
PART 1 - GENERAL

1.1 RELATED WORK

- .1 Refer to other specification sections for related work.
- .2 Refer to Section 01 33 00 for Shop Drawings/Submission requirements.

1.2 CODES AND STANDARDS

- .1 Do complete installation to CSA C22.1-2018 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.

1.3 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 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 project.

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- 1.3 PERMITS, FEES (Cont'd) .3 All bidders to carry a lump sum \$3,000.00(three thousand 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 \$3,000.00 will be addressed as an extra change order to the contract.
- 1.4 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.
- 1.5 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 the:
 - .1 The removal of all existing electrical equipment, including: meter base, service entrance rated disconnect, distribution panel, poles, receptacles, derrick controls and all associated cabling, wiring and conduits.

1.5 WORK INCLUDED (Cont'd)

- .2 Removals by NSPI include:
existing overhead secondary
feed, existing pole mounted
lights and existing meter.
- .3 Construction of new electrical
building as indicated on the
electrical drawings.
- .3 The supply and installation of
new equipment including: meter
base, service entrance rated
circuit breaker, transformer,
distribution panels, junction
boxes, lighting controls and
customer sub-metering equipment
in new electrical building.
- .4 Power shrouds (x6): Supply and
install new receptacles on
galvanized steel shrouds and
all associated wiring, conduits
and cabling as indicated on the
electrical drawings.
- .5 Supply and install 7 new
treated timber poles with new
LED luminaires and all
associated wiring/cabling as
indicated on the electrical
drawings
- .6 The supply, installation and
construction of electrical
direct buried conduits and
concrete encased duct banks.
- .7 The supply and installation of
new derrick controls and all
associated wiring/cabling.

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.

1.7 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 Engineer, such personnel are not competent to carry out their work, the Contractor shall replace these personnel immediately upon written request of the Departmental Representative.

1.8 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.

1.9 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 Representative review.
- .4 Megger line voltage circuits, feeders and equipment up to 350 V with 500 V instrument; feeders and equipment to 600 V with 1000 V instruments.
- .5 Replace conductors that fail insulation test.

1.10 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.

1.11 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.

1.11 NAMEPLATES (Cont'd)

- .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 circuit numbers.
- .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

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

1.12 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.

1.13 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 personnel.

1.14 WIRING IDENTIFICATION

.1 Maintain phase sequence and colour coding throughout.
.2 Colour code to CSA C22.1 1998.

1.15 WIRING TERMINATIONS

.1 Lugs, terminals, screws used for termination of wiring to be suitable for copper conductors.

1.16 MANUFACTURERS AND CSA LABELS

.1 Manufacturers nameplates and CSA labels to be visible and legible after equipment is installed.

1.17 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.
- .2 Furnish a Certificate of Acceptance from the local inspection authority on completion of work to the Departmental Representative if required and if available.

END OF SECTION

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 & Electronics 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 on 600 volt conductors smaller than No 8 and the same on 1000 volt conductors 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 1000 V insulation of chemically cross-linked thermosetting polyethylene material rated RW 90: to CSA C22.2 No. 75-M1983.

2.2 WIRE CONNECTIONS

.1 Splices and joints in circuit wiring shall be made using: a) Mechanical split bolt connectors.

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.

.2 Maintain phase sequence and colour coding throughout in accordance with Item 4-032 of the Canadian Electrical Code Part I.

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.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Common Works Results - Section 26 05 01
Electrical

1.2 REFERENCES

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

.2 Canadian Standards Association, (CSA
International)

PART 2 PRODUCTS

2.1 EQUIPMENT

.1 System and circuit, equipment, grounding
conductors, bare stranded copper, un-tinned,
soft annealed, size as indicated.

.2 Insulated grounding conductors: green,
type RW90 to Section 26 05 21.

.3 Rod electrodes: copper clad steel, 19 mm
dia by 3000 mm long.

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

.1 Grounding and bonding bushings.

.2 Protective type clamps.

.3 Bolted type conductor connectors.

.4 Thermit welded type conductor
connectors.

2.1 EQUIPMENT (Cont'd)

- .5 Bonding jumpers, straps.
- .6 Pressure wire connectors.
- .7 Ground bar (copper) size as indicated on drawings. Glass stand-off insulators.
- .8 Copper grounding lug to ground bars. Double barrel size to accommodate various size ground wires.

PART 3 - EXECUTION

3.1 INSTALLATION GENERAL

- .1 Install complete permanent, continuous, system and circuit, equipment, grounding systems including, electrodes, conductors, connectors, accessories, as indicated, to conform to requirements of Departmental Representative, and local authority having jurisdiction over installation. Where EMT is used, run separate ground wire in conduit.
- .2 Install rod electrodes and make grounding connections.
- .3 Install connectors in accordance with manufacturer's instructions.
- .4 Protect exposed grounding conductors from mechanical injury.
- .5 Use mechanical connectors for grounding connections to equipment provided with lugs.
- .6 Soldered joints not permitted.
- .7 Install an integral bonding wire in all conduits, connected at both ends to grounding bushing, solderless lug, clamp or cup washer and screw.

3.1 INSTALLATION GENERAL (Cont'd)

.8 Install separate ground conductor to outdoor lighting standards.

.9 Make connections to ground bar(s) and to ground bus in service board as shown on drawings.

3.2 SYSTEM AND CIRCUIT GROUNDING

.1 Install system and circuit grounding connections to neutrals of the secondary 600/347 V system.

3.3 EQUIPMENT GROUNDING

.1 Install grounding connections to typical equipment included in, but not necessarily limited to following list. Service equipment, transformers, distribution panels and outdoor lighting.

3.4 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 01.

.2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation.

.3 Perform tests before energizing electrical system.

END OF SECTION

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.

.2 CSA C22.2 No. 83-M1985 (R1999), Electrical Metallic Tubing.

PART 2 - PRODUCTS

2.1 CONDUITS

.1 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings.

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

2.2 CONDUIT FASTENINGS AND SUPPORTS

.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 Galvanized fastening hardware.

.3 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.

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 site 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.

3.1 CONDUIT INSTALLATION (Cont'd)

.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 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.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

- .1 General Requirements: Division 1.
- .2 Common Work Results: Electrical
Section 26 05 01.
- .3 Excavation and Backfilling:
Section 31 23 10.

PART 2 - PRODUCTS

2.1 PVC DUCTS

- .1 PVC ducts, type DB2, encased in reinforced concrete.
- .2 Rigid PVC opaque solvent welded type couplings, bell end fittings, plugs, caps, adaptors as required to make complete installation.
- .3 Expansion joints.
- .4 Rigid PVC 5° angle couplings.

2.2 DIRECT BURIED CONDUITS

- .1 Rigid PVC conduit type II and fittings, solvents weld couplings, factory bends in sizes larger than 32 mm, field bends and offsets for sizes less than 32 mm.

PART 3 - EXECUTION

3.1 INSTALLATION GENERAL

- .1 Install underground duct banks including formwork.

3.1 INSTALLATION GENERAL (Cont'd)

.2 Build duct bank on undisturbed soil or on well compacted granular fill not less than 150 mm thick, compacted to 95% of maximum proctor dry density.

.3 Install ducts at elevations and with slope as indicated and minimum slope of 1 to 400.

.4 Install base spacers at maximum intervals of 1.5 m levelled to grades indicated for bottom layer of ducts.

.5 Lay PVC ducts with configuration and reinforcing as indicated with preformed interlocking, rigid plastic intermediate spacers to maintain spacing between ducts at not less than the spacing's shown on the drawings. Stagger joints in adjacent layers at least 150 mm and make joints watertight. Encase duct bank with 150 mm thick concrete cover as indicated on the drawings.

.6 Make transpositions, offsets and changes in direction using 5° bend sections, do not exceed a total of 20° with duct offset.

.7 Use bell ends at duct terminations through slabs or at buildings.

.8 Use conduit to duct adapters when connecting to conduits.

.9 Terminate duct runs with duct coupling set flush with the end of concrete envelope when dead ending duct bank for future extension.

.10 Cut, ream and taper end of ducts in field in accordance with manufacturer's recommendations, so that duct ends are fully equal to factory-made ends.

3.1 INSTALLATION GENERAL (Cont'd)

.11 Allow concrete to attain 50% of its specified strength before backfilling.

.12 Use anchors, ties and trench jacks as required to secure ducts and prevent moving during placing of concrete. Tie ducts to spacers with twine or other non-metallic material. Remove weights or wood braces before concrete has set and fill voids.

.13 Clean ducts before laying. Cap ends of ducts during construction and after installation to prevent entrance of foreign materials.

.14 Immediately after placing of concrete, pull through each duct a wooden mandrel not less than 300 mm long and of a diameter 6 mm less than internal diameter of duct, followed by stiff bristle brush to remove sand, earth and other foreign matter. Avoid disturbing or damaging ducts where concrete has not set completely. Pull stiff bristle brush through each duct immediately before pulling-in cables.

.15 Install reinforcing rods as shown on drawings.

.16 In each duct install pull rope continuous throughout each duct run with 3 m spare rope at each end.

3.2 MARKERS

.1 Mark location of duct runs under hard surfaced areas not terminating in manhole with railway spike driven flush in edge of pavement, directly over run. Place concrete duct marker at ends of such duct runs. Construct markers and install flush with grade.

3.2 MARKERS (Cont'd)

.2 Mark ducts every 150 m along straight runs and changes in direction.

.3 Where markers are removed to permit installation of additional duct, reinstall existing markers.

.4 Lay concrete markers flat and centered over duct with top 25 mm above earth surface.

.5 Provide drawings showing locations of markers.

3.3 INSPECTIONS

.1 Advise Departmental Representative so that he may inspect ducts prior to placing and be present during placement of concrete and clean-out.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK

.1 Excavation and backfilling:

Section 31 23 10

PART 2 PRODUCTS

2.1 PVC DUCTS AND FITTINGS

.1 Rigid PVC conduits - schedule 40 for direct burial: with expanded flange ends, with minimum wall thickness at any point of 2.8 mm. Nominal length: 3 m plus or minus 12 mm.

.2 Rigid PVC reducers, bell end fittings, plugs, caps, adaptors as required to make complete installation.

.3 Rigid PVC 90° and 45° bends as required.

.4 Rigid PVC 5° angle couplings as required.

.5 Expansion joints as required.

2.2 SOLVENT WELD COMPOUND

.1 Solvent weld compound for PVC joints.

2.3 CABLE PULLING EQUIPMENT

.1 6 mm stranded nylon pull rope tensile strength 5kN.

2.4 MARKERS

.1 Over all underground conduit install continuously, at 150 mm below grade, 75 mm wide electrical underground polyethylene marking tape with warning "CAUTION, CAUTION, POWER LINES BELOW".

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install markers as required.
- .2 Install underground conduit bank.
- .3 Build conduit bank on undisturbed soil or well compacted granular fill (sand) not less than 150 mm thick, compacted to 95% of maximum proctor dry density.
- .4 Open trench completely and ensure that no obstructions will necessitate change in grade of conduits.
- .5 Prior to laying conduits, construct a "mud slab" not less than 75 mm thick extended the entire width of the trench.
- .6 Install conduits at elevations and with slope as indicated and minimum slope of 1 to 400.
- .7 Install base spacers at maximum intervals of 1.5 m levelled to grades indicated for bottom layer of conduits.
- .8 Lay conduits with the configuration and reinforcing as indicated with preformed interlocking, rigid plastic spacers to maintain spacing between ducts at not less than the dimensions indicated on the Bench Section Details. Stagger joints in adjacent layers at least 150 mm and make joints watertight.
- .9 Use anchors, ties and trench jacks as required to secure conduits and prevent moving while backfilling and tamping.

3.1 INSTALLATION (Cont'd)

.10 Cover conduits with compacted granular fill (sand) not less than 150 mm above top tier of conduits. Fill voids and spaces between conduits by hand tamping with a plank. Fill to extend the full width of the trench.

.11 Provide 50 mm thick, treated plank(s) on top of the compacted fill, centered over the conduits. Planks to extend 50 mm (minimum) past the conduit array on both sides.

.12 Clean conduits before laying. Cap ends of conduits during construction and after installation to prevent entrance of foreign material.

.13 Pull through each conduit a steel mandrel not less than 300 mm long and of a diameter 6 mm less than the internal diameter of the conduit, followed by a stiff bristle brush to remove sand, earth and other foreign matter. Pull stiff bristle brush through each conduit immediately before pulling cables.

.14 In each conduit install pull rope, continuous throughout each conduit run with 3 m spare rope at each end.

.15 Install expansion joints in conduit systems in all rises above grade and in all connections to fixed equipment and as required by code.

.16 Install markers as required.

.17 After installing and backfilling, restore surface to original condition as directed by Departmental Representative.

Upper Port LaTour

Harbour Improvements

Shelburne County, NS

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Direct Buried Underground Conduits

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3.1 INSTALLATION (Cont'd)

.18 Advise Departmental Representative so that they may inspect conduits prior to backfilling. Allow 10 days advance notice.

END OF SECTION

PART 1 - GENERAL

PART 2 - PRODUCTS

PART 3 - EXECUTION

3.1 CABLE INSTALLATION IN DUCTS/CONDUITS

- .1 Install cables as indicated in ducts/conduits.
- .2 Do not pull spliced cables inside ducts/conduits.
- .3 Install multiple cables in duct simultaneously.
- .4 Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.
- .5 Before pulling cable into ducts 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 duct 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.

3.3 PRE-ACCEPTANCE TESTS

.1 After installing cable but before splicing and terminating, perform insulation resistance test with a 1000 volt meggar on each phase conductor of the 600/347 volt system.

.2 Check insulation resistance after each splice and/or termination to ensure that cable system is ready for acceptance testing.

.3 Provide Departmental Representative with list of test results showing location at which each test was made, circuit tested and result of each test.

.4 Remove and replace entire length of cable if cable fails to meet any of test criteria.

END OF SECTION

Part 1 - GENERAL

1.1 RELATED SECTIONS

.1 Common Works Results - Electrical Section
26 05 01

.2 Service and Distribution Equipment
Section 26 24 10

1.2 REFERENCES

.1 Measurement Canada Installation
Requirements; PS-E-04-E Installation
requirements for Multiple Customer Metering
Systems.

1.3 DESCRIPTION OF SYSTEM

.1 System includes:

.1 1- Energy Monitoring Pod c/w Local
Meter Display and extended Memory.

.2 3- 120/208 volt Potential
Transformers.

.3 1 - Potential Transformer Enclosure
10" x 10" x 4" Hinged door c/w a 3 pole
fused Disconnect and CSA factory
assembled approval.

.4 14 - 80mA Solid Core Current
transducers for 14 - 30 amp, 120 volt
circuit breakers.

.5 Portable Operator Interface c/w system
software.

.2 System to measure, gather, store and
transmit the following:

.1 Instantaneous RMS voltage and amperage
for each phase or leg.

1.3 DESCRIPTION OF SYSTEM (Cont'd)

.2 Instantaneous and present Kw and Kva demand.

.3 Kwhr energy consumption.

.3 Computer based electronic sub metering system to include sub metering data collection and communication with local field display integral with the field panels.

.1 Metering compartment to be integral with and to be part of a complete manufactured unit. Complete assembly to be CSA approved.

.2 Unit which require fabrication or fitting on site will not be accepted.

1.4 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 33 00 - Shop Drawings and Other Submittal Procedures. .

.2 Include:

.1 Layout of equipment.

.2 Panel dimension.

.3 Schematic Diagrams.

1.5 OPERATION AND MAINTENANCE DATA

.1 Provide operation and maintenance data for Sub metering System for incorporation into O&M manual specified in section 01 33 00 - Shop Drawings and other Submittal Procedures.

.2 O&M Manual to include:

.1 Technical data - illustrated parts lists with parts catalogue numbers.

.2 Copy of approved shop drawings.

1.6 MAINTENANCE AND MAINTENANCE MATERIALS

.1 Provide maintenance materials in accordance with Section 26 05 01 Common Work Results - Electrical.

.2 Provide one year's free maintenance with two inspections by manufacturer during year:

.1 Interim Inspection

.2 One (1) year warranty inspection.

1.7 TRAINING

.1 Arrange and pay for on-site lectures and demonstrations by Customer Sub metering manufacturer to train operational personnel in use and maintenance of Customer Sub metering System.

PART 2 - PRODUCTS

2.1 ENERGY MONITORING PODS

.1 Energy Monitoring Pods (EMP) to be integral with the identified power distribution panel.

.2 Units to be supplied in enclosures suitable for surface mounting. Enclosures to be complete with knockouts for conduit entry and designed to measure and transmit the following:

.1 Instantaneous RMS voltage and amperage for each phase.

.2 Instantaneous and present Kw and Kva Demand.

.3 Kwhr. energy consumption.

2.1 ENERGY MONITORING PODS (Cont'd)

.3 Each unit to:

.1 Contain a non - volatile memory.

.2 Be tamper proof.

.3 Be complete with automatic self-test diagnostic feature.

.4 Be equipped with terminal blocks to accommodate all necessary connections for current transducers, potential transformers and communication cables.

.5 Be complete with connections for local interrogation of the unit utilizing a laptop computer.

.6 Units to be Bench Verified and sealed by Measurement Canada for legalized sub metering.

.1 Measurement Canada approved field panel electronics to be fully removable and to be non-disruptive to EMP field terminations.

2.2 CURRENT TRANSDUCERS AND TRANSFORMERS

.1 Sized to accommodate the following loads:

.1 30 amp @ 120 volt.

.2 Certified by Measurement Canada for this application.

.3 To be equipped with pre wired leads, three (3) meters in length.

2.3 POTENTIAL TRANSFORMERS

- .1 Voltage ratings to match system operation.
- .2 Certified by Measurement Canada for this application.
- .3 To be field mounted in a separate enclosure by the Div.26 contractor.

2.4 SYSTEM SOFTWARE

- .1 To receive the legal metering measurements from all sub metering sensors and to store the information in a central Data Collection (DCU) or central computer.
 - .1 To monitor, acknowledge and control communications with remote metering points and to log any disruption of the communication link or unauthorized system access or tampering.
 - .2 Provide a Windows based simplified user interface for system operation.
 - .3 To automate the generation of energy billings in a format similar to that provided by the local Utility supplier. To permit the energy costs calculations to be derived from the bill received from the local Utility supplier, allowing for the incorporation of co-incident demand charges and time of use rates allocated to each user.
 - .4 To permit multiple metering points to be allocated to a single user file in order to totalize a number of metering points and energy costs to a single user file.
 - .5 To permit reconfiguration of tenant accounts through menu selection.

2.4 SYSTEM SOFTWARE Cont'd)

.6 To list all tenant accounts including the tenant history file.

.7 To access the actual metering measurements used in deriving each users invoice.

.8 To include service menus for diagnostic monitoring of the metering equipment and through a modem and telephone link to permit remote diagnostics by the manufacturer's service technicians. Security access control shall permit remote diagnostics to be locked out.

2.5 PORTABLE OPERATOR INTERFACE

.1 Metering system manufacturer to provide a Portable operator terminal that shall be capable of accessing all system data.

.2 Portable Operator Terminal shall be a Laptop with all software and hardware required.

.3 This Portable Operator Terminal will be kept on site.

.4 The Laptop is the main user interface to the meter manager System. The Laptop is to remain operational 24 hours per day and shall be dedicated to running the meter manager system.

.5 Portable Operator Interface minimum requirements:

.1 Processor Type: AMD FX9 8009

.2 16 GB Ram

2.5 PORTABLE OPERATOR
INTERFACE (Cont'd)

- .3 1.0 TB Hard Disk Drive.
- .4 DVD+RW Drive for system Backup.
- .5 AMD Radeon R7 M445 Graphics Card.
- .6 Ethernet port for network interface unit.
- .7 PS/2 mouse Port or additional serial port.
- .8 Compatible mouse.
- .9 Connectivity - Bluetooth, Wi-Fi, USB 2.0, USB 3.0, WLAN

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Provide 120 volt grounded power for EMPs.
- .2 Provide for wireless communication to Central Computer.
- .3 Mount EMPs away from vibration and threat of water damage.
- .4 Mount Pt's and connect to proper phase legs as per EMP wiring charts.
- .5 Install CT's on phase legs corresponding to assigned PTs as per EMP wiring charts.
- .6 Ensure that CT's and PTs are accessible to Measurement Canada Inspection and Verification Personnel.
- .7 Ensure proper operation.
- .8 Provide training to Harbour Authority designated personnel.

3.2 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section
26 05 01- Common Work Results - Electrical.

.2 Arrange, provide and pay for
Manufacturers' representative presence on
site to commission the complete system.

END OF SECTION

Dry Type Transformers
Up To 600 Volts, Primary

Page 1

PART 1 - GENERAL

1.1 PRODUCT DATA

.1 Submit product data in accordance with
Section 01 33 00 - Shop Drawings and Other
Submittal procedures.

PART 2 - PRODUCTS

2.1 TRANSFORMERS

.1 Design 1

.1 Type: ANN, Delta-wye connected.

.1 Three phase, 75 KVA, 600 volt
input, 60 Hz; 120/208 volt output.

.2 Voltage taps: standard.

.3 Insulation: Class, 185, 115°C
temperature rise.

.4 Basic Impulse Level (BIL):
standard

.5 Hipot: standard

.6 Average sound level: 40 db

.7 Impedance at 170°C: standard

.8 Enclosure: EEMAC 1, removable
metal front panel.

.9 Mounting: floor

.10 Finish: in accordance with
Section 260501 Common Works Results
- Electrical

Dry Type Transformers
Up To 600 Volts, Primary

Page 2

2.2 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 01 - Common Works Results - Electrical.

.2 Label size: 7.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Ensure adequate clearance around transformer for ventilation.

.2 The floor under the transformer and the wall immediately behind the transformer are to consist of fire rated material acceptable to the local inspection authority.

.3 Install transformers in level upright position.

.4 Remove shipping supports only after transformer is installed and just before putting into service.

.5 Loosen isolation pad bolts until no compression is visible.

.6 Make primary and secondary connections in accordance with wiring diagram.

.7 Energize transformers after installation is complete.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK

.1 Complete service entrance to conform to Nova Scotia Power Inc. - Service Entrance Standards.

PART 2 - PRODUCTS

2.1 SUPPLY DATA

.1 Service equipment suitable for incoming supply: 347/600 volt, 100 amp, 60Hz, three phase, 4 wire, grounded neutral.

2.2 EQUIPMENT

.1 Service entrance rated, 100A, 600/347V, 3 pole, SN, 3 phase main circuit breaker:

.1 K frame.

.2 Non interchangeable trip.

.3 IC. 18 Ka @600V.

.4 With neutral and grounding kit.

.5 Copper terminals.

.6 EEMAC 1 - General purpose enclosure surface mounted.

.7 100 amp lugs

.8 18 circuit

.2 Utility Meter Socket:

.1 100 amp, 600/347 V, 7 jaw meter socket to meet utility standards.

.2 Meter supplied and installed by N.S. Power Inc.

2.2 EQUIPMENT (Cont'd)

.3 Wall Mounted Copper Ground Bus:

.1 38.1 mm high X 3.2 mm thick X 450 mm long copper ground.

.2 Predrilled to accept lugs.

.3 Lugs to be copper. Size of lugs as required.

.4 Bus to be mounted 300 mm AFF on 25 mm glass insulators.

.4 Panelboard 'A', 100 amp, 347/600 volt, 3 phase, 4 wire.

.1 K frame.

.2 Non interchangeable trip.

.3 IC. 10 Ka @ 250 volt.

.4 With neutral and grounding kit.

.5 EEMAC 1 - General purpose enclosure - surface mounted.

.6 Copper bussing.

.7 100 amp lugs.

.8 18 circuit.

.5 Panelboard 'B', 400 amp, 120/208 volt, 3 phase, 4 wire.

.1 K frame.

.2 Non interchangeable trip.

.3 IC. 10 Ka @ 250 volt.

.4 With neutral and grounding kit.

2.2 EQUIPMENT .5 Panelboard 'B' (Cont'd)

.5 EEMAC 1 - General purpose enclosure - surface mounted.

.6 Copper bussing.

.7 400 amp lugs.

.8 42 circuit.

.9 Bolt on breakers; the number and rating of breakers is shown on the drawings.

.10 Ground bar.

.11 Integral current transformer compartment attached.

.1 Current transformer compartment in conjunction with the panel to be a complete manufactured unit.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Install service and distribution equipment as indicated.

.2 Connect to incoming service.

.3 Ensure all circuit breakers are properly torqued.

.4 Make grounding connections.

.5 Meggar all circuits as required by Section 26 05 01 - Common Works Results - Electrical.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK

.1 Common Work Results - Electrical:
Section 26 05 01.

.2 Division 1.

PART 2 - PRODUCTS

2.1 RECEPTACLES

.1 20 amp, 125 volt, duplex, ground fault circuit interrupter. Nylon construction. Female receptacle CSA configuration 5-20R. Weather and corrosion resistant

.1 Device box: surface mounted in a duplex - "Watertight" device box. Yellow in colour.

.2 Metal, hinged and gasketted "In-Use" cover.

.3 Receptacle device box and "In-Use" cover to be products of the same manufacturer.

.2 30 amp, 125 V, simplex, locking, female receptacle. CSA configuration L5 - 30 R.

.1 Approved for wet applications (marine environment); Corrosion Resistant.

.2 Yellow nylon face.

.3 Device Box - "Watertight" device box with hinged and gasketted, weatherproof coverplate. Both yellow in colour.

.4 Device box and receptacle to be products of the same manufacturer and to be a complete assembly.

2.2 JUNCTION BOXES

- .1 Moulded PVC. Reinforced junction boxes.
 - .1 With screw down gasketted cover.
 - .2 Stainless steel screws.
 - .3 Conduit hubs
 - .4 External mounting feet.
 - .5 EEMAC 4X rating.
 - .6 Sized as per Canadian Electrical Code.

PART 3 - EXECUTION

- .1 Install junction boxes on power shrouds, poles and walls of electrical building as indicated on drawings.
- .2 Install conduit and wiring and/or cabling from junction boxes to receptacles.
- .3 Install conduit and wiring and/or cabling from junction boxes to lights.
- .4 Mount receptacles on power shrouds as indicated.
- .5 Make connections - use split bolt mechanical connectors with heat shrink boots inside junction boxes.
- .6 Ensure proper operation.

END OF SECTION

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 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 panel schedules.

END OF SECTION

BERLIN WALL

APPROACH STRUCTURE

PEREAU (DELHAVEN)

PROJECT NO. R.089492.007

LED Luminaires on Timber Poles
and Lighting Controls

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PART 1 - GENERAL1.1 PRODUCT DATA

.1 Submit product data in accordance with Section 01 33 00 - Shop drawings and Other Submittal Procedures.

PART 2 - PRODUCTS2.1 AREA LIGHTING

- .1 Marine Rated, LED luminaires.
 - .1 Light input: 168 watt, 120 volt, R3 Roadway Type III distribution
 - .2 1000 ma driver.
 - .3 4000k colour temperature.
 - .4 Optical enclosure to be sealed and gasketted to IP66 rating.
 - .5 Die-cast aluminum; polyester powder coat finish. Gray in colour.
 - .6 Enhanced corrosion resistant finish rated at 5000 hour exposure to salt spray.
 - .7 UL standard 1598A (salt water) marine outside tested.
 - .8 Galvanized steel mounting brackets and hardware suitable for mounting on timber poles.

2.2 FLOOD LIGHTING

- .1 Marine grade LED flood light.
 - .1 Light input: 177 watt (400W equivalent), 120 volt, vertical distribution. NEMA 4x4 beam pattern. Minimum 20,000 lumens.

BERLIN WALL

APPROACH STRUCTURE

PEREAU (DELHAVEN)

PROJECT NO. R.089492.007

LED Luminaires on Timber Poles
and Lighting ControlsPage 2

2.2 FLOOD LIGHTING (Cont'd)

.2 Die-cast aluminum with copper alloy housing. Epoxy primer, grey finished coat.

.3 4000k colour temperature with a 70 CRI (minimum).

.4 1000 ma driver.

.5 Enhanced corrosion resistant finish rated at 5000 hour exposure to salt spray.

.6 UL standard 1598A (salt water) marine outside tested.

.7 Optical enclosure to be sealed and gasketed to IP66 rating.

.8 Galvanized steel mounting brackets and hardware suitable for mounting on timber poles.

2.3 TREATED TIMBER POLES

.1 Timber poles to be Jack Pine, to CSA 015-15 'Wood utility poles and reinforcing stubs'.

.2 Timber treatment to CSA 080-15 'Wood Preservation'.

.3 Poles to be Class 4, 12.2M in total length.

.4 Handle treated material to avoid damage causing alteration in original treatment.

2.4 LIGHTING CONTROLS

.1 Photo Controls

.1 Conduit wired photo control.

.2 Manually adjustable level slide.

BERLIN WALL

APPROACH STRUCTURE

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LED Luminaires on Timber Poles
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2.4 LIGHTING CONTROLS (Cont'd)

.3 120V, 16.5 amps, 2000 watts.

.4 Light levels: ON at 1.5 F.C. - OFF at
10 F.C.

.2 Lighting Contactors

.1 Mounted in electrical building.

.2 20 A, 120 V, 60 Hertz coil; 20 amp, 12
volt contacts, 3 pole.

.3 Electrically held.

.4 EEMAC 1 General purpose enclosure.

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.

3.2 HANDLING TREATED TIMBER

.1 Handle treated material to avoid damage
causing alteration in original treatment.

.2 Treat in field, spike holes, boreholes,
plugged holes, cuts and any damage to
treated material, using Copper naphthenate,
as specified herein, regardless of plant
treatment type.

BERLIN WALL

APPROACH STRUCTURE

PEREAU (DELHAVEN)

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LED Luminaires on Timber Poles
and Lighting ControlsPage 4

3.2 HANDLING TREATED TIMBER (Cont'd)

.3 Provide methodology pertaining to heating and application. Apply to dry surfaces, wherever possible.

.4 Treat boreholes, using a pressurized container with an extension rod, to produce a fine spray in the holes with one application. Alternately a cylindrical brush may be used.

.5 Treat field cuts and any abrasions with minimum of two liberal applications, using either spray or brush.

.6 In addition, field cuts and underwater damaged areas will receive a coating of plastic compound, capped with lead flashing secured with galvanized roofing nails. Plastic compound not to be water soluble and is subject to approval.

.7 Environmental Concern: Ensure no spillage or excess application of field preservative. Provide workmen with sufficient training and protective gear to properly and safely handle the treated materials and to apply field treatment, so as to prevent undue hazard to themselves, others, or the environment.

.8 Contain all debris and leachates (films on water surface) within the area of the work by using containment facilities such as floating booms or screens.

END OF SECTION