

Special Specification 6020

Multipolymer Pavement Markings (MPM) with Warranty



1. DESCRIPTION

Furnish and place MPM as shown on the plans. Provide a manufacturer's warranty bond for longitudinal lines for a 3-yr. period. The Department will allow a Contractor provided warranty bond in lieu of the manufacturer's bond if all conditions of the manufacturer's warranty including the requirements of this Item are met. In such case, the Contractor is responsible for the meeting the warranty requirements. Use the form provided by the Department.

2. MATERIALS

- 2.1. **Multipolymer Pavement Marking Materials.** Use materials that produce an adherent, retroreflective pavement marking system that meets all of the performance requirements of this Item. Use materials that do not result in the generation of any hazardous materials/wastes, as defined in Article 1.58, "Hazardous Materials or Waste," during application or removal. If requested, provide a laboratory report from a commercial laboratory indicating material used does not result in the generation of any hazardous materials/wastes, as defined in Article 1.58, during application or removal.

Use a multipolymer resin material, which is:

- 2-component (a predominantly multipolymer pigmented resin component with a curing agent component);
- 100% solids, producing no toxic fumes when heated to application temperature;
- track-free in less than 40 min.; and
- formulated and tested to perform as a pavement marking material with glass spheres applied to the surface.

Before work begins, provide a laboratory report from an independent testing laboratory showing that the initial color of each material selected for use conforms to the color limits set forth in Table 1, measured by 45°/0° geometry CIE, D65 Illuminant, 2° standard observation angle in accordance with ASTM E1347, E1348, or E1349.

- 2.2. **Non-ReflectORIZED Contrast or Shadow Markings.** The marking material used for the contrast or shadow marking must conform to the same formulation, material, prequalification and sampling requirements with the exception of the following items:

- color pigment used;
- glass spheres must be replaced with a black, color-fast, anti-skid material.

Before work begins, provide a laboratory report from an independent testing laboratory showing that the initial color of each material selected for use conforms to the color limits set forth in Table 1, measured by 45°/0° geometry CIE, D65 Illuminant, 2° standard observation angle in accordance with ASTM E1347, E1348, or E1349.

3. EQUIPMENT

Provide equipment as required or directed according to the following (The provider of the warranty bond is responsible for providing equipment during the warranty period unless otherwise shown on the plans.):

- 3.1. **Preparation and Application.** Use equipment designed for the pavement preparation and application of the type of MPM material selected.
- 3.2. **Colorimeter.** Provide a colorimeter using 45°/0° geometry CIE, D65 Illuminant, 2° standard observation angle meeting the requirements of ASTM E1347, E1348, or E1349.
- 3.3. **Retroreflector.** Unless otherwise shown on the plans, provide a portable or mobile retroreflector meeting the following requirements.
- 3.3.1. **Portable Retroreflector.** Provide a portable retroreflector that meets the requirements of ASTM E1710.
- 3.3.2. **Mobile Retroreflector.** Provide a mobile retroreflector that:
- is approved by the Construction Division (CST) and certified by the Texas Transportation Institute Mobile Retroreflector Certification Program for project evaluation of retroreflectivity
 - is calibrated daily, before measuring retroreflectivity on any pavement stripe, with a portable retroreflector meeting the following requirements: ASTM E1710, entrance angle of 88.76°, observation angle of 1.05°, and an accuracy of ±15%
 - requires no traffic control when retroreflectivity measurements are taken and is capable of taking continuous readings at posted speeds

Furnish mobile retroreflectivity measurements in compliance with Special Specification Mobile Retroreflectivity Data Collection for Pavement Markings unless otherwise approved by the Engineer. The Engineer may require an occasional field comparison check with a portable retroreflector meeting the requirements listed above to insure accuracy.

4. CONSTRUCTION

- 4.1. **General.** Prepare the pavement surface using controlled techniques that minimize pavement damage and hazards to the traveling public. Apply the MPM materials, according to the manufacturer's recommendations, using widths, colors, shapes, and at locations as shown on the plans.
- Obtain approval for the sequence of work and estimated daily production. Use traffic control as shown on the plans or as approved. Establish guides to mark the lateral location of pavement markings as shown on the plans or as directed, and have guide locations verified. Use material for guides that will not leave a permanent mark on the roadway. Apply markings in alignment with the guides and without deviating for the alignment more than 1 in. per 200 ft. of roadway or more than 2 in. maximum. Remove all applied markings that are not in alignment or sequence as stated in the plans or as stated in the specifications at the Contractor's expense and in accordance with Item 677, "Eliminating Existing Pavement Markings and Markers," except for measurement and payment.
- 4.2. **Initial Performance Requirements.** Meet Article 5, "Performance Requirements," initially, after installation. Perform an initial performance evaluation after 7 and before 15 days after MPM are installed to verify that the MPM meet the performance requirements in Article 5 for retroreflectivity. Conduct initial retroreflectivity evaluations of placed pavement markings with either a portable or mobile retroreflector, unless otherwise shown on the plans, according to Section 5.4.2., "Retroreflectivity." The Contractor is responsible for traffic control when conducting performance evaluations.
- For color and durability, the Engineer will conduct a visual evaluation and require Contractor testing only if MPM do not appear to meet the performance requirements in Article 5.
- For MPM not meeting performance requirements, repair or replace until reevaluation shows the MPM meet the performance requirements as approved by the Engineer.

- 4.3. **Written Acceptance.** The Department will provide written acceptance after the Contractor meets the initial performance requirements. This written acceptance (see attached sample form) will include the date, location, length, and type of MPM.

5. PERFORMANCE REQUIREMENTS

- 5.1. **Color.** Provide MPM consisting of pigments blended to provide color conforming to standard highway colors as shown in Table 1.

Table 1
Color Requirements

Federal 595 Color		Chromaticity Coordinates								Brightness (Y)
		1		2		3		4		
		x	y	x	y	x	y	x	y	
White	17855	.290	.315	.310	.295	.350	.340	.330	.360	60 min
Yellow	33538	.470	.455	.510	.489	.490	.432	.537	.462	30 min
Black										5 max

- 5.2. **Retroreflectivity.** Provide MPM meeting the minimum retroreflectivity values listed in Table 2.

Table 2
Minimum Retroreflectivity Requirements

Color	Retroreflectivity, mcd/m ² /lx, Min
White	175
Yellow	125

- 5.3. **Durability.** Provide MPM that do not lose more than 5% of the striping material in a 1,000- ft. section of continuous stripe or broken stripe (25 broken stripes). Pavement markings must remain in the proper alignment and location.

- 5.4. **Performance Evaluation Procedures.** Provide traffic control and conduct evaluations of color, retroreflectivity, and durability as required or directed.

- 5.4.1. **Color.** Measure color using 45°/0° geometry CIE, D65 Illuminant, 2° standard observation angle in accordance with ASTM E1347, E1348, or E1349.

- 5.4.2. **Retroreflectivity.** Unless otherwise shown on the plans, conduct retroreflectivity evaluations of pavement markings with either a portable or mobile retroreflectometer. Make all measurements in the direction of traffic flow, except for broken centerline on 2-way roadways, where measurements will be made in both directions.

If using a portable retroreflectometer, take a minimum of one measurement every mile on each series of markings (i.e., edgeline, center skipline, each line of a double line, etc.), at approved locations. If more than one measurement is taken, average the measurements. For all markings measured in both directions, take a minimum of one measurement in each direction. If the measurement taken on a specific series of markings within each mile segment falls below the minimum retroreflectivity values, take a minimum of 5 more measurements within that mile segment for that series of marking. If the average of these 5 measurements falls below the minimum retroreflectivity requirements, that mile segment of the applied markings does not meet the performance requirement.

If using a mobile retroreflectometer, review the results to determine deficient sections and deficient areas of interest. These areas do not meet the performance requirements.

- 5.4.3. **Durability.** Measure durability in accordance with ASTM D913 for marking material loss and visual inspection for alignment and location. Conduct evaluations at locations approved by the Engineer.

6. WARRANTY REQUIREMENTS

The warranty requirements apply to the longitudinal lines only. Transverse and gore markings, symbols, words, etc. will not require warranty.

Each warranty period is for 3 yr. and starts the day after written acceptance.

The warrantor is responsible for meeting Article 5, "Performance Requirements," for the duration of the warranty period.

During the warranty period, the Engineer will conduct periodic visual performance evaluations of MPM. For retroreflectivity, the Engineer will use Tex-828-B, "Determining Functional Characteristics of Pavement Markings." The warrantor may be present during these evaluations. For areas, which, in the opinion of the Engineer, have a questionable visual evaluation, the warrantor may replace the MPM or may conduct a performance evaluation for the performance requirement in question, according to Section 5.D, "Performance Evaluation Procedures." Conduct retroreflectivity evaluations according to Section 5.D.2, "Retroreflectivity," using either portable or mobile retroreflectometer unless otherwise shown on the plans. The warrantor is responsible for traffic control when conducting performance evaluations.

The warrantor will replace MPM that fails to meet the color, retroreflectivity, or durability performance requirements during the warranty period. Within 15 days after notification place new markings in accordance with Article 4, "Construction."

All replacement MPM must meet the materials and performance requirements of this specification.

The end of the warranty period does not relieve the warrantor from the performance deficiencies requiring corrective action identified during the warranty period.

The Engineer may exclude MPM from the replacement provisions of the warranty period, provided the Engineer determines that the failure is a result of outside causes rather than defective material. Examples of outside causes are extreme wear at intersections, damage by snow or ice removal, and premature pavement failure.

Provide a contact name, address and telephone number for notification of needed MPM replacement.

7. MEASUREMENT

This Item will be measured by the foot; by each word, symbol, or shape; or by any other unit shown on the plans. Each stripe will be measured separately.

This is a plans quantity measurement Item. The quantity to be paid is the quantity shown in the proposal unless modified by Article 9.2., "Plans Quantity Measurement." Additional measurements or calculations will be made if adjustments of quantities are required.

8. 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 "Multipolymer Pavement Markings (MPM) with Warranty" of the type and color specified and the shape, width, and size specified as applicable, at the time of project acceptance. This price is full compensation for materials, application of MPM, equipment, labor, tools, and incidentals.

WARRANTY BOND	CONTRACT NO.	
	COUNTY	
	BOND NO	

KNOW ALL PERSONS BY THESE PRESENTS: That we, _____, manufacturer of or Contractor for multipolymer pavement markings, as Principal, and _____, as Surety, are held and firmly bound unto the State of Texas, as Obligee, in the penal sum of _____ Dollars \$ _____, lawful money of the United States, well and truly to be paid to the State of Texas, and we bind ourselves, our heirs, successors, executors, and administrators jointly and severally, firmly by these presents.

Whereas, the above bounden Principal has provided multipolymer pavement markings to _____ for the foregoing contract entered into between _____ and the Obligee, attached hereto; and

Whereas, the Principal is required to protect the Obligee against any defects resulting from faulty multipolymer pavement markings installed under said contract for a period of 3 years beginning the day after written acceptance.

Now, therefore, the condition of this obligation is such that if the above bounden principal, its heirs, successors, executors, and administrators shall promptly and faithfully carry out and perform the warranty as provided in said contract, and shall, within fifteen days of due notice, replace any installed multipolymer pavement markings that may fail to meet Obligee's performance evaluation as provided for in the Contract during the period specified above or shall pay over, make good, and reimburse to the said Obligee all loss and damage that said Obligee may sustain by reason of failure or default of said Principal so to do, then this obligation shall be null and void, otherwise it shall remain in full force and effect.

Provided further that the end of a warranty period shall not relieve Principal from its obligation to correct deficiencies requiring corrective action, so long as those deficiencies are identified during the warranty period.

WITNESS our hand this _____ day of _____ 20 _____ .

(Warrantor Name)

* By: _____
(Warrantor Officer)

****SURETY** (Print Firm Name and Seal)

By: _____
(Title)

* By: _____
(Warrantor Officer)

****SURETY** (Print Firm Name and Seal)

By: _____
(Title)

****SURETY** (Print Firm Name and Seal)

By: _____
(Title)

Note: * Attach a Power of Attorney showing that the officer of the warrantor has authority to sign this obligation.

** Attach a Power of Attorney showing that the surety officer or Attorney-In-Fact has authority to sign this obligation; the Power of Attorney and bond must be impressed with the corporate seal. The surety must be a US Treasury listed company and provide notification information.