

**STATE****OF****TENNESSEE**

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**SPECIAL PROVISION****REGARDING****PROFILED THERMOPLASTIC PAVEMENT MARKING****AUDIBLE (4 INCH AND 6 INCH)****Description**

This work shall consist of the placement of an Inverted Profile Pavement Marking (Audible) that is hot applied to the pavement surface. All work shall be performed in accordance with Sections 716 and 918.23 of the *Standard Specification for Road and Bridge Construction*. This pavement marking shall be formed during application with a profile that will create an audible effect when driven over. The inverted profile allows for the rapid draining of the pavement marking which results in a highly reflective marking in a heavy rain.

The Inverted Profile Pavement Marking (Audible) System shall be composed of 3 items: a thermoplastic marking compound, a double drop glass bead system meeting the minimum requirements from 918.23, and special equipment capable of producing an Audible Inverted Profile Pavement Marking.

**Materials**

Use thermoplastic material meeting the requirements of 918.23. The Engineer will take random samples of the materials in accordance with the Department's Sampling and Testing Guide.

**Retroreflective Elements**

Use reflective elements recommended by the manufacturer that meet the requirements of 918.23 and are part of the system listed on the QPL.

**Equipment**

Use equipment capable of providing continuous, uniform heating of the striping material to temperatures exceeding 390°F, mixing and agitating the material in the reservoir to provide a homogenous mixture without segregation. Use equipment that will maintain the striping material in a plastic state, in all mixing and conveying parts, including the line dispensing device until applied. Use equipment which is capable of producing a consistent pattern of transverse bumps positioned at regular and predetermined intervals. Use equipment which meets the following requirements:

- A. Capable of traveling at a uniform rate of speed, both uphill and downhill, to produce a uniform application of striping material and capable of following straight lines and making normal curves in a true arc.
- B. Capable of applying reflective elements to the surface of the completed stripe
- C. By automatic dispensers attached to the striping machine such that the reflective elements are dispensed closely behind the installed line. Use reflective element dispensers equipped with an automatic cut-off control that is synchronized with the cut-off of the thermoplastic material and applies the reflective elements uniformly on the

entire traffic stripe surface with 50 to 60% embedment.

- D. Equipped with a special kettle for uniformly heating and melting the striping material. The kettle must be equipped with an automatic temperature control device and material thermometer for positive temperature control and to prevent overheating or scorching of the thermoplastic material.
- E. Meets the requirements of the National Fire Protection Association, state and local authorities.

### **Application**

Before applying traffic stripes and markings, remove any material that would adversely affect the bond of the traffic stripes by a method approved by the Engineer.

Before applying traffic stripes to any Portland cement surface, apply a primer, sealer or surface preparation adhesive of the type recommended by the manufacturer. Offset longitudinal lines at least 2 inches from construction joints of Portland cement concrete pavement.

Apply traffic stripes or markings only to dry surfaces, and when the ambient air and surface temperature is at least 50°F and rising for asphalt surfaces and 60°F and rising for concrete surface.

Apply striping to the same tolerances in dimensions and in alignment specified in 716 of the Standard Specification for Road and Bridge Construction. When applying traffic stripes and marking over existing markings, ensure that not more than 2 inches on either end and not more than 1 inch on either side of the existing line is visible.

### **Thickness**

Apply flat base lines having a thickness of 0.100 to 0.150 inches, exclusive of the audible bumps, when measured above the pavement surface.

As an alternative to the flat baseline, a profiled baseline meeting the following dimensions may be applied. For profiled thermoplastic markings make profile measurements above the pavement surface. Provide a baseline thickness not to exceed 0.050 inches. Provide individual profiles across the full width of the marking on approximately 1.0 inch centers with a space between profiles of approximately .25 inches and an average thickness of at least 0.110 inches above the baseline profile.

### **Dimensions of Audible Bumps**

Apply the raised bumps with a profile such that the leading and trailing edges are sloped at a sufficient angle to create an audible and vibratory warning.

Bumps on edge line and centerline markings shall be at least 0.45 inches at the highest point of the bump, above the pavement surface, including the base line. The height shall be measured after application of drop-on reflective elements. Bumps shall have a minimum baseline coverage dimension of 2.5 inches in both transverse and longitudinal directions. The bumps may have a drainage channel, the width of each drainage channel will not exceed 1/4 inch at the bottom of the channel. The longitudinal distance between bumps shall be approximately 30 inches.

### **Retroreflectivity:**

Apply white and yellow audible and vibratory markings that will attain an initial retro reflectance of not less than 300 mcd/lx·m<sup>2</sup> and not less than 250 mcd/lxlm<sup>2</sup>, respectively.

### **Reflective Elements:**

Apply reflective elements to all markings at the rates determined by the manufacturer's recommendations as identified from the QPL System.

### **Loss:**

If more than 1% of the bumps or more than three consecutive bumps are missing or broken (less than half a bump remaining) within the first 45 days under traffic, replace all failed bumps at no expense to the Department. If more than 2% of the bumps fail within the first 45 days under traffic, the replacement period will extend an additional 45 days from the date all replacement bumps were installed. If, at the end of the additional 45 days, more the 2% of all bumps (initial and replacement) fail, replace all failed bumps at no expense to the Department. Measure, record and certify on a Department approved form and submit to the Engineer, the loss of bumps.

**Contractor's Responsibility for Notification.**

Notify the Engineer prior to the placement of audible and vibratory markings. Furnish the Engineer with the manufacturer's name and batch numbers of the thermoplastic materials and reflective elements to be used. Ensure that the batch numbers appear on the thermoplastic materials and reflective elements packages.

**Protection of Newly Applied Audible Markings.**

Do not allow traffic onto or permit vehicles to cross newly applied pavement markings until they are sufficiently dry. Remove and replace any portion of the pavement markings damaged by passing traffic or from any other cause.

**Corrections for Deficiencies.**

Correct all deficiencies by removal and reapplication of a 1.0 mile section centered on the deficiency at no cost to the Department.

**Method of Measurement.**

Inverted Profile Pavement Marking (Audible) shall be measured in accordance with **Sub-section 716.08** of the Standard Specification for Road and Bridge Construction.

**Basis of Payment.**

Prices and payments will be full compensation for all work specified in this Section, including, all cleaning and preparing of surfaces, furnishing of all materials, application, curing and protection of all items, protection of traffic, furnishing of all tools, machines and equipment, and all incidentals necessary to complete the work. Final payment will be withheld until all deficiencies are corrected.

Payment will be made under:

716-14.01 PROFILED THERMO PVMT MRKNG AUDIBLE (4IN) L.M.

716-14.02 PROFILED THERMO PVMT MRKNG AUDIBLE (6IN) L.M.