



Florida Department of Transportation

RON DESANTIS
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

JARED W. PERDUE, P.E.
SECRETARY

November 2, 2023

Khoa Nguyen
Director, Office of Technical Services
Federal Highway Administration
3500 Financial Plaza, Suite 400
Tallahassee, Florida 32312

Re: State Specifications Office
Section: 711
Proposed Specification: **7110200 Thermoplastic Pavement Markings.**

Dear Mr. Nguyen:

We are submitting, for your approval, two copies of the above referenced Supplemental Specification.

The changes are proposed by Awilda Merced to add language in general application regarding open graded surfaces, specify project acceptance method, correct unit of retroreflectivity, and remove how applied high friction thermoplastic.

Please review and transmit your comments, if any, within two weeks (10 business days). Comments should be sent via email daniel.strickland@dot.state.fl.us.

If you have any questions relating to this specification change, please call me at (850) 414-4130.

Sincerely,

Signature on File

Daniel Strickland, P.E.
State Specifications Engineer

DS/jb

Attachment

cc: Florida Transportation Builders' Assoc.
State Construction Engineer

THERMOPLASTIC PAVEMENT MARKINGS.
(REV 7-6-23)

ARTICLE 711-2 is deleted and the following substituted:

711-2 Materials.

Use only materials listed on the Department's Approved Product List (APL) meeting the following requirements.

Hot-Applied Standard and Refurbishment Thermoplastic	971-1 and 971-5
.....	971-1 and 971-5
Preformed Thermoplastic.....	971-1 and 971-6
Hot-Applied High Friction Thermoplastic	971-1 and 971-10
Glass Spheres	971-1 and 971-2

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

ARTICLE 711-4 is deleted and the following substituted:

711-4 Application.

711-4.1 General: Remove existing thermoplastic pavement markings using a method approved by the Engineer such that pavement surface scars or traces of the removed thermoplastic pavement markings will not conflict with new pavement markings. Do not use paint to blackout, hide, or disguise existing pavement markings.

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

Before applying 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 thermoplastic material thickness according to 711-4.2. Application on open graded friction surfaces may require more thermoplastic material to achieve the required thickness above the pavement surface.

Apply pavement markings 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 pavement markings to the same tolerances in dimensions and in alignment specified in 710-5. When applying 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 by extrusion or other means approved by the Engineer.

When thermoplastic pavement markings are to be removed and replaced, apply new thermoplastic pavement markings prior to opening to traffic.

Conduct field tests in accordance with FM 5-541 [Part A](#). Take test readings representative of the pavement marking performance. Remove and replace pavement markings not meeting the requirements of this Section at no additional cost to the Department.

With the exception of short-term raised rumble strips, wait at least 14 days after constructing the final asphalt surface course to place thermoplastic pavement markings. Installation of thermoplastic on concrete requires a clean, dry surface. Follow the manufacturer's recommendations for surface preparation for thermoplastic on concrete. Provide temporary pavement markings during the interim period prior to opening the road to traffic.

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.

~~711-4.1.2 Hot Applied High Friction Thermoplastic: Hot-applied high friction thermoplastic may be used as an alternative to preformed thermoplastic for special emphasis crosswalk markings. Apply markings only by gravity or air pressure thermoplastic hand liners set up with double drop bead attachments. Install markings in accordance with the manufacturer's recommendations.~~

711-4.2 Thickness:

711-4.2.1 Hot-Applied Standard Thermoplastic Markings: Apply or recap standard thermoplastic pavement markings for longitudinal lines to attain a minimum thickness of 0.10 inch or 100 mils and a maximum thickness 0.15 inch or 150 mils when measured above the pavement surface.

Markings other than longitudinal lines, 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 [Part A](#).

The Engineer will verify the thickness of the pavement markings in accordance with FM 5-541 [Part A](#) within 30 days of receipt of the Contractor's certification.

711-4.2.2 Hot-Applied Refurbishment Thermoplastic Markings: Apply a minimum of 0.06 inch or 60 mils of thermoplastic material. Ensure that the combination of the existing 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 [Part A](#).

The Engineer will verify the thickness of the pavement markings in accordance with FM 5-541 [Part A](#) within 30 days of receipt of the Contractor's certification.

711-4.2.3 Preformed Thermoplastic Markings: Apply 0.125 inch or 125 mils of preformed thermoplastic material.

Use preformed thermoplastic for bicycle markings, shared use path markings, 24-inch markings on special emphasis crosswalks, route shields, ramp exit numbers, roundabout informational markings, railroad dynamic envelopes, white dotted lines (2'-4') with trailing black contrast, 12-inch transverse crosswalk lines with black contrast, 24-inch stop line with 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 [Part A](#).

~~711-4.2.4 Hot Applied High Friction Thermoplastic: Apply lines to attain a minimum thickness of 0.09 inch or 90 mils and a maximum thickness of 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 the pavement markings in accordance with FM 5-541.~~

711-4.3 Retroreflectivity:

711-4.3.1 General: 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 [Part A](#).

711-4.3.2 Longitudinal Lines: Apply hot-applied standard and refurbishment thermoplastic pavement markings that will attain an initial retroreflectivity of not less than 450 $\frac{\text{mcd}}{\text{lx}\cdot\text{m}^2}$ $\frac{\text{mcd}}{\text{m}^2/\text{lx}}$ and not less than 350 $\frac{\text{mcd}}{\text{lx}\cdot\text{m}^2}$ $\frac{\text{mcd}}{\text{m}^2/\text{lx}}$ for white and yellow, respectively.

711-4.3.3 Markings Other Than Longitudinal Lines: Apply hot-applied standard and refurbishment thermoplastic markings that will attain an initial retroreflectivity of not less than 300 $\frac{\text{mcd}}{\text{lx}\cdot\text{m}^2}$ $\frac{\text{mcd}}{\text{m}^2/\text{lx}}$ and 250 $\frac{\text{mcd}}{\text{lx}\cdot\text{m}^2}$ $\frac{\text{mcd}}{\text{m}^2/\text{lx}}$ for white and yellow, respectively.

711-4.3.4 Preformed ~~and Hot Applied High Friction~~ Markings: Apply white preformed thermoplastic markings ~~and hot-applied high friction thermoplastic markings~~ that will attain an initial retroreflectivity of not less than 200 $\frac{\text{mcd}}{\text{lx}\cdot\text{m}^2}$ $\frac{\text{mcd}}{\text{m}^2/\text{lx}}$. Black pavement markings must have a retroreflectance of less than 20 $\frac{\text{mcd}}{\text{lx}\cdot\text{m}^2}$ $\frac{\text{mcd}}{\text{m}^2/\text{lx}}$.

711-4.4 Glass Spheres:

711-4.4.1 Longitudinal Lines: For hot-applied 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 hot-applied refurbishment thermoplastic markings, apply a single drop of Type 3 glass spheres. Apply retroreflective glass spheres to all markings at the rates provided in the manufacturer's installation instructions.

711-4.4.2 Markings Other Than Longitudinal Lines: For hot-applied standard and refurbishment thermoplastic markings, apply a single drop of Type 1 glass spheres and sharp silica sand at the rates provided in the manufacturer's installation instructions. Use sharp silica sand materials meeting the requirements of 971-5.4. For hot-applied high friction thermoplastic markings, apply retroreflective and friction elements at the rates provided in the manufacturer's installation instructions.

711-4.4.3 Preformed Markings: These markings are factory supplied with glass spheres and friction elements. Apply additional glass spheres and friction elements in accordance with the manufacturer's instructions.

THERMOPLASTIC PAVEMENT MARKINGS.
(REV 7-6-23)

ARTICLE 711-2 is deleted and the following substituted:

711-2 Materials.

Use only materials listed on the Department's Approved Product List (APL) meeting the following requirements.

Hot-Applied Standard and Refurbishment Thermoplastic	
.....	971-1 and 971-5
Preformed Thermoplastic.....	971-1 and 971-6
Glass Spheres	971-1 and 971-2

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

ARTICLE 711-4 is deleted and the following substituted:

711-4 Application.

711-4.1 General: Remove existing thermoplastic pavement markings using a method approved by the Engineer such that pavement surface scars or traces of the removed thermoplastic pavement markings will not conflict with new pavement markings. Do not use paint to blackout, hide, or disguise existing pavement markings.

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

Before applying 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 thermoplastic material thickness according to 711-4.2. Application on open graded friction surfaces may require more thermoplastic material to achieve the required thickness above the pavement surface.

Apply pavement markings 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 pavement markings to the same tolerances in dimensions and in alignment specified in 710-5. When applying 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 by extrusion or other means approved by the Engineer.

When thermoplastic pavement markings are to be removed and replaced, apply new thermoplastic pavement markings prior to opening to traffic.

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

With the exception of short-term raised rumble strips, wait at least 14 days after constructing the final asphalt surface course to place thermoplastic pavement markings. Installation of thermoplastic on concrete requires a clean, dry surface. Follow the manufacturer's recommendations for surface preparation for thermoplastic on concrete. Provide temporary pavement markings during the interim period prior to opening the road to traffic.

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.

711-4.2 Thickness:

711-4.2.1 Hot-Applied Standard Thermoplastic Markings: Apply or recap standard thermoplastic pavement markings for longitudinal lines to attain a minimum thickness of 0.10 inch or 100 mils and a maximum thickness 0.15 inch or 150 mils when measured above the pavement surface.

Markings other than longitudinal lines, 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 Part A.

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

711-4.2.2 Hot-Applied Refurbishment Thermoplastic Markings: Apply a minimum of 0.06 inch or 60 mils of thermoplastic material. Ensure that the combination of the existing 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 Part A.

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

711-4.2.3 Preformed Thermoplastic Markings: Apply 0.125 inch or 125 mils of preformed thermoplastic material.

Use preformed thermoplastic for bicycle markings, shared use path markings, 24-inch markings on special emphasis crosswalks, route shields, ramp exit numbers, roundabout informational markings, railroad dynamic envelopes, white dotted lines (2'-4') with trailing black contrast, 12-inch transverse crosswalk lines with black contrast, 24-inch stop line with 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 Part A.

711-4.3 Retroreflectivity:

711-4.3.1 General: 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 Part A.

711-4.3.2 Longitudinal Lines: Apply hot-applied standard and refurbishment thermoplastic pavement markings that will attain an initial retroreflectivity of not less than 450 mcd/m²/lx and not less than 350 mcd/m²/lx for white and yellow, respectively.

711-4.3.3 Markings Other Than Longitudinal Lines: Apply hot-applied standard and refurbishment thermoplastic markings that will attain an initial retroreflectivity of not less than 300 mcd/m²/lx and 250 mcd/m²/lx for white and yellow, respectively.

711-4.3.4 Preformed Markings: Apply white preformed thermoplastic markings that will attain an initial retroreflectivity of not less than 200 mcd/m²/lx. Black pavement markings must have a retroreflectance of less than 20 mcd/m²/lx.

711-4.4 Glass Spheres:

711-4.4.1 Longitudinal Lines: For hot-applied 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 hot-applied refurbishment thermoplastic markings, apply a single drop of Type 3 glass spheres. Apply retroreflective glass spheres to all markings at the rates provided in the manufacturer's installation instructions.

711-4.4.2 Markings Other Than Longitudinal Lines: For hot-applied standard and refurbishment thermoplastic markings, apply a single drop of Type 1 glass spheres and sharp silica sand at the rates provided in the manufacturer's installation instructions. Use sharp silica sand materials meeting the requirements of 971-5.4. For hot-applied high friction thermoplastic markings, apply retroreflective and friction elements at the rates provided in the manufacturer's installation instructions.

711-4.4.3 Preformed Markings: These markings are factory supplied with glass spheres and friction elements. Apply additional glass spheres and friction elements in accordance with the manufacturer's instructions.