Part 1 General

1.1 RELATED SECTIONS

.1 Division 01 – General Requirements.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA C22.1-12, Canadian Electrical Code (CEC), Part 1 (22nd Edition), Safety Standard for Electrical Installations.

.2 CAN/CSA-C22.3 No. 7-10, Underground Systems.

.3 CAN3-C235-83(R2000), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.

.4 CSA Z462-12, Workplace Electrical Safety.

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

.1 EEMAC Y1-2-1979, Performance Specifications for Finishing Systems for Outdoor Electrical Equipment.

.2 EEMAC 2Y-1-1958, Light Gray Colour for Indoor Switch Gear.

.3 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)

.1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

1.3 DEFINITIONS

.1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.

1.4 DESIGN REQUIREMENTS

.1 Operating voltages: to CAN3-C235.

.2 Control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.

.1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

.3 Language operating requirements: provide identification nameplates and labels for control items in English.

1.5 ACTION AND INFORMATION SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00 – Shop Drawings and Other Submittal Procedures.

.2 Submit to Technical Inspection Services, Department of Public Safety necessary number of drawings and specifications for examination and approval prior to commencement of work. Pay all associated fees.

.3 Product Data: submit WHMIS MSDS in accordance with Section 01 35 29 – Health and Safety .

.4 Shop drawings:

.1 Submit manufacturer shop drawings of all equipment.

.2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, accessories and other items that must be shown to ensure co-ordinated installation.

.3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.

.4 Indicate on drawings clearances for operation, maintenance, and replacement of operating equipment devices.

.5 If changes are required, resubmit corrected drawings.

.5 Quality Control: in accordance with Section 01 45 00 – Testing and Quality Control.

.1 Provide CSA certified equipment and material.

.2 Where CSA certified equipment and material is not available, submit such equipment and material to inspection authorities for special approval before delivery to site.

.3 Submit test results of installed electrical systems and instrumentation.

.4 Permits and fees: in accordance with General Conditions of contract.

.5 Submit, upon completion of Work, load balance report as described in PART 3 – FIELD QUALITY CONTROL.

.6 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Departmental Representative.

.6 Manufacturer's Field Reports: submit to Departmental Representative manufacturer's written report, within 3 days of review, verifying compliance of Work and electrical system and instrumentation testing, as described in PART 3 - FIELD QUALITY CONTROL.

.7 Upon completion of project, submit as-built drawings and maintenance manuals.

1.6 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Section 01 45 00 – Testing and Quality Control.

.2 Qualifications: electrical Work to be carried out by qualified, licensed electricians or apprentices in accordance with authorities having jurisdiction as per the conditions of Provincial Act respecting manpower vocational training and qualification.

.1 Employees registered in provincial apprentices program: permitted, under direct supervision of qualified licensed electrician, to perform specific tasks.

.2 Permitted activities: determined based on training level attained and demonstration of ability to perform specific duties.

.3 Site Meetings:

.1 Site Meetings: as part of Field Services described in Part 3 - FIELD QUALITY CONTROL, schedule site visits, to review Work, at stages listed.

.1 After delivery and storage of products, and when preparatory Work is complete but before installation begins.

.2 Twice during progress of Work at 25% and 60% complete.

.3 Upon completion of Work, after cleaning is carried out.

.4 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.

.2 Separate and recycle waste materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

.1 Separate waste materials for reuse and recycling.

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

1.8 SYSTEM STARTUP

.1 Instruct Departmental Representative and operating personnel in operation, care and maintenance of systems, system equipment and components.

.2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.

.3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant will aspects of its care and operation.

1.9 SITE VISIT

.1 Prior to tender submission, visit the site and become familiar with the job and all conditions which may affect costs. Ignorance of existing conditions will not be considered as basis for extra claims.

1.10 MEASUREMENT FOR PAYMENT

.1 Electrical will be measured by lump sum.

Part 2 Products

2.1 MATERIALS AND EQUIPMENT

.1 Provide material and equipment in accordance with Section 01 61 00 - Common Product Requirements.

.2 Material and equipment to be CSA certified. Where CSA certified material and equipment are not available, obtain special approval from inspection authorities before delivery to site and submit such approval as described in PART 1 - SUBMITTALS.

2.2 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS

.1 Verify installation and co-ordination responsibilities related to motors, equipment and controls, as indicated. Verify size, location and wiring requirements of all equipment with appropriate trade and reviewed shop drawings prior to rough-in.

.2 Provide wiring and conduit.

2.3 WARNING SIGNS

.1 Warning Signs: in accordance with requirements of authority having jurisdiction Departmental Representative.

.2 Decal signs, minimum size 175 x 250 mm.

2.4 WIRING TERMINATIONS

.1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.

2.5 EQUIPMENT IDENTIFICATION

.1 Identify electrical equipment with nameplates and labels as follows:

.1 Nameplates: plastic laminate lamicoid 3 mm thick plastic engraving sheet, matte white finish face, black core, lettering accurately aligned and engraved into core and mechanically attached with 3M VHB acrylic adhesive type 4941.

.2 Sizes as follows:

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

.2 Labels: embossed plastic labels with 6 mm high letters unless specified otherwise.

.3 Wording on nameplates and labels to be approved by Departmental Representative prior to manufacture.

.4 Allow for minimum of twenty-five (25) letters per nameplate.

.5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.

.6 Lamicoid nameplate installed on distribution panelboards, meter centers, circuit breaker enclosures and power modules shall indicate the following:

.1 Designated name of equipment.

.2 Overcurrent protection device rating.

.3 Voltages, number of phases and wires.

.4 Designation of power source.

.5 The following is an example.

PANEL D1 – 400A

120/240V – 1PH – 3W

.7 Lamicoid nameplates installed on disconnect switches, large junction and pull boxes, service equipment shall contain the following information:

.1 Designated name of equipment.

.2 Designated name of power source.

.3 Voltage(s), number of phases and wires.

.4 Branch circuit breaker number(s) where possible.

.8 All junction and/or pull boxes (volume less than 8500 cu cm) shall be marked with an indelible ink marker to designate the circuit number of enclosed wiring, the designated panel name and electrical characteristics where applicable.

.9 Install an additional lamicoid nameplate on all, or any piece of electrical equipment, or apparatus, i.e. panelboards and fusible switches, etc. that may contain overcurrent devices, i.e. circuit breakers and/or fuses, that have been designed for, and incorporate an interrupting capacity sized “larger” than 10 KAIC.

Example:

Minimum interrupting capacity of breakers installed in this panel is to be not less than 14 KAIC	Minimum interrupting capacity of fuses installed in this fusible switch is to be not less than 100 KAIC

2.6 WIRING IDENTIFICATION

.1 Identify wiring with permanent indelible identifying markings, indicating panel and circuit number; i.e., D2-31. Normal ground circuits to have ground, neutral and phase wires identified with black on white background tape. Tape to be preprinted vinyl, self-adhesive. Circuits to be identified a both ends and at all pull and junction boxes.

.2 Use coloured plastic tapes to identify feeders on both ends of phase conductors and at junction and pull boxes if conductor insulation colours are other than red, black, blue, white and green.

.3 Maintain phase sequence and colour coding throughout.

.4 Colour coding: to CSA C22.1.

.5 Use colour coded wires in communication cables, matched throughout system.

2.7 FINISHES

.1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.

Part 3 Execution

3.1 INSTALLATION

.1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.

.2 Do underground systems in accordance with CSA C22.3 No.1 except where specified otherwise.

3.2 CUTTING AND PATCHING

.1 Provide cutting, coring and drillings as required for installation of electrical services. Hole sizes to be kept to a minimum. Restoration of damaged surfaces to preconstruction condition will be by this contractor.

.2 Change location of outlets and equipment at no extra cost or credit, providing distance does not exceed 3000 mm and information is given before installation.

3.3 NAMEPLATES AND LABELS

.1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.

3.4 CONDUIT AND CABLE INSTALLATION

.1 Install cables, conduits and fittings embedded in structure as indicated.

3.5 LOCATION OF OUTLETS AND EQUIPMENT

.1 Locate outlets in accordance with Section 26 05 32 - Outlet Boxes, Conduit Boxes and Fittings.

.2 Change location of outlets and equipment at no extra cost or credit, providing distance does not exceed 3000 mm, and information is given before installation.

3.6 MOUNTING HEIGHTS

.1 Mounting height of equipment is from wharf deck to centreline of equipment unless specified or indicated otherwise.

.2 If mounting height of equipment is not indicated, verify before proceeding with installation.

.3 Install electrical equipment at the following heights unless indicated otherwise.

.1 Panelboards: 1500 mm or as required by Code.

.4 Refer to all detail drawings and confirm mounting of outlet boxes prior to roughing-in.

3.7 CO-ORDINATION OF PROTECTIVE DEVICES

.1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

3.8 FIELD QUALITY CONTROL

.1 Conduct following tests in accordance with Section 01 45 00 – Testing and Quality Control.

.1 Power distribution system including phasing, voltage, grounding and load balancing.

.2 Circuits originating from branch distribution panels.

.3 Lighting and its control.

.4 Insulation resistance testing:

.1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.

.2 Check resistance to ground before energizing.

.2 Carry out tests in presence of Departmental Representative.

.3 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

3.9 CLEANING

.1 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.

END OF SECTION

Part 1 General

1.1 DESCRIPTION OF WORK

.1 In general, work of this Section consists of the removal of existing aerial cables and removal of existing conduits and pull box.

1.2 RELATED SECTIONS

.1 Section 01 74 19 - Construction/Demolition Waste Management And Disposal.

.2 Section 26 05 00 – Common Work Results for Electrical.

1.3 SITE SURVEY

.1 Prior to Tender submission, visit the site and survey and Quantify the extent of the removals/alterations required for this contract and include all costs in the total tendered price.

1.4 REFERENCE STANDARDS

.1 All removal and alteration work of electrical construction to be done in accordance with the safety standards outlined in the Canadian Electrical Code.

1.5 PROTECTION

.1 The contractor is responsible for any damages to existing structure as a result of the work.

1.6 COORDINATE WITH UTILITIES

.1 Coordinate and arrange with Utility for disconnection and removal of utility services.

.2 Pay any utility fee or charges.

Part 2 Products

Not Applicable

Part 3 Execution

3.1 GENERAL REMOVALS

.1 Remove all obsolete and abandoned electrical services including wire and conduit.

.2 Coordinate disconnection of existing services with Departmental Representative of services and the Utility.

.3 Schedule all removal work with the Departmental Representative. Do not disrupt operations.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 26 05 00 – Common Work Results for Electrical.

.2 Section 26 05 21 – Wires and Cables.

.3 Section 26 05 28 – Grounding – Secondary.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA-G12-92(R2012), Zinc-Coated Steel Wire Strand.

.2 CAN/CSA-C83-96(R2011), Communication and Power Line Hardware.

.3 CAN/CSA-O80 Series-08(R2012), Wood Preservation.

.4 CAN/CSA-O15-05(R2009), Wood Utility Poles and Reinforcing Stubs.

.2 NB Power Standard Construction Practices.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 – Shop Drawings and Other Submittals.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

.2 Fold up metal banding, flatten and place in designated area for recycling.

.3 Do not dispose of preservative treated wood through incineration.

.4 Do not dispose of preservative treated wood with other materials destined for recycling or reuse. Dispose of treated wood, end pieces, wood scraps and sawdust at sanitary landfill as approved by Departmental Representative.

.5 Dispose of unused wood preservative material at official hazardous material collections site.

.6 Do not dispose of unused preservative material into sewer system, into streams, lakes, onto ground or in other location where they will pose health or environmental hazard.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.

.2 Separate and recycle waste materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

.1 Separate waste materials for reuse and recycling.

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

Part 2 Products

2.1 MATERIALS

.1 Wood preservation: to CAN/CSA O80 Series.

.2 Power line hardware: to CAN/CSA-C83.

.3 Wood utility poles: to CAN/CSA-O15, wood species Douglas Fir, Class 5, preservative treated.

.1 11 m long poles for secondary circuits only.

2.2 WOOD PRODUCTS

.1 All wood products shall be cut from live timber and must be free from physical defects such as surface rot, heart rot and loose knots.

.2 Wood products to be pressure treated in accordance with CAN/CSA-O80 Series-08(R2012). Use ACA or CCA treatment only.

.3 Pressure treatment to be AWAP category 4B with a CCA pcf of 0.60, suitable for marine use.

.4 Any field cuts and holes to be treated in accordance with AWPA standard M4 with a preservative containing at least 2% copper.

.5 Rough hardware: bolts, nuts, washers, lags, pin, screws; 316 stainless steel.

.6 Wood products to be ordered to length to avoid field cuts.

2.3 GUYS AND ANCHORS

.1 Guy wire: to CAN/CSA-G12, 9.5 mm nominal diameter, stranded, galvanized steel grade 160 for dead ends and guys. Where guy attaches to pole, provide guy hook and preformed guying dead end.

.2 Guy clamps: preform grip type.

.3 Eye bolt: 19 mm thimble, length to suit, four hole guy straps and 16 mm machine bolt with square washer to attach guy wire to pole.

.4 Anchor rod: 19 mm diameter x 2438 mm m long, galvanized steel with thimble eye.

.5 Anchor: power installed screw anchor (PISA), double helix

.6 Guy guard: plastic, colored yellow, 2.1 m long.

2.4 CONDUCTORS

.1 In accordance with Section 26 05 21 – Wires and Cables.

2.5 GROUND RODS AND GROUND CONDUCTORS

.1 In accordance with Section 26 05 28 – Grounding - Secondary.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Install electrical pole lines and hardware in accordance with manufacturer's written recommendations and specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 PREPARATION OF POLES

.1 Where poles require shortening, cut piece from top only.

.2 Roof top of poles with single slope bevelled top.

.3 Treat roof top, gains, bored holes with preservative before assembly.

3.3 INSTALLATION

.1 Locate and dig pole holes.

.1 Make holes large enough to allow space for tamping backfill.

.2 Set poles.

.3 Set poles to maintain even grade.

.1 Allow for contour of terrain and do not exceed grading of 1.5 m per pole.

.4 Replace backfill in 150 mm layers.

.1 Tamp each layer, and apply final layer to drain water away from pole.

.5 Locate and install guy wires and anchors at dead-ends, at non-tangent poles, corner poles, and start of branch feeders.

.6 Insert anchor at least 1.8 m into ground. Backfill and tamp in 150 mm layers.

.7 Pre-drill all anchor holes to prevent splitting of wood.

.8 Install aerial messenger cable.

.9 Install line conductors.

3.4 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.1 On completion and verification of installation remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 – Common Work Results for Electrical.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA-C22.2No.18-98, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.

.2 CSA C22.2No.65-03(R2008), Wire Connectors (Tri National Standard with UL 486A-486B and NMX-J-543-ANCE-03.

.2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)

.1 EEMAC 1Y-2, 1961 Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).

.3 National Electrical Manufacturers Association (NEMA)

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Shop Drawings to include manufacturer’s instructions, printed product literature and data sheets including characteristics, physical size, finish and limitations.

.3 Operational and Maintenance Data: submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals

1.4 DELIVERY STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.

.2 Separate and recycle waste materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

.1 Separate waste materials for reuse and recycling.

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

Part 2 Products

2.1 MATERIALS

.1 Waterproof gel filled twist-on type splicing connectors to: CSA C22.2No.65, with current carrying parts of copper alloy sized to fit copper conductors as required.

.1 Gel filled silicone sealant temperature -43 deg. C to 205 deg. C.

.2 Suitable for use in damp, wet, raintight and submersible locations.

.3 Acceptable materials:

.1 King Innovation: Dryconn waterproof connectors.

.2 Ideal “Underground” connectors.

.2 Bushing stud connectors: to EEMAC 1Y-2 to consist of:

.1 Connector body and stud clamp for stranded round copper conductors.

.2 Clamp for stranded round copper conductors.

.3 Stud clamp bolts.

.4 Bolts for copper conductors.

.5 Sized for conductors as indicated.

.3 Teck Connectors:

.1 Watertight, copper free aluminum approved for TECK cable.

.2 Acceptable materials:

.1 Thomas & Betts StartTeck.

.2 Iberville Tek Series.

.4 Cold Weather Tape:

.1 Acceptable materials:

.1 Scotch Brand ‘88’.

Part 3 Execution

3.1 INSTALLATION

.1 Remove insulation carefully from ends of conductors and:

.1 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CSA C22.2No.65.

.2 Install gel filled twist-on type connectors for lighting and receptacle splice locations and tighten.

.3 Install bushing stud connectors in accordance with EEMAC 1Y-2.

.4 Wrap connectors in junction boxes with double half lapped layer of cold weather tape.

3.2 RESTRICTIONS

.1 No splices are allowed in panelboards or in equipment enclosures.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 – Common Work Results for Electrical.

.2 Section 26 05 20 – Wire and Box Connectors - 0 - 1000 V.

.3 Section 26 05 34– Conduits, Conduit Fastenings and Conduit Fittings

1.2 REFERENCES

.1 CSA C22.2 No. 0.3-96, Test Methods for Electrical Wires and Cables.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Shop Drawings to include manufacturer's instructions, printed product literature and data sheets including characteristics, physical size, finish and limitations.

.3 Operational and Maintenance Data: submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals

1.4 DELIVERY STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.

.2 Separate and recycle waste materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling.

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

Part 2 Products

2.1 WIRES

.1 Conductors: stranded for 8 AWG and larger. Minimum size: 12 AWG.

.2 Copper conductors: size as indicated, with 600V insulation of chemically cross-linked thermosetting polyethylene material rated RWU90.

2.2 TECK CABLE

.1 Cable: to CAN/CSA-C22.2 No. 131.

.2 Conductors:

.1 Grounding conductor: copper.

.2 Circuit conductors: copper, size as indicated.

.3 Insulation:

.1 Chemically cross-linked thermosetting polyethylene rated type RW90, 600V.

.4 Inner jacket: polyvinyl chloride material.

.5 Armour: flat interlocking aluminum.

.6 Overall covering: thermoplastic polyvinyl chloride material.

.7 Fastenings:

.1 One hole steel straps to secure surface cables 50 mm and smaller. Two hole steel straps for cables larger than 50 mm.

.2 Channel type supports for two or more cables at 1500 mm centers.

.3 Threaded rods: 6 mm dia. to support suspended channels.

.8 Connectors:

.1 Watertight approved for TECK cable.

Part 3 Execution

3.1 INSTALLATION OF WIRES

.1 Install wiring as follows:

.1 In conduit systems in accordance with Section 26 05 34.

3.2 INSTALLATION OF TECK CABLE 0 -1000 V

.1 Install cables, fastened in place at 1200mm intervals.

.2 Terminate cables in accordance with Section 26 05 20- Wire and Box Connectors - 0 - 1000 V.

.3 Install galvanized steel cable guards where indicated.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 - Common Work Results for Electrical.

1.2 REFERENCES

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

.1 ANSI/IEEE 837-02 Standard for Qualifying Permanent Connections Used in Substation Grounding.

.2 Canadian Standards Association, (CSA International)

.1 CSA C22.2 No.41-07 (R2012), Grounding and Bonding Equipment (Bi-National Standard with UL 467).

1.3 DELIVERY STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.

.2 Separate and recycle waste materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

.1 Separate waste materials for reuse and recycling.

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

PART 2 PRODUCTS

2.1 EQUIPMENT

.1 Rod electrodes: copper clad steel 19mm dia. By 3 m long.

.2 Clamps for grounding of conductor: size as required.

.3 Grounding conductors: bare stranded copper, tinned , soft annealed, size as indicated.

.4 Insulated grounding conductors: green, type RW90 minimum size #12AWG

.5 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 Bonding jumpers, straps.

Part 3 Execution

3.1 INSTALLATION GENERAL

.1 Install complete permanent, continuous grounding system including, rod electrodes, conductors, connectors, accessories. Install an insulated ground wire in all conduits.

.2 Install connectors in accordance with manufacturer's instructions.

.3 Protect exposed grounding conductors from mechanical injury.

.4 Make connections to electrodes, using copper welding by thermit process.

.5 Use mechanical connectors for grounding connections to equipment provided with lugs.

.6 Soldered joints not permitted.

.7 Connect metal door frame to ground by welding copper to steel.

.8 Make grounding connections in radial configuration only, with connections terminating at single point. Avoid loop connections.

3.2 ELECTRODES

.1 Install rod electrodes and make grounding connections

.2 Bond separate, multiple electrodes together.

.3 Use size 3 AWG copper conductors for connections to electrodes.

.4 Make special provision for installing electrodes that will give acceptable resistance to ground value where rock or sand terrain prevails. Ground as indicated.

3.3 SYSTEM AND CIRCUIT GROUNDING

.1 Install system and circuit grounding connections to neutral of systems.

3.4 EQUIPMENT GROUNDING

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

3.5 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results - Electrical.

.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 RELATED SECTIONS

.1 Section 26 05 00 – Common Work Results for Electrical.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Shop Drawings to include manufacturer's instructions, printed product literature and data sheets including characteristics, physical size, finish and limitations.

.3 Operational and Maintenance Data: submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals

1.3 DELIVERY STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.

.2 Separate and recycle waste materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

.1 Separate waste materials for reuse and recycling.

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

Part 2 Products

2.1 SPECIFIC PURPOSE SUPPORTS

.1 Specific purpose, corrosion resistant, heat treated, stainless steel fasteners to be used to support boxes, conduit and cable from structures.

.2 One or two hole corrosion resistant PVC coated steel straps for conduits.

2.2 MOUNTING HARDWARE

.1 Stainless steel or hot dipped galvanized corrosion resistant mounting hardware to be used.

2.3 MESSENGER CABLE

.1 Stranded galvanized steel according to CAN/CSA G12

.2 Type 5 MG3 with a 6.27 mm diameter and breaking load of 2580 kg.

.3 Weight capacity of 132kg/km.

.4 Hardware and fittings for aerial cable installation to be in accordance with CAN/CSA C83.

Part 3 Execution

3.1 INSTALLATION

.1 Secure equipment to poured concrete with expandable inserts.

.2 Secure surface mounted equipment with stainless steel fasteners.

.3 Fasten exposed conduit or cables to structures or support systems using corrosion resistant coated straps.

.1 One-hole PVC coated steel straps complete with stainless steel hardware to secure surface conduits and cables 50 mm and smaller.

.4 Attach Teck cables to aerial messenger cable using stainless steel cable ties on at 600mm intervals.

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

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 – Common Work Results for Electrical.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA C22.1-12, Canadian Electrical Code, Part 1, 22th Edition.

.2 CSA C22.2 No. 40-M1989(R2009), Cutout, Junction and Pull Boxes.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Shop Drawings to include manufacturer's instructions, printed product literature and data sheets including characteristics, physical size, finish and limitations.

.3 Operational and Maintenance Data: submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals

1.4 DELIVERY STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.

.2 Separate and recycle waste materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

.1 Separate waste materials for reuse and recycling.

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

Part 2 Products

2.1 JUNCTION AND PULL BOXES

.1 Construction: 316 stainless steel, CSA 4X rated

.2 Covers: Stainless steel continuous hinge with clamps, seamless foam in place gasket.

.3 Mounting feet.

.4 Acceptable materials:

.1 Hoffman A1008CHNFSS6.

2.2 DRAIN / BREATHER

.1 Drain and breather to accommodate pressure changes and allow moisture or condensation to drain from enclosure while maintaining CSA rating.

.2 Inner dust seal to prevent contaminants from entering enclosure.

.3 Constructed of fibre reinforced nylon with castellated locknuts.

.4 Acceptable manufacturer or approved equal:

.1 Killark #DPE-40-50-S3.

Part 3 Execution

3.1 JUNCTION AND PULL BOXES INSTALLATION

.1 Install pull boxes in accessible locations as indicated.

.2 Size and install junction and pull boxes to CSA C22.1.

.3 Install breather/drain on all junction and pull boxes

3.2 IDENTIFICATION

.1 Equipment Identification: to Section 26 05 00 - Common Work Results for Electrical.

.2 Identification Labels: size 2 indicating system name voltage and phase or as indicated.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 - Common Work Results for Electrical.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA C22.1-12, Canadian Electrical Code, Part 1, 22th Edition.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Shop Drawings to include manufacturer's instructions, printed product literature and data sheets including characteristics, physical size, finish and limitations.

.3 Operational and Maintenance Data: submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals..

1.4 DELIVERY STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.

.2 Separate and recycle waste materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

.1 Separate waste materials for reuse and recycling.

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

Part 2 Products

2.1 OUTLET AND CONDUIT BOXES GENERAL

.1 Size boxes in accordance with CSA C22.1.

.2 102 mm square or larger outlet boxes as required.

.3 Blank cover plates for boxes without wiring devices.

2.2 CONDUIT BOXES

.1 Cast FS or FD boxes with factory hubs and mounting feet for surface wiring of devices.

.2 Provide gasketed covers for exterior boxes.

2.3 FITTINGS - GENERAL

.1 Bushing and connectors with nylon insulated throats.

.2 Knock-out fillers to prevent entry of debris.

.3 Conduit outlet bodies for conduit up to 35 mm and pull boxes for larger conduits.

Part 3 Execution

3.1 INSTALLATION

.1 Support boxes independently of connecting conduits.

.2 Fill boxes with sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.

.3 Provide correct size of openings in boxes for conduit and cable connections. Do not install reducing washers.

.4 Vacuum clean interior of outlet boxes before installation of wiring devices.

.5 Identify systems for outlet boxes as required.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 – Common Work Results for Electrical.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA C22.2 No. 18-98 (R2003), Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.

.2 CSA C22.2 No. 45 - M1981 (R2003), Rigid Metal Conduit.

.3 CSA C22.2 No. 211.2-M1984 (R2003), Rigid PVC (Unplasticized) Conduit.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Shop Drawings to include manufacturer's instructions, printed product literature and data sheets including characteristics, physical size, finish and limitations.

.3 Operational and Maintenance Data: submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.

1.4 DELIVERY STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.

.2 Separate and recycle waste materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

.1 Separate waste materials for reuse and recycling.

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

Part 2 Products

2.1 CONDUITS

.1 PVC coated rigid steel conduit to CSA C22.2 No. 45, hot dipped galvanized after fabrication:

.1 Blue urethane coating on threads.

.2 Minimum 40 mil PVC coating on exterior.

.3 Nominal 2 mil blue urethane on interior.

.4 Acceptable materials:

.1 Thomas & Betts OCAL-BLUE Conduit and Fittings.

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

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

2.2 CONDUIT FASTENINGS

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

.1 40 mil corrosion resistant PVC coating.

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

.3 Acceptable materials:

.1 Thomas & Betts OCAL Pipe Straps.

2.3 CONDUIT FITTINGS

.1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified. Coating: same as conduit.

.2 Ensure factory "ells" where 90 degrees bends are required.

2.4 EXPANSION FITTINGS FOR RIGID CONDUIT

.1 Weatherproof expansion fittings with internal bonding assembly suitable for 100 mm linear expansion.

.2 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19 mm deflection.

2.5 FISH CORD

.1 Polypropylene.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

.1 Install conduits to cause minimum interference in spaces through which they pass.

.2 Use PVC coated rigid steel conduit, fittings and straps for all surface and exposed work to services, devices and equipment on wharf. Install in accordance with manufacturer’s recommendations.

.3 Use rigid PVC conduit underground.

.4 Minimum conduit size: 21 mm.

.5 Use standard radius elbows for PVC coated rigid steel conduit.

.6 Bend conduit cold:

.1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.7 Mechanically bend conduit over 21 mm diameter.

.8 Install fish cord in empty conduits.

.9 Remove and replace blocked conduit sections.

.1 Do not use liquids to clean out conduits.

.10 Dry conduits out before installing wire.

3.3 SURFACE CONDUITS

.1 Run parallel or perpendicular to wharf.

.2 Group conduits wherever possible on channels.

3.4 CONDUITS UNDERGROUND

.1 Slope conduits to provide drainage.

.2 Waterproof joints (PVC excepted) with heavy coat of bituminous paint.

3.5 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.2 Touch up any damaged PVC coating on conduits and fittings with manufacturer’s OCAL-Blue coating touch up compounds.

.3 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 - Common Work Results for Electrical.

.2 Section 31 23 10 – Excavating, Trenching and Backfilling

1.2 REFERENCES

.1 Canadian Standards Association, (CSA International)

.2 Insulated Cable Engineers Association, Inc. (ICEA)

1.3 DELIVERY STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00– Common Product Requirements.

.2 Separate and recycle waste materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling.

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

Part 2 Products

2.1 CABLE MARKER TAPE

.1 Polyethylene marker tape: 75mm wide for direct burial.

.2 Marker sheet red in colour with the following words printed in large black block letters: CAUTION CAUTION CAUTION ELECTRIC LINE BURIED BELOW.

Part 3 Execution

3.1 CABLE INSTALLATION IN TRENCHES

.1 Install cables as indicated in trenches.

.2 Install multiple cables simultaneously.

3.2 MARKER TAPE

.1 Install cable marker tape 300mm below grade, continuous over full length of cables.

3.3 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - 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 tests.

.1 After installing cable but before splicing and terminating, perform insulation resistance test with 500V megger on each conductor.

.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.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 - Common Work Results for Electrical.

.2 Section 26 28 16.02 - Moulded Case Circuit Breakers.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA C22.2No.29-11 (R2000), Panelboards and enclosed Panelboards.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Shop Drawings to include manufacturer’s instructions, printed product literature and data sheets including characteristics, physical size, finish and limitations.

.3 Operational and Maintenance Data: submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.

1.4 DELIVERY STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00– Common Product Requirements.

.2 Separate and recycle waste materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling.

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities

Part 2 Products

2.1 PANELBOARDS

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

.1 Install circuit breakers in panelboards before shipment.

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

.2 250 V panelboards: bus and breakers rated for 10K A (symmetrical) interrupting capacity or as indicated.

.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.

.4 Panelboards: mains, number of circuits, and number and size of branch circuit breakers as indicated.

.5 Four keys for each panelboard and key panelboards alike.

.6 Aluminum bus with neutral of same ampere rating as mains.

.7 Mains: suitable for bolt-on breakers. Feed through lugs where indicated.

.8 Stainless steel (316) enclosure CSA 4X rated.

.9 Gasketted door with locking hasp and threaded screw clamps. Finish: baked grey enamel.

.10 Condensate drain in bottom of enclosure.

.11 Minimum of 33% spare space unless indicated otherwise.

.12 Acceptable materials:

.1 Square D
.2 Cutler-Hammer
.3 Siemens

2.2 BREAKERS

.1 Breakers: to Section 26 28 16.02 - Moulded Case Circuit Breakers.

.2 Breakers with thermal and magnetic tripping in panelboards except as indicated otherwise.

.3 Lock-on devices for 10% of 15 A breakers installed as indicated. Turn over unused lock-on devices to Departmental Representative.

2.3 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results - Electrical.

.2 Nameplate for each panelboard size 4 engraved as indicated.

.3 Complete circuit directory with typewritten legend showing location and load of each circuit.

.4 Arc flash hazard label installed on panel door.

Part 3 Execution

3.1 INSTALLATION

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

.2 Mount panelboards to height specified in Section 26 05 00 - Common Work Results - Electrical or as indicated.

.3 Connect loads to circuits.

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

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 - Common Work Results for Electrical.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA-C22.2 No.42-99(R2002), General Use Receptacles, Attachment Plugs and Similar Devices.

.2 CSA-C22.2 No.42.1-00, Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Shop Drawings to include manufacturer's instructions, printed product literature and data sheets including characteristics, physical size, finish and limitations.

.3 Operational and Maintenance Data: submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.

1.4 DELIVERY STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00– Common Product Requirements.

.2 Separate and recycle waste materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling.

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

Part 2 Products

2.1 RECEPTACLES

.1 Duplex receptacles, CSA type L5-15 R, 125 V, 15 A, ground, to: CSA-C22.2 No.42 with following features:

.1 Corrosion resistant, marine grade, watertight 3R enclosure complete with cast aluminum weatherproof when in use cover. Receptacle is to be mounted in a common two device copper free cast aluminum FD box complete with mounting tabs. Boxes are to be drilled and tapped for bottom entry only.

.2 Suitable for No. 10 AWG back and side wiring.

.3 Triple wipe contacts and riveted grounding contacts.

.4 Acceptable manufacturer or approved equal:

.1 Box: Crouse Hinds #FD029SA.

.2 Receptacle: Hubbell #HBL47CM00.

.3 Cover: Hubbell #WP8E.

2.2 GFI MODULE

.1 GFI Module rated 20 A, 120 V AC, 60 Hz with following features:

.1 Corrosion resistant, marine grade, watertight 3R enclosure complete with cast aluminum flip cover. Mounted in common cast aluminum FD box complete with duplex receptacle .

.2 Suitable for No. 10 AWG back and side wiring.

.3 Triple wipe contacts and riveted grounding contacts.

.4 Acceptable manufacturer or approved equal:

.1 GFI Module: Hubbell #GFM20.

.2 Crouse-Hinds #WLGFFSV.

Part 3 Execution

3.1 INSTALLATION

.1 Receptacles:

.1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.

.2 Mount receptacles and outlets at heights indicated.

.2 Do not install coverplates meant for flush outlet boxes on surface mounted boxes.

.3 Identification:

.1 Provide identification indicating circuit and panel number at all wiring devices using lamacoid plates.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 – Common Work Results for– Electrical.

.2 Section 26 24 16.01 – Panelboards Breaker Type.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International).

.1 CSA-C22.2 No. 5-02, 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).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Shop Drawings to include manufacturer's instructions, printed product literature and data sheets including characteristics, physical size, finish and limitations.

.3 Operational and Maintenance Data: submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.

1.4 DELIVERY STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.

.2 Separate and recycle waste materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

.1 Separate waste materials for reuse and recycling.

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

Part 2 Products

2.1 BREAKERS GENERAL

.1 Moulded-case circuit breakers, to CSA C22.2 No. 5

.2 Bolt-on moulded case circuit breaker: quick- make, quick-break type, for manual and automatic operation with temperature compensation for 40 degrees C ambient.

.3 Common-trip breakers: with single handle for multi-pole applications.

.4 Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting.

.5 Circuit breakers to have minimum 10KA symmetrical rms interrupting capacity rating.

.6 Circuit breakers being installed in panelboards to be by the same manufacturer as the panelboard.

.7 Breakers must be new, complete with original factory warranty and supplied from an authorized manufacturer's distributor.

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.

2.3 OPTIONAL FEATURES

.1 ON-OFF locking device. Provide 5 breaker lock-offs to Owner.

Part 3 Execution

3.1 INSTALLATION

.1 Install circuit breakers as indicated.

END OF SECTION