AUSTRALIAN PERSPECTIVE
Bridge & Vehicle Monitoring
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UK BRIDGE OWNERS FORUM
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AUSTRALIAN BRIDGES
PBS Road Mapping Classification

37000 bridges in Australia
- 1 per 22 km
17000 bridges in NZ
- 1 per 5 km
AUSTRALIAN BRIDGES
Bridge Inspection Systems

General
- Manuals based on USA Pontis system
- Common approach by all states
- State specific bridge types, components and environments
- Applicable to bridges and other road related structures – signs, mast, retaining walls and similar

Level 1
- Undertaken as part of routine road and bridge maintenance
- Undertaken after specific incidents – flood, fire, earthquake, accident

Level 2
- Visual inspection and with standardised reporting
- Undertaken by prequalified bridge inspectors

Level 3
- Undertaken by experienced bridge engineer
- Field inspection and testing
- Theoretical analysis
- Complex bridges – bridge specific inspection, monitoring and maintenance systems
- Heritage bridges – bridge specific requirements

• Results held in Bridge Information Systems and used for Bridge Asset Management
• Bridge Condition Rating influences maintenance priorities and funding
AUSTRALIAN BRIDGES
Theoretical Assessment

General
• Ultimate limit state live load factors
• Serviceability limit states
• Fatigue assessment
• Material properties and allowing for condition deterioration

Freight Vehicles
• Increasing mass and number
• Overloading - potential failure of components
• Repeated loading - potential fatigue damage in steel and concrete bridges

Special Purpose Vehicles
• Increasing number
• Overloading still an issue – counterweights on cranes

Indivisible Heavy Loads
• Mass measurement
• Allowable stresses
AUSTRALIAN BRIDGES
Load Testing & Monitoring

- Ultimate load capacity
- Linear elastic behaviour
- Measured strains
- Calibration of computer models
- Load distribution
- Dynamic response
- Monitor bridge inspections

Graph: 8.5 m span, T-44 Load

Max moment (kN.m)
Max bar strain (micro)
AUSTRALIAN BRIDGES
Monitoring Inspections
AUSTRALIAN BRIDGES
Cantilever, Gantry & High Mast Structures
Retaining Walls & Noise Walls
AUSTRALIAN BRIDGES
High Mast Lighting Structures

Defects  Analysis  Retrofit Strengthening
AUSTRALIAN BRIDGES
Inspection & Monitoring - Structure & Traffic

- Visual inspection
- NDT inspection
- On bridge weigh-in-motion system
- Traffic loop detection
- Health monitoring and testing
BRIDGE SURVEY & MONITORING

Laser scanning – Cloud map generation
- 3D models
- Monitor movements periodically
- Monitor movements during load testing
**AUSTRALIAN BRIDGES**

**Vehicle and Freight Monitoring & Management**

**Weigh-in-motion systems**
- Vehicle type and mass data
- Freight data
- Current and future trends
- Enforcement – linked to cameras

**Mass Management**
- Self regulation – QA systems, weigh-bridges
- On-board weighing systems
- Audits by surveillance officers

**Intelligent Access Programs**
- GPS tracking over permit specified routes
- On-board weighing
- Weigh-in-motion audits
AXLE DYNAMIC LOADING MEASUREMENT

Figure 5.8: Drop test result for air suspension with axle 2 shock absorbers removed

Figure 5.9: Drop test result for air suspension with axle 2 shock absorbers removed (expanded)