**ORIGINATION FORM**
**Proposed Revisions to the Specifications**
**(Please provide all information - incomplete forms will be returned)**

**Date:** 7/10/23

**Office:** State Materials Office

**Originator:** Awilda Merced

**Specification Section:** 970

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**Article/Subarticle:** 970-2, 970-3,

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**Associated Section(s) Revisions:** 701, 709, 710, 711, 713

**Will the proposed revision require changes to the following Publications:**

| Publication | Yes | No | Office Staff Contacted | Date |
|---|---|---|---|---|
| Standard Plans Index | ○ | ◉ | Rick Jenkins/Joshua Turley | 7/10/23 |
| Traffic Engineering Manual | ○ | ◉ | Mariano Amicarelli | 7/10/23 |
| FDOT Design Manual | ○ | ◉ | DeWayne Carver | 6/27/23 |
| Construction Project Administration Manual | ○ | ◉ | Patrick Overton | 7/10/23 |
| Basis of Estimate/Pay Items | ○ | ◉ | Ryan Gray | 7/10/23 |
| Structures Design Guidelines | ○ | ◉ | Ben Goldsberry | 7/10/23 |
| Approved Product List | ◉ | ○ | Karen Byram | 6/26/23 |
| Materials Manual | ○ | ◉ | Susan Musselman/Brad Pearson | 7/10/23 |
| Maintenance Specs | ○ | ◉ | Deanna Hutchison | 7/6/23 |

**Will this revision necessitate any of the following:**

**Design Bulletin** ☐ **Construction (DCE Memo)** ☐ **Estimates Bulletin** ☐ **Materials Bulletin** ☐

**Have all references to internal and external publications in this Section been verified for accuracy?** YES

**Synopsis: Summarize the changes:**

1. Updated the name of the AASHTO program used by the department to evaluate RPMs from National Transportation Product Evaluation Program (NTPEP) to AASHTO Product Evaluation & Audit Solutions.
2. Removed a sentence in physical requirements for Class B RPMs.

**Justification: Why does the existing language need to be changed?**

1. Updated the specification with the new name of National Transportation Product Evaluation Program (NTPEP).
2.Editorial changes to avoid redundancy.
3.The requirements of the Class D RPM to be L Shape was not clear to some manufacturers.
4. When approving Class D RPMs the department does not evaluate the reflective sheetings as required in section 994. Manufacturers use reflective sheetings already listed on the APL.

**Do the changes affect either of the following types of specifications (Hover over type to go to site.):**

**Special Provisions** ☐ **Developmental Specifications** ☐

**List Specifications Affected: (ex. SP3270301, Dev330TL, Dev334TL etc.)**

**Contact the State Specifications Office for assistance completing this form.**

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1. Are changes in line with promoting and making meaningful progress on improving safety, enhancing mobility, inspiring innovation, and fostering talent; explain how?

Requiring field performance of bituminous adhesives helps the department to identify adhesive with high retention of RPMs needed to improve driving during nighttime and wet weather condition

2. What financial impact does the change have; project costs, pay item structure, or consultant fees?

No financial impact is anticipated.

3. What impacts does the change have on production or construction schedules?

No schedule impact anticipated.

4. How does this change improve efficiency or quality?

Providing field data to approve bituminous adhesives with a better performance for construction projects.

5. Which FDOT offices does the change impact?

Construction, Maintenance, State Materials Office, APL.

6. What is the impact to districts with this change?

The change will have a positive impact as it will provide the districts with additional information about expected field peformance.

7. Does the change shift risk and to who?

No.

8. Provide summary and resolution of any outstanding comments from the districts or industry.

Comments and Responses are available on the Track the Status of Revisions hyperlink located on the Specifications landing page: https://www.fdot.gov/programmanagement/Specs.shtm

9. What is the communication plan?

Through the established specification revision process (e.g., Internal and Industry Review)

10. What is the schedule for implementation?

The Standard Specifications eBook and Workbook are effective July 1st every year.

**MATERIALS FOR RAISED PAVEMENT MARKERS AND ADHESIVE.**
**(REV 7-10-23)**

ARTICLE 970-2 is deleted and the following substituted:

**970-2 Performance Requirements.**

**970-2.1 Class B RPMs:** The RPMs shall meet the performance requirements specified in ASTM D4280, Section 6.2, for luminous intensity, flexural strength, compressive strength, resistance to cracking, and thermal cycling, as modified herein.

Submit product photo, product data sheet, and documentation from the AASHTO Product Evaluation & Audit Solutions ~~National Transportation Product Evaluation Program (NTPEP)~~ showing that the RPMs meet the requirements of this Section.

**970-2.1.1 Composition:** The RPM shall consist of materials conforming to ASTM D4280.

**970-2.1.2 Physical Requirements:** The physical size of the RPM shall conform to the requirements of ASTM D4280. ~~Laboratory and field samples for RPMs and bituminous adhesives shall meet the requirements of ASTM D4280 and include the following requirements:~~

The minimum area of each retroreflective face shall be 2.5 square inches. The minimum base size shall be 12 square inches.

**970-2.1.3 Abrasion Resistant:** Meet the coefficient of luminous intensity requirements of ASTM D4280 after abrasion.

**970-2.1.4 In-Service Minimum Retroreflective Intensity:** Class B RPMs shall retain a minimum coefficient of luminous intensity for 18 months of not less than 30% of the values shown in Table 1 of ASTM D4280, and a minimum luminous intensity of 0.2 cd/fc at the end of two years.

**970-2.2 Class D RPMs:** Submit product photo, product data sheet, and certified test reports from an independent laboratory showing that the RPMs meet the requirements of this Section.

**970-2.2.1 Body Requirements:** Provide RPMs made of nonferrous material. RPM dimensions are based on an x and y axis where the y dimension is parallel to the centerline and the x axis is 90° to the y axis (~~-~~L-shaped).

The base must be approximately 4 inches along the x axis and approximately 1 inch along the y axis.

The vertical wall must be a minimum of 4 inches long with a minimum height of 2 inches and a maximum height of 3 inches with retroreflective sheeting affixed to the upper portion of the vertical wall. The retroreflective sheeting must be a minimum of 0.25 inch in width and extend the full length of the vertical wall.

**970-2.2.2 Color Requirements:** The color of the body and the retroreflective strips must be yellow.

**970-2.2.3 Flexibility and Deformation Resistance:** The vertical wall of the tabs must be flexible to bend under normal traffic and resistant to permanent deformation for a minimum of one month.

**970-2.2.4 Adhesion:** Provide tabs that adhere to the pavement such that no tab dislodges.

**970-2.2.5 Retroreflective Sheeting:** ~~Provide retroreflective sheeting of Type IV or greater and meet the requirements of Section 994.~~ Use a retroreflective sheeting meeting Type IV or greater and listed on the Department's Approved Product List (APL).

**970-2.2.6 Removability:** Ensure the entire RPM is removable without damaging the asphalt surface.

**970-2.3 Class F RPMs:** Submit product photo, product data sheet, and certified test reports from an independent laboratory showing that the RPMs meet the requirements of this Section.

**970-2.3.1 Functional Requirements:** RPMs must be steadily-illuminated.

**970-2.3.2 Electrical Requirements:** Electrical power for the RPM must be provided by solar power.

RPMs must meet the performance requirements for at least 16 hours of continuous duty without sunlight. Charging time must be less than 3 hours during sunny conditions and less than 8 hours during cloudy conditions. Operation must be controlled by a photoreceptor located inside the RPM.

**970-2.3.3 Physical Requirements:** RPMs must have a maximum width of eight inches. The depth of embedment of the RPM housing into pavement must be 2.5 inches or less, and the housing must project 0.75 inches or less above the pavement surface.

RPMs must have a compressive strength of 20,000 pounds.

RPMs must have an IP 68 rating.

**970-2.3.4 Performance Requirements:** The light source for RPMs must be light-emitting diodes (LEDs).

The light produced by the RPM must only be visible from the direction of traffic that it is intended to guide. No light produced by the RPM should be visible when viewed from a height of 3.5 feet above the pavement at a distance of 20 feet from the opposite quadrant or side quadrants of the RPM's LED projection quadrant.

RPMs must be capable of producing the following luminance values when measured at the LED source:

Table 970-2
RPM Color and Luminance

| Color | Luminance (Foot-candle) |
|---|---|
| White | 5.00 |
| Yellow | 1.00 |
| Red | 1.50 |
| Blue | 0.10 |

The RPM lenses must meet the abrasion-resistant requirements of ASTM D4280. After abrading the RPM, the luminance produced by the RPM must be 50% or greater than the values in the above table.

**970-2.3.5 Warranty:** The manufacturer must provide a five-year, non-prorated warranty on all components for five years from the date of final acceptance in accordance with Section 706.

ARTICLE 970-3 is deleted and the following substituted:

**970-3 Adhesive for Class B and F Raised Pavement Markers.**

**970-3.1 General:** Adhesive as recommended by the RPM manufacturer shall be used for bonding the RPM to the pavement. Manufacturers seeking evaluation of their product for the APL must submit an application in accordance with Section 6 and provide documentation showing the product is in conformance with this Section.

**970-3.2 Specific Requirements for Bituminous Adhesives:** The bituminous adhesive shall meet the properties of adhesives per ASTM D4280 Section A1, including filler-free and filler alone properties. Manufacturers seeking evaluation of bituminous adhesive products shall submit field test data from the AASHTO Product Evaluation & Audit Solutions. The adhesive shall retain a minimum of 80% of RPMs at 18 months. Manufacturer to specify the recommended thickness of adhesive.

**970-3.3 Specific Requirements for Epoxy Adhesives:** The epoxy adhesive shall conform to the following requirements of AASHTO M 237 for T~~t~~ypes I and II (Table 970-3).

Table 970-3

| | | Type I | | Type II | |
|---|---|---|---|---|---|
| Property | Test Method | Min. | Max. | Min. | Max. |
| Viscosity:<br>Component A (Resin) TD<br>Spindle at 5 rev/min, poises | AASHTO T 237 | 3,500 | 5,000 | 1,000 | 3,000 |
| Viscosity:<br>Component B (Hardener) TD<br>Spindle at 5 rev/min, poises | | 3,500 | 5,000 | 1,000 | 3,000 |
| Shear Ratio (Each Component) | | 2.0 | | 2.0 | |
| Gel Time, Minutes | AASHTO T 237 | 6 | 10 | 6 | 10 |
| Bond Strength to Concrete, max. time, minutes to reach 200 psi | AASHTO T 237 | | 35 | | 210 |
| Density lbs/gal.<br>Component A (Resin) | AASHTO T 237 | 11.7 | 12.2 | 10.6 | 10.9 |
| Component B (Hardener) | | 11.7 | 12.2 | 11.3 | 11.6 |
| Slant Shear Strength (Dry)<br>24 hr, psi | AASHTO T 237 | 1,000 | | 2,000 | |
| Slant Shear Strength (Wet)<br>24 hr, psi | | 800 | | 1,500 | |