

All additional materials and labor required to complete the highway lighting installation shall be considered as incidental to the construction and be included in the respective lump sum contract price. All materials shall conform to Section 800 and Division III of these specifications.

The accepted quantities of highway lighting poles, area lighting poles, high mast towers, luminaries, photo electric control (including test switch), multiple control switch, multiple circuit contactor and time clock will be paid for at the contract unit price each, for the length, type and size specified, which price shall include full compensation for anchor bolts and miscellaneous hardware.

No direct payment will be made for the following incidental materials: conduit fittings, all bolts, nuts and washers and wiring.

### 820.82 Payment Items.

820.10	Highway Lighting - Roadway	Lump Sum
820.11	Highway Lighting - Underpass	Lump Sum
820.12	Highway Lighting - Area	Lump Sum
820.13	Highway Lighting - Sign	Lump Sum
821.10 to 821.15	Highway Lighting Pole (Anchor Base) (* meter Bracket)	Each
821.20 to 821.25	Highway Lighting Pole (Anchor Base) Twin (* meter Bracket) *(1.2 meters - 4.5 meters)	Each
822.10 to 822.15	Highway Lighting Pole (Transformer Base) (* meter Bracket)	Each
822.20 to 822.25	Highway Lighting Pole (Transformer Base) Twin (* meter Bracket) *(1.2 meters to 4.5 meters)	Each
822.80 to 822.82	Area Lighting Hinged Pole (* meters Mounting Height) *(12 - 15 meters)	Each
822.83 to 822.88	Area Lighting Mast Pole or Tower (* meters Mounting Height) *(12 - 30 meter)	Each
822.89 to 822.98	Area Lighting Mast Pole or Tower (* meters Mounting Height) *(33 - 60 meter)	Each
823.10 to 823.14	Highway Lighting Luminaire * ___ Watt * (175-1000 Watt)	Each
823.15 to 823.21	Area Lighting Luminaire * ___ Watt * (175 - 4000 Watt)	Each
823.22	Flood Lighting Luminaire Less than 500 Watt	Each
823.23	Flood Lighting Luminaire 500 Watt and Over	Each
823.30 to 823.32	Underpass Lighting Luminaire * ___ meters Fluorescent	Each
823.33 to 823.35	Sign Lighting Luminaire * ___ meters Fluorescent *(1.2 - 2.5 meters)	Each
823.40	Sign Lighting Luminaire 175 Watt	Each
823.41	Sign Lighting Luminaire 250 Watt	Each
823.50	Photo Electric Control	Each
823.51	Multiple Control Switch	Each
823.52	Multiple Circuit Contactor	Each
823.53	Time Clock	Each
823.60	Highway Lighting Load Center	Lump Sum
823.70	Highway Lighting Pole and Luminaire Removed and Reset	Each
823.71	Highway Lighting Pole and Luminaire Removed and Stacked	Each
823.72	Highway Lighting Pole and Luminaire Removed and Transported	Each

## SECTION 824

### FLASHING BEACONS, ILLUMINATED WARNING SIGNS, AND LIGHTED BARRIER ARROWS

#### DESCRIPTION

**824.20 General.**

This work shall consist of furnishing and installing or modifying flashing beacons, highway illuminated warning signs and lighted barrier arrows at designated locations as shown on the plans and detail sheets in conformance with these Specifications and the Standard Drawings.

Included in the work is the furnishing and installing, modifying, removing, resetting, stacking or transporting existing control equipment, signal heads, electric lamps, posts and bases, poles, pedestals, mast arms, barriers, barrier arrows, service connections, wire and cable, pull and junction boxes, electrical conduits, and all incidental materials necessary for operating and controlling the beacons, signs and arrows.

The locations of beacons, signs, barriers, control equipment and appurtenances shown on the plans are approximate and the exact locations will be established by the Engineer in the field.

**MATERIALS**

**824.40 General.**

When existing systems are to be modified, the existing equipment and materials shall be incorporated in the revised system, salvaged or abandoned as directed.

Equipment and materials shall meet the requirements specified in Section 800 for Signals & Wiring.

**824.41 Highway Illuminated Warning Signs and Barrier Arrows.**

Illuminated warning signs and barrier arrows shall be designed so that lamps, tubes, electrodes, transformers or ballasts and all wiring shall be totally enclosed and protected from the weather. Each sign or arrow shall be delivered to the project completely finished and assembled, ready for erection.

**824.42 Flasher.**

The flasher unit shall be two-circuit jack mounted using solid state circuiting (no moving parts) designed to operate on 105-130 volt, 60 hertz, alternating current. The output load rating with incandescent traffic signal lamps or an inductive load shall not be less than 10 amperes. The unit shall be capable of providing alternating flashing operation at the rate of 50 to 60 flashes per minute. The flasher unit shall be individually housed and protected from the weather and must not present a shock hazard to maintenance personnel.

Filter – Each flasher shall be equipped with a suitable filter wired or built into the flasher in the manner recommended by the Manufacturer. Any filter not completely eliminating radio interference shall be replaced.

Housing – The combined flasher and filter shall be installed in an approved weatherproof housing equipped with a disconnect block for shutting off the system. The cabinet shall be fastened to a standard 2.5 meter signal post by means of a suitable saddle or backplate. The flasher and filter shall be fastened to a backboard and the combined assembly shall be removable from the housing intact.

**COMPENSATION**

**824.80 Method of Measurement.**

Flashing beacons, highway illuminated warning signs and lighted barrier arrows will be measured as complete units.

**824.81 Basis of Payment.**

824.81 Basis of Payment.

Flashing beacons, highway illuminated warning signs and lighted barrier arrows will be paid for at the respective contract unit price complete in place.

**824.82 Payment Items.**

824.10	Flashing Warning Beacon Type D	Lump Sum
824.20	Flashing Warning Beacon Type A	Lump Sum

824.30	Flashing Warning Beacon Type B	Lump Sum
824.40	Flashing Warning Beacon Type C	Lump Sum
824.50	Flashing Warning Beacon Removed and Reset	Lump Sum
824.51	Flashing Warning Beacon Removed and Stacked	Lump Sum
824.60	Highway Warning Sign - Illuminated	Each
824.61	Highway Warning Sign - Illuminated	Lump Sum
824.70	Highway Warning Sign - Illuminated Removed and Reset	Lump Sum
824.71	Highway Warning Sign - Illuminated Removed and Reset	Lump Sum
824.72	Highway Warning Sign - Illuminated Removed and Transported	Lump Sum
824.80	Lighted Barrier Arrows	Each
824.81	Lighted Barrier Arrows	Lump Sum
824.90	Lighted Barrier Arrows Removed and Reset	Lump Sum
824.91	Lighted Barrier Arrows Removed and Reset	Lump Sum
824.92	Lighted Barrier Arrows Removed and Transported	Lump Sum
824.93	Lighted Barrier Arrows Removed, Transported and Reset	Lump Sum

## SECTION 828

### TRAFFIC SIGNS

#### DESCRIPTION

#### 828.20 General.

The provisions of this section shall apply to the fabricating, furnishing and erecting warning clusters and signs, overhead and roadside guide signs, warning and regulatory signs, route and project markers and supports for delineators and markers.

Traffic Signs are officially erected devices, mounted on fixed or portable supports, whereby specific messages are conveyed by means of words or symbols, for the purpose of regulating, warning or guiding traffic.

The signs, foundations and supports shall be fabricated and erected in conformity with the following:

- A. Manual on Uniform Traffic Control Devices (Current Edition) hereinafter referred to as MUTCD.
- B. The AASHTO publication entitled "Specifications for Design and Construction of Structural Supports for Highway Signs, Luminaries and Traffic Signals" (Current Edition).
- C. The Massachusetts Highway Department "Construction Standards".

#### 828.21 Plans.

The Contractor shall develop plans for the foundations, structural supports and sign panels, including the spacing of panels, except for the designs shown as typical on the standard drawings and plans. The message and size of legend for sign panels shall be as specified by the Department.

#### MATERIALS

#### 828.40 General.

Materials shall meet the requirements specified in the following Subsections of Division III Materials:

Reflective Sheeting	M9.30.0
Acrylic, Prismatic Reflectors and Embossed	M9.30.3
Aluminum Frames for Signs Acrylic Plastic Reflector Type "A"	M9.30.4
Demountable Reflectorized Delineator-Guard Rail	M9.30.7