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Florida Department of Transportation

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TRAFFIC ENGINEERING AND OPERATIONS BULLETIN 20-01
ROADWAY DESIGN BULLETIN 20-02
PROGRAM MANAGEMENT BULLETIN 20-01
CONSTRUCTION BULLETIN 20-02
FREIGHT AND MULTIMODAL OPERATIONS BULLETIN 20-01

DATE: February 11, 2020

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

FROM: Trey Tillander, P.E., Director, Traffic Engineering and Operations
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SUBJECT: **Railroad Dynamic Envelope Safety Countermeasure**

This bulletin introduces new requirements for the Railroad Dynamic Envelope pavement markings. These requirements involve updates in the FDOT Design Manual (FDM), Standard Plans for Road and Bridge Construction (Standard Plans), Standard Specifications for Road and Bridge Construction (Standard Specifications), and the Basis of Estimates Manual (BOE).

REQUIREMENTS FOR FDOT DESIGN MANUAL

1. Renumber ***FDOT Design Manual*** (***FDM***) ***220.2.1.1*** *(Preemption)* to ***FDM 220.2.1.2.***

2. Insert the following as new ***FDM 220.2.1.1***

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220.2.1.1 Signing and Pavement Markings

Include signing and pavement markings in accordance with ***Standard Plans, Index 509-070***.

Include Railroad Dynamic Envelope (RDE) pavement markings at the following at-grade railroad crossings on:

- State Roads;
- State-owned rails; and
- State-owned property.

For side roads with at-grade crossings within 100 feet of the edge of traveled way, include W10-2, W10-3 or W10-4 signs on the mainline state road in accordance with the ***MUTCD***.

For pavement marking material selection, see ***FDM 230***.

3. Add the following as the last paragraph to ***FDM 230.3***.

   See ***FDM 220*** for signing and pavement marking requirements for at-grade railroad crossings.

4. Delete ***FDM Figure 230.3.1*** and replace it with the figure shown in Attachment 'A'.

5. Add item "(6)" to the first paragraph (i.e., Use Preformed Thermoplastic on all pavement types…) of ***FDM 230.3.1.3***:

   (6) Railroad dynamic envelopes. When installed on concrete riding surfaces, a 4-inch wide black contrast border is required on both sides of each 12-inch wide marking.

REQUIREMENTS FOR STANDARD PLANS

1. ***Standard Plans, Index 509-070*** *(Railroad Grade Crossing Traffic Control Devices)* has been updated and is released as an ***Interim Revision*** (***IR509-070***) to the ***FY 2020-21 Standard Plans***. The Interim Revision will replace the original version of the Index published on October 30, 2019; therefore, a reference to the ***Interim Revision*** is not required on the Key Sheet under the Governing Standard Plans.

2. ***Standard Plans Instructions (SPI)*** are released for ***Index 509-070***. ***SPI 509-070*** contains important information about the usage requirements for the use of traffic control devices for at-grade railroad crossings.

3. See Attachment 'B' for ***IR509-070*** and ***SPI 509-070***.

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REQUIREMENTS FOR SPECIFICATIONS

1. The specifications for railroad dynamic envelope are provided in ***Modified Special Provision*** (***MSP***) 711. This ***MSP*** shall be used on affected projects with letting dates prior to July 2020. See Attachment 'C' for a draft of this ***MSP***. This bulletin serves as approval to incorporate this ***MSP*** into project specification packages. No further approval is needed. Contact the District Specification Office to obtain a copy of this MSP.

2. ***Standard Specifications*** will be available for use on affected projects with letting dates on or after July 2020.

REQUIREMENTS FOR BOE

The following pay items have been added to the ***BOE*** for the railroad dynamic envelopes:

- For Asphalt Surfaces: 711-14-19x Preformed Thermoplastic for Railroad Dynamic Envelope, LF
- For Concrete Surfaces: 711-14-19x Preformed Thermoplastic with Contrast for Railroad Dynamic Envelope, LF

Per the specification, the linear foot measurement will be Plan Quantity, along the centerline length of each marking. The various widths, x for the pay item, will be available per the ***Standard Plans***.

COMMENTARY

Railroad Dynamic Envelope pavement markings are used to delineate the area around at-grade railroad crossings where vehicles should not stop.

In 2014 and 2019, FDOT conducted railroad dynamic envelope pilot programs in south and central Florida, respectively. Following the installation of the railroad dynamic envelope, traffic data indicated that the number of vehicles that stopped on or too close to the rail tracks was reduced by at least 15%.

Engineering and Operations Memorandum 19-02 was issued on December 5, 2019 and work to implement railroad dynamic envelopes on State Roads and State-owned land is anticipated to be completed by March 2022.

In addition, this bulletin addresses the need for consistency of railroad crossing advanced signing for passive railroad crossings parallel to and within 100 feet of a State Road.

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IMPLEMENTATION

The requirements of this bulletin are effective on all design-bid-build projects with railroad crossings within the project limits for lettings May 1, 2020 and later.

The requirements of this bulletin are effective on all design-build projects with railroad crossings within the project limits for which the final Request for Proposal (RFP) has not been released. Implementation of this bulletin for design-build projects for which the final RFP has been released is at the discretion of the District.

At the District's discretion, District Construction Offices may issue a Supplemental Agreement to ongoing construction contracts to implement the requirements of this bulletin. District Construction Offices must notify the District Rail Coordinators and the District Traffic Operations Engineers to report project status upon starting and completing the projects.

EVALUATION

The Freight and Multimodal Operation Office and District Rail Offices, in consultation with the District Traffic Engineering and Operation Offices, will measure the effectiveness of the railroad dynamic envelope implementations using before-and-after evaluations.

CONTACT

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ATTACHMENT ‘A’

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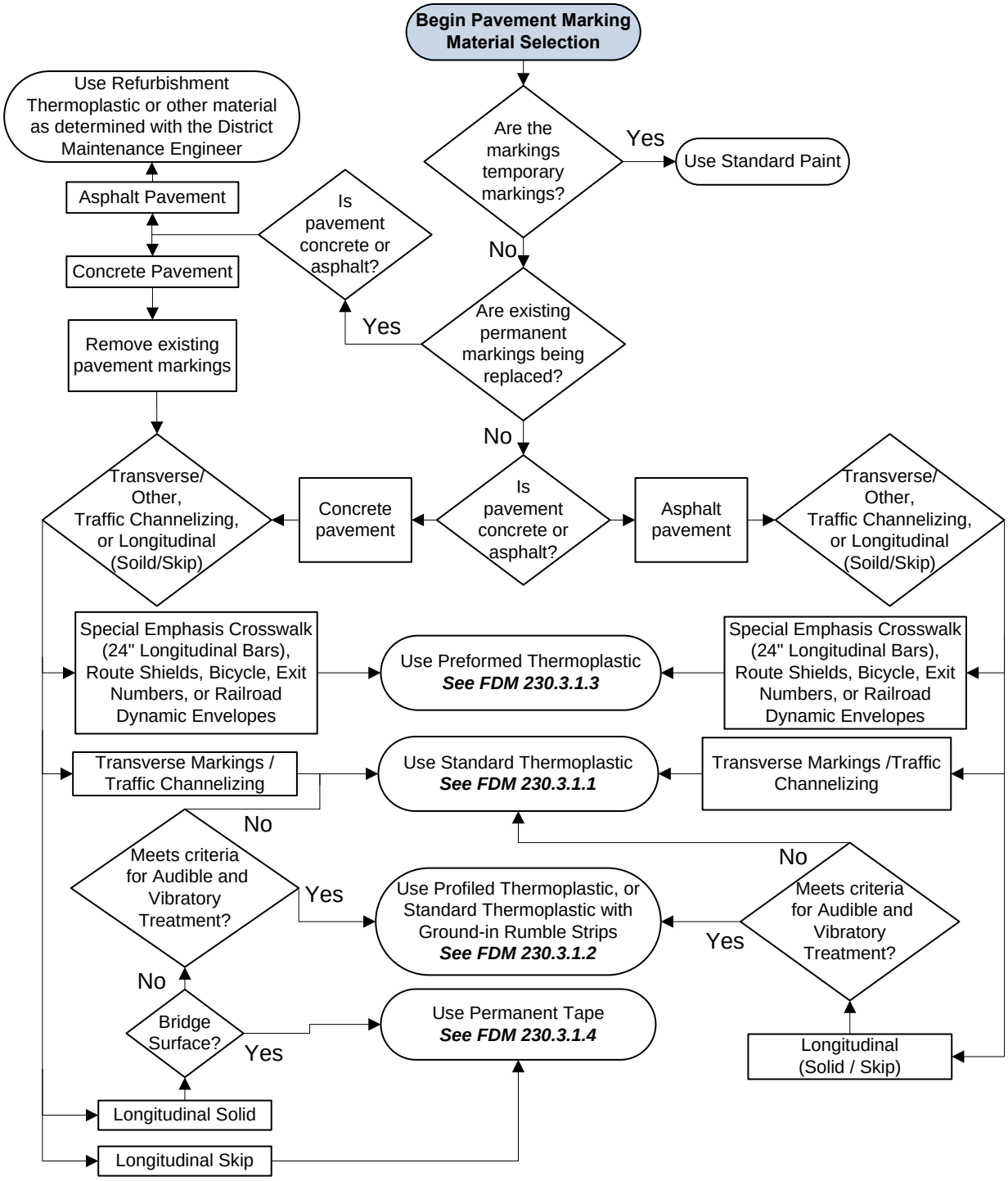
Figure 230.3.1 Pavement Marking Material Selection



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ATTACHMENT ‘B’

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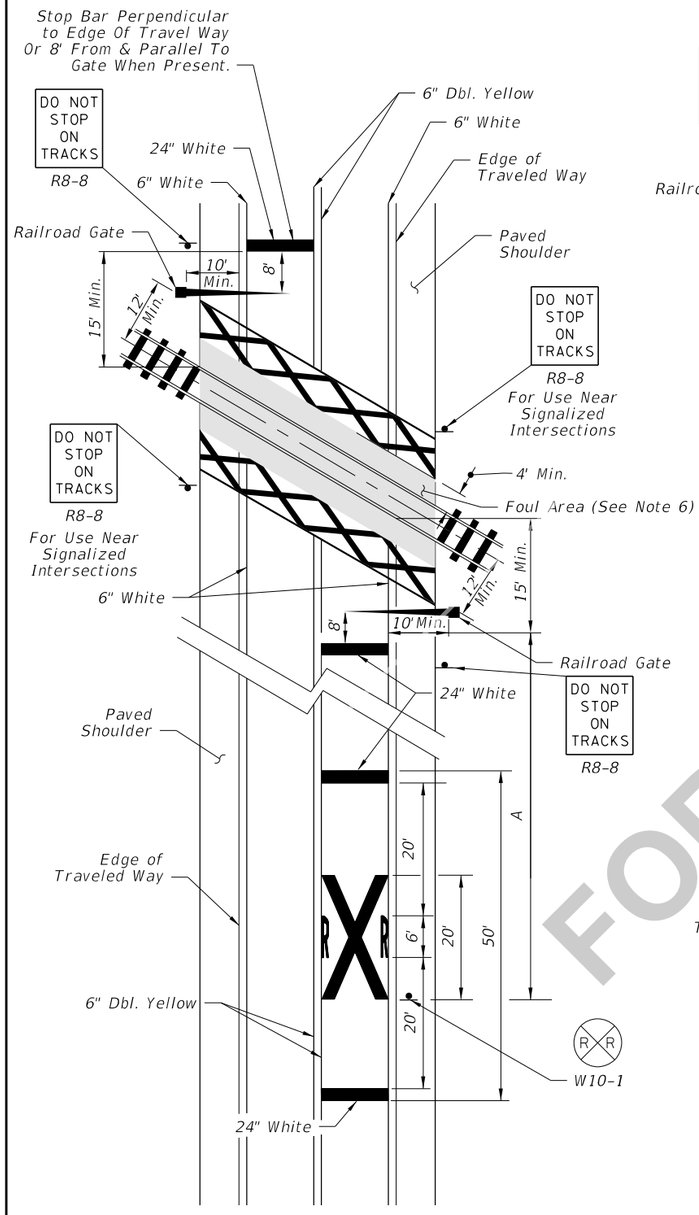
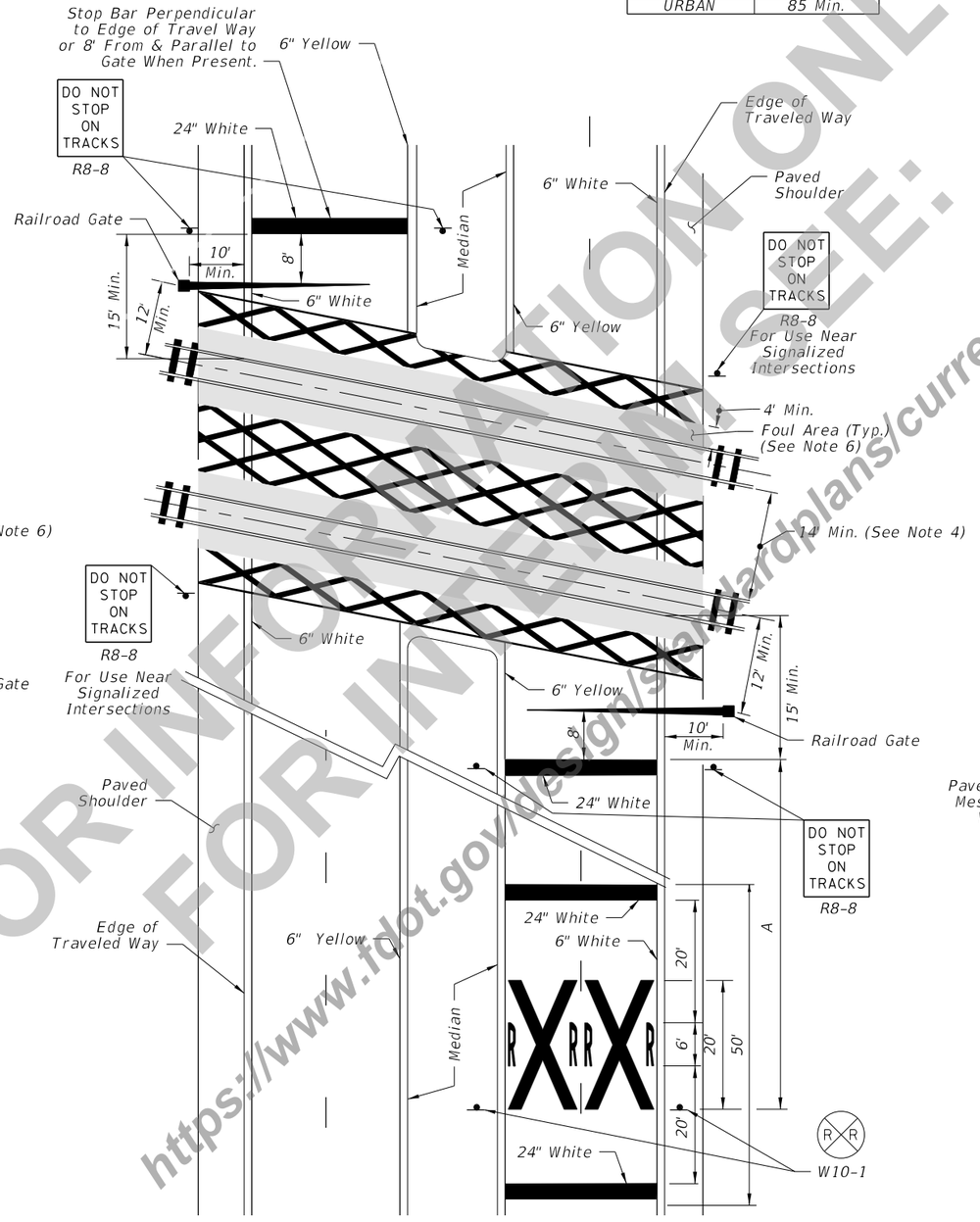
NOTES

1. Place an additional W10-1 sign where intersections occur between the R/R pavement message and the tracks.
2. Place FTP-61-06 or FTP-62-06 sign 100' in advance of crossing for urban conditions and 300' in advance of crossing for rural conditions. See Index 700-102 for sign details.
3. Install Railroad Dynamic Envelope Pavement Markings only when called for in the Plans.
4. Do not install pavement markings when the distance between tracks is less than 14'.
5. The transverse dimension for the RDE "X" may be reduced to the lane width for two-lane roadways without shoulders or when shown in the Plans.
6. Do not install pavement markings in the Foul areas.

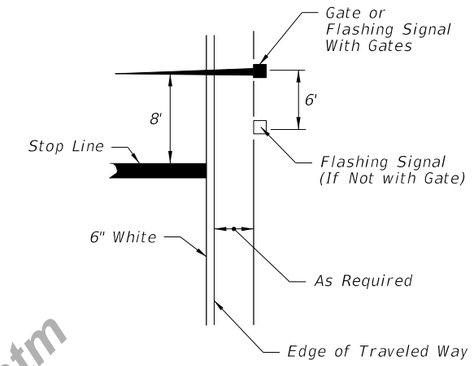
Design Speed (mph)	Distance "A" (ft)
60	400
55	325
50	250
45	175
40	125
35	100
URBAN	85 Min.



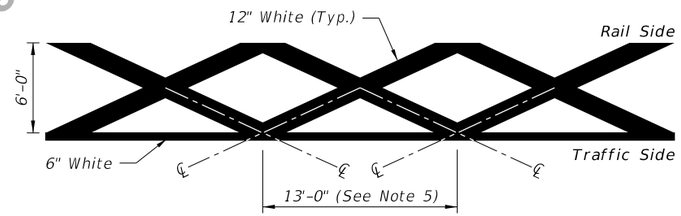
RAILROAD CROSSING AT TWO-LANE ROADWAY



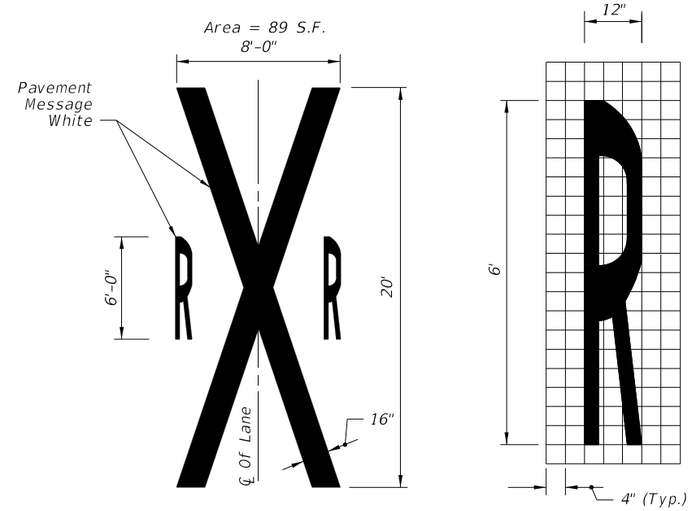
RAILROAD CROSSING AT MULTILANE ROADWAY



RELATIVE LOCATION OF CROSSING TRAFFIC CONTROL DEVICES



RAILROAD DYNAMIC ENVELOPE (RDE) PAVEMENT MARKING DETAIL



RAILROAD CROSSING PAVEMENT MESSAGE

FOR INFORMATION ONLY
FOR INTERIM USE.
https://www.fdot.gov/design/standardplans/current/rev.shtm

LAST REVISION	REVISION	DESCRIPTION:	FDOT		INDEX	SHEET
02/11/20		Added Railroad Dynamic Envelope Pavement Marking Details.	FY 2020-21 STANDARD PLANS	RAILROAD GRADE CROSSING TRAFFIC CONTROL DEVICES	509-070	3 of 4

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Index 509-070

Railroad Grade Crossing Traffic Control Devices

Design Criteria

FDOT Design Manual (FDM), Manual on Uniform Traffic Control Devices (MUTCD)

Design Assumptions and Limitations

Signing and Pavement Markings:

Index 509-070, provides standard signing and pavement marking for active at-grade railroad crossing (i.e., crossing with flashing-light signals, gates, or traffic control signals). Refer to the ***MUTCD*** for signing and pavement markings at passive at-grade crossings.

Refer to ***FDM 220*** for the requirements to include Railroad Dynamic Envelope (RDE) pavement markings. In situations where the configuration of the track(s) is not parallel, maintain the typical Railroad Dynamic Envelope pattern and fill the gap between the tracks as necessary.

Plan Content Requirements

Signing and Pavement Markings:

Summarize quantities in the Tabulation of Quantities of the Signing and Pavement Marking Plan.

Detail the pavement markings and sign locations in the Signing and Pavement Marking Plan view.

Payment

See the ***BOE*** and ***Specifications*** for information on payment, pay item use, and compensation.

FOR INFORMATION ONLY

FOR INTERIM SEE:

https://www.fdot.gov/design/standardplans/current/rev.shtm

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ATTACHMENT ‘C’

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THERMOPLASTIC PAVEMENT MARKINGS
(REV 1-29-20)

SUBARTICLE 711-4.1.1 is deleted and the following substituted:

711-4.1.1 Preformed Thermoplastic: Apply markings 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. For railroad dynamic envelopes, keep all equipment and personnel out of the foul area.

SUBARTICLE 711-4.2.3 is deleted and the following substituted:

711-4.2.3 Preformed Thermoplastic: Apply 0.125 inch or 125 mils of preformed thermoplastic material. Use preformed thermoplastic for bicycle markings, shared use path markings, 24 inch markings ~~of the~~on special emphasis crosswalks, route shields, ramp exit numbers, roundabout informational markings, railroad dynamic envelopes, white dotted lines (2'-4') with trailing black contrast, and black contrast arrows, messages, and symbols.

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.

SUBARTICLE 711-4.3 is deleted and the following substituted:

711-4.3 Retroreflectivity: Apply white and yellow pavement markings that will attain an initial retroreflectivity of not less than 450 mcd/lx·m^2 and not less than 350 mcd/lx·m^2, respectively for all longitudinal lines. All chevrons, diagonal lines, stop lines, messages, symbols, and arrows will attain an initial retroreflectivity of not less than 300 mcd/lx·m^2 and 250 mcd/lx·m^2 for white and yellow respectively. All crosswalks, railroad dynamic envelopes, and bicycle markings shall attain an initial retroreflectivity of not less than 275 mcd/lx·m^2. Black pavement markings must have a retroreflectance of less than 5 mcd/lx m^2.

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.

SUBARTICLE 711-9.2 is deleted and the following substituted:

711-9.2 Contractor's Certification of Quantities: For all items except railroad dynamic envelope, ~~R~~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:

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

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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.

ARTICLE 711-10 is deleted and the following substituted:

711-10 Method of Measurement.

711-10.1 Certified Quantities: The certified quantities, authorized and acceptably applied, under this Section will be paid as follows:

1. The length, in gross miles, of solid, 10'-30' skip, 3'-9' dotted, 6'-10' dotted, 2'-2' dotted, and 2'-4' dotted lines.

2. The length, in linear feet, of transverse lines, diagonal lines, chevrons, and parking spaces.

3. The number of pavement messages, symbols, and arrows. Each arrow is paid as a complete marking, regardless of the number of "points" or directions.

4. The area, in square feet, for removal of existing thermoplastic pavement markings acceptably removed. Payment for removal of thermoplastic pavement markings will only be made for locations where the existing pavement surface is to remain.

The gross mile measurement will be taken as the distance from the beginning of the thermoplastic line to the end of the 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.

711-10.2 Plan Quantities: The plan quantity length, in linear feet of railroad dynamic envelope markings.

ARTICLE 711-11 is deleted and the following substituted:

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	
		Solid - per gross mile.
		Solid - per linear foot.
		Skip - per gross mile.
		Dotted - per gross mile.
		Message or Symbol - each.
		Arrows - each.
		Yield Line - per linear foot.
		Railroad Dynamic Envelope - per linear foot.
		Remove - per square foot.

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