# Snowplowable Raised Pavement Marker Rehabilitation or Removal JSP-07-07

1.0 Description.

1.1 Rehabilitation of Existing SRPM’s. This work shall consist of the rehabilitation of existing SRPM’s, including removing, furnishing and installing replacement reflectors or SRPM’s as shown on the plans or as directed by the engineer. Removal of SRPM’s shall include removing the SRPM and repairing the pavement surface. Reflector replacement shall include removing the reflector, cleaning the casting and installing a new reflector.

1.2 Removal of Existing SRPM’s. This work shall consist of the removal of existing SRPM’s. Removal of SRPM’s shall include removing the SRPM and repairing the pavement surface.

**2.0** **Material.** All material shall be in accordance with Division 1000, Material Details, and specifically as follows**.** The rapid set concrete patching material shall be from the qualified listing available from Construction and Materials, MoDOT’s web site or as approved by the engineer.

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| Item | Section |
| Coarse Aggregate | 1004.2 |
| Fine Aggregate | 1002.3 |
| Mineral Filler | 1002.4 |
| Hydrated Lime | 1002.5 |
| Asphalt Binder, Performance Graded (PG) | 1015 |

2.1 Snowplowable Raised Pavement Markers. All materials used during the rehabilitation of SRPM’s shall meet the following.

**2.1.1 Casting.** The durable metal base casting shall be shaped to deflect a snowplow blade upward and to prevent damage to the reflectors. The casting shall have leveling tabs to ensure proper embedment and shall be fastened to the road surface by an epoxy adhesive. The casting shall be designed for bi-directional plowing.

**2.1.2 Reflector.** The reflector shall have one or two retroreflective lenses as shown on the plans to reflect incident light from a single direction or from opposite directions. The lens shall be hermetically sealed and permanently bonded to the reflector base. The manufacturer's identification shall be molded in the face of the reflector lens or on the reflector body so as to be visible after installation. The reflector color shall be as shown on the plans.

**2.1.3** The reflector shall have nominal dimensions of 2.0 x 4.0 x 0.5 inches (50 x 100
x 12.7 mm). The reflector shall fit securely into a recessed area on the upper surface of the casting web and shall not protrude above the profile of the casting. The reflective surface of each lens face shall be a minimum of 1.55 square inches (1000 mm2) in area.

**2.1.4 Epoxy Adhesive.** The epoxy adhesive used to bond the SRPM to the pavement shall be in accordance with the SRPM manufacturer’s recommendations.

**2.1.5** In addition to the requirements described, the SRPM shall have completed testing through NTPEP. A written request for qualification shall be sent by the manufacturer to Construction and Materials with the following information:

(a) Brand name of the product.

(b) A copy of the actual test results from NTPEP.

(c) Certification that the material meets this specification and is intended for use as described.

(d) Specific installation instructions.

**2.1.5.1** To become qualified, the SRPM’s shall receive at a minimum average ratings for each of the SRPM components for all NTPEP test decks.

**2.1.5.2** The casting shall receive at a minimum average rating of 4.0 for housing performance and 3.0 for lens and visibility after one year of exposure on both concrete and asphalt test decks.

**2.1.5.3** The reflector shall receive at a minimum an average rating of 3.0 for lens and visibility after one year of exposure on both concrete and asphalt test decks.

**2.1.5.4** A retest on approved SRPM’s and reflectors shall be conducted if the configuration changes.

3.0 Construction Requirements.

**3.1 Rehabilitation of Existing SRPMs.**

**3.1.1** All work shall be performed in accordance with the SRPM manufacturer’s recommendations and as approved by the engineer.

**3.1.2** Existing reflectors shall be removed without causing damage to the existing casting. The casting shall be thoroughly cleaned prior to installation of the reflector. The replacement reflector shall be securely bonded to the casting using a manufacturer recommended adhesive. Any castings damaged due to the contractor's operations shall be replaced at the contractor's expense.

**3.1.3** All cracked, broken or missing castings shall be replaced. If the existing hole cannot be used, the hole shall be patched with the same type of epoxy used to install the new SRPM. The new SRPM shall be installed approximately 2 feet (0.6 m) before or after the existing location in accordance with 3.2.

**3.2 Installation of New SRPM’s during Rehabilitation**

**3.2.1** The bottom surface of the casting shall be free of scale, dirt, rust, oil, grease or any other contaminant that might reduce bonding to the epoxy adhesive. SRPM’s shall be pre-approved prior to installation.

**3.2.2** Prior to placement of the SRPM, the reflector shall be attached to the casting in accordance with the manufacturer’s recommendations. No adhesive shall be on the reflective lens.

**3.2.3** The epoxy adhesive used to install the SRPM shall be machine mixed and applied unless otherwise approved by the engineer. The machine mixer and applicator shall be capable of accurately and uniformly proportioning the components. The mixing chamber shall produce an epoxy adhesive of uniform color with no visible evidence of streaks on the surface or within the mixed epoxy adhesive.

**3.2.4** No SRPM’s shall be installed when the ambient temperature is below 50 F
(10 C), the relative humidity is above 80 percent or when the pavement surface is wet.

**3.2.5** Newly placed bituminous pavement surfaces shall be allowed to cure for a minimum of seven days prior to installing SRPM’s.

**3.2.6** A longitudinal adjustment to the location of an SRPM shall be made in order to avoid damage to deteriorated pavement or transverse joints. In locations where concrete and bituminous surfaces abut, SRPM’s shall be installed in the concrete surface.

**3.2.7** The pavement shall be accurately cut to the SRPM manufacturer's specifications. The entire cut shall be made in a single plunge. Multiple saw cuts to create a slot will not be permitted.

**3.2.8** If necessary, installations on crowned pavements, superelevated pavements or ramps shall be cut as needed to provide proper SRPM fit.

**3.2.9** When the roadway is opened to traffic during non-working hours, the contractor shall not cut more slots than the number of SRPM’s that can be installed in the same day.

**3.2.10** The slot shall be clean and dry prior to application of the epoxy adhesive.

**3.2.11** After seating the casting, the epoxy shall extrude to the pavement surface, completely filling all voids around and under the casting. There shall be no epoxy adhesive on the reflector.

**3.2.12** When hand mixing of epoxy adhesive is permitted, no more than one quart (L) of epoxy adhesive shall be mixed at one time. The SRPM shall be installed within five minutes after mixing operations are started.

**3.2.13** The installed marker shall be protected from traffic until the epoxy adhesive has hardened. If, after the manufacturer’s recommended cure time, the epoxy adhesive can be penetrated by a screwdriver or other pointed instrument, the SRPM shall be removed, cleaned and reinstalled.

**3.3 Removal of Existing SRPM’s.**

**3.3.1 Concrete.** The SRPM shall be removed with minimal damage to the pavement. The hole shall be completely filled with an approved rapid set concrete patching material. When SRPMs are removed from bridge decks the standard method of repairing a hole in a deck should be used. An elastomeric concrete should be used to patch the hole in the bridge deck.

**3.3.2 Asphalt.**

**3.3.2.1** **No Resurfacing.** The SRPM shall be removed with minimal damage to the pavement.The hole shall be patched with commercial mix if no resurfacing is planned.

**3.3.2.2 Coldmilling.** Patching will not be required when coldmilling follows the removal of SRPM’s.

**3.3.3 Resurfacing.** If the pavement is to be resurfaced without coldmilling, the SRPM shall be removed with minimal damage to the pavement and the hole patched with the same mix to be used in the resurfacing.

**3.3.4 Surface Treatments.** The SRPM shall be removed with minimal damage to the pavement.The hole shall be patched with BP-2, in accordance with Sec 401, or an approved commercial mix prior to placement of the final surface.

**4.0 Method of Measurement.** Measurement for the removal of SRPM’s, replacement of SRPM’s and removal and replacement of reflectors will be made per each. No measurement will be made for the removal of SRPM’s in Asphalt that is to be coldmilled or resurfaced.

**5.0 Basis of Payment.** The accepted quantity for removal of the SRPM’s will be paid for at the contract unit price. The cost of the removal of SRPM’s in Asphalt to be resurfaced will be considered included in the contract unit price for resurfacing. The accepted quantity of replacement SRPM’s or reflectors will be paid for at the contract unit price for each of the pay items included in the contract.