



Florida Department of Transportation

JEB BUSH
GOVERNOR

605 Suwannee Street
Tallahassee, Florida 32399-0450

THOMAS F. BARRY, JR.
SECRETARY

April 14, 1999

THIS MEMO IS EXPIRED

MEMORANDUM NO. 12-99

TO: DISTRICT CONSTRUCTION ENGINEERS

FROM: 
Greg Xanders, State Construction Engineer

COPIES: Charles Goodman, Archie Montgomery, Alan Lafferty,
Area Construction Engineers

SUBJECT: MAINTENANCE OF REFLECTIVE PAVEMENT MARKERS

When painted pavement markings are to be used, the restriping may be paid at contract unit prices if the markings have been in use for at least six months. Please refer to this Office memorandum dated March 14, 1994.

Reflective pavement markers (RPM) may be substituted for painted pavement markings in our work zones in accordance with the Standard Specifications. The same life span (six months) will also be applied when reflective pavement markers are used in work zones. **However, the contractor shall have the maintenance responsibility of the RPM's for the first six months of application.** The replacement requirements are: " when more than two markers in a skip or more than three consecutive markers on an edgeline are missing". In addition, if 5% or more of the RPMs are missing within the first six months of installation the contractor shall be required to replace them at his own expense. Please refer to Subarticle 102-3.3 revised June 16, 1997 of the specifications.

The contractor shall be paid at contract unit prices for replacement RPMs after six months of the original installation. This interpretation is as of this date and will not be applied retroactive. Our State specifications will be changed accordingly in the near future.

If you have any questions please contact Querido Castillo at SC 994-4138.

Date: 04/09/99

From: Goodman, Charles

To: Ricky A. Langley

Henry Haggerty

Steve Benak

Aime J Yocca

Bill Downs

Perez, Eduardo

JIM MOULTON, JR

Wegman, Charles

Greg A. Xanders

Archie Montgomery

CN982CG - DOT1

CN106RL - DOT1

CN206HH - DOT1

CN306SB - DOT1

CN406AY - DOT1

CN506WD - DOT1

CN606EP - DOT1

CN706JM - DOT1

TP854CW - DOT1

CN982GX - DOT1

CN982MA - DOT1

Subject: CONSTRUCTION MAINTENANCE OF TRAFFIC RPM'S

ON MARCH 14, 1994, LAIRSCEY SET OUT A MEMO ON PAYING FOR MAINTENANCE OF TRAFFIC PAVEMENT STRIPING. (IF YOU DONOT HAVE A COPY OF THIS MEMO, LET ME KNOW AND I WILL SEND.)

THE QUESTION HAS BEEN ASKED ABOUT MAINTENANCE OF TRAFFIC RPM'S PAYMENT FOR REPLACEMENTS. IT IS THIS OFFICE RECOMMENDATION THAT WE DO THE SAME FOR RPM'S. WE PAY FOR NO REPLACEMENTS DURING THE FIRST SIX MONTHS UNDER TRAFFIC AND THEN PAY FOR REPLACEMENT UP TO THE ORIGINAL AMOUNT DURING THE SECOND SIX MONTHS. THE CONTRACTOR SHOULD MAINTAIN 98% OF THE RPM'S DOWN AT ALL TIMES. IN THE CURVE SECTIONS YOU SHOULD LIMIT THE AMOUNT OF MISSING RPM'S.

FOLLOW THE SAME DOCUMENTATION AS REQUIRED IN LAIRSCEY'S MEMO.

A FORMAL MEMO WILL FOLLOW.

1. WORK ZONE PAVEMENT MARKINGS. (REV 6-18-97) (7-97)

SUBARTICLE 102-3.3 (Pages 90-92) is deleted and the following substituted:

102-3.3 Work Zone Pavement Markings:

102-3.3.1 Description: Furnish and install Work Zone Pavement Markings for maintenance of traffic in construction areas and in close conformity with the lines and details shown on the plans. Measure the reflectivity of white and yellow stripes using a MiroLux 12 retroreflectometer or equal approved by the State Materials Office. Reflectivity shall be at least 250 mcd/lx·m² for yellow and 300 mcd/lx·m² for white when installed. Re-stripe anytime the reflectivity falls below 150 mcd/lx·m². Compensation for re-striping will be at the contract unit price for the appropriate material when the material used appears on the Qualified Products List (QPL) and is properly installed. The pavement marking materials shall not contain any lead or chromium compounds. Manufacturers seeking product approval shall furnish certified test reports showing the Work Zone Pavement Marking material meets the requirements of this section.

Centerlines, lane lines, edgelines, stop bars and turn arrows in work zones will be required in accordance with Section 6D of the MUTCD with the following additions:

(a) Install edgelines when a paved shoulder 1.2 m or greater in width exists along the edge of a lane.

(b) Place edgelines on all detours where vehicle paths are altered from normal operations and where a lane is narrowed from its normal width for any reason.

(c) Apply Work Zone Pavement Markings, including arrows and messages determined by the Engineer to be required for safe operation of the facility, prior to the end of the day if the highway is open to traffic. Channelizing devices may be used to direct traffic during the day prior to placing the Work Zone Pavement Markings.

(d) Work Zone Pavement Markings will be designated in the plans or by the Engineer as removable or non-removable.

Work Zone Raised Pavement Markers (WZRPM) may be used in lieu of Temporary Tape or Paint in accordance with 102-3.3.2.4.

Removable Work Zone Pavement Markings consists of materials that can be taken up by hand. An example of this category of markings is plastic film (Tape), or Work Zone Raised Pavement Markers (WZRPM's).

Non-Removable Work Zone Pavement Markings consists of markings that are not classified as removable.

Use of Removable or Non-Removable Work Zone Pavement Markings shall be as follows:

Application	Category
Finished Pavement*	
All stripes representing final pavement markings.	Non-Removable

All stripes in an area where the traffic pattern will be altered prior to project acceptance.

Removable

*Place striping representing final markings in the permanent location unless excepted in writing by the Engineer.

Intermediate Pavement Course

All stripes in pavement areas that will be covered with a subsequent course of pavement prior to altering of the traffic pattern within such area.

Non-Removable

All stripes where the traffic pattern will be altered prior to placing of the subsequent paving course within such area.

Removable

Existing Pavement

All stripes that will be removed or overlaid with new pavement prior to altering the traffic pattern within such area.

Non-Removable

All stripes where the traffic pattern will be altered prior to removal or overlaying of such area.

Removable

Removable Pavement Markings may be substituted for Non-Removable Pavement Markings. When substitution is made, payment will be made under the Bid Item, Non-Removable Pavement Marking.

102-3.3.2 Materials:

102-3.3.2.1 Paint and Glass Beads: Meet the application requirements of Section 710, and the material requirements of section 971.

102-3.3.2.2 Preformed Non-removable Pavement Marking Film (Tape): Conform to the application requirements of Section 713, and the material requirements of 971-18.

102-3.3.2.3 Preformed Removable Pavement Marking Film (Tape): Meet the following requirements:

(1) Composition: Use a mixture consisting of polymeric materials, pigments, glass beads, and a retro-reflective layer of glass beads firmly bonded to the top surface.

(2) Adhesive: Precoat removable preformed plastic pavement marking film with a pressure sensitive adhesive capable of being affixed to asphaltic concrete and portland cement concrete pavement surfaces without the use of heat, solvents, and other additional adhesives or activators. Use an adhesive that exhibits excellent sheer characteristics and minimal tensile characteristics. Ensure that the adhesive does not require a protective liner when the preformed plastic pavement marking film is in rolled form for shipment. Ensure that the adhesive is capable of temporarily bonding to the roadway pavement at temperatures of 10°C and the above without pick-up distortion by vehicular traffic.

(3) Pigmentation: Thoroughly blend color pigments to provide a plastic marking film that maintains uniform color under daylight and night lighting conditions

throughout the expected life of the film. White pavement marking film shall meet Federal Standard Color No. 595-17886. Yellow pavement marking film shall be similar to Federal Standard Color No. 595-13538.

(4) Glass Beads: Use colorless glass beads with a minimum refraction index of 1.50 when tested using the liquid oil immersion method. Use size and quantity of beads that will maintain the retro-reflectivity of the preformed plastic film as the film wears through the surface course. Firmly adhere approximately 2% by weight of glass beads to the top of the preformed plastic film. Beads should not be easily removed when film surface is scratched firmly with a thumbnail.

(5) Application Requirements: Apply removable Pavement Marking Film (Tape) with a mechanical applicator to provide pavement lines that are neat, accurate and uniform. Equip the mechanical applicator with a film cut-off device and with measuring devices that automatically and accumulatively measure the length of each line placed within an accuracy tolerance of $\pm 2\%$. Roll or tamp pavement marking films (tape) to facilitate adhesion to the road surface. Tape may be placed by hand on short sections 150 m or less if it is done in a neat accurate manner.

(6) Removability: Provide preformed plastic pavement marking film capable of being removed from bituminous concrete and portland cement concrete pavement intact or in substantially large strips, either manually or by a mechanical roll-up device, at temperatures above 4°C, without the use of heat, solvents, grinding or blasting. Ensure that the manufacturer shows documented reports that the retro-reflective preformed plastic pavement marking film meets this requirement after being in place for a minimum of 90 days and under an average daily traffic count per lane of at least 9000 vehicles per day.

102-3.3.2.4 Work Zone Raised Pavement Markers: Work Zone Raised Pavement Markers (WZRPM's) are RPM's intended for use in work zones as an alternate to other line markings. Use tape or paint in all transition areas in addition to the RPMs. WZRPM's shall be referred to as class "D" or class "E" Markers. Apply all markers in accordance with Roadway and Traffic Design Standards, Index No. 600.

Class A, B, and flexible E markers may be used in lieu of class D Markers. Class E Markers will only be allowed for use in areas for 5 continuous days or less.

Use colorless reflectors to replace white lines and amber reflectors to replace yellow lines. Space markers at 750 mm centers for lane lines and 1.5 m centers for edge lines.

To provide contrast, place five black Work Zone Raised Pavement Markers (WZRPM's) immediately after the five colorless reflective markers on asphalt pavement 5 years or older and all concrete pavement. Black Work Zone Raised Pavement Markers (WZRPM's) will not be required with amber markers.

Ensure that Work Zone Raised Pavement Markers (WZRPM's), are certified as meeting the following except for Class E markers as noted below:

(1) Composition: Use markers made of plastic, ceramic or other durable materials. Markers with studs or mechanical attachments will not be allowed.

(2) Dimensions: Marker minimum and maximum surface dimensions is based on an x and y axis where the y dimension is the axis parallel to the centerline and the x axis is 90° to y. Class E markers shall be 100 mm (W) by 50 mm (H) by 25 mm (D).

The x and y dimension of Class D markers shall be

a maximum of 125 mm. The x dimension shall be a minimum of 100 mm and the minimum y dimension will be 57 mm.

Ensure that the maximum installed height of Class D markers is 25 mm. Ensure that the maximum installed height of Class E markers is 50 mm. Use Class D markers having a minimum reflective face surface of 225 mm². Use Class E markers having a minimum reflective surface area of 645 mm².

Ensure that after installation, the marker's reflective face is completely visible and above the pavement surface measured from a line even with the pavement perpendicular to the face of the marker.

(3) Optical Performance: Ensure that the specific intensity of each white reflecting surface at 0.2 degrees observation angle is at least the following when the incident light is parallel to the base of the marker:

Horizontal Entrance Angle	Specific Intensity
0 degrees	3
20 degrees	1.2

For yellow reflectors, the specific intensity shall be 60% of the value for white.

For red reflectors, the specific intensity shall be 25% of the value for white.

Reflectivity of all (WZRPM's) shall not be less than 1.0 Specific Intensity (SI) any time after installation.

(4) Strength requirements: Markers shall support a load of 20 kN. Three markers per lot or shipment will be randomly selected for a test.

Position the marker base down between the flat parallel platens of a compression testing machine. Place on top of the marker a flat piece of 65 durometer rubber 150 by 150 by 9.5 mm centered on the marker. Apply the compressive load through the rubber to the top of the marker at a rate of 0.085 mm/s.

Either cracking or significant deformation of the marker at any load less than 20 kN will constitute failure.

(5) Adhesion: Use bituminous or other adhesive materials recommended by the marker manufacturer for bonding the markers to the pavement. The adhesive used shall be one of the products included on the Qualified Products List

(6) Removability: Ensure that the pavement marker is removable from asphalt pavement and portland cement concrete pavement intact or in substantially large pieces, either manually or by mechanical devices at temperatures above 4°C, and without the use of heat, grinding or blasting.

~~(7)~~ **Replacement Requirements: Replace markers any time after installation when more than two markers in a skip, or more than three consecutive markers on an edgeline are missing at no expense to the Department. Replace all failed markers in a timely manner as directed by the Engineer.**

102-3.3.3 Certification: Furnish the Engineer certified test reports showing the work zone pavement marking material and adhesive supplied meets the applicable specification.



March 14, 1994

M E M O R A N D U M

**TO: DISTRICT CONSTRUCTION ENGINEERS
TURNPIKE CONSTRUCTION ENGINEER**

FROM: J. B. Lairscey, Director, Office of Construction

**COPIES: C. W. Goodman, Ed Minchin, Tom Aldridge, FHWA,
Area Construction Engineers, Querido Castillo**

**SUBJECT: MAINTENANCE OF TRAFFIC
TEMPORARY PAVEMENT STRIPING**

Temporary pavement striping on our active construction projects are generally good at the beginning of construction activities but deteriorates very rapidly after a few months of use. This is due to several possible reasons. One, of course, is that the life span of the pavement stripe is approximately six months according to maintenance records. In some other cases, a pavement stripe installed soon after an asphalt course is laid will be "soaked in" and will not serve a long life. Another reason for a rapid deterioration is simply because the stripe is not installed according to specification requirements. We must improve on this.

According to our Specifications, the contractor is required to maintain the temporary pavement markings that he initially installs. This maintenance obligation is considered to be six (6) months. This obligation includes restriping if considered necessary by the Project Engineer and the sweeping of debris at all times.

If, after the six month period, the Project Engineer deems that the initial stripe no longer is serving its purpose, he shall direct the contractor to restripe the area once more and will pay the contractor the unit bid price for this additional work. The contractor is obligated to maintain this restriping for another six months as described above. It is recommended that the work for pavement striping be documented in the daily diary or other field book to determine the contractor's maintenance obligation. It is expected that overruns will occur in this item but it is also essential that we have good pavement markings throughout the limits of construction for the safety of the travelling public.

DISTRICT CONSTRUCTION ENGINEERS
TURNPIKE CONSTRUCTION ENGINEER
March 14, 1994
Page 2

Please remind your Project Engineers that the specification requirements for temporary pavement striping is identical to the permanent striping. We must assure ourselves that all of the specification criteria in spread thickness, width and amount of glass beads are in the initial and subsequent installations.

A specification change request is not required in this interpretation of the maintenance obligation for pavement markings. This interpretation is as of this date and should not be applied retroactive.

If you have any questions, please contact Querido Castillo at Suncom 278-4756.

QC/mw