ITEMS 010680

Item 0106801 - 12" WHITE PREFORMED PLASTIC PAVEMENT MARKINGS
Item 0106802 - 4" YELLOW PREFORMED PLASTIC PAVEMENT MARKINGS
Item 0106803 - 4" WHITE PREFORMED PLASTIC PAVEMENT MARKINGS
Item 0106804 - DIRECTIONAL PREFORMED PLASTIC PAVEMENT MARKINGS

DESCRIPTION

These items shall include furnishing materials, labor, tools and equipment to install yellow and/or white reflectorized pre-formed plastic pavement line and/or directional markings at locations indicated on the plans or where ordered by the Engineer and in conformance with the plans and these specifications.

The Contractor shall notify the Engineer when he has obtained the line and/or directional markings, and any material found to be defective or damaged, upon its inspection by the Traffic Engineer, will be rejected.

The markings described are pre-formed plastic pavement markings consisting of yellow and/or white pigmented plastic with reflective glass spheres uniformly distributed throughout their entire cross-sectional area, which are capable of being affixed to bituminous concrete pavement by a pressure sensitive pre-coated adhesive. The markings shall be provided complete in a form that will facilitate rapid application and protect the markings in shipment and storage. The marker material shall mold itself to pavement contours, breaks, faults, and the like, by action of traffic at normal pavement temperatures. The plastic shall have resealing characteristics such that it will fuse with itself under normal conditions of use.

REFERENCED ITEMS

None

REQUIRED SUBMITTALS

Material Certificate of Compliance:

Submit 5 copies of material certificate of compliance for pavement markings in accordance with the contract general requirements.

Certified Test Report:

Submit 5 copies of certified test reports for pavement markings in accordance with the contract general requirements.

MATERIALS

Reflectorized pre-formed plastic pavement marking material shall consist of uniform consistency, prefabricated thermoplastic ribbon with a thickness of 60 mil and with specified width (see proposal section for specific width) of either white or yellow color and shall contain reflective glass spheres uniformly distributed throughout the entire cross-section that shall be capable of being affixed to non-bleeding bituminous concrete pavement.

The reflectorized material shall be of plastic, cold flow type.

The reflectorized pre-formed plastic pavement marking material shall consist of the following components with maximum and minimum composition by weight tolerances as shown:

	Maximum	**Minimum**
Plastics and Plasticizers	46%	40%
Pigments	42%	38%
Glass Spheres	18%	14%

Pigment shall include titanium dioxide conforming to the requirements of ASTM D-476-00 for white plastic material and CP medium chrome yellow conforming to the requirements of ASTM D-211-67 for yellow materials.

When extruded, the reflectorized cold thermoplastic material without pre-coated adhesive shall be 1/16" thick with a tolerance of + 5 percent. The edges shall be clear cut and true. The preformed plastic material may be supplied complete with a pre-coated, factory applied adhesive backed with a protective release paper so as to make possible immediate pavement application without the use of heat, solvent on other types of adhesive operations.

1. **PHYSICAL REQUIREMENTS**

a. Bent Test No. 1 (with Pre-coated Adhesive)

The plastic shall be of such a structure that a temperature of 80^{O}F, a piece of 3" by 6" material (with paper backing) placed upon a 1" diameter mandrel may be bent over the mandrel until the end faces are parallel and 1" apart. By visual inspection, there shall be not fracture lines apparent in the uppermost surface.

b. Bent Test No. 2 (without Paper Backing)

A piece of plastic 6" x 12" in size (paper backing removed) when balanced upon a supported 1/2" diameter mandrel, reflective side up, and left in this position at a temperature of 80^{o}F shall have flexed out of its own weight at the end of eight hours into an inverted "V" position with the free ends at an angle of not more than 30^{o} from the vertical. The uppermost surface of the plastic shall show no fracture or breaks. Upon removing the plastic from the mandrel, the material should be firmly but not abruptly returned to a semi-flat position with the reflective side down. The plastic, at a temperature of 80^{o}F on a smooth, flat, glass surface shall have returned to its original flat condition in not more than eight hours.

c. Tensile Strength

Employing ASTM designation D-638-03, the plastic shall have a tensile strength of 300psi + or - 100psi. The elongation shall be no greater than 50 percent. The tensile strength calculations should be based on the minimum measured thickness of the test specimen. The rate of pull on the test shall be 0.25 inch per minute. The test shall be conducted at temperature of 70^{o} to 80^{o}F using a strip of material 6" long and 1" wide.

d. Plastic Pull Test

A 6" long by 1" wide section of the thermoplastic material shall support a dead load weight of 6 pounds for not less than 30 minutes. This test shall be conducted at a temperature of 70^{o} to 80^{o}F.

e. Glass Sphere Retention

A 2" specimen of thermoplastic material shall be cut at right angle to the long edge and bent parallel to the long edge on a 1/2" diameter mandrel. While the specimen is bent, a strip of 1/2" wide masking tape shall be applied firmly along the length of the area of maximum bend and then removed. Retention of any glass spheres on the masking tape when the tape is removed shall be cause for rejection of the material.

f. Gloss

The plastic material shall have a maximum 60^{o} gloss of 10 units as measure in accordance with ASTM designation D-523-89.

g. Abrasion Resistance

The plastic material shall have a maximum loss in weight of 0.25 grams in 500 revolutions when abraded according to Federal Test Method Standard No. 141 Method 6192, using H-18 calibrate wheels with 1,000 gram load on each wheel.

Reflective glass spheres shall meet the following general requirements:

a. Crushing Resistance

The crushing resistance of glass spheres may be determined. A 40 pound dead weight for 20 to 30 mesh spheres should be the average resistance of the spheres tested.

b. Roundness

The roundness of glass spheres may be determined by ASTM designation D-1155-03. A typical requirement is that 70 to 80 percent of the spheres of each sieve size be free from imperfection of all types including file, scratches, pits, dusters, opaqueness and non-spherical shape.

c. Index

The liquid immersion method at 77^{o}F may be used to determine the refractive index of 1.50 to 1.60 for pavement line markings.

d. Gradation

A sieve analysis of glass spheres shall be in accordance with ASTM designation D-1214-89, 100 passing the No. 60 sieve, 0 to 15 percent passing the No. 140 sieve.

e. Chemical Resistance

The glass spheres shall withstand immersion in water and acids without undergoing noticeable corrosion or etching and shall not be darkened or otherwise noticeably decomposed by sulfides. The tests for chemical resistance shall consist of one hour immersion in water and in solutions of corrosive agents followed by microscopic inspection. A 3 to 5 gram portion

of the sample shall be placed in each of three Pyrex glass beakers or porcelain dishes; one sample shall be covered with distilled water, one with a 3N solution of sulfuric acid and the other with a 50 percent solution of sodium sulfide. After one hour of immersion, the glass spheres of each sample shall be examined microscopically for evidence of darkening and frosting.

f. Flow Properties

The glass spheres shall flow freely through the dispensing equipment in any weather for striping.

The pre-formed plastic material shall be capable of application to nondefective pavement surfaces that are free from dirt or other foreign matter. For normal application, the pavement temperature should be at least 60^{O}F or more. Special instructions should be supplied by the vendor for application to be made at pavement temperature below 60^{O}F.

CONSTRUCTION METHODS

Pre-formed plastics shall be capable of being applied to new asphaltic pavement immediately prior to the final rolling of the new surface and of being rolled into place with conventional pavement and highway rollers. The plastic material and adhesives used in such applications shall be of the type that water used on the roller to prevent asphalt pickup shall not be harmful to the successful application of the plastic.

Apply the reflectorized plastic pavement markings after the first rolling operation. Allow the roller to tamp the tape into the asphalt surface during the final rolling operation.

METHOD OF MEASUREMENT

This work will be measured for payment at the contract unit price per linear foot or square foot for "PRE-FORMED PLASTIC PAVEMENT MARKINGS" of the color and width specified, complete in place and accepted by the Engineer. Price shall include all materials, equipment, tools and labor incidental thereto.

BASIS OF PAYMENT

This work will be paid for at the contract unit price per linear foot or square foot for "PRE-FORMED PLASTIC PAVEMENT MARKINGS" of the color and width

specified, completed in place, and accepted by the engineer. Price shall include all materials, equipment, tools and labor incidental thereto.

PAY ITEM	DESCRIPTION	PAY UNIT
0106801	12" White Preformed Plastic Pavement Markings	LF
0106802	4" Yellow Preformed Plastic Pavement Markings	LF
0106803	4" White Preformed Plastic Pavement Markings	LF
0106804	Directional Preformed Plastic Pavement Markings	SF