

**Construction Specification For
Flashing Beacons****Table of Contents**

TTS 811.100.01	SCOPE.....	3
TTS 811.100.02	REFERENCES.....	3
TTS 811.100.03	DEFINITIONS – Not Used.....	3
TTS 811.100.04	SUBMISSION AND DESIGN REQUIREMENTS – Not Used	3
TTS 811.100.05	MATERIALS	3
TTS 811.100.05.01	Flasher Beacons	3
TTS 811.100.05.02	Lamps and LED Modules	4
TTS 811.100.05.03	Mounting Hardware	4
TTS 811.100.05.04	Equipment Enclosures	4
TTS 811.100.05.04.01	General	4
TTS 811.100.05.04.02	Solar Power Flasher Beacons Enclosure	4
TTS 811.100.05.05	Cables	4
TTS 811.100.05.06	Connectors	4
TTS 811.100.05.07	Conduits, Junction Boxes and Fittings	4
TTS 811.100.05.08	Grounding Materials	5
TTS 811.100.05.09	Environmental	5
TTS 811.100.05.10	Solar Powered Flasher Beacons.....	5
TTS 811.100.05.11	Solar Array and Battery	5
TTS 811.100.05.12	Flashing Mechanism	5
TTS 811.100.05.13	Mounting Hardware	5
TTS 811.100.05.14	Wireless Communications.....	6
TTS 811.100.05.15	Wireless Antenna	6
TTS 811.100.06	EQUIPMENT – Not Used	6
TTS 811.100.07	CONSTRUCTION	6
TTS 811.100.07.01	Flashing Beacons.....	6
TTS 811.100.07.02	Flasher Mechanisms	6
TTS 811.100.07.03	Enclosures	6
TTS 811.100.07.04	Wiring	7
TTS 811.100.07.05	Grounding	7
TTS 811.100.07.06	Removals	7
TTS 811.100.07.07	Quality Control	7
TTS 811.100.08	QUALITY ASSURANCE.....	7

TTS 811.100.09	MEASUREMENT OF PAYMENT.....	7
TTS 811.100.09.01	Actual Measurement.....	7
TTS 811.100.09.01.01	Flashing Beacon, Hardwired Power, Hardwired Communication....	7
TTS 811.100.09.01.02	Flashing Beacon, Hardwired Power, Wireless Communication	7
TTS 811.100.09.01.03	Flashing Beacon, Solar Power, Wireless Communication	8
TTS 811.100.09.01.04	Flashing Beacon, Solar Power, No Communication	8
TTS 811.100.09.02	Plan Quantity Measurement	8
TTS 811.100.10	BASIS OF PAYMENT	8

TTS 811.100.01 SCOPE

This specification covers the requirements for the installation of intersection control flashing beacons systems.

TTS 811.100.02 REFERENCES

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

City of Toronto Standard Specifications

TTS 804.100	Construction Specification for Cable Installation
TTS 808.100	Specification for Traffic Signal Equipment
TTS 808.210	Material Specification for Traffic Signal Head
TTS 808.220	Material Specification for LED Traffic Signal Lamp Modules
TTS 809.210	Material Specification for Traffic Signal Controller and Cabinet TS2 Type 1
TTS 813.100	Construction Specification for Grounding
TTS 815.100	Construction Specification for The Removal of Electrical Equipment

Canadian Standards Association

C22.2 No. 45-M1981 (R1999)	Rigid Metal Conduit
C22.2 No. 45.1	Electrical Rigid Metal Conduit – Steel
C22.2 No. 45.2	Electrical rigid metal conduit – Aluminum, red brass, and stainless steel
C22.2 No. 65	Wire Connectors
C22.2 No. 85	Rigid PVC Boxes and Fittings
C22.2 No. 211.2-M1984 (R2003)	Rigid PVC (Unplasticized) Conduit

Institute of Transportation Engineers

ST-017B 2006	Equipment and Material Standards of the Institute of Transportation Engineers
--------------	---

US Federal Highway Administration

MUTCD	Manual of Uniform Traffic Control Devices
-------	---

National Electrical Manufacturers Association

NEMA TS2	Traffic Controller Assemblies with NTCIP Requirements
----------	---

TTS 811.100.03 DEFINITIONS – Not Used

TTS 811.100.04 SUBMISSION AND DESIGN REQUIREMENTS – Not Used

TTS 811.100.05 MATERIALS

TTS 811.100.05.01 Flasher Beacons

The flasher beacon housing shall meet the requirements of TTS 808.210 for the signal head housing.

Each flasher beacon that provides intersection control and each red flasher beacon shall be 300mm diameter.

Flasher beacons for solar powered flashers shall have LED modules that are amber and conform to the requirements of TTS 808.220.

TTS 811.100.05.02 Lamps and LED Modules

The LED module shall meet the requirements of TTS 808.220.

TTS 811.100.05.03 Mounting Hardware

The Contractor shall provide all necessary hardware for mounting the flashing beacon assembly as shown in the Contract Documents.

TTS 811.100.05.04 Equipment Enclosures

TTS 811.100.05.04.01 General

Equipment enclosure shall 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, such as but not limited to wireless communication equipment, and flashing mechanism.

TTS 811.100.05.04.02 Solar Power Flasher Beacons Enclosure

The Contractor shall supply separate enclosure where solar power system is required.

The enclosure shall be as described elsewhere in this document and shall be of size to accommodate the required equipment, such as combiner, charger and batteries – where not part of the solar panel assembly.

TTS 811.100.05.05 Cables

Cables shall be according to TS 804.100.

TTS 811.100.05.06 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 811.100.05.07 Conduits, Junction Boxes and Fittings

Rigid PVC conduit and fittings shall be according to CSA C22.2 No. 211.2.

Rigid galvanized steel conduit and fittings shall be according to CSA C22.2 No. 45.1.

Rigid aluminum conduits and fittings shall be according to CSA C22.2 No. 45.2.

Junction boxes and fittings shall be according to CSA C22.2 No. 85.

TTS 811.100.05.08 Grounding Materials

Grounding materials shall be according to TTS 813.100.

TTS 811.100.05.09 Environmental

All supplied equipment shall have an operating temperature range of -34°C and +74°C

TTS 811.100.05.10 Solar Powered Flasher Beacons

All solar-powered flasher beacon systems shall include an integrated system control and batteries required to operate the system within the constraints stated in this document.

TTS 811.100.05.11 Solar Array and Battery

The solar array or photovoltaic cells shall be 12V rated at a minimum 40W. The solar array shall come complete with pole mounting hardware to attach the array to the top or side of a traffic pole.

The battery bank shall be rated at 12V with a minimum 36Ah capacity. The battery bank shall be sealed, field replaceable with no special tools required and rated for use in outdoor cold weather.

All equipment, for example combiner, fuses and charge controller required to supply power to the flasher enclosure equipment and beacons shall be provided by the Contractor.

TTS 811.100.05.12 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 811.100.05.13 Mounting Hardware

The Contractor shall provide all necessary hardware for mounting the flashing beacon assembly as shown in the Contract Documents.

Mounting brackets for solar powered flasher beacon system shall be aluminum in construction and 16 mm stainless steel strapping and buckles shall be used to attach the mounting brackets with flasher beacon section to the traffic pole installed.

TTS 811.100.05.14 Wireless Communications

The Contractor shall provide communications equipment to enable a NEMA TS2 Type 1 traffic signal controller cabinet to activate the flasher beacons flashing mechanism in the flasher enclosure.

The wireless equipment shall take either a 12VDC or 24VDC input from the controller cabinet.

The wireless link shall operate on a local license free radio link maintain communications over a minimum 65 m distance.

TTS 811.100.05.15 Wireless Antenna

The Contractor shall provide antennas compatible for use with wireless equipment supplied. The wireless antennas shall come complete with manufacturer supplied cables and pole mounting hardware.

TTS 811.100.06 EQUIPMENT – Not Used

TTS 811.100.07 CONSTRUCTION

TTS 811.100.07.01 Flashing Beacons

Location of pole(s), flasher section and enclosure mounting height shall be as shown in the Contract Documents.

Flashing beacons for pole front or side mounting shall be aligned facing the direction of approaching traffic and mounted on double arm brackets or mast arms and signal hangers in accordance with the requirements of TS 808 pertaining to the installation of traffic signal heads.

Flashing beacons, single or in multiple clusters, for aerial mounting shall be arranged on the overhead support cable to give the required visibility and clearances for each direction of approaching traffic to be controlled. Mounting hardware shall be securely tightened.

TTS 811.100.07.02 Flasher Mechanisms

Flashing beacons shall come complete with flasher mechanism. Flasher mechanisms shall be mounted on poles with the accompanying conduit, conduit fittings and wiring systems. Flasher mechanisms shall be electronic and complete with weatherproof enclosure.

TTS 811.100.07.03 Enclosures

Enclosures for the communication, flashing mechanism and the solar power equipment, if required, shall be mounted on the pole side facing opposite traffic and, if present, behind the static signage.

TTS 811.100.07.04 Wiring

Wiring between the flashing beacons, pole handhole and pole mounted junction box shall be installed and connected in accordance with the requirements of TTS 804.100 and TTS 808.100.

All internal wiring shall be neatly trained. Harnesses, switches and terminals shall be labeled.

TTS 811.100.07.05 Grounding

Traffic control devices shall be grounded in accordance with the requirements of TTS 813.100.

TTS 811.100.07.06 Removals

Removals of traffic control devices necessary for the installation of work described herein shall be done in accordance with the requirements of TTS 815.100.

TTS 811.100.07.07 Quality Control

The Contractor shall locate, space and aim the flashing beacons for optimal visibility from the roadway.

On the date of activation, the Contractor shall confirm that the flashing beacon operation performs as noted on the intersection timing card where the flasher beacons are controlled by the traffic controller. The testing shall include operational check and configuration of the flashing beacons, wireless communications and solar power provisions. With solar powered flashing beacons, the Contractor shall also provide test readings showing optimal battery charge.

TTS 811.100.08 QUALITY ASSURANCE

The Contractor shall provide one year of warranty and support services after date of activation. This includes reconfiguration, testing and recalibration at no extra cost to the City.

TTS 811.100.09 MEASUREMENT OF PAYMENT

TTS 811.100.09.01 Actual Measurement

TTS 811.100.09.01.01 Flashing Beacon, Hardwired Power, Hardwired Communication

For measurement purposes, a count shall be made of the number of flashing beacon, hardwired power, hardwired communication systems installed.

TTS 811.100.09.01.02 Flashing Beacon, Hardwired Power, Wireless Communication

For measurement purposes, a count shall be made of the number of flashing beacon, hardwired power, wireless communication systems installed.

TTS 811.100.09.01.03 Flashing Beacon, Solar Power, Wireless Communication

For measurement purposes, a count shall be made of the number of flashing beacon, solar power, wireless communication systems installed.

TTS 811.100.09.01.04 Flashing Beacon, Solar Power, No Communication

For measurement purposes, a count shall be made of the number of flashing beacon, solar power, no communication systems installed.

TTS 811.100.09.02 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 811.100.10 BASIS OF PAYMENT

Flashing Beacon, Hardwired Power, Hardwired Communication – Item

Flashing Beacon, Hardwired Power, Wireless Communication – Item

Flashing Beacon, Solar Power, Wireless Communication – Item

Flashing Beacon, Solar Power, No Communication – Item

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