Section 02765

TEMPORARY AND REMOVABLE REFLECTORIZED PAVEMENT MARKINGS

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Temporary retroreflective preformed pavement markings.

B. Wet retroreflective markers.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices.

1. No separate payment will be made for temporary and removable reflectorized pavement markings under this Section unless included as a bid item in Document 00410 - Bid Form. Include payment in unit price for installation and maintenance of traffic control when there is no bid item in Document 00410.

2. Payment for temporary pavement markings is on linear foot basis, for each class, measured in place.

3. Refer to Section 01270 - Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 REFERENCES

A. ASTM D 1056 - Test Method for Flexible Cellular Materials Sponge or Expanded Rubber

B. ASTM D 4061 - Standard Test Method for Retroflectance of Horizontal Coatings.

C. ASTM E 1347 - Standard Test Method for Color and Color-Difference Measurement by Tristimulus (Filter) Colorimetry.

D. ASTM E 303 - Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester.

E. ASTM E 808 - Standard Practice for Describing Retroreflection.

F. ASTM E 809 - Standard Practice for Measuring Photometric Characteristics of Retroreflectors.

1.04 TEMPORARY PAVEMENT MARKING DEFINITIONS

A. Class I - Temporary preformed pavement markings suitable for longitudinal and word and symbol markings where removability will be required.

B. Class II - Temporary non-removable preformed pavement markings suitable for overlay lane lines, edge lines, and channelizing lines where pavement will be resurfaced.

C. Class III - Class I markers with wet reflective markers added every 8 feet.

D. Class IV - Class II markers with wet reflective markers added every 8 feet.

1.05 SUBMITTALS

A. Conform to requirements of Section 01330 - Submittal Procedures.

B. Submit manufacturer's product data for each proposed class of marking material and installation instructions for approval. Include certificate by manufacturer that each class of marking conforms to requirements of this Section.

C. Submit details of manufacturer’s removal and replacement policy for each class of marker.

1.06 DELIVERY AND STORAGE

A. Deliver preformed plastic marking material in rolls or strips.

B. Store material in cool dry conditions as recommended by manufacturer until application.

PART 2 P R O D U C T S

2.01 PREFORMED MARKINGS

A. Retroreflective Preformed Markings: White or yellow retroreflective tape on conformable backing with pigments conforming to standard highway colors. Incorporate glass beads in film and bond reflective layer of beads to top surface of film. Adhere beads so that they cannot be easily removed by scratching with thumbnail.

B. Preformed marking shall be precoated with pressure sensitive adhesive and shall have demonstrated ability to adhere to roadways under climatic and traffic conditions normally encountered in construction work zone when properly applied.

C. Class I markings shall be removable from Portland cement and asphaltic concrete pavements intact, or in large pieces, at temperatures above 40 degrees F without use of heat, solvents,

grinding, or blast cleaning. Marking film shall be removable after exposure to following minimum traffic exposure when tested on transverse test decks with rolling traffic:

1. Time in Place (days) 632
2. ADT per lane (23% trucks, 3.5 axles/unit) 9,000
3. Minimum Axle Hits 13,000,000

D. Quality performance characteristics:

	CLASS I		CLASS II		TEST METHOD
	White	Yellow	White	Yellow	
1. Init. Retroreflectance (mcd x ft^{-2} x fc^{-1}), min.					
* @ 86.0E, 0.2E	1770	1310	1360	820	ASTM D 4061
* @ 86.5E, 1.0E	750	450	500	350	
2. Daytime Reflectance Factor "Y" %, min.	65	36	65	36	ASTM E 1347
3. Init. Skid Resistance, Avg. BPN	50		35		ASTM E 303
4. Refractive Index of Beads, min.	1.9		1.9		Liquid Immersion
5. Thickness, without adhesive, mils, min.	40		9		Caliper Gauge

* (Entrance Angle, Observation Angle).

2.02 RAISED WET REFLECTIVE MARKERS

A. Raised Markers: Expanded rubber extrusions capable of being elastically compressed and deflected when impacted by rotating vehicle tires. Marker body shall have following properties when tested in accordance with ASTM D 1056:

1. Compression deflection: less than 16 psi at 25 degrees deflection.
2. Oven aged compression deflection: +18 percent change
3. Compress set low: 10 percent.
4. Water absorption: less than 9 percent.
5. Density: 24 pounds per foot

B. Pre-coat markers with pressure sensitive adhesive capable of holding markers to top of preformed marking film.

C. Markers shall have enclosed retroreflective lens sheeting elements attached to marker bodies with pressure sensitive adhesive.

1. Retroreflective lenses elements shall have following initial minimum reflectance when measured in accordance with ASTM E 809:

Color	White	Yellow	White	Yellow	White	Yellow	White	Yellow
Observation Angle	0.2E		0.5E		1.0E		1.5E	
Coeff. of Luminous Intensity, R ($cd \times fc^{-1}$)	1.00	0.60	0.40	0.24	0.19	0.11	0.14	0.08

Notes: a. Test at entrance angle (Beta 2 horizontal entrance component described in ASTM E 808) of -4 degrees measured from axis perpendicular to top edge of marker when viewed from above.

b. Angle formed by reflective surface and base of marker shall be between 75 degrees and 90 degrees prior to measurement.

2. Marker reflective elements shall be visible at night, to motorists with low beam headlights, under following conditions:

a. Dry conditions: 1500 feet

b. Rainfall at rate of 1 inch per hour: 1000 feet

c. Rainfall at rate of 8 inches per hour: 250 feet

PART 3 E X E C U T I O N

3.01 INSTALLATION

A. Apply markings to clean dry surfaces in accordance with manufacturer's recommendations at locations indicated on Drawings, or as directed by City Engineer.

B. Place markings on each paving lift that is to be opened to traffic prior to end of each day's work.

C. Maintain markings, and replace as needed, until they are covered with subsequent paving courses or replaced by permanent markings on final lifts.

3.02 REMOVAL

A. Remove and obliterate markings on existing and final lifts used for redirecting traffic during construction. When blast cleaning is required, comply with requirements of Section 02762 - Blast Cleaning of Pavement.

END OF SECTION