

Item No. **863S**
Reflectorized Pavement Markers

863S.1 Description

This item governs reflectorized pavement markers to be used to delineate traffic lanes or fire hydrants.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text, the inch-pound units are given preference followed by SI units shown within parentheses.

863S.2 Submittals

The submittal requirements of this specification item include:

- A. List of specific application(s) [i.e. type: (reflectorized Type I-A, I-C or II-A-A, II-B-B or II-C-R)] and applicable epoxy system and adhesive types [867S.5].
- B. Specific manufacturer with test results and technical specifications for proposed pavement markers.
- C. Manufacturer's recommendations for surface preparation, cleaning, placement temperatures and installation instructions.
- D. Adhesive components and mixing recommendations.

863S.3 Materials

All materials shall meet the requirements as specified below and indicated on City of Austin Standard Detail 863S-1, "Pavement Markers (Reflectorized - Type I & II)". The pavement markers shall comply with TxDOT Departmental Materials Specifications DMS-4210.

A. Design and Shape

The outer surface of the marker shall be smooth and all corners and edges exposed to traffic must be rounded. The base of the marker shall have a width of 4.0 inches + 1/2 inch (100 mm + 13 mm) and shall have a minimum area exposed to traffic of 12.5 square inches (8000 square mm). The maximum height shall be 3/4 inch (19 mm). The maximum slope of the reflector face or faces shall be not more than 30 degrees from the horizontal.

The bottom surface of the markers shall be of a design for adhesion with epoxy adhesives to comply with TxDOT Test Method Tex-611-J.

The marker shall be designed to show no change in shape or color when subjected to the requirements of TxDOT Test Method Tex-846-B, at a temperature of 140°F (60°C) with the marker in a vertical position.

B. Optical

1. Definitions

- (a) Horizontal entrance angle is defined as being in a plane parallel to the base of the road marker, between a line in the direction of the incident light and a line that is perpendicular to the leading edge of the reflective surface.

- (b) Divergence angle shall mean the angle at the reflector between observer's line of sight and the direction of the light incident on the marker.
- (c) Specific intensity shall mean candle power of the returned light at the chosen divergence and entrance angles for each footcandle of incident light per reflective face. TxDoT Test Method Tex-842-B will be used to determine specific intensity.

2. Performance

For the pavement markers the specific intensity of the reflecting surface at a 15-degree divergence angle shall be not less than the following when the incident light is parallel to the base of the marker.

Horizontal Entrance Angle, Degrees	Specific Intensity	
	Cry stal	A mber
0	3.0	2.0
20	1.5	1.0

The specific intensity of the marker shall not be less than 80 percent of the above minimum values after being subjected to heat test of TxDoT Test Method Tex-846-B.

C. Pavement Marker Types

Pavement markers shall be of the following types:

1. Type I-A shall contain an approach face that reflects amber light. The body, other than the reflective face, shall be yellow.
2. Type I-C shall contain an approach face that reflects white light. The body, other than the reflective face, shall be white, silver white or light gray.
3. Type II-A-A, shall contain two reflective faces (approach and trailing), each of which shall reflect amber light. The body, other than the reflective faces, shall be yellow.
4. Type II-B-B shall contain two reflective faces (approach and trailing) with glass covered pneumatic reflective faces, each of which shall reflect blue light. The body, other than the reflective faces, shall be blue.
5. Type II-C-R shall contain two reflective faces (approach and trailing), one of which reflects white light and one of which reflects red light. The body, other than the reflective faces, shall be either white, silver white or light gray or one-half white, silver white or light gray on the side that reflects white light and one-half red on the side that reflects red light.

The reflective faces of the Type II markers shall be located so that the direction from one face shall be directly opposite the direction of reflections of the other face.

863S.4 Sampling

Sampling will be conducted in accordance with TxDoT Test Method Tex-729-I.

863S.5 Testing

The Contractor shall certify that the markers meet the requirements defined in the specification and meet or exceed the applicable tests required. All testing will be in accordance with the TxDOT manual of Testing Procedures. Applicable tests shall include the following:

- Tex-611-J: Adhesion Requirements
- Tex-842-B: Light Retroreflectivity
- Tex-846-B: Heat Resistance

Blue markers' color will conform to Fire Department requirements.

863S.6 Construction Methods

The Contractor shall use a crew experienced in the work of installing reflectorized pavement markers and in the necessary traffic control for such operations on the roadway surface and shall supply all the equipment, personnel, traffic control and materials necessary for the placement of the pavement markings as indicated on the Drawings or as directed by the Engineer or designated representative. All work shall conform to the current edition of the Texas Manual of Uniform Traffic Control Devices (TMUTCD), The City of Austin Transportation Criteria Manual and Standard Detail 863S-1.

All reflectorized pavement markers shall be from the same manufacturer. Surfaces to which markers are to be attached by an adhesive shall be prepared by any method approved by the Engineer or designated representative to ensure that the surface is free of dirt, curing compound, grease, oil, moisture, loose or unsound pavement markings and any other material which would adversely affect the adhesive bond. Unless indicated otherwise on the Drawings, surface preparation for installation of raised reflectorized pavement markers will not be paid for directly, but shall be included in the unit price bid for this specification item.

Guides to mark the lateral location of pavement markings shall be established as indicated on the Drawings or as directed by the Engineer or designated representative. The Contractor will establish the pavement marking guides and the Engineer or designated representative will verify the location of the guides prior to final installation.

The pavement markers shall be placed in proper alignment with the Guides. The deviation rate in alignment shall not exceed 1 inch per 200 feet (25 millimeters per 60 meters) of roadway. The maximum deviation shall not exceed 2 inches (50 millimeters) nor shall any deviation be abrupt.

Markers placed which are not in alignment indicated on the Drawings shall be removed by the Contractor at the Contractor's expense. Removal shall be in accordance with Specification Item 874S except for measurement and payment. Guides placed on the roadway for alignment purposes shall not establish a permanent marking on the roadway.

The Reflectorized Pavement Markers shall be applied using an approved epoxy adhesive (City of Austin Standard Specification Item 867S) to the lines and spacings as indicated on the Drawings or as directed by the Engineer or designated representative. The adhesive shall be applied in sufficient quantity to ensure that 100 percent of the bonding area of the pavement markers shall be in contact with the adhesive. The adhesive shall be applied in accordance with the manufacturer's recommendations.

Pavement markers shall be placed immediately after the adhesive is applied and shall be firmly bonded to the pavement. Adhesive or any other material that impairs functional reflectivity will not be acceptable.

When deemed necessary by the Engineer or designated representative, the Contractor, at the Contractor's expense, shall place any additional pilot markings required to facilitate the placement of the permanent markings in the alignment specified. Any and all additional markings placed on the roadway for alignment purposes shall be temporary in nature and shall not establish a permanent marking on the roadway. Materials used for pilot markings and equipment used to place such markings shall be approved by the Engineer or designated representative.

863S.7 Measurement

Reflectorized Pavement Marker will be measured as per each, complete in place.

863S.8 Payment

Payment will be made at the unit bid price per each. The price shall include full compensation for all work performed and all materials furnished in constructing, transporting and placing the markers.

Payment will be made under:

- Pay Item No. 863S -1:** Reflectorized Pavement Markers (Type I-A) - Per Each.
- Pay Item No. 863S -2:** Reflectorized Pavement Markers (Type I-C) - Per Each.
- Pay Item No. 863S -3:** Reflectorized Pavement Markers (Type II-A-A) - Per Each.
- Pay Item No. 863S -4:** Reflectorized Pavement Markers (Type II-B-B) - Per Each.
- Pay Item No. 863S -5:** Reflectorized Pavement Markers (Type II-C-R) - Per Each.

End

<i>SPECIFIC</i> CROSS REFERENCE MATERIALS
Specification Item 863S " Reflectorized Pavement Markers"

Texas Department of Transportation: Manual of Testing Procedures

<u>Designation</u>	<u>Description</u>
Tex 611-J	Adhesion Test For Traffic Buttons, Markers, and Jiggle Bars
Tex-729-I	Sampling of Traffic Markers
Tex-842-B	Method for Measuring Retroreflectivity
Tex-846-B	Method of Testing The Heat Resistance of Reflector Units

Texas Department of Transportation: Departmental Materials Specifications

<u>Designation</u>	<u>Description</u>
DMS-4210	Pavement Markers (All Weather Reflectorized

City of Austin Standard Details

<u>Designation</u>	<u>Description</u>
863S-1	Pavement Buttons (Reflectorized-Type I & Type II)

City of Austin Standard Specifications

<u>Designation</u>	<u>Description</u>
Item No. 867S	Epoxy Adhesive
Item No. 874S	Eliminating Existing Pavement Markings and Markers
Item No. 875S	Pavement Surface Preparation For Markings

City of Austin Transportation Criteria Manual

<u>Designation</u>	<u>Description</u>
Section 8	Traffic Control

State of Texas Manual on Uniform Traffic Control Devices for Streets and Highways

<u>Designation</u>	<u>Description</u>
Part III	Markings
Part VI	Traffic Controls for Street and Highway Construction, Maintenance, Utility and Incident Management Operations
Part VI, Article D	Markings
Part VI, Article F	Control of Traffic Through Work Areas

<i>RELATED</i> CROSS REFERENCE MATERIALS

City of Austin Standard Specifications

<u>Designation</u>	<u>Description</u>
Item No. 865S	Non-Reflectorized Traffic Buttons
Item No. 870S	Work Zone Pavement Markings
Item No. 871S	Reflectorized Pavement Markings
Item No. 873S	Raised Pavement Markers

Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges

<u>Designation</u>	<u>Description</u>
Item No. 666	Reflectorized Pavement Markings
Item No. 672	Raised Pavement Markers
Item No. 677	Eliminating Existing Pavement Markings and Markers
Item No. 678	Pavement Surface Preparation For Markings