Safety Impacts of Using Wider Pavement Markings on Two-Lane Rural Highways

Kevin Chang, Ph.D., P.E. and Marvin Ramirez, E.I.
ITE Intermountain Section
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Introduction

Research Objective

• To determine if implementation of wider longitudinal edgeline pavement markings will:
  • Help drivers to maintain appropriate lane position
  • Help drivers to maintain appropriate speed

Do wider longitudinal edgeline pavement markings (6”) provide more safety benefits than standard longitudinal edgeline pavement markings (4”)?

• Project funded by Idaho Transportation Department (ITD)
Introduction

Research Components

• Edgeline Marking Widths:
  • 4” (standard)
  • 6”
  • 2”

• Edgeline Marking Deterioration %:
  • 0%
  • 25%
  • 50%
  • 75%

• Roadway Geometries:
  • Straight segments
  • Curve segments
    • Narrow
    • Wide
Methodology

National Advanced Driving Simulator (NADS) MiniSim
Methodology

- Scenario Development Programs:
  - 3ds Max Design (Autodesk)
  - Tile Mosaic Tool
  - Interactive Scenario Authoring Tool
## Methodology

<table>
<thead>
<tr>
<th>Scenario #</th>
<th>Edgeline Width (in)</th>
<th>Edgeline Deterioration Percentage Distribution (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>0 25 75 50</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>25 50 0 75</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>50 75 25 0</td>
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<td>2</td>
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<td>4</td>
<td>0 25 75 50</td>
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<td>4</td>
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<td>50 75 25 0</td>
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<td>50 75 25 0</td>
</tr>
<tr>
<td>12</td>
<td>6</td>
<td>75 0 50 25</td>
</tr>
</tbody>
</table>
Methodology

4-inch edgeline with 0% deterioration

4-inch edgeline with 25% deterioration
Methodology

4-inch edgeline with 50% deterioration

4-inch edgeline with 75% deterioration
Methodology

6-inch edgeline with 0% deterioration

6-inch edgeline with 25% deterioration
Methodology

6-inch edgeline with 50% deterioration

6-inch edgeline with 75% deterioration
Methodology

- 24 participants from the Moscow, ID community
- Each participant performed three sessions (different edgeline width for each session)
- One hour per session
- Participant incentive - $20/session ($70 total)

<table>
<thead>
<tr>
<th>Gender</th>
<th>Participants</th>
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<tbody>
<tr>
<td>Male</td>
<td>13</td>
</tr>
<tr>
<td>Female</td>
<td>7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>18 - 30 years old</td>
<td>13</td>
</tr>
<tr>
<td>31 - 49 years old</td>
<td>4</td>
</tr>
<tr>
<td>50 - 70 years old</td>
<td>3</td>
</tr>
</tbody>
</table>

Youngest participant: 19 years old (F)
Oldest participant: 64 years old (M)
Average age: 31.2 years old
Average years driving: 15.0 years
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• To determine if implementation of wider longitudinal edgeline pavement markings will:
  • Help drivers to maintain appropriate lane position
  • Help drivers to maintain appropriate speed
• Edgeline width did not have an impact on lane deviation (not statistically significant)
Edgeline deterioration did have an impact on lane deviation (statistically significant).
Results - Lane Deviation

• Roadway geometry did have an impact on lane deviation (statistically significant)
Results - Lane Deviation (Gender)
Results - Lane Deviation (Age Group)
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• To determine if implementation of wider longitudinal edgeline pavement markings will:
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  • Help drivers to maintain **appropriate speed**
Results - Vehicle Speed

• Edgeline width did have an impact on vehicle speed (statistically significant)
• Edgeline deterioration did have an impact on vehicle speed (statistically significant)
Roadway geometry did have an impact on speed (statistically significant)
Results - Vehicle Speed (Gender)
Results - Vehicle Speed (Age Group)
Conclusions

• Edgeline widths do not impact lane deviation but did have a minor (positive) impact on speed
• Edgeline deterioration does impact lane deviation and speed
  • Most evident at the 75% edgeline deterioration level
• Roadway geometry does impact lane deviation and speed
  • Wide curved segments (turning left) provide more lane deviation
• Gender and age group influences driver behavior
Future Research

- Daytime vs. nighttime
- 8” or 10” longitudinal edgelines
- Multi-lane highways
Questions?