Engineering Technology Forum 2014
Better outcomes through innovation

Reducing the cost of infrastructure: Industry update
Government Priorities

Four pillars of the Queensland economy

| Tourism | Agriculture | Resources | Construction |

The Queensland Plan
A 30-year vision for Queensland

Our values

- Customers First
- Ideas into Actions
- Unleash Potential
- Be Courageous
- Empower People

Connecting Queensland
delivering transport for prosperity

13 QGOV (13 74 68)
Angellala Creek Bridge before
You will have seen many images – but here are a few more…
After
Presentation overview

1. Innovation
2. Pavements
3. Structures
4. Road design
5. Procurement and contracts
6. Traffic management and road lighting
Innovation

Industry update
Julie Mitchell
Industry feedback in November about progressing innovation

1. More information of frameworks and processes
2. Information on Transport Infrastructure Product Evaluation Scheme (TIPES) and Research and Development (R&D) funding
3. Confidentiality agreements
4. Know what the Department of Transport and Main Roads (TMR) wont approve
5. Culture in TMR to support not block innovation
6. Explore what others are doing
7. Concerns how TMR deal with ‘out of specification’ decisions.
Our approach

1. More information of frameworks and processes
2. Information on (TIPES) and R&D funding
3. Confidentiality agreements
4. Know what TMR wont approve
5. Culture in TMR to support not block innovation
6. Explore what others are doing
7. Concerns how TMR deal with ‘out of specification’ decisions

- A – Update Innovation Brochure
- B – Culture and understanding skills
- C – Learn from others.
A – Updated Innovation Brochure
Innovation Brochure

• Included a forward to show what TMR are trying to achieve
  - Role of specifications as a benchmark
  - Expectations of designers
  - Not just about lowering quality.

• Redefined innovation, consistent with TMR’s new strategy
  - “The application of a new idea or way to do business that creates value for TMR and customers”.

• Clarified intellectual property belongs to the party who paid for its development unless the contractual relationship states otherwise.

• Mentions confidentiality agreements.
Innovation Brochure (cont.)

• List of products and practices contractors should ideally not waste time exploring, unless there are special circumstances
• TMR staff not to blindly apply specifications
• Forms of contract that intend to improve opportunities for innovation
  - EP 150
    - Early Contractor Involvement (ECI)
    - Early Tender Involvement (ETI)
    - Guided Tender Alternatives (GTA) – dialogue, no payment for tender development, contractor owns Intellectual property (IP).
• Explained TIPES
  - Products assessed by expert panel will determine what is required to substantiate the proponent’s claims
  - Proponent’s expense
  - Satisfies multiagencies.

• Explains when TMR will partner on an innovation
  - Accepted internationally
  - Partner to promote/use/pilot
  - Costs – case by case.

• Explains our R&D program with ARRB
  - TMR initiated opportunities.
B – Culture and skills
Culture and skills

• All contract administration staff informed of TMR’s expectations
  - Importance of innovation
  - Stressed must spend the time to evaluate
  - Protect intellectual property.

• Commentaries in specifications to improve understanding of the ‘why’
  - Commentaries don’t form part of the specification.
C – Learning from others
Learning from others

- ARRB project to see what other states/councils are doing in the innovation space.
Pavements

Industry update

Peter Evans
Industry feedback in November about pavements and materials

• Industry happy with Pavements, Materials and Geotechnical direction
• Continue to deliver our initiatives
• Continue to lead
• Maintain momentum
• Industry looking forward to delivery of initiatives
• Harmonisation of asphalt specification
• Delivery of new Pavement Design Supplement
• Delivery of new approach to delivery reduced quarry testing.
Our approach

- Strong focus in reducing costs to industry to gain efficiencies and savings for TMR
- Maintain close collaboration with industry to drive this agenda
- Maintain strong linkages with ARRB to ensure changes are based on research.

A – Asphalt harmonisation
B – Quarry specific testing frequencies
D – New Pavement Design Supplement
E – ARRB TIPES.
A – Asphalt harmonisation
Asphalt harmonisation with Road and Maritime Services New South Wales

2012 restructure and government policy

2012 restructure and government policy

Improved performance

TMR Drivers

Warranty

Lower costs
Advantages

- Lower cost Mix Design Registration
  - Supplier fully responsible for production based mix design
  - Reduced time and cost
  - More consistent approach
- Enables new technologies
  - Increased use of reclaimed asphalt pavement
  - Increased use of warm mix asphalt
- Permits removal of waterproofing seal below dense graded asphalt wearing surfaces
- Two year warranty for asphalt held under separate deed.
B – Quarry specific testing frequencies
Quarry specific testing frequencies

- Quarries vary widely in rock quality, management and experience
- Product quality varies between quarries
- Excessive testing for many quarries
- Challenge for Government to approve different frequencies
- Solution – allow quarries to self assess against TMR guidelines.
Quarry specific testing frequencies

• Self assessment guidelines negotiated and agreed with Cement, Concrete and Aggregates Australia (CCAA)
• Guidelines to be reviewed after 12 months
• Quarries can start self assessment after July 2014
• Implementation in all new TMR contracts from 1 January 2015.
C – New Pavement Design Supplement
New Pavement Design Supplement (PDS)

- Improved value for money
- Replaces Pavement Design Manual
- Aligns with, and compliments, Austroads Pavement Design Guide
- Less prescriptive and caters for project specific engineering decisions
- Links to other technical documents
- Developed with extensive consultation with regions and industry.
D – ARRB TIPES
ARRB TIPES

- Transport Infrastructure Product Evaluation Scheme (TIPES)
- Replaces TMR TIPES
- Now administered by ARRB
- Agreement being negotiated with all states and local governments for national accreditation scheme
- Proponents outline their claims
- TIPES panel established to develop laboratory, and ultimately field testing procedure to evaluate claims
- TIPES report avoids requirement for separate evaluations for each state.
Structures

Industry update
Dr Ross Pritchard
Industry feedback in November about progressing Structures

1. Industry want to understand where TMR is coming from in technical documents
2. Long term maintenance issues
3. Updating specifications to be more consistent with Australian Standards, performance based not prescriptive
4. Commentaries in all new specifications or major revisions
5. Engage with industry on best practice, not prohibit practices
6. TMR to allow good innovation
7. Update contemporary practice, such as Building Information Modelling (BIM).
Our approach

1. Develop Technical Notes and/or one page case studies about what we will and will not accept
2. More material available on web for transparency
3. Industry forums
4. Updating specifications to be more consistent with Australian Standards
5. Develop position when outside Australian Standards, for example, Acid Sulphate Soils

- A – Understanding where TMR is coming from
- B – Specifications and technical documents
- C – Industry forums
Understanding where TMR is coming from
Untidy workmanship
Non-uniform loading of bearing
Durability – no liners in cast-in-place piles
Do we need more holes?
Poor quality – soft drink bottle in prestressed concrete pile
Mortar above bearing
Our response

• Develop Technical Notes and/or one page case studies we will and will not accept
• More material available on web for transparency
• Technical Note on reinforced piles – published
• 24 previous Technical Notes now on TMR website.
Specifications and technical documents
Our response

• Updating specification to be more consistent with Australian Standards
• Develop position when outside Australian Standards, for example, Acid Sulphate Soils
• Commentaries in all new specification or major revisions
• Design criteria – updated
• Standard pile drawing – published
• Fibre composite drawings – published
• Intelligent Transport System (ITS) gantry drawing published
• ITS flowchart – published.
Our response (cont.)

• MRTS14 Guardrail – published
• MRTS24 Box culverts – public comment
• MRTS25 Concrete pipes – published
• MRTS26 Fibre pipes – published
• MRTS59 Manufacture fibre composite – published
• MRTS60 Installation fibre composites - published
• MRTS70 Concrete – public comment
• MRTS71 Reinforcing steel – public comment
• MRTS73 Prestressed precast – public comment
• MRTS82A Finger joints – published
• MRTS96 Asbestos existing structures – published.
C – Industry forums
Our response

- Industry workshops:
  - Piling
  - Design criteria.
Road design and scoping

Industry update
Dr Owen Arndt
Industry feedback in November about road design and scoping

- Make TMR training courses available for industry to attend
- Make design speed equal to speed limit
- Reward innovation
- Improve data source availability
  - extended design and design exception reports
- Check need for hard copy drawings and improve process for signing drawings
- Other industry feedback
  - Harmonise design guidelines nationally
  - Incorporate Building Information Modelling (BIM).
Our approach

1. Make TMR training courses available
2. Make design speed equal to speed limit
3. Reward innovation
4. Improve data source availability
5. Check need for hard copy drawings and improve process for signing drawings

- Other industry feedback
  - Harmonise design guidelines nationally
  - Incorporate Building Information Modelling (BIM)

- A – Make training courses accessible
- B – Review and update design criteria and processes
- C – Undertake research
A – Make training courses accessible
TMR Training courses

- Staff from industry want to attend TMR’s training courses
  - To be skilled in TMR practices, processes and design criteria
  - To enable fit-for-purpose and consistent designs with less rework
  - Learnings from industry incorporated into TMR practice.
TMR Training courses

- Mailing list to consultancies to advise of new courses
- Training calendar available on TMR website
  - Business and industry
  - Commercial services
  - TTS Civil Training (TTS)
    - Technical training calendar.
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On-line videos to be prepared

• Identify new documents and changes to existing documents
• Short training courses
• On-line videos to be accessible and directly adjacent to relevant guideline or specification.
Speed parameters
- Divide into two courses: Fundamental and advanced
- Roll out fundamental course from October 2014

Brownfields / Extended Design Domain (EDD) / Design exceptions training
- 16 training courses in Brownfield guidelines delivered (16% attendees from industry and local authorities)
- Brownfield and EDD training courses being merged (roll-out expected mid 2015)

Project Scoping Guidelines
- Release as a 20 minute on-line training package in first half of 2015

Role of RPEQ engineers
- Release as a one or two 20 minute on-line training package/s in first half of 2015
B – Review and update design criteria and processes
Reward innovation

Updated guidance on design briefs in Part 8 ‘Design Process’ of Volume 3 of the Road Planning and Design Manual

- Expected to optimise the design (fit-for-purpose), justifying design exceptions as appropriate
- Seek innovative options
- Determine risk appetite of client

Time and cost savings

- Minimise rework
- Minimise variations
- Maximise innovation

• Progressed as part of recommendations from review of “Engagement of Design Consultants”
Can reduction in standard be justified by the RPEQ?

Yes

TMR takes responsibility if anything goes amiss

No

- Consider other innovative ideas
- Reduce scope of project

With consideration of suitable and recognised levels of safety and operation of the road
However, experience has shown that to achieve completely fit-for-purpose road design schemes, TMR does require its own supplements.
Road Planning and Design Manual

- Publishing timeline:
  - July 2013 – initial release
  - August 2014 – Parts 4, 4A, 4B and 6 of Volume 3
  - September 2014 – Parts 4C, 6A and 6B of Volume 3
  - June 2015 – Volume 3 completed.
Improve data source availability – EDD and design exception reports

• Savings in time and money when justifying similar design exceptions
• Project being advanced through the TMR “Leadership Connect 2014” program
  • Recommendation in 2015
• Incorporate reports into TMR Global Information Systems?
• Research project proposed to the Austroads Road Design Taskforce
  • Document all known quantitative relationships between road geometry and crash rates.
Certification of drawings

- Prior to February 2014
  - Issued for construction, design revisions and as-constructed plans individually certified on permanent paper

- Drafting and Design Presentations Standards Manual updated in February 2014
  - As a minimum, only issued for construction plans require individual certification
  - Certification of design revisions and as-constructed plans can be achieved via the consultant’s quality system
  - Significant savings in effort and time.
Need for hard copy of engineering drawing

- **Legal requirements**
  - Currently no mandate for long term storage of electronic files (including long term formats)
- **Long term record keeping**
  - 500 years for microfilm
- **Cost to maintain ‘readability’ of electronic files**
  - Regular updating of software and files, for example, Drawing Office Graphics System, to more recent design programs.
C – Undertake research
Building Information Modelling (BIM)

- BIM is a method to manage the design and project data in digital format throughout the asset life-cycle.
  - Streamline the whole delivery process
  - Design quality can be improved through automated checks.

TMR involvement with Sustainable Built Environment National Research Centre (SBEnrc)
Design to the posted speed limit

- **TMR/ARRB project “Design Speed Review”**
  - Reviewed practice of adopting Design speed = Posted speed + 10km/h” where no appropriate speed data available

- **Results:**
  - Speed limit plus 5km/h may be permissible for some roads, especially in south-east Queensland
  - Cost savings due to the reduced design speeds are minor

- To be included in the Road Planning and Design Manual.
Procurement and contracts

Industry update
Allan Uhlmann
Industry feedback in November about progressing contracts

1. Encourage innovation/alternatives
2. Clarify alternatives that could be accepted
3. More short and long lists
4. Use appropriate procurement processes
5. Use appropriate contract form
6. Consistency.
Our approach

1. Encourage innovation/alternatives
2. Clarify alternatives that could be accepted
3. More short and long lists
4. Use appropriate procurement processes
5. Use appropriate contract form
6. Consistency.

- A – Infrastructure procurement
- B – Contracts
- C – Planning and design.
A – Infrastructure procurement
Project delivery system

• Main Roads Project Delivery System (MRPDS) updated and released as the Transport Infrastructure Project Delivery System (TIPDS)

• Further updates to follow in 2014/15 in association with release of the new Modular Contract.
Engineering Policy 150

- Procurement of Infrastructure Project Thresholds
- Issued June 2014
- Guidance on value/risk profiles for procurement methods and contract forms.
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<th>Infrastructure procurement method</th>
<th>Contract form</th>
<th>Value and risk profile</th>
<th>Contract value ($m) thresholds</th>
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<td>Early Contractor Involvement (ECI)</td>
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<td>Transport Infrastructure Construction Contract (TICC)</td>
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<td>Guided tender alternative</td>
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<td>Low to medium vale, low to medium risk</td>
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<td>Minor Works</td>
<td>Low to medium value, low risk</td>
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<td>Minor (non-prequalified contractor)</td>
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<td>Low value, low risk</td>
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Guided tender alternatives

- Trial complete
- Two-stage process with opportunity to discuss proposed alternatives.
B – Contracts
Modular contract suite

- Draft documents complete
- Trial projects being identified
- Planned for full implementation mid-2015.
C – Planning and design
Procurement transformation
Traffic management at roadworks and road lighting update

Industry update

Jon Douglas
Industry feedback in November about traffic management at roadworks

1. Department of Transport and Main Roads
   • Holistic risk assessment and use of engineering judgement
   • Awareness training in Manual of Uniform Traffic Control Devices (MUTCD)
   • Training in exceptions
   • Speed compliance
   • Clarify relationship between documents and roles
   • Mutual recognition of level 3/4 training across Australia
   • Enforce erection/removal of signs
   • Consistent application with local governments and utility companies.

2. Industry
   • Challenge risk aversion
   • Bring forward innovation
   • Demonstrate cost savings
   • Be an informed buyer of traffic management services
   • Remove unnecessary signs.
Our approach

• **Action Area A – Engineering**
  1. Realistic and practical speed limits through roadworks
  2. Restoring driver confidence in roadwork signage
  3. Encouraging innovation in roadwork signage practice

• **Action Area B – Enforcement**
  4. Increased speed compliance effort
  5. Increased enforcement of roadwork signage practice

• **Action Area C – Education**
  6. Educate drivers on the consequences of speed to roadworkers and themselves
  7. Educate contractors and workers on the impact of poor signage
  8. Educate engineers on improving the quality of signage choices and layouts.

• A – Engineering
• B – Enforcement
• C – Education.
Traffic management at roadworks

- Aim is to achieve safe workplace, safe travel with minimal delays, at a reasonable cost
- “Speed limits should be there for a reason”
- “More isn’t better when it comes to signs”.
A – Engineering
What we have done – Engineering

• Release of new MRTS02 – Provision for traffic in April 2014 and September 2014
• Release of updated MUTCD Part 3 September 2013 and May 2014.
Premier’s statement – 21 August 2014

• Queenslanders driving to work and home to their families will be able to get there safer, more quickly and with fewer frustrations with an improved signage system around roadworks.

• One of the greatest frustrations for drivers is having to slow to a crawl when there are no roadworks taking place – whether that’s at night or on the weekend.

• Under this new approach, engineers will be required to return signs to a safe speed when works aren’t being carried out.

• At the same time we’ll be working with police to step up enforcement around roadworks.

• We will be rolling this out to roadworks across the state to deliver more consistent signage, crack down on speeding and educate drivers and traffic managers of the dangers around roadworks.
Document hierarchy

MRTS02 – Provision for Traffic

Traffic Management Plan

Traffic Guidance Schemes

Roadwork Sites – Planning and Design Considerations

MUTCD Part3

TRUM Manual (Traffic and Road Use Management Manual)
Engineering safer and more affordable traffic management at roadworks

• MUTCD Part 3 – ‘Ready Reckoner’
Engineering safer and more affordable traffic management at roadworks

- MUTCD Part 3 – ‘Ready Reckoner’

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<td>Pedestrians, bicycles, wheelchairs, public transport, local traffic</td>
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<td>Signing and delineation</td>
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<td>Freeway exit closures</td>
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<td>Vehicle size restriction</td>
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<th>Traffic control devices for all static sites</th>
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<td>Worksites approaches and departures</td>
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<td>Delineation</td>
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<td>Lane and road closures</td>
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<td>General requirements, function, format and size of signs</td>
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<td>Frequently changing areas Clause 4.3.4</td>
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<td>Gaps in traffic Clause 4.4.7</td>
</tr>
<tr>
<td>Protected by specialist vehicles Clause 4.4.8</td>
</tr>
<tr>
<td>Survey work Clause 4.4.9</td>
</tr>
<tr>
<td>Traffic investigations Clause 4.4.10</td>
</tr>
</tbody>
</table>

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## MUTCD – Roles and responsibilities

<table>
<thead>
<tr>
<th>Traffic Guidance Scheme (TGS) Type</th>
<th>TGS Prep by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use a single standard diagram in MUTCD or TRUM</td>
<td>Level 2</td>
</tr>
<tr>
<td>Modify the advance and departure speed signs on a standard diagram in the MUTCD or TRUM</td>
<td>Level 2</td>
</tr>
<tr>
<td>Preparation of site specific TGS using MUTCD and TRUM</td>
<td>Level 3</td>
</tr>
<tr>
<td>A recommended (“should”) or “where practicable” requirement in the MUTCD is not implemented</td>
<td>Level 3 or RPEQ prepares TGS &amp; risk assessment. RPEQ certifies both.</td>
</tr>
<tr>
<td>A mandatory (“shall”) requirement in the MUTCD is not implemented</td>
<td>Level 3 + risk assessment</td>
</tr>
<tr>
<td>Practice outside requirements or scope of MUTCD and/or TRUM Manual – innovative</td>
<td>Level 3 (or RPEQ) prepares TGS &amp; risk assessment. RPEQ certifies both.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>On-site modifications to TGS</th>
<th>TGS to be modified by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Move signs within tolerances (Clause 4.1.6) including away from intersections etc</td>
<td>Level 2 + note all changes on the TGS</td>
</tr>
<tr>
<td>Use a different standard diagram from MUTCD or TRUM</td>
<td>Level 3 + note all changes on the TGS</td>
</tr>
<tr>
<td>In response to an incident or an unplanned event</td>
<td>Level 2 + note all changes on the TGS</td>
</tr>
<tr>
<td>In response to long queue of traffic (as per Clause 4.7.8)</td>
<td>Level 2 + note all changes on the TGS</td>
</tr>
<tr>
<td>Changes required due to vehicles exceeding speed limits in accordance with MUTCD or TRUM provisions</td>
<td>Level 3 + note all changes on TGS</td>
</tr>
<tr>
<td>Changes outside provisions of the MUTCD or TRUM</td>
<td>Level 3 to prepare risk assessment and note all changes on TGS. RPEQ to certify both</td>
</tr>
</tbody>
</table>
Process for the exemptions to MUTCD Part 3

1. Review background information
2. Review crash data operating speeds and other special considerations
3. Understand the required standard for traffic control elements
4. Develop & evaluate alternatives
5. Can we retain the exception?
   - Yes
     - Mitigation of specific exception or generally throughout the construction site
   - No
     - Consider construction sequencing, methods and redesign TMP
6. Are mitigation treatments required?
7. Review document and approve
Examples of innovative devices
B – Enforcement
What we have done – enforcement

Traffic Management Plan

Traffic Guidance Scheme

Implementation Speed Camera Enforcement

Project Management & Controls

Policy being developed on use of penalty infringement notices at roadworks (within an overall compliance plan)

- TRUM note
- Trial on Pacific Motorway
- Inclusion in scheduler system

Documentation by Project Managers to support enforcement
C – Education
What we have done - education

- AAPA and Industry Forum in December 2013 with 200 attendees
- MRTS02 – 23 A3 pages of comments
- Delivery of 18 Technical Awareness sessions across 14 locations across the state (with over 600 attendees)
- Presentations at a range of internal and industry forums
- Traffic Management Industry Alliance Group
- Austroads project on harmonising competencies well progressed
- Review and redevelopment of Level 3 and 4 traffic management training.
Industry feedback in November about road lighting

1. Design consultants to better understand and apply warrants and standards appropriately
2. TMR to continue to support R&D and pursue innovation and trials
3. TMR peer review of lighting designs to ensure warrants and standards are being applied appropriately.
Our approach

1. Design consultants to better understand and apply warrants and standards appropriately
2. TMR to continue to support R&D and pursue innovation and trials
3. TMR peer review of lighting designs to ensure warrants and standards are being applied appropriately.

- A – Peer reviews
- B – Innovation.
A – Peer reviews
Success: Peer reviews for major road lighting designs

- Energy costs increasing 10% p.a.
- Correct application of TMR policy and standards is needed to manage cost impacts from new lighting.
- Road Operations lighting team now engaged on all major projects as peer review.
- Peer reviewed six major projects in 2014
- Project 1 - 89 poles and luminaires removed, $900,000 in savings over expected life cycle.
- Project 2 - 156 daytime lighting underpass luminaires removed through specific analysis of the daylight contribution within the underpass. Projected savings of $2.6 million in capital, energy and maintenance savings.

Key facts
- TMR has a well established policy for lighting warrants.
- Minimizing energy consumption is one of the key design objectives within the Australian Road Lighting Design Standards.
- TMR’s operational budget will continue to face fiscal challenges.
B – Innovation
Innovation

• Successful trial of LED lighting - 2km section of Glenella Connection Road
• Been operational for two years, no failures to date
• Positive feedback on the lighting - vision, uniformity, maintenance
• Diming trial - changing over 40 400W high pressure sodium lights on Southern Cross Way
• Installation of control and monitoring system with this project
• First for TMR on a major road
• Collaboration with Queensland University of Technology to investigate human factors and energy savings.
Thank you