Risk management approach to reducing road injury

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Submission to Victorian Parliament Road Safety Committee
Two approaches to reduction of road trauma through road engineering:

1. Reactive approach: treat crash sites only
   - Blackspots qualified for funding due to ‘crash reduction’

2. Proactive approach: find high risk sites and treat them
   - Identify problematic road features that cause crashes
   - Estimates of risk are based on measured road features, traffic flow and speeds
   - May include crash history
   - Treat highest risk sites first
Context

- Diminishing blackspots
- Only 1/3 of fatal crashes occur at blackspots
- More than 1/2 are the first crash to occur at a site
- Fatal and serious injury crashes scattered on rural and LGA roads – few blackspots to treat
Context

• Safe System vision – focus on prevention of death and serious injury everywhere, not just at blackspots

• Need to look beyond traditional solutions – proactively address complex mixes of crash risk factors

• Prevention rather than cure

• Supportive national & Victorian road safety strategies
Development of crash risk assessment

• Road safety audits common since 1990s
• Austroads and VicRoads investment in research, > 10 years
• Focus on fatal and serious injury crashes
• Results:
  – better understanding of severe crash risk
  – increasing familiarity / change in culture
  – confidence in application.
• e.g. SRIP program guidelines, setting of speed limits
What are severe crash risk features?

Road features which make a difference in number of severe crashes likely to occur:

- traffic flow
- pedestrian & cyclist movements
- speed
- horizontal alignment
- road slope
- lane and shoulder width
- clear zone width

- road surface condition
- median / no median
- line marking, signs
- street lighting
- intersections / access points
- sight distance
- pedestrian facilities
Horizontal alignment – curve sharpness

Relative risk and horizontal alignment

Relative risk vs. Curve radius (m)

- Relative risk decreases as the curve radius increases.
- Sharp curves (small radii) have higher relative risks compared to wide curves (large radii).

This graph illustrates the relationship between curve sharpness and relative risk, helping road authorities make informed decisions about designing safer roads.
Clear zones – offset to roadside hazards

![Graph showing the relationship between clear zone width and run-off-road crashes per 100M VKT. The graph includes a trend line and data points.]
Severe crash risk assessment methods

- Many different approaches developed over last 15 years
- Some specific, e.g. to pedestrians, other universal
- Examples:
  - NetRisk – simple and effective approach to identifying high-risk rural roads
  - AusRAP – road assessment program, part of the iRAP family used in 70 countries, RACV
  - Australian National Risk Assessment Program (ANRAM) – road agencies, local government
Crash risk assessment in ANRAM

Road attributes
- AADT
- Risk factors
- Risk factors
- Risk factors
- Risk factors

Risk scores for crash types
- Run off road
- Head on
- Intersection
- Pedestrians
- Other

Predicted severe crashes

Measure of future crash risk
# Run-off road risk score

<table>
<thead>
<tr>
<th>Factor</th>
<th>Value</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed</td>
<td>80km/h</td>
<td>0.67</td>
</tr>
<tr>
<td>Lane width</td>
<td>2.75m to 3.25m</td>
<td>1.1</td>
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<tr>
<td>Curvature</td>
<td>Straight</td>
<td>1.0</td>
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<tr>
<td>Quality of curve</td>
<td>Adequate</td>
<td>1.0</td>
</tr>
<tr>
<td>Delineation</td>
<td>Adequate</td>
<td>1.0</td>
</tr>
<tr>
<td>Shoulder width</td>
<td>≤ 1m</td>
<td>1.3</td>
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<tr>
<td>Shoulder rumble strips</td>
<td>No</td>
<td>1.0</td>
</tr>
<tr>
<td>Road condition</td>
<td>Good</td>
<td>1.0</td>
</tr>
<tr>
<td>Roadside distance (left)</td>
<td>Object 0-5 m</td>
<td>5.0</td>
</tr>
<tr>
<td>Roadside severity (left)</td>
<td>Wire rope</td>
<td>0.1</td>
</tr>
<tr>
<td>Roadside distance (right)</td>
<td>Object 0-5 m</td>
<td>5.0</td>
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<tr>
<td>Roadside severity (right)</td>
<td>Drainage</td>
<td>5.0</td>
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</tbody>
</table>

The calculated risk score is 0.44.
ANRAM Analysis and Outputs

ANRAM SRS score for section(s) (average)

<table>
<thead>
<tr>
<th>Category</th>
<th>Score</th>
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<tbody>
<tr>
<td>Run-off-road</td>
<td>5.41</td>
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<tr>
<td>Head-on</td>
<td>2.96</td>
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<tr>
<td>Intersection</td>
<td>37.48</td>
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<tr>
<td>Pedestrian</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>20.22</td>
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</table>
ANRAM Analysis and Outputs

FSI crash results for section(s)

<table>
<thead>
<tr>
<th>Potential FSI</th>
<th>Predicted FSI</th>
<th>Observed FSI</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Run-off-road</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>Head-on</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>Intersection</td>
<td>2.00</td>
</tr>
<tr>
<td></td>
<td>Pedestrian</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>0.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Potential FSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run-off-road</td>
<td>1.91</td>
</tr>
<tr>
<td>Head-on</td>
<td>0.61</td>
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<tr>
<td>Intersection</td>
<td>4.63</td>
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<tr>
<td>Pedestrian</td>
<td>2.79</td>
</tr>
<tr>
<td>Other</td>
<td>4.48</td>
</tr>
</tbody>
</table>
ANRAM inputs/outputs

• Outputs
  – SRS risk scores
  – Predicted FSI crashes per 5 years per road section
  – Information on specific treatable crash risk factors
  – Road safety program development tools

• Inputs:
  – Road type, state
  – Observed severe crashes per each section, 5 years
  – Coded road feature data, traffic flow