From CFLOS to Route and Network Planning

Asset Management, a step ahead

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Main Roads Western Australia
CONTENT

- The Context
- Brief description of the CFLOS
- Outline of the route planning process
- Network prioritisation and analysis
- Other considerations
- Conclusions
Main Roads
Western Australia

Mission: provide world class outcomes for our customers through a safe, reliable and sustainable road transport system.

90 years of existence in 2020

One of the most geographically dispersed road networks
- 18,528 km of State roads
- 2.5 million square kilometres
- 8 Regions

Asset Value: $47.4 b
KEY DRIVERS

- Auditor General Report
- ISO 55000 reinvigorated the approach
- Corporate support
- Road Safety corporate framework
ROUTE AND NETWORK INVESTMENT PLANNING

- CUSTOMER FACING LOS
- ROUTE AND LINKS PLANS
- NETWORK PRIORITISATION BY ACTIVITY
  - Network All Activities (MCA)
- DEVELOP 20Y NETWORK PLAN
  - Aligned with STRATEGIC PRIORITIES
  - Budget Scenarios
  - Other Considerations
- 10Y ROAD NETWORK DEVELOPMENT PLAN
- INPUT TO EPM (PIPELINE OF PROJECTS)
THE KEY INPUTS/COMPONENTS

- Strategic Link Categories - MABCD based on demand;
- CFLOS – links MR Outcomes, AM Objectives and Customer Expectations;
- Technical Parameters - based on standards, national guidelines;
- MCA Network Prioritisation;
- Corporate Road Inventory, Condition, Road Usage/Demand, and Crash Data;
- Freight/RAV Networks.
## STRATEGIC PRIORITIES

<table>
<thead>
<tr>
<th>Main Roads Outcomes</th>
<th>Asset Management Objectives</th>
<th>Required Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SAFETY – reduce the cost of road trauma to the community</strong></td>
<td>Reduce Road Trauma Risk</td>
<td>-Top 50 Sections with very high and high Road Trauma Risk</td>
</tr>
<tr>
<td><strong>Contribute to economic development through improved Freight EFFICIENCY</strong></td>
<td>Provide improved freight access and amenity on significant freight networks. Reduce or eliminate access restrictions.</td>
<td>-Current RAV 7 and RAV10 and PBS networks. -Future RAV extension. -Grain Network</td>
</tr>
<tr>
<td><strong>Contribute to economic development through Improved Travel Time RELIABILITY</strong></td>
<td>Reduce travel time delay.</td>
<td>Top 50 Sections with significant Travel Time Delay</td>
</tr>
<tr>
<td><strong>Contribute to economic development and support vibrant communities through Improved “all year round” ACCESSIBILITY/ availability of the route</strong></td>
<td>Reduce the duration of road closures due to natural causes. Support local communities through provision of access and connectivity</td>
<td>-Sections with significant duration and incidence of road closure. -Sections that are the unique access/connectivity road to a local community.</td>
</tr>
<tr>
<td><strong>CUSTOMER FOCUSED TRAVEL EXPERIENCE</strong></td>
<td>Improve the overall travel experience, access and amenities on tourist routes</td>
<td>-Significant tourist routes.</td>
</tr>
<tr>
<td>Performance Indicators</td>
<td>Technical Measures</td>
<td>Customer LOS Description</td>
</tr>
<tr>
<td>------------------------</td>
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<tr>
<td><strong>Reliability</strong></td>
<td></td>
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<tr>
<td>Overtaking opportunities: provides an indication of the ability to achieve consistent journey times by avoiding unpredictable delays associated with vehicles travelling at slower speeds.</td>
<td>% of road length offering overtaking opportunities (analysed in each direction).</td>
<td>Safe overtaking opportunities every 10 min.</td>
</tr>
<tr>
<td>Overtaking lane length: assesses whether the overtaking lanes which are provided are of a sufficient length.</td>
<td>% of overtaking lanes that fall into certain length categories.</td>
<td>Sufficient length to overtake safely.</td>
</tr>
<tr>
<td>Turning pockets and passing bulges: provides an indication of the ability to achieve consistent journey times by avoiding unpredictable delays associated with turning vehicles.</td>
<td>% of intersections with turning pockets and passing bulges.</td>
<td>Safe turning movement.</td>
</tr>
<tr>
<td>Road closures: provides an indication of the likelihood of the road being closed (which has the potential to reduce the reliability of the route).</td>
<td>Total number of hours closed per year within a range.</td>
<td>No or limited road closures. Ability to recover quickly after a natural disaster.</td>
</tr>
<tr>
<td><strong>Efficiency</strong></td>
<td></td>
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<tr>
<td>Design speed: provides an indication of the ability to achieve travel times close to the posted speed limit.</td>
<td>Safe speed (km/h), % of route length within a range.</td>
<td>.</td>
</tr>
<tr>
<td>Delays: provides an overarching indicator which relates to both reliability and efficiency. This indicates the likelihood of delays due to traffic volume, traffic mix and road geometry.</td>
<td>Number of 5min delays per car per km per day as calculated using MRWA Delays Model.</td>
<td>No travel time delays (ability to travel at posted speed).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level of Service</th>
<th>Overtaking Opportunity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low (red)</td>
<td>No overtaking opportunities available</td>
</tr>
<tr>
<td>Medium (yellow)</td>
<td>Sufficient sight distance for overtaking available</td>
</tr>
<tr>
<td>High (green)</td>
<td>Physical provisions for overtaking available (dual carriageways, multiple lanes or overtaking lanes)</td>
</tr>
</tbody>
</table>
ROUTE PLANNING PROCESS

VISION STATEMENT: role and function of the route or link.

STRATEGY: includes width configuration, the type of restricted access vehicle network to be provided, key areas of focus.

PLAN: specific Investment Initiatives, to address (reduce or eliminate) performance deficiencies, with assigned priorities;

DEMAND DRIVERS AND ASSET INFORMATION

INVESTMENT INITIATIVES include:

New assets: construction of new links or extension of existing, major realignment and reconstruction, construction of new bridges.

Asset improvements: seal and pavement widening, additional overtaking lanes, geometry improvements, provision of new rest areas, installation of safety barriers, line marking.

Asset preservation: e.g. resurfacing and rehabilitation of pavements, bridge strengthening.
Route 8: Perth to Esperance

Level of Service Performance and Investment Initiatives
**NETWORK PRIORITISATION AND ANALYSIS**

The aim is to balance **Risk**, **Cost** and **Performance**.

The methodology includes:

1. Network Prioritisation by each type of investment initiative using Multi Criteria Analysis.

2. Identification of specific Strategic Priorities.

3. Budget Scenarios and Other Considerations.
<table>
<thead>
<tr>
<th>COST ESTIMATES BY PRIORITY</th>
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<th></th>
<th>TOTAL COST</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
<td>High-Med</td>
<td>Med</td>
<td>Med-Low</td>
<td>Low</td>
<td>ALL PRIORITIES</td>
</tr>
<tr>
<td>Widening Low Cost</td>
<td>266,814,461</td>
<td>120,860,593</td>
<td>90,357,972</td>
<td>43,004,342</td>
<td>30,970,023</td>
<td>552,007,391</td>
</tr>
<tr>
<td>Widening Ultimate</td>
<td>1,704,405,840</td>
<td>909,435,856</td>
<td>531,972,507</td>
<td>331,380,059</td>
<td>253,675,127</td>
<td>3,730,869,389</td>
</tr>
<tr>
<td>New OVTI</td>
<td>278,370,000</td>
<td>77,564,000</td>
<td>50,998,000</td>
<td>22,110,000</td>
<td>5,534,000</td>
<td>434,576,000</td>
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<tr>
<td>Extent OVTI</td>
<td>12,865,000</td>
<td>11,030,000</td>
<td>11,019,000</td>
<td>11,764,000</td>
<td>11,747,000</td>
<td>58,425,000</td>
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<tr>
<td>Geometry H</td>
<td>181,000,000</td>
<td>138,500,000</td>
<td>72,500,000</td>
<td>33,500,000</td>
<td>25,000,000</td>
<td>450,500,000</td>
</tr>
<tr>
<td>Geometry V</td>
<td>415,000,000</td>
<td>281,000,000</td>
<td>251,000,000</td>
<td>248,500,000</td>
<td>213,500,000</td>
<td>1,409,000,000</td>
</tr>
<tr>
<td>Rest Areas</td>
<td>27,700,000</td>
<td>16,700,000</td>
<td>15,300,000</td>
<td>15,500,000</td>
<td>13,500,000</td>
<td>88,700,000</td>
</tr>
<tr>
<td>Rehabilitation</td>
<td>232,953,000</td>
<td>232,953,000</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>465,906,000</td>
</tr>
<tr>
<td>TOTAL COST 1</td>
<td>999,702,461</td>
<td>597,607,593</td>
<td>240,174,972</td>
<td>125,878,342</td>
<td>86,751,023</td>
<td>2,050,114,391</td>
</tr>
<tr>
<td>TOTAL COST 2</td>
<td>2,852,293,840</td>
<td>1,667,182,856</td>
<td>932,789,507</td>
<td>662,754,059</td>
<td>522,956,127</td>
<td>6,637,976,389</td>
</tr>
</tbody>
</table>

*NOTE:
Rehabilitation Needs split 50/50 between High and Medium High Priority
TOTAL COST 1 incl Wide Low Cost, Geom H and the rest of activities
TOTAL COST 2 incl Wide Ultimate, Geom All, and the rest of activities.*
▲ Very High Cost of Compliance with Standards.

▲ Identification of the links where a “Lower cost/intermediate” width configuration can be safely adopted (instead of the “ultimate” configuration).

▲ On the balance of cost and risks Identify sites where Extended Design Domain (EDD) for road geometry can be adopted.

▲ Vertical Geometry Data not as good as expected.
OTHER CONSIDERATIONS

▲ “Packaging” - Identifying initiatives that can be combined into a single complex project with multiple benefits and potentially better value for money, and possibly qualification for capital funding.

▲ Timeline of initiatives, for example delaying rehabilitation where widening is planned in a couple of years;

▲ Delivery Readiness, considering time required for environmental clearance, land acquisition.

▲ Consistency of the Level of Service at route and road level to ensure a seamless travel experience.

▲ Visibility of progress, goes hand in hand with the consistency principle – this means addressing certain routes and roads to visibly improve the level of service, instead of trying to address a multitude of network dispersed sites.

▲ Consider “many versus one”. Where possible, low cost solutions to improve several sites are preferred to a very high cost solution to improve one site. Cost of compliance needs to be analysed, usually full compliance is required for capital complex projects.
CONCLUSIONS

- It was a worthwhile process that helped us understand the needs of the network and the costs.
- First time the process was utilised – needs to be formally integrated within the overall investment planning process.
- Data accuracy needs to be improved to ensure validity of the results.
- Corporate sign offs are required on several fundamental issues like configuration/width and geometry standards.
- Continuous improvement is required to ensure annual utilisation, currency and relevance.
- Ongoing communication and reiteration with key stakeholders.
- Interactive visualisation tool to host the process to be deployed.
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