

## ITEM 621 RAISED PAVEMENT MARKERS (RPM)

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**621.01 Description.** This work consists of preparing the pavement and furnishing and placing plowable raised pavement marker castings (RPMs) and prismatic retroreflectors, and removing existing RPMs for disposal.

**621.02 Materials.** Furnish materials from the City's Qualified Products List (QPL) conforming to the following:

Castings.....	721.01
Prismatic retroreflectors (reflectors).....	721.02
Casting adhesive.....	721.03
Reflector adhesive.....	721.04

Before installation, the Engineer will verify a sample of the products to be used on the project are on the City's Qualified Products List (QPL). After completion of the work, the Engineer will perform a spot check of the castings and retroreflectors to verify products used are on the City's QPL.

**621.03 Layout.** Before placing RPMs, lay out the location of all RPMs. Locate RPMs within 10 percent of specified spacing. Do not place RPMs under the following conditions:

- A. On pavement surfaces with cracking, spalling, or failure of underlying base material.
- B. Within 1 foot (0.3 m) of active signal detector loop wires. Exercise care to ensure that detector lead-in cables are not cut.
- C. Over pavement markings except with the Engineer's approval.
- D. Closer than 2 inches (50 mm) to a pavement construction (transverse or longitudinal) joint or within an intersection.
- E. Within 3 feet (1 m) of a bridge expansion joint.
- F. Any bridge deck with Portland cement concrete.
- G. Within an intersection of a driveway or public street.

If the initial location of a RPM is determined to violate one of the aforementioned conditions, relocate the affected RPM longitudinally. Relocate the RPM within a distance not exceeding 10 percent of the specified RPM spacing. If necessary to relocate the RPM to a distance greater than 10 percent of the specified RPM spacing, do not install the affected RPM.

#### 621.04

Place RPMs along double yellow centerline in line or on line. RPMs installed along a channelizing line are to be placed no more than 1 inch (25 mm) from the edge of the painted line. Place the RPMs installed along a lane line or dashed yellow centerline between and in line with the dashes.

Install replacement RPMs within 3 feet (0.9 m) longitudinally of the damaged or missing RPM.

**621.04 Installation RPM Casting.** Cut parallel slots with 1/16 to 1/8-inch (1.5 to 3 mm) clearance on each side for installing RPM castings.

When a casting is inserted in the cut without casting adhesive to test proper cut, at least 3 of the 4 leveling lugs/tabs must contact the pavement surface and all four keel-ends of castings must be below the pavement surface.

Center each casting lengthwise and to have 1/16 to 1/8-inch (1.5 to 3 mm) clearance between pavement cut and casting for casting adhesive to bond properly. Ensure that only the leveling lugs/tabs are in contact with the pavement surface after insertion of casting in pavement so that a minimum of 1/16 inch (1.5 mm) of casting adhesive is the bonding adhesive between the casting and pavement. Ensure that casting adhesive fills all voids.

Ensure that the pavement cut is completely dry and free of dust, dirt or any other material that will interfere with the adhesive bond to the casting and the pavement. Remove casting adhesive on the active reflector face immediately.

Install the RPM casting within 24 hours after cutting the slots into the pavement. On new pavement surfaces, the Contractor may begin RPM placement as soon as the pavement markings for that section are completed and dry.

Ensure that the RPM casting is free of dirt, dust, oil, grease, rust, moisture, or any foreign matter that impairs adhesion to the pavement.

Place RPMs when the pavement surface temperature and the ambient air temperature are at least 40 °F (5 °C) and the pavement is dry. Heat both parts of the RPM casting adhesive to 100 ± 10 °F (38 ± 5 °C) during installation when either the pavement surface or ambient air temperature is between 40 and 50 °F (5 and 10 °C).

Ambient Air Temperature		Minimum Period Protected from Traffic
°F	(°C)	Minutes
100	(38)	15
90	(32)	20
80	(27)	25
70	(21)	30
60	(16)	35
50	(10)	45
40	(5)	60

Do not allow traffic on the RPMs until the adhesive has cured.

Use two component approved casting adhesive to fill the pavement cut to within approximately 3/8 inch (9 mm) of the top of the pavement cut. A minimum of 3 of the 4 leveling lugs/tabs must be in contact with the pavement surface and the casting adhesive should ooze out from under the casting from all sides filling all voids around the casting and be level with the pavement surface.

Mix the casting adhesive according to the manufacturer's recommendations. Complete the mixing operation and placing of the RPMs rapidly. Do not use any mixed batch that becomes so viscous that it cannot be readily extruded from under the RPM with light pressure.

**621.05 Installation RPM Retroreflector.** Attach the reflector to the casting before installation or after the adhesive in the pavement slots has cured.

Remove all dirt, dust, oil, grease, rust, moisture, parts of damaged reflectors, or any foreign matter that impairs adhesion of the reflector to the casting.

Peel the release liner from the back of the reflector with butyl pad. Apply a wide bead (approximately 3/8 inch [9 mm]) of a reflector adhesive sufficient to squeeze out on all sides when pressure is applied to seat the reflector.

Apply approximately 100 pounds (45 kg) of pressure on the reflector or foot pressure for 1 to 3 seconds. Do not allow adhesive material on the reflective surface of the reflector. Any adhesive on the active reflector must be removed immediately.

Apply the reflector when the pavement surface temperature and the ambient air temperature are at least 35 °F (2 °C) and the casting surface is dry. Do not attach the reflector to the casting when rain over the work site is imminent.

**621.06 Reflector Replacement.** Replace damaged, non-retroreflective, or missing reflectors within the existing marker installations where the casting remains intact with the appropriate reflector type. The Engineer will determine the location of replacement reflectors.

Perform the cleaning and attachment procedure for replacing reflectors within existing RPM installations according to 621.05.

**621.07 Reflector Color.** Use the appropriate reflector color for the following applications:

- A. Channelizing Lines.** White/red two-way reflectors with white facing traffic.
- B. Lane Lines.** White one-way or white/red two-way reflectors as specified, with white facing traffic.
- C. Edge Lines.** One-way reflectors facing traffic matching the edge line color or two-way reflectors with the edge line color facing traffic and red in the opposite direction.
- D. Center Lines.** Yellow two-way reflectors.

**621.08 Raised Pavement Markers Removed.** As designated, remove existing raised pavement markers. On all projects where the pavement is not being replaced, fill all depressions caused by removing the castings with asphalt concrete by the end of the next workday. Remove all standing water from the hole before filling. Compact the

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asphalt concrete flush with the pavement. Take ownership of removed raised pavement markers.

**621.09 Method of Measurement.** The City will measure RPMs by the number of each furnished, complete with reflectors, in place, and accepted.

The City will measure RPM, Reflectors by the number of each, complete in place, for use on existing RPM castings in the pavement, and accepted.

The City will measure Raised Pavement Markers Removed by the number. Payment will include the cost of asphalt concrete, if required, to fill depressions caused by removal of the castings.

**621.10 Basis of Payment.** The City will pay for accepted quantities at the contract prices as follows:

<b>Item</b>	<b>Unit</b>	<b>Description</b>
621	Each	Raised Pavement Marker Installed
621	Each	Raised Pavement Marker Reflector Replacement
621	Each	Raised Pavement Marker Removed