

MOUNTAIN-PLAINS CONSORTIUM

RESEARCH BRIEF | MPC 17-341 (project 306) | December 2017

Optimization of Pavement Marking Performance



the ISSUE

Pavement marking retroreflectivity in cold regions is achieved through the use of reflective elements (beads) and wet reflective elements (WRE). Frequent snow plowing and winter maintenance affect the performance and durability of pavement marking. This study evaluates the constructability, durability, and visibility of alternative pavement marking materials

the RESEARCH

Researchers studied seven pavement marking test sections on highways in different regions of South Dakota. The test sections were designed to represent different pavement marking material combinations and winter maintenance conditions. The parameters considered in this study were: paint type (waterborne and epoxy); paint thickness (15, 17, 20, and 25 mils); paint color (white and yellow); reflective elements (glass beads and wet reflective elements); line type (edge line and skip line); pavement type (asphalt concrete and Portland cement concrete); pavement surface preparation (surface and inlaid applications); winter maintenance region (wet freeze and dry freeze).

The collected data included: 1) paint thickness measurements, 2) retroreflectivity of the pavement marking at different ages and under dry and wet conditions, and 3) visual rating of the pavement marking.

Data analysis included: 1) curve fitting of measured retroreflectivity with time, 2) investigation of the relationship between retroreflectivity and visual rating, 3) effect of the different parameters on retroreflectivity longevity, and 4) cost effectiveness of the different pavement marking alternatives. An interactive spreadsheet was developed to compare the unit costs of different pavement marking alternatives.



A University Transportation Center sponsored by the U.S. Department of Transportation serving the Mountain-Plains Region. Consortium members:

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the FINDINGS

A cost/benefit analysis should be based on the pavement marking life-cycle cost rather than the initial construction cost. The cost comparison spreadsheet developed in this study, combined with other factors such as the construction season time window and material availability, should be used to aid in selecting the optimum pavement marking option.

Because material, labor, and equipment costs and material availability vary from one year to another, the life-cycle cost for the different pavement marking options presented in this study should not be used as a basis for future selection of the optimum pavement marking option. The unit costs to be used in the cost comparison spreadsheet should be updated annually to reflect the most current material and installation prices.

Wet reflective elements improve initial retroreflectivity. However, the retroreflectivity of yellow pavement marking was shown to deteriorate rapidly. Therefore, yellow paint should be re-applied annually to maintain acceptable retroreflectivity levels.

the IMPACT

The cost comparison spreadsheet developed in this study, combined with other factors such as the construction season time window and material availability, can be used to aid in selecting the optimum pavement marking.

For more information on this project, download the entire report at <http://www.ugpti.org/resources/reports/details.php?id=898>

For more information or additional copies, visit the Web site at www.mountain-plains.org, call (701) 231-7767 or write to Mountain-Plains Consortium, Upper Great Plains Transportation Institute, North Dakota State University, Dept. 2880, PO Box 6050, Fargo, ND 58108-6050.



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