SPECIAL SPECIFICATION

6449

Prefabricated Pavement Markings with Warranty

1. **Description.** This Item shall govern for the materials, application, and warranty of prefabricated pavement markings on existing or new concrete surfaces and new asphaltic concrete surface type pavements.

2. **Materials.** Pavement markings shall meet the requirements of Departmental Materials Specification DMS-8240, Prefabricated Pavement Markings-Permanent, Type B and shall be shown on the list of approved manufacturers. A copy of this list is available from the Director of General Services, Texas Department of Transportation (TxDOT), 125 East 11th Street, Austin, Texas, 78701-2483.

The materials are required to be sampled and tested in accordance with the department's Manual of Testing Procedures.

3. **Construction Methods.**

   (1) **General.** When required by the Engineer, the Contractor and the Engineer shall review the sequence of work to be followed and the estimated progress schedule.

   Markings may be placed on roadways either free of traffic or open to traffic. On roadways already open to traffic, the markings shall be placed in a method which provides a minimum of interference to the operation of the facility. Traffic control shall be as shown on the plans or as approved by the Engineer in writing.

   Guides to mark the lateral location of pavement markings shall be established as shown on the plans or as directed by the Engineer. The Contractor shall establish the pavement marking guides and the Engineer will verify the location of the guides.

   Markings shall be placed in proper alignment with the guides. The deviation rate in alignment shall not exceed 25.4 mm per 61 m of roadway. The maximum deviation shall not exceed 50 mm nor shall any deviation be abrupt.

   Markings placed that are not in alignment or sequence, as shown on the plans or as stated in this specification, shall be removed and replaced by the Contractor at the Contractor's expense. Removal shall be in accordance with Item 677, "Eliminating Existing Pavement Markings and Markers," except for measurement and payment. Guides placed on the roadway for alignment purposes shall not establish a permanent marking on the roadway.

   Waste generated by this work shall be removed from the job site before the end of each working day.
(2) **Application.** Pavement markings shall be applied according to the manufacturer's recommendations. An adhesion-promoting primer shall be required when the material has been prequalified with a primer in accordance with Departmental Materials Specification DMS-8240, Prefabricated Pavement Markings - Permanent.

(3) **Dimensions.** Pavement markings shall be in accordance with the color (daytime and nighttime reflected), length, width, shape, and configuration shown on the plans. The alignment and location shall be as shown on the plans or as directed by the Engineer.

4. **Performance Requirements.** Pavement markings shall meet the following performance requirements for the warranted life of the materials.

   (1) **Reflectivity.** Pavement markings, both white and yellow, shall maintain a minimum coefficient of retroreflected luminance of 120 millicandela/square meter/lux when measured at "30 meter" geometry (entrance angle of 88.76 degrees and observation angle of 1.05 degrees). At the request of TxDOT, the manufacturer shall, on a loaner basis, supply to the Department an instrument designed and calibrated to measure 30 meter geometry. For the purpose of accuracy the same instrument shall be supplied on each request.

   (2) **Adhesion.** Pavement markings shall remain in the proper alignment and location. Deviations in alignment or location caused by, in the Engineer's opinion, pavement failure will not be considered as a failure of the pavement markings.

   (3) **Durability.** Pavement markings shall maintain the color (daytime and nighttime reflected), length, width, shape, and configuration shown on the plans. Nighttime and daytime color shall be essentially the same color as the standard maintained by the department's Construction Division, Materials Section. Deviations in length, width, shape, or configuration caused by, in the Engineer's opinion, pavement failure will not be considered as a failure of the pavement markings.

5. **Warranty.** Before application of pavement markings, the Manufacturer shall provide TxDOT a warranty by the Manufacturer that the Manufacturer will replace, at no cost to the department, in kind, except as noted below, any materials which fail to meet the performance requirements as listed in Article 4 of this specification for the functional life defined in Article 6.

   (1) **Longitudinal Markings.** If the pavement markings fail to meet the performance requirements as listed in Article 4 of this specification during the fifth (5) or sixth (6) year of the functional life period, the manufacturer will install, at no cost to the department, a pavement marking system that shall meet as a minimum the department's Prefabricated Pavement Markings - Permanent, DMS-8240 specification under the following conditions to complete the warranty period:

       If the pavement surface is to be replaced during the fifth (5) or sixth (6) year, materials meeting Type A or B requirements of specification DMS-8240 will be used.

       If the pavement surface will not be replaced during the fifth (5) or sixth (6) year, materials meeting Type B requirements of specification DMS-8240 will be used.
(2) **Symbols and Legends.** If the pavement markings fail to meet the performance requirements as listed in Article 4 of this Specification during the functional life, the manufacturer will install, at no cost to the Department material, in kind.

6. **Additional Terms of the Warranty.** The Manufacturer shall be responsible for application, at no cost to the department, of all replacement materials covered by the warranty.

(1) **Functional Life.** Longitudinal markings shall meet performance requirements described in Section 4 for six (6) years as defined in Section 5, Warranty, from the date the portion of the facility containing those markings becomes operational.

Symbols and legends shall meet the durability requirements described in Article 4 for three (3) years on roads with less than 100,000 ADT or two (2) years on roads exceeding 100,000 ADT from the date the portion of the facility containing those markings becomes operational.

(2) **Reflectivity Determination.** The following procedures will be used to determine the performance of pavement markings for warranty purposes. Periodic visual night inspection will be made by TxDOT as described by TxDOT Test Method TEX-828-B, when deemed necessary by the Engineer. The Manufacturer's representative may accompany the Engineer on a subsequent inspection when pavement markings do not appear to meet minimum retroreflectivity or nighttime color requirements. All retroreflectivity measurements shall be made on a clean, dry surface at a minimum temperature of 4 C. The average retroreflectivity value for the Measurement Zone shall be used to determine if the minimum performance values have been met.

(a) **Longitudinal Markings.** A Measurement Zone shall consist of either edge lines, center lines, or lane lines, but not in combination. Random sampling techniques shall be used to determine the average reflectivity throughout the zone.

(b) **Symbols and Legends.** Each symbol or legend is considered a Zone. A minimum of five (5) measurements shall be made. The average of the measurements shall be the Zone retroreflectivity value.

(c) **Replacement.** Pavement markings that do not meet performance requirements of Article 4 shall be replaced by the Manufacturer normally within 15 days unless weather conditions or other conditions as approved by the Engineer dictate otherwise, but not more than 90 days. Notification will be by mail, return receipt requested, to an address as specified by the Manufacturer as indicated on the warranty.

(d) **Exclusions.** Up to 5 percent of the markings on any project may at the discretion of the Engineer, be excluded from the replacement provisions provided that the failure is a result of outside causes rather than defective material as determined by the Engineer. Outside causes include, without limitation: Extreme wear at intersections or crossover areas, unusually large amounts of heavy vehicles. Outside causes exclude, without limitation: Linear, free rolling traffic regardless of ADT.
(3) Pavement markings damaged by snow or ice removal operations or other natural occurrences such as flooding, earth quakes, landslides, are exempt from warranty.

(4) The Manufacturer shall post a surety bond to cover the warranty costs for the six (6) year warranty period. The surety bond will be based on the full amount of the contract price, including materials, labor, equipment rental, and incidentals. The surety bond will be considered as a performance bond as defined in the General Requirements and Covenants of Items 1 to 9, of the General Provisions of the Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges, adopted by TxDOT, March 1, 1995.

7. Training and Certification.

(1) Contractor. The Contractor shall provide a minimum of one (1) employee for the duration of the application that is certified to apply pavement markings. Failure to provide a certified employee shall be cause for the Engineer to suspend application of pavement markings until a certified employee is on site. The Contractor shall complete a daily log report and supply a copy of this report to the Engineer. The minimum information to be contained in the log shall be: Contractor identification, date, time start and stop, weather information, and daily work completed.

(2) Manufacturer. Training and certification of Contractor and Department employees, such as inspectors, maintenance supervisors, etc., shall be supplied by the Manufacturer at or near project location. The training shall be of a duration and content sufficient to satisfy the Manufacturer that individuals who complete the training are eligible for certification as a competent applicator of the Manufacturer's materials. The Manufacturer shall supply to each graduate of the training, a wallet card attesting to the individual's certification. The certification shall be effective for one (1) year from completion of the training. Training and certification shall be provided at no charge to Contractor and Department personnel.

8. Measurement. This Item will be measured by the meter, by each of the various words, symbols or shapes, or by any other unit as shown on the plans.

Where double stripes are placed, each stripe will be measured separately.

9. Payment. The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Pavement Markings with Warranty" of the various types, colors, shapes, sizes, and widths specified. This price shall be full compensation for furnishing all materials; for application of pavement markings; and for all other labor, tools, equipment and incidentals necessary to complete the work.