

PART 1 - GENERAL

- | | | |
|---|----|---|
| <u>1.1 RELATED SECTIONS</u> | .1 | Section 01 33 00 - Submittal Procedures. |
| <u>1.2 GENERAL</u> | .1 | This section covers items common to Division 26. This section supplements requirements of Division 1. |
| <u>1.3 CODES AND STANDARD</u> | .1 | Perform the complete installation in accordance with the Canadian Electrical Code 2015, except where specified otherwise in the Contract Documents. |
| | .2 | Construct underground systems in accordance with respectively CSA C22.3 No. 7-15 except where specified otherwise in the Contract Documents. |
| <u>1.4 CARE, OPERATION AND START-UP</u> | .1 | Instruct Departmental Representative and operating personnel in the operation, care and maintenance of systems, system equipment and components. |
| | .2 | Arrange and pay for services of manufacturer's factory service Representative 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 all aspects of its care and operation. |
| <u>1.5 VOLTAGE RATINGS</u> | .1 | Operating voltages: to CAN3-C235-83(R2015). |
| | .2 | Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment. |
-

1.6 PERMITS, FEES AND INSPECTION

- .1 Pay associated fees for Electrical Permit.
- .2 Notify Departmental Representative of changes required by Electrical Inspection Department prior to making changes.
- .3 Furnish Certificates of Acceptance from Electrical Inspection Department on completion of work to Departmental Representative.

1.7 MATERIALS AND EQUIPMENT

- .1 Provide materials and equipment in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Equipment and materials to be CSA certified. Where there is no alternative to supplying equipment which is not CSA certified, obtain special approval from Electrical Inspection Department.
- .3 Factory assemble control panels and component assemblies.

1.8 ELECTRIC EQUIPMENT AND CONTROLS

- .1 Supplier and installer responsibility is indicated on electrical drawings.

1.9 FINISHES

- .1 Shop finish metal enclosure surfaces; by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
- .2 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.
- .3 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.

1.10 EQUIPMENT IDENTIFICATION

- .1 Identify electrical equipment with nameplates as follows:
- .2 Nameplates:
 - .1 Lamicoid 3 mm thick plastic engraving sheet, white face, black core for normal power, red core

for emergency power.

- .3 Lettering on lamicoid nameplates shall not start nor end nearer than 3/8" from either, or both end of plates.

NAMEPLATE	SIZES	HEIGHT	LENGTH	
Size 1	10 mm	As Required	1 line	5 mm high letters
Size 2	13 mm	" "	1 line	6 mm high letters
Size 3	16 mm	" "	2 lines	5 mm high letters
Size 4	20 mm	" "	1 line	10 mm high letters
Size 5	25 mm	" "	2 lines	6 mm high letters
Size 6	25 mm	" "	1 line	12 mm high letters
Size 7	30 mm	" "	2 lines	12 mm high letters

- .4 Lamicoid plates to be affixed to concrete, concrete blocks, brick, etc. with two nylon inserts and No. 6 panhead sheet metal screws.
- .5 Lamicoid plates are to be affixed to all "metal" surfaces with steel type pop rivets.
- .6 Lamicoid plates to be affixed to other types of surfaces with contact type cement. Contact type cement is to be applied to complete rear side of plate.
- .7 Wording on nameplates to be approved by Departmental Representative prior to manufacture.
- .8 Allow for average of fifty (50) letters per nameplate.
- .9 Identification to be English.
- .10 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
- .11 Terminal cabinets and pull boxes: indicate system

and voltage.

1.11 WIRING IDENTIFICATION

- .1 Identify wiring with permanent indelible identifying markings, either numbered or coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.
- .2 Maintain phase sequence and colour coding throughout.
- .3 Colour code: to Canadian Electrical Code 2015.
- .4 Use colour coded wires in communication cables, matched throughout system.

1.12 CONDUIT AND CABLE IDENTIFICATION

- .1 Colour code conduits and boxes.
- .2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m intervals.
- .3 Colours: 25 mm wide prime colour and 20 mm wide auxiliary colour.

up to 250 V Yellow

Other Green Blue
Communication
Systems

1.13 WIRING TERMINATIONS

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

1.14 MANUFACTURERS AND CSA LABELS

- .1 Visible and legible, after equipment is installed.

1.15 WARNING SIGNS

- .1 As specified and to meet requirements of Electrical Safety Authority and Departmental Representative.

- .2 Aluminum composite decal signs, minimum size 175 x 250 mm.

1.16 MOUNTING HEIGHTS

- .1 Mounting height of equipment is from finished floor or grade to centreline of equipment unless specified or indicated otherwise.
- .2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.
- .3 Install electrical equipment at heights indicated on drawings.

1.17 CONDUIT AND CABLE
INSTALLATION

- .1 Install conduit and sleeves prior to pouring of concrete. Sleeves through concrete: schedule 40 steel pipe, sized for free passage of conduit, and protruding 50 mm.
- .2 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.
- .3 Install cables, conduits and fittings to be embedded or plastered over, neatly and close to building structure so furring can be kept to minimum.

1.18 FIELD QUALITY
CONTROL

- .1 All electrical work to be carried out by qualified, licensed electricians or apprentices as per the conditions of the Provincial Act respecting manpower vocational training and qualification. Employees registered in a provincial apprentices program shall be permitted, under the direct supervision of a qualified licensed electrician, to perform specific tasks - the activities permitted shall be determined based on the level of training attained and the demonstration of ability to perform specific duties.
 - .2 The work of this division to be carried out by a contractor who holds a valid Electrical Contractor license as issued by the Province where the work is being constructed.
 - .3 Conduct and pay for following tests:
-

2016-01-13

- .1 Circuits originating from branch distribution panels.
- .2 Electric heat tracing and its control.
- .4 Furnish manufacturer's certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturer's instructions.
- .5 Insulation resistance testing.
 - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
 - .2 Megger circuits, feeders and equipment up to 600 V with a 1000 V instrument.
 - .3 Check resistance to ground before energizing.
- .6 Carry out tests in presence of Departmental Representative.
- .7 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
- .8 Submit test results for Departmental Representative's review.

1.19 CO-ORDINATION OF
PROTECTIVE DEVICES

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

1.20 TESTING

- .1 The Contractor shall engage the services of a certified manufacturer's service personnel to do a complete testing of the installed system during the commissioning phase. Commissioning personnel must have the following qualifications:
 - .1 Must be factory trained on OEM equipment.
 - .2 Must be familiar with the installation, commissioning and start-up of equipment on this project.
 - .3 Must have appropriate commissioning equipment.
 - .4 Must have a Company Construction Safety Plan.
 - .7 The following systems/equipment shall be tested:

PWGSC	COMMON WORK RESULTS FOR	Section 26 05 00
Neils Brook Bridge	ELECTRICAL	Page 7
Replacement		
Job No. R.074443.001		2016-01-13

.1 Electric heat tracing.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

- 1.1 SECTION INCLUDES .1 Materials and installation for wire and box connectors.
- 1.2 RELATED SECTIONS .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- 1.3 REFERENCES .1 Canadian Standards Association (CSA International)
- .1 CAN/CSA-C222.2 No. 18.3-12, Conduit, Tubing and Cable Fittings.
- .2 CAN/CSA-C22.2 No. 18.4-04(R2013), Hardware for the Support of Conduit, Tubing and Cable.
- .3 CSA C22.2 No. 65-13, Wire Connectors.
- .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)
- 1.4 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 and 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.

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 Clamps or connectors for flexible conduit, as required to: CAN/CSA-C22.2 No. 18.

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. 65-13.
 - .2 Install fixture type connectors and tighten. Replace insulating cap.

END OF SECTION

PWGSC	WIRES AND CABLES	Section 26 05 21
Neils Brook Bridge	(0-1000 V)	Page 1
Replacement		
Job No. R.074443.001		2016-01-13

PART 1 - GENERAL

- | | | |
|--|----|--|
| <u>1.1 RELATED SECTIONS</u> | .1 | Section 01 33 00 - Submittal Procedures. |
| | .2 | Section 26 05 20 - Wire and Box Connectors - 0 - 1000 V. |
| <u>1.2 REFERENCES</u> | .1 | CSA C22.2 No. 0.3-09(R2014), Test Methods for Electrical Wires and Cables. |
| <u>1.3 PRODUCT DATA</u> | .1 | Submit product data in accordance with Section 01 33 00 - Submittal Procedures. |
| <u>1.4 WASTE MANAGEMENT AND DISPOSAL</u> | .1 | Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal, and with the Waste Reduction Workplan. |
| | .2 | Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan. |
| | .3 | Fold up metal banding, flatten and place in designated area for recycling. |

PART 2 - PRODUCTS

- | | | |
|---------------------------|----|---|
| <u>2.1 BUILDING WIRES</u> | .1 | Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG. |
| | .2 | Copper conductors: size as indicated, with minimum 600 V insulation of chemically cross-linked thermosetting polyethylene material rated RWU90. |
| | .3 | Do not use A/C 90. |
| | .6 | Conductors shall be one continuous piece. Conductors are sized based on the 75°C column of |

PWGSC	WIRES AND CABLES	Section 26 05 21
Neils Brook Bridge	(0-1000 V)	Page 2
Replacement		
Job No. R.074443.001		2016-01-13

Table 2 of the CEC. Do not use butt splices in order to obtain the 90°C rating in Table 2.

- | | | |
|---------------------------|----|---|
| <u>2.2 CONTROL CABLES</u> | .1 | Cable type in accordance with equipment system supplier recommendation where indicated on drawings, or identified in equipment specification section. |
| | .2 | 600 V type: 14 AWG stranded annealed copper conductors, with RWU90 (x-link) insulation. |

PART 3 - EXECUTION

- | | | |
|---|----|---|
| <u>3.1 INSTALLATION OF BUILDING WIRES</u> | .1 | Install wiring as follows: |
| | .1 | In conduit systems in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings. |
| | .2 | In underground ducts in accordance with Section 26 05 43.01 - Installation of Cables in Trenches and Ducts. |

- | | | |
|---|----|--|
| <u>3.2 INSTALLATION OF CONTROL CABLES</u> | .1 | Install control cables in conduit system in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings and in underground ducts. |
|---|----|--|

END OF SECTION

PART 1 - GENERAL

- | | | |
|--|----|---|
| <u>1.1 RELATED SECTIONS</u> | .1 | Section 01 74 21 - Construction/Demolition Waste Management and Disposal. |
| | .2 | Section 26 05 00 - Common Work Results for Electrical. |
| <u>1.2 REFERENCES</u> | .1 | Canadian Electrical Code, 2015. |
| <u>1.3 WASTE MANAGEMENT AND DISPOSAL</u> | .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 metal materials from landfill to metal recycling facility as approved by Departmental Representative. |
| | .5 | Fold up metal banding, flatten and place in designated area for recycling. |

PART 2 - PRODUCTS

- | | | |
|----------------------|----|---|
| <u>2.1 EQUIPMENT</u> | .1 | Grounding conductors: bare stranded copper, tinned, soft annealed, size as indicated. |
| | .2 | Insulated grounding conductors: stranded copper, green insulation colour, type TW, size as indicated. |
| | .3 | 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.
- .5 Pressure wire connectors.

PART 3 - EXECUTION

3.1 INSTALLATION GENERAL

- .1 Install complete permanent, continuous grounding system including conductors, connectors, accessories. Provide insulated, green colour, minimum #12 AWG wire in conduit.
- .2 Install connectors in accordance with manufacturer's instructions.
- .3 Protect exposed grounding conductors from mechanical injury.
- .4 Use mechanical connectors for grounding connections to equipment provided with lugs.
- .5 Soldered joints not permitted.
- .6 Install bonding wire for flexible conduit, connected at both ends to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit.
- .7 Make grounding connections in radial configuration only, with connections terminating at single grounding point. Avoid loop connections.

3.2 EQUIPMENT GROUNDING

- .1 Install grounding connections to typical equipment included in, but not necessarily limited to following list. Control panels, enclosures, boxes.

- | | | |
|------------------------------|----|--|
| 3.3 FIELD QUALITY
CONTROL | .1 | Perform tests in accordance with Section 26 05 00
- Common Work Results - For 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

PWGSC		Section 26 05 31
Neils Brook Bridge	SPLITTERS, JUNCTION, PULL	Page 1
Replacement	BOXES AND CABINETS	
Job No. R.074443.001		2016-01-13

PART 1 - GENERAL

1.1 RELATED SECTIONS .1 Section 01 33 00 - Submittal Procedures.

1.2 SHOP DRAWINGS AND PRODUCT DATA .1 Submit shop drawings and product data for cabinets in accordance with Section 01 33 00 - Submittal Procedures.

PART 2 - PRODUCTS

2.1 JUNCTION AND PULL BOXES .1 General Service: Welded steel construction with screw-on flat covers for surface mounting.
.2 Covers with 25 mm minimum extension all around, for flush-mounted pull and junction boxes.

2.2 CABINETS .1 General purpose CSA Type 2 for Indoor use and CSA Type 4 for Exterior use.

PART 3 - EXECUTION

3.1 JUNCTION AND PULL BOXES INSTALLATION .1 Install pull boxes in inconspicuous but accessible locations. Do not install boxes higher than 760mm above ceilings.

3.2 IDENTIFICATION .1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results - Electrical.
.2 Install size 2 engraved nameplate on enclosure

PWGSC		Section 26 05 31
Neils Brook Bridge	SPLITTERS, JUNCTION, PULL	Page 2
Replacement	BOXES AND CABINETS	
Job No. R.074443.001		2016-01-13

cover indicating system name, voltage and phase.

- .3 Install size 2 engraved nameplate on enclosure cover indicating panel and circuit numbers as appropriate.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS .1 Section 01 33 00 - Submittal Procedures.

1.2 REFERENCES .1 Canadian Standards Association (CSA)
.1 CSA C22.2 No. 45.1-07(R2012), Electrical Rigid Metal Conduit.
.2 CSA C22.2 No. 56-13, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
.3 CSA C22.2 No. 211.2-06(R2011), Rigid Types PVC (unplasticized) Conduit.

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, and with the Waste Reduction Workplan.
.2 Place materials defined as hazardous or toxic waste in designated containers.
.3 Ensure emptied containers are sealed and stored safely for disposal away from children.
.4 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

PART 2 - PRODUCTS

2.1 CONDUITS .1 Rigid metal conduit: to CSA C22.2 No. 45.1(07(R2012), Electrical Rigid Metal Conduit, galvanized steel threaded.
.2 Rigid pvc conduit: to CSA C22.2 No. 211.2-06(R2011), Schedule 40.
.3 Flexible metal conduit: to CSA C22.2 No. 56-13. Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduits.

- 2.2 CONDUIT FITTINGS
- .1 Fittings: steel as manufactured for use with conduit specified. Coating: same as conduit.
 - .2 Factory "ells" where 90° bends are required for 25 mm and larger conduits excluding telecom service.

- 2.4 FISH CORD
- .1 Polypropylene.

PART 3 - EXECUTION

- 3.1 INSTALLATION
- .1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces where conduits are routed.
 - .2 Use Schedule 40 rigid pvc conduit in underground locations.
 - .3 Use liquid tight flexible metal conduit from heat tracing controller to entry into pipe insulation. The maximum length of any flexible conduit shall be 1.5m.
 - .4 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.
 - .5 Mechanically bend steel conduit over 21 mm dia.
 - .6 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.
 - .7 Install fish cord in empty conduits.
 - .8 Remove and replace blocked conduit sections. Do not use liquids to clean out conduits.
 - .9 Dry conduits out before installing wire.
-

PWGSC		Section 26 05 34
Neils Brook Bridge	CONDUITS, CONDUIT FASTENINGS	Page 3
Replacement	AND CONDUIT FITTINGS	
Job No. R.074443.001		2016-01-13

- 3.2 CONDUITS UNDERGROUND .1 Slope conduits to provide drainage.
- .2 Waterproof joints (pvc excepted) with heavy coat of bituminous paint.

END OF SECTION

PART 1 - GENERAL

- | | | |
|--|----|--|
| <u>1.1 RELATED REQUIREMENTS</u> | .1 | Section 26 05 21 - Wires and Cables (0-1000V). |
| <u>1.2 REFERENCES</u> | .1 | Canadian Electrical Code, latest edition. |
| | .2 | Insulated Cable Engineers Association, Inc. (ICEA) |
| <u>1.3 ACTION AND INFORMATIONAL SUBMITTALS</u> | .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 cables and include product characteristics, performance criteria, physical size, finish and limitations. |
| <u>1.4 DELIVERY, STORAGE AND HANDLING</u> | .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, labelled with manufacturer's name and address. |
| | .3 | Storage and Handling Requirements:
.1 Store materials and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new. |
| | .4 | Packaging Waste Management: remove for reuse of pallets, crates, padding, and packaging materials as specified in Construction Waste Management |
-

Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

- | | | |
|-----------------------------|----|---|
| <u>2.1 CABLE PROTECTION</u> | .1 | 38 x 140 mm planks pressure treated with copper naphthenate or 5% pentachlorophenol solution, water repellent preservative. |
| <u>2.2 MARKERS</u> | .1 | Concrete type cable markers: 600 x 600 x 100 mm with words: cable, joint or conduit impressed in top surface, with arrows to indicate change in direction of cable and duct runs. |
| | .2 | Polyethylene warning tape over full length of raceway route. Tape width of 75 mm with 4 mil thickness. Text on tape to read "CAUTION, BURIED ELECTRIC LINE BELOW". |

PART 3 - EXECUTION

- | | | |
|--|----|--|
| <u>3.1 EXAMINATION</u> | .1 | Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for cable installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Departmental Representative.
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative. |
| <u>3.2 CABLE INSTALLATION IN DUCTS</u> | .1 | Install cables as indicated in ducts. |
| | .2 | Do not pull spliced cables inside ducts. |
| | .3 | Install multiple cables in duct simultaneously. |
-

- .4 Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.
- .5 To facilitate matching of colour coded multiconductor control cables reel off in same direction during installation.
- .6 After installation of cables, seal duct ends with duct sealing compound.

3.3 MARKERS

- .1 Mark cable every 150 m along cable duct runs and changes in direction.
- .2 Where markers are removed to permit installation of additional cables, reinstall existing markers.
- .3 Lay concrete markers flat and centred over cable with top flush with finish grade.

3.4 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Perform tests using qualified personnel.
 - .1 Include 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.
 - .1 Ensure resistance to ground of circuits is not less than 50 megohms.
- .5 Tests:
 - .1 After installing cable but before splicing and terminating, perform insulation resistance test with 500 V megger on each phase 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.

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with
-

Section 01 74 11 - Cleaning.

- .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal 01 47 15 - Sustainable Requirements: Construction.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.6 PROTECTION

- .1 Repair damage to adjacent materials caused by cables installation.

END OF SECTION

PART 1 - GENERAL

- | | | |
|--|----|---|
| <u>1.1 RELATED SECTIONS</u> | .1 | Section 01 33 00 - Submittal Procedures. |
| | .2 | Section 01 74 21 - Construction/Demolition Waste Management and Disposal. |
| <u>1.2 PRODUCT DATA</u> | .1 | Submit product data in accordance with Section 01 33 00 - Submittal Procedures. |
| <u>1.3 WASTE MANAGEMENT AND DISPOSAL</u> | .1 | Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal. |
| | .2 | Collect and separate plastic, paper and corrugated cardboard in accordance with Waste Management Plan. |

PART 2 - PRODUCTS

- | | | |
|-----------------------------|----|--|
| <u>2.1 BREAKERS GENERAL</u> | .1 | Moulded-case circuit breakers and ground-fault circuit-interrupters 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 match existing. |
| | .6 | Circuit breakers to have minimum symmetrical rms interrupting capacity rating same as associated board. |
-

2.2 THERMAL MAGNETIC_ .1 Moulded case circuit breaker to operate
BREAKERS 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 circuit breakers in panels as indicated.

END OF SECTION
