Traffic Engineering Safety
Pavement Markings Guidance

VDOT Asphalt Regional Meeting
February 22, 2011 – Fredericksburg
February 24, 2011 – Richmond
March 1, 2011 - Roanoke

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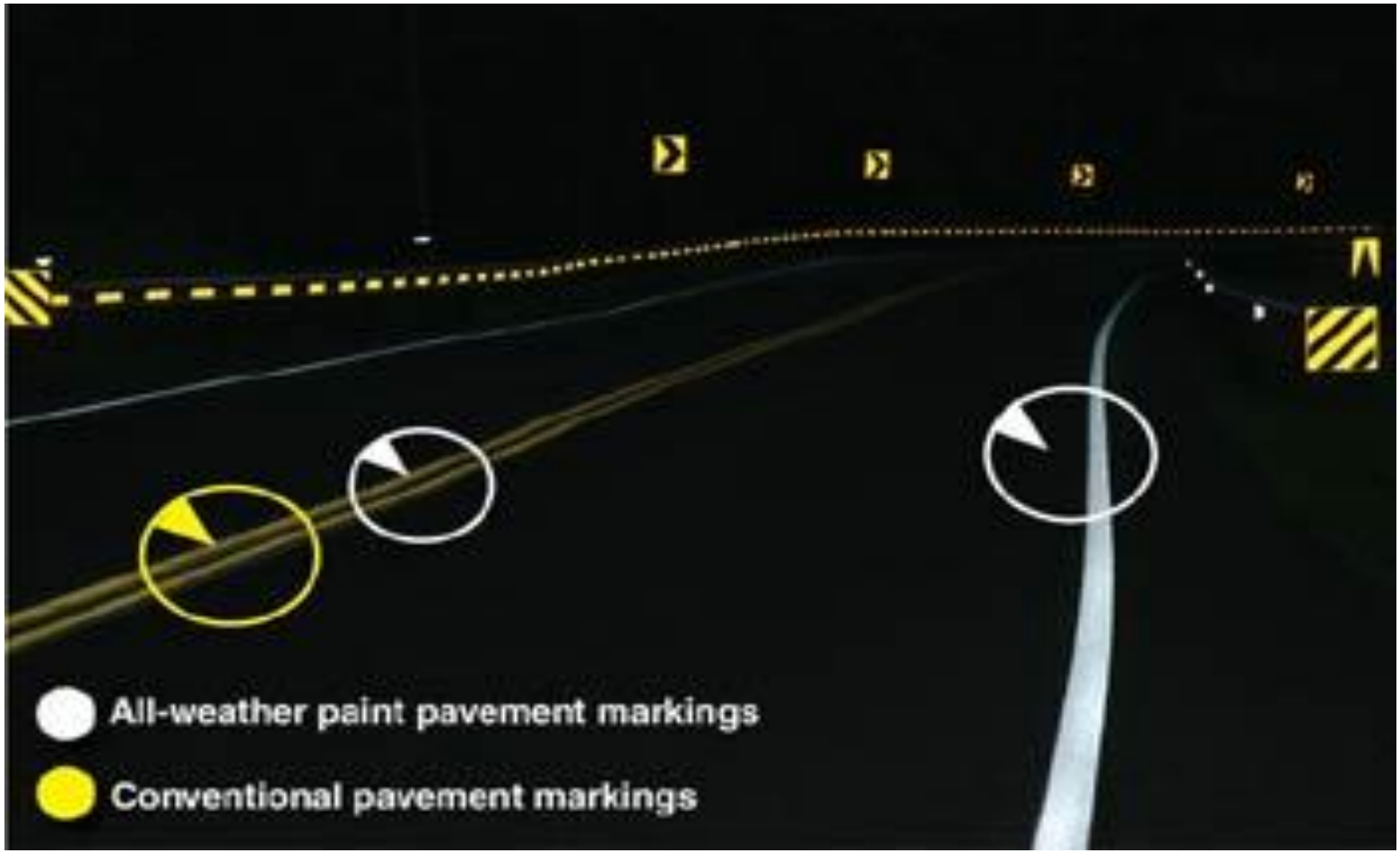
Assistant Division Administrator
Traffic Engineering Division

Marking Visibility – Dry Day Condition

Source: FHWA

Marking Visibility – Dry Night Condition



Source: FHWA

Marking Visibility – Wet Night Condition

Source: FHWA

State of the Pavement Marking System

- **VDOT's roadway systems have approximately 45,200 miles of pavement markings, 145,000 messages and 700,000 markers.**
- **Pavement markings are an essential component of highway safety in reducing crashes – providing continuous information on lane alignments & reinforcing the messages of other traffic devices.**
- **A 1997 VDOT survey of 3,000 Virginians identified roadway "night-time visibility, especially during wet conditions" as a great concern.**
- **AASHTO reported every 21 minutes a highway death occurs as a result of a lane departure. This equals to 25,000 deaths or 60% of all highway fatalities annually.**
- **As traffic accidents are three times more likely to occur in wet, night conditions, VDOT is committed to maintaining the effectiveness of pavement marking system during adverse weather, particularly at night and in Work Zone areas.**

2005-’08 Crash Summary

On average, during these four years:

38.1% of all roadway crashes and;

36.4% of all injuries and;

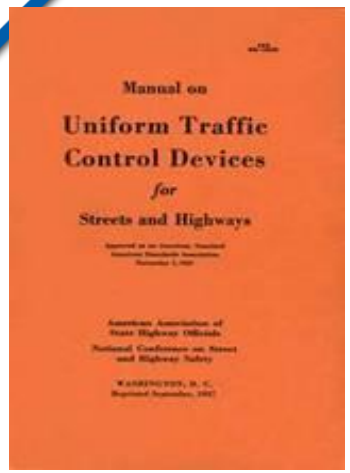
45.6% of all fatalities in motor vehicle crashes occurred to motorist over 40 years old.

Older Motorists
Pavement Marking Enhancement Initiatives

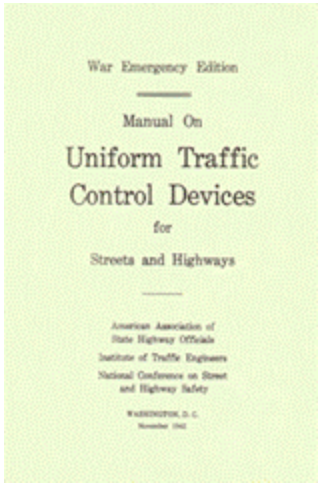
- **Highly reflective material for pavement markings and reflective markers on high volume/high-speed roadways;**
- **Increase use of Durable & Wet Reflective products;**
- **A higher standard for road markings than required; and**
- **Use of wider markings for high volume and high-speed roadways.**

Even though we have taken these steps. Our crash numbers for motorist over 40 years old are still too high . . .

Federal MUTCD Requirements



1935



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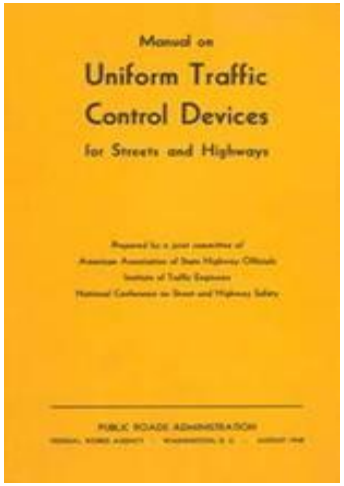
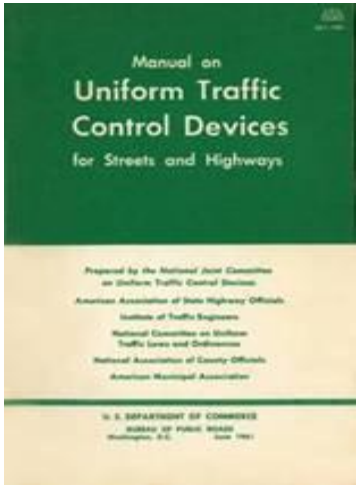


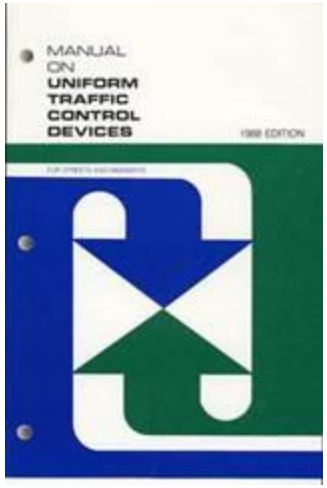
1948



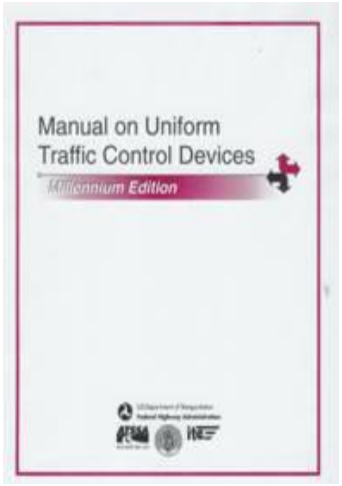
1961

1971

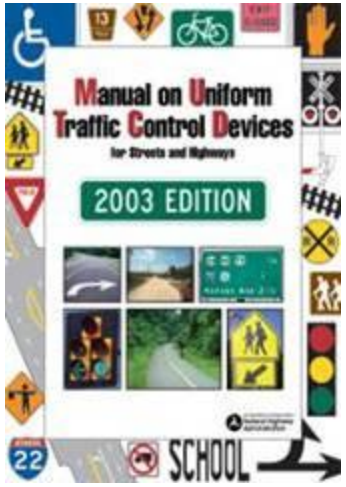
1978



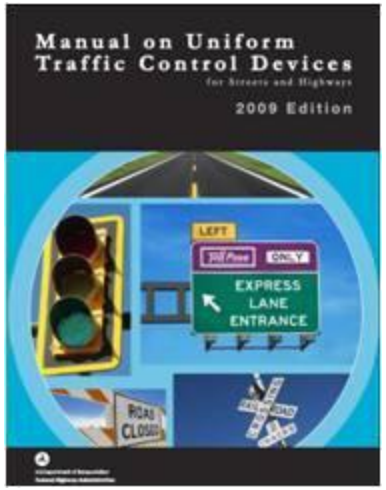
1988



2000



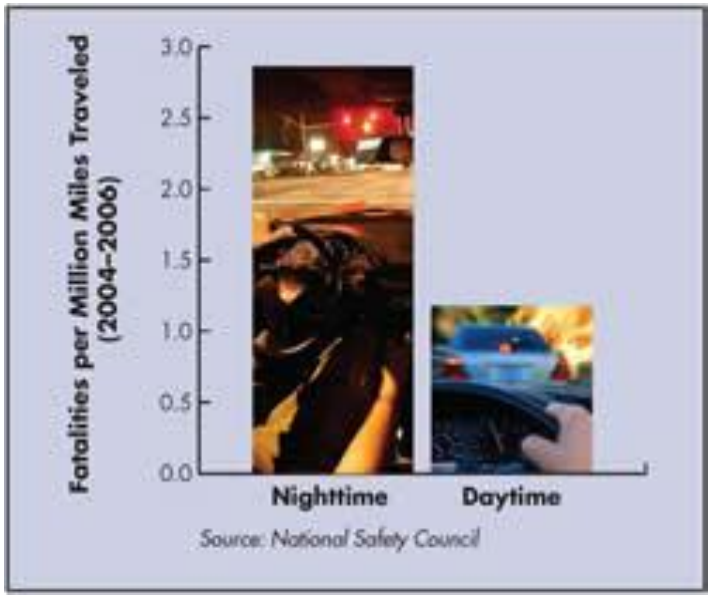
2003



2009

Federal Policy Guidance

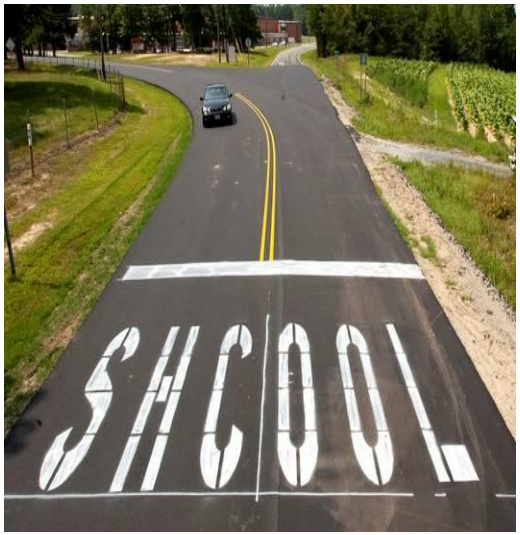
- **Federal Manual on Uniform Traffic Control Devices (MUTCD) provides guidance on:**
  - Centerline
  - Edge line
  - Spacing of Skip line
  - Gore markings
  - Intersection markings
  - Symbols
  - Bike/Ped markings
  - School Zones
  - Work Zones
  - Rail Road –Xing
  - Marking widths
  - Retroreflectivity levels



Marking Guidance Policy Elements

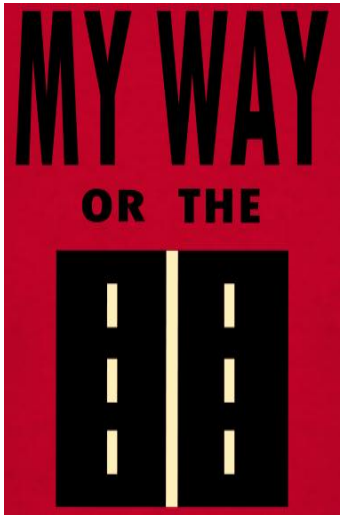
VDOT Objectives & Guidance on:

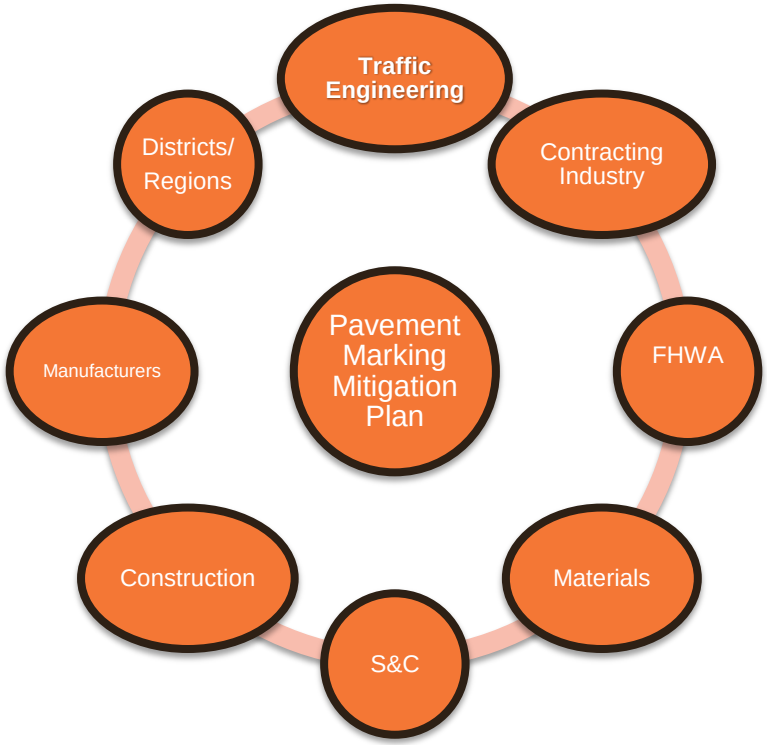
- Legislative requirements
- Deploying Strategic Safety Initiatives – Older Motorists
- Worker & Traveling Public Safety
- Types of Materials & their Performance
- Installation Applications & Constructability
- Application based on Roadway System & ADT
- Durability & Pavement Service Life
- Retained Retroreflectivity performance
- Life-Cycle Cost-Effectiveness
- Temporary & Permanent Applications
- Standards & Specification
- Congestion Minimization
- Funding Constraints



Stakeholders Coordination for Marking Policy Development

- **Stakeholders:**
  - **VDOT - Materials, Construction, S&C, L&D, Maintenance, OPD, Districts/Regions, Research Council, Chief Engineer, CSO.**
  - **Contractor, Consultant, Supplier, Manufacturer & Industry Associations**
  - **FHWA, Localities**





The Issue – Spring/Summer 2010 Raw Materials Shortage

Issues - Spring/Summer 2010

- Raw Materials Shortage- Acrylic & Liquid Epoxy Resins, Rosin Esters & Titanium Dioxide created a need for VDOT develop a Mitigation Plan
- Limited Availability of Paint
- Limited Availability of Thermoplastic
- Epoxy was more available
- Tape was more available

Challenges

- How to work with multiple stakeholders to develop a Mitigation Plan
- Addressing competing issues:
  - safety impacts
  - unapproved marking materials & their performance in Virginia
  - contractual requirements/obligations, project delays, advertisement delays
  - additional work zone periods, longer temporary marking periods
  - FHWA approvals, etc.

How VDOT Addressed the Issue for FY2010 Paving Season

Mitigation Plan Action

Summer 2010

- Engaged VDOT Divisions, FHWA and Industry Stakeholders
- Held a series of meeting with Paving Contractors, Marking Contractors, Manufacturers, Suppliers, Industry Associations to solicit input & ideas
- Materials, TED, S&C, Construction actively researched and developed recommendations on:
  - alternative materials
  - alternative marking application rates & thickness between lifts
  - edge line delineation options
  - remove requirement for eradication of lite lines
  - easing marking requirements for restriping projects
  - use of temporary markers/construction tape between lifts
- Developed a TE Marking Guidance Matrix, effective until December 2010.
- Developed a list of Alternative Paint Materials used by other DOTs.
- Provided Guidance on no-cost change for Epoxy in lieu of Thermoplastic

Marking Guidance Matrix – July 13, 2010

Guidance During Limited Availability of Pavement Marking Materials *July 13, 2010*

Effective until December 31, 2010

	Temporary Lite Markings *Centerline, Skip, Gore*	Temporary Lite Markings *Edge*	Permanent Markings *Centerline, Skip, Gore*	Permanent Markings *Edge*
New Pavement Projects				
Less than 10,000 ADT Roadways	Between Lifts Options • Type A or F Paint • 7-Mil thickness • 3lbs/Gallon Beads • 4" width • Max. 10 days • Type D Const. Tape • Transitory Markers	Between Lifts • No Edge lines • Max. 10 days	• Type A or Type F with 15-Mil thickness, 6lbs/Gallon Beads, or • Thermo, or • Epoxy • 4" width	• Type A or Type F with 15-Mil thickness, 6lbs/Gallon Beads, or • Thermo, or • Epoxy • 4" width.
More than 10,000 ADT Roadways	Between Lifts Options • Type A or F Paint • 7-Mil thickness • 3lbs/Gallon Beads • 4" width • Max. 5 days • Type D Const. Tape • Transitory Markers	Between Lifts • No Edge lines • Max. 5 days	• Type A or Type F with 15-Mil thickness, 6lbs/Gallon Beads, or • Thermo, or • Epoxy • 4" or 6" width • Pavement Markers, as appropriate	• Type A or Type F with 15-Mil thickness, 6lbs/Gallon Beads, or • Thermo, or • Epoxy • 4" width.
Re-Tracing Projects				
Less than 6,000 ADT Roadways			• Type A or Type F with 15-Mil thickness, 6lbs/Gallon Beads, or • Thermo, or • Epoxy • 4" width	• Do not re-trace Edge Lines until next cycle • Inspector to record & report locations to Regions for next cycle prioritization.
More than 6,000 ADT Roadways			• Type A or Type F with 15-Mil thickness, 6lbs/Gallon Beads, or • Thermo, or • Epoxy • 4" width • Replace Pavement Markers, as appropriate	• Re-trace Edge Lines on higher volume, critical roads first. • Do not re-trace until next cycle if existing Edge Lines are visible, based on engineering judgment. Consult with RTE. • Inspector to record & report locations to Regions for next cycle prioritization.

Additional Guidance

1. See Materials Division 2010 Paint Material Alternatives Guidelines for additional information. All marking materials used shall be those identified on the latest Materials Division Approved Products List.
2. The Chief Engineer has approved the interchange of Type B, Class I (Thermo) and Type B, Class III (Epoxy) materials on projects, depending on availability, ***at no additional cost to projects***.
3. Eradication will not be required for removal of 7-Mil Temporary Lite Marking Paint prior to the application of Permanent Durable Thermo or Epoxy markings.

How VDOT is Addressing the Issue for FY2011 Paving Season

Update of the Marking Materials Availability Issue

Winter 2011

- Continued constraints on the supply of Raw Materials required VDOT to reassess the July 2010 Mitigation Plan
- More Availability of Paint
- Continued Limited Availability of Thermoplastic
- Epoxy appears to be more available
- Tape appears to be available

Mitigation Plan Action

- Extended TE Marking Application Matrix, effective until December 31, 2011.
- Materials, TED, S&C researched and recommended temporary approval of Polyurea marking products – Ennis, Epoplex, 3M, Poly-Carb
- Added Polyrurea products to list of Alternative Materials approved until December 31, 2011
- Continues to monitor situation and reassess as needed

Moving Forward
Statewide Pavement Marking System Management

Initiatives

- Developing statewide pavement marking policy
  - *Visibility - Retained Retroreflectivity performance*
  - *Durability*
  - *Cost-Effectiveness*
  - *Constructability & Productivity*
- Updating Standards & Specifications - to streamline and improve project delivery
- Addressing Temporary Markings issues- balancing safety, cost-effectiveness, productivity & constructability

Commitments

- Inclusive and Transparent Policy Development Processes
- More participation in Working Committees to address marking issues
- Open to Innovation & Performance ideas from Industry

Comments & Questions

Open Discussion
to Gather Input from the Industry