

**INTERNALLY ILLUMINATED RAISED PAVEMENT MARKERS.
(REV 10-3-14)**

The following new Section is added after Section 706:

**SECTION 707
INTERNALLY ILLUMINATED RAISED PAVEMENT MARKERS**

707-1 Description.

Furnish and install Internally Illuminated Raised Pavement Markers (IIRPMs) as shown in the plans. IIRPMs are steadily illuminated lights installed in the roadway surface used (1) as a positioning guide in the roadway immediately adjacent to or on top of curbs on the approach ends of raised medians and around islands and (2) to supplement or substitute for longitudinal line markings. IIRPMs may be used with and without raised retroreflective pavement markers (RPMs).

707-2 Materials.

An IIRPM typically consists of a housing; transparent cover or lens; light source; and electrical power supply. IIRPMs are classified by electrical power supply as either (1) low voltage cable or (2) solar powered. The IIRPM shall be designed and manufactured of materials and components intended for placement in a roadway. The IIRPM must withstand heavy vehicular traffic wheel loads. The compressive strength of the IIRPM shall exceed 30,000 pounds.

707-2.1 Functional Requirements: IIRPMs shall provide enhanced guidance for drivers during night or low light conditions, and shall be steadily illuminated when operating. The illumination shall not flicker or pulse between 5 and 30 flashes per second, to avoid frequencies that might cause seizures. IIRPMs shall conform to the color of the marking for which they serve as a position guide, supplement or substitute.

707-2.2 Height and Dimensional Requirements: The maximum height above the roadway of an installed IIRPM shall not exceed 3/4 inch. The maximum width dimension of the IIRPM shall not exceed 8 inches. The maximum depth of embedment of the IIRPM housing into the roadway shall not exceed 2-1/2 inches.

707-2.3 Housing: The housing shall be made of galvanized steel, aluminum or other material capable of providing the structural integrity necessary to withstand heavy vehicle traffic.

707-2.4 Cover or lens: The cover or lens shall provide a waterproof and impact resistant compartment for the IIRPM light source and other internal electronics. The cover or lens shall be a UV stable, crack resistant material meeting the requirements of ASTM D4280.

707-2.5 Light source: The light source(s) of the IIRPM shall be light emitting diodes (LEDs). White, yellow, red, and blue IIRPMs must be available from the manufacturer.

The IIRPM shall have a minimum light luminous intensity level as specified in Table 1 when measured at the LED source.

Color	Minimum Intensity
White	50.0 lux
Yellow	10.0 lux

Red	15.0 lux
Blue	1.0 lux

The light produced by the IIRPM must only be visible from the direction(s) of traffic that it is intended to guide. No light produced by the IIRPM should be visible when viewed from a height of 3.5 feet above the pavement at a distance of 20 feet from the opposite quadrant or side quadrants of the IIRPM's LED projection quadrant.

707-2.6 Electrical Specifications: Electrical power for the light source(s) and other electronics within the IIRPM may be provided by solar power or a low voltage cable between the IIRPM and a control cabinet. The maximum voltage allowed in the cable is 24V (AC or DC).

The cable can be used to directly power or charge a battery or super capacitor within the IIRPM.

Solar powered IIRPMs must meet the requirements of Table 1 for at least 16 hours of continuous duty without sunlight. Charging time shall be less than 3 hours during sunny conditions and less than 8 hours during cloudy conditions. Operation shall be controlled by a photoreceptor located inside the IIRPM.

707-3 Installation Requirements.

For guidance on roadway spacing, MUTCD, Section 3B11 and 3B12 shall be followed. Install the IIRPM according to the manufacturer's recommendations. Use the size and type of low voltage power cables specified by the IIRPM manufacturer.

Cables placed in saw cuts in the roadway surface must be per the manufacturer's recommendations. Cables not in the roadway must be placed in pull boxes and conduit. Installation may include the removal of roadway surface material in order to recess a portion of the IIRPM housing; the use of an epoxy or bituminous adhesive; saw cutting, placement of electrical wire and sealing; and the installation of conduit, pull boxes and power control cabinet.

The following installation characteristics are prohibited: excessive or crude removal of roadway surface material to allow a portion of the IIRPM housing to be recessed; unsightly or distracting roadway surface appearance around the installed IIRPM; or the use of nails, screws, spikes or similar hardware devices to secure the IIRPM to the roadway surface whether permanent or temporary.

Restore any areas impacted by the installation of the IIRPM to original condition unless otherwise shown in the plans.

707-4 Warranty.

Ensure the IIRPM assembly has a manufacturer's warranty covering defects for five years from the date of final acceptance in accordance with Section 5-11 and Section 608. Ensure the warranty includes providing replacements within 30 calendar days of notification for defective parts and equipment during the warranty period at no cost to the Department.

707-5 Method of Measurement.

The Contract unit price for each IIRPM will included furnishing, placement, and testing of all equipment and materials, and for all tools, labor, hardware, operational software packages and firmware, supplies, support, personnel training, documentation, and incidentals necessary to complete the work.

707-6 Basis of Payment.

Price and Payment will be full compensation for all work specified in this Section.

Payment will be made under:

Item No. 707-1 Internally Illuminated Raised Pavement Marker

Do Not Use Without
CO Specs Authorization