

## 600 INCIDENTALS

### ITEM 621 - RAISED PAVEMENT MARKERS

- 621.01 Description
- 621.02 Materials
- 621.03 Equipment
- 621.04 Pavement Preparation
- 621.05 Layout and Premarking
- 621.06 Placement of RPMs
- 621.07 RPM Types
- 621.08 Prismatic Retroreflector Replacement
- 621.09 Prismatic Retroreflector Removed
- 621.10 Two-Way Radio Communications
- 621.11 Method of Measurement
- 621.12 Basis of Payment

**621.01 Description.** This work shall consist of furnishing all materials, equipment and labor necessary for the required pavement preparation and placement of raised pavement markers (hereafter referred to as RPMs) in accordance with the plans or as described herein.

**621.02 Materials.** Materials shall conform to the following:

Two-way plowable raised pavement marker .....	721
Prismatic retroreflector .....	721.01
RPM casting .....	721.02
Casting adhesive .....	721.03
Reflector adhesive.....	721.04

**621.03 Equipment.** Pavement sawing shall be done with an arbor of diamond blades flushed with water.

**621.04 Pavement Preparation.** The Contractor shall clean and prepare the pavement to which the RPM casting is to be bonded, to the satisfaction of the Engineer, such that at the time of RPM installation the pavement shall be free of dirt, dust, oil, grease, moisture, curing compound, loose or unsound layers or any other material which would interfere with proper bonding of the RPM to the pavement.

Pavement sawing shall be done with an arbor of diamond blades flushed with water. Slurry from the sawing operation must be vacuumed up and disposed of in an approved manner. Dry sawing of the pavement will not be allowed.

**621.05 Layout and Premarking.** Before beginning RPM placement on each street or highway, the Contractor shall accurately and adequately layout, by reference points, the location of all RPMs for that street or highway.

RPMs shall not be placed on pavement surfaces that show visible evidence of cracking, checking, spalling, or failure of underlying base material.

RPMs shall not be placed within 1 foot (0.3 m) of active signal detector loop wires. The Contractor shall exercise extreme care so that detector lead-in cables will not be cut. RPMs shall not be placed directly over pavement markings except where the pavement markings deviate visibly from their correct alignment, and then only with the approval of the Engineer. RPMs shall not be placed at a pavement construction joint or within an intersection of a driveway or public street as a result of typical RPM spacing.

If during the pre-installation layout operation, it is determined that an RPM would be placed at a point with one of the aforementioned conditions, the affected RPM shall be relocated longitudinally a sufficient distance to a point approved by the Engineer. The distance the RPM may be relocated shall not exceed 10 percent of the typical RPM spacing. Where it would be necessary to relocate the RPM a distance greater than 10 percent of the typical RPM spacing, the affected RPM shall not be installed.

Installation of RPMs on bridge decks, although acceptable, shall be minimized by the Contractor. When the typical RPM spacing would require a RPM to be installed on a bridge deck near the bridge enddam, the subject RPM shall be relocated to the approach slab. This procedure shall be waived for all bridge deck mounted RPMs whose typical locations are separated from the bridge enddam by a distance exceeding 10 percent of the typical RPM spacing.

When placing RPMs at an existing RPM installation, the new location of each RPM shall be not more than one foot longitudinally in either direction from the damaged or missing casting location. Unless the downstream traffic location has superior pavement quality to the upstream traffic location, the preferred location shall be the upstream location.

Damaged castings with prismatic retroreflectors still intact shall be replaced as determined by the Engineer.

**621.06 Placement of RPMs.** At the time of placement in the pavement the RPM casting shall be free of dirt, dust, oil, grease, rust, moisture or any foreign matter which will impair adhesion to the pavement. It shall be the Contractor's responsibility to clean each contaminated casting by sand blasting or other acceptable procedures approved by the Engineer to remove all such foreign matter prior to installation.

The pavement surface temperature at the time of RPM placement shall be not less than 50°F (10°C). The ambient air temperature shall be not less than 50°F (10°C). RPMs shall not be installed if the pavement surface is visibly wet.

The Contractor shall keep traffic off newly installed RPMs for a minimum period specified in the following table.

<b>Ambient Air Temperature °F (°C)</b>	<b>Minimum Period (Minutes) Protected From Traffic</b>
100 (38)	15
90 (32)	20
80 (27)	25
70 (21)	30
60 (16)	35
50 (no application below 50°F) (10)	45

During periods of high ambient relative humidity, epoxy may require a longer drying time than indicated above.

RPMs shall be installed by inserting the 2 keels on the casting into parallel slots cut into the pavement, the RPM castings shall be installed within 10 days after the slots are cut into the pavement.

The casting adhesive shall be mixed by combining components A (epoxy) and B (hardener) in a ratio of 1:1 by volume. The casting adhesive requires that the mixing operation and placing of the RPMs be done rapidly. Any mixed batch that becomes so viscous that it cannot be readily extruded from under the RPM with light pressure shall not be used. The casting adhesive shall be maintained at 60°F (16°C) to 80°F (27°C) before mixing. Any heating of the casting adhesive shall be by the application of indirect heat. The casting adhesive shall not be heated above 120°F (49°C). Before applying the casting adhesive, the slots shall be brushed or blown clean of loose material and shall be dry. The cleaned slots shall be filled with casting adhesive. Sufficient epoxy shall be placed in and between the slots to insure that all voids beneath and around the casting are filled so as to create a watertight seal around the casting. The keels of the casting shall be placed into the slots in such a manner as to assure that the tips of the RPM snowplow deflecting surfaces are below the pavement surface and that the four lugs on the keels of the casting are in contact with the pavement.

The Contractor may attach the prismatic retroreflectors to new castings which do not include a prismatic retroreflector already factory attached by Amerace Corporation at any time prior to the insertion of the casting into the pavement slots. Otherwise, the prismatic retroreflector shall not be attached to a new casting until after the epoxy adhesive in the pavement slots has properly hardened. In either operation, the following prismatic retroreflector attachment procedure shall be used. The RPM casting shall be rid of dirt, dust, oil, grease, rust, moisture or any foreign matter (including damaged reflectors

or parts thereof) which will impair adhesion of the prismatic retroreflector to the casting. Sandblasting shall be utilized to rid the recessed prismatic retroreflector attachment area of the casting of any foreign matter. Reflector adhesive shall be uniformly applied in a single bead across the recessed prismatic retroreflector attachment area of the RPM casting at the rate of 1 ounce (28 grams) minimum (by weight) per 3 prismatic retroreflectors attached. If the Contractor so elects, he may submit in writing to the Engineer, not later than the project preconstruction conference, an alternate method for removing all foreign matter from the recessed prismatic retroreflector attachment area of the casting provided the intent of the above provisions is followed. No alternate method shall be used until approval has been granted, in writing, by the Engineer.

As a condition of approval a demonstration of the Contractor's proposed alternate method may be required. The prismatic retroreflector shall be inserted into the recessed attachment area and pressed into place until a small amount of reflector adhesive squeezes out of all sides and a bond has been made with the casting. The Contractor shall press the prismatic retroreflector into place by the application of a load of not less than 100 pounds (45 kg) or by a procedure acceptable to the Engineer. Adhesive material shall not be permitted on the reflective surface of the prismatic retroreflector. The pavement surface temperature and the ambient air temperature shall be at or above 40°F (5°C) at the time of application of the prismatic retroreflector. The Contractor shall not attach the prismatic retroreflector to the casting when rain over the work site is imminent.

Spacing and alignment shall be in accordance with the plans or as outlined in ODOT Standard Construction Drawings TC-65.10, TC-65.11, TC-65.12, and TC-65.13.

**621.07 RPM Types.** A one-way RPM is equipped with a prismatic retroreflector which retroreflects light in one direction only.

A two-way RPM is equipped with a prismatic retroreflector which retroreflects light in two opposing directions.

**621.08 Prismatic Retroreflector Replacement.** Damaged, nonretroreflective, or missing prismatic retroreflectors within the existing marker installations where the casting remains intact shall be replaced with the appropriate reflector type. The location of replacement retroreflectors shall be determined by the Engineer.

The cleaning and attachment procedure for replacing prismatic retroreflectors within existing RPM installations shall be in accordance with 621.06.

**621.09 Prismatic Retroreflector Removed.** Where designated, and/or in conflict with permanent pavement markings, prismatic retroreflectors shall be removed from the RPM casting. In a manner which will prevent damage to the casting, prismatic retroreflectors shall be totally removed so that no portion is visible to vehicular traffic.

**621.10 Two-Way Radio Communications.** The Contractor shall furnish and maintain the radio equipment necessary for two-way voice communication between the Contractor's project supervisor and the City inspector at all times during the RPM installation operations. This equipment shall be provided for the term of the contract only.

**621.11 Method of Measurement.** The number of RPMs will be the actual number installed and accepted, in the units designated, including layout, premarking, surface preparation, and the furnishing and application of all required adhesives.

**621.12 Basis of Payment.** Payment for accepted quantities in place will be made at the contract price for:

<b>Item</b>	<b>Unit</b>	<b>Description</b>
621	Each	Raised Pavement Markers Furnished and Installed
621	Each	Prismatic Retroreflector Replacement
621	Each	Prismatic Retroreflector Removed