SECTION 11.13
CONTROL CABLE

11.13.01--Description: This item shall consist of furnishing and installing electrical cable and appurtenances of the type specified at the locations shown on the plans or as indicated by the Engineer, in accordance with these specifications.

11.13.02--Materials: The materials for this work shall conform to the requirements of Article M.16.14.

11.13.03--Construction Methods: All wiring shall conform to the appropriate requirements for the NEC and shall be insulated for six hundred (600) volts. Wire splicing will not be permitted in conduit or outside of junction boxes, hand holes, poles or pedestals, unless otherwise indicated on the plans.

All cables shall contain the required number of conductors as shown on the plans. The substitution of several cables to attain the required number of conductors will not be permitted. Cable to be installed in conduit shall be pulled with a minimum of dragging on the ground or pavement. This shall be accomplished by means of reels mounted on jacks or approved devices conveniently located for unreeling cable directly into the conduit. Powdered soapstone, talc, or other approved lubricants shall be used when inserting cable into the conduit. Cable shall be pulled through conduit by means of a cable or cables. Wiring within junction boxes and cabinets shall be neatly arranged.

Conductors entering the controller cabinet shall be neatly dressed and laced along the base and back of the cabinet to the terminal board mounted in the cabinet. When three or more conductors are attached to the same terminal in the controller cabinet, they shall not be twisted together, but shall be attached with a set screw type lug of the correct size. When less than three conductors are attached to the same terminal, in the controller cabinet, a separate spade type connector shall be attached to each conductor. Spare conductors shall be tied together with their ends taped. All splices are to be of an approved type and made in such a manner that the connection will be moisture-proof. All aerial splices shall be accomplished as shown on the plans using a cable closure. At least 600 mm of slack shall be left for each conductor at each standard and at least 300 mm of slack at each pull box.

All splicing in junction boxes, hand holes, poles and pedestals can be accomplished by one of the following methods:

1. Splices can be made by soldering with the pouring or dipping method.

2. Non-insulated butt-type pressure connectors shall be seamless and be U.L. approved for aluminum or copper wire. The butt-type pressure connector shall be connected to the wire with an installing tool that is designed for butt-type pressure connectors. After crimping, all detector cable splices shall also be soldered. Each butt-type connector shall be insulated separately by applying layers of thermoplastic electrical insulating tape. The thermoplastic tape shall extend 13 mm beyond the conductor insulation and be lapped at 6 mm intervals. The entire completed splice shall have an application of layers of 30 mil high voltage rubber self-fusing tape well lapped over and equal to the original insulation. The splice shall then be covered with layers of thermoplastic electrical insulating tape not over 200 µm thick conforming to MIL-7798 and a coating of flexible insulating paint approved by the Engineer.

At least 300 mm of slack shall be left for each conductor at each splice. An approved type of water-tight splicing box may be used in lieu of the aforementioned, providing the box has sufficient number of terminals to accommodate the number of conductors to be spliced in the box.

When conductors and cables are pulled into conduits, all ends of conductors and cables shall be taped to exclude moisture, and shall be so kept until the splices are made or terminal appliances attached.

3. Cable closures shall be installed as shown on the plans or as directed by the Engineer. The cable closure shall be attached to the span or messenger with suspension brackets. After the cables have been installed, each opening shall be sealed with sealing tape. When using cable less than 15 mm in diameter, a cone-shaped collar

shall be formed with sealing tape, to seal off the space between the cable and closure nipple. Two turns of sealing tape will then be placed over the closure nipple and the cable. The cable shall be attached to the terminal blocks as shown on the typical installation details.

The terminals shall then be securely wrapped with electrical tape. Connectors shall not extend beyond the end of the terminal post. The terminals and connectors shall not be in contact with the closure cover at any point.

11.13.04--Method of Measurement: This work will be measured as follows:

1. The quantity of control cable to be paid for under these items shall be the actual number of meters measured along the center of the cable specified, installed, tested and accepted in place with the necessary connections.

2. Cable closures will be measured for payment by the number of cable closures of the type specified, completed and accepted in place.

11.13.05--Basis of Payment:

1. Control cable shall be paid for at the Contract unit price per meter for "(No.) Conductor #( ) (Type)" which price shall include installation, splicing, connecting, necessary fittings, equipment, labor, all materials and work incidental thereto.

2. Cable closure will be paid for at the Contract unit price for "Cable Closure" complete, in place, which price shall include all materials, sealing tape, terminal blocks and all equipment, tools, labor and work incidental thereto.

Pay Item	Pay Unit
(No.) Conductor #( )(Type)	m
Cable Closure	EA.