

**DEPARTMENT OF TRANSPORTATION  
STATE OF GEORGIA**

**SUPPLEMENTAL SPECIFICATION**

**Section 919—Raised Pavement Markers**

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*Delete Section 919 and substitute the following:*

**919.1 General Description**

This section includes the requirements for raised pavement marker materials for use in reflective, ceramic, and channel markers.

**919.1.01 Related References**

**A. Standard Specifications**

General Provisions 101 through 150.

**B. Referenced Documents**

ASTM C 424

ASTM C 373

ASTM D 2240

ASTM D 4280

Federal Method TT-T-141, Method 4252

**919.2 Materials**

**A. Requirements**

Do not use any marker materials until the laboratory approves it.

1. Use raised pavement marker sources as listed in [OPL 76](#).
2. Use raised pavement markers of the type shown in the Plans or specified in the proposal. This Specification references markers as follows:

<b>Type</b>	<b>Description</b>
1	Two-way, one-color, 4 x 2 in (100 mm x 50 mm), reflective
2	One-way, one-color, 4 x 2 in (100 mm x 50 mm), reflective
3	Two-way, two color, 4 x 2 in (100 mm x 50 mm), reflective
4	Round white, yellow or black ceramic, non reflective
5	Oval white, yellow or black ceramic, non-reflective
6	Oval white or yellow ceramic, reflective
7	White or yellow ceramic jiggle bar, non-reflective
8	White or yellow ceramic jiggle bar, reflective
9	White or yellow channel, non-reflective

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10	White or yellow channel, reflective
11	Two-way, one-color, 4 x 4 in (100 mm x 100 mm), reflective
12	One-way, one color, 4 x 4 in (100 mm x 100 mm), reflective
13	Two-way, two color, 4 x 4 in (100 mm x 100 mm), reflective
14	Two-way, one color, flexible reflective
15	One-way, one color, flexible reflective

### 3. Certification

Submit a certification to the Engineer from the manufacturer showing the physical properties of the markers and their conformance to this Specification.

### 4. Packaging

Pack shipments in containers that are acceptable to common carriers.

- a. Pack the containers to ensure delivery in perfect condition.
- b. Clearly mark each package of pavement markers with the size, color, type, and lot number.
- c. You are liable to replace any damaged shipments.

## 919.2.01 Raised Retro-Reflective Pavement Markers (Type 1, 2, 3, 11, 12, and 13)

### A. Requirements

1. Use raised retro-reflective pavement makers that meets the requirements of ASTM D 4280, designation H.
2. Use raised retro-reflective pavement makers as listed in QPL 76.
3. Use raised retro reflective pavement makers that have been evaluated by the National Transportation Product Evaluation Panel (NTPEP) test facility or other approved test facility.

### B. Fabrication

General Provisions 101 through 150

### C. Acceptance

The Department will give conditional and final approval to retro reflective pavement markers evaluated by the National Transportation Product Evaluation Program (NTPEP), the Georgia Department of Transportation, or other Department-approved test facilities and place them on QPL 76.

All white and yellow retro reflective pavement markers must meet the requirements of this Specification and the following NTPEP field performance requirement.

- a. **Conditional QPL Placement:** The Department may add markers on a conditional basis to QPL 76. These markers must maintain an average coefficient of luminous intensity for 12 months during the NTPEP evaluation of not less than 25% of the values shown in Table 1 of ASTM D 4280.
- b. **Final QPL Approval or Rejection:** The Department will approve or reject markers based on the marker maintaining an average coefficient of luminous intensity of 0.2 cd/fc for 24 months during the NTPEP evaluation.

## 919.2.02 Flexible Reflective Markers (Type 14 and 15)

### A. Requirements

Use markers manufactured by extruding plastic into an “L” shape, with nominal dimensions of 4 in (100 mm) long x 2 in (50 mm) high (vertical face) x 1 in (25 mm) wide (base leg). Ensure that the markers have the following:

- A pressure-sensitive adhesive with a paper release liner to the bottom of the base leg.
- Strips of metallized acrylic reflective sheeting on either one or both sides of the vertical face.
- A clear plastic cover to protect the reflective strip. Ensure that the cover withstands a chip-seal operation and is easily removed after the operation.

### 1. Hardness

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- a. Select five random markers
- b. Use ASTM D 2240 to determine the Shore A hardness
- c. The Department will reject markers whose body and clear protective cover hardness is less than 80.

### B. Fabrication

General Provisions 101 through 150.

#### 919.2.03 Ceramic Pavement Markers (Type 4, 5, 6, 7, and 8)

### A. Requirements

1. Use ceramic pavement markers made from a heat-fired, white, vitreous, ceramic base and a heat fired, opaque, glazed surface to produce the properties required in these Specifications.
  - a. Do not place glaze on the marker bottom where it connects to the road surface.
  - b. Thoroughly and evenly mature the markers. Ensure that they have no defects that affect appearance and serviceability.
  - c. Use reflective ceramic markers that meet the specific intensity of each reflective surface according to Table 1 of ASTM D 4280.
  - d. Ensure that the mean thickness of the glazed surface is at least 0.005 in (0.13 mm) when measured at least 0.25 in (6 mm) from the edge of the marker.
  - e. Ensure that the water absorption of the ceramic markers does not exceed 2 percent of the original dry weight when tested according to ASTM C 373.
  - f. Ensure that the glazed surface does not craze, spoil, or peel when passed through one cycle of the Autoclave test at 250 psi (1724 kPa) (ASTM C 424).
2. Use the designated colors for the white and yellow markers.
  - a. Ensure that the colors are uniform.
  - b. Ensure that black matches Federal Color No. 595-27038.
  - c. Determine the color by visually comparing each marker with calibrated standards having CIE Chromaticity Coordinate limits. Determine the limits with Federal methods of test TT-T-141, Method 4252, using a rectangle with the following corner points:

	1		2		3		4		(90MGO)
White	.290	.316	.310	.296	.330	.320	.310	.344	80 min.
Yellow	.435	.485	.445	.435	.544	.456	.516	.484	50 min.

### B. Fabrication

General Provisions 101 through 150.

### C. Acceptance

1. Use a random sample of five markers for lens impact strength, temperature cycling and compressive strength tests specified in ASTM D 4280.
2. Use the following table to determine if the markers pass the tests.

Markers that Pass	Department Action
5 of 5	Accept the lot.
3 or less of 5	Reject the lot; no resample allowed.
4 of 5	The Contractor may request a retest. The Department will retest an additional 25 random markers in the test or tests where the original sample failed.
20 of 25 retested	Accept the lot.
19 or less of 25 retested	Reject the lot; no resample allowed.

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### 3. Compressive Strength Test

- a. The markers pass if the average compressive load of all five markers is at least 1,500 psi (6.7 kN). No individual marker shall be less than 1,200 psi (5.3 kN).

### D. Materials Warranty

General Provisions 101 through 150.

### 919.2.04 Channel Pavement Markers (Type 9 and 10)

#### A. Requirements

1. Use channel pavement markers made of either a heat-fired, white, vitreous, ceramic base with a heat-fired, opaque, glazed surface, or a 9 gauge (3.9 mm) steel body with a heat-fired porcelain finish.
  - a. Ensure both ceramic and steel channel markers have no defects that affect appearance and serviceability.
  - b. Ensure that the mean thickness of the glazed surface of ceramic channel markers is at least 0.005 in (0.13 mm) when measured at least 0.25 in (6 mm) from the edge of the marker.
  - c. Ensure that mean thickness of the porcelain finish on the steel channel markers is at least 0.030 in (0.76 mm).
  - d. Ensure that the water absorption of the ceramic markers does not exceed 2.0 percent of the original dry weight when tested according to ASTM C 373.
  - e. Ensure that the surface of the markers do not craze, spoil, or peel when passed through one cycle of the Autoclave test at 250 psi (1724 kPa) (ASTM C 424).
2. Use the designated colors for the white and yellow markers.
  - a. Ensure that the colors are uniform.
  - b. Determine the color by visually comparing them with calibrated standards having CIE Chromaticity Coordinate limits. Determine the limits with Federal methods of test TT-T-141, Method 4252, using a rectangle with the following corner points:

	1		2		3		4		(90MGO)
White	.290	.316	.310	.296	.330	.320	.310	.344	80 min.
Yellow	.435	.485	.445	.435	.544	.456	.516	.484	50 min.

#### B. Fabrication

General Provisions 101 through 150.

#### C. Acceptance

1. Ensure that Type 10 markers meet the specific intensity of each reflective surface according to Table 1 in ASTM D 4280.
2. Use a random sample of five markers for lens impact strength, temperature cycling and compressive strength tests specified in ASTM D 4280.
3. Select two of the five markers and subject them to all the required tests.
4. Use the following table to determine if the markers pass the tests.

Markers that Pass	Department Action
2 of 2	Accept the lot.
0 of 2	Reject the lot; no resample allowed.
1 of 2	Retest the three remaining markers.
3 of 3 retested	Accept the lot.
2 or less of 3 retested	Reject the lot; no resample allowed

#### D. Materials Warranty

General Provisions 101 through 150.