

**Construction Specification For
Pedestrian Crossover (PXO) Equipment****Table of Contents**

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TTS 812.100.01 SCOPE

This specification covers the requirements for the installation of Level 1 Type A or Level 2 Type B Pedestrian Crossover (PXO) equipment, including flashing beacons, rectangular rapid flashing beacons, flashing mechanisms/timers, beacon mounting arms, LED fixtures, pedestrian pushbuttons, traffic signs and sign mounting bracket, junction boxes, wiring, at the crossing.

TTS 812.100.02 REFERENCES

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

City of Toronto Standard Specifications

TS 801	Electrical Work - General
TS 804	Cables
TTS 809.210	Material Specification for Traffic Signal Controller and Cabinet TS2 Type 1
TTS 810.100	Construction Specification for Traffic Actuation Equipment
TTS 811.100	Construction Specification for Flashing Beacons
TTS 812.200	LED Pedestrian Crossover (PXO) Fixtures Material
TTS 813.100	Grounding and Bonding
TTS 815.100	Construction Specification for The Removal of Electrical Equipment

City of Toronto Standard Drawings

TTD 812.001	Level 1 Type A Pedestrian Crossover Aerial Installation
TTD 812.005	Level 1 Type A Split Pedestrian Crossover Pole Mounted Installation
TTD 812.006	Level 1 Type A Standard Pedestrian Crossover Schematic Wiring Diagram
TTD 812.007	Level 1 Type A Split Pedestrian Crossover Schematic Wiring Diagram
TTD 812.010	Mounting Brackets for Level 1 Type A Split Pedestrian Crossover Installation
TTD 812.011	Level 1 Type A Pedestrian Crossover Hardware Installation Types
TTD 812.015	Level 1 Type A Pedestrian Crossover Fixture Mounting on Guy Wire
TTD 812.020	Flashing Beacon Back-to-back Span Wire Mounting Hardware
TTD 812.025	Level 2 Type B Pedestrian Crossover Typical Plan View
TTD 812.026	Level 2 Type B Pedestrian Crossover Elevation View – AC Power
TTD 812.030	Level 2 Type B Pedestrian Crossover Schematic Wiring Diagram

Canadian Standards Association

C22.2 No. 38	Thermoset – Insulated Wires and Cables
C22.2 No. 45.2-08 (R2013)	Electrical Rigid Metal Conduit
C22.2 No. 65-13	Wire Connectors
C22.2 No. 84 – 95 (R2004)	Incandescent Lamps
C22.2 No. 85-14	Rigid PVC Boxes and Fittings
C22.2 No. 197-M1983 (R2013)	PVC Insulating Tape
C22.2 No. 211.2-M1984 (R2021)	Rigid PVC (Unplasticized) Conduit
C22.2 No. 239	Control and Instrumentation Cables
C57-16	Electric Power Connectors for Use in Overhead Line Conductors

US Federal Highway Administration

MUTCD	Manual on Uniform Traffic Control Devices
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TTS 812.100.03 DEFINITIONS – Not Used

TTS 812.100.04 SUBMISSION AND DESIGN REQUIREMENTS – Not Used

TTS 812.100.05 MATERIALS

TTS 812.100.05.01 General

All components shall properly operate within an ambient temperature ranging from –34 °C to +74 °C, 10 to 90%, non-condensing. The components shall be able to withstand vibrations caused by normal vehicular traffic and occasional construction operations around the crossing.

TTS 812.100.05.02 Pedestrian Pushbuttons

The PXO system shall be manually activated by a pushbutton. Pedestrian pushbuttons shall be according to TTS 810.100.

TTS 812.100.05.03 Static Signs

When indicated in the Contract, all static signs required for installation on poles or mast arms are to be provided by the City's sign shop. The Contractor shall submit the list of all static signs required by the Contract to the Contract Administrator for fabrication.

The Contractor shall provide all necessary mounting hardware for all the static sign installations.

TTS 812.100.05.04 Cables

Low-voltage multiconductor cables shall be according to CAN/CSA C22.2 No. 239.

Low-voltage single conductor cables shall be type RWU90 according to CSA C22.2 No. 38.

Conductors shall be insulated stranded copper and be according to CAN/CSA C22.2 No. 239.

TTS 812.100.05.05 Conduits and Fittings

Rigid PVC conduit and fittings for the installation of pole-mounted equipment shall be according to CSA C22.2 No. 211.2.

TTS 812.100.05.06 Grounding

Grounding shall be according to TTS 813.100.

TTS 812.100.05.07 Tape

Electrical insulating tape shall meet the requirements of CSA C22.2 No. 197-M1983 (R2003), rated for -18°C to 90°C use, 600V.

TTS 812.100.05.08 Wire Connectors

Wire connectors shall be of the insulated wing nut vibration proof spring type and shall meet the requirements of CSA C22.2 No. 65.

TTS 812.100.05.09 Junction Boxes and Fittings

PVC junction boxes and fittings shall be according to CAN/CSA C22.2 No. 85.

TTS 812.100.05.10 Strapping

Stainless steel strapping and buckles shall have a minimum ultimate strength of 4.5 kN.

TTS 812.100.05.11 Grommets

Grommets shall be rubber or neoprene sized to suit the aperture metal thickness and cable diameter.

TTS 812.100.05.12 Equipment Enclosures

Equipment enclosures shall be aluminum in construction, be pole mounted type, rated NEMA 3R or better with forward facing access door.

Conduit knockouts along with the accompanying conduit, conduit fittings and wiring systems shall be provided by the Contractor.

The enclosure shall be equipped with a keyed lock according to TTS 809.210.

The enclosure shall come complete with manufacturer provided pole mounting kit.

The enclosure shall be as described elsewhere in this document and shall be of size to accommodate all required equipment.

TTS 812.100.05.13 Level 1 Type A Pedestrian Crossover Equipment**TTS 812.100.05.13.01 LED PXO Fixtures**

PXO fixtures shall be according to TTS 812.200.

TTS 812.100.05.13.02 Flashing Beacons

Flashing beacons shall be according to TTS 811.100.

The flashing beacons shall be activated simultaneously within 1 second of pushbutton activation. Pressing the pushbutton within the flashing cycle shall add another flashing cycle to the current one.

TTS 812.100.05.14 Flashing Mechanism

The flashing mechanism shall be capable of driving the flashing beacons with wigwag and MUTCD compliant 0.5 second on/0.5 second off flashing patterns.

TTS 812.100.05.14.01 Hanger Assembly

The hanger assembly for the mast arm mounting of the internally illuminated pedestrian crossover sign and the flasher beacons shall be composed of U-bolts and custom brackets as shown on TTD 812.010.

For aerial mounting, the internally illuminated pedestrian crossover sign and the flasher beacons shall be suspended on the slack span wire with trunnion type suspension clamp. The clamp shall be made of ductile iron with galvanized steel nuts and bolts.

TTS 812.100.05.15 Level 2 Type B Pedestrian Crossover Equipment

TTS 812.100.05.15.01 Rectangular Rapid Flashing Beacon Light Bar

The light bar shall adhere to SAE J595 Class I LED specifications and SAE J578 color specifications.

Each light bar shall consist of two rectangular rapid-flashing high intensity output yellow LED modules with UV resistant clear lens, wide-angle visibility. Each module shall be a minimum 125 mm wide by 50 mm high.

The light bar shall be mounted in such a way that the LED modules are aligned horizontally with 175 mm spacing between the modules.

The light bar shall have side-mounted yellow LED indication or provision to have the flashing beacon visible to pedestrians at the crosswalk.

The light bar housing shall be constructed with corrosion resistant sheeting, powder-coated yellow and shall mount to a standard pole. Contractor to provide all necessary galvanized or stainless steel universal mounting hardware for back-to-back mounting.

The light bar components shall be modular and replaceable without uninstalling the assembly. The housing shall have provisions or opening for access to LED module wiring connections. All cable entry shall be watertight.

The flash rate of the LEDs when activated shall be 70 to 80 flashes per minute with adjustable automatic nighttime dimming.

The duration for every cycle of RRFB activation shall be adjustable between 5 seconds to 60 minutes.

TTS 812.100.05.15.02 Rectangular Rapid Flashing Beacon Lighting Controller

For Level 2 pedestrian crossovers, the flashing mechanism shall be capable of driving the rectangular rapid flashing beacons with Wig-Wag plus Simultaneous (WW+S) and 2-5 flash patterns. The flashing mechanism shall be configured to WW+S flash pattern.

Each controller shall have independent outputs to simultaneously control a minimum of two RRFB light bars.

TTS 812.100.06 EQUIPMENT – Not Used

TTS 812.100.07 CONSTRUCTION

TTS 812.100.07.01 General

Level 1 pedestrian crossovers shall be installed according to TTD 812.001, TTD 812.005, TTD 812.006, TTD 812.007, TTD 812.010, TTD 812.011, TTD 812.015, TTD 812.020.

Level 2 pedestrian crossovers shall be installed according to TTD 812.025, TTD 812.026, TTD 812.030.

TTS 812.100.07.02 Mast Arm Installation

TTS 812.100.07.02.01 Level 1 Type A Pedestrian Crossovers

The internally illuminated pedestrian crossover fixture shall be mounted as specified in the Contract Drawings.

Flashing beacons shall be installed 300 mm from either side of the illuminated pedestrian crossover fixture. The flashing beacons shall be aligned facing the direction of approaching traffic.

Equipment shall be supported on the mast arm using offset hanger brackets specified in this Document.

TTS 812.100.07.02.02 Level 2 Type B Pedestrian Crossovers

Rectangular rapid flashing beacons shall installed as specified in the Contract Drawings.

Equipment shall be supported on the mast arm using offset hanger brackets specified in this Document.

TTS 812.100.07.03 Aerial Installation

The Contractor shall install all equipment and fittings, hardware, junction boxes and accessories necessary for the mounting of equipment on aerial messenger cable systems. All compression units, locknuts and fitting hardware shall be securely tightened to prevent shifting of equipment by wind.

Equipment shall be supported on the span wire using clamps, bull ring, and eyebolts, as specified in the Contract Drawings.

TTS 812.100.07.04 Wiring Apertures

Wiring apertures shall be drilled in metal poles as required. Apertures shall be de-burred and painted with grey zinc rich paint. Rubber grommets shall be installed after paint is dry.

TTS 812.100.07.05 Conduit Systems

Where pedestrian crossover signal devices are to be installed on poles and mast arms, the Contractor shall install conduit systems inclusive of junction boxes and all necessary fittings and hardware. Conduit shall be installed along the centre of the arm using stainless steel strapping at 1.5 m maximum spacing. Conduits shall be kept free of kinks or scorch marks.

TTS 812.100.07.06 Wiring

Wiring shall be installed from the pedestrian crossover fixtures and flashers to either the pole handhole or the pole mounted junction box. A minimum length of 600 mm of riser cable shall be coiled and secured inside pole handholes. Drip loops shall be left on all external cable. Cable shall be protected with rigid PVC conduit where slack lengths of more than 450 mm are externally exposed. Aerial cable from the junction box to the pedestrian cross over assembly shall be installed in accordance with the requirements of TS 804.

Riser cables shall be connected to terminal blocks. Lampholder leads shall be disconnected from internal terminal strips in the flashing or pedestrian crossover fixture housing and connected to riser cables with insulated wingnut vibration proof spring connectors. All insulated spring connectors shall be held in place with three half wraps of electrical vinyl tape. Upon completion of connections, all conductors shall be neatly bundled together and secured with four wraps of electrical vinyl tape.

TTS 812.100.07.07 Grounding

All metal parts of pedestrian crossover assembly shall be grounded in accordance with the requirements of TTS 813.100.

Grounding shall be done with the use of the designated spare conductor in the riser cable, connected securely to the ground terminal at the pole ground stud or the system ground wire in junction boxes. Ground system on TTC poles shall not be used.

TTS 812.100.07.08 Static Signage

When required, all static signs shall be installed on the mast arms as shown in the Contract documents.

All static signs shall be mounted only with mounting hardware recommended by the City sign shop.

TTS 812.100.07.09 Equipment Modification

When required, removal of existing equipment shall be done in accordance with the requirements of TTS 815.100 and TS 801. Installation of new, refurbished or modified equipment shall be done in accordance with the requirements for installation of the particular items of equipment as described herein.

TTS 812.100.07.10 Quality Control

The Contractor shall locate, space and aim flashing beacons and internally illuminated fixtures.

TTS 812.100.08 QUALITY ASSURANCE

The Contractor shall perform all tests on wiring of equipment in accordance with the requirements in TS 804.

The Contractor shall perform all tests on grounding of equipment in accordance with the requirements in TTS 813.100.

Equipment and Materials, as supplied by Contractor, are subject to inspection by the Contract Administrator prior to installation.

TTS 812.100.09 MEASUREMENT OF PAYMENT

TTS 812.100.09.01 Actual Measurement

TTS 812.100.09.01.01 Pedestrian Crossover Level 1 Type A

The unit of measure is each, where each represents the number of completed pedestrian crossovers installed per site.

TTS 812.100.09.01.02 Pedestrian Crossover Level 2 Type B

The unit of measure is each, where each represents the number of completed pedestrian crossovers installed per site.

TTS 812.100.09.02 Plan Quantity Measurement

When measurement is by Plan Quantity, such measurement shall be based on the units shown in the clauses under Actual Measurement.

TTS 812.100.10 BASIS OF PAYMENT

TTS 812.100.10.01 Pedestrian Crossover Level 1 Type A – Item

Payment at the Contract Price for the above tender item shall be full compensation for all labour, Equipment and Material to do the Work.

TTS 812.100.10.02 Pedestrian Crossover Level 2 Type B – Item

Payment at the Contract Price for the above tender item shall be full compensation for all labour, Equipment and Material to do the Work.