

**TS 810
TRAFFIC ACTUATION EQUIPMENT**

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TTS 810.100	CONSTRUCTION SPECIFICATION FOR INSTALLATION OF TRAFFIC ACTUATION EQUIPMENT
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3. MATERIAL SPECIFICATIONS

NOT USED

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1.0 Scope

This specification covers the requirements for the installation of vehicular and pedestrian traffic actuation equipment.

The requirements of TS 1.00 and TS 801 shall apply to this work.

2.0 References

This specification refers to the following standards, specifications or publications:

Toronto Transportation:

TS 1.00	Maintenance of Traffic
TS 801	Electrical Work
TS 802	Handwells
TS 803	Ducts
TS 804	Cables
TS 814	Traffic Signs

Ministry of Transportation Publications:

Ontario Traffic Manual

NEMA

NEMA Standard TC 7-2000 - smooth Wall Coilable Polyethylene Electrical Plastic Duct

Canadian Standard Association:

CSA C22.2 No. 65-03 - M88 Wire Connectors.

CAN/CSA-C22.2 No. 75-03 Thermoplastic Insulated Wires & Cables.

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

CSA C22.2 No. 197-M1983 (R2003) - PVC Insulating Tape

3.0 Equipment

3.1 Slot Cutting Equipment

Slot wet cutting equipment shall include a minimum 70 HP engine and a minimum 400mm diameter diamond tooth blade adjustable between 20mm and 100mm depth of cut. Slot cutting shall be done above -5°C. For ambient temperatures between -5°C and 0°C use diluted concentrated windshield washer anti-freeze.

4.0 Construction

4.1 Loop Detectors

The work for loop detectors regardless of size or type of loop, shall include loop layout, saw-cutting, slot preparation, flexible duct installation, loop cable, sealant, splicing, and quality assurance tests described in Section 5.

4.1.1 Loop Layout

The Contractor shall accurately layout the loops on the pavement to the dimensions indicated in the contract. Slot-cutting lines shall be marked with non-permanent materials. Saw-cutting of slot shall not commence until the Engineer has inspected the loop layout.

The Contractor shall report any instance where the layout of loop crosses a major pavement crack, butt, expansion joint or transition area. In such instances, the treatment for crossing the pavement irregularity shall be as indicated in the contract; or, at the option of the Engineer, the loop shall be remarked into separate loops, each commencing approximately 300mm away from the irregularity.

4.1.2 Saw-cutting

The use of asbestos in the surface layer of roadways during the 1960s, 1970s and early 1980s was common in many City of Toronto roadways. This potential hazard can be encountered when saw cutting the asphalt. The City of Toronto has developed Measures and Procedures for Roadwork with Asphalt containing Asbestos Fibres. These measures include training, notification, separation, special signing, use of respirators, protective clothing, dust control and decontamination procedures. The Contractor is to follow all procedures as outlined in the City of Toronto policy.

Saw-cutting of loop slots in pavement shall be in straight lines with slots 65mm deep and 10mm wide. Corner cutting for slots shall be extended only far enough past each corner point to obtain the full depth of the slot. Slot crossing of pavement irregularities shall be constructed using additional widths and depths of slots as indicated in the contract.

4.1.3 Slot Preparation

Upon completion of saw-cutting, the slot shall be cleaned with a pressurized water and dried by means of compressed forced air. The air may be heated to a maximum of 160°C where required to remove excess moisture.

All corners shall be chisel off or drilled with a 25mm bit. All slots and corners shall be examined for protrusion of sharp stone aggregates or debris which may damage cable. Any such protrusions or debris shall be removed. Final slot preparation shall be done immediately prior to installation of cable.

4.1.4 Duct Installation

A hole shall be drilled through the pavement to accommodate a duct at the location indicated in the contract.

All work for duct installation including earth excavation, backfill, removal and restoration, shall conform to TS 803.

Flexible polyethylene ducts and fittings shall conform to NEMA Standard TC 7-2000.

Rigid PVC conduits and fittings shall conform to CSA C22.2 No. 211.2-M1984 (R2003).

4.1.5 Loop Cables

Cables for loop detectors shall be #14 AWG type TEW 90, 41 strand, -40°C rated 600 V copper conductor.

Cables for loop detector feeders shall be 2-#14 AWG shielded stranded, PVC jacketed detector cable rated 600 V (Beldon #8720 or approved equal).

The loop shall be installed with the size, winding direction, configurations, number of turns and type of cables as indicated in the contract.

The loop cable end which progresses clockwise shall be marked at the splice point with two bands of electrical vinyl tape.

Cable in slots shall be firmly and carefully tamped in place using a blunt instrument on each successive turn of cable.

Loop cables between the loop and the splice point, including those in the slot, shall be twisted together to form a consistent lay of 10 turns per metre. The entire loop and lead cable system shall be formed of a continuous and unspliced length of cable.

Identify each loop cable and extra low voltage cable with a wire marker in the splice point as shown on the contract drawings.

4.1.6 Sealant Compound

Sealant compound shall be installed in slots as protection for loop cables. Heat sealant to 175°C using an indirect oil heater.

The sealing compound shall be poured in multiple (min. 2) passes to prevent loop wire insulation damage and allowed to set prior to allowing vehicles to cross the loop. Pour sealant slightly above grade as shown in 810.006. Cement dust may be added to tacky sealant where necessary.

Sealant compound shall be PQ 6190 Loop Detector Sealant, unless otherwise indicated in the contract.

4.1.7 Splicing

Splices of cables shall be made only at the designated splice point. The cables shall be stripped of insulation for approximately 12mm, shall be twisted together with a minimum of four turns and shall be soldered to produce a bonded connection with a maximum resistance of 0.1 Ohm.

Splices shall be insulated with four half-laps of tape and encased in a resin splice with the splices positioned to obtain a minimum coverage of 6mm of resin around each splice. The black conductor of the extra low voltage cable shall be connected to the clockwise winding lead cable as described in sub-section 4.1.5.

The metallic shield of cables shall be cut off cleanly and left unconnected in the resin splice.

Solder shall be 60/40 tin/lead mix, resin core type.

Extra low voltage splice insulation kit shall be 3M Scotchkit, Raychem Low-Voltage H-frame Closure or others as directed by the Engineer.

Electrical insulating tape shall conform to CSA C22.2 No. 197-M1983 (R2003), rated for -18°C to 105°C use, 600 V.

4.2 Non Intrusive Detectors

The work for Non Intrusive detectors installation shall include the work described in sub-section 4.2.1 and section 5.0 for quality assurance.

Non Intrusive detectors shall conform to the contract requirements.

4.2.1 Aerial Installation

Non Intrusive detectors, cables, equipment and fittings, hardware, junction boxes, and accessories necessary for the mounting of equipment on a mounting bracket or single member arm shall be installed as indicated in the contract. All compression nuts, locknuts and fitting hardware shall be securely tightened to prevent shifting of equipment by wind.

4.3 Pedestrian Pushbuttons

The work for pedestrian pushbuttons shall include the installation of pedestrian pushbuttons and signs, and the work described in Section 5.0 for quality assurance.

Pedestrian pushbuttons shall be as indicated in the contract and directed by the Contract Administrator.

4.3.1 Installation

Pedestrian pushbuttons and signs shall be mounted on the side of the pole such that the pedestrian signal pushbutton sign indicates the proper direction for which roadway crossing is required.

Pedestrian pushbuttons shall be installed with self tapping screws or stainless steel strapping. A wiring aperture shall be drilled in metal poles and fitted with a rubber grommet, or a rigid conduit shall be installed on poles, for wiring access.

4.4 Traffic Actuation Equipment

The work for traffic actuation equipment, shall include the work described in sub-section 4.1 for loop detectors, 4.2 for Non Intrusive detectors and 4.3 for pedestrian pushbuttons.

5.0 Quality Assurance

5.1 General

The Contractor shall perform all tests as described in this specification. The Contractor shall give the Contract Administrator 24 hours notice of when final tests are to be performed. Final tests will be done after the sealing of saw-cuts, or after all work is completed.

The Contract Administrator shall witness all final tests. All tests results shall be submitted to the Engineer.

Upon completion of installation and testing, a visual check shall be made at the controller cabinet to ensure proper operation of the equipment.

5.2 Loop Detectors

Prior to sealing slots, loop wiring shall be tested for continuity, for leakage to ground and for inductance. Resistance to ground shall be 10Ω or greater. Inductance shall be within 25% of the value indicated in the contract using a 100 kHz signal at 5V.

Upon completion of splices, installation of extra low voltage cable, sealing of slots and back-filling of trenches, the foregoing tests shall be repeated at the controller cabinet.

5.3 Non Intrusive Detectors

Prior to installation of Non Intrusive detectors, the sensitivity range of detector shall be tested and shall be within 25% of the manufacturer's rated parameters. Any detector not passing the foregoing tests shall not be used.

5.4 Pedestrian Pushbuttons

Upon completion of the installation of the pedestrian pushbuttons, the system shall be tested at the controller cabinet.

6.0 Measurement for Payment

6.1 Actual Measurement

6.1.1 Loop Detectors, Non Intrusive Detectors and Pedestrian Pushbuttons

The unit of measurement is each.

6.2 Plan Quantity Measurement

6.2.1 Loop Detectors, Non Intrusive Detectors and Pedestrian Pushbuttons

Measurement is by Plan Quantity, as may be revised by Adjusted Plan Quantity. The unit of measurement is each.

7.0 Basis of Payment

7.1 Loop Detectors - Item Non Intrusive Detectors - Item Pedestrian Pushbuttons - Item Traffic Actuation Equipment - Lump Sum Item

Payment at the contract price for the above tender items shall be full compensation for all labour, equipment and materials required to do the work.