



Level 1 Bridge Inspection Framework



mainroads
WESTERN AUSTRALIA

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1.0 Introduction

Main Roads WA has control and responsibility to manage bridges on roads that are classified as State Roads. Bridges on Local Government roads and footpaths are the responsibility of Local Governments. All regulatory signage of bridges however is managed by Main Roads WA.

There are approximately 900 Local Government owned bridges that require regular inspections and maintenance. Local Governments are required to fund and perform routine visual inspections (Level 1) of all bridges annually and to submit the inspections to Main Roads WA. Main Roads WA performs all other detailed technical inspections of bridges, known as Level 2 and Level 3, on behalf and/or in consultation with Local Governments.

In order to be eligible for Special Project funding from the State Road Funds to Local Government Agreement (SRFLGA), Local Governments must be able to show that Level 1 inspections have been performed and that adequate routine and preventative maintenance have been undertaken to prevent undue deterioration. WALGA and Main Roads WA have agreed to implement this framework during 2019 to monitor and support all Local Governments to fulfil the obligation of performing annual Level 1 bridge inspections.

2.0 Purpose

This purpose of this framework is to provide guidance to Local Governments to ensure that level 1 bridge inspections are completed annually. This framework is designed to:

- Provide an annual procedure for the performance, reporting and monitoring of Level 1 bridge inspections
- Define the roles of Local Governments and Main Roads WA regarding bridge inspections
- Provide a mechanism to monitor the performance of Local Government and Main Roads regarding Level 1 bridge inspection obligations
- Define the funding mechanisms and support that can be provided to Local Governments to meet their Level 1 bridge inspection obligations

3.0 Scope

The scope of this Level 1 Inspection Framework covers bridges that are owned by Local Governments and that form part of the public road network. Bridges that form part of the public road network include road bridges over road, road bridges over water, road bridges over rail and pedestrian bridges over the road network but excluding pedestrian bridges owned by Local Government over water.

A list of bridges falling under this framework will be supplied to each Local Government annually by Main Roads WA.

4.0 Definitions

Bridge is a structure (with the exception of gantries) having a clear opening in any span of greater than 3 metres measured between the faces of piers or abutments or structures of a lesser span with a deck supported on timber stringers.

When a Structure is constructed of Precast Box Units (Large Culverts) which have a clear span greater than three (3) metres, such structures are referred to as a “Precast Box Unit Bridge”. The inspection of such is undertaken using a slightly different process and form.

Level 1 inspection is a routine visual inspection performed annually. The visual inspection must check on the overall safety and performance of the structure and identify any major accident damage or incident and any obvious failure or deterioration of structural components. The inspection provides an opportunity to schedule routine maintenance requirements and check on the completion and effectiveness of previous routine maintenance. The need for further detailed inspections must also be identified.

Level 2 inspection involves a closer visual inspection commonly within one meter of the various bridge components which is performed by Main Roads WA. Detailed quantitative data is captured for further analysis and deterioration modelling.

Level 3 inspections are requested for a specific reason and are managed by Main Roads WA in consultation with the Local Government. These inspections can be requested due to concerns about the bridges safety, condition, load capacity or for structures subject to complex associated repair, strengthening or widening works. They also may be requested after Level 2 inspections.

Routine Maintenance involves small, generally reactive works comprising mainly minor work items planned on a short term basis.

Routine maintenance includes activities such as clearing and maintenance of drainage structures, guardrail repairs, clearing vegetation and insect extermination.

Preventative Maintenance involves proactive works that are conducted at regular intervals longer than one year. This type of work is carried out before the development of defects (e.g. timber rot) and is aimed at preventing occurrence or progression of a defect.

Preventative maintenance includes activities such as bolt tightening, end grain sealing, fungicide treatment, repairing splits in timber elements, minor concrete crack repairs and maintenance of joints seals and paint.

Special Project refers to bridge projects which are funded by Financial Assistance Grant funding provided by the Commonwealth to the Western Australian Local Government Grants Commission. Special Project funds are typically allocated for works including proactive work items to maintain the integrity of bridge structural components or for bridge reconstruction where the existing bridge has reached the end of its economic life.

5.0 Relevant documents and methodologies

The process for carrying out Level 1 inspections is detailed in Main Roads WA ‘*Routine Visual Bridge Inspection Guidelines (Level 1 Inspections)*’ and available from the [website](#). The document details the requirements of a level 1 inspection and includes report examples.

Local Governments are required to document the results of each Level 1 bridge inspection in the Inspection Form (*Timber and Non Timber Bridge Routine Visual Inspection Report - Level 1 Inspection Form*) available on the Main Roads WA website and in Appendix 1 or the *Precast Box Unit Bridge Routine Visual Inspection Report* in the case of box culverts (Appendix 2)

The ‘*Main Roads WA Structures Inspection and Information Policy*’ (16/8/2013) details the responsibilities and processes involved with inspecting State and Local Government owned bridges. The policy states that Level 1 inspections must be carried out annually for both timber and non-timber bridges (Figure 1 and Figure 2).

Figure 1: Timber bridges frequency of inspection

Inspection Type	Frequency	Responsibility
Level 1	Annual	Asset Owner
Level 2	5 year cycle or as requested	Main Roads WA
Level 3	As requested	Main Roads WA

Figure 2: Non-timber bridges frequency of inspection

Inspection Type	Frequency	Responsibility
Level 1	Annual	Asset Owner
Level 2	7 year cycle or as requested	Main Roads WA

The scope of a routine Level 1 inspection includes:

- inspection of the road surface, guardrails/barriers, road drainage, waterways, vegetation and debris, footpaths, expansion joints and deck joints, bearings, superstructure and substructure for all timber and non-timber bridges;
- inspection of the road surface, guardrails/barriers, road drainage, waterways, vegetation and debris, walls and aprons, and box units for the specific superstructure bridge type of precast box units;
- particular close inspection to ascertain the effectiveness and condition of previous repairs and maintenance;
- recommendation of a detailed inspection if it is warranted by observed distress or unusual behaviour of the bridge;
- identification of routine maintenance requirements; and
- confirmation that routine maintenance requirements identified in previous inspections has been completed.

Components that are not accessible without specialist equipment (e.g. underbridge inspection unit) are to be checked from as close as practicable.

6.0 Funding

The Commonwealth provides Financial Assistance Grant funding to the Western Australian Local Government Grants Commission in the form of Untied Funds for Local Roads. Four point six seven (4.67%) percent of these funds (excluding Roads to Recovery funding), is set aside for Special Projects on Local Government bridges. These Special Projects include planned proactive work items normally scheduled at least two years in advance to maintain the integrity of bridge structural components (i.e. to ensure safe passage of motorists and to ensure that the structure performs in accordance with its intended life) or for bridge reconstruction where the existing bridge has reached the end of its economic life.

The State provides a matching contribution of \$1 (under the SRFLGA) for every \$2 provided by the Commonwealth under this arrangement. The State also provides additional funding for Detailed Visual inspections (Level 2), Specialist Inspections and Investigations (Level 3) and for specific bridge projects (Special Project Funding) with no funding contribution required from Local Government.

In order to be eligible for Special Project funding from the State, Local Governments must be able to show that Level 1 inspections have been performed and that adequate routine and preventative maintenance have been undertaken to prevent undue deterioration.

Local Governments may be able to access funding from the SRFLGA to perform Level 1 bridge inspections in extenuating circumstances through special consideration from the Regional Road Groups. It should be noted that Local Governments will need to provide evidence to demonstrate that they are experiencing extenuating circumstances preventing them from funding the bridge inspections with their own funding sources. The Regional Road Group will make funding recommendations to a Main Roads / WALGA Technical Review Group.

7.0 Annual procedure for Local Governments to conduct Level 1 inspections

The step by step procedure for Level 1 Bridge Inspections is detailed below and a flow chart is depicted in Appendix 2.

1. Each year in August/September/October a letter will be sent out from Main Roads WA to all Local Governments with bridges to advise that they need to undertake their annual Level 1 Bridge inspections. Main Roads WA will supply a schedule listing the relevant Local Government managed bridges and the dates of the last level 1 inspection/s. All annual Level 1 bridge Inspections must be completed by February the following year.
2. Local Governments are required to download the 'Routine Visual Bridge Inspection Guidelines (Level 1 Inspections for Bridges)' and 'Timber and Non-Timber Bridge Routine Visual Inspection Report - Level 1 Inspection Form' or 'Precast Box Unit Bridge Routine Visual Inspection Report' from the Main Roads WA website.

3. Local Governments are required to perform the annual Level 1 Inspection for each bridge they manage and complete the inspection form. If a Local Government officer has never completed a Level 1 visual bridge inspection before, Main Roads WA in liaison with WALGA can provide further guidance.
4. Local Governments must schedule future Routine and Preventative Maintenance, identified by the Level 1 Inspection.

Where the condition of some components is not clear during the routine visual inspection, a further detailed inspection (Level 2 and/or 3) may be necessary to confirm the status and identify any problems. The need for additional inspections must be noted in the visual inspection report. Decommissioned bridges shall still be inspected annually but focus is on safety and ensuring the bridge remains closed to all traffic rather than structural issues.

5. After the inspection Local Governments shall send the completed inspection form/s to Main Roads WA via the “Structures Engineering Inspections” generic email inbox (StrucEngInspections@mainroads.wa.gov.au) by the deadline of 30th April. .
6. Main Roads Structures Engineering Branch will process, document manage and make inspection report available to the relevant MRWA Asset Manager Structures.
7. Main Roads WA will produce a preliminary list in May to provide to the Regional Road Groups to monitor Local Government’s Level 1 Inspections.
8. Regional Road Groups will discuss outstanding inspections and identify any obstacles, and if necessary consult with Main Roads WA or WALGA to provide support. Local Governments who have not completed the Level 1 Inspections will have three months to rectify the situation.

If a Local Government is facing financial or other difficulties in performing the inspections, they may be able to access funding by submitting a request to the Regional Road Group. Local Governments will need to provide evidence to demonstrate that they are facing extenuating circumstances. The Regional Road Group shall forward supported requests to a Main Roads / WALGA Technical Review Group for approval.

9. Local Governments may request that Main Roads WA undertake further inspections (Level 2 or 3), after performing Level 1 inspections. Main Roads WA will supply copies of the Level 2 and 3 inspections to the Local Government and the Local Government must monitor the recommendations and resulting actions.
10. Main Roads WA will produce a final report of Local Government Level 1 Inspections in June or July and provide this to WALGA and Main Roads WA Regional Structures Asset Managers.
11. WALGA will use the final report to produce annual KPIs and a statistical summary to the State Advisory Committee (SAC) in November. Main Roads WA Regional Structures Asset Managers will provide feedback to Regional Road Groups.

8.0 Training

Main Roads WA will assist in the provision of training to Local Governments on Level 1 inspections upon request.

The Institute of Public Works Engineering Australasia (IPWEA) also offers the online Professional Certificate in Asset Management Planning. The course assists with developing a quality asset management plan and encourages appropriate data collection. This course may be valuable for Local Governments to assist with Level 1 Bridge Inspection and reporting.

The Australian Road Research Board (ARRB) provides three day workshops on Level 1 and Level 2 Bridge Inspections. This may be delivered as an online training module if required.

If a Local Government is having difficulty in sourcing competent inspectors, they may approach Main Roads WA, WALGA or their Regional Road Group for assistance.

Appendix 1: Level 1 Inspection Form

Bridge Number:	Crossing Name:
Road Name:	Road Number:
SLK:	Local Authority:
Responsibility Area:	Latitude:
Inspected By:	Longitude:
Inspection Date:	

Have structural issues been found that require further investigation? (Y/N)

Inspection Item	Defect		Comments <i>(Including location and extent)</i>	Maint. Required
	Yes	No		
1. Road Surface Signs and Delineators: missing, damaged, obscured Road Surface and Footpaths: material defects, surfacing defects, settlement, depressions, joint transitions, kerbing, shoulders	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
2. Guardrails/Barriers Accident damage, connections, alignment, material defects	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
3. Road Drainage Scuppers, drains, gully traps, erosion	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
4. Waterways, Vegetation and Debris Vegetation and debris in waterways and clearance envelope Embankment erosion, scour, damaged guide-banks	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
5. Footpaths Drainage, even surface, surface condition, railing	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
6. Expansion Joints and Deck Joints Loose/damaged fixings, damaged/missing seals, damage to deck/nosings, obstructions in gap, gaps closed, decks in contact/damaged	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
7. Bearings Bearings displaced or damaged, seating, corrosion, seized	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
8. Superstructure Material defects or damage to beams/stringers, fasteners, soffit, cross bracing or coatings Debris/dirt build-up, impact damage, excessive movement/vibration, dampness through deck, condition of air release holes	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
9. Substructure Material defects to piles, footings, walls or capbeams. Movement of abutment or wing walls. Substructure protection (bridges over road/rail).	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>

Defect Descriptions

Material	Defect Descriptions
Concrete	Cracking (hairline: $\leq 0.1\text{mm}$) (fine: >0.1 & $\leq 0.3\text{mm}$) (medium: $>0.3\text{mm}$ & $\leq 0.7\text{mm}$) (heavy: $>0.7\text{mm}$), spalling, corrosion of reinforcement, rust staining, efflorescence
Steel	Bending, buckling, cracking, distortion, corrosion, protective coating damage/deterioration, loose fasteners
Timber	Splitting, crushing, rot, failure, termites/termite nest
Masonry	Cracking, opening of joints, mortar loss, bulging
Bituminous Surfacing	Cracking, crazing, breaking up, heaving, shoving, rutting
Protective Coating	Cracked, weathered, peeling, flaking, oxidising

General Comments
Ancillary Items (such as service attachments etc.)

This bridge has been inspected in accordance with the requirements of the Main Roads Western Australia Bridge Inspection Manual for Level 1 Inspections.

Signature: _____ **Position:** _____ **Date:** _____

Appendix 2: Box Culvert Inspection Form

Bridge Number:	Crossing Name:
Road Name:	Road Number:
SLK:	Local Authority:
Responsibility Area:	Latitude:
Inspected By:	Longitude:
Inspection Date:	

(Y/N) **Have structural issues been found that require further investigation?**

Inspection Item	Defect		Comments <i>(Including location and extent)</i>	Maint. Required
	Yes	No		
<u>1. Road Surface</u> <i>Signs and Delineators: missing, damaged, obscured</i> Road Surface and Footpaths: material defects, surfacing defects, settlement, depressions, joint transitions, kerbing, shoulders	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
<u>2. Guardrails/Barriers</u> Accident damage, connections, alignment, material defects	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
<u>3. Road Drainage</u> Drains, gully traps, erosion	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
<u>4. Waterways, Vegetation and Debris</u> Vegetation and debris in waterway and clearance envelope Embankment erosion, scour, silt build-up, blockages, damaged guide-banks, revetment mattresses, rock protection	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>

5. Walls and Aprons Headwalls, wing walls, aprons: material defects, impact damage, coatings, movement/settlement	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
6. Precast Box Units Box units, link slabs, base slab: material defects, impact damage, coatings, movement/settlement	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>

<i>General Comments</i>

This precast box unit bridge has been inspected in accordance with the requirements of the Main Roads Western Australia Bridge Inspection Manual for Level 1 Inspections.

Signature: _____ **Position:** _____ **Date:** _____

Appendix 3: Schedule for Level 1 Bridge Inspections

Task	Timing
MRWA to inform Local Governments annually about annual Level 1 bridge inspections and provide schedule listing the relevant Local Government owned bridges and the dates of the last level 1 inspection	August/September/October
Local Governments to download relevant Routine Visual Bridge Inspection Guidelines Level 1 from the MRWA website	If applicable
Local Governments to perform annual Level 1 Inspection and complete the Level 1 Inspection Form (assistance from MRWA can be provided)	November – April *
Local Governments to send the form to MRWA via the “Structures Engineering Inspections” generic email inbox (StrucEngInspections@mainroads.wa.gov.au).	By 30 th April deadline
MRWA Structures Engineering Branch will process, document manage and make inspection report available to the relevant MRWA Asset Manager Structures.	May
MRWA will produce a preliminary list to provide to the RRG’s to monitor compliance	May
RRG’s to discuss outstanding inspections and facilitate solutions for completion.	May
MRWA produces final report of Local Government Level 1 Inspections annually	June/July
The level of inspection compliance shall be reported as an annual KPI to the State Advisory Committee (SAC).	November

* Note: Inspections of bridges over water should be conducted at low water mark, and in some parts of the State, this will not coincide with the timing given above. The inspection should be scheduled at the time of year that coincides with low water levels in the local climate.

Appendix 4: Main Roads WA Structures Asset Managers

REGION	ASSET MANAGER	OFFICE LOCATION
Goldfields - Esperance	Anthony Humphreys anthony.humphreys@mainroads.wa.gov.au	Main Roads - Albany
Great Southern	Anthony Humphreys anthony.humphreys@mainroads.wa.gov.au	Main Roads - Albany
Kimberley	Gavin Johnston gavin.johnston@mainroads.wa.gov.au	Main Roads – East Perth
Metropolitan	Sam Mathankar sambashiv.mathankar@mainroads.wa.gov.au	Main Roads – East Perth
Mid West-Gascoyne	Gavin Johnston gavin.johnston@mainroads.wa.gov.au	Main Roads – East Perth
Pilbara	Gavin Johnston gavin.johnston@mainroads.wa.gov.au	Main Roads – East Perth
South West	Peter Newhouse peter.newhouse@mainroads.wa.gov.au	Main Roads - Bunbury
Wheatbelt	Anthony Humphreys anthony.humphreys@mainroads.wa.gov.au	Main Roads - Albany

Appendix 5: Main Roads WA Report on Level 1 Bridge Inspections

The Report shall list all the bridges in the relevant Local Government and include the following columns:

1. Road No.
2. Road Name
3. SLK
4. Crossing Name
5. Structure Number
6. Structure Type
7. TRIM Reference No. (MRWA Document Number)
8. Last Inspected by (Name of person/company undertaking inspection)
9. Last Inspection (Date)