ACCIDENT RATES ON RURAL ROADS IN THE WESTERN CAPE

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Contents

• Overview

• Literature Study
  ➢ Previous SA studies
  ➢ International studies

• Methodology

• Results

• Comparison with earlier study

• Conclusions and Recommendations
Overview

• Accidents form a major part of transport costs.
• Improvements in safety can lead to substantial benefits.
• It is therefore essential to know the number and severity of accidents related to geometric & pavement features.
• This type of study was last done in 1988.
• The current study is based on data from the Cape Winelands District Municipal Area.
• The results are compared to the 1988 study which was based on data from the whole Cape Province and KwaZulu-Natal.
Study Area
Literature study

• The 1988 report considered:
  • Lane & shoulder width
  • Shoulder surface
  • Hilliness & bendiness
  • Accident severity & type

• A 1994 study (Skinner) looked at:
  • Number of lanes
  • Alignment
  • At high accident locations

• International studies confirmed the effect of:
  • Alignment
  • Cross-section
  • Pavement condition
Methodology

• Data from the Road Infrastructure Branch of the WCG were combined in a web based GIS map platform.
• Interactive data of road, traffic and accident characteristics (2000 to 2011).
• Cape Winelands District Municipal Area.
• Mostly for Trunk, Main and Divisional roads.
• Two data sets (accidents & road characteristics) were combined by link ID and km distance.
Data Preparation

• Accidents in urban areas and at intersections were removed.
• The following was determined for each road link:
  • Number & severity of accidents
  • % Heavy vehicles
  • Link lengths
  • Million vehicle kilometres travelled (VKT)
  • Cross-section classifications
  • Road condition
Data Preparation (2)

- Relationships between accident rate (Acc/MVKT) and the following road features were studied:
  - Road surface
  - Lane width (LW)
  - Shoulder width (SW)
  - Shoulder surface type
  - Terrain (Flat, Rolling, Mountainous)
  - Road condition
  - Traffic (AADT & % heavies)
Lane & Shoulder Width Categories

• **Lane width:**
  • LW1: LW≤3.2m (Narrow) – 10ft
  • LW2: 3.2m>LW≤3.5m (Medium) – 11ft
  • LW3: LW>3.5m (Wide) – 12ft

• **Shoulder Width:**
  • SW1: SW≤1.5m (Narrow) – 4-5ft
  • SW2: 1.5m>SW≤2.1m (Medium) – 6-7ft
  • SW3: SW>2.1m (Wide) – 8-10ft
Results - Severity

- Accidents with fatalities, 4%
- Accidents with serious injuries, 7%
- Accidents with slight injuries, 22%
- No information provided, 11%
- Accidents with no injuries, 56%
## Results – Surface Type & Traffic

<table>
<thead>
<tr>
<th></th>
<th>Paved</th>
<th></th>
<th>Gravel</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All</td>
<td>AADT &lt; 1000</td>
<td>%HV &gt;15</td>
<td>All</td>
</tr>
<tr>
<td><strong>Acc Rate</strong></td>
<td>0.78</td>
<td>1.43</td>
<td>0.92</td>
<td>2.28</td>
</tr>
<tr>
<td><strong>Fatal</strong></td>
<td>4</td>
<td>6</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td><strong>Serious</strong></td>
<td>7</td>
<td>8</td>
<td>8</td>
<td>8</td>
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<tr>
<td><strong>Slight</strong></td>
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<td>27</td>
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<td>25</td>
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<tr>
<td><strong>DO</strong></td>
<td>56</td>
<td>56</td>
<td>62</td>
<td>60</td>
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<tr>
<td><strong>Pedestrian</strong></td>
<td>9</td>
<td>12</td>
<td>6</td>
<td>8</td>
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</tbody>
</table>
Results - Lane Width

- **Narrow**: Paved (0.7), Gravel (2.2)
- **Medium**: Paved (0.9), Gravel (1.5)
- **Wide**: Paved (0.5), Gravel (2.5)

Legend:
- **Grey**: All
- **Orange**: Paved
- **Blue**: Gravel
Results - Shoulder width

<table>
<thead>
<tr>
<th>Shoulder Width</th>
<th>All</th>
<th>Paved</th>
<th>Gravel</th>
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</thead>
<tbody>
<tr>
<td>Narrow</td>
<td>0.68</td>
<td>0.45</td>
<td>0.87</td>
</tr>
<tr>
<td>Medium</td>
<td>0.56</td>
<td>0.44</td>
<td>0.76</td>
</tr>
<tr>
<td>Wide</td>
<td>0.44</td>
<td>0.45</td>
<td>0.53</td>
</tr>
<tr>
<td>None</td>
<td>0.85</td>
<td>0.45</td>
<td></td>
</tr>
</tbody>
</table>
Results - Terrain Type

- Flat
- Rolling
- Mountainous

Accident Rate

- All
- Paved
- Gravel
Results - Riding Quality: Paved roads

- Severe
- Warning
- Sound
Comparison with previous study

- Gravel Roads
- Paved Roads
- Lane width - N
- Lane width - M
- Lane width - W
- Shoulder width - N
- Shoulder width - M
- Shoulder width - W

Accident rate (Acc/MVKT)

1988

2013
Possible Reasons for difference

- Roads became safer
- Traffic volumes used
- Calculation of average accident rates
Conclusions

• Gravel roads have a higher accident rate than paved roads (192%)
• Accident rate increases with HV>15%
• Accident rate increases with AADT<1000
• Wide lanes and shoulders are the safest
• Accident rate increases with the terrain becoming less flat
• Roads with a severe riding quality rating have a higher accident rate
Recommendations

• Data should be checked for inconsistencies

• Areas with high accident rates should be investigated in more detail
THANK YOU