

## ORIGINATION FORM

**THE INFORMATION BELOW IS TO BE PROVIDED BY THE ORIGINATOR**

(The person who receives or originates the issue and needs to forward the issue for action.)

Modify Specification 7100000SS.  
Section/File number

New Section \_\_\_\_\_.  
Section number

**Subject:** Painted Pavement Markings

**Origination date:** July 8, 2003

**Originator:** Chester Henson  
**Office/Phone:** Roadway Design/ 414-4117  
**Email address/** chester.henson@dot.state.fl.us  
**Userid:**

**Problem statement:** Industry standard method of measurement of retroreflectivity has changed from 15 meter geometry to 30 meter geometry.

**Information source:** Input was provided from materials lab, construction and maintenance.

**Background data:** Materials Lab, construction and maintenance currently have the equipment to measure retroreflectivity using the new 30 meter geometry.

**Recommended  
usage note:**

**Desired  
implementation  
date:** Beginning with the July 2005 letting.



# Florida Department of Transportation

JEB BUSH  
GOVERNOR

605 Suwannee Street  
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JOSÉ ABREU  
SECRETARY

## MEMORANDUM

**DATE:** May 27, 2005

**TO:** Specification Review Distribution List

**FROM:** Duane F. Brautigam, P.E., State Specifications Engineer

**SUBJECT:** **Proposed Specifications Change: 7100000 – Painted Pavement Markings**

In accordance with Specification Development Procedures, we are sending you a copy of a proposed specification change to Section 710.

This change was proposed by Chester Henson of the State Roadway Design Office to update Section 710 to meet current requirements.

Please share this proposal with others within your responsibility. Review comments are due within four weeks and should be sent to Mail Station 75 or to my attention via e-mail at SP965DB or duane.brautigam@dot.state.fl.us. Comments received after June 24, 2005 may not be considered. Your input is encouraged.

DFB/jf

Attachment

COMMENTS:

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Submitted by:

Phone #:

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**710 — PAINTED PAVEMENT MARKINGS.**  
~~(REV 6-10-03) (7-16-03) (1-04) (REV 5-11-05)~~

SECTION 710 (Pages 748-752 of the Supplemental Specifications) is deleted and the following substituted:

**SECTION 710  
PAINTED PAVEMENT MARKINGS**

**710-1 Description.**

Apply Painted *Traffic Stripes and Pavement* Markings, in accordance with ~~the details shown in~~ the Contract Documents, ~~and remove Painted Pavement Markings when required.~~

**710-2 Materials.**

Use only materials listed on the Qualified Products List (QPL) meeting the following requirements:

Raised Retro-reflective Pavement Markers and Bituminous Adhesive .....	Section 970
<del>Work Zone Pavement Markings .....</del>	<del>971-1 and 971-19</del>
<del>Waterborne Paint .....</del>	<del>971-1 and 971-3</del>
<del>Fast Dry Solvent Paint.....</del>	<del>971-1 and 971-419</del>
Glass Spheres .....	971-1 and 971-142
<del>Preformed Pavement Stripes and Markings.....</del>	<del>971-18</del>

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

**710-3 Equipment.**

Use equipment that will produce continuous~~ly~~ uniform dimensions of ~~Painted p~~Pavement ~~m~~Markings of varying widths and meet the following requirements:

(a) Capable of traveling at a uniform, predetermined rate of speed, both uphill and downhill, in order to produce a uniform application of paint and capable of following straight lines and making normal curves in *a* true arcs.

(b) Capable of applying glass spheres to the surface of the completed stripe by an automatic sphere dispenser attached to the striping machine such that the glass spheres are dispensed closely behind the installed line. Use a glass spheres dispenser equipped with an automatic cut-off control synchronized with the cut-off of the traffic paint and applies the glass spheres in a manner such that the spheres appear uniform on the entire ~~Painted p~~Pavement ~~m~~Markings surface with, 50 to 60% embedment.

(c) Capable of spraying the paint to the required thickness and width without thinning of the paint. Equip the paint tank with nozzles equipped with cut-off valves, which will apply broken or skip lines automatically. ~~Provide each nozzle with suitable line guides, either metallic shrouds or air blasts.~~

**710-4 Application:**

**710-4.1 General:** *Remove existing pavement markings, such that scars or traces of removed markings will not conflict with new pavement markings, by a method approved by the Engineer. Payment for marking removal will be in accordance with ~~Section 102-5.9.~~*

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

*Apply traffic stripes and markings only to dry surfaces, and when the ambient air and surface temperature is at least 40°F [5°C] and rising. Do not apply traffic stripes and markings when winds are sufficient to cause spray dust.*

*Apply traffic stripes and markings, having well defined edges, over existing pavement markings such that not more than 2 inches [50 mm] on either end and not more than 1 inch [25 mm] on either side is visible.*

Mix the paint thoroughly prior to pouring into the painting machine. Apply paint to the pavement by spray or other means approved by the Engineer.

~~The Engineer will~~ Conduct field testing in accordance with FM 5-541. Remove and replace ~~Painted Pavement Markings-traffic stripes and markings~~ not meeting the requirements of this Section at no additional cost to the Department.

~~Ensure that existing Painted Pavement Markings are removed, such that scars or traces of removed markings will not conflict with new Painted Pavement Markings, by a method approved by the Engineer.~~

~~Prior to applying Painted Pavement Markings, remove any material that would adversely affect the bond of the Painted Pavement Markings by a method approved by the Engineer.~~

~~Establish tack points at appropriate intervals for use in aligning stripes, and set a stringline from such points to achieve accuracy.~~

~~Apply Painted Pavement Markings only to dry surfaces, and when the ambient air and surface temperature is at least 40°F [5°C] and rising. Follow the manufacturer's recommendations for application temperature. Do not apply Painted Pavement Markings when winds are sufficient to cause spray dust.~~

~~Apply Painted Pavement Markings, having well defined edges, over existing Painted Pavement Markings such that not more than 2 inches [50 mm] on either end and not more than 1 inch [25 mm] on either side is visible.~~

Apply all ~~Painted~~ Pavement ~~m~~Markings prior to opening the road to traffic.

**710-4.1.1 Final Surface:** Painted Pavement Markings (Final Surface) will include two applications of ~~p~~Painted ~~p~~Pavement ~~m~~Markings and one application of ~~r~~Retro-reflective ~~p~~Pavement ~~m~~Markers applied to the final surface. ~~When Painted Pavement Markings (Final Surface) are required on the project, apply the second application of Painted Pavement Markings a minimum of 14 days after first application but prior to final acceptance of the project.~~ Apply all ~~r~~Retro-reflective ~~p~~Pavement ~~m~~Markers meeting the requirements of Section 706.

~~**710-4.2 Corrections for Deficiencies to Applied Painted Pavement Markings:** Remove and reapply a 1.0 mile [1.0 kilometer] LOT centered around any deficiency, at no additional cost to the Department. **710-4.2 Thickness:** Apply paint to attain a minimum wet film thickness in accordance with the manufacturer's recommendations.~~

**710-4.33 Retroreflectivity:** Apply white and yellow- ~~Painted~~ ~~p~~Pavement ~~m~~Markings that will attain an initial retroreflectance of not less than ~~250 cd/ft<sup>2</sup> [ 300250 mcd/lx·m<sup>2</sup>]~~ and not less than ~~250175 cd/ft<sup>2</sup> [175 mcd/lx·m<sup>2</sup>]~~, respectively. *Measure, certify on a Department approved form and submit to the Engineer, the retroreflectivity of white and yellow pavement markings in accordance with Florida Method FM 5-541.*

*The Department reserves the right to test the markings within 3 days of receipt of the Contractor's certification. Failure to afford the Department opportunity to test the markings*

*will result in non-payment. The test readings should be representative of the Contractor's striping performance. If the retroreflectivity values measure below values shown above, the striping will be reapplied at the Contractor's expense.*

*For work zone markings, ensure that the minimum retroreflectance of white and yellow pavement markings are not less than  $\pm 150 \text{ cd/ft}^2$  [ $150 \text{ mcd/lx}\cdot\text{m}^2$ ]. If the retroreflectivity values fall below the  $150 \text{ mcd/lx}\cdot\text{m}^2$  value within six months of initial application, ~~the striping will be reapplied at the Contractor's expense. restriping will be required at Contractor expense. Re-stripe whenever the retroreflectivity falls below the minimum retroreflectance.~~ Compensation will be at the Contract unit price for the appropriate material when the material used appears on the QPL and is properly installed.*

~~Measure, certify (on Department approved form) and submit to the Engineer, no later than the next working day after the application of pavement markings, the retroreflectivity of white and yellow pavement markings in accordance with Florida Method FM 5-5XX41.~~

~~If the Department retests within 3 days of initial application and reflectivity values measure below values shown above, the striping will be reapplied at the Contractor's expense. Project personnel performing any retesting should take into consideration events beyond the control of the Contractor and not due to material application failures before requiring re-striping at Contractor expense. The retest readings should be representative of the Contractor's striping performance. Compensation will be at the Contract unit price for the appropriate material when the material used appears on the QPL and is properly installed.~~

~~Ensure that the intermittent and final retroreflectance of white and yellow Painted Pavement Markings are not less than  $150 \text{ cd/ft}^2$  [ $150 \text{ mcd/lx}\cdot\text{m}^2$ ]. Re-stripe whenever the reflectivity falls below the intermittent retroreflectance. Compensation will be at the Contract unit price for the appropriate material when the material used appears on the QPL and is properly installed.~~

~~Painted Pavement Markings (Final Surface) shall meet the initial reflectivity values stated above.~~

~~Measure and certify (on Department approved form), no later than the next working day after the application of Painted Pavement Markings, the reflectivity of white and yellow Painted Pavement Markings in accordance with Florida Method FM 5-541. Use an approved 30-meter instrument for measuring retroreflectivity.~~

**710-4.4 Color:** *Use paint material that meet the requirements of 971-1. Use white Painted Pavement Marking material that is pure white, free from any tint and showing no deviations from magnesium oxide color standard greater than the following:*

Scale Definition	Magnesium Oxide Standard	Sample
RD	100	75% minimum
Reflectance		
a. Red-Green	0	-5 to +5
b. Yellow-Blue	0	-10 to +10

~~Use yellow Painted Pavement Marking material which visually matches Federal Test Standard Number 595 color 33538, and meet the following criteria for chromaticity coordinates (x,y):~~

x	0.455	0.510	0.472	0.530
y	0.444	0.485	0.400	0.456

*710-4.5 Glass Spheres: Apply glass spheres on all pavement markings immediately and uniformly following the paint application. The rate of application shall be based on the manufacturer's recommendation.*

#### **710-5 Tolerances in Dimensions and in Alignment.**

*Establish tack points at appropriate intervals for use in aligning stripes, and set a stringline from such points to achieve accuracy.*

##### **710-5.1 Dimensions:**

**710-5.1.1 Longitudinal Lines:** ~~Apply painted skip segments of 10 foot [3 m], with a 30 foot [9 m] unpainted gap between segments.~~ Apply painted *skip line* segments with no more than  $\pm 12$  inches [ $\pm 300$  mm] variance, so that over-tolerance and under-tolerance lengths *between skip line and the gap* will approximately balance. Apply longitudinal lines at least 2 inches [50 mm] from construction joints of portland cement concrete pavement.

**710-5.1.2 Transverse Markings, Gore Markings, Arrows, and Messages:** Apply paint in multiple passes when the marking cannot be completed in one pass, with an overall line width allowable tolerance of  $\pm 1$  inch [ $\pm 25$  mm].

**710-5.1.3 Contrast Lines:** Use black paint to provide contrast on concrete or light asphalt pavement, when specified by the Engineer. Apply black paint in 10 foot [3 m] segments following each longitudinal skip line.

**710-5.2 Alignment:** Apply painted stripes that will not deviate more than 1 inch [25 mm] from the stringline on tangents and curves one degree or less. Apply painted stripes that will not deviate more than 2 inches [50 mm] from the stringline on curves greater than one degree. Apply painted edge stripes uniformly, not less than 2 inches [50 mm] or more than 4 inches [100 mm] from the edge of pavement, without noticeable breaks or deviations in alignment or width.

*Remove and replace at no additional cost to the Department, traffic stripes that deviates more than the above stated requirements.*

**710-5.3 Correction Rates:** Make corrections of variations in width at a maximum rate of 10 feet [3 m] for each 0.5 inch [13 mm] of correction. Make corrections of variations in alignment at a maximum rate of 25 feet [8 m] for each 1 inch [25 mm] of correction, to returned to the stringline.

~~**710-5.4 Alignment of Stripes:** Remove and replace at no additional cost to the Department traffic stripes that deviates more than 1 inch [25 mm] in any 40 feet [12 m] from the stringline on tangents and curves of one degree or less and that deviate more than 2 inches [50mm] for curves greater than one degree.~~

#### **710-6 Contractor's Responsibility for Notification.**

Notify the Engineer prior to the placement of the materials. Furnish the Engineer with the manufacturer's name and LOT numbers of the materials and glass spheres to be used. Ensure that the approved LOT numbers appear on the materials and glass spheres packages. Submit a certified test report to the Engineer indicating that the materials meet all requirements specified.

#### **710-7 Protection of Newly Painted Pavement Markings.**

Do not allow traffic onto *or permit vehicles to cross* newly applied ~~*p-Painted Pavement mMarkings*~~ until they are sufficiently dry ~~*to permit vehicles to cross them without damage.*~~ Remove and replace any portion of the ~~*Painted pPavement mMarkings*~~ damaged by passing traffic or from any other cause, at no additional cost to the Department.

**710-8 Corrections for Deficiencies to Applied Painted Pavement Markings.**

*Remove and reapply a 1.0 mile [1.0 kilometer] LOT centered around any deficiency, at no additional cost to the Department.*

**710-98 Submittals.**

**710-98.1 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 dDaily wWorksheets* to the Engineer. The Department will not pay for any disputed items until the Engineer approves the certification of quantities.

**710-98.2 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) Contract Number, FPID Number, Certification Number, Certification Date and the period that the certification represents.

(b) 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.

**710-109 Method of Measurement.**

The quantities to be paid for under this Section will be as follows:

- ~~(1) The length, in gross miles [kilometers], of Skip Traffic Stripes.~~
- ~~(2) The length, in net miles [net kilometers], of Solid Traffic Stripes.~~
- ~~(3) The length, in feet [meters], of Solid Traffic Stripes and Skip Traffic Stripes.~~
- ~~(4) The number of directional arrows and pavement messages, painted.~~
- ~~(5) The area, in square feet [square meters], of Reflective Paint (Island Nose).~~
- ~~(6) The area, in square feet [square meters], of Remove Existing Markings.~~

*(a) The net length, in feet [meters], of each of the various types of lines and stripes, authorized and acceptably applied.*

*(b) The total traversed distance in gross miles [kilometers] of 10-30 skip line. The actual applied line is 25% of the traverse distance for a 1:3 ratio. This equates to 1,320 feet [250 m] of marking per mile [kilometer] of single line.*

*(c) The length, in net miles [net kilometers], of Solid Traffic Stripe, authorized and acceptably applied.*

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

*(e) The length, in gross miles [kilometers], of Alternating Skip Traffic Stripe, authorized and acceptable applied.*

~~(f) Lump Sum, as specified in 710-4.1.1 when the item for Painted Pavement Markings (Final Surface) is included in the proposal.~~

*The net length, in feet [meters] of dotted and skip stripes other than 10-30 [3m-9m] will be measured* ~~The quantities to be paid for will also include 6'—10' skip [2 m—3 m skip] traffic stripe sections as indicated in the plans. Measurement will be taken~~ as the distance from the beginning of the first painted stripe to the end of the last painted stripe with proper deductions

made for unpainted intervals as determined by plan dimensions or stations, subject to 9-1.3. Unpainted intervals will not be included in pay quantity.

The gross-mile [gross-kilometer] measurement of **10-30** Skip Traffic Stripes will be taken as the distance from the beginning of the first painted stripe to the end of the last painted stripe, and will include the unpainted intervals. It will not include any lengths of unpainted intervals which, by design or by other intent of the Department, are greater than 30 feet [9 m]. Final measurement will be determined by plan dimensions or stations, subject to 9-1.3.1.

### **710-110 Basis of Payment.**

**710-110.1 General:** 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.

**710-110.2 Lump Sum Payment:** When the item for Painted Pavement Markings (Final Surface) is included in the proposal, price and payment will be full compensation for all work specified in this Section, including two applications of all **pPainted pPavement mMarkings** applied to the final surface, and one application of **rRetro-reflective pPavement mMarkers** applied to the final surface in accordance with Section 706.

Payment will be made under:

Item No. 710- 6-	Directional Arrow, Painted - each.
Item No. 2710- 6-	Directional Arrow, Painted - each.
Item No. 710- 7-	Pavement Messages, Painted - each.
Item No. 2710- 7-	Pavement Messages, Painted - each.
<del>Item No. 710- 11-</del>	<del>Remove Existing Markings (Paint) - per square foot.</del>
<del>Item No. 2710- 11-</del>	<del>Remove Existing Markings (Paint) - per square meter.</del>
Item No. 710- 21-	Skip Traffic Stripe (White/Black) - per gross mile.
Item No. 2710- 21-	Skip Traffic Stripe (White/Black) - per gross kilometer.
Item No. 710- 22-	Skip Traffic Stripe (Yellow) - per gross mile.
Item No. 2710- 22-	Skip Traffic Stripe (Yellow) - per gross kilometer.
Item No. 710- 23-	Solid Traffic Stripe (White/Black) - per net mile.
Item No. 2710- 23-	Solid Traffic Stripe (White/Black) - per net kilometer.
Item No. 710- 24-	Solid Traffic Stripe (Yellow) - per net mile.
Item No. 2710- 24-	Solid Traffic Stripe (Yellow) - per net kilometer.
Item No. 710- 25-	Solid Traffic Stripe (White/Black) - per foot.
Item No. 2710- 25-	Solid Traffic Stripe (White/Black) - per meter.
Item No. 710- 26-	Solid Traffic Stripe (Yellow) - per foot.
Item No. 2710- 26-	Solid Traffic Stripe (Yellow) - per meter.
Item No. 710- 27-	Skip Traffic Stripes (White/Black) - per foot.
Item No. 2710- 27-	Skip Traffic Stripes (White/Black) - per meter.
Item No. 710- 28-	Skip Traffic Stripe (Yellow) - per foot.
Item No. 2710- 28-	Skip Traffic Stripe (Yellow) - per meter.
Item No. 710- 29-	Reflective Paint (Island Nose) (White) - per square foot.
Item No. 2710- 29-	Reflective Paint (Island Nose) (White) - per square meter.
Item No. 710- 30-	Reflective Paint (Island Nose) (Yellow) - per square foot.
Item No. 2710- 30-	Reflective Paint (Island Nose) (Yellow) - per square meter.

7100000  
710; 2710 items

Item No. 710- 79- Alternating Skip Traffic Stripe - per gross mile.  
Item No. 2710- 79- Alternating Skip Traffic Stripe - per gross kilometer.  
Item No. 710- 90- Painted Pavement Markings (Final Surface) - lump sum.  
Item No. 2710- 90- Painted Pavement Markings (Final Surface) - lump sum.