

Pavement Marking Selection





Introductions

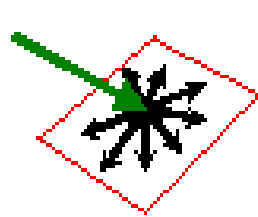


General Issues to All Markings

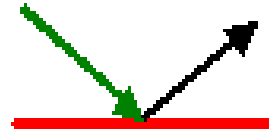
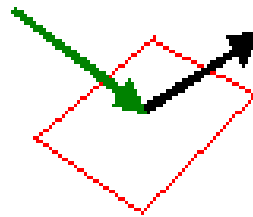
- Color
- Retroreflectivity



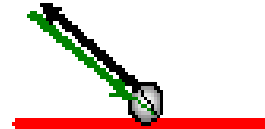
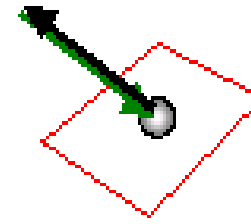
Types of Reflectors



**Diffuse
reflector**



**Specular
reflector**



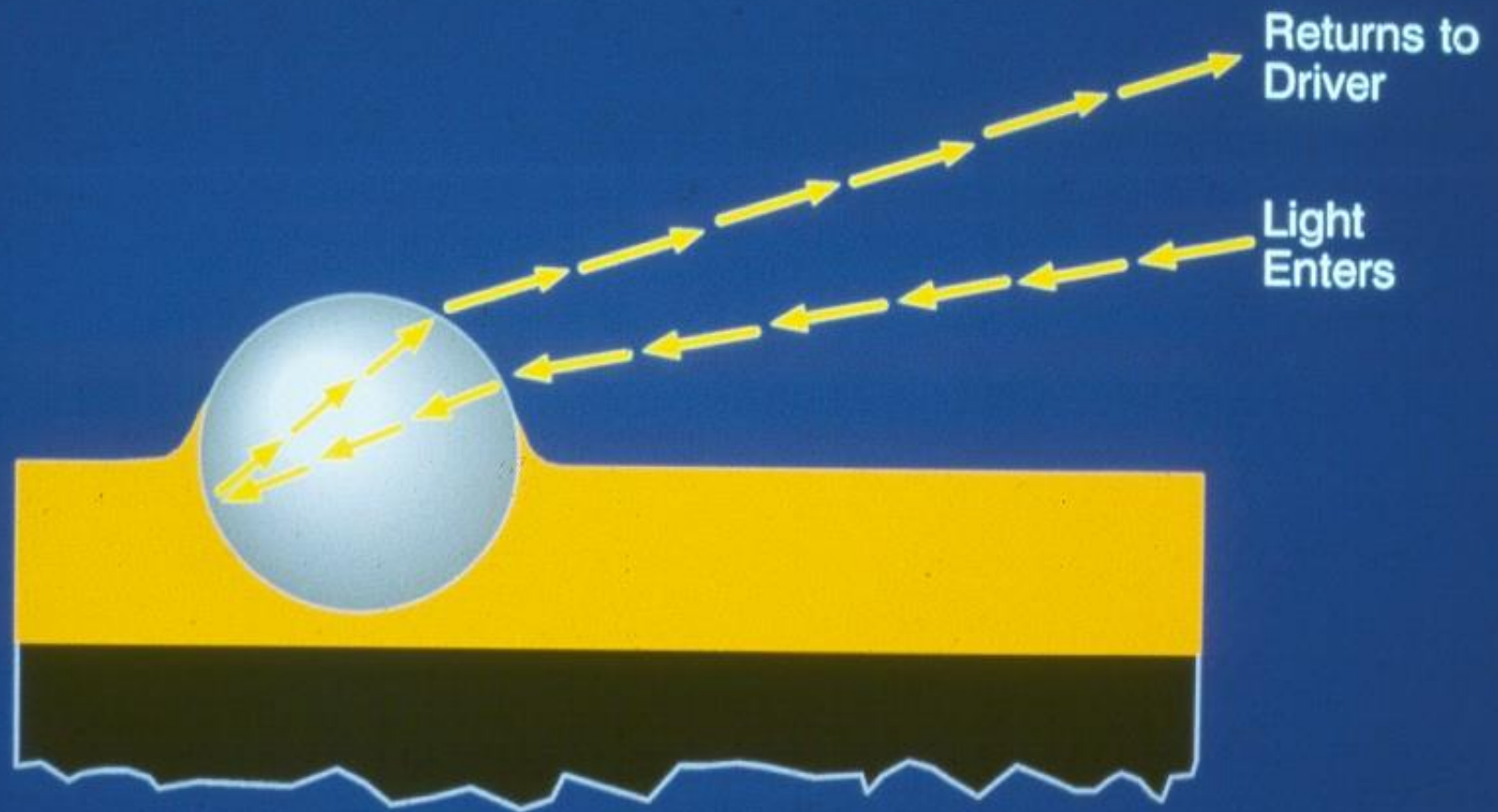
**Retro-
reflector**



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.

RETROREFLECTIVE BEAD OPTICS



How is Retroreflectivity Measured



Coefficient of Retroreflected Luminance:
 R_L in ($\text{mcd/m}^2 \cdot \text{lx}$)



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



Painted Pavement Markings

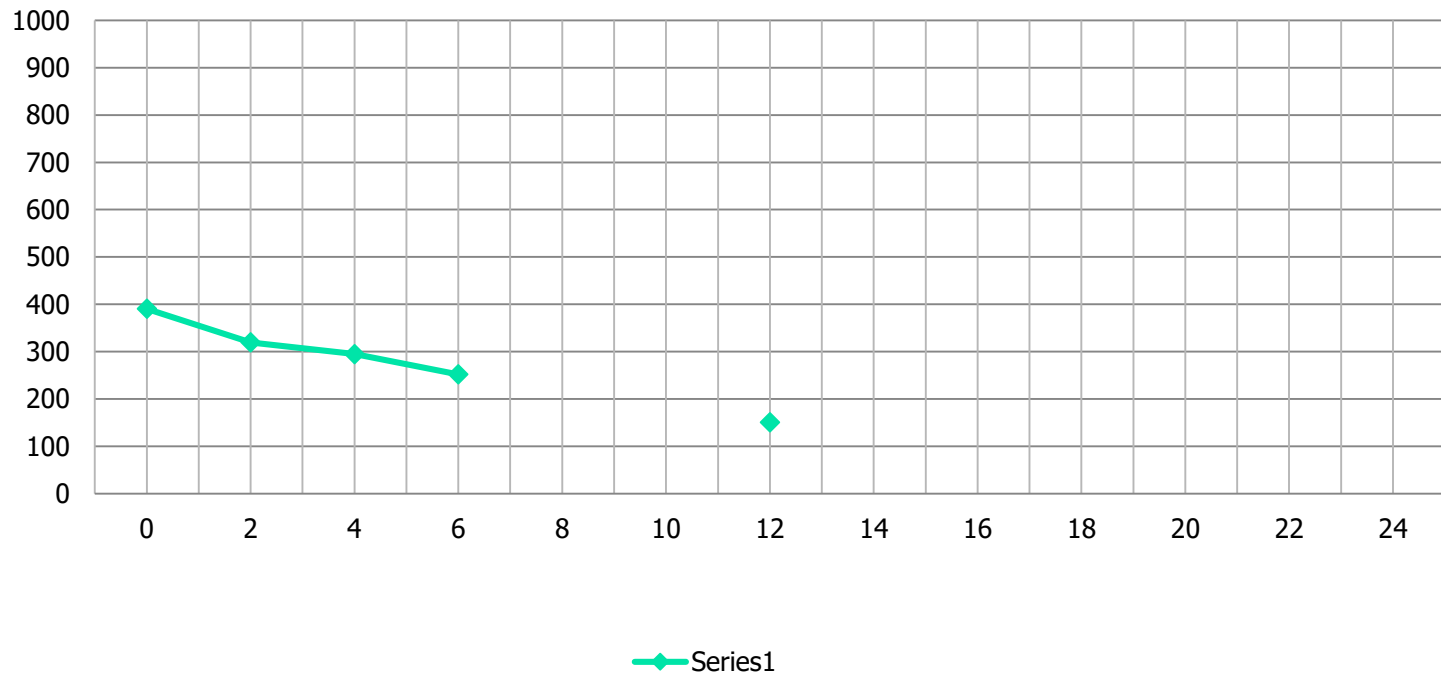
Limitations:

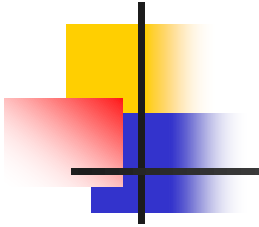
- Expected Service Life - 6 to 12 Months
- No Wet Retroreflectivity Characteristics



White Paint Performance

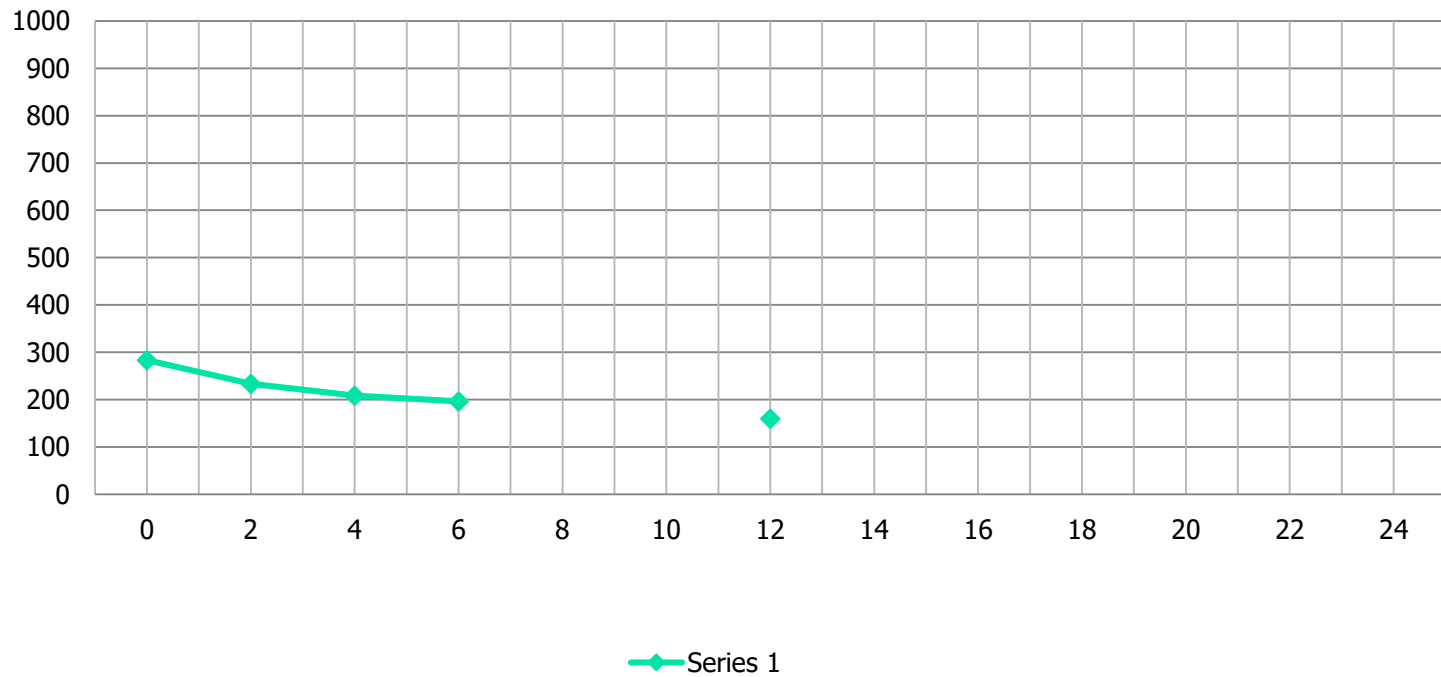
White Retroreflectivity





Yellow Paint Performance

Yellow Retroreflectivity





Painted Pavement Markings

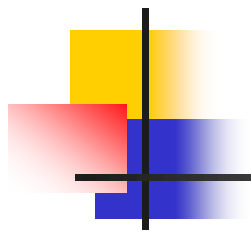
Life Cycle Cost:

- 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

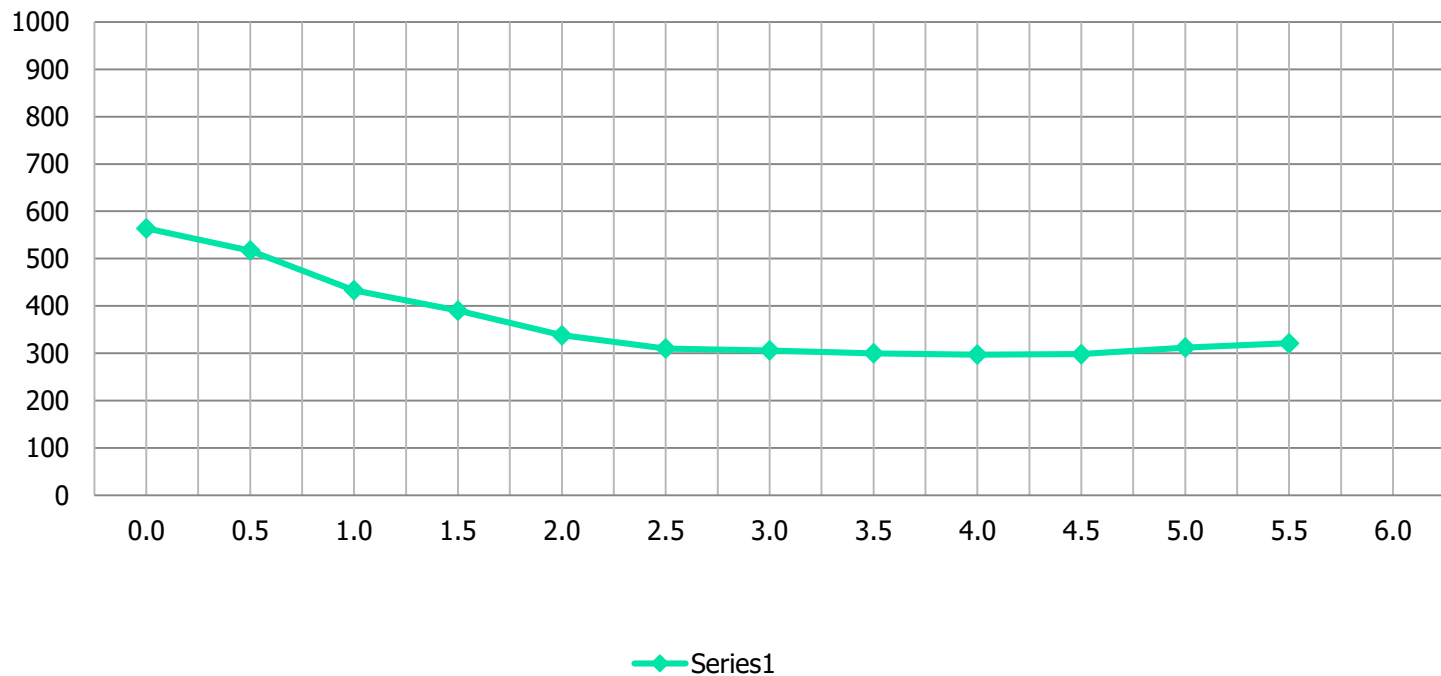
Advantages:

- 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

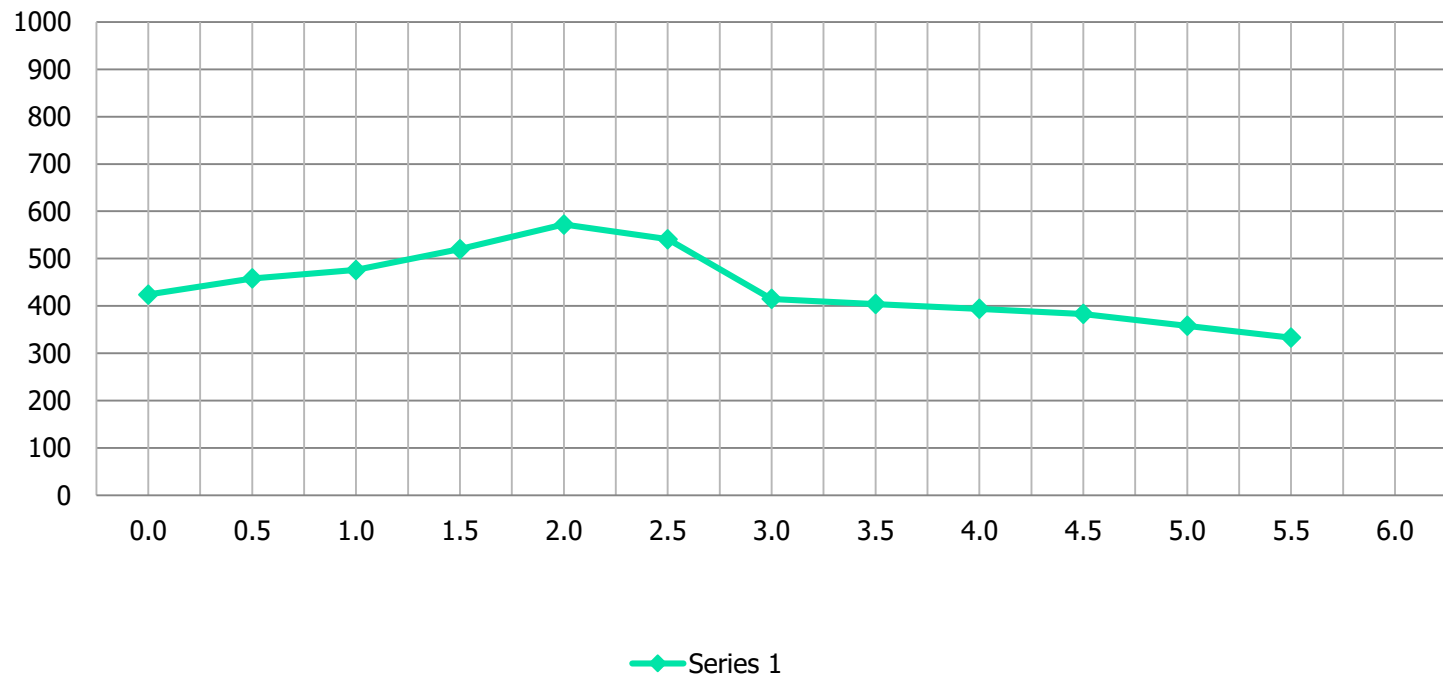
White Retroreflectivity





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 – 8 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 should 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

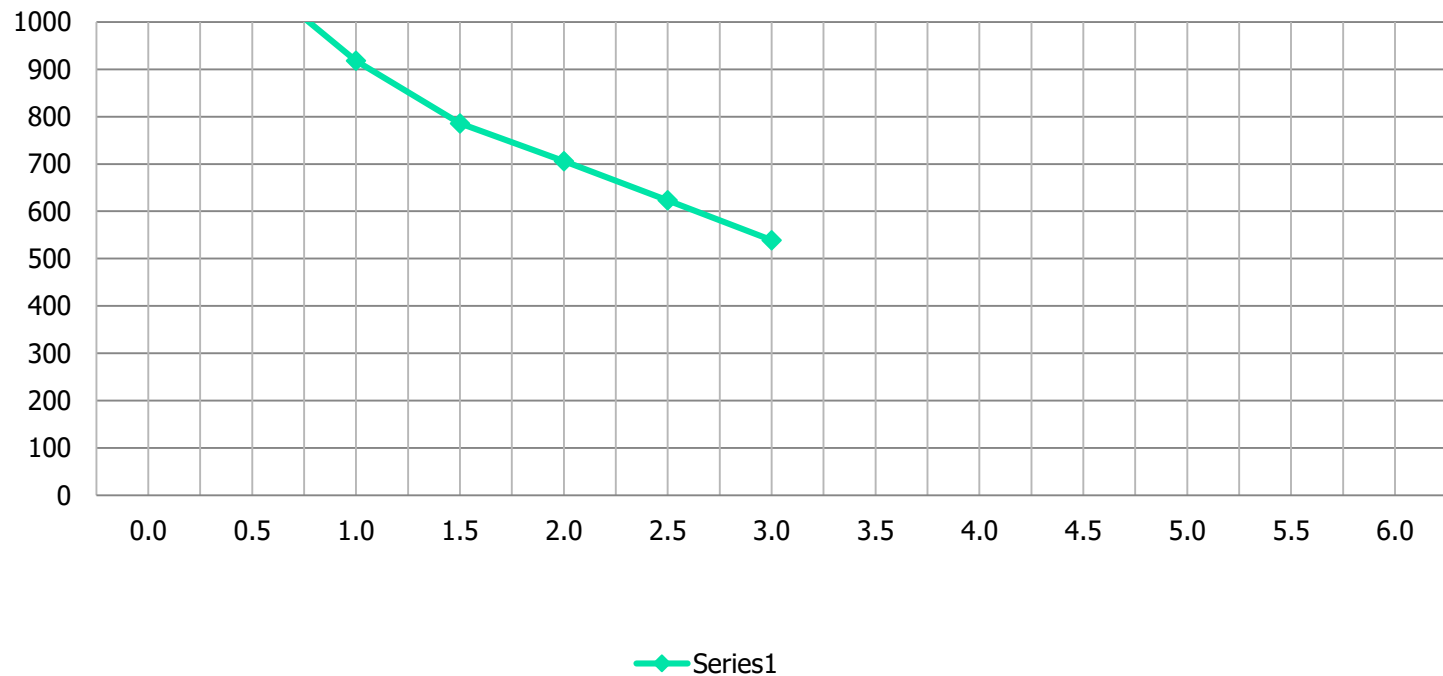
Advantages:

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



White High Performance Tape

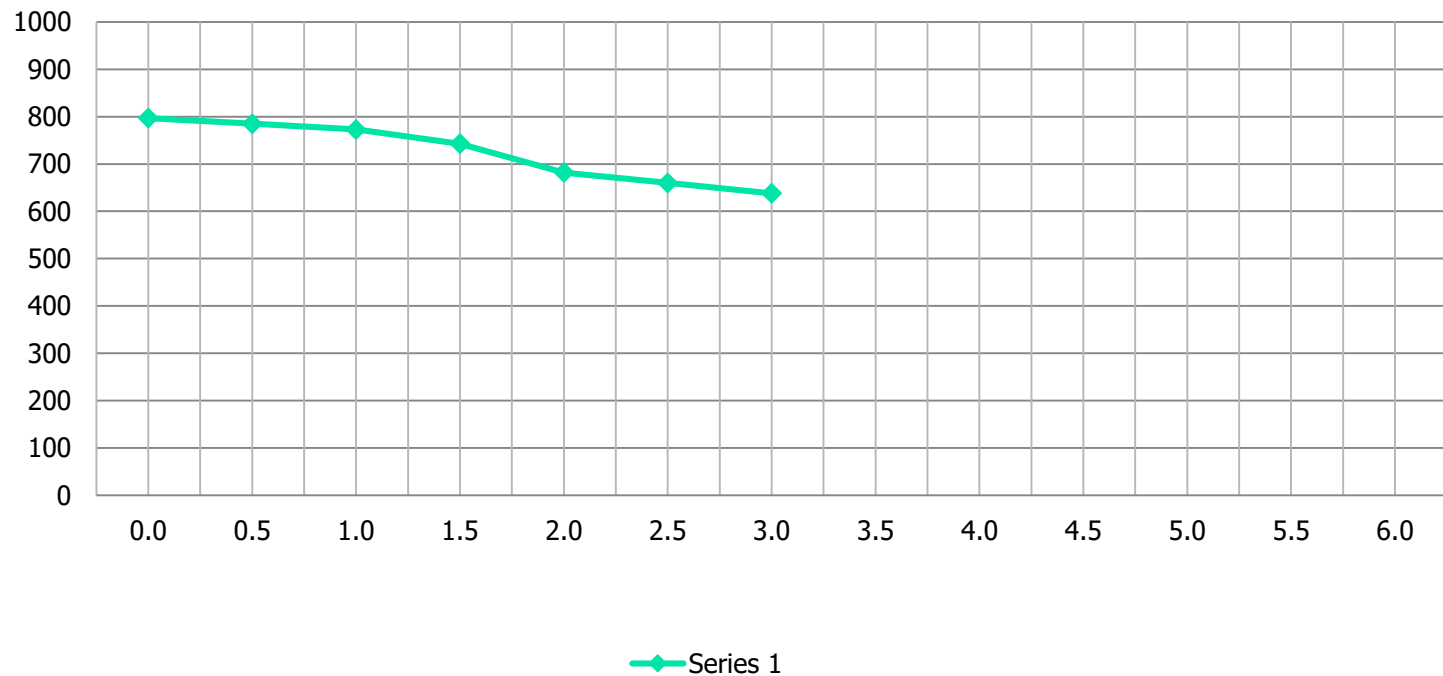
White Retroreflectivity





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



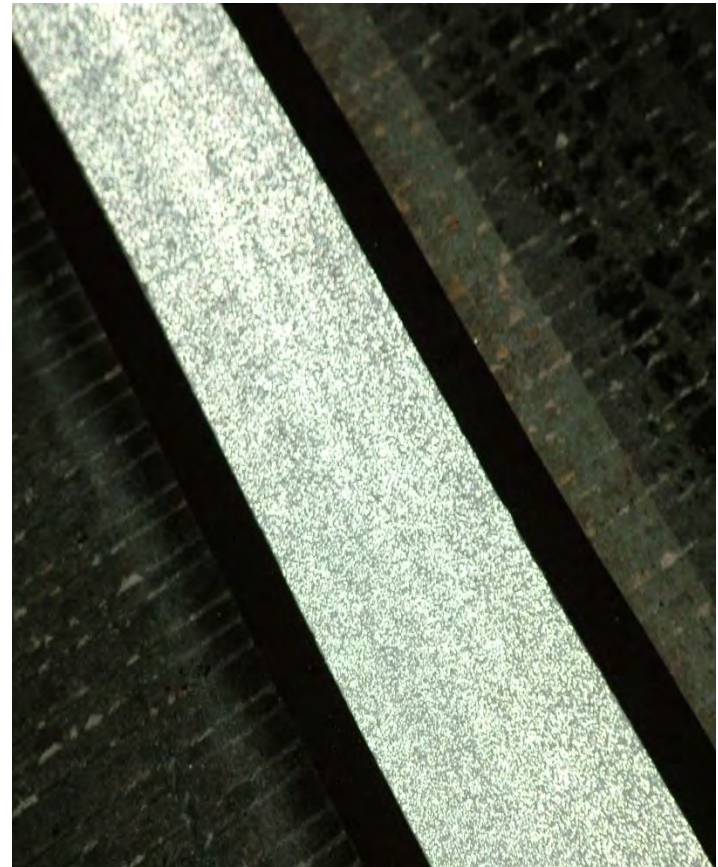
Tape Pavement Markings

Limitations:

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



High Performance Tape Markings





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



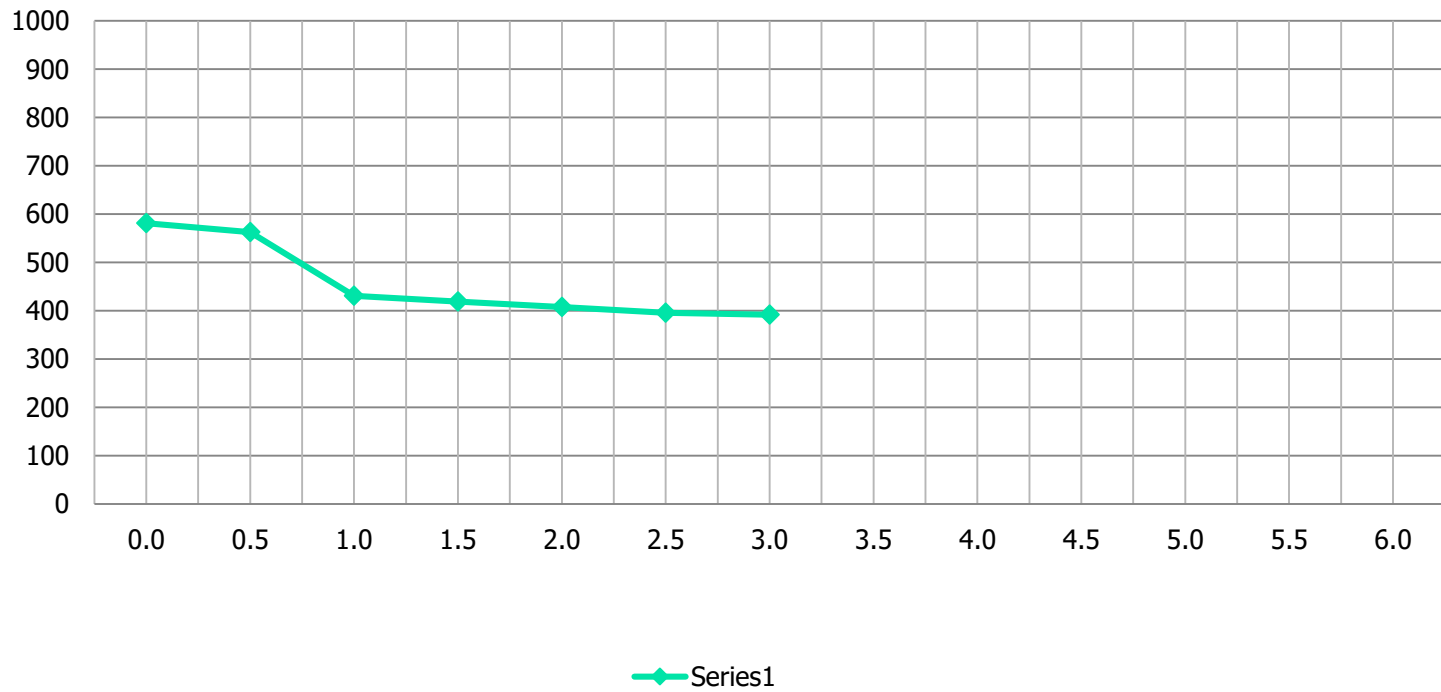
Two Component Markings

Advantages:

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

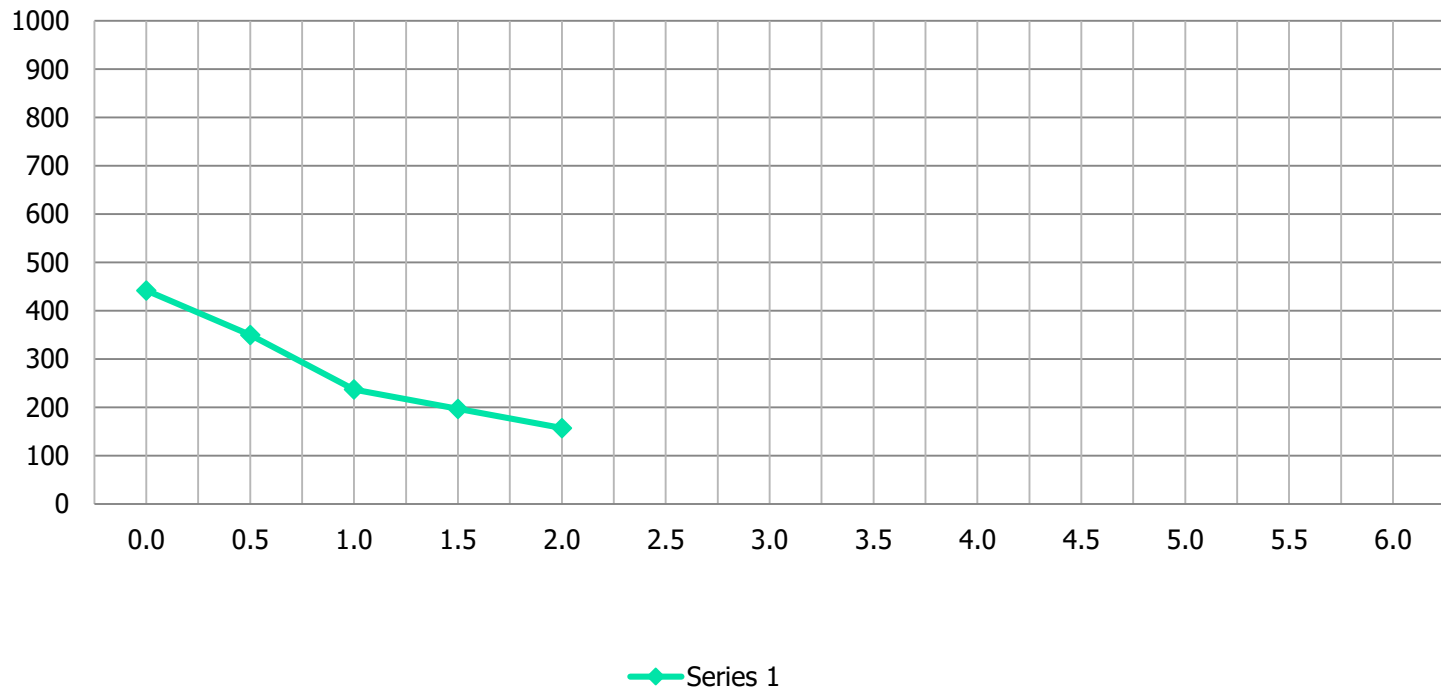
White Two Component Performance

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
- 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

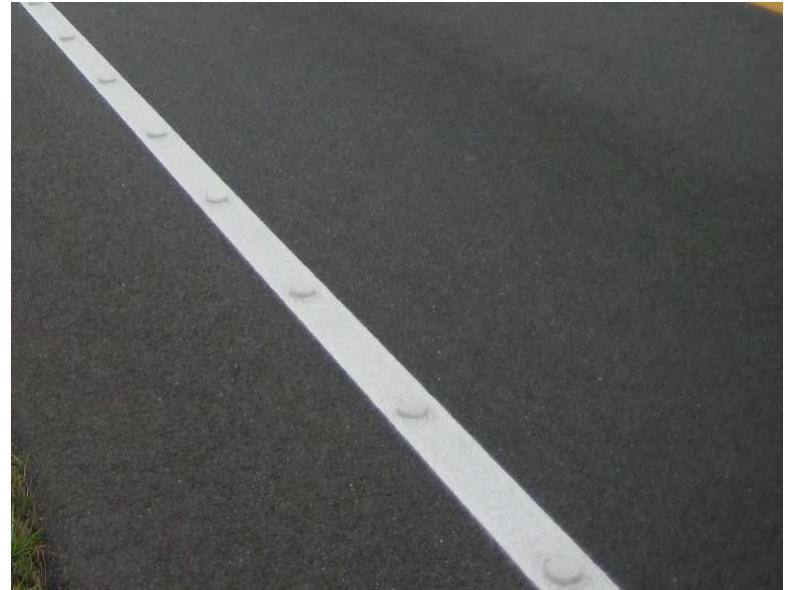
Ennis Product





Audible & Vibratory Markings

Crown Product



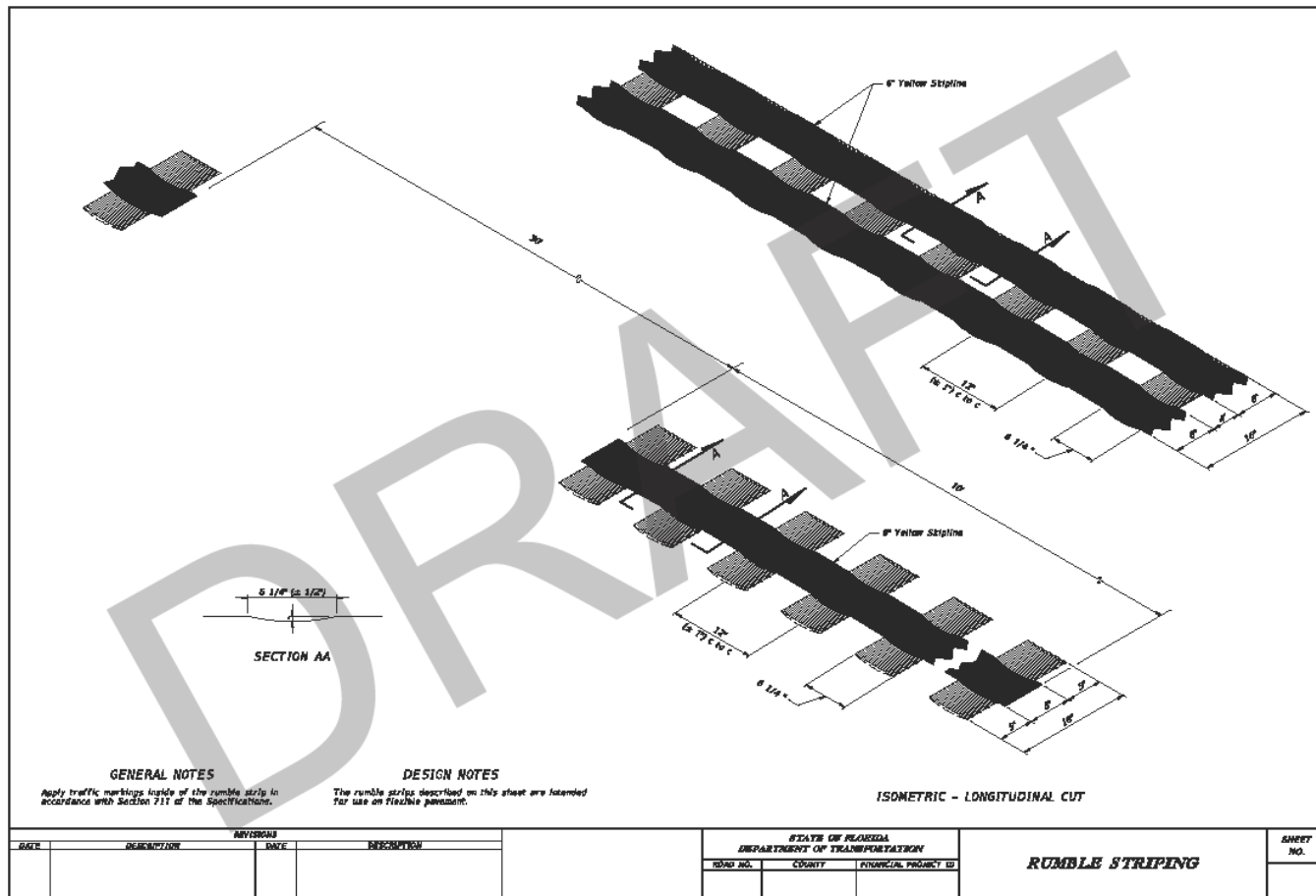
Audible & Vibratory Markings

Ground-in Rumble Stripe



Audible & Vibratory Markings

Field Installation - Ground-in Rumble Stripe



Section 701:

Audible & Vibratory Markings

Field Installation - Ground-in Rumble Stripe



Section 701:

Audible & Vibratory Markings

Field Installation - Ground-in Rumble Stripe



Section 701:

Audible & Vibratory Markings

Field Installation - Ground-in Rumble Stripe



Audible & Vibratory Markings

Field Installation - Ground-in Rumble Stripe



Section 701:

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

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Contact Information

Chester A. Henson, P.E.

State Traffic Standards Engineer

chester.henson@dot.state.fl.us

(850) 414-4117