Enhanced Edge Lines

What are enhanced edge lines?

Enhanced edge lines refer to pavement markings that are either wider than typical or provide other enhancements such as recessing the marking or using an alternative material.

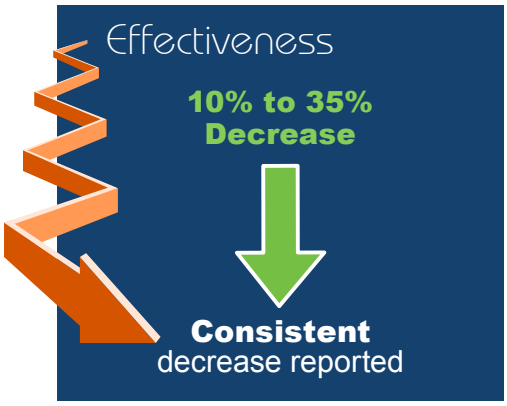
Along roadways with edge lines installed, most agencies have traditionally used a 4-inch-wide latex (water-based paint) line placed on the surface of the road, consistent with the guidelines in the Minnesota Manual on Uniform Traffic Control Devices (MN MUTCD). Section 3A.6 (functions, widths and patterns of longitudinal pavement markings) of the MN MUTCD states that "the width of the line indicates the degree of emphasis."[1] The chosen width, or degree of emphasis, can be based on a combination of agency judgment and practice, economic benefit, and safety need.

The three most common techniques for providing enhanced edge lines include:

- Using a wider 6-inch line for heightened visibility of the line and road edge
- Using a special paint that provides benefits such as higher levels of retroreflectivity (a wet-reflective material that contains larger glass beads) or increased durability
- Recessing the markings in a shallow trough to protect from snow plow damage

What is the purpose of enhanced edge lines?

Both nationally and in Minnesota, road departure crashes account for more fatalities and serious injuries than any other type of crash. A first step in efforts to mitigate these crashes is attempting to keep vehicles on the roadway by focusing on improvements to the road edge. This further suggests that if the reduction of these kinds of crashes is desired, agencies should improve road edge delineation by using enhanced edge lines along key roadway segments that are identified as being the most at-risk for road departure crashes.



How effective are enhanced edge lines?

Two studies[2,6] documented the effects of providing non-recessed enhanced edge lines along approximately 3,800 miles of two-lane rural roads in Michigan and Minnesota. Both studies found that replacing 4-inch edge lines with 6-inch edge lines was an effective countermeasure for reducing run-off-road crashes. Crash reduction factors include:

- Total crashes were reduced by 16 to 18 percent (statistically significant).
- Severe crashes were reduced by 10 to 18 percent (not statistically significant).
- Total run-off-road right crashes were reduced by 34 percent (statistically significant).
- Severe run-off-road right crashes were reduced by around 85 percent (not statistically significant).

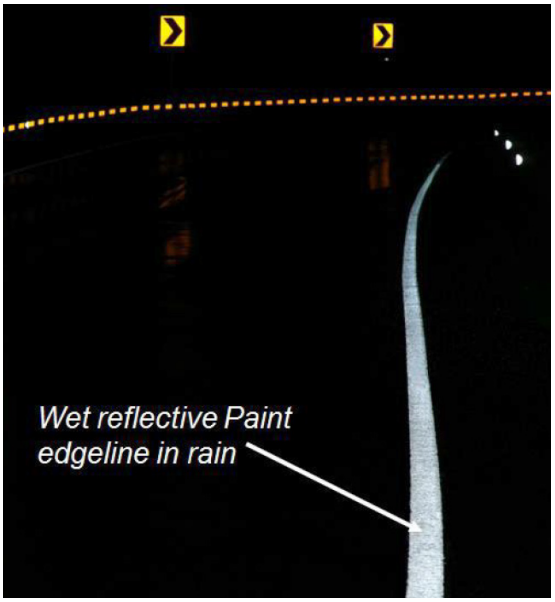
Cost

Varies significantly based on material.

- A 6-inch edgeline will cost approximately 25 percent more than the typical 4-inch edgeline.
- Typical per-mile costs:
  - 4-inch latex: $300
  - 4-inch epoxy: $1,000
  - 6-inch latex: $400
  - 6-inch epoxy: $1,300
  - 6-inch ground-in wet reflective epoxy: $3,500

What are candidate locations for enhanced edge lines?

Road departure crashes are the predominant severe crash type along two-lane rural roads but the density of these crashes is low, with approximately one severe road departure crash per mile every 167 years. These crashes are widely dispersed and their location and frequency change over time across these rural two-lane systems. An analysis of the severe road departure crashes found a set of roadway and traffic characteristics that identify segments considered to be at-risk. These characteristics include: curves, high number of accesses, and a particular range of traffic volumes. Segments exhibiting most or all of these characteristics were considered at-risk and priority candidates for safety investment, including enhanced edge lines.



Are there additional considerations?

Some local agencies have questioned the economics of securing safety funding for an initial deployment if they would then be responsible for the total increased cost of refreshing the wider edge lines annually or bi-annually. To address this concern, MnDOT and FHWA have worked to develop a new policy about federal participation for items such as pavement markings that have a relatively short service life. Previously it was FHWA's position that they would support the implementation of safety countermeasures but not support their maintenance. However, to encourage a wider deployment of low-cost strategies, some of which have short service lives, FHWA will now support the re-application of pavement markings after their service life has ended as long as two conditions are met:

1. The type of crashes being address (road departure) and the solution (enhanced pavement markings) must still be identified as priorities in Minnesota's Strategic Highway Safety Plan
2. The segments proposed for re-painting must still be considered high priority candidates based on the outcome of a systemwide risk assessment. END

References

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6. TTI. 2012. *An Evaluation of the Effectiveness of Wider Edge Line Pavement Markings.* Sponsored by American Glass Bead Manufacturer's Association. https://static.tti.tamu.edu/tti.tamu.edu/documents/TTI-2012-1.pdf.