

Pavement Marking Selection



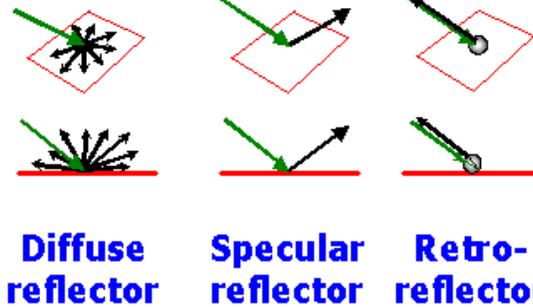
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General Issues to All Markings

- ◆ Color
- ◆ Retroreflectivity



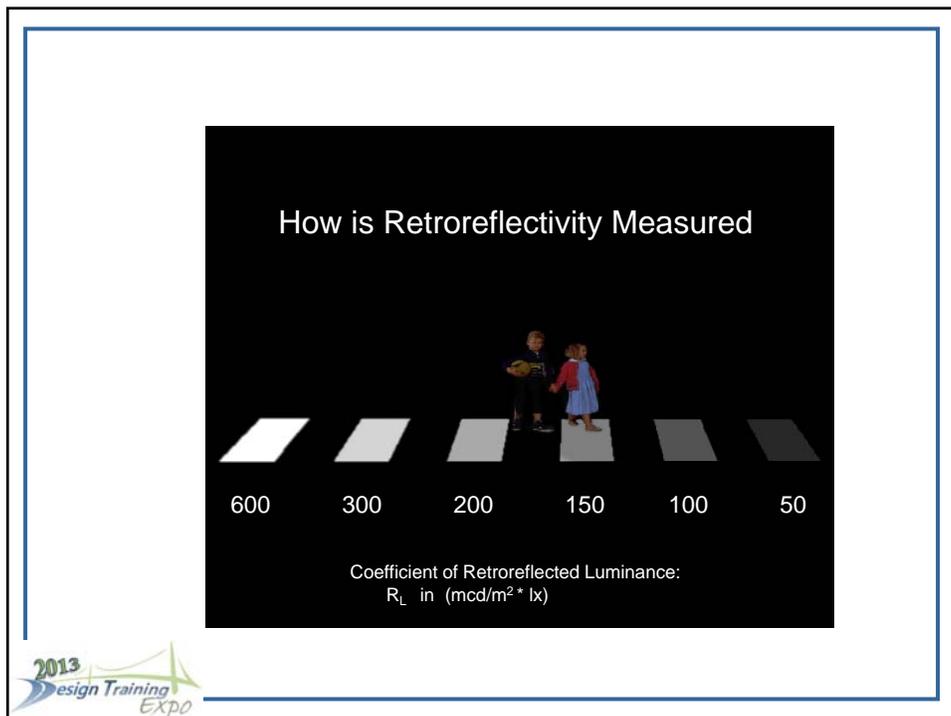
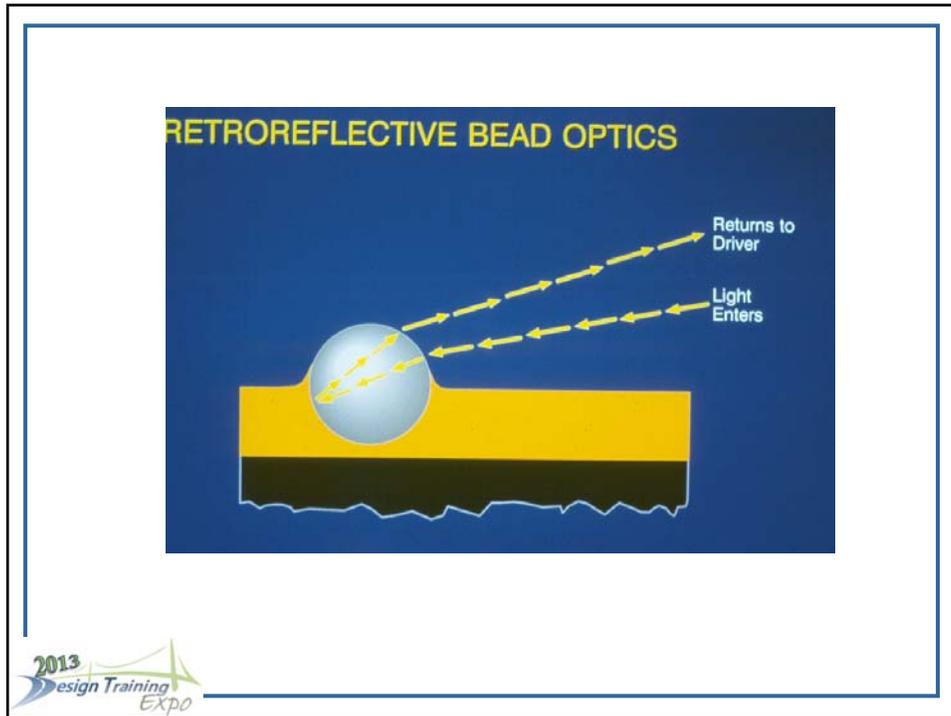
Types of Reflectors



What is Retroreflectivity?

- ◆ Retroreflectivity is where the reflected rays are preferentially returned in a direction close to the opposite of the direction of the incident rays.





Types of Marking Materials

- ◆ Paint
- ◆ Thermoplastic
- ◆ Preformed Thermoplastic
- ◆ High Performance Tapes
- ◆ Two Component Reactive
- ◆ Audible & Vibratory Markings



Types of Marking Materials

- ◆ Paint



Paint Policy

- ◆ “Paint is normally used in MOT operations and is appropriate for short term operations.”
- ◆ Two coats of paint are required as the final pavement markings for construction contracts.



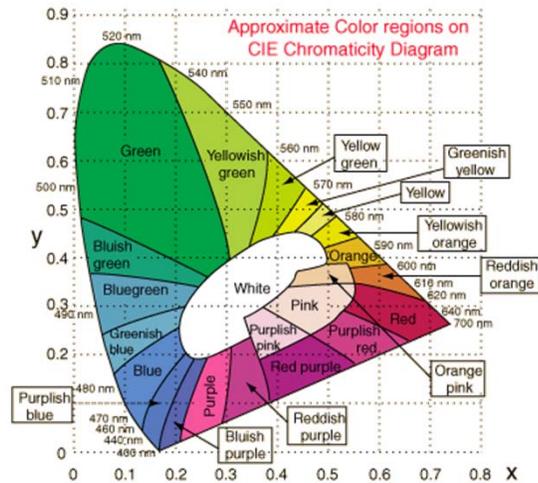
Painted Pavement Markings

Primary Uses:

- ◆ Maintenance of Traffic Markings
- ◆ Short Term Refurbishment Marking
- ◆ Contrast Marking



1931 CIE Chromaticity Diagram



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Painted Pavement Markings

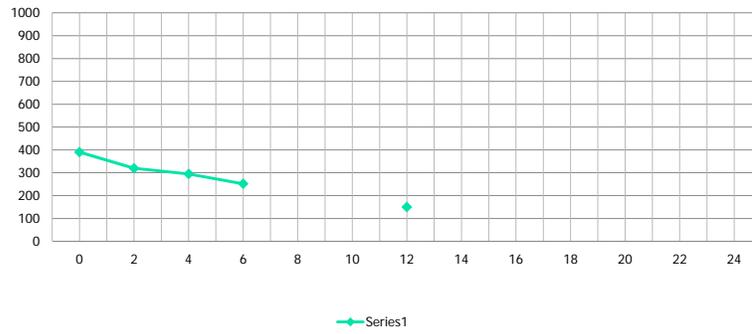
Limitations:

- ◆ Expected Service Life - 6 to 12 Months
- ◆ No Wet Retroreflectivity Characteristics

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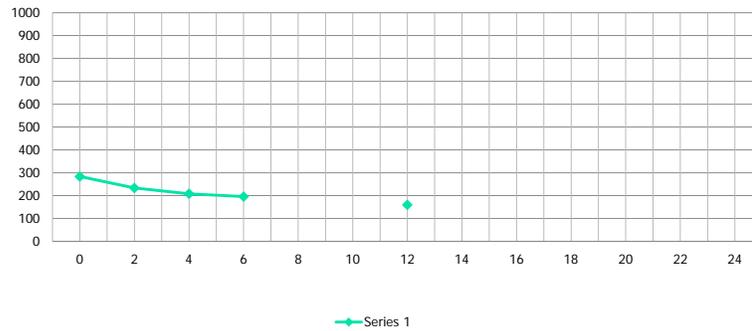
White Paint Performance

White Retroreflectivity



Yellow Paint Performance

Yellow Retroreflectivity



Painted Pavement Markings

Life Cycle Cost:

- ◆ Initial Cost - \$ 900/Mile
- ◆ Expected Life – 1 Year
- ◆ Annualized Cost - \$ 900/Year
- ◆ Average Retroreflectivity -
 - ✓ White – 261 mcd
 - ✓ Yellow – 206 mcd



Section 710: Painted Pavement Markings Field Installation



*Section 710:
Painted Pavement Markings
Field Installation*



*Section 710:
Painted Pavement Markings
Field Installation*



Types of Marking Materials

- ◆ Paint
- ◆ Thermoplastic



Thermoplastic Policy

- ◆ “Thermoplastic is the Department’s primary material to be used for permanent markings on asphalt surfaces.”



Thermoplastic Pavement Markings

Primary Uses:

- ◆ Longitudinal and Transverse Lines
- ◆ Messages and Symbols
- ◆ Arrows



Thermoplastic Pavement Markings

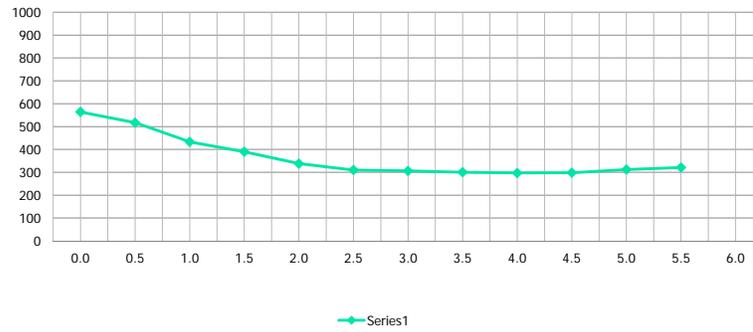
Advantages:

- ◆ Expected Service Life - 7 to 8 Years
- ◆ Retroreflectivity Levels
 - ✓ White Average - 374 mcd (6 Years)
 - ✓ Yellow Average - 434 mcd (6 Years)
- ◆ Wet Retroreflectivity Characteristics



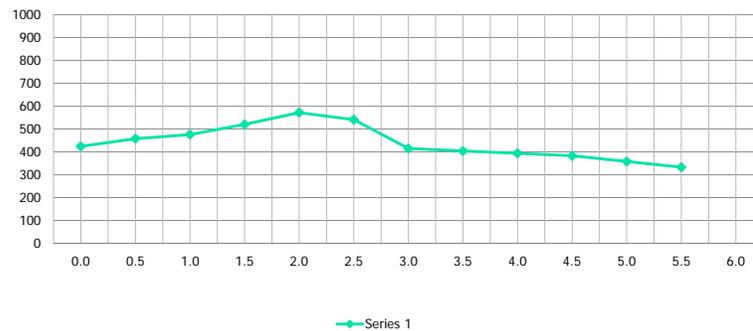
White Thermoplastic Performance

White Retroreflectivity



Yellow Thermoplastic Performance

Yellow Retroreflectivity



Thermoplastic Pavement Markings

Limitations:

- ◆ Sealer for Use on Concrete
- ◆ Will Not Bond to Concrete If Moisture is Present



Thermoplastic Pavement Markings

Life Cycle Cost:

- ◆ Initial Cost - \$ 4000/Mile
- ◆ Expected Life – 18 Years
- ◆ Annualized Cost - \$ 500/Year
- ◆ Average Retroreflectivity -
 - ✓ White – 374 mcd
 - ✓ Yellow – 434 mcd



Thermoplastic Pavement Markings Field Installation – Ribbon Gun



Thermoplastic Pavement Markings Field Installation – Handliner



Types of Marking Materials

- ◆ Paint
- ◆ Thermoplastic
- ◆ **Preformed Thermoplastic**



Preformed Thermoplastic Policy

- ◆ Preformed thermoplastic is required for all bicycle markings.
- ◆ Preformed thermoplastic is required for interstate exit numbers.
- ◆ Special emphasis crosswalk markings at midblock are required to utilize preformed thermoplastic.



Preformed Thermoplastic Pavement Markings

Primary Uses:

- ◆ Exit Ramp Numbers
- ◆ Bicycle Symbols
- ◆ Crosswalk Pavement Markings
- ◆ Horizontal Pavement Signing
- ◆ Pavement Messages



Preformed Thermoplastic Markings



Preformed Thermoplastic Markings



Preformed Thermoplastic Markings



Preformed Thermoplastic Markings



Preformed Thermoplastic Markings



Preformed Thermoplastic Markings



Types of Marking Materials

- ◆ Paint
- ◆ Thermoplastic
- ◆ Preformed Thermoplastic
- ◆ Permanent Tapes



High Performance Tape Policy

- ◆ “High performance contrast tape is required for centerline markings on concrete pavements and concrete bridge decks with (lengths of 300' or greater).”



Tape Pavement Markings

Primary Uses of High Performance:

- ◆ Longitudinal Centerlines on Concrete



Tape Pavement Markings

Advantages:

- ◆ Expected Service Life - 7 to 8 Years
- ◆ Retroreflectivity Levels
 - ✓ White – 842 mcd (3 Years)
 - ✓ Yellow – 725 mcd (3 Years)
- ◆ Wet Retroreflectivity Characteristics



Tape Pavement Markings

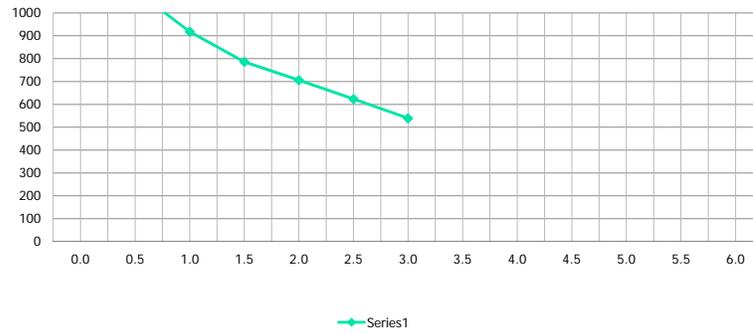
Advantages:

- ◆ Expected Service Life - 7 to 8 Years
- ◆ Retroreflectivity Levels
 - ✓ White – 842 mcd (3 Years)
 - ✓ Yellow – 725 mcd (3 Years)
- ◆ Wet Retroreflectivity Characteristics



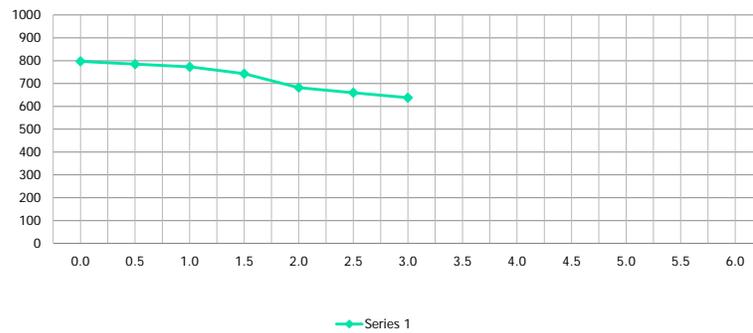
White High Performance Tape

White Retroreflectivity



Yellow High Performance Tape

Yellow Retroreflectivity



High Performance Tape Skip/Contrast Markings

Life Cycle Cost:

- ◆ Initial Cost - \$ 8,450/Mile
- ◆ Expected Life – 7 Years on Concrete
- ◆ Annualized Cost - \$ 1207/Year
- ◆ Average Retroreflectivity -
 - ✓ White – 842 mcd (3 Years)
 - ✓ Yellow – 725 mcd (3 Years)



High Performance Tape Edge Line Markings

Life Cycle Cost:

- ◆ Initial Cost - \$ 18,750/Mile
- ◆ Expected Life – Insufficient Data
- ◆ Annualized Cost – Insufficient Data



Tape Pavement Markings

Limitations:

- ◆ High Cost
- ◆ Performs Best on Concrete
- ◆ Requires Lane Closures to Install
- ◆ Extensive Prep. for Refurbishment



Tape Pavement Markings



High Performance Tape Markings Field Installation - Mobile



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High Performance Tape Markings Field Installation - Mobile



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Types of Marking Materials

- ◆ Paint
- ◆ Thermoplastic
- ◆ Preformed Thermoplastic
- ◆ High Performance Tapes
- ◆ **Two Component Reactive**



Types of Two Component Reactive Pavement Markings

- ◆ Epoxies
- ◆ Polyureas
- ◆ Modified Urethanes
- ◆ Methyl Methacrylates



Two Component Markings

Primary Uses:

- ◆ Longitudinal Edge Lines on Concrete



Two Component Markings

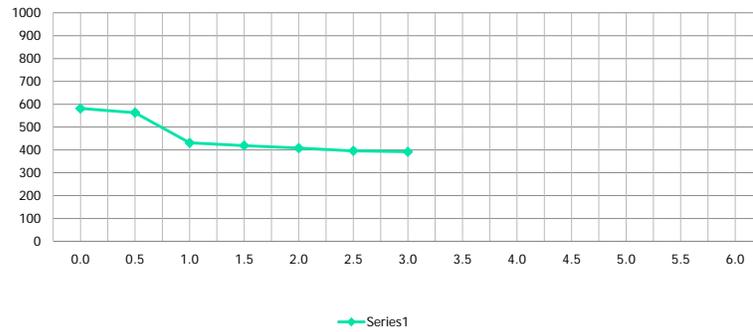
Advantages:

- ◆ Excellent Adhesion to Concrete
- ◆ Retroreflectivity Levels
 - ✓ White – 415 mcd (3 Years)
 - ✓ Yellow – 277 mcd (2 Years)
- ◆ Wet Retroreflectivity Characteristics



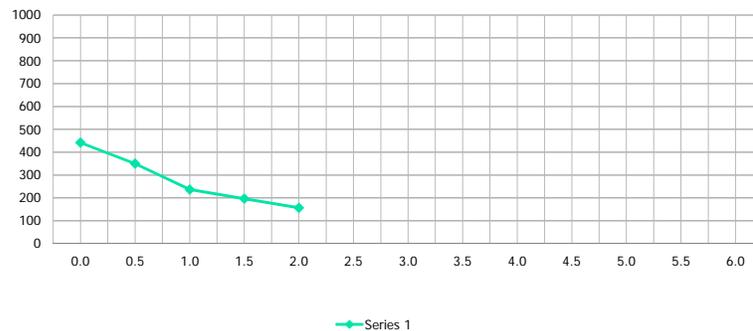
White Two Component Performance

White Retroreflectivity



Yellow Two Component Performance

Yellow Retroreflectivity



Two Component Markings

Limitations:

- ◆ Limited Equipment - Do Not Specify for Projects with Small Quantities
- ◆ Extensive Prep. for Installation
- ◆ May Require Lane Closures to Install
- ◆ Can Only Be Refurbished With Identical Materials



Two Component Markings

Life Cycle Cost:

- ◆ Initial Cost – Insufficient Data
- ◆ Expected Life – Insufficient Data
- ◆ Annualized Cost – Insufficient Data



Types of Marking Materials

- ◆ Paint
- ◆ Thermoplastic
- ◆ Preformed Thermoplastic
- ◆ High Performance Tapes
- ◆ Two Component
- ◆ Audible & Vibratory Markings



Audible & Vibratory Policy

- ◆ “Edge lines on all two-lane and multi-lane flush shoulder rural roads with posted speed of 50 mph or greater.”
- ◆ “Only on centerlines of two-lane rural roads with history of centerline cross over crashes.”



Audible & Vibratory Pavement Markings

Primary Use:

- ◆ Longitudinal Edge Lines
- ◆ Centerline markings (If Justifiable)



Audible & Vibratory Markings *Ennis Product*



Audible & Vibratory Markings *Crown Product*



Audible & Vibratory Markings *Field Installation - Crown*



Audible & Vibratory Markings
Ground-in Rumble Stripe



Audible & Vibratory Markings
Ground-in Rumble Stripe



*Audible & Vibratory Markings
Field Installation - Ground-in Rumble Stripe*



*Audible & Vibratory Markings
Field Installation - Ground-in Rumble Stripe*



Audible & Vibratory Markings

Life Cycle Cost:

- ◆ Initial Cost - \$ 5,750/Mile
- ◆ Expected Life – Insufficient Data
- ◆ Annualized Cost – Insufficient Data



Audible & Vibratory Markings

Limitations:

- ◆ Do Not Specify for Tapers, Turn Lanes or Radius Markings



Questions

