Baystate Roads Program
Local Technical Assistance Program (LTAP)
TECHnotes

PAVEMENT MARKINGS: CENTERLINES & EDGELINES #61

New MUTCD terminology explained

When using the Manual on Uniform Traffic Control Devices (MUTCD), the text headings of Standard, Guidance, Option, and Support shall be defined as follows:

A. **Standard**—a statement of required, mandatory, or specifically prohibitive practice regarding a traffic control device. All Standard statements are labeled, and the text appears in bold type. The verb "shall" is typically used. The verbs "should" and "may" are not used in Standard statements. Standard statements are sometimes modified by Options.

B. **Guidance**—a statement of recommended, but not mandatory, practice in typical situations, with deviations allowed if engineering judgment or engineering study indicates the deviation to be appropriate. All Guidance statements are labeled, and the text appears in unbold type. The verb "should" is typically used. The verbs "shall" and "may" are not used in Guidance statements. Guidance statements are sometimes modified by Options.

C. **Option**—a statement of practice that is a permissive

Please see MUTCD on page 4

Pavement markings help prevent deadly crashes

Providing pavement markings is an effective strategy to prevent vehicles from encroaching on the roadside. Run-off-the-road and cross-over-the-center line crashes are among the most deadly crashes along U.S. roadways. Lane departure crashes account for nearly half of all fatal crashes in Massachusetts.

A Federal Highway Administration (FHWA) report of ranked countermeasures listed highly visible and well-maintained pavement markings, such as centerlines and edgelines, as the third most effective low-cost safety improvement behind (1) the installation of edgeline rumble strips and (2) enhanced shoulder or in-lane delineation and markings for sharp curves.

Longitudinal Lines

Centerlines, edgelines, and lanelines are used to guide the road user and delineate travel lanes. These lines are even more critical when visibility is compromised by fog or heavy rain. Centerlines are intended to separate two opposing traffic streams, whereas edgelines are used to separate the travel lane from an adjacent shoulder. The MUTCD states that centerlines must be yellow and edgelines must be white. When used, laneline pavement markings delineating the separation of traffic lanes that have the same direction of travel shall be white. The MUTCD also provides information regarding

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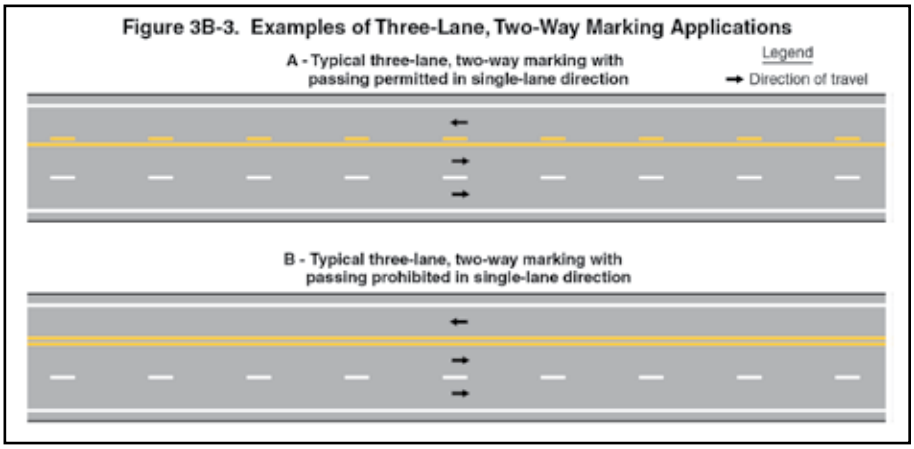

Example of Three-Lane, Two-Way Marking Applications

Lines

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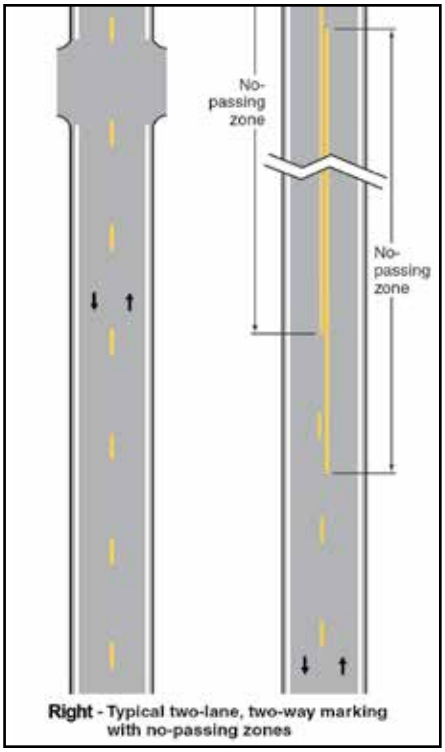
the width of centerlines, lanelines, and edgelines.

A solid line discourages or prohibits crossing (depending on the specific application) and a double line prohibits passing or indicates special restrictions. A broken centerline, used to indicate a passing zone, indicates a permissive condition. The MUTCD suggests that for highways the broken line should consist of 10 foot line segments and 30 foot gaps, or dimensions in a similar ratio of line segments to gaps as appropriate for traffic speeds and need for delineation.

Centerlines

The center line markings on two-lane, two-way roadways shall be one of the following. 1. Two-direction passing zone markings consisting of a normal broken yellow line where crossing the center line markings for passing with care is permitted for traffic traveling in either direction; 2. One-direction no-passing zone markings consisting of a double yellow line, one of which is a normal broken yellow line and the other is a normal solid yellow line, where crossing the center line markings for passing with care is permitted for the traffic traveling adjacent to the broken line, but is prohibited for traffic traveling adjacent to the solid line; or

3. Two-direction no-passing zone markings consisting of two normal solid yellow lines where crossing the center line markings for passing is prohibited for traffic traveling in either direction. A single solid yellow line shall not be used as a center line marking on a two-way roadway. The center line markings on undivided two-way roadways with four or more lanes for moving motor vehicle traffic always available shall be the two-direction no-passing zone markings consisting of a solid double yellow line. Centerlines are required on all paved urban arterials and collectors that have a traveled way of 20 feet or more in width and an



Example of Two-Lane, Two-Way Marking Applications

When to use Centerlines

Center line pavement markings, when used, shall be the pavement markings used to delineate the separation of traffic lanes that have opposite directions of travel on a roadway and shall be yellow.

Center line pavement markings may be placed at a location that is not the geometric center of the roadway.

On roadways without continuous center line pavement markings, short sections may be marked with centerline pavement markings to control the position of traffic at specific locations, such as around curves, over hills, on approaches to grade crossings, at grade crossings, and at bridges.

Did You Know?

A study by the American Traffic Safety Services Association and the National Association of County Engineers found that on two lane rural roads with an ADT of at least 500 vehicles per day, edge lines yield $17 in safety benefits for every dollar invested.

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A variety of new materials is just one consideration during installation

A problem facing many communities is the maintenance of worn centerlines and edgelines. There are a variety of new materials which are more durable, but cost more than older types, such as paint. Line width, pattern, and color are all used to convey meaning to the road user. Another consideration may be the use of supplemental signage or markers, such as embedded or raised pavement markers, to emphasize a message.

Some other considerations when selecting materials and pavement marking type include: retroreflectivity in dry and wet conditions, durability, worker safety during application, total cost, ease of application, life expectancy, and supplier availability.

Additional Considerations

The first step in installing pavement markings is determining the ADT and roadway classification (i.e., arterial, collector, or local).

Contact MassDOT for help in determining the roadway classification. Next, select appropriate pavement markings based upon the MUTCD. Finally, choose a marking material based upon information provided in this Tech Note as well as local considerations. Questions about pavement markings on state roads and bridges should be directed to MassDOT.

Solid double yellow centerline with embedded pavement markers.

Material Comparison

	Thermoplastic	Paint	Epoxy	Grooved in Tape
Relative Cost (per ft)	.60 - 1.50	.50	Data not available	Data not available
Life Expectancy (asphalt/concrete)	2 – 5 years	4 – 18 months	2 – 3 years	3 – 7 years
Life Expectancy (Portland cement)	1 – 3 years	2 – 7 months	1 – 2 years	3 – 7 years
Approximate Nighttime Visibility in feet (in dry conditions)	340	290	Data not available	320
Approximate Nighttime Visibility in feet (in wet conditions)	200	70		200

Source: *Wet Night Visibility of Pavement Markings: Executive Summary* by Gibbons, R., Hankey, J., and Pashaj, I. 2004. Price source: mhd.state.ma.us. Based on minimum quantity.

MUTCD

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condition and carries no requirement or recommendation. Option statements sometime contain allowable modifications to a Standard or Guidance statement. All Option statements are labeled, and the text appears in unbold type. The verb "may" is typically used. The verbs "shall" and "should" are not used in Option statements.

D. **Support**—an informational statement that does not convey any degree of mandate, recommendation, authorization, prohibition, or enforceable condition. Support statements are labeled, and the text appears in unbold type. The verbs "shall," "should," and "may" are not used in Support statements. *(See Section 1A.13)*

Lines

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Average Daily Traffic (ADT) volume of 6,000 vehicles per day or greater. Centerline markings shall also be placed on all paved two-way streets or undivided highways that have three or more lanes for travel.

A two-lane, two-direction roadway meeting the above criteria should have one of the following centerline combinations: a double yellow solid centerline where passing is prohibited in both directions, a single solid yellow and adjoining broken yellow line where passing in one direction is permitted, or a single broken yellow line. A highway with four or more lanes, with at least two lanes in each direction should have a double yellow solid centerline along the entire roadway.

Edgelines

Edgelines shall be placed on paved rural arterials with a traveled way of 20 feet or more and an ADT of 6,000 vehicles per day or greater. Edgelines may also be placed on any paved street or highway where an engineering study indicates a need and does not show that edgelines would decrease safety.

References

Main articles for ***Tech Notes*** are taken from the Massachusetts Department of Transportation's ***Massachusetts Traffic Safety Toolbox Series***

This series of fact sheets on safety improvements that can be implemented at the local level is available online. Information on problem areas, possible countermeasures, and implementation considerations is included in each fact sheet. Available online at **www.mass.gov/mhd/safetytoolbox/**

The Manual on Uniform Traffic Control Devices (MUTCD)

The MUTCD defines the standards used by transportation professionals nationwide to install and maintain traffic control devices on all streets and highways. The most recent version (2009) can be found online at **http://mutcd.fhwa.dot.gov/**

Pavement Marking Materials

Additional information on pavement marking materials can be found online through the Iowa State University Center for Transportation Research and Education at **http://www.ctre.iastate.edu/reports/pavemark.pdf**

The Baystate Roads Program *is a cooperative effort of the Federal Highway Administration, Massachusetts Department of Transportation (MassDOT), and the University of Massachusetts. Program Director, Dr. John Collura, and Program Manager, Dr. Christopher J. Ahmadjian, provide technology transfer assistance to all communities in the Commonwealth. Our purpose is to provide information and training on transportation and related topics, to answer the needs and problems of local agencies, to identify and transfer new technologies and innovations into a usable format, and to operate as a link between transportation research and practicing highway personnel.* ***www.baystateroads.org.***