

## Toole, Deborah

---

**From:** Maxwell, Stefanie  
**Sent:** Wednesday, January 28, 2015 3:54 PM  
**To:** Toole, Deborah; Henson, Chester  
**Cc:** Gentry, Paul; Lewis, Christopher  
**Subject:** Pavement Marking Specs  
**Attachments:** 711-csl.sdm1-26-15.docx; 713-csl.sdm1-26-15.docx; 709-csl.sdm1-26-15.docx; 5460000 Comments2o GJM Admin Changes 01-13-15.smaxwelledits 01-26-15.docx; 701redln715.smaxwelledits1-26-15.docx; 7100000 ind revised 1-26-15.doc

Attached are the pavement marking spec changes that are required as a result of the Roadway Design Bulletin.

*Stefanie D. Maxwell, P.E.*

*Specialty Engineer*

*FDOT, Office of Construction*

*605 Suwannee Street, MS 31*

*Tallahassee, FL 32399*

*Office (850)414-4314*

*Cell (850) 445-3510*



## Florida Department of Transportation

RICK SCOTT  
GOVERNOR

605 Suwannee Street  
Tallahassee, FL 32399-0450

JIM BOXOLD  
SECRETARY

### **ROADWAY DESIGN BULLETIN 15-02**

*(FHWA Approved: January 21, 2015)*

DATE: January 22, 2015

TO: District Directors of Transportation Operations, District Directors of Transportation Development, District Design Engineers, District Consultant Project Management Engineers, District Roadway Design Engineers, District Construction Engineers, District Maintenance Engineers, District Traffic Operations Engineers and Program Management Engineers

FROM: Michael Shepard, P.E., State Roadway Design Engineer 

COPIES: Brian Blanchard, Tom Byron, Duane Brautigam, David Sadler, Lora Hollingsworth, Tim Lattner, Trey Tillander, Robert Robertson, Mark Wilson, Bruce Dana, John Krause, Bob Crim, Rudy Powell, Greg Schiess, Nicholas Finch (FHWA), Chad Thompson (FHWA), and Phillip Bello (FHWA)

SUBJECT: **Pavement Marking Materials Selection**

This bulletin clarifies existing policy on the selection of pavement marking materials and introduces a new policy on Profiled Thermoplastic (previously "Audible and Vibratory") and Rumble Striping as further supported by Roadway Design Bulletin 15-03 and Estimates Bulletin 15-01.

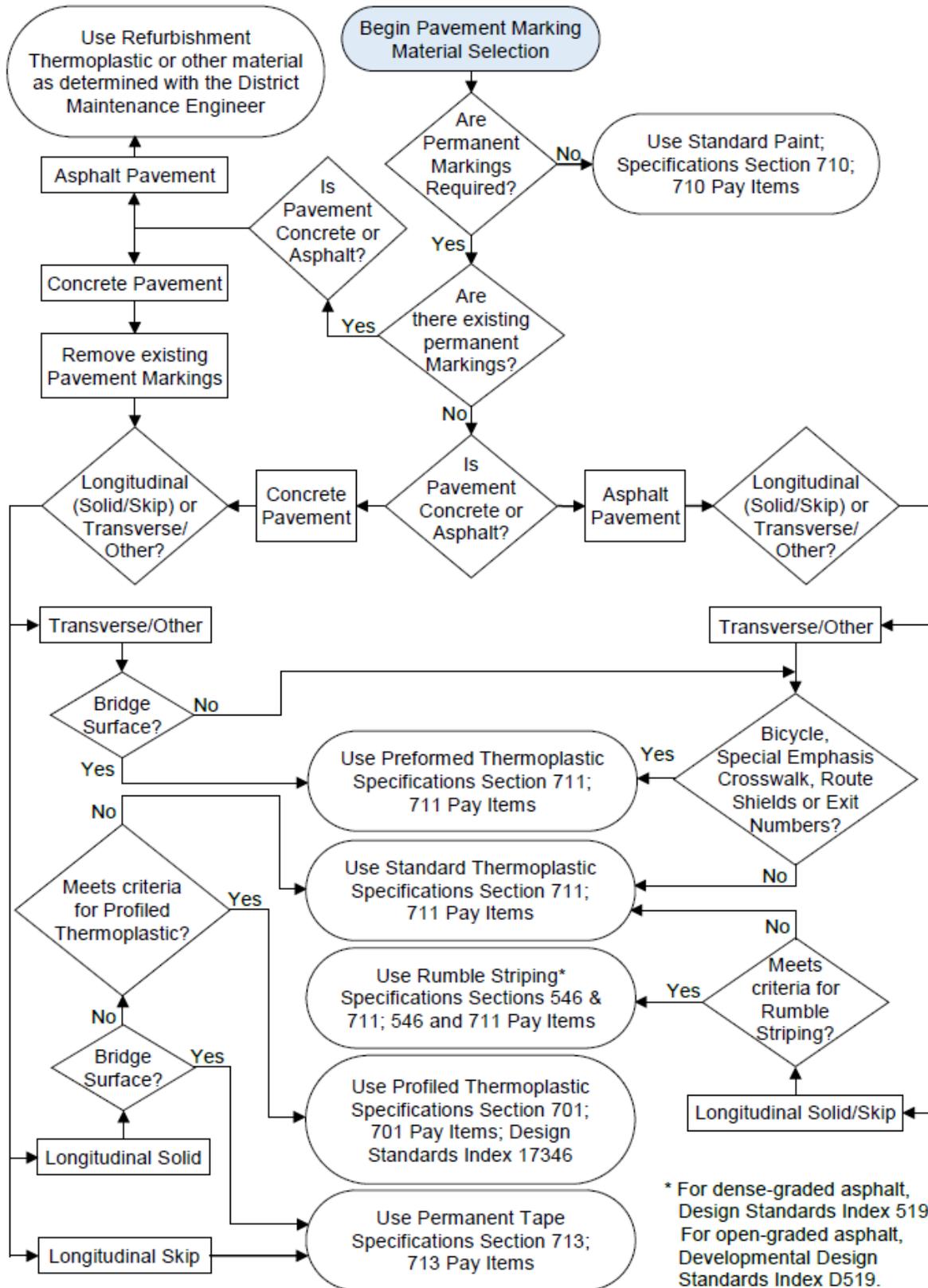
### **REQUIREMENTS**

1. Meet the requirements of Roadway Design Bulletin 15-03 and Estimates Bulletin 15-01.
2. A [\*Design Standards Revision \(DSR\)\*](#) for Index 17346, Sheets 1, 2, 13 and 14 is released.
3. Delete *PPM*, Volume 1, Section 7.6 and replace it with the following:

#### **7.6 Pavement Markings**

##### **7.6.1 Pavement Marking Materials Selection**

Use the following flowchart as a tool for selection of the appropriate pavement marking material.



Once the pavement marking material is selected from the flowchart above, verify the project meets the following criteria for the selected pavement marking material.

### 7.6.1.1 Standard and Refurbishment Thermoplastic

Use Standard Thermoplastic material for all lines and markings not meeting the criteria for Rumble Striping, Profiled Thermoplastic, Preformed Thermoplastic or Permanent Tape.

Where there are existing permanent pavement markings on concrete pavement, include the removal pay item for the existing material.

Where there are existing permanent pavement markings on asphalt pavement, coordinate with the District Maintenance Engineer to determine if Refurbishment Thermoplastic or other pavement marking is warranted and to evaluate the existing markings to determine if they need to be removed. If it is determined that the existing markings are to be removed, include the removal pay item for the existing material.

For existing asphalt pavement, contact the District Maintenance Engineer to determine if contrast is required for skip lines, messages and arrows. If required, use black paint for contrast.

|                                                                                                        |
|--------------------------------------------------------------------------------------------------------|
| Modification for Non-Conventional Projects:<br>Delete the last three paragraphs above and see the RFP. |
|--------------------------------------------------------------------------------------------------------|

*Commentary: This is Standard Thermoplastic, not the Hot Spray Thermoplastic used by Maintenance.*

*Standard Thermoplastic is not used on bridges with concrete riding surfaces due to vibration/durability.*

*The performance of Refurbishment Thermoplastic has been evaluated by the Department for a period of 36 months.*

### 7.6.1.2 Rumble Striping

Use Rumble Striping on asphalt pavement for edge lines and center lines on all rural, two-lane and multi-lane, flush shoulder, non-limited access facilities, where posted speed is 50 mph or greater. This includes areas on rural facilities where the posted speed has been reduced due to restricted horizontal or vertical geometry. For dense-graded asphalt, use **Design Standards** Index 519; for open-graded asphalt, use **Developmental Design Standards** Index D519.

For existing asphalt pavement, contact the District Maintenance Engineer to determine if the remaining service life of the asphalt warrants the use of Rumble Striping.

|                                                                                            |
|--------------------------------------------------------------------------------------------|
| Modification for Non-Conventional Projects:<br>Delete the paragraph above and see the RFP. |
|--------------------------------------------------------------------------------------------|

*Commentary: Rumble Striping provides an audible and vibratory effect and is used on asphalt pavement as a countermeasure for lane departures and center line crossover crashes. Rumble Striping is created by utilizing the rumble striping process as specified in Specifications Section 546 and **Design Standards Index 519** or **Developmental Design Standards Index D519**. Standard Thermoplastic markings are installed over the ground-in rumble strips producing “Rumble Striping”. No contrast is used with Rumble Striping.*

### **7.6.1.3 Profiled Thermoplastic**

Use Profiled Thermoplastic on concrete pavement for edge lines and center lines on all rural, two-lane and multi-lane, flush shoulder, non-limited access facilities, where posted speed is 50 mph or greater. This includes areas on rural facilities where the posted speed has been reduced due to restricted horizontal or vertical geometry. Use **Design Standards Index 17346**.

*Commentary: Profiled Thermoplastic provides an audible and vibratory effect and is used on concrete pavement as a countermeasure for lane departure and center line crossover crashes. Permanent Tape markings are typically used on bridges with concrete riding surfaces due to vibration/durability. However, Profiled Thermoplastic markings may be used on bridges with narrow shoulders as a measure to reduce the number of impacts to the barriers. No contrast is used with Profiled Thermoplastic markings.*

### **7.6.1.4 Preformed Thermoplastic**

Use Preformed Thermoplastic for the following markings on asphalt pavement:

- Bicycle Markings shown on **Design Standards Index 17347**
- Special Emphasis Crosswalks
- All Route Shields
- Exit Numbers for Ramps

Use Preformed Thermoplastic for the following markings on concrete pavement (including bridges with concrete riding surfaces):

- Bicycle Markings shown on **Design Standards Index 17347**
- Special Emphasis Crosswalks
- All Route Shields
- Exit Numbers for Ramps
- White dotted Lines (2’-4’) with trailing black contrast (2’ white preformed thermoplastic + 2’ black preformed thermoplastic). Use only the alternating skip pattern.
- Arrows, Messages and Symbols. Black contrast border is required for design speeds 45 mph and less, and black contrast block is required for design speeds 50 mph and greater. Provide a detail in the plans. Contact the Roadway Design Office for guidance.

### 7.6.1.5 Permanent Tape

Use Permanent Tape for the following conditions on concrete pavement:

- White skip lines (10'-30') with trailing black contrast (10' white tape + 10' black tape). Use only the alternating skip pattern.
- White dotted lines (6'-10') with trailing black contrast (6' white tape + 6' black tape). Use only the alternating skip pattern.
- White dotted lines (3'-9') with trailing black contrast (3' white tape + 3' black tape). Use only the alternating skip pattern.
- Yellow skip lines. Do not use contrast.
- Center lines and edge lines of bridges with concrete riding surfaces. Do not use contrast.

Include the removal pay item when installing permanent tape on concrete pavement.

### 7.6.1.6 Two Reactive Components

Two Reactive Components may be used as an alternative to Standard Thermoplastic markings for edge lines and skip lines on asphalt pavement and edge lines only on concrete pavement.

The use must be approved by both the District Maintenance Engineer and the District Construction Engineer on a project specific basis.

For existing asphalt pavement, contact the District Maintenance Engineer to determine if contrast is required for skip lines, messages and arrows. If required, use black paint for contrast.

|                                                                                                      |
|------------------------------------------------------------------------------------------------------|
| Modification for Non-Conventional Projects:<br>Delete the last two paragraphs above and see the RFP. |
|------------------------------------------------------------------------------------------------------|

*Commentary: The cost of Two Reactive Components pavement markings has historically been greater than Standard Thermoplastic pavement markings and the service life is unknown. The equipment for installation of Two Reactive Components pavement markings is not readily available. Two Reactive Components pavement markings may be feasible for larger projects.*

### 7.6.1.7 Standard and Durable Paint

Use Standard Paint for work zone markings on asphalt and concrete pavement.

Use Durable Paint for refurbishment markings on asphalt pavement where the longer service life of Refurbishment Thermoplastic is not required. Contact the District Maintenance Engineer to determine if Durable Paint is acceptable.

|                                                                                            |
|--------------------------------------------------------------------------------------------|
| Modification for Non-Conventional Projects:<br>Delete the paragraph above and see the RFP. |
|--------------------------------------------------------------------------------------------|

*Commentary: The performance of Durable Paint products on the APL have been evaluated by the Department for a period of 18 months. The performance of Standard Paint products on the APL have been evaluated by the Department for a period of 6 months.*

*For refurbishment markings, consider the following factors:*

- *Service life of pavement*
- *Thickness and conditions of existing markings*
- *Traffic volumes*
- *Cost of markings*
- *Other special requirements such as contrast needs or rumble striping*

### **7.6.2 No-passing Zones**

The procedures required by the Department for determining the limits of no-passing zones are contained in the *Manual on Uniform Traffic Studies, (MUTS)*. The requirements of this manual must be followed.

Limits of pavement markings for no-passing zones shall be established by one of the following methods:

1. On projects where existing roadway conditions (vertical and horizontal alignments) are to remain unaltered by construction, the no-passing zones study shall be accomplished as part of the design phase. This will be either by in-house staff or included in design consultant contracts.

The limits of the no-passing zones shall be included in the contract documents, and a note to this effect shown on the plans.

2. On projects with new or altered vertical and horizontal alignments, limits for no-passing zones shall be established during construction. The required traffic study and field determination of limits shall be performed through the design consultant as a post design service, or as part of a district wide consultant contract for such services.

When this service is included as part of post design services, sufficient time shall be included to accomplish the required field operations without delaying or interfering with the construction process.

### **COMMENTARY**

These criteria and guidelines were developed by a Department wide task team to clarify and agree on the proper pavement marking material selection for each application.

The ***Design Standards Revision (DSR)*** for ***Design Standards*** Index 17346, Sheets 1, 2, 13 and 14 is released to accommodate the change to the naming conventions. Revisions to Sheets 13 and 14 were required to accommodate the name change from “Audible and Vibratory” markings to “Profiled Thermoplastic” markings. This is necessary due to the implementation of Rumble Striping which is another type of the Department’s standardized audible and vibratory pavement markings. The distinction between the two types of audible and vibratory markings is required to provide clear and consistent criteria, guidance and specifications. This ***DSR*** includes updates to the notes and figures to provide additional clarifications.

***Standard Specification*** Sections 546, 701, 709, 710, 711, 713 and 971 are being revised for the July 2015 Workbook to align terminology to be consistent with the PPM.

### **IMPLEMENTATION**

The requirements of this bulletin are effective for all projects with LET dates after July 1, 2015.

To meet the requirements of this bulletin, when Profiled Thermoplastic markings are to be used on the project insert the revised ***Design Standards*** Index drawings in the Plans as described in the ***PPM, Vol. 2, Section 3.6.1.***

### **CONTACT**

Gevin McDaniel, P.E.  
Roadway Design Standards Administrator  
Florida Department of Transportation  
605 Suwannee Street, MS-32  
Tallahassee, FL 32399-0450  
Phone (850) 414-4284  
[gevin.mcdaniel@dot.state.fl.us](mailto:gevin.mcdaniel@dot.state.fl.us)

MAS/GJM/CAH



## Florida Department of Transportation

RICK SCOTT  
GOVERNOR

605 Suwannee Street  
Tallahassee, FL 32399-0450

JIM BOXOLD  
SECRETARY

### ESTIMATES BULLETIN 15-01

DATE: January 23, 2015

TO: District Estimates Engineers, District Directors of Transportation Operations, District Directors of Transportation Development, District Design Engineers, District Consultant Project Management Engineers, District Roadway Design Engineers, District Construction Engineers, District Maintenance Engineers, District Traffic Operations Engineers and Program Management Engineers

FROM: Phillip "Greg" Davis, PE, State Estimates Engineer

A handwritten signature in blue ink that reads "Phillip G. Davis".

COPIES TO: Brian Blanchard, Tom Byron, Duane Brautigam, David Sadler, Tim Lattner, Trey Tillander, Michael Shepard, Robert Robertson, Mark Wilson, Bruce Dana, John Krause, Rudy Powell, Greg Schiess, Nick Finch (FHWA), Chad Thompson (FHWA), and Phillip Bello (FHWA), David Sadler, Daniel Scheer, Gevin McDaniel, Chester Henson, Stefanie Maxwell, Deanna Carroll, Chris Lewis

SUBJECT: Pavement Marking Guidance

This bulletin updates the pay items, in coordination with Roadway Design Bulletin 15-02, for the selection of pavement marking materials. The criteria and guidelines included in the bulletin were developed by a Department wide task team to clarify and agree on the proper pavement marking material selection for each application. The method of measurement and basis of payment were also updated in the specifications, to be consistent across the various pavement marking sections.

### REQUIREMENTS

1. Meet the requirements of Roadway Design Bulletin 15-02, including the Plans Preparation Manual (PPM) changes for Pavement Marking Materials Selection.
2. Meet the requirements of Estimates Bulletin 15-02/Roadway Design Bulletin 15-03 for Rumble Stripe.

### IMPLEMENTATION PLAN

Effective with the July 2015 letting, update the pay items in accordance with the Roadway Design Bulletin and PPM changes and the changes noted below. Refer to the Roadway Design Bulletin for additional guidance.

The following pay item changes have been made. Shaded areas are for maintenance use. Pay item and description changes are noted with **redline** and ~~strikeout~~. Note the unit of measure changes, especially for solid, 3-9 dotted and 2-4 dotted/ guidelines.

Estimators: Carefully review quantities for all pay item changes. Update unit prices as needed.

### **701-1A-BCD ~~AUDIBLE & VIBRATORY~~ PROFILED THERMOPLASTIC**

*Use Profiled Thermoplastic on concrete pavement for edge lines and center lines on all rural two lane and multi-lane, flush shoulder, rural, non-limited access facilities, where posted speed is 50 mph or greater. Contrast is not allowed with profiled thermoplastic markings. These markings are NOT used on bridges with concrete riding surfaces, due to vibration/durability; refer to PPM guidance for concrete bridges.*

*The pay items for Audible & Vibratory Pavement Marking have been updated to include "Profiled Thermoplastic" in the description field. After a transition period of approximately one year, the term "Audible & Vibratory" will be removed. During the transition period, either the old, transition, or new description is acceptable in the plans. DO NOT require a plans revision to change the pay item description.*

*Not valid for transverse or other markings.*

*Pay items for "asphalt surfaces" will be valid through 6-30-2015. Rumble Stripe is required for asphalt surfaces, in accordance with Roadway Design Bulletin 15-02.*

### **701- 1A-BCD PROFILED THERMOPLASTIC**

A= Class

1 (Standard) valid through 12-31-13\*

5 (Standard- Open graded asphalt surfaces) for 6" and 8" longitudinal stripes; C=1 or 2

6 (Standard- Other surfaces) for 6" and 8" longitudinal stripes on dense graded asphalt or concrete surfaces; C=1 or 2

7 (Standard- concrete surfaces) C=1 or 2, effective 7-1-15

B= Color

1 (White)

2 (Yellow)

C= Type of Marking

0 (Solid) GM effective 7-1-15

1 (Solid) NM valid through 6-30-15

2 (Skip) GM

D= Width

1 (6")

2 (8") approval required\*

### **709- 1A-BCD TRAFFIC STRIPE-TWO REACTIVE COMPONENTS**

*Two Reactive Components may be used as an alternative to Standard Thermoplastic markings for edge lines and skip lines on asphalt surfaces and edge lines only on concrete surfaces. The use must be approved by both the District Maintenance Engineer and the District Construction Engineer on a project specific basis.*

*For existing asphalt surfaces, contact the District Maintenance Engineer to determine if black paint contrast is required for skip lines, messages and arrows.*

*Not valid for transverse or other markings. (Possible future use for transverse markings is under review by Product Evaluation.)*

### **709- 1A-BCD TWO REACTIVE COMPONENTS PAVEMENT MARKINGS**

A= Class

1 (Standard)

7 (Remove) SF, BCD= Blank. NOT FOR MOT marking removal

B=Color

- 1 (White)
- 2 (Yellow)
- 3 (Black) valid through 6-30-15

C= Type of Marking

- 0 (Solid) GM effective 7-1-15
- 1 (Solid) NM; D=1 or 2
- 2 (Solid) LF valid through 6-30-15
- 3 (Skip/Dotted) GM;
  - D= 1 for 6" wide 10-30 skip or 3-9 dotted
  - D=3 for 12" wide 3-9 dotted lane drop
- 4 (2'-4' Dotted Guide line/ 6'-10' Dotted Extension line) GM, D=1 effective 7-1-15
- 5 (6-10 Gap Extension) LF, D=1

D= Width

- 1 (6")
- 2 (8")
- 3 (12")
- 4 (18") valid through 6-30-15
- 5 (24") valid through 6-30-15

## 710- 11-BCD PAINTED PAVEMENT MARKINGS

Use Standard Paint for temporary markings on asphalt and concrete surfaces.

Use Durable Paint for refurbishment of markings on existing asphalt surfaces where the service life of Refurbishment Thermoplastic is not required. Contact the District Maintenance Engineer to determine if Durable Paint is acceptable.

For refurbishment markings, consider the following factors:

- Required service life
- Traffic volumes
- Cost of markings
- Thickness and conditions of existing markings
- Other special requirements such as contrast or rumble striping

The term "Guideline" was changed to "2-4 Dotted" on Design Standard Index 17346. DO NOT require a plans revision to update this pay item description change.

## 710- 1A-BCD PAINTED PAVEMENT MARKINGS

A= Class

- 1 (Standard)
- 2 (Durable)
- 7 (Remove) SF, BCD=blank.
  - Maintenance use only. NOT FOR MOT marking removal; see details above.

B= Color

- 1 (White)
- 2 (Yellow) C= 0, 1, 2, 3, 4, 5, 9
- 3 (Black) C=3
- 4 (Blue)
  - C=2 for accessible markings
  - C=6 valid through 6-30-15

C= Type of Marking

- 0 (Solid) GM effective 7-1-15
- 1 (Solid) NM; D = 1, 2\*, 3 valid through 6-30-15
- 2 (Solid) LF; D = 1, 2, 3, 4, 5
- 3 (Skip/Dotted) GM;
  - D= 1 for 6" wide 10-30 skip or 3-9 dotted
  - D= 3 for 12" wide 3-9 dotted lane drop and approach to toll plaza

- 4 (2'-4' Dotted Guide line/ 6'-10' Dotted Extension line) GM, D=1 effective 7-1-15
- 5 (2'-4' Dotted Guide line/ 6'-10' Dotted Extension line) LF; D=1 valid through 6-30-15
- 6 (Message or Symbol) EA; D=0,
- 7 (Arrows) EA complete marking; D=0
- 8 (Yield Line) LF; D=0 see details above
- 9 (Island Nose) SF; D=0

D= Width

0 valid for C=6-9

1 (6") NM-valid through 6-30-15

1 (6") GM

1 (6" for parking lot- accessible markings) blue only, LF

1 (6" for parking lot and maintenance use) LF

2 (8") LF-valid through 6-30-15

2 (8") NM valid through 6-30-15

2 (8" for interchange and urban island) GM effective 7-1-15

3 (12") NM valid through 6-30-15

3 (12") GM

3 (12" for cross walk or roundabout) LF

4 (18" for diagonal or chevrons) LF

5 (24" for stop line or crosswalk) LF

#### Maintenance pay items

A=2 (Durable)

*Durable paint items will be opened upon request through the Maintenance Office.*

#### 711- 1A-BCD THERMOPLASTIC

*711-11-BCD, 711-15-BCD, and 711-16-BCD are all Standard Thermoplastic.*

*Use Standard Thermoplastic material for all lines and markings not meeting the criteria for Rumble Striping, Profiled Thermoplastic, Preformed Thermoplastic or Permanent Tape.*

**Maintenance pay items** (for use on Maintenance Contracts ONLY. LF pay items are permitted for longitudinal markings, in accordance with maintenance specifications.)

#### 711- 12-BCD THERMOPLASTIC- REFURBISHMENT

*Refer to Roadway Design Bulletin 15-02 or the PPM for guidance on refurbishment markings on existing surfaces.*

#### 711-13-BCD THERMOPLASTIC- HOT SPRAY

*Hot Spray is used by Maintenance for edge and skip pavement markings. DO NOT use for new construction.*

#### 711-14-BCD PREFORMED THERMOPLASTIC

*Asphalt pavement:*

- *Bicycle symbols, messages and arrows shown on Design Standards Index 17347*
- *Special Emphasis Crosswalks*

- *All Route Shields*
- *Exit numbers for ramps. For exit numbers to be placed on existing asphalt surfaces, contact the District Maintenance engineer to determine if black paint contrast is required.*

*Concrete pavement (including bridges with concrete riding surfaces):*

- *All bicycle markings shown on **Design Standards Index 17347***
- *Exit Numbers for ramps*
- *Special Emphasis Crosswalks*
- *All Route Shields*
- *White dotted Lines (2'-4') with trailing black contrast (2' white preformed thermoplastic + 2' black preformed thermoplastic). Use only the alternating skip pattern.*
- *Arrows, Messages and Symbols. Black contrast border is required for design speeds 45 mph and less, and black contrast block is required for design speeds 50 mph and greater.*

## **711- 1A-BCD THERMOPLASTIC PAVEMENT MARKINGS**

A=Class

- 1 (Standard) Use A=5 or 6 for 6" or 8" longitudinal stripes
- 2 (Refurbishment)
- 3 (Hot Spray) Maintenance Use Only
- 4 (Preformed)
- 5 (Standard- Open graded asphalt surfaces) for 6" and 8" longitudinal stripes; C=1 or 3
- 6 (Standard- Other surfaces) for 6" and 8" longitudinal stripes on dense graded asphalt or concrete surfaces; C=1 or 3
- 7 (Remove) SF, BCD=blank. NOT FOR MOT marking removal; see details above.

B=Color

- 1 (White) C=1-8
- 2 (Yellow) C=04-5
- 3 (Black) not valid as of 12-15-05; use 710 paint items. See details above.
- 4 (Blue) C=2, 6
- 5 (White with Black Contrast) A=4 only; C=6 or 7 only
- 6 (Multi-color) defined in plans; specs may be needed- DO NOT OPEN

C= Type of Marking

- 0 (Solid) GM effective 7-1-15
- 1 (Solid) NM, longitudinal lines, D=1, 2 valid through 6-30-15
- 2 (Solid) LF, transverse lines; D = 2, 3, 4, 5
- 3 (Skip/Dotted) GM, longitudinal lines
  - D= 1 for 6" wide 10-30 skip or 3-9 dotted
  - D= 3 for 12" wide 3-9 dotted lane drop and approach to toll
- 4 (2'-4' Dotted Guide line/ 6'-10' Dotted Extension line) GM, D=1 effective 7-1-15
- 5 (Dotted/Guideline/6-10 Gap Extension) LF, D=1, 2 or 3
- 6 (Message or Symbol) EA Includes Yield Messages and painted curb face, D=0
- 7 (Arrows) EA ; D=0
- 8 (Yield Line) LF, D=0

D= Width

- 0 valid for C=6-8
- 1 (6") NM valid through 6-30-15
- 1 (6") GM
- 1 (6" for parking lot- accessible markings) blue only, LF
- 1 (6" for parking lot and maintenance use) LF2 (8")
  - 8" solid longitudinal lines, channelizing line
  - 8", 2'-4' skip at roundabout
- 2 (8") LF valid through 6-30-15
- 2 (8") NM valid through 6-30-15
- 2 (8" for interchange and urban island) GM effective 7-1-15
- 3 (12") NM valid through 6-30-15
- 3 (12") GM

- 3 (12" for crosswalk or roundabout) LF
- 4 (18" for diagonal or chevrons) LF
- 5 (24" for stop line or crosswalk) LF

### 713-1A-BCD ~~PREFORMED~~ PERMANENT TAPE-

"Preformed Tape" was changed to "Permanent Tape". The term "High Performance" was removed from the specification. The pay items have been updated to reflect this change.

Use Permanent Tape for the following conditions on concrete pavement:

- White skip lines (10'-30') with trailing black contrast (10' white tape + 10' black tape). Use only the alternating skip pattern.
- White dotted lines (6'-10') with trailing black contrast (6' white tape + 6' black tape). Use only the alternating skip pattern.
- White dotted lines (3'-9') with trailing black contrast (3' white tape + 3' black tape). Use only the alternating skip pattern.
- Yellow skip lines. Do not use contrast.
- Center lines and edge lines of bridges with concrete riding surfaces. Do not use contrast.

Include the removal pay item when installing permanent tape on concrete pavement.

### 713-1AA-BCD PERMANENT TAPE

AA= Class

01 (Standard) Transverse lines, arrows, and messages only, per spec. Valid through 12-31-13.

02 (High Performance) required for longitudinal skip stripe, per spec

03 blank- no class distinction in spec, effective 7-1-15

07 (Removal of Permanent Tape or Paint for Surface Preparation) SF, BCD=blank.

B= Color

1 (White)

2 (Yellow)

3 (Black)

C= Type of Marking

0 (Solid, for bridges with concrete surfaces) GM

1 (Solid) NM, valid through 6-30-15

3 (Skip/Dotted, for concrete surfaces) GM;

D= 1 for 6" wide 10-30 or 3-9 skip-dotted

D= Width

1 (6")

**Plans:** For applicable projects, update the plans, tabulation sheets/Plan Summary Boxes, and Proposal Summary of Quantities (Transport report).

**Plans Preparation Manual (PPM):** The PPM will be updated with the Roadway Design Bulletin.

**Specifications:** Specifications are available with the July 2015 eBook.

**Design Standards:** Rumble Strip and Rumble Stripe standards are available, as well as changes to Index 17346. Refer to the Roadway Design Bulletin and web pages for additional information.

**Basis of Estimates (BOE):** The BOE will be updated to clarify the use of the pay items, as described above.

If you have any questions, please contact:

Estimates: Melissa Hollis, [Melissa.Hollis@dot.state.fl.us](mailto:Melissa.Hollis@dot.state.fl.us), or 850-414-4182

Roadway Design: Chester Henson, [Chester.Henson@dot.state.fl.us](mailto:Chester.Henson@dot.state.fl.us), or 850-414-4117

Construction: Stefanie Maxwell, [Stefanie.Maxwell@dot.state.fl.us](mailto:Stefanie.Maxwell@dot.state.fl.us), or 850-414-4134

Maintenance: Deanna Carroll, [Deanna.Carroll@dot.state.fl.us](mailto:Deanna.Carroll@dot.state.fl.us), or 850-410-5634



*Florida Department of Transportation*

RICK SCOTT  
GOVERNOR

605 Suwannee Street  
Tallahassee, FL 32399-0450

JIM BOXOLD  
SECRETARY

**MEMORANDUM**

**DATE:** February 2, 2015  
**TO:** Specification Review Distribution List  
**FROM:** Daniel Scheer, P.E., State Specifications Engineer  
**SUBJECT:** Proposed Specification: **7110000 Thermoplastic Traffic Stripes and Markings.**

In accordance with Specification Development Procedures, we are sending you a copy of a proposed specification change.

These changes were proposed for language consistency due to the release of Roadway Design Bulletin 15-02 on January 22, 2015.

Please share this proposal with others within your responsibility. Review comments are due within two weeks and should be sent to Mail Station 75 or online at <http://www2.dot.state.fl.us/SpecificationsEstimates/Development/IndustryReview.aspx>. Comments received after February 13, 2015, may not be considered. Your input is encouraged.

DS/  
Attachment

**THERMOPLASTIC TRAFFIC STRIPES AND MARKINGS.  
(REV 1-29-15)**

SECTION 710 is deleted and the following substituted:

**SECTION 711  
THERMOPLASTIC ~~TRAFFIC STRIPES AND~~ PAVEMENT MARKINGS**

**711-1 Description.**

Apply new thermoplastic ~~traffic stripes and~~ pavement markings, or refurbish existing thermoplastic ~~traffic stripes and~~ pavement markings, in accordance with the Contract Documents.

**711-2 Materials.**

~~711-2.1 Thermoplastic:~~ Use only ~~thermoplastic~~ materials listed on the Department's Approved Product List (APL) *meeting the following requirements. The Engineer will take random samples of all material in accordance with the Department's Sampling, Testing and Reporting Guide schedule.*

~~711-2.1.1 Initial or Recapped Stripes and Markings:~~ Use materials meeting the requirements of 971-1 and 971-5.

~~711-2.1.2 Refurbishing Existing Stripes and Markings:~~ Use materials meeting the requirements of 971-1 and 971-5.

~~711-2.1.3 Preformed Stripes and Markings:~~ Use Materials meeting the requirements of 971-1 and 971-6.

~~711-2.2 Glass Spheres:~~ Use only glass spheres listed on the APL, meeting the requirements of 971-1 and 971-2. The Engineer will take random samples of all glass spheres in accordance with ASTM D1214 and the Department's Sampling, Testing and Reporting Guide schedule.

*Standard and Refurbishment Thermoplastic .....*

*..... 971-1 and 971-5*

*Preformed Thermoplastic ..... 971-1 and 971-6*

*Glass Spheres..... 971-1 and 971-2*

~~711-2.3 Sand:~~ Use *sand* materials meeting the requirements of 971-5.4.

*The Engineer will take random samples of all material in accordance with the Department's Sampling, Testing and Reporting Guide schedule.*

**711-3 Equipment.**

Use equipment capable of providing continuous, uniform heating of *the striping pavement marking* materials to temperatures exceeding 390°F, mixing and agitation of the material *in the* reservoir to provide a homogeneous mixture without segregation. Use equipment that will maintain the *striping-pavement marking* material in a plastic state, in all mixing and conveying parts, including the line dispensing device until applied. Use equipment which can produce varying width *traffic stripes lines* and which meets the following requirements:

~~(a)~~ *I.* Capable of traveling at a uniform, predetermined rate of speed, both uphill and downhill, ~~in order~~ to produce a uniform application of *striping-pavement marking* material and capable of following straight lines and making normal curves in a true arc.

~~(b)~~2. ~~e~~Capable of applying glass spheres to the surface of the completed ~~stripe pavement marking~~ by a double drop application for ~~initial traffic striping and marking~~ ~~standard thermoplastic pavement markings~~ and a single drop application for recapping and refurbishment ~~thermoplastic pavement markings~~. The bead dispenser for the first bead drop shall be attached to the striping machine in such a manner that the beads are dispensed closely behind ~~with the thermoplastic material~~ ~~installed line~~. The second bead dispenser bead shall be attached to the striping machine in such a manner that the beads are dispensed immediately after the first bead drop application. ~~Use~~ ~~G~~glass spheres dispensers shall be equipped with an automatic cut-off control that is synchronized with the cut-off of the thermoplastic material and applies the glass spheres ~~uniformly in a manner such that the spheres appear uniform~~ on the entire ~~traffic stripes and pavement~~ markings surface with 50 to 60% embedment.

~~(c)~~3. ~~E~~equipped with a special kettle for uniformly heating and melting the ~~striping pavement marking~~ material. The kettle must be equipped with an automatic temperature control device and material thermometer for positive temperature control and to prevent overheating or scorching of the thermoplastic material.

~~(d)~~4. ~~M~~meet the requirements of the National Fire Protection Association, state, and local authorities.

#### 711-4 Application.

**711-4.1 General:** Remove existing pavement markings such that scars or traces of removed markings will not conflict with new ~~stripes and pavement~~ markings by a method approved by the Engineer. Cost for removing conflicting pavement markings during maintenance of traffic operations to be included in Maintenance of Traffic, Lump Sum.

Before applying ~~traffic stripes and pavement~~ markings, remove any material ~~that would adversely affect the bond of the pavement markings~~ by a method approved by the Engineer ~~that would adversely affect the bond of the traffic stripes~~.

Before applying ~~traffic stripes~~ ~~pavement markings~~ to any portland cement concrete surface, apply a primer, sealer, or surface preparation adhesive of the type recommended by the manufacturer. Offset longitudinal lines at least 2 inches from any longitudinal joints of portland cement concrete pavement.

Apply ~~traffic stripes or pavement~~ markings ~~only~~ to dry surfaces ~~only~~, and when the ambient air and surface temperature is at least 50°F and rising for asphalt surfaces and 60°F and rising for concrete surfaces.

Apply ~~striping pavement markings~~ to the same tolerances in dimensions and in alignment specified in 710-5. When applying ~~traffic stripes and pavement~~ markings over existing markings, ensure that no more than 2 inches on either end and not more than 1 inch on either side of the existing line is visible.

Apply thermoplastic material to the pavement either by spray, extrusion, or other means approved by the Engineer.

Conduct field tests in accordance with FM 5-541. Take test readings representative of the striping performance. Remove and replace ~~traffic stripes and pavement~~ markings not meeting the requirements of this Section at no additional cost to the Department.

~~Apply all final pavement markings prior to opening the road to traffic. Wait at least 14 days after constructing the final asphalt surface course to place thermoplastic pavement markings. Provide temporary pavement markings during the interim period prior to opening the road to traffic.~~

Comment [dt1]: Proposed revision 7110401 has not been approved by FHWA as of 2-2-15.

**711-4.1.1 Preformed Thermoplastic:** Apply markings ~~only~~ to dry surfaces *only* and when ambient air temperature is at least 32°F. Prior to installation, follow the manufacturer's recommendations for pre-heating.

**711-4.2 Thickness:**

**711-4.2.1 Initial or Recapped Stripes and Markings** *Standard Thermoplastic Markings:* Apply or recap *standard thermoplastic traffic stripes or pavement markings for longitudinal lines to attain a minimum thickness* such that all lane lines, center lines, transverse markings and traffic stripes and markings within traffic wearing areas, will have a thickness of 0.10 inch ~~(or 100 mils)~~ *to and a maximum thickness* 0.15 inch ~~or (150 mils)~~ *maximum thickness*, when measured above the pavement surface.

Also, all ~~gore, island, and diagonal stripe chevrons, diagonal and transverse line markings, bike lane symbols and messages, messages, symbols, and arrows,~~ wherever located, will have a thickness of 0.09 inch ~~or (90 mils)~~ to 0.12 inch ~~(or 120 mils)~~ when measured above the pavement surface.

Measure, record and certify on Department approved form and submit to the Engineer, the thickness of white and yellow pavement markings in accordance with FM 5-541.

The Engineer will verify the thickness of the pavement markings in accordance with FM 5-541 within 30 days of receipt of the Contractor's certification.

**711-4.2.2 Refurbishing Existing Traffic Stripes and** *ment Thermoplastic Markings:* Apply a minimum of 0.06 inch ~~or (60 mils)~~ of thermoplastic material. Ensure that the combination of the existing ~~stripe marking~~ and the overlay after application of glass spheres does not exceed the maximum thickness of 0.150 inch ~~or 150 mils~~ for all lines.

Measure, record and certify on Department approved form and submit to the Engineer, the thickness of white and yellow pavement markings in accordance with FM 5-541.

The Engineer will verify the thickness of the pavement markings in accordance with FM 5-541 within 30 days of receipt of the Contractor's certification.

**711.4.2.3 Preformed Thermoplastic:** *Apply 0.12 inch or 120 mils of preformed thermoplastic material.*

*Measure, record and certify on Department approved form and submit to the Engineer, the thickness of the pavement markings in accordance with FM 5-541.*

**711-4.3 Retroreflectivity:** Apply white and yellow ~~traffic stripes and pavement~~ markings that will attain an initial retroreflectivity of not less than 450 mcd/lx·m<sup>2</sup> and not less than 350 mcd/lx·m<sup>2</sup>, respectively for all longitudinal lines. All *chevrons, diagonal lines, transverse stop* lines, messages, *symbols*, and arrows will attain an initial retroreflectivity of not less than 300 mcd/lx·m<sup>2</sup> and 250 mcd/lx·m<sup>2</sup> for white and yellow respectively. All ~~pedestrian crosswalks and bicycle lane symbols or messages in a proposed bike lane markings~~ shall attain an initial retroreflectivity of not less than 275 mcd/lx·m<sup>2</sup>.

Measure, record and certify on Department approved form and submit to the Engineer, the retroreflectivity of white and yellow pavement markings in accordance with FM 5-541.

**711-4.4 Glass Spheres:**

**711-4.4.1 Longitudinal Lines:** For ~~initial traffic striping and~~ *standard thermoplastic* markings, apply the first drop of Type 4 or larger glass spheres immediately followed by the second drop of Type 1 glass spheres. For refurbish*ment thermoplastic markings*,

7110000  
All Jobs

apply a single drop of Type 3 glass spheres. Apply reflective glass spheres to all markings at the rates determined by the manufacturer's recommendations.

**711-4.4.2 Chevrons, Diagonal and Transverse Stripes and Markings Lines, Messages, Symbols, and Arrows:** For standard or refurbishment thermoplastic markings,

Apply a single drop of Type 1 glass spheres. Apply retroreflective glass spheres to all markings at the rates determined by the manufacturer's recommendations.

Apply a mixture consisting of 50% glass spheres and 50% sharp silica sand to all standard thermoplastic pedestrian-crosswalk lines and bike lane symbols at the rates determined by the manufacturer's recommendations.

**711-4.4.3 Preformed Markings:** These markings are factory supplied with glass spheres and skid resistant material. No additional glass spheres or skid resistant material should be applied during installation.

#### **711-5 Contractor's Responsibility for Notification.**

Notify the Engineer prior to the placement of the thermoplastic materials. Furnish the Engineer with the manufacturer's name and batch numbers of the thermoplastic materials and glass spheres to be used. Ensure that the approved batch numbers appear on the thermoplastic materials and glass spheres packages.

#### **711-6 Protection of Newly Applied Traffic Stripes and Thermoplastic Pavement Markings.**

Do not allow traffic onto or permit vehicles to cross newly applied pavement markings until they are sufficiently dry. Remove and replace any portion of the pavement markings damaged by passing traffic or from any other cause, at no additional cost to the Department.

#### **711-7 Observation Period.**

Longitudinal pavement markings are subject to a 180 day observation period under normal traffic. The observation period shall begin with the satisfactory completion and acceptance of the work.

The longitudinal pavement markings shall show no signs of failure due to blistering, excessive cracking, chipping, discoloration, poor adhesion to the pavement, loss of retroreflectivity or vehicular damage. The retroreflectivity shall meet the initial requirements of 711-4.3. The Department reserves the right to check the retroreflectivity any time prior to the end of the observation period.

Replace, at no additional expense to the Department, any longitudinal pavement markings that do not perform satisfactorily under traffic during the 180 day observation period.

#### **711-8 Corrections for Deficiencies.**

Recapping applies to conditions where additional striping-pavement marking material is applied to new or refurbished traffic stripes or pavement markings to correct a thickness deficiency. Correct deficiencies by recapping a 1.0 mile section centered around the deficiency with additional striping-pavement marking material or by complete removal and reapplication or removal and reapplication of a one mile section centered around the deficiency, as determined by the Engineer, at no additional cost to the Department.

If recapping will result in a thickness exceeding the maximum allowed, the traffic stripes or markings will be removed and reapplied.

### 711-9 Submittals.

**711-9.1 Submittal Instructions:** Prepare a certification of quantities, using the Department's current approved form, for each project in the Contract. Submit the certification of quantities and daily worksheets to the Engineer. The Department will not pay for any disputed items until the Engineer approves the certification of quantities.

**711-9.2 Contractor's Certification of Quantities:** Request payment by submitting a certification of quantities no later than Twelve O clock noon Monday after the estimate cut-off date or as directed by the Engineer, based on the amount of work done or completed. Ensure the certification of quantities consists of the following:

(a) 1. Contract Number, FPID Number, Certification Number, Certification Date and the period that the certification represents.

(b) 2. The basis for arriving at the amount of the progress certification, less payments previously made and less any amount previously retained or withheld. The basis will include a detailed breakdown provided on the certification of items of payment.

### 711-10 Method of Measurement.

The quantities, *authorized and acceptably applied, to be paid for* under this Section will be *paid* as follows:

(a) 1. The length, in ~~net gross~~ miles, of ~~6 inch solid, traffic stripe, authorized and acceptably applied~~ *10'-30' skip, 3'-9' dotted, 6'-10' dotted, and 2'-4' dotted lines.*

(b) 2. The ~~total traversed distance in gross miles of 10-30 or 3-9 skip line. The actual applied line is 25% of the traverse distance, for a 1:3 ratio. This equates to 1,320 feet of marking per mile of single line length, in linear feet, of transverse lines, diagonal lines, chevrons, and parking spaces.~~

(c) 3. The ~~net length, in feet, of all other types of lines and stripes, authorized and acceptably applied~~ *number of pavement messages, symbols, and arrows. Each arrow is paid as a complete marking, regardless of the number of "points" or directions.*

(d) 4. The area, in square feet, ~~of for~~ removal of existing ~~pavement~~ markings, acceptably removed. *Payment for removal of conflicting markings will be in accordance with 102-5.8. Payment for removal of non-conflicting markings will be paid separately.*

~~(e) The number of pavement messages, symbols and directional arrows, authorized and acceptably applied.~~

*The gross mile measurement will be taken as the distance from the beginning of the ~~painted~~ thermoplastic line to the end of the ~~painted~~ thermoplastic line and will include the unmarked gaps for skip and dotted lines. The gross mile measurement will not include designated unmarked lengths at intersections, turn lanes, etc. Final measurement will be determined by plan dimensions or stations, subject to 9-1.3.1.*

### 711-11 Basis of Payment.

Prices and payments will be full compensation for all work specified in this Section, including, all cleaning and preparing of surfaces, furnishing of all materials, application, curing and protection of all items, protection of traffic, furnishing of all tools, machines and equipment, and all incidentals necessary to complete the work. Final payment will be withheld until all deficiencies are corrected.

Payment will be made under:

Item No. 711-      Thermoplastic *Pavement Markings*  
                                         ~~Traffic Stripes~~, Solid - per ~~net gross~~ mile.

7110000  
All Jobs

~~Traffic Stripes~~, Solid - per *linear* foot.  
~~Traffic Stripes~~, Skip - per gross mile.  
~~Dotted/Guideline~~ - per ~~foot~~*gross mile*.  
Messages *or Symbol* - each.  
Arrows - each.  
Yield ~~Markings~~ *Line* - per *linear* foot.  
~~Thermoplastic~~, Remove - per square foot.