

PART 1      GENERAL

1.1          References

- .1      Canadian Standards Association (CSA International).
  - .1      CSA C22.1-12, Canadian Electrical Code, Part 1 (22nd Edition), Safety Standard for Electrical Installations.
  - .2      CAN3-C235-83(R2010), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.
- .2      Electrical and Electronic Manufacturer's Association of Canada (EEMAC).
  - .1      EEMAC 2Y-1-[1958], Light Gray Color 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.

1.2          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.

1.3          Design Requirements

- .1      Operating voltages: to CAN3-C235.
- .2      Motors, electric heating, 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, labels for control items in English.
- .4      Use one label for each language as indicated in 1.04 .3.

1.4          Action and Informational Submittals

- .1      Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2      Product Data: submit WHMIS MSDS in accordance with Section 01 47 15 - Sustainable Requirements: Construction and Section 02 81 01 - Hazardous Materials.
- .3      Submit for review single line electrical diagrams.
- .4      Shop drawings:
  - .1      Submit drawings stamped and signed by professional engineer registered or licensed in Alberta, Canada.
  - .2      Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure coordinated installation.
  - .3      Submit 2 copies of 600 x 600 mm minimum size drawings and product data

- to authority having jurisdiction.
- .4 If changes are required, notify the Departmental Representative of these changes before they are made.
- .5 Quality Control: in accordance with Section 01 45 00 - Quality Control.
  - .1 Provide CSA certified equipment and material.
  - .2 Submit test results of installed electrical systems and instrumentation.
  - .3 Permits and fees: in accordance with General Conditions of contract.
  - .4 Submit, upon completion of Work, load balance report as described in PART 3 - LOAD BALANCE.
  - .5 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to the Departmental Representative.

## 1.5 Quality Assurance

- .1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control].
- .2 Qualifications: electrical Work to be carried out by qualified, licensed electricians who hold valid Master Electrical Contractor license or apprentices in accordance with authorities having jurisdiction as per the conditions of the Alberta 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 In accordance with Section 01 32 16.07 - Construction Progress Schedule - Bar GANTT Charts
  - .2 Site Meetings: as part of Manufacturer's Field Services described in Part 3 - FIELD QUALITY CONTROL,
    - .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 29.06 - Health and Safety Requirements.

## 1.6 Delivery, Storage and Handling

- .1 Material Delivery Schedule: provide Departmental Representative with schedule within 2 weeks after award of Contract.
- .2 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 21 – construction/Demolition Waste Management and Disposal.

## 1.7 System Startup

- .1 Instruct Departmental Representative, DCC 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 with aspects of its care and operation.

#### 1.8 Operational Instructions

- .1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.
- .2 Operating instructions to include the following:
  - .1 All appropriate data sheets, drawings, and literature necessary to support operations of the lighting system.
  - .2 Schematics and wiring diagrams that correlate to the operation and function of the entire lighting system.
  - .3 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
  - .4 Start up, proper adjustment, operating, and shutdown procedures.
  - .5 Safety precautions.
  - .6 Procedures to be followed in event of equipment failure.
  - .7 Other items of instruction as recommended by manufacturer of each system or item of equipment.
- .3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.
- .4 Post instructions where directed.
- .5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.
- .6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.
- .7 Train a minimum of 2 personnel in the operation and maintenance of all equipment and provide 2 training manuals explaining in detail the contents of the operating instructions and aspects of the operating instructions relevant to operations and maintenance.

#### 1.9 Commissioning

- .1 During the process of commissioning and start-up of installation, arrange and pay for services of electrical personnel familiar with the operation of electrical systems similar to those being installed. Check, adjust, balance and calibrate components and instruct operating personnel on all system operations.
- .2 Verify point to point cable continuity.
- .3 verify correct device action
- .4 Verify each control operation as identified in the operating instructions
- .5 Verify that all electrical monitoring devices are functioning fully.

- .6 with consultation with the electrical contractor and the process above, have non-functioning electrical equipment replaced to ensure complete operation of all systems.

1.10 Warranty

- .1 Provide 12 month warranty for all material and labour from the date of acceptance by the Departmental Representative

PART 2 PRODUCTS

2.1 Sustainable Requirements

- .1 Materials and products in accordance with Section 01 47 15 - Sustainable Requirements: Construction.
- .2 Do verification requirements in accordance with Section 01 47 17 - Sustainable Requirements: Contractor's Verification].

2.2 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 authority having jurisdiction before delivery to site and submit such approval as described in PART 1 - SUBMITTALS.
- .3 Factory assemble control panels and component assemblies.

2.3 Warning Signs

- .1 Warning Signs: in accordance with requirements of authority having jurisdiction, inspection authorities, and the 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: 3 mm thick melamine, black matt white finish face, lettering accurately aligned and engraved into core mechanically attached with self tapping screws.
  - .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 6mm 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 and label.
- .5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
- .6 Disconnects, and contactors: indicate equipment being controlled and voltage.
- .7 Terminal cabinets and pull boxes: indicate system and voltage.
- .8 Transformers: indicate capacity, primary and secondary voltages.

## 2.6

Wiring Identification

- .1 Identify wiring with permanent indelible identifying markings, with coloured plastic tapes, and numbered on both ends of phase conductors of feeders and branch circuit wiring.
- .2 Maintain phase sequence and color coding throughout.
- .3 Colour coding: to CSA C22.1.

## 2.7

Conduit and Cable Identification

- .1 Code with plastic tape or paint at points where conduit or cable enters the light poles or control cabinets.
- .2 Colours: 25 mm wide prime colour and 20 mm wide auxiliary colour.

	<u>Prime</u>	<u>Auxiliary</u>
up to 250 V	Yellow	
up to 600 V	Yellow	Green
up to 5 kV	Yellow	Blue
up to 15 kV	Yellow	Red
Telephone	Green	
Other	Green	Blue

## 2.8

Finishes

- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
  - .1 Paint outdoor electrical equipment "equipment gray" finish

## PART 3

EXECUTION

3.1 Installation

- .1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.
- .2 Do overhead and underground systems in accordance with CSA C22.3 No.1 except where specified otherwise.

3.2 Nameplates and Labels

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

3.3 Conduit and Cable Installation

- .1 Install conduit and sleeves as indicated in the electrical drawings.
- .2 Install cables, conduits and fittings as indicated in the electrical drawings, per CEC requirements.

3.4 Co-Ordination of Protective Devices

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

3.5 Field Quality Control

- .1 Load Balance:
  - .1 Measure phase current to panel-boards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.
  - .2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.
  - .3 Provide upon completion of work, load balance report: phase and neutral currents on panel-boards, and transformers operating under normal load, as well as hour and date on which each load was measured, and voltage at time of test.
- .2 Conduct following tests in accordance with Section 01 45 00 - 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 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
    - .3 Check resistance to ground before energizing.
- .3 Carry out tests in presence of the Departmental Representative.
- .4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

- .5 Manufacturer's Field Services:
  - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports.
  - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
  - .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

3.6 Cleaning

- .1 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.
- .2 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.

END OF SECTION

PART 1      GENERAL

1.2      References

- .1      Canadian Standards Association (CSA International)
  - .1      CAN/CSA-C22.2 No.18-98, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.
  - .2      CSA C22.2 No.65-, Wire Connectors.
- .2      Electrical and Electronic Manufacturers' Association of Canada (EEMAC)
  - .1      EEMAC 1Y-2, 1961 Bushing Stud Connectors
- .3      National Electrical Manufacturers Association (NEMA).

1.2      Action and Informational Submittals

- .1      Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2      Product Data:
  - .1      Submit manufacturer's instructions, printed product literature and data sheets for wire and box connectors.

1.3      Waste Management and Disposal

- .1      Separate and recycle waste materials in accordance with Section 01 74 21 Construction/Demolition Waste Management And Disposal.
- .2      Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3      Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4      Divert unused wiring materials from landfill to metal recycling facility as approved by Departmental Representative.

1.4      Delivery Storage & handling

- .1      Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2      Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labeled with manufacturer's name and address.
- .3      Storage and Handling Requirements:
  - .1      Store materials off ground and in accordance with manufacturer's recommendations.
  - .2      Store and protect wire and box connectors from nicks, and blemishes.
  - .3      Replace defective or damaged materials with new.



PART 2        PRODUCTS

2.1            Materials

- .1        Pressure type wire connectors to: CSA C22.2 No.65, with current carrying parts of copper alloy sized to fit copper conductors as required.
- .2        Fixture type splicing connectors to: CSA C22.2 No.65, with current carrying parts of copper alloy sized to fit copper conductors 10 AWG or less.
- .3        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.
- .4        Clamps or connectors for armoured cable, as required to: CAN/CSA-C22.2

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 C22.2 No.65.
  - .2        Install fixture type connectors and tighten. Replace insulating cap.
  - .3        Install bushing stud connectors in accordance with EEMAC 1Y-2.

END OF SECTION

PART 1      GENERAL

1.1          Product Data

- .1          Provide product data in accordance with Section 01 33 00 - Submittal Procedures

1.2          Delivery, Storage, and Handling

- .1          Packaging Waste Management: remove for reuse or disposal, of pallets crates padding and packaging materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.3          Measurement for Payment

- .1          Wires and cables shall be measured per linear metre of cable installed and paid as per bid item 19 – Wiring, and will be considered full compensation for all materials, equipment, labour, tools and incidentals necessary to complete the Work to the satisfaction of the Departmental Representative.

PART 2      PRODUCTS

2.1          Teck 90 Cable

- .1          Cable: in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2          Conductors:
  - .1          Grounding conductor: copper as indicated.
  - .2          Circuit conductors: copper as indicated, size as indicated.
- .3          Insulation:
  - .1          Cross-linked polyethylene XLPE.
  - .2          Rating: 1000 V.
- .4          Inner jacket: polyvinyl chloride material.
- .5          Armour: flat interlocking galvanized steel.
- .6          Overall covering: thermoplastic polyvinyl chloride.
- .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 if required and as indicated.
  - .3          Threaded rods: 6 mm diameter to support suspended channels if required and as indicated.
- .8          Connectors:
  - .1          Watertight, approved for TECK cable.

2.2          Control Cables

- .1          Type: low energy 300 V control cable: stranded annealed copper conductors sized as indicated
  - .1          Insulation: TWH polyethylene.

- .2 Overall covering: polyethylene jackets

PART 3 EXECUTION

3.1 Field Quality Control

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Perform insulation tests using method appropriate to site conditions and to approval of the Departmental Representative and local authority having jurisdiction over installation.
- .3 Perform tests before energizing electrical system.

3.2 General Cable Installation

- .1 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors and the CEC as indicated.
- .2 Cable Colour Coding: to Section 26 05 00 Common Work Results for Electrical.
- .3 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.
- .4 Provide numbered wire collars for control wiring. Numbers to correspond to control shop drawing legend. Obtain wiring diagram for control wiring.

3.3 Installation of Teck90 Cable (0-1000 V)

- .1 Group cables wherever possible on channels.
- .2 Install cable securely supported as indicated in drawings and according to CEC requirements.

END OF SECTION

PART 1      GENERAL

1.1          References

- .1          Canadian Standards Association (CSA International)
  - .1          CSA C22.1-06, Canadian Electrical Code, Part 1, 22nd Edition.

1.2          Action and Informational Submittals

- .1          Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2          Product Data:
  - .1          Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .3          Provide shop drawings: in accordance with Section 01 33 00 - Submittal Procedures.
  - .1          Provide drawings stamped and signed by professional engineer registered or licensed in the Province of Alberta, Canada.

1.3          Delivery, Storage and Handling

- .1          Waste Management and Disposal:
  - .1          Separate waste materials for recycling in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

1.4          Measurement for Payment

- .1          Measurement for installation of the control panel shall be made per unit and paid for under bid item 20 – Control Panel, and will be considered full compensation for all materials, equipment, labour, tools and incidentals necessary to complete the Work to the satisfaction of the Departmental Representative.

PART 2      PRODUCTS

2.1          Splitters

- .1          Construction: sheet metal enclosure, welded corners and formed hinged cover suitable for locking in closed position.
- .2          Terminations: connection blocks to match required size and number of incoming and outgoing conductors as indicated.
- .3          Spare Terminals: minimum three spare terminals on each connection sized less than 400 A.

2.2          Junction, Pull Boxes and Manholes

- .1          Construction:
  - a.          welded steel enclosure, and
  - b.          Pre-cast, and
  - c.          Structural Foam Plastic

- .2 Covers Flush Mounted: 25 mm minimum extension all around.
- .3 Covers Surface Mounted: screw-on turned edge covers.
- .4 Pull boxes. Structural Foam Plastic such as the West Coast Engineering Cat # 25110.
- .5 Pull Box Lid – Steel – West Coast Engineering Cat. # 25610

## 2.3

### Cabinets

- .1 EEMAC 3R Enclosure – Large Body
- .2 Corrosion resistance
- .3 Super durable
- .4 To fit large capacity roadway lighting
- .5 Entire CDP to be controlled by one lighting contactor
- .6 Double outer overlapping doors and hold open device
- .7 4" snow kick
- .8 Pad mounted style
- .9 Open bottom for easy access with 53mm mounted flange turned in
- .10 Factory prewired & CSA certified assembly
- .11 Strip heater/Thermostat, convenience receptacle, light & switch
- .12 1.5 KVA 600V – 120V transformer c/w 2 – 6A mini circuit breakers – One for control & one for heater, receptacle & service light

## PART 3

### EXECUTION

### 3.1

#### Junction, Pull Boxes and Cabinets Installation

- .1 Install pull boxes in inconspicuous but accessible locations.
- .2 Mount cabinets with top not higher than 2 m above finished floor except where indicated otherwise.
- .3 Install terminal block as indicated in Type T cabinets.
- .4 Only main junction and pull boxes are indicated. Install additional pull boxes as required and as indicated in the electrical drawings.

### 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            References

- .1        Canadian Standards Association, (CSA International)
- .2        Insulated Cable Engineers Association, Inc. (ICEA)

1.2            Waste Management and Disposal

- .1        Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

PART 2        PRODUCTS

2.1            Cable Protection

- .1        Place sand bedding and surrounding material in unfrozen condition as specified in Section 31 23 33 01

2.2            Markers

- .1        Cedar post type markers: 89 x 89 mm, 1.5 m long, pressure treated with copper naphtenate or 5% pentachlorophenol solution, water repellent preservative, with nameplate fastened near post top, on side facing cable or conduit to indicate depth and direction of duct and cable runs.
  - .1        Nameplate: aluminum anodized 89 x 125 mm, 1.5 mm thick mounted on cedar post with mylar label 0.125 mm thick with words Cable, Joint or Conduit with arrows to indicate change in direction.

PART 3        EXECUTION

3.1            Direct Burial of Cables

- .1        After sand bed specified in Section 31 23 33.01- Excavating, Trenching and Backfilling, is in place, lay cables maintaining 75 mm clearance from each side of trench to nearest cable. Do not pull cable into trench.
- .2        Provide offsets for thermal action and minor earth movements. Offset cables 150 mm for each 60 m run, maintaining minimum cable separation and bending radius requirements.
- .3        Make termination and splice only as indicated leaving 0.6 m of surplus cable in each direction.
  - .1        Make splices and terminations in accordance with manufacturer's instructions using approved splicing kits.
- .4        Underground cable splices not acceptable.
- .5        Minimum permitted radius at cable bends for rubber, plastic or lead covered cables, 8 times diameter of cable; for metallic armoured cables, 12 times diameter of cables or in accordance with manufacturer's instructions.
- .6        Cable separation:
  - .1        Maintain 75 mm minimum separation between cables of different circuits.

- .2 Maintain 300 mm horizontal separation between low and high voltage cables.
- .3 When low voltage cables cross high voltage cables maintain 300 mm vertical separation with low voltage cables in upper position.
- .4 At crossover, maintain 75 mm minimum vertical separation between low voltage cables and 150 mm between high voltage cables.
- .5 Install treated planks on lower cables 0.6 m in each direction at crossings.

### 3.2 Cable Installation in Ducts

- .1 Install cables as indicated in ducts.
- .2 Do not pull spliced cables inside ducts.
- .3 Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.
- .4 To facilitate matching of colour coded multi-conductor control cables reel off in same direction during installation.
- .5 Before pulling cable into ducts and until cables are 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 duct sealing compound.

### 3.3 Markers

- .1 Mark cable every 150 m along cable runs and changes in direction.
- .2 No underground splices.
- .3 Where markers are removed to permit installation of additional cables, reinstall existing markers.
- .4 Install cedar post type markers.

### 3.4 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 1000 V megger on each phase conductor.
  - .2 Check insulation resistance after each splice and/or termination to ensure that cable system is ready for acceptance testing.

- .6 Acceptance Tests
  - .1 Ensure that terminations and accessory equipment are disconnected.
  - .2 Ground shields, ground wires, metallic armour and conductors not under test.
  - .3 High Potential (Hipot) Testing.
    - .1 Conduct hipot testing, factory test voltage in accordance with manufacturer's recommendations.
  - .4 Leakage Current Testing.
    - .1 Raise voltage in steps from zero to maximum values as specified by manufacturer for type of cable being tested.
    - .2 Hold maximum voltage for the time period as specified by the manufacturer.
    - .3 Record leakage current at each step.
- .7 Provide Departmental Representative with list of test results showing location at which each test was made, circuit tested and result of each test.
- .8 Remove and replace entire length of cable if cable fails to meet any of test criteria.

END OF SECTION



PART 1      GENERAL

1.1           References

- .1      Canadian Standards Association (CSA International)  
      .1      CSA C22.2 No.206- Lighting Poles.

1.2           Action Information and Submittals

- .1      Submit product data in accordance with Section 01 33 00 - Submittal Procedures.

1.3           Waste Management and Disposal

- .1      Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .2      Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3      Collect and separate for disposal all packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4      Divert unused metal and wiring materials from landfill to metal recycling facility approved by Departmental Representative.
- .5      Fold up metal banding, flatten and place in designated area for recycling.
- .6      Do not dispose of preservative treated wood through incineration.
- .7      Do not dispose of preservative treated wood with other materials destined for recycling or reuse.
- .8      Dispose of unused wood preservative material at official hazardous material collections site approved by Departmental Representative.
- .9      Do not dispose of unused preservative material into sewer system, into streams, lakes, onto ground or in any other location where they will pose health or environmental hazard.
- .10     Divert unused concrete materials from landfill to local facility approved by Departmental Representative.

1.4           Measurement for Payment

- .1      Measurement of installation of light posts shall be made per unit and paid for under bid items 16 – Light Posts. Installation of new light fixtures shall be made per unit and paid for under bid item 17 Light fixtures – 200w @ 347V. Removal and disposal of existing light fixtures shall be made per unit and paid for under bid items 18 – Light Fixtures – Remove and Dispose of Existing. No separate payment shall be made for cast in place concrete base. Cast in place concrete base shall be considered incidental to light post installation and shall be incorporated into the unit price for bid item 16 – Light Posts. Payment under these bid items will be considered full compensation for all materials, equipment, labour, tools and incidentals necessary to complete the Work to the satisfaction of the Departmental Representative.

PART 2        PRODUCTS

2.1            Luminaires

- .1        Luminaire with cast aluminum weatherproof housing and:
  - .1        Cooper WR Warrior
  - .2        MP Pulse start metal halide
  - .3        Lamp 200 W,
  - .4        Ballast: 200 W 347 V, MP.
  - .5        Distribution 65
  - .6        Voltage 347 – TT (Triple Tap)
  - .7        Factory wired including integral ballast terminated at terminal block.

2.2            Poles

- .1        Steel pole to CSA C22.2 No.206 designed for underground wiring and:
  - .1        Mounting on concrete anchor base without transformer base.
  - .2        Style: Square minimum 3.0 mm thick, tapered Square .
  - .3        Terminating in single davit.
  - .4        Access handhole above pole base for wiring connections, with welded-on reinforcing frame and bolted-on cover.
  - .5        Anchor bolts: as per DWG E01
  - .6        Finish: Hot dip galvanized with powder coat
  - .7        Grounding lug.9.5 mm
  - .8        Approved product includes Valmont West Coast Engineering # WCE-7011-5S-01-30.

2.3            Cast in Place Concrete Base

- .1        To conform to DWG E01
- .2        To conform to Specification 03 30 00 – Cast in Place Concrete

PART 3        EXECUTION

3.1            Installation

- .1        Install poles true and plumb, complete with brackets in accordance with manufacturer's instructions.
- .2        Install luminaires on pole davits and install lamps.
- .3        Check luminaire orientation, level and tilt.
- .4        Connect luminaire to lighting circuit.
- .5        Perform tests in accordance with Section 26 05 00 - Common Work Results – Electrical

END OF SECTION