To:		New York State Department of Transportation ENGINEERING BULLETIN	EB 03-021
			Expires one year after issue unless replaced sooner

Title: **PREFORMED WET-REFLECTIVE TAPE DELINEATION (GROOVED-PAVEMENT METHOD)**

Distribution:

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Approved:

Bruce W. Smith, Director, Traffic Engineering & Highway Safety Division

4/10/03
Date

ADMINISTRATIVE INFORMATION: This issuance shall be effective with projects submitted for the letting of 09/11/03. No issuances are superseded but this issuance supplements EI 93-037 Raised Snowplowable Pavement Markers.

PURPOSE: This EB transmits special specifications for new reflective pavement marking tape.

TECHNICAL INFORMATION: Durable Preformed Wet-Reflective Tape Delineation provides better reflectivity during wet road conditions than traditional pavement marking tapes and may be used as an alternative to raised snowplowable pavement markers to supplement long-line pavement markings as mitigation for nighttime wet-weather accidents. Wet-reflective tape may also be used as barrier marking but the added cost should be considered. The standard installation should consist of 0.6-meter (two-foot) stripes at 24-meter (80-foot) spacing (every other marking cycle).

IMPLEMENTATION: Designers should consider using wet-reflective tape where the accident pattern is correctable by improved lane delineation as per EI 93-037. Designers should specify the spacing and length and width of the tape in the contract documents since it is not in the specification.

Construction staff should closely monitor the installation of the tape. Limited experience with the tape indicates that durability of the tape is highly dependent on strict compliance with proper installation procedures as detailed by the manufacturer and the specification. To date, all performance problems with the tape have been traced to installation problems. If the Contractor is inexperienced or has a history of quality control problems with the tape, the Engineer-In-Charge should consider requiring the services of a manufacturer's representative as authorized in the specification.

TRANSMITTED MATERIALS: Special Specification Durable Preformed Wet-Reflective Tape Delineation (Grooved-Pavement Method).

BACKGROUND: Reflectivity of traditional pavement markings is scattered when the markings are wet or submerged. Traditionally, the standard treatment for locations identified as wet-weather accident- prone has been the installation of raised snowplowable pavement markers. However, the effects of repeated impacts with the raised markers on both snow plowing equipment and operators has been identified as a concern. The wet-reflective tape displays nighttime wet-weather retroreflectivity values after two years of service which exceed the requirements for new epoxy marking, and eliminates the snow plowing related concerns cited in EI 93-037.

CONTACT: Direct questions on use of the tape to Dave Clements dclements@dot.state.ny.us or Chuck Riedel criedel@dot.state.ny.us of the Traffic Engineering & Highway Safety Division at 457-3537. Direct questions about the specification to Pat Galarza pgalarza@dot.state.ny.us. of the Materials Bureau at 457-4285.

ITEMS 91688.1001 M AND 91688.1002 M - DURABLE PREFORMED WET-REFLECTIVE TAPE DELINEATION (GROOVED-PAVEMENT METHOD)

DESCRIPTION

Furnish and install, white or yellow durable preformed wet-reflective tape meeting this specification, into grooves, machine-cut into the pavement in accordance with the contract documents, and as directed by the Engineer to supplement long-line pavement markings and provide wet-weather nighttime delineation.

MATERIALS

General.

Provide a durable preformed wet-reflective tape that:

- Consists of a highly retroreflective enclosed lens, white or yellow film with a thin, flexible, and conformable backing pre-coated with a pressure-sensitive adhesive.
- Adheres to hot-mix asphalt (HMA) or portland cement concrete (PCC) pavement surfaces at a minimum air temperature of 16°C (60°F), and a minimum pavement temperature of 21°C (70°F).
- Provides wet-weather nighttime retroreflectivity (visibility) and dry nighttime retroreflectivity (visibility) when installed below the pavement surface into machine-cut grooved pavement.
- Provides an approved, preformed, wet-reflective tape of the color and dimensions indicated in the contract documents, free of cracks or other defects, and with clean-cut and well-defined edges.
- Is weather resistant, showing no appreciable fading, significant tearing, lifting, or shrinkage through normal traffic wear.
- Is capable of molding itself to the contours, breaks, and faults of HMA or PCC pavement surfaces.

Daytime Chromaticity Coordinates (Dry).

CHROMATICITY COORDINATES								
Color	Point 1		Point 2		Point 3		Point 4	
	x	y	x	y	x	y	x	y
White	.355	.355	.305	.305	.285	.325	.335	.375
Yellow	.560	.440	.460	.400	.420	.440	.490	.510

Retroreflectivity (Dry).

MINIMUM INITIAL RETROREFLECTANCE [(mcd/m²)/lx] ASTM E 1710 / E2176 / E2177	
White	Yellow
750	450

Liquid Adhesive. Use approved surface-preparation liquid adhesive which conforms to Federal and State regulations for the emission of volatile organic compounds (VOC) and as recommended by the preformed tape manufacturer.

Packaging and Shipment. Clearly display the name of the product, the name and address of the manufacturer, the quantity of material, the date of manufacture, and the date of expiration or the shelf life, on each container or on the shipping invoice .

Basis of Acceptance.

ITEMS 91688.1001 M AND 91688.1002 M - DURABLE PREFORMED WET-REFLECTIVE TAPE DELINEATION (GROOVED-PAVEMENT METHOD)

a. As listed in this specification or approved equal by the Materials Bureau:

BRAND NAME	SUPPLIER\LOCATION
Stamark Wet-Reflective Pavement Marking Tape - Series 820 (White) - Series 821 (Yellow) Stamark Surface-Preparation Adhesive P-50	3M Traffic Control Materials Division St. Paul, MN Guin, AL

b. Manufacturer's Certification that the wet-reflective tape meets the requirements of these specifications.

CONSTRUCTION DETAILS

General. Install white or yellow, durable, preformed wet-reflective tape as shown in the contract documents and in accordance with the New York State Manual of Uniform Traffic Control Devices (MUTCD).

Submit a schedule of operations for the approval by the Engineer before any pavement marking work is begun. At least 5 calendar days prior to the start of work, provide the Engineer with the manufacturer's written instructions for:

- Grinding pavement for wet reflective tape.
- Applying surface-preparation liquid adhesive.
- Installing preformed wet reflective tape.

Weather and Seasonal Limitations.

Do not install wet reflective tape during periods of rain, or when the pavement surface is wet or damp. Apply wet-reflective tape within the seasonal and temperature limitations given in the table below:

TEMPERATURE AND SEASONAL REQUIREMENTS			
Geographic Location	**Pavement Surface Temperature**	**Air Temperature**	**Allowable Installation Dates**
Regions 1, 2, 3, 4, 5, 6, 7 & 9 (All Counties) Region 8 (Ulster County only)	21°C, Min.	16°C, Min.	May 15 to September 1
Regions 8 & 10 (except Ulster County)	21°C, Min.	16°C, Min.	May 15 to September 15
Region 11	21°C, Min.	16°C, Min.	May 1 to September 30
Notes: 1. Measure surface temperature at three locations, 30 m apart on the pavement surface where the wet- reflective tape is to be installed and average the three readings to determine specification compliance. 2. Measure air temperature in a shaded area.			

If the Contractor has not installed this product before, provide a manufacturer's representative to provide guidance for the proper grinding equipment and grinding method, and for the proper installation of preformed wet- reflective tape. Retain the services of the manufacturer's representative until the Engineer approves all equipment and construction operations.

Establish marking-line points at appropriate intervals throughout the length of the pavement.

On newly constructed PCC pavements, do not begin grinding operations until the requirements of §502-3.18, *Opening To Traffic* are met. Conduct pavement-cutting operations and pavement-cleaning work in such a manner as

to minimize airborne dust and similar debris and prevent a hazard to workers, motor vehicle traffic, or nuisance to property.

Install wet- reflective tape in such a manner to prevent damage to the surrounding pavement or pavement joints. A pavement joint is defined as either a sawed or formed joint in a PCC pavement that separates two pavement slabs or lanes, or as a construction (paving) joint or sawed-and-sealed joint in HMA pavement. Repair all damaged pavement surfaces that result from improper installation, or installation of wet-reflective tape in unauthorized areas. Remove and repair damaged areas at no additional cost to the State.

Install wet-reflective tape into the grooved/ground pavement at the specified depth, and the required width and length shown in the contract documents. Do not grind grooves or install wet-reflective tape across longitudinal or transverse pavement joints.

Install wet-reflective tape between existing broken (skip) lines and in the same longitudinal alignment as existing broken lines at the spacing shown on the contract documents. If the wet-reflective tape is being used as a full or partial barrier centerline, remove the entire section of existing centerline markings and replace with the wet-reflective tape.

Locate the edges of the wet-reflective tape, at least 100 mm to 150 mm away from pavement joints and cracks when possible. Do not install wet-reflective tape at locations that show visible evidence of pavement deterioration such as cracking and spalling. Relocate the installation of wet-reflective tape to another area if the typical longitudinal spacing of the wet-reflective tape falls at a location of pavement deterioration. Do not install the wet-reflective tape if it cannot be relocated within ± 10% tolerance of the specified longitudinal spacing.

Installation. Install wet-reflective tape according to the following sequence of operations within the same calendar day:

- Grind a groove of the following dimensions into the pavement without the use of water or lubricants:
  Length: 1.5 m typical; Width: Specified tape width plus 30 mm, Depth: 2.2 mm - 2.4 mm
- Use free-floating, independent grinding heads for a consistent, uniform groove depth. Grind the groove with portable or mobile equipment that has a cutting head(s) designed to provide a pavement surface texture that is free of sharp ridges. Grind the pavement in accordance with the tape manufacturer's written guidelines for grooving pavement surfaces. If necessary, supplement grooving with shot blasting, abrasive blasting, or power sweeping or brooming to achieve the proper surface texture.
- Verify the specified groove depth at the start of the grooving operation and periodically throughout the day's operation. Regrind areas where any groove depth measurement does not meet the minimum specified depth. Reject grooves which exceed the specified maximum and relocate the groove to an adjacent area. Repair rejected grooves.
- Remove and collect debris resulting from the grooving/grinding operation, prior to opening the roadway to traffic and prior to the application of a surface preparation adhesive. Dispose of collected debris as uncontaminated solid waste or construction and demolition debris. Ensure that all operations associated with the handling, transporting, and disposal of the construction and demolition debris are in compliance with §107-16, *Solid Waste Management.*
- Clean all surfaces of the groove by air blasting (min. 90 psi) to remove all loose residue. Include power brooming or manual brooming, if necessary, to remove all loose residue from the groove. Make sure all pavement surfaces are free of oil, dirt, dust, grease, salt, and similar foreign materials at the time of application.
- Uniformly apply approved surface-preparation adhesive to the entire bottom area of the groove at the manufacturer's recommended application rate and method. Allow the liquid adhesive to dry as recommended by the manufacturer.
- Apply wet-reflective tape into the primed groove. Tamp (roll) in a straight line with a shouldered tamping roller, slightly less in width than the groove, in accordance with the manufacturer's recommendations. Do not roll the tape with a vehicle tire unless allowed by the manufacturer's written instructions.

METHOD OF MEASUREMENT

The Engineer will measure the meters of wet-reflective tape satisfactorily furnished and installed in grooved pavement, excluding the length of gaps between wet-reflective tape, for the purpose of payment. The Engineer will measure wet-reflective tape with a width greater than the standard 100 mm using the following method:

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$$\frac{\text{Width of Striping (Millimeters)} \times \text{Meters}}{\text{100 Millimeters}}$$

BASIS OF PAYMENT

Include the cost of furnishing all labor, materials, and equipment to satisfactorily install Durable Preformed Wet-Reflective Tape Delineation and the cost for collection and disposal of uncontaminated solid waste in the price bid. The cost of grooving the pavement for the installation of wet-reflective tape will be included in the price bid for wet-reflective tape.

Payment will be made under:

Item No.	Item	Pay Unit
91688.1001 M	White Durable Preformed Wet-Reflective Tape Delineation (Grooved-Pavement Method)	Meter
91688.1002 M	Yellow Durable Preformed Wet-Reflective Tape Delineation (Grooved-Pavement Method)	Meter