

2.2 Wire
Connections

- .1 Splices and joints in circuit wiring shall be made using: a) Mechanical split bolt connectors. Acceptable manufacturers - Thomas & Betts; Ilsco.
- .2 Nickel Plated Brass, liquid tight cable glands (connectors) c/w threaded lock nuts for entrance to junction boxes and device boxes. Sized to suit individual cable diameters.

PART 3 - EXECUTION

3.1 Installation of
Wire & Cable

- .1 Identify wiring with permanent indelible identifying marks, either numbered or coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit.

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- .2 Maintain phase sequence and colour coding throughout in accordance with Item 4-036 of the Canadian Electrical Code Part I.
- .3 Install TECK cables as indicated on the drawings.
- .4 Support TECK cables as indicated on drawings and according to requirements of the Canadian Electrical Code. Use corrosion resistant cable supports.
- .5 New Teck cables to be continuous with no splices.

3.2 Wire & Cable
Connection

- .1 All connections shall be made electrically and mechanically secure. Sizes of connectors shall be according to manufacturer's recommendations for each wire size and combination of wires.
- .2 Install liquid tight cable glands (connectors) at all flexible cable termination points ie... junction boxes and devices boxes.
- .3 Provide galvanized steel cable guards, to protect Teck Cables at all poles, to meet utility standards. Paint with two coats marine grey enamel.

PART 1 - GENERAL

- 1.1 References .1 Canadian Standards Association (CSA)
.1 CAN/CSA C22.2 No. 18-98, Outlet Boxes,
Conduit Boxes, and Fittings and Associated
Hardware.

PART 2 - PRODUCTS

- 2.1 Conduits .1 Rigid pvc conduit: to CSA C22.2 No. 211.2.
.2 Rigid galvanized steel; threaded conduits:
to CSA C22.2 No. 45.
- 2.2 Conduit
Fastenings .1 PVC coated one hole steel pipe straps for
surface conduits less than 50 mm and
smaller. Two hole PVC coated steel pipe
straps for conduits larger than 50 mm.
.2 Rigid galvanized steel channel type supports
for two or more conduits at 1.5 m oc.
.3 Galvanized fastening hardware.
.4 Male and female threaded PVC adapters.
- 2.3 Conduit
Fittings .1 Factory "ells" where 90° bends are required
for 25 mm and larger conduits.
.2 Steel set screw connectors and couplings for
EMT.
- 2.4 Expansion
Fittings for Rigid
Conduit .1 Weatherproof expansion fittings with
internal bonding assembly suitable for 200
mm linear expansion.
.2 Watertight expansion fittings with integral
bonding jumper suitable for linear expansion
and 19 mm deflection in all directions.
.3 Weatherproof expansion fittings for linear
expansion at entry to panel.
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2.5 Fish Cord .1 Polypropylene.

PART 3 - EXECUTION

- 3.1 Conduit Installation
- .1 All conduits and cables shall be kept parallel or perpendicular to wharf lines. All conduits shall be securely held in place at intervals and with supports as required by the Canadian Electrical Code.
 - .2 Conduit openings shall be sealed with plugs or caps to prevent entrance of foreign materials. Where conduits pass through a waterproof membrane an oversize sleeve shall be installed and caulking applied to maintain the waterproof properties of the membrane.
 - .3 Conduit shall not pass through structural members without the permission of the Departmental Representative.
 - .4 Sufficient number of fittings shall be used to permit easy pulling of wires. Conduits shall be continuous. To ensure the conduit is clean and dry before conductors are pulled in, the conduit shall be swabbed out by using a drag consisting of tight rubber washers.
 - .5 Install service masts and weatherheads to local utility standards.
 - .6 Touch up all marked surfaces using manufacturer's recommended materials and methods.
- 3.2 Fastenings and Supporting Devices
- .1 Secure all equipment in a manner, so as to not distort or cause undue stress on any components.

PART 3 - EXECUTION

- 3.1 Cable Installation in Conduits
- .1 Install cables as indicated in conduits.
 - .2 Do not pull spliced cables inside conduits.
 - .3 Install multiple cables in conduit simultaneously.
 - .4 Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.
 - .5 Before pulling cable into conduits and until cables properly terminated, seal ends of lead covered cables with wiping solder; seal ends of non-leaded cables with moisture seal tape.
 - .6 After installation of cables, seal conduit ends with dust sealing compound.
- 3.2 Field Quality Control
- .1 Perform tests in accordance with Section 26 05 01 Common Work Results - Electrical.
 - .2 Perform tests using qualified personnel. Provide necessary instruments and equipment.
 - .3 Check phase rotation and identify each phase conductor of each feeder.
 - .4 Check each feeder for continuity, short circuits and grounds. Ensure resistance to ground of circuits is not less than 50 megohms.
 - .5 Pre-acceptance test(s).
 - .1 After installing cable but before splicing and terminating, perform insulation resistance test with 500V megger on each phase conductor of the 120 /240 volt system.
 - .2 Check insulation resistance after each splice and/or termination to ensure that cable system is ready for acceptance testing.
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- .6 Provide Departmental Representative with list of test results showing location at which each test was made, circuit tested and result of each test.
 - .7 Remove and replace entire length of cable if cable fails to meet any of test criteria.

PART 1 - GENERAL

- 1.1 Related Work .1 Common Work Results - Electrical: Section 26 05 01.
.2 Division 1.

PART 2 - PRODUCTS

- 2.1 Receptacle .1 20 amp, 125 volt, simplex, locking, female receptacle. CSA configuration L5-20R. Standard of acceptance: Hubbell Marine product series HBL23CM10. Other manufacturers meeting this specification will be accepted.
.1 Device box: surface mounted in a "Watertite" device box. Yellow in colour.
.2 Polycarbonate hinged and gasketed cover.
.3 Receptacle device box and "in use" cover to be products of the same manufacturer.
.2 20 amp, 120 volt, 60Hz, ground fault circuit interrupter module. Yellow in colour. Automatic trip adjustment.
.1 Trip level: 4 to 6 ma.
.2 Trip time: 0.025 seconds. Nominal.
.3 High impact, UV stabilized rigid PVC housing.
.4 Power "ON" neon indicator light.
.5 CSA certified, UV listed.
.6 Device box; duplex device box surface mounted complete with a polycarbonate, hinged and gasketed cover.
.7 Standard of acceptance: Hubbell marine product series #GFM20A. Other manufacturers meeting this specification will be accepted.
- 2.2 Junction/Pull Boxes .1 Molded PVC or Fibreglass. Reinforced junction and/or pull boxes.
.1 With screw down gasketed cover.
.2 Stainless steel screws.
.3 Conduit hubs.
.4 External mounting feet.
.5 Corrosion resistant.
.6 Approved for wet marine environments.
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- .7 Size as indicated or as per CEC.
- .2 Cast PVC Junction Box.
 - .1 With overlapping screw down gasketed cover.
 - .2 Stainless steel screws.
 - .3 Conduit hubs.
 - .4 External mounting feet.
 - .5 Corrosion resistant.
 - .6 Approved for wet marine environments.
 - .7 Size as indicated or as per CEC.

PART 1 - GENERAL

- 1.1 Product Data .1 Submit product data in accordance with Section 01 33 00 - Shop drawings and Other Submittal Procedures..
- .2 Include time-current characteristic curves for breakers with ampacity as indicated in drawing with interrupting capacity of 22,000 A symmetrical (rms) and over at rated system voltage.

PART 2 - PRODUCTS

- 2.1 Breakers
General .1 Bolt-on moulded case circuit breaker: quick-make, quick-break type, for manual and automatic operation with temperature compensation for 40°C ambient.
- .2 Common-trip breakers: with single handle for multi-pole applications.
- .3 Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting. Trip settings on breakers with adjustable trips to range from 3-8 times current rating.
- .4 Circuit breakers with interchangeable trips as indicated.

- 2.2 Thermal
Magnetic Breakers .1 Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.

PART 3 - EXECUTION

- 3.1 Installation .1 Install as indicated on schedule drawing.

PART 1 - GENERAL

- 1.1 Shop Drawings and Product Data .1 Submit shop drawings and product data in accordance with Section 01 33 00- Shop Drawings and other submittal procedures.

PART 2 - PRODUCTS

- 2.1 Deck Lighting .1 Marine Rated, LED luminaires.
.1 168 watt input, 120 volt.
.2 1000 ma driver.
.3 4000k colour temperature.
.4 IP66 Rated.
.5 R3 Roadway Type III distribution.
.6 Die-cast aluminum; polyester powder coat finish. Gray in colour.
.7 Enhanced corrosion resistant finish rated at 5000 hour exposure to salt spray.
.8 Galvanized steel mounting brackets and hardware suitable for mounting on timber poles.
.9 Standard of acceptance: Holophane Mongoose Series or equal.

- 2.2 Flood Lighting .1 Marine grade LED flood light.
.1 Light output: 177 watt (400W equivalent), vertical distribution.
.2 Die-cast aluminum with copper alloy housing. Epoxy primer, grey finished coat.
.3 4000k colour temperature with a 70 CRI (minimum).
.4 4 modules.
.5 1000 m a driver.
.6 UL standard 1598A (salt water) marine outside tested.
.7 Optical enclosure to be sealed and gasketed to IP66 rating.
.8 Standard of acceptance: Holophane Predator medium LED series.
.9 Galvanized wood pole bracket for Yoke mounting cat # BKT-4G.
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- 2.3 Timber Poles .1 Timber poles to be Jack Pine, to CSA 015.
Pressure or vacuum treated with Penta
preservatives.
- .2 Pole to be Class 3, 10.7M in total length.
- 2.4 Lighting Controls .1 Photo Controls
- .1 Conduit wired photo control.
- .2 Manually adjustable level slide.
- .3 120V, 16.5 amps, 2000 watts.
- .4 Light levels: On at 1.5 F.C. - OFF
at 10 F.C.
- .5 Standard of Acceptance: Paragon
Cat. # CW-201 or equal.
- .2 Lighting Contactors
- .1 Mounted on plywood backboard.
- .2 20 A, 120 V, 60 Hertz coil; 20
amp., 240 V contacts, 2 pole.
- .3 Electrically held.
- .4 EEMAC 4x Watertight, corrosion
resistant stainless steel enclosure.
- .5 Standard of Acceptance:
Allen-Bradley Cat. # 500L-BCD920 or
equal.

PART 3 - EXECUTION

- 3.1 Installation .1 Poles - install poles as indicated and to
utility standards.
- .2 Luminaires - Install luminaires as indicated
and connect to lighting circuits and
controls.
- .3 Ensure proper operation.
- .4 Luminaires and mounting brackets to be
products of one manufacturer.