Asset Management in the Department of Transport and Main Roads

Approach to Strategic Asset Management

Presentation to Regional Asset Management Group – Toowoomba | 29 October 2015
Welcome and Departmental Overview
Our values, our diversity

Customers first

Unleash potential

Be courageous

Ideas into action

Empower people

diversity

inspire create innovate
Queensland’s state-controlled road network

- Longest state-controlled road network of any Australian state or territory
- 25% of all state-controlled road networks across Australia
- As at 30 June 2015, the gross replacement value (including capital works in progress) was $69.84 billion
- 33,343 km of state-controlled roads
- 29 km busway network
- 3,010 bridges
- 3,987 major culverts
Diverse network

- Queensland’s state-controlled road network is vast, connecting geographically dispersed centres through varying terrains, soil conditions and climatic zones.
- Roads serve varying functions from high-speed motorways in urban areas to remote community access roads.
Natural disasters

- Approximately 80% of Queensland's road network was closed or had limited access in the natural disasters of 2010, 2010-2011, 2011-12 and 2012-13.
- Large reconstruction program covering over 8,500 km completed by the end of January 2015.
Freight

- 20 ports handling combined trade of 317.6 million tonnes and 208.9 million tonnes of export coal.
Topics

1. **Transport Infrastructure Portfolio Management**
2. **MPO Program Structure and Governance**
3. **Element Management and QRSPP**
4. **MPO Performance Reporting**
5. **Accounting for Infrastructure**
6. **Asset Management Planning**
Transport Infrastructure Portfolio Management
Key investment principles

- Run the system; allow sufficient funding to operate infrastructure service to ensure an appropriate level of access and safety.
- Maintain the system; focus on repair or rehabilitation of networks to a safe standard rather than replacement.
- Build the System; investment to incrementally expanding the system. This principle will be guided by the following investment sub-themes:
  - economic growth through transport infrastructure
  - future focus of the transport system
  - create an integrated, multi-modal transport network.
- Safety – overlays the principles ‘safety underpins everything that we do’
Portfolio management

Doing the right things / making the right decisions and investments

Doing the things right / getting the return on the investment decisions
Portfolio management

• Portfolio investment categories:
  - To enable effective governance, management and prioritisation of the portfolio, the Transport Infrastructure Portfolio has been broken into 15 Investment Groups, each of which will have distinct governance, management and reporting arrangements.

• Maintenance, preservation and operation of the state-controlled road network is managed through two investment groups:
  - Maintenance, Preservation and Environment
  - Operations.
Maintenance, Preservation and Operations program structure and governance
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IIC
Responsible for:
Transport Infrastructure Investment across TMR

STIAM SC
• Provide high level strategic direction for asset management

MPO Steering Committee
• Strategic issues, planning, allocations
• Review variations outside of business rules

Maintenance, Preservation and Operations Governance Model
Program structure

Investment Category

Transport Infrastructure Portfolio

- Maintenance, preservation and environment
- Road operations

Investment Groups

Business Programs

Elements
Maintenance, preservation and operations

- **Programmed maintenance** *(surfacing treatments, skid resistance management).*
- **Rehabilitation** *(pavement rehabilitation, bridge and culvert rehabilitation, batter slope management).*
- **Routine maintenance** *(routine maintenance, unsealed road resheeting).*
- **Grids, guidance and delineation** *(management of grids, roadside signing, roadside and surface delineation).*
- **Corridor management** *(nature conservation, road traffic noise management, contaminated areas, degraded areas, heritage preservation, declared pest species, fire risk management roadside landscape).*
- **Data collection.**
Element management and Queensland Road System Performance Plan
Element Management Framework

- Investment is managed through the Element Management Framework.
- An element is a work activity or work item related to the road system that requires resources and/or funding to ensure an appropriate level of service is achieved.
- 26 Elements grouped into Business Programs.
Element management plans

Each plan outlines:
• element scope
• priority list of works to be completed
• rules to enable regions to develop detailed programs of work
• data collection requirements
• performance measures
• methods of performance reporting.
QRSPP

- Queensland Road System Performance Plan
- Documents the 4-year allocations and performance targets by element and by region.
- Element needs are assessed and moderated on the basis of cost, risk and performance
- Funding indicatively split by national / state networks, but districts can spend state funding on NLTN to maintain safety and serviceability.
- First QRSPP was published in 2007
- QRSPP is a rolling program (out years updated annually)
- Current QRSPP under development covers 2016-17 to 2019-20
How do we determine the funding?

- Automated condition data collection
- Pavement Modelling and Network Performance Predictions against Levels of Service
- Moderation between elements to balance risk
- Element allocations across the 4-year QTRIP period
Element name

Element contacts for further information

Summary of the element scope. For further information, consult the Element Management Plan, the who pays for what document or contact the Element Leader

20-year aspirational Element Performance Targets. This level of performance is generally unattainable with the current level of funding.

Performance trends against the 20-year performance targets.

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QRSPP contents

1. TSAM undertake SCENARIO analysis (based on June inventory and condition data)
2. Calculate aspirational needs for E17 and E18 (excluding QTRIP projects, and TNRP projects where in QTRIP)
3. Aspirational needs change due to TNRPP works programmed but not in QTRIP
4. Recalculate the rehabilitation needs
5. Allocate the target funding on a pro-rata basis comparing with revised aspirational needs
6. Run SCENARIO optimisation with target allocations to predict performance.

Rationale for Allocation

<table>
<thead>
<tr>
<th>Element 117</th>
<th>Surfacing treatments (ALL Regions)</th>
<th>QRSPP Allocations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2014-15</td>
<td>2015-16</td>
</tr>
<tr>
<td>State</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Federal</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Description of the rationale for allocating funds across regions.

Proposed four-year Element allocations

The achievable performance milestones expected during the QRSPP period.
MPO performance reporting
State of the Asset Report

- Annual report prepared by to document:
  - extent of the network
  - detailed inventory of assets
  - network usage
  - climate trends
  - road system improvements
  - road network condition
  - structures condition
  - road operations performance
  - maritime assets – from 2013-14
  - road safety – from 2013-14
  - other assets condition.

Data based on ARMIS / BIS extract as at 30 June 2014
Report products

<table>
<thead>
<tr>
<th>Asset type</th>
<th>Road network</th>
<th>Busways</th>
<th>Pedestrian</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roads (km)</td>
<td>33,339</td>
<td>28</td>
<td>0</td>
<td>33,367</td>
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<tr>
<td>Bridges</td>
<td>2,895</td>
<td>43</td>
<td>34</td>
<td>2,972</td>
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<td>Tunnels</td>
<td>3</td>
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<td>28</td>
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<td>Tunnel portals</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>3</td>
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<td>Major culverts</td>
<td>3,852</td>
<td>8</td>
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<td>3,886</td>
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<tr>
<td>Minor culverts</td>
<td>33,212</td>
<td>4</td>
<td>0</td>
<td>33,216</td>
</tr>
</tbody>
</table>

Source: ARMIS and BIS 30 June 2013

Inventory Summary

Condition Trends

Performance Summary

Road operation performance trends

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The Asset Sustainability Ratio (ASR) measures whether assets are being replaced at the rate they are wearing out. It is a ratio of current replacement expenditure relative to depreciation for a period.
Seal age

% of sealed carriageway length

- 1 Very poor
- 2 Poor
- 3 Fair
- 4 Good
- 5 Very good

% not meeting target

Years: 2003 to 2015
Pavement strength

- Entered an agreement with Australian Road Research Board (ARRB), Roads and Maritime Services (NSW) and New Zealand Transport Agency (NZTA) for data collection with Traffic Speed Deflectometer (TSD).
- Transport and Main Roads collecting 20,000 km per year.
- First data collected in 2014.
- In addition to standard condition information, TSD collects network level strength information and automated crack detection.
Pavement strength
Accounting for infrastructure
Valuation Policy Changes

- **AASB Decision on residual values (29 May 2015)**
  - Current practice (intrinsic value of reused component) disallowed
  - Directed towards greater componentisation: short-life and long-life subcomponents
  - Obsolescence of long-life components must be considered
  - Non-physically distinct components allowed.

- **Cost versus Valuation**
  - Greenfield basis for unit rates is no longer relevant
  - We need to ensure that unit rates are aligned to the cost of replacing the service capacity of the existing asset.
Transport system valuation

Valuation Analysis

- Inventory Extraction
- Stereotype Unit Rates
- Components
- Impairment Assessment
- Remaining Useful Life Analysis
- Depreciation Models

Gross Replacement Value
Accumulated Depreciation
Fair Value
Current Age
Remaining Useful Life

$
Unit rate stereotype

- Central Coast (CC)
- Central Inland (CI)
- Southern Inland (SI)
- Southeast Qld (SQ)
- Tropical North (TN)

Costing Region
- Renewal Work schedules
- Road stereotype
- Market Input costs
- Environment

Road stereotype
- Resealing/Resurfacing
- Pavement Rehabilitation
- Road Reconstruction
- Complete New Road

Stereotype description

<table>
<thead>
<tr>
<th>Stereotype</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Unformed roads (to differentiate whether it is in a rural or urban road an ‘R’ or ‘U’ will be placed in front of the stereotype)</td>
</tr>
<tr>
<td>1</td>
<td>Unsealed roads</td>
</tr>
<tr>
<td>2</td>
<td>Single carriageway &lt;= 6.4m seal width constructed pre 1980</td>
</tr>
<tr>
<td>3</td>
<td>Single carriageway &lt;= 6.4m seal width constructed post 1980</td>
</tr>
<tr>
<td>4</td>
<td>Single carriageway &gt; 6.4m seal width constructed pre 1980</td>
</tr>
<tr>
<td>5</td>
<td>Single carriageway &gt; 6.4m seal width constructed post 1980</td>
</tr>
<tr>
<td>6</td>
<td>Motorway sealed - typically up to 6 lanes</td>
</tr>
<tr>
<td>7</td>
<td>Major motorway - 6 lanes or more</td>
</tr>
</tbody>
</table>

Urban Roads
- 8 Unsealed roads
- 9 Single carriageway less than 4 lanes
- 10 Single carriageway 4 lanes or more
- 11 Divided carriageway 4 lanes or more non-motorway standard
- 12 Motorway 4 to 6 lanes
- 13 Major motorway - 6 lanes or more

Stereotype example

TLDR-CC
- ‘1’ = indicates that it is in rural area and is an unsealed road
- ‘L’ = in a level terrain
- ‘D’ = in a dry environment
- ‘R’ = soil is reactive
- ‘CC’ = in Central Coast Region
Physical v Virtual Components

Current Physical Components
- Surfacing
- Pavement
- Formation

AASB Detailed Level Components
- Surface Short-life
- Surface Long-life
- Pavement Short-life
- Pavement Long-life
- Formation Short-life
- Formation Long-life

TMR virtual components
- Component A - Surface Renewal Component
- Component B - Pavement Renewal Component
- Component C – Earthworks Renewal Component
- Component D – Earthworks Capital Component

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Previous Unit Rate Derivation

Greenfield Unit Rates
- New Construction Project

Brownfield Unit Rates
- Resealing Project
- Rehabilitation Project
- Widening Project

Surfacing costs

Pavement Costs

Earthworks Costs

Surface GRV
- Surface Residual

Pavement GRV
- Pavement Residual

Formation GRV
- Formation Residual

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New Unit Rate Derivation Example – Component B - Pavement Renewal Component

Component B GRV = {Rehab. project: Pavement + Surfacing costs} – {Resealing project: Surfacing Costs} + Surfacing costs

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Proposed Unit Rate Derivation - Overview

- Resealing Project
- Rehabilitation Project
- Reconstruction Project
- New Construction Project

Component A:
- Surfacing costs
- Pavement Costs

Component B:
- Surfacing costs
- Pavement Costs

Component C:
- Surfacing costs
- Earthworks Costs

Component D:
- Surfacing costs
- Earthworks Costs

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Financial sustainability measures

- Financial sustainability focuses on the affordability issues of meeting.
- Transport and Main Roads’ needs over the long term:
  - **Asset sustainability ratio = 45%** Ratio of five years projected replacement or renewal funding per annum and annual depreciation expenses (including TNRP funding = 112%).
  - **Asset consumption ratio = 76%** Shows the Net Book Value relative to current Gross Replacement Value (after Residual Value adjustment = 45%).
  - **Asset renewal funding ratio = 40%** Ratio of the current long-term financial plan with projected capital renewal aspirational figures (including TNRP funding = 43%).
Asset management planning
Asset management policy

- Released August 2012
- Espouses sustainable asset management
- Update 2015.
  - ISO55000

Implement international best practice benchmarks for asset management

Utilising the international standard ISO 5500x suite of documents

Deliver a ‘fix it first’ approach.

Utilising the full potential of existing assets by proactively repairing or rehabilitating networks rather than replacing them.

Provide fit for purpose transport solutions

Maintain existing assets sustainably and define appropriate, affordable levels of service which balance performance, costs and risks throughout an asset’s life

Ensure whole-of-life costs are factored into transport infrastructure developments

Capital expansion programs and projects will be accompanied by a clear position on the ongoing funding required to maintain and operate the new assets and services.
Asset Management Benchmarking and System Improvement Plan
Asset management benchmarking

- **2011**: External review of the department’s asset management competency against PAS55
- **2012**: System Improvement Plan developed
- **2012**: IIC Endorsement of 3 key improvements
- **2012**: TIAMS project commences
- **2015**: TIAMS project deferred
- **2015**: System Improvement Plan re-initiated
- **2015**: Benchmarking to ISO55000
4.1 - General requirements
4.2 - Asset management policy
4.3 - Asset management strategy, objectives and plans
  4.3.1 - Asset management strategy
  4.3.2 - Asset management objectives
  4.3.3 - Asset management plan(s)
  4.3.4 - Contingency planning
4.4 - Asset management enablers and controls
  4.4.1 - Structure, authority and responsibilities
  4.4.2 - Outsourcing of asset management activities
  4.4.3 - Training, awareness and competence
  4.4.4 - Communication, participation and consultation
  4.4.5 - Asset management system documentation
  4.4.6 - Information management
  4.4.7 - Risk management
    4.4.7.1 - Risk management process(es)
    4.4.7.2 - Risk management methodology
    4.4.7.3 - Risk identification and assessment
    4.4.7.4 - Use and maintenance of asset risk information
  4.4.8 - Legal and other requirements
  4.4.9 - Management of change
4.5 - Implementation of asset management plan(s)
  4.5.1 - Life cycle activities
  4.5.2 - Tools, facilities and equipment
4.6 - Performance assessment and improvement
  4.6.1 - Performance and condition monitoring
  4.6.2 - Investigation of asset-related failures, incidents and...
    4.6.3 - Evaluation of compliance
    4.6.4 - Audit
    4.6.5 - Improvement actions
      4.6.5.1 - Corrective and preventative action
      4.6.5.2 - Continual improvement
    4.6.6 - Records
  4.6.7 - Improvement actions
  4.6.8 - Audit
  4.6.9 - Records
  4.7 - Management review
Total Asset Management Plans
Total Asset Management Plans

- 2013: Former state government’s Commission of Audit recommended all departments should develop Total Asset Management Plans, with an intention that they form the basis of a State Infrastructure Plan.
- 2014: Transport and Main Roads was one of six agencies to participate in the initial trial implementation of the TAMPs.
- 2015 onwards: Likely expansion of the TAMP process across all of government.
## Asset profile

<table>
<thead>
<tr>
<th>Asset type</th>
<th>Road network</th>
<th>Busways</th>
<th>Pedestrian</th>
<th>Total</th>
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<tbody>
<tr>
<td>Roads (km)</td>
<td>33,343</td>
<td>28</td>
<td>0</td>
<td>33,371</td>
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<tr>
<td>Bridges</td>
<td>3,018</td>
<td>0</td>
<td>34</td>
<td>2,983</td>
</tr>
<tr>
<td>Tunnels</td>
<td>33</td>
<td>0</td>
<td>0</td>
<td>31</td>
</tr>
<tr>
<td>Major culverts</td>
<td>3,987</td>
<td>0</td>
<td>26</td>
<td>3,987</td>
</tr>
<tr>
<td>Minor culverts</td>
<td>34,637</td>
<td>0</td>
<td>0</td>
<td>34,637</td>
</tr>
</tbody>
</table>

Source: ARMIS and BIS 30 June 2015
# Gap analysis

## State-controlled road network and busway network

<table>
<thead>
<tr>
<th>Freight</th>
<th>People</th>
<th>Measure of deficiency</th>
<th>Potential Treatments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vulnerable assets restricting access</td>
<td></td>
<td>Steel culverts (#) Timber bridges (#) Bridges risk score &gt; 1,500 (#)</td>
<td>Culvert replacement Bridge replacement Structure rehabilitation</td>
</tr>
<tr>
<td>Road geometrics</td>
<td></td>
<td>Seal width &lt; interim standard (km)</td>
<td>Road widening</td>
</tr>
<tr>
<td>Road safety</td>
<td></td>
<td>Crash history Crash risk</td>
<td>Mass action safety programs</td>
</tr>
<tr>
<td>Road condition</td>
<td></td>
<td>Pavement rehabilitation need (km) Road resurfacing need (km)</td>
<td>Pavement rehabilitation Road resurfacing</td>
</tr>
<tr>
<td>Journey reliability (flood immunity)</td>
<td></td>
<td>Average time of closure Level of flood immunity ($Q_x$)</td>
<td>Realignment</td>
</tr>
<tr>
<td>Journey reliability (congestion)</td>
<td></td>
<td>Average travel time per 10km Average travel speed</td>
<td>ITS&amp;E optimisation Intersection upgrades Construct additional lanes</td>
</tr>
</tbody>
</table>
Road condition

- Utilise pavement management system to quantify existing backlog and predict future renewal needs.

- Eliminate the existing backlog over 10 years and renew the rest of the network to minimise whole-of-life costs.
Journey reliability

Flood Immunity

• Sites identified on the basis of:
  - prolonged hours of closure
  - high frequency of closure
  - freight impacts
  - traffic impacts.

Minimise impact on flooding on priority routes.
Asset investment options

Government Policy

Transport Demand

Drivers

Asset Investment Options

Investment in network operations

Investment in asset maintenance and corridor management

Investment in asset renewal

Upgrade and replacement of existing infrastructure

Investment in new infrastructure assets

Run the system

Maintain the system

Build the system

Funding Priority
Asset sustainability ratio

- Asset Sustainability Ratio (Proposed)
- Asset Sustainability Ratio (Planned)
- Target
Thank you