



**Manual**

**Structures Inspection Manual  
Part 1: Structures Inspection Policy**

**September 2016**

## Copyright



<http://creativecommons.org/licenses/by/3.0/au/>

© State of Queensland (Department of Transport and Main Roads) 2016

**Feedback:** Please send your feedback regarding this document to:

[TMRStructuresInspectionManual@tmr.qld.gov.au](mailto:TMRStructuresInspectionManual@tmr.qld.gov.au)

**Contents**

**1 Objectives**.....1

**2 Structures Asset Management System (SAMS)** .....1

**3 Scope** .....1

3.1 Asset types ..... 1

**4 Structure identification** .....2

**5 Accountability** .....5

5.1 General Accountabilities ..... 5

5.2 Overview of Responsibility for WHS in Inspections ..... 6

**6 Structure Information** .....7

**7 Inspection Requirements**.....7

**Figures**

Figure 1 – Structures Asset Management System Framework..... 3

Figure 2 – Structures Asset Management Mechanisms ..... 4

## 1 Objectives

The purpose of this policy is to ensure that the condition of all qualifying highway structures is systematically monitored to ensure that conditions which may lead to severe structural damage or collapse are identified as soon as possible in order that the appropriate intervention or remedial action may be undertaken.

In addition, the data collected from the inspections may be used to:

- develop inspection and maintenance programs
- carry out load capacity assessments
- provide feedback to the design process
- monitor the effectiveness of maintenance treatments on a local or state-wide basis
- maintain hazard registers including the department's Asbestos Register.

The policy also identifies accountabilities for structures asset management and establishes the requirements for data management and a systematic inspection and condition rating programme.

## 2 Structures Asset Management System (SAMS)

The SAMS has been developed to ensure that the department's structures are managed effectively and efficiently. Inspection and condition rating is an integral component of the SAMS and its relationship with other principal components of the system is shown in the system framework diagram (refer Figure 1) and in the mechanisms used to deliver desired outcomes (Figure 2).

The primary objective of the SAMS is to establish an integrated and accessible information system for structure inventory, condition, load capacity and inspection and works history.

The Bridge Information System (BIS) has been developed for this purpose.

## 3 Scope

### 3.1 Asset types

This policy applies to the following structures:

- All bridges
- All 'major' culverts. I.e. meeting the following criteria:
  - metal culverts (steel and aluminium):
    - at least one barrel (cell) with span, height or diameter  $\geq 1.2$  m, or
  - all other culverts:
    - pipes with at least one barrel (cell) with diameter  $\geq 1.8$  m, or
    - rectangular/oval/arch culverts at least one barrel (cell) with span  $> 1.8$  and height  $> 1.5$  m.
    - stock and pedestrian underpasses

These culverts typically have an opening large enough to:

- access without specialist equipment and are therefore capable of being inspected relatively easily.
- close the road and create a significant safety hazard in the event of structural failure.

Further to the above, the following asset types are also included, irrespective of ownership, where there will be significant impact to public safety or critical network function in the event of failure:

- tunnels
- busway bridges, including elevated and underground stations
- pedestrian overbridges at busway stations
- retaining structures<sup>1</sup> below the highway, including gravity, cantilever and mechanically stabilised earth structures > 1.5 m high within 1.5 x retained height of the carriageway shoulder
- retaining structures<sup>1</sup> above the highway, including gravity, cantilever and mechanically stabilised earth structures > 2.0 m high within 1.0 x retained height of the carriageway shoulder
- gantries over road network and all structures supporting signs over traffic lanes. This includes large signs with truss supports in close proximity to traffic lanes (i.e where failure of the supporting structure could impact on road users/network function)
- pedestrian/cycle bridges over the road network
- rail/light rail bridges over the road network
- high risk 'minor culverts' e.g. culverts falling just outside of criteria listed above may be referred to BCMAM by the District for consideration for reclassification as a major culvert if failure were to result in a significant impact on public safety or critical network function.

<sup>1</sup> Retaining structures at bridge/culvert sites should be recorded as a component of that structure.

Where the department do not own the structure, or are not responsible for its inspection/maintenance under a formal agreement, any decision to include the structure on a formal inspection program is to be considered on a case-by-case basis and shall take into account the department's confidence in how the structure is being managed. The asset owner shall be consulted.

Notwithstanding the above, all structures meeting the above criteria shall be captured in the BIS.

#### **4 Structure identification**

All structures complying with these criteria shall be allocated a unique number in the BIS and, in addition, shall be physically numbered to permit ready identification in the field.

There is capacity within the BIS which permits Districts to record data on "other" structures if desired, (e.g. minor culverts). In this event the Districts can adopt a local numbering system to locally manage these assets. It is anticipated that these smaller structures shall be managed through the RMPC system.

**Figure 1 – Structures Asset Management System Framework**

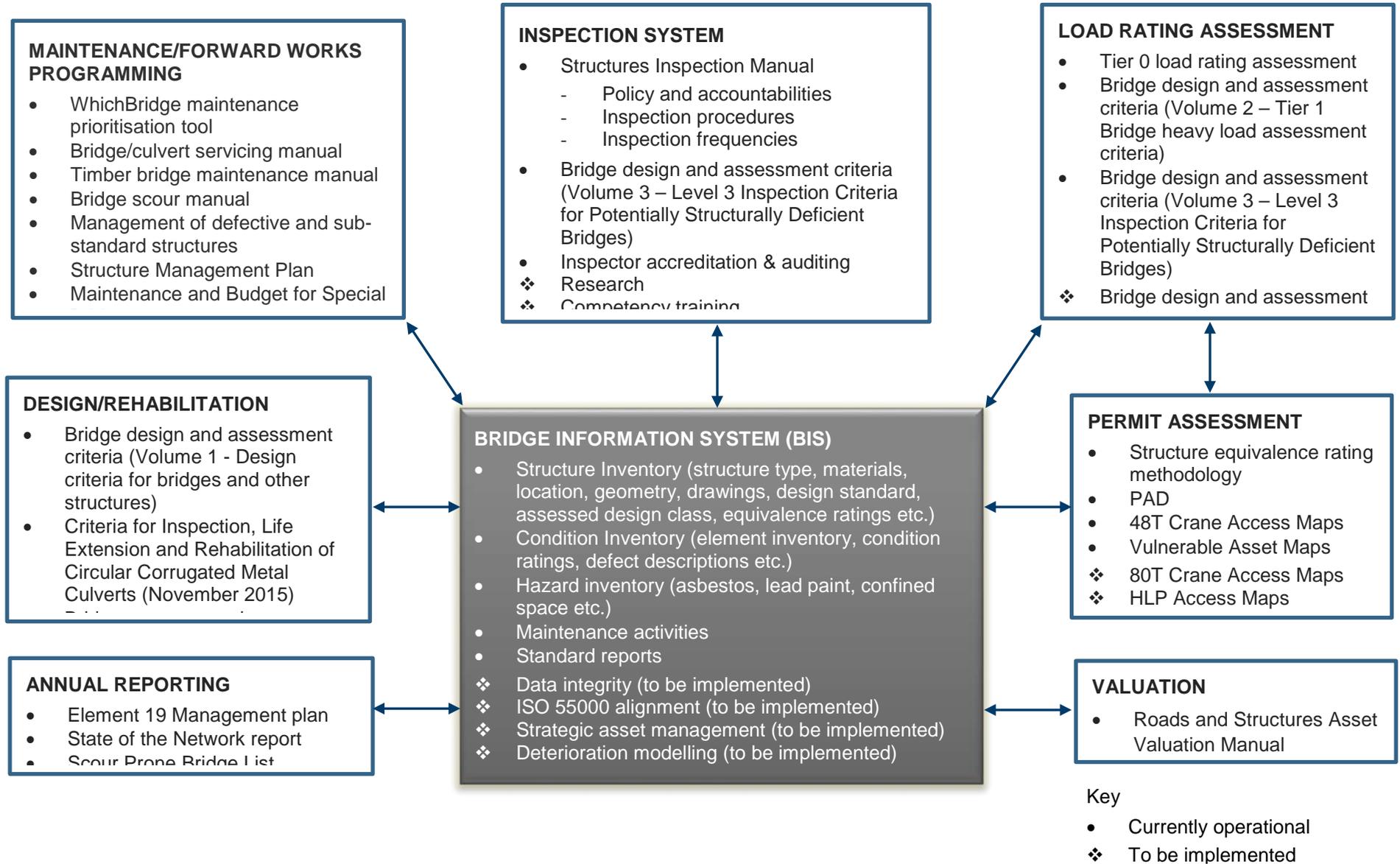
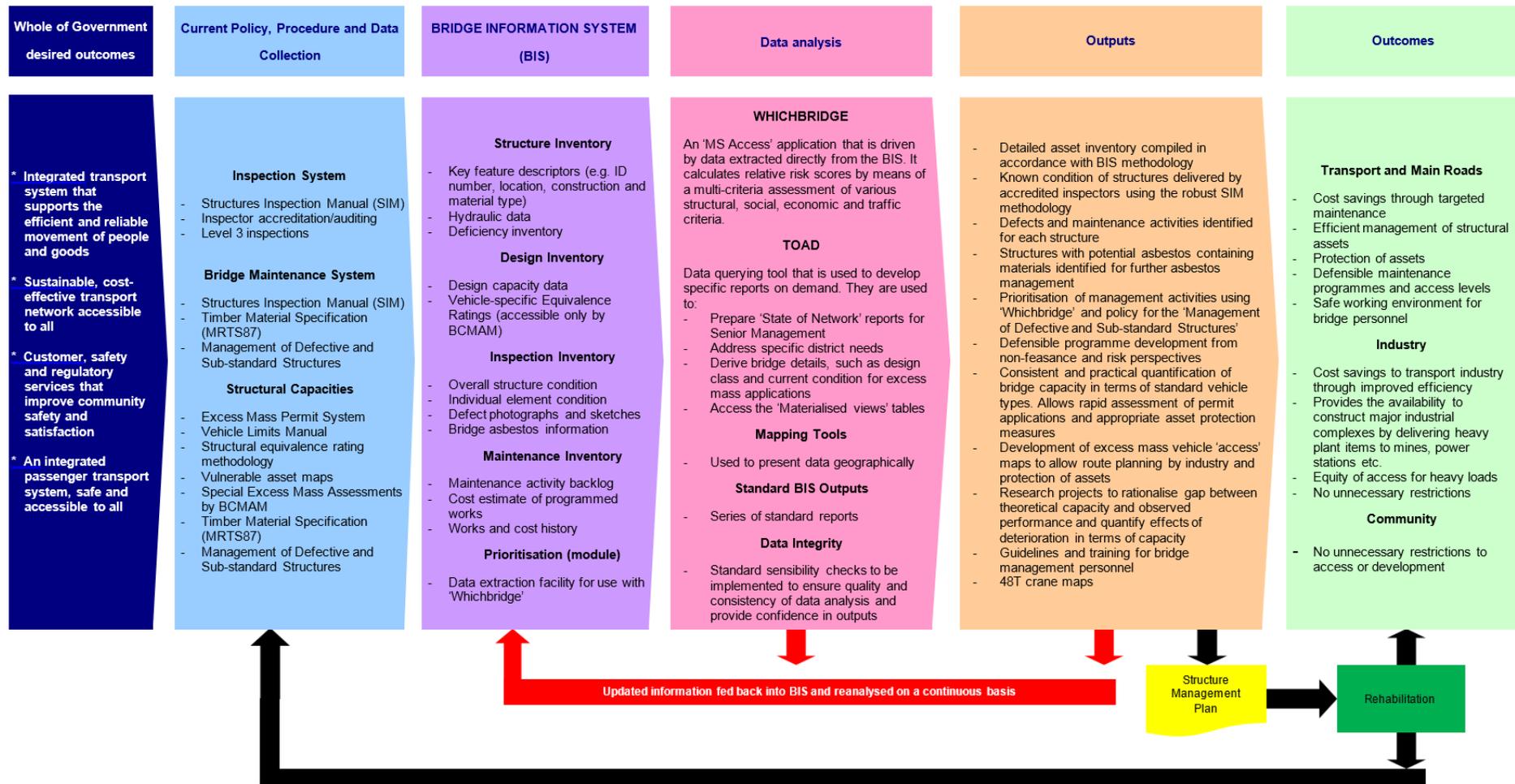


Figure 2 – Structures Asset Management Mechanisms



## 5 Accountability

### 5.1 General Accountabilities

**District Directors** are accountable for the management of all highway structures on the State controlled road network. These management responsibilities include:

- Monitoring the delivery of the structure inspection programme.
- Ensuring that Routine Maintenance Inspections are carried out at least once every 12 months, inspection data is monitored and recorded and recommendations are actioned.
- Ensuring that Condition Inspections are carried out at the required frequencies, inspection data is monitored and recorded and recommendations are actioned.
- Ensuring that the required "Maintenance Activities" are recorded, costed and entered in the BIS and managed effectively.
- Commissioning Detailed Engineering Inspections, investigations and analysis when required, and ensuring that recommendations are actioned.
- Ensuring that all inspection data is transferred to the Bridge Information System within 30 days of its collection. However, in the event that a defective structure is detected, all inspection data shall be entered into the BIS within seven days of its collection.
- Development of "Structure Management Plans" in accordance with the guidelines in Appendix F. Plans are to be developed in conjunction with Structures Directorate, for all defective or substandard structures.

**Deputy Chief Engineer (Structures)** through **Director (Bridge Construction Maintenance & Asset Management (BCMAM))** is accountable for:

- Promulgating and monitoring the implementation of this policy.
- Developing, implementing and maintaining the Bridge Information System (including updating descriptive and design data) and providing the necessary access and reporting mechanisms for all TMR personnel involved in structures management.
- Ensuring the technical adequacy of the specified inspection processes.
- Developing and supporting the technical procedures; including the preparation of the supporting manuals and the training and accreditation programmes necessary to implement this policy.
- Monitoring the delivery of the inspection programme through a data and physical auditing programme.
- Accreditation of inspectors and maintain an accredited inspector register.
- Assist Districts in the development and certification of Management Plans for substandard and defective structures.
- Supporting the BIS Functional Manager – Director (BCMAM).
- Providing resources to maintain and audit data that is held in the BIS.
- Supplying the specialist resources to enable Director (BCMAM) to develop, implement and support the Structures Inspection Manual and attendant procedures and processes. This

includes BCMAM arranging or carrying out detailed structural engineering inspections for the Regions and Districts.

**Executive Director (Program Management Delivery)** is accountable for:

- Development of uniform, consistent and cost effective inspection programmes; including quality assurance systems and the co-ordination of joint services among regions and districts.

**Executive Director (Strategic Investment and Asset Management)** is accountable for:

- Providing resources to develop and maintain the BIS IT system through the ARMIS service request (ASR) system.
- Providing resources to train and support BIS users.

## **5.2 Overview of Responsibility for WHS in Inspections**

All inspections must comply with the requirements of:

- this manual
- any applicable legislation, codes of practice, standards and Transport and Main Roads policy/manuals including but not limited to:
  - *Work Health and Safety Act 2011*
  - *Work Health and Safety Regulations 2011*
  - *Bridge Asbestos Management Plan*

All inspectors are responsible for their own personal safety and that of others impacted by inspections at all times.

The department demonstrates part of its duty of care for those undertaking inspections and the general public by:

- Providing a generic list of hazards typical for many inspections.
- Providing known specific hazards for each structure in the structure information passed onto inspectors (e.g. presence of possible/confirmed asbestos containing materials).
- Requiring a minimum of two people on site at any given time when inspecting.
- Requiring inspectors to provide and submit a Safe Work Method Statements (SWMS) for each inspection (or set of inspections) undertaken for review and comment before commencing site works.
- Conducting audit and surveillance to ensure inspections are carried out as per the SWMS.
- Requiring inspectors to submit an update of the specific road structures inspection hazards to TMR following site inspections.

If an inspection is required from water, any vessel used for the purpose and its operation will be required to satisfy the legal obligations of the Marine Act, other relevant Acts, and associated regulations.

Where inspections are carried out on structures located over or under the assets of other Authorities, the relevant regulations and Codes of Practice relating to work on or close to their assets must be adhered to.

## 6 Structure Information

Comprehensive inventory and condition data is captured in the BIS, which is maintained by the Deputy Chief Engineer (Structures). This system provides accessible and timely information to all TMR personnel involved in structures management and is integrated with ARMIS. This connects all related structure and road data through a common location reference system.

The District Director will act as an agent for the Deputy Chief Engineer (Structures) and is responsible for entering and managing the inventory, inspection, condition and maintenance data at the local level in accordance with the documented guidelines for the BIS and this manual.

Details of the data capture requirements for the various inspection levels are defined in the inspection requirements section.

## 7 Inspection Requirements

The safety and condition of structures on the state road network is monitored through a three level hierarchical inspection regime that was introduced in March 1998.

The overall requirements for each inspection level are covered in *Part 3 – Procedures*.

The three inspection levels are as follows:

- Level 1 – Routine Maintenance Inspection
  - A visual inspection to check the general serviceability of the structure, particularly for the safety of road users, and to identify any emerging problems.
- Level 2 – Condition Rating Inspection
  - An inspection to assess and rate the condition of a structure (as a basis for assessing the effectiveness of past maintenance treatments, identifying current maintenance needs, modelling and forecasting future changes in condition and estimating future budget requirements).
- Level 3 – Special Inspection
  - An inspection to provide improved knowledge of the condition, load capacity, in-service performance or any other characteristic beyond the scope of other types of inspection. Special inspections may be used to inform/develop the scope of other types of inspection. Level 3 inspection categories include:
    - structural engineering
    - ACM identification
    - ACM verification
    - underwater access
    - fracture critical/low redundancy
    - sub-standard load rating
    - complex/unique structures
    - known/suspected deficiencies
    - confined space inspection.

