



Transport  
**Roads & Maritime  
Services**

# **BRIDGE INSPECTION PROCEDURE MANUAL**



**Second Edition  
Version 2.1**

**March 2019**





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**Roads & Maritime  
Services**

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**Second Edition  
Version 2.1**

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Version 2.0

Prepared By

Bridge Engineering Section  
Engineering Technology Branch  
Directorate Regional Operations and Services

Version 2.1 - Mar 2019


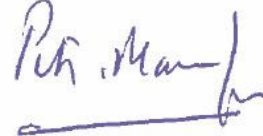

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## 1. INTRODUCTION TO EDITION 2

Edition 2 is a completely revised procedure which incorporates the following:

- Standardise on four condition states for every element
- Separate the condition state of coatings from the underlying metal for steel elements
- Remove the feasible actions comments
- Incorporate RMS photographs where available
- Introduce colour coding for condition states

The revision has also taken the opportunity to reformat the procedure to make it more user friendly but at the same time minimising changes to the database.

## 2. PURPOSE

The objective of the RMS BIS Bridge Inspection Procedure Manual is to describe the steps involved in inspecting bridges and bridge size culverts so as to collect consistent, objective quantitative condition ratings for the bridge elements.

## 3. SCOPE

The procedure is to be used for the maintenance inspection of all RMS bridges and bridge size culverts.

## 4. DEFINITIONS

Table 1 shows all of the possible bridge element types which are included in the RMS Bridge Inspection Procedure.

Appendix B contains definitions for each possible element type and the units of measurement, descriptions for each possible condition state and the feasible maintenance actions for each condition state.

## 5. PROCEDURE

### 5.1. ***DIVIDE THE BRIDGE INTO ELEMENTS***

- (i) *Divide the bridge or bridge size culvert to be inspected into elements, each element of which comprises particular types of members generally made of a similar material.*

Most bridges have about ten to twelve elements. Most bridge sized culverts have three to five elements. Bridges and bridge sized culverts which have more than one span material or span type may have more elements.

Some of the more common element types include:

<b>Element Code</b>	<b>Description of Element</b>
CPRG	Concrete - Pre-Tensioned, Precast Plank/Unit/I Girder/Trough Girder/Broad Flange Girder
CPIL	Concrete - Reinforced/Prestressed Pile
CDSL	Concrete, Deck Slab (including Concrete Overlay/Kerb/Parapet)
CCUL	Concrete - Culvert, Cast-in-Place
LBGI	Steel - Rolled Beam/Fabricated I Girder, including Stringers and Girders (Load Bearing)
TGCG	Timber - Beam/Cross Girder (Beam Bridge)
JPOS	Pourable/Cork Joint Seal
BELA	Elastomeric Bearing
RMET	Metal Bridge Railing
MMAS	Masonry, Brick and Reinforced Earth

- (ii) *On a Bridge Elements Form (see figure 1), fill in the Bridge Number, Description and all relevant data fields at the top of the form.*
- (iii) *On the Bridge Elements Form, circle or highlight each element type which occurs in the bridge. Definitions for each element type are given in Appendix B.*

For the sake of accuracy and completeness, this is to be done in the office working from the Work - as - Executed Drawings for the bridge wherever possible. If there are not suitable Drawings available for the bridge, it may be necessary to identify the elements at the bridge site.

## **5.2. CALCULATE THE TOTAL QUANTITIES OF THE ELEMENTS**

- (i) *Calculate the total quantity of each element which occurs in the bridge.*

See Appendix B for the element definitions which indicate what total quantity is to be calculated for each element type. For many element types, the total quantity is calculated as square metres of exposed surface area. At the back of Appendix B, there are diagrams for some element types which indicate how the area is to be calculated.

The total quantity must be measured in the correct units for the element (see the Bridge Elements Form, Table 1 or Appendix B). The units of measurement are square metres, metres or each.

The purpose of including the quantities is so that the quantities and costs of future maintenance work can be estimated for all the bridges in a network. If the quantities are not calculated with sufficient accuracy or are not measured in the correct units, the estimates will not be reliable.

For the sake of accuracy and completeness, the total quantity for each element is to be calculated in the office working from the Work - as - Executed Drawings for the bridge wherever possible. If there are not suitable Drawings available for the bridge, it may be necessary to take measurements at the bridge site to allow the total quantities to be calculated.

- (ii) *Enter the total quantity to the nearest whole unit of each element which occurs in the Bridge Elements Form. Do not use decimal places or fractions.*

### **5.3. ENTER THE ELEMENT DATA INTO THE BRIDGE INFORMATION SYSTEM (BIS)**

- (i) *Enter the element codes and total quantities for all the elements in the bridge from the Bridge Elements Form into the Bridge Elements screen in the Bridge Information System (BIS) database.*

It is very important that as complete details as possible are recorded in BIS. See the BIS User Guide for the procedures for entering the elements and their total quantities in the Bridge Elements screen.

By entering the correct elements and total quantities for a bridge in the Bridge Elements screen, and assuming that changes are not made to the bridge, e.g. widening or lengthening the bridge or changing the traffic barriers, etc. then the same elements and total quantities can be used for future inspections of the bridge. However where additional information is being sought by BIS subsequent to the original input of bridge data, then this should be added at the next inspection.

It must be stressed again that it is very important that as complete and accurate information about a bridge as is possible is input into the BIS so that accurate information is available for load assessment, budgeting or common problem identification. There are new fields for Issues/Special features, Coating Paint History and Monitoring System/Gantries. The relevant information from the bridge should be gathered for populating these fields. This will then remind planners of the need for inspections of these special features.

- (ii) *Print a Bridge Inspection Report form to be filled in for an inspection of the bridge. For most bridges, this is a four page form (see figure 2)*

See the BIS User Guide for the procedure for printing a Bridge Inspection Report form

#### **5.4. PREPARE THE BRIDGE INSPECTION REPORT AT THE BRIDGE SITE**

- (i) *On each page of the Bridge Inspection Report form, fill in the Inspection Date and the Inspector's Given Name and Surname.*

- (ii) *On page 1 - General Information, of the report form, fill in the:*

- **Inspection Type**

The inspection type can be any one of:

Monitor  
Normal  
Test bore  
Underwater

- **Temperature (°C)**

This is the shade temperature taken by the inspector at the bridge site

- **Weather**

The description of the weather can be any one of:

Cloudy  
Rainy  
Showers  
Sunny  
Windy

- **Proposed Date of Next Inspection**

This is necessary to assist in preparing future inspection programs.

- **Inspection Equipment**

This will be entered into BIS and will be printed on the report forms to be filled in for future inspections as a reminder or as a checklist.

Inspection equipment can be any or all of:

Breathing apparatus & monitors  
Boat, dinghy, pontoon  
Elevating platform  
Ladder  
Scaffolding  
Traffic control  
Underbridge inspection unit  
Other equipment

- **Inspection Equipment Comments**

This allows the inspector to record more details about each type of inspection equipment for the particular bridge e.g. the type of boat, the length of ladder required or details of other equipment such as an inspection gantry.

(iii) *On page 2 - Condition Rating of Elements, the bridge elements for the bridge or culvert and the total quantities for each element are printed.*

Before condition rating the elements at the bridge site, the Inspector must check that the printed list of elements is complete and correct and that the total quantities are correct.

(a) *For each element of the bridge, fill in the Environment category which can be:*

<b>L</b>	Low	Environmental factors and/or operating practices either do not adversely influence the condition of the element or their effects are substantially lessened by the application of effective protective systems. This would generally apply west of the Great Diving Range.
<b>M</b>	Moderate	Any change in the condition of the element is likely to be quite normal as measured against those environmental factors and/or operating practices that are considered typical by the RMS. This would generally apply on and east of the Great Diving Range.
<b>S</b>	Severe	Environmental factors and/or operating practices contribute to the rapid decline in the condition of the element. Protective systems are not in place or are ineffective. This would generally apply where the element is exposed to sea spray or severe industrial pollution or frequent freeze-thaw cycles and/or de-icing salt.

These will be entered into BIS and will be printed on the report forms to be filled in for future inspections.

(b) *For each element of the bridge, fill in the estimated quantity or the percentage of the total quantity in each condition state.*

For each element, the estimated quantities or percentages in each condition state are calculated by dividing the total quantity between three to five possible condition states.

See Appendix B for the condition state descriptions and the feasible actions for each condition state for each element type.

When estimating the quantities or percentages in each condition state, the condition state descriptions and the feasible actions are both to be considered.

- (c) *Check that the quantities in all of the possible condition states for the element add up to the total quantity,*

or

Check that the percentages of the total quantity in all of the possible condition states add up to 100 percent.

By estimating the quantity, or percentage of the total quantity, in each possible condition state for each element, the inspector is measuring the condition profile of each element of the bridge at a point in time.

From condition profiles obtained by inspections at say 2 yearly intervals, a computer model can be developed to predict deterioration for each bridge element type for each environment. The condition profiles and the deterioration models are then used to estimate optimum maintenance budgets, etc.

- (iv) *On page 3 - Required Maintenance Actions, fill in one row of the page for each required maintenance action on an element, including*

- **Element Code**  
This will be one of the element codes printed on page 2 of the report form.
- **Activity Number, and Activity Description**  
This is the activity to which the required maintenance action is to be costed. See Appendix A for the Bridge Activity List.
- **Inspector's Comments on Required Actions and Locations on Structure**  
  
This allows the inspector to give additional details of the required maintenance action which may not be clear from the Activity Description, and details of the location where the maintenance action is required, e.g. upstream girder, span 3.
- **Estimated Quantity**  
This is the inspector's estimate of the quantity of the required maintenance action.
- **Units**  
These are the units of measurement of the required maintenance action.

- Date for Completion  
This is the inspector's estimate of the date (MMM-YYYY) by which the required maintenance action should be completed.

(v) *On page 4 - Inspection Comment, spaces are provided for:*

- Inspector's Comments  
This allows for the inspector to make any additional comments on the inspection.
- Inspector's Signature and Date  
The inspector is certifying that the bridge is as per the BIS record, that all relevant fields have been recorded and that the inspection of the bridge has been carried out and that the data is accurate as of the inspection date.
- Bridge Maintenance Planner's (BMP) Comments  
This allows for the BMP to make any additional comments on the inspection.
- Bridge Maintenance Planner's Signature and Date

The BMP signs that he has examined the inspection report, taken note of any required action and has added comments where required.

- Data Entry Operator's Signature and Date  
The data entry operator signs that the hand written information has been accurately entered into BIS

## **5.5. BRIDGE MAINTENANCE PLANNER'S COMMENTS**

Send the inspector's handwritten bridge inspection report form to the BMP for comment and signature. The BMP will arrange for the Bridge Inspection data to be entered into BIS.

## **5.6. ENTER THE INSPECTION DATA IN BIS**

Enter the inspection data from the Bridge Inspection Report form into the following screens for the bridge:

- List of Inspections screen
- Condition Rating of Elements screen, and
- Required Maintenance Actions screen

It is then possible to view the Bridge Inspection data on the above screens.

It is also possible to view the required maintenance actions for the bridge on the Maintenance Action From All Inspections screen.

The BIS User Guide should be referred to for further information.

### **5.7. BRIDGE INSPECTION REPORTS IN BIS**

It is possible to obtain the following reports from BIS:

- Bridge Inspection Report Form for new inspection
- Completed Bridge Inspection Report Form
- Maintenance Actions Not Programmed but to be Completed by a Certain Date
  
- Maintenance Actions Programmed and to be Completed by a Certain Date
  
- Maintenance Actions Completed in a Specified Period
  
- Required Inspections Report
- Network Element Conditions Report
- Bridges with a Specified Element having more than a Specified Percentage of the Total Quantity in worse than a specified Condition State

The BIS User Guide should be referred to for further information.

## FIGURES

***Figure 1***

Bridge Elements Form

***Figure 2***

Bridge Inspection Report Form

***Figure 3***

Completed Bridge Inspection Report  
Form



**RMS BRIDGE INSPECTION PROCEDURE - MARCH 2019**

**BRIDGE ELEMENT**

Bridge No.: \_\_\_\_\_

Description: \_\_\_\_\_

Road No.: \_\_\_\_\_ Overall Length: \_\_\_\_\_ m

Region: \_\_\_\_\_ Overall Width Min: \_\_\_\_\_ m

Network: \_\_\_\_\_ Overall Width Max: \_\_\_\_\_ m

LGA: \_\_\_\_\_ Constr. Drawings No.: \_\_\_\_\_

Element Code	Description of Element	Total Quantity	Units of Measure
<b>CONCRETE</b>			
CPOG	Concrete-Post-tensioned Girder		m2
CPRG	Concrete-Pre-tensioned Girder		m2
CRBM	Concrete-Reinforced Beam		m2
CCGD	Concrete-Cross Girder / Diaphragm		m2
CPHS	Concrete-Pier Headstock		m2
CPIR	Concrete-Pier (excl. any Headstock or Piles)		m2
CABW	Concrete-Abutment and Wingwalls		m2
CPIL	Concrete-Pile		m2
CDSL	Concrete-Deck Slab		m2
CCUL	Concrete-Culvert, Cast-in-place		m2
CCUP	Concrete - Culvert, Precast		m2
<b>STEEL</b>			
STPR	Steel - Truss Principal		m2
STBC	Steel - Truss Bottom Chord		m2
STTC	Steel - Truss Top Chord		m2
STDG	Steel - Truss Diagonals		m2
STGP	Steel - Truss Connection Gusset Plates		m2
STST	Steel - Truss Stringers		m2
STTB	Steel - Truss Top Bracing		m2
STVT	Steel - Truss Verticals		m2
STBB	Steel - Truss Bottom Bracings		m2
STCG	Steel - Truss Cross Girder		m2
SLST	Steel - Lift Span Support Structure		m2
SBGI	Steel - Beam / Girder (Load Bearing)		m2
SDBR	Steel - Diaphragm / Bracing / Secondary Member		m2
SPIR	Steel - Pier (excl. any Piles & Secondary Members)		m2
SPIL	Steel - Pile		m2
SCBT	Steel - Cables/Hangers/Tension Ties (Not Embedded in Conc.)		ea
SASG	Steel - Abutment Sheeting / Gravel Board		m2
SOGD	Steel - Open Grid Deck		m2
SBPD	Steel - Buckle Plate Deck		m2
SCOD	Steel/Aluminium - Corrugated/Orthotropic/etc Deck		m2
SCUL	Steel - Culvert		m2
<b>PROTECTIVE COATINGS</b>			
PTPR	Protective Coating – Truss – Principal		m2
PTTC	Protective Coating – Truss – Top Chord		m2
PTBC	Protective Coating – Truss – Bottom Chord		m2
PTDG	Protective Coating – Truss – Diagonals		m2
PTVT	Protective Coating – Truss – Verticals		m2
PTGP	Protective Coating – Truss – Connection Gusset Plates		m2
PTTB	Protective Coating – Truss – Top Bracings		m2
PTBB	Protective Coating – Truss – Bottom Bracings		m2
PTCG	Protective Coating – Truss – Cross Girder		m2

Figure 1

Element Code	Description of Element	Total Quantity	Units of Measure
PTST	Protective Coating – Truss – Stringers		m2
PLST	Protective Coating – Truss – Lift Span Support Structure		m2
PBGI	Protective Coating - Beam / Girder (Load bearing)		m2
PDBR	Protective Coating - Diaphragm/Bracing/Secondary member		m2
PPIR	Protective Coating - Pier (excluding any piles and secondary members)		m2
PPIL	Protective Coating - Pile (including steel cased concrete pile or caisson)		m2
PCBT	Protective Coating - Cables/Hangers/Tension Ties (Not Embedded in Conc.)		ea
PASG	Protective Coating – Abutment Sheeting / Gravel Board		m2
POGD	Protective Coating - Open Grid Deck		m2
PBPD	Protective Coating - Buckle Plate Deck		m2
PCOD	Protective Coating - Corrugated/Orthotropic/Etc. Deck		m2
<b>TIMBER TRUSS ELEMENTS</b>			
TPCH	Timber Truss-Principal / Top Chord / Bottom Chord		ea
TSBC	Timber Truss-Bottom Chord (Steel)		ea
TSTT	Timber Truss-Strut		ea
TTIE	Timber Truss-Tie (Steel, Wrought Iron)		ea
TSBR	Timber Truss-Brace / Undertrussing		ea
TSHO	Timber Truss-Metal Shoe		ea
TBJB	Timber Truss-Butting Block / Jacking Block		ea
TPTT	Timber Truss-Paintwork		m
TTCG	Timber Truss-Cross Girder		ea
TSTR	Timber Truss-Stringer		ea
<b>OTHER TIMBER ELEMENTS</b>			
TGCG	Timber-Girder / Cross Girder		ea
TCHS	Timber-Capwales / Headstock / Sill		ea
TPIL	Timber-Pile		ea
TCOR	Timber-Corbel		ea
TWBR	Timber-Wale / Brace		ea
TASG	Timber-Abutment Sheeting / Gravel Board		m2
TTDK	Timber-Transverse Deck Plank		m2
TLSH	Timber-Longitudinal Sheeting / Decking		m2
TSLD	Timber-Stress Laminated Deck		m2
TDBO	Timber-Deck Bolts		ea
<b>FIBRE REINFORCED</b>			
FRPE	Fibre Reinforced Plastic Element		m2
<b>JOINTS</b>			
JPOS	Pourable / Cork Joint Seal		m
JCOS	Compression Joint Seal		m
JASS	Assembly Joint / Seal		m
JNOS	Joint - No Seal		m
<b>BEARINGS</b>			
BELA	Elastomeric Bearing Pad		ea
BEXP	Metal Expansion (Roller, Sliding, etc) Bearing		ea
BFIX	Metal Fixed Bearing		ea
BENC	Enclosed / Concealed Bearing		ea
<b>BRIDGE RAILINGS</b>			
RMET	Metal Railing		m
RCON	Concrete Railing / End Posts		m
RTIM	Timber Railing		m
RMIS	Miscellaneous Railing including Guardfence		m
RPNT	Railing Paint work		m
<b>MISCELLANEOUS</b>			
MMAS	Brick / Masonry / Reinforced Earth		m2
MBAT	Batter protection		m2
MWES	Wearing surface		m2
MAPP	Approach Carriageway		ea
MWWY	Waterway		ea
MSWS	Stormwater System		Item
MSCR	Safety Screen		m
MATT	Miscellaneous Attachments		Item
MGCL	General Cleaning		ea

# RTA BRIDGE INSPECTION REPORT - Level 2 - PAGE 1 of 4 -- General Information

AT STH OF GOULBURN

YASS RIVER

Description: S/B BRIDGE OVER

Bridge Name:

7783

Bridge No.:

Roadloc: 0000003.1031.C2.1.215      Longitude: 149.27504  
 Directorate: CND COUNTRY OPERATIONS DIRECTORATE      Latitude: 35.17541  
 Region: 757 SOUTHERN REGION      Overall Length: 81.20  
    Overall Width MIN: 10.20  
    Overall Width MAX: 10.20

IGA: 147 PALERANG      Construction Drawings No.: 0003.514.BC.0128

Inspected by: R.T.A.  
 Maintained by: R.T.A.  
 Complex or Unusual:

Inspection Equipment \_\_\_\_\_ Comments \_\_\_\_\_

Traffic Control \_\_\_\_\_

Underbridge Inspection Platform \_\_\_\_\_

Inspection Details \_\_\_\_\_

Level of Inspection: \_\_\_\_\_ Inspection Date: \_\_\_\_\_  
 Inspection Type: \_\_\_\_\_ Proposed Date of Next Inspection: \_\_\_\_\_  
 Temp (°C): \_\_\_\_\_ Weather: \_\_\_\_\_  
 Inspector's Given Name: \_\_\_\_\_ Surname: \_\_\_\_\_  
 Engineer's Given Name: \_\_\_\_\_ Surname: \_\_\_\_\_

Span From	Span To	Span Length (m)	Culvert Height (m)	Span Material	Span Type	Year Completed
1	4	20.15		P	TROG	1987

# RTA BRIDGE INSPECTION REPORT - Level 2 - PAGE 2 of 4 -- Condition Rating of Elements

Bridge No.: 7783 Bridge Name: \_\_\_\_\_ Description: S/B BRIDGE OVER YASS RIVER AT STH OF GOULBURN

Inspection Date: \_\_\_\_\_ Inspector's Given Name: \_\_\_\_\_ Surname: \_\_\_\_\_

Element Code	Element Description	Environment	Total Quantity	Estimated Quantity (or Percent of Total Quantity) in Condition State				
				1	2	3	4	5
BELA	Elastomeric Bearing Pad	M	32 ea	_____	_____	_____	_____	XXXXXXX
CABW	Concrete-Abutment and Wingwalls	M	95 m2	_____	_____	_____	_____	XXXXXXX
CCGD	Concrete-Cross Girder / Diaphragm	M	55 m2	_____	_____	_____	_____	XXXXXXX
CDSL	Concrete-Deck Slab	M	822 m2	_____	_____	_____	_____	XXXXXXX
CPHS	Concrete-Pier Headstock	M	160 m2	_____	_____	_____	_____	XXXXXXX
CPIR	Concrete-Pier (excl. any Headstock or Piles)	M	205 m2	_____	_____	_____	_____	XXXXXXX
CPRG	Concrete-Pre-tensioned Girder	M	921 m2	_____	_____	_____	_____	XXXXXXX
JASS	Assembly Joint / Seal	M	23 m	_____	_____	_____	_____	XXXXXXX
JPOS	Pourable / Cork Joint Seal	M	31 m	_____	_____	_____	_____	XXXXXXX
MAPP	Approach Carriageway	M	2 ea	_____	_____	_____	_____	XXXXXXX
MBAT	Batter protection	M	460 m2	_____	_____	_____	_____	XXXXXXX
MGCL	General Cleaning	M	4 ea	_____	_____	_____	_____	XXXXXXX
MWES	Wearing surface	M	730 m2	_____	_____	_____	_____	XXXXXXX
MWY	Waterway	M	1 ea	_____	_____	_____	_____	XXXXXXX
RCON	Concrete Railing / End Posts	M	14 m	_____	_____	_____	_____	XXXXXXX
RMET	Metal Railing	M	161 m	_____	_____	_____	_____	XXXXXXX

**Figure 2**



**RTA BRIDGE INSPECTION REPORT -Level 2- PAGE 4 of 4 -- Inspection Comment**

Bridge No.: 7783      Bridge Name: YASS RIVER      AT STH OF GOULBURN

Description: S/B BRIDGE OVER

Inspector's Given Name: \_\_\_\_\_ Surname: \_\_\_\_\_

Inspection Date: \_\_\_\_\_

Inspector's Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Inspector's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Maintenance Manager's Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Maintenance Manager's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Data Entry Operator's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Attachments : \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Figure 2**

# RTA BRIDGE INSPECTION REPORT -Level 2- PAGE 1 of 6 -- General Information

Bridge No.: 7783 Bridge Name: YASS RIVER Description: S/B BRIDGE OVER AT STH OF GOULBURN

Roadloc: 0000003.1031.C2.1.215 Longitude: 149.27504  
 Directorate: CND COUNTRY OPERATIONS DIRECTORATE Latitude: 35.17541  
 Region: 757 SOUTHERN REGION Overall Length: 81.20  
 Overall Width MIN: 10.20  
 Overall Width MAX: 10.20  
 LGA: 147 PALERANG Construction Drawings No.: 0003.514.BC.0128  
 Inspected by: R.T.A.  
 Maintained by: R.T.A.  
 Complex or Unusual:

Inspection Equipment Comments

Traffic Control

Underbridge Inspection Platform

Inspection Details

Level of Inspection: Level 2 Inspection Date: 28-FEB-2007  
 Inspection Type: Normal Proposed Date of Next Inspection: FEB-2009  
 Temp (C): 12 Weather: Cloudy  
 Inspector's Given Name: STEVE Surname: WATSON  
 Engineer's Given Name: \_\_\_\_\_ Surname: \_\_\_\_\_

Span From	Span To	Span Length (m)	Culvert Height (m)	Span Material Type	Span Type	Year Completed
1	4	20.15		P	TROG	1987

Figure 3

# RTA BRIDGE INSPECTION REPORT -Level 2- PAGE 2 of 6 -- Condition Rating of Elements

Bridge No.: 7783 Bridge Name: AT STH OF GOULBURN Description: S/B BRIDGE OVER YASS RIVER

Inspection Date: 28-FEB-2007 Inspector's Given Name: STEVE Surname: WATSON

Element Code	Element Description	Environment	Total Quantity	Units	Estimated Quantity (or Percent of Total Quantity) in Condition State					
					1	2	3	4	5	
BELA	Elastomeric Bearing Pad	M	32	ea	30	2	0	0	0	XXXXXXXX
CABW	Concrete-Abutment and Wingwalls	M	95	m2	94	1	0	0	0	XXXXXXXX
CCGD	Concrete-Cross Girder / Diaphragm	M	55	m2	55	0	0	0	0	XXXXXXXX
CDSL	Concrete-Deck Slab	M	822	m2	822	0	0	0	0	XXXXXXXX
CPHS	Concrete-Pier Headstock	M	160	m2	154	6	0	0	0	XXXXXXXX
CPIR	Concrete-Pier (excl. any Headstock or Piles)	M	205	m2	205	0	0	0	0	XXXXXXXX
CPRG	Concrete-Pre-tensioned Girder	M	921	m2	921	0	0	0	0	XXXXXXXX
JASS	Assembly Joint / Seal	M	23	m	23	0	0	0	0	XXXXXXXX
JPOS	Pourable / Cork Joint Seal	M	31	m	0	0	31	0	0	XXXXXXXX
MAPP	Approach Carriageway	M	2	ea	2	0	0	0	0	XXXXXXXX
MBAT	Batter protection	M	460	m2	460	0	0	0	0	XXXXXXXX
MGCL	General Cleaning	M	4	ea	2	2	0	0	0	XXXXXXXX
MWES	Wearing surface	M	730	m2	728	2	0	0	0	XXXXXXXX
MWWY	Waterway	M	1	ea	1	0	0	0	0	XXXXXXXX
RCON	Concrete Railing / End Posts	M	14	m	14	0	0	0	0	XXXXXXXX
RMET	Metal Railing	M	161	m	161	0	0	0	0	XXXXXXXX

# RTA BRIDGE INSPECTION REPORT -Level 2- PAGE 3 of 6 -- Required Maintenance Actions

Bridge No.: 7783 Bridge Name: S/B BRIDGE OVER YASS RIVER AT STH OF GOULBURN

Inspection Date: 28-FEB-2007 Inspector's Given Name: STEVE Surname: WATSON

Element Environ MMS Act. No. MMS Activity Description Inspector's Comments on Required Actions and Locations on Structure Estimated Quantity Units Date for Completion Work Request Number

BELA	M	702.00	M700 Bearing Maintenance, Minor	Cracking of elastomeric bearings at Abut. A No. 1 & pier 2 span 2 side.	2	Each	FEB-2009	
CABW	M	713.00	M700 Concrete Repairs, Minor	Minor vertical cracking on Abut. A curtainwall.	1	m2	FEB-2009	
CPHS	M	713.00	M700 Concrete Repairs, Minor	Vertical cracking on cantilever on pier headstocks - some moisture is getting into cracks from the joints.	6	m2	FEB-2009	
JPOS	M	703.00	M700 Joint Maintenance, Minor	Hotmelt seal has lost adhesion on pier 1,2 & 3 joints - moisture getting onto headstock.	31	m	FEB-2009	
MGCL	M	480.00	M480 Amenities, bridge and tunnel cleaning [General cleaning]	Clean out seal in Abut. A & B assembly joints.	2	Each	FEB-2009	
MWES	M	203.00	M9 Surface Texture Repair [Pot holes, rutting etc.]	Some areas of wearing surface (flush seal) has worn off - concrete deck is visible.	1	each	FEB-2009	

**RTA BRIDGE INSPECTION REPORT -Level 2- PAGE 4 of 6 -- Inspection Comment**

Bridge No.: 7783 Bridge Name: YASS RIVER Description: S/B BRIDGE OVER AT STH OF GOULBURN  
Inspection Date: 28-FEB-2007 Inspector's Given Name: STEVE Surname: WATSON

Inspector's Comments: Pier joints need to be resealed. Damaged railing & kerb has been repaired. No changes in cracks on headstocks.

Inspector's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Maintenance Manager's Comments: \_\_\_\_\_

Maintenance Manager's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Data Entry Operator's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Attachments : \_\_\_\_\_

RTA BRIDGE INSPECTION REPORT -Level 2- PAGE 5 of 6 --

Bridge No.: 7783

Bridge Name: YASS RIVER

Description: S/B BRIDGE OVER

AT STH OF GOULBURN



7783\_101a.JPG

Cracking of Abutment A No. 1 elastomeric bearing.

Inspection details: 28-FEB-2007 SW (N); Elastomeric Bearing Pad; MODERATE; M700 Bearing Maintenance, Minor

**RTA BRIDGE INSPECTION REPORT -Level 2- PAGE 6 of 6 --**

**Bridge No.:** 7783 **Bridge Name:** YASS RIVER **AT STH OF GOULBURN**

**Description:** S/B BRIDGE OVER



7783\_102b.JPG

Hotmelt seal has lost adhesion on pier 2 joint.

Inspection details: 28-FEB-2007 SW (N); Pourable / Cork Joint Seal; MODERATE; M700 Joint Maintenance, Minor

## **APPENDIX A**

Bridge Maintenance Activity List

## Bridge Maintenance Activities

Activity Code	Description	Units
202.00	M9 Surface Correction Repair [Bridge approaches]	m2
203.00	M9 Surface Texture Repair [Pot holes, rutting etc.]	each
301.00	M9 Tree and/or Bush Control	each
480.00	M480 Amenities, bridge and tunnel cleaning [General cleaning]	Each
480.01	M480 Amenity maintenance	Each
480.02	M480 Remove graffiti and banners	Each
480.03	M480 Sweep bridge deck and tunnel roadway	Each
480.04	M480 Clean scuppers	Each
480.05	M480 Clean public thoroughfares	Each
480.06	M480 Clean tunnel walls	Each
480.07	M480 Clean tunnel holding tanks	Each
600.00	M9 Delineators (per structure)	each
611.00	M9 Reactive Sign Maintenance (per sign)	each
700.00	M700 Other Bridge and Tunnel Repairs	Each
701.00	M700 (Reserved)	Each
702.00	M700 Bearing Maintenance, Minor	Each
703.00	M700 Joint Maintenance, Minor	m
704.00	M700 (Reserved)	m
705.00	M700 Clean Steelwork	m
706.00	M700 Clear Waterway, Minor	Each
707.00	M700 Scour Protection, Minor	Each
708.00	M700 Bolt Tightening and Replacement, Timber	Structure
709.00	M700 Deck and Footway Repairs, Minor	m2
710.00	M700 Timber Element Maintenance, Minor	Structure
711.00	M700 Termite Treatment	Structure
712.00	M700 Paint Repairs, Minor	m2
713.00	M700 Concrete Repairs, Minor	m2
714.00	M700 Masonry / Brick Repairs, Minor	m2
715.00	M700 Railings / Traffic Barriers Repair, Minor	m
730.00	M730 Bridge and Tunnel Inspection	Each
730.11	Level 1 Inspection (Monitoring)	Each
732.00	Waterway and Culvert Clearing, Major	m3
733.00	Repair Scour Protection, Major	Each
734.00	Provide Scour Protection, Major	Each
735.00	Structural Repair to Culverts	Each
735.01	Item 1 (Structural Repair to Culverts)	Each
736.00	Waterways / Culverts, Other Specific Maintenance	Each
741.00	Monitoring of Cathodic Protection Works	Each
743.00	M743 Surface preparation and priming	m2
744.00	M743 Application of Stripe, Build and Topcoats	m2
745.00	Repaint Timber Truss	m2
746.00	Repaint Timber Railings / Kerbs	m2
747.00	Repaint / Galvanise Traffic Barrier / Railings (non-Timber)	m2
748.00	Barrier Coating Treatments (Anti-Graffiti / Silane / AAR etc)	m2

## Bridge Maintenance Activities (Cont.)

Activity Code	Description	Units
752.00	M752 Temporary Sub-Structure / Stabilisation Work	Each
753.00	M752 Temporary Bailey Bridge Support	Each
754.00	M752 Temporary Pier / Abutment Support	Each
755.00	M752 Temporary Support Systems, Other	Each
757.00	M757 Replace Timber Truss Elements	Each
757.01	M757 Replace Principals / Chords (TPCH)	Each
757.02	M757 Replace Steel Bottom Chords (TSBC)	Each
757.03	M757 Replace Struts & Ties (TSTT)	Each
757.04	M757 Replace Ties (Steel, Wrought Iron) (TTIE)	Each
757.05	M757 Replace Brace, Undertrussing (TSBR)	Each
757.06	M757 Replace Metal Shoe (TSHO)	Each
757.07	M757 Replace But / Jack Block (TBJB)	Each
757.08	M757 Replace Truss Cross Girder (TTCG)	Each
757.09	M757 Replace Stringer (TSTR)	Each
759.00	M757 Strengthen Timber Truss Element	Each
760.00	M757 Timber Truss Elements, Other Specific Maintenance	Each
762.00	M762 Replace Other Timber Structural Elements	Each
762.01	M762 Replace Girder / Cross Girder (TGCG)	Each
762.02	M762 Replace Cap/ Head / Sill (TCHS)	Each
762.03	M762 Replace / Splice Pile (TPIL)	Each
762.04	M762 Replace Corbel (TCOR)	Each
762.05	M762 Replace Wale / Brace (TWBR)	Each
763.01	M762 Replace Abutment Sheeting / Gravel Board (TASG)	m2
763.02	M762 Replace Transverse Deck Plank (TTDK)	m2
763.03	M762 Replace Longitudinal Sheeting / Decking (TLSH)	m2
763.04	M762 Replace Stress Laminated Deck (TSLD)	m2
764.00	M762 Replace Kerb / Rail / End Post	m
765.00	M762 Strengthen Timber Element	Each
766.00	M762 Rehabilitate and/or Preserve Deck	m2
767.00	M762 Other Timber Structural Elements, Other Specific Maintenance	Each
769.00	M769 Rehabilitation Concrete Structural Elements	m2
769.01	M769 Rehab Concrete - Post-tensioned Girder (CPOG)	m2
769.05	M769 Rehab Concrete - Pier Headstock (CPHS)	m2
769.06	M769 Rehab Concrete - Pier (excl. any Headstock or Piles) (CPIR)	m2
769.07	M769 Rehab Concrete - Abutment and Wingwalls (CABW)	m2
769.08	M769 Rehab Concrete - Pile (CPIL)	m2
769.09	M769 Rehab Concrete - Deck Slab (CDSL)	m2
769.10	M769 Rehab Concrete - Culvert, Cast-in-place (CCULV)	m2
770.00	M769 Replace Concrete Structural Elements	m2
770.09	M769 Replace Concrete - Deck Slab (CDSL)	m2
770.11	M769 Replace Concrete - Culvert, Precast (CCULP)	m2
771.00	M769 Concrete Structural Elements, Other Specific Maintenance	Each
778.00	M778 Rehabilitate Structural Steel Element	m2
779.00	M778 Replace Structural Steel Element	m2

## Bridge Maintenance Activities (Cont.)

Activity Code	Description	Units
781.00	M778 Steel Structural Elements, Other Specific Maintenance	Each
783.00	M783 Reset Bearing	Each
784.00	M783 Rehabilitate Bearing	Each
784.02	M783 Rehab Metal Expansion (Roller, Sliding, etc) Bearing (BEXP)	Each
784.04	M783 Rehab Enclosed / Concealed Bearing (BENC)	Each
785.00	M783 Replace Bearing	Each
786.00	M783 Bearings, Other Specific Maintenance	Each
788.00	M788 Rehabilitate Joint	m
788.01	M788 Rehab Pourable / Cork Joint Seal (JPOS)	m
788.02	M788 Rehab Compression Joint Seal (JCOS)	m
788.03	M788 Rehab Assembly Joint / Seal (JASS)	m
788.04	M788 Rehab Joint - No Seal (JNOS)	m
789.00	M788 Replace Joint	m
789.01	M788 Replace Pourable / Cork Joint Seal (JPOS)	m
789.03	M788 Replace Assembly Joint / Seal (JASS)	m
790.00	M788 Joints, Other Specific Maintenance	Each
837.00	R106 Reseal bridge surface	m <sup>2</sup>
873.00	R116 Resurface Asphalt Wearing Course	m <sup>2</sup>

## **APPENDIX B**

Element Descriptions and Codes

Units of measurement

Definitions of Elements

Condition State Descriptions



Transport  
Roads & Maritime  
Services

# BRIDGE INSPECTION PROCEDURE MANUAL

## Element Definitions

# **Element Definitions**

## PRESTRESSED CONCRETE ELEMENTS

Element	Description	Units
<b>CPOG</b>	<b>Concrete - Post-tensioned, Cast-in-place or Precast-Box Girder/Girder/Slab</b> This element defines only those box girders/girders/slabs constructed of cast-in-place or precast, post-tensioned concrete.	<b>m<sup>2</sup></b> of exposed surface area of element
<b>CPRG</b>	<b>Concrete - Pre-tensioned, Precast - Planks/Units/I girders/ Trough Girder/Broad Flange Girder</b> This element defines only those planks/units/I girders/trough girders/broad flange girders constructed of precast, pre-tensioned concrete and includes any transverse prestressing of members.	<b>m<sup>2</sup></b> of exposed surface area of element
<b>CCGD</b>	<b>Concrete – Reinforced/Prestressed - Cross Girder/Diaphragm</b> This element defines only those cross girders/diaphragms constructed of reinforced or prestressed concrete.	<b>m<sup>2</sup></b> of exposed surface area of element
<b>CPHS</b>	<b>Concrete - Reinforced/Prestressed - Pier Headstock (non-integral with superstructure)</b> This element defines only those pier headstocks (non-integral with the superstructure) constructed of reinforced or prestressed concrete.	<b>m<sup>2</sup></b> of exposed surface area of element
<b>CPIR</b>	<b>Concrete - Reinforced/Prestressed - Pier (excluding any headstock or piles)</b> This element defines only those piers constructed of reinforced or prestressed concrete but excluding any headstocks or piles. Where the top of a wall pier projects in the transverse or longitudinal directions, this is to be considered as a pier headstock (element CPHS).	<b>m<sup>2</sup></b> of exposed surface area of element
<b>CPIL</b>	<b>Concrete - Reinforced/Prestressed -Pile</b> This element defines only those parts of reinforced or prestressed concrete piles that can be inspected, including underwater inspection if appropriate.	<b>m<sup>2</sup></b> of exposed surface area of element
<b>CABW</b>	<b>Concrete - Reinforced/Prestressed - Abutment and Wingwalls</b> This element defines only those abutments and wingwalls constructed of reinforced or prestressed concrete.	<b>m<sup>2</sup></b> of exposed surface area of element

## PRESTRESSED CONCRETE ELEMENTS

For each of condition states, report the estimated surface area in square metres.

### Condition state descriptions

Condition State	Description
1	The element shows no deterioration. There may be discolouration, efflorescence, and/or superficial cracking.
2	Minor cracks and spalls may be present but there is no evidence of corrosion of the non-prestressed reinforcement or deterioration of the prestress system.
3	Some delaminations, significant cracks or spalls may be present. There is no evidence of deterioration of the prestress system. Corrosion of non-prestressed reinforcement may be present but loss of section is minor. There is not sufficient concern to warrant an analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.
4	Delaminations or spalls or cracks or corrosion of non-prestressed reinforcement are prevalent. There may also be exposure and deterioration of the prestress system (manifested by loss of bond, broken strands or wire, corrosion or failed anchorages, etc). There is sufficient concern to warrant an analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

**Key Areas to inspect** for any crack, spall, leaching, signs of corrosion etc:

1. Anchorage Zone
2. Shear zones near supports (likely diagonal cracks)
3. Midspan of girders (likely vertical cracks)
4. Longitudinal cracks along member
5. Step or half joint anchorages and support zones

### Rating Guidance Notes:

For Level 2 inspection of these elements, all diagonal cracks near supports shall be considered as significant distress that could affect the strength or serviceability of the element. The cracked area shall be rated as condition 4 even if there are no signs of corrosion or loss of section.

These cracks must be brought to the attention of Bridge Maintenance Planner for further review.

## REINFORCED CONCRETE ELEMENTS

Element	Description	Units
<b>CRBM</b>	<b>Concrete-Reinforced, Cast-in-Place-Beam/Girder/Arch</b> This element defines only those beams/girders/arches constructed of cast-in-place reinforced concrete.	m <sup>2</sup> of exposed surface area of element
<b>CDSL</b>	<b>Concrete - Reinforced, Deck Slab (Including Concrete Overlay/Kerb/Parapet)</b> This element defines only reinforced concrete bridge deck slabs, bare or with a flush seal or asphaltic concrete wearing surface, and includes concrete overlays, kerbs and parapets. (Note: Where there is a wearing surface, rate the deck slab from the condition of its underside and of the wearing surface.)	m <sup>2</sup> of exposed surface area of element
<b>CCGD</b>	<b>Concrete - Reinforced/Prestressed - Cross Girder/Diaphragm</b> This element defines only those cross girders/diaphragms constructed of reinforced or prestressed concrete.	m <sup>2</sup> of exposed surface area of element
<b>CPHS</b>	<b>Concrete - Reinforced/Prestressed - Pier Headstock (non-integral with superstructure)</b> This element defines only those pier headstocks (non-integral with the superstructure) constructed of reinforced or prestressed concrete.	m <sup>2</sup> of exposed surface area of element
<b>CPIR</b>	<b>Concrete - Reinforced/Prestressed - Pier (excluding any headstock or piles)</b> This element defines only those piers constructed of reinforced or prestressed concrete but excluding any headstocks or piles. Where the top of a wall pier projects in the transverse or longitudinal directions, this is to be considered as a pier headstock (element CPHS).	m <sup>2</sup> of exposed surface area of element
<b>CPIL</b>	<b>Concrete - Reinforced/Prestressed -Pile</b> This element defines only those parts of reinforced or prestressed concrete piles that can be inspected, including underwater inspection if appropriate.	m <sup>2</sup> of exposed surface area of element
<b>CABW</b>	<b>Concrete - Reinforced/Prestressed - Abutment and Wingwalls</b> This element defines only those abutments and wingwalls constructed of reinforced or prestressed concrete.	m <sup>2</sup> of exposed surface area of element

## REINFORCED CONCRETE ELEMENTS

For each of condition states, report the estimated surface area in square metres.

### Condition state descriptions

Condition State	Description
1	The element shows no deterioration. There may be discolouration, efflorescence, and/or superficial cracking.
2	Minor cracks and spalls may be present but there is no exposed reinforcement or surface evidence of corrosion of reinforcement.
3	Some delaminations, significant cracks or spalls may be present or some reinforcement may be exposed. Corrosion of reinforcement may be present but loss of section is minor and is not sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.
4	Advanced deterioration. Corrosion of reinforcement and/or loss of concrete section is sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

**Key Areas to inspect** for any crack, spall, leaching, signs of corrosion etc:

1. Shear zones near supports (likely diagonal cracks)
2. Midspan of beams (likely vertical cracks)

### Rating Guidance Notes:

For level 2 inspections, all diagonal cracks > 0.5mm near the supports in the element shall be considered as significant distress that could affect the strength or serviceability of the element. The cracked area shall be rated as condition 4 even if there are no signs of corrosion or loss of section.

These cracks must be brought to the attention of Bridge Maintenance Planner for further review.

## REINFORCED CONCRETE CULVERTS

Element	Description	Unit
<b>CCUL</b>	<p><b>Concrete - Culvert, Cast-in-Place</b>                      This element defines all cast-in-place reinforced concrete arch and box culverts that have an opening measured along the road centreline of six metres or more, measured between spring lines of arches, or extreme ends of openings for multiple boxes. For each of condition states 1 to 4, report the estimated surface area inside the culvert and on wingwalls, headwalls and apron slabs in square metres.</p>	<p><b>m<sup>2</sup></b> of exposed surface area of inside culvert and on wingwalls, headwalls and apron slabs.</p>
<b>CCUP</b>	<p><b>Concrete - Culvert, Precast</b>                      This element defines all precast reinforced concrete arch and box culverts that have an opening measured along the road centreline of six metres or more, measured between spring lines of arches, or extreme ends of openings for multiple boxes.</p>	<p><b>m<sup>2</sup></b> of exposed surface area inside culvert.</p>

## REINFORCED CONCRETE CULVERTS

For each of condition states 1 to 4, report the estimated surface area in square metres.

### Condition state descriptions

Condition state	Description
1	Superficial cracks and spalls may be present, but there is no exposed reinforcement or evidence of reinforcement corrosion. There is little or no deterioration or separation of joints. <b>CCUL</b> : Minor scour & erosion at wingwalls or cut-off walls may exist.
2	Deterioration, minor chloride contamination, minor cracking and/or leaching may have begun. There may be deterioration and separation of joints. Minor scour of barrel may have occurred but is not affecting structural integrity.
3	There may be moderate to major deterioration, extensive cracking and/or leaching and large areas of spalls. Scour may be beginning to affect structural integrity. Minor to moderate distortion, settlement, or misalignment may have occurred. There may be considerable deterioration and separation of joints and/or minor roadway settlement.
4	Major deterioration, spalling, cracking, major distortion, deflection settlement, or misalignment of the barrel may be in evidence. Major separation of joints may have occurred. Holes may exist in floors and walls. Settlement of roadway may have occurred. Severe scour, if any, will affect structural capacity.

### Key Areas to inspect:

1. Look for deformation of culvert.
2. Spring and the crown areas of an arch culvert.
3. Check scour is not undermining the invert of the culvert.

### Rating Guidance Notes:

## STEEL ELEMENTS

Element	Description	Units
<b>STPR</b>	<b>Steel – Truss – Principal</b> This element defines the principals of steel trusses only excluding the protective coating.	m <sup>2</sup> of exposed surface area
<b>STTC</b>	<b>Steel – Truss – Top Chord</b> This element defines the top chords of steel trusses only excluding the protective coating.	m <sup>2</sup> of exposed surface area
<b>STBC</b>	<b>Steel – Truss – Bottom Chord</b> This element defines the bottom chords of steel trusses only excluding the protective coating.	m <sup>2</sup> of exposed surface area
<b>STDG</b>	<b>Steel – Truss – Diagonals</b> This element defines the diagonals of steel trusses only excluding the protective coating.	m <sup>2</sup> of exposed surface area
<b>STVT</b>	<b>Steel – Truss – Verticals</b> This element defines the verticals of steel trusses only excluding the protective coating.	m <sup>2</sup> of exposed surface area
<b>STGP</b>	<b>Steel – Truss – Connection Gusset Plates</b> This element defines the connection gusset plates of steel trusses only excluding the protective coating.	m <sup>2</sup> of exposed surface area
<b>STTB</b>	<b>Steel – Truss – Top Bracings</b> This element defines the top bracings of steel trusses only excluding the protective coating.	m <sup>2</sup> of exposed surface area
<b>STBB</b>	<b>Steel – Truss – Bottom Bracings</b> This element defines the bottom bracings of steel trusses only excluding the protective coating.	m <sup>2</sup> of exposed surface area
<b>STCG</b>	<b>Steel – Truss – Cross Girder</b> This element defines the cross girders of steel trusses only excluding the protective coating.	m <sup>2</sup> of exposed surface area
<b>STST</b>	<b>Steel – Truss – Stringers</b> This element defines the stringers of steel trusses only excluding the protective coating.	m <sup>2</sup> of exposed surface area
<b>SLST</b>	<b>Steel – Lift Span Support Structure</b> This element defines the steel lift span support structure of lift spans only excluding the protective coating.	m <sup>2</sup> of exposed surface area
<b>SBGI</b>	<b>Steel - Rolled Beam/Fabricated I Girder/Trough Girder/Box Girder, including Stringers and Cross Girders (Load bearing)</b> This element defines all steel (or wrought iron) rolled beams/I girders/trough girders/box girders including stringers and cross girders that are load bearing excluding the protective coating.	m <sup>2</sup> of exposed surface area
<b>SDBR</b>	<b>Steel - Diaphragm/Bracing/Secondary member</b> This element defines only steel diaphragms/braces /secondary members excluding the protective coating.	m <sup>2</sup> of exposed surface area
<b>SPIR</b>	<b>Steel - Pier (excluding any piles and secondary members)</b> This element defines steel piers, excluding any piles and secondary members excluding the protective coating.	m <sup>2</sup> of exposed surface area
<b>SPIL</b>	<b>Steel - Pile (including steel cased concrete pile or caisson)</b> This element defines only those parts of steel piles and that can be inspected, including underwater inspection if appropriate excluding the protective coating.	m <sup>2</sup> of exposed surface area
<b>SASG</b>	<b>Steel Abutment Sheeting / Gravel Board</b> This element defines only the abutment sheeting/Gravel Boards made of steel. The vertical steel supports are treated as steel piles.	m <sup>2</sup> of exposed surface area

## STEEL ELEMENTS

For each of the condition states, report the estimated area in square metres.

### Condition state descriptions

Condition State	Description
1	There is no evidence of section loss or damage or cracking.
2	Surface rust or minor pitting has formed or is forming. There is no measurable loss of section.  There may be minor deformations that do not affect the integrity of the element.  There are no cracks in the steel or welds. All bolts and rivets are in sound condition.
3	Heavy pitting may be present. Some measurable section loss is present locally, but not critical to structural integrity and/or serviceability of the element.  There may be some loose or missing bolts or rivets. Defects have been assessed as not sufficient to impact on the ultimate strength and/or serviceability of the element.
4	Section loss is sufficient to warrant analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge.  There may be cracks and/or deformations in the steel or welds. There may be numerous failed or missing bolts or rivets. Defects may impact on the ultimate strength and/or serviceability of the element.

**Key Areas to inspect** for any cracking, section loss and other deterioration signs:

1. Edges of members
2. Connections
3. Splice Plates
4. End plates of girders
5. Bottom chords of trusses

### Rating Guidance Notes:

Defects are defined as notches, gauges or discontinuities.

Deformations are defined as buckled plate, bent members or sections

Section loss is defined as loss of original metal.

## Steel - Cables/Hangers/Tension Ties (Not Embedded In Concrete)

**SCBT**

Element	Description	Units
<b>SCBT</b>	<p><b>Steel - Cables/Hangers/Tension Ties (Not Embedded In Concrete)</b></p> <p>This element defines only those steel cables, hangers and other tension ties (cables or rods) excluding steel bracings and steel tension members in trusses, and external post tensioning systems including those for correction of deformations. This element includes the anchorages and other supports associated with the cables/ties and any cable dampening systems. These tension members may be galvanised, painted, coated or wrapped in grease with a protective outer wrapper, but are not embedded in concrete. The protective coating systems are not included in this element.</p>	Each

For each of condition states, report the number of units affected..

### Condition state descriptions

Condition State	Description
1	There is no evidence of corrosion. There are no signs of distress at anchors, sockets or saddles.
2	Surface or spot rust has formed or is forming. There are no signs of distress at anchors or sockets but the saddles may be rusty and in need of lubrication.
3	Minor corrosion. Surface pitting may be present but the extent is minor and does not yet affect the strength or serviceability of either the element or the bridge. The cables may have slackened off slightly or the hangers are slipping on the cable. Cables may be beginning to abrade but there are no wire breakages. Anchors may have minor cracking, sockets may be a little loose or saddles may have fine cracks in the metal.
4	Pitting or general corrosion is advanced. Section loss is sufficient to warrant analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge. Cables may be abraded with broken wire(s). Units may have slackened noticeably or differentially and/or are not fully effective. Anchorages may have cracked or have moved or slipped. Sockets may have loosened or saddles are badly damaged.

### Key Areas to inspect :

1. Where cables change direction and at anchorages
2. At saddles, bulldog clamps, swages..
3. Where water can infiltrate or pond

### Rating Guidance Notes:

Any measurable section loss warrants an analysis.  
There is a higher tolerance for defects in any cable dampening system.

## Steel – Deck Elements

## SOGD, SBPD, SCOD

Element	Description	Units
<b>SOGD</b>	<b>Steel - Open Grid Deck</b> This element defines only those bridge decks that are constructed of steel grids and are open and unfilled excluding the protective coating.	<b>m<sup>2</sup></b> of exposed surface area
<b>SBPD</b>	<b>Steel - Buckle Plate Deck</b> This element defines only those bridge decks that are constructed of steel buckle plates and support a layer of reinforced concrete or gravel, excluding the protective coating.	<b>m<sup>2</sup></b> of exposed surface area
<b>SCOD</b>	<b>Steel - Corrugated/Orthotropic/Etc. Deck</b> This element defines only those bridge decks that are constructed of corrugated metal filled with Portland cement concrete or asphaltic concrete or an orthotropic steel deck. The orthotropic deck may be covered with asphaltic concrete. The protective coating is not included in this element.	<b>m<sup>2</sup></b> of exposed surface area

For each of the condition states, report the estimated area in square metres.

### Condition state descriptions

Condition State	Description
1	There is no corrosion. The connectors (welds, rivets, etc) are sound. The surfacing on the deck (if any) has no repaired areas and there are no potholes.
2	Surface rust or minor pitting has formed. There is no loss of section. The connectors may be starting to show signs of distress - cracked welds or broken rivets. Potholes may exist in the surfacing at scattered locations and there may be cracking in the infill pavement (if any). There may be minor deformations that do not affect the integrity of the element.
3	Corrosion is moderate. Surface pitting may be present but any section loss is minor. Numerous connectors are failing at scattered locations. There may be minor cracks and/or deformations in the steel or welds which have been assessed as not sufficient to impact on the ultimate strength and/or serviceability of the element.  Potholes may expose the metal decking. There may be significant cracking in the infill pavement (if any).
4	Corrosion is advanced. Numerous connectors have failed. Section loss, connectivity loss, cracks, deformations or holes in the steel or welds may impact on the ultimate strength and/or serviceability of the element.  The infill pavement (if any) has failed.

**Key Areas to inspect** for any cracking, corrosion and other deterioration signs:

1. Deck surface for cracking, potholes
2. Soffit of deck for leakage, cracking, corrosion
3. Connections to stringers

### Rating Guidance Notes:

## Steel – Culvert

**SCUL**

Element	Description	Units
<b>SCUL</b>	<p><b>Steel – Culvert</b>                      This element defines all steel culverts, including arches, round or elliptical pipes etc that have an opening measured along the road centreline of six metres or more, measured between spring lines of arches, or extreme ends of openings for multiple pipes.</p>	<b>m<sup>2</sup></b> of exposed surface area

For each of the condition states, report the estimated area in square metres.

### Condition state descriptions

Condition State	Description
1	The element shows little or no deterioration. Some discolouration or surface corrosion with no pitting may exist. Very little or no scour or erosion is evident.
2	There may be minor to moderate corrosion and pitting, especially at the barrel invert. The connectors may be starting to show signs of distress. Little or no distortion exists. Minor scouring may be evident.
3	Significant corrosion, deep pitting or some holes in the invert may exist. Numerous connectors are failing at scattered locations. Significant scour or erosion not affecting structural integrity. Minor to moderate distortion and deflection may exist. There is little or no roadway settlement.
4	<p>Major corrosion, extreme pitting or holes in the barrel may exist. Major distortion, deflection, or settlement may be evident. There may be severe scour affecting the structural capacity. Minor to major roadway settlement may be evident.</p> <p>Section loss, connectivity loss, cracks and/or deformations may impact on the ultimate strength and/or serviceability of the element.</p>

**Key Areas to inspect** for any cracking, corrosion and other deterioration signs:

1. Roadway for settlement
2. Roof for distortion/out of shape
3. Inlet and outlet of culvert for scour
4. Sides of barrel invert for corrosion

### Rating Guidance Notes:

## STEEL PROTECTIVE COATING ELEMENTS

Element	Description	Units
<b>PTPR</b>	<b>Protective Coating – Truss – Principal</b> This element defines the protective coating on principals of steel trusses only.	<b>m<sup>2</sup></b> of exposed surface area
<b>PTTC</b>	<b>Protective Coating – Truss – Top Chord</b> This element defines the protective coating on top chords of steel trusses only.	<b>m<sup>2</sup></b> of exposed surface area
<b>PTBC</b>	<b>Protective Coating – Truss – Bottom Chord</b> This element defines the protective coating on bottom chords of steel trusses only.	<b>m<sup>2</sup></b> of exposed surface area
<b>PTDG</b>	<b>Protective Coating – Truss – Diagonals</b> This element defines the protective coating on diagonals of steel trusses only.	<b>m<sup>2</sup></b> of exposed surface area
<b>PTVT</b>	<b>Protective Coating – Truss – Verticals</b> This element defines the protective coating on verticals of steel trusses only.	<b>m<sup>2</sup></b> of exposed surface area
<b>PTGP</b>	<b>Protective Coating – Truss – Connection Gusset Plates</b> This element defines the protective coating on connection gusset plates of steel trusses only.	<b>m<sup>2</sup></b> of exposed surface area
<b>PTTB</b>	<b>Protective Coating – Truss – Top Bracings</b> This element defines the protective coating on top bracings of steel trusses only.	<b>m<sup>2</sup></b> of exposed surface area
<b>PTBB</b>	<b>Protective Coating – Truss – Bottom Bracings</b> This element defines the protective coating on bottom bracings of steel trusses only.	<b>m<sup>2</sup></b> of exposed surface area
<b>PTCG</b>	<b>Protective Coating – Truss – Cross Girder</b> This element defines the protective coating on cross girders of steel trusses only.	<b>m<sup>2</sup></b> of exposed surface area
<b>PTST</b>	<b>Protective Coating – Truss – Stringers</b> This element defines the protective coating on stringers of steel trusses only.	<b>m<sup>2</sup></b> of exposed surface area
<b>PTLS</b>	<b>Protective Coating – Truss – Lift Span Support Structure</b> This element defines the protective coating on the lift span support structure of steel trusses only.	<b>m<sup>2</sup></b> of exposed surface area
<b>PBGI</b>	<b>Protective Coating - Rolled Beam/Fabricated I Girder / Trough Girder/Box Girder, including Stringers and Cross Girders (Load bearing)</b> This element defines the protective coating on all steel (or wrought iron) rolled beams/I girders/trough girders/box girders including stringers and cross girders that are load bearing.	<b>m<sup>2</sup></b> of exposed surface area
<b>PDBR</b>	<b>Protective Coating - Diaphragm/Bracing/Secondary member</b> This element defines the protective coating on steel diaphragms/braces/secondary members.	<b>m<sup>2</sup></b> of exposed surface area

Element	Description	Units
PPIR	<p><b>Protective Coating - Pier (excluding any piles and secondary members)</b>                      This element defines the protective coating on steel piers, excluding any piles and secondary members.</p>	m <sup>2</sup> of exposed surface area
PPIL	<p><b>Protective Coating - Pile (including steel cased concrete pile or caisson)</b>                      This element defines only the protective coating on those parts of steel piles and that can be inspected, including underwater inspection if appropriate.</p>	m <sup>2</sup> of exposed surface area
PASG	<p><b>Protective Coating – Abutment Sheeting / Gravel Board</b>                      This element defines only the protective coating on the abutment sheeting/Gravel Boards made of steel. The vertical steel supports are treated as steel piles.</p>	m <sup>2</sup> of exposed surface area
POGD	<p><b>Protective Coating - Open Grid Deck</b>                      This element defines only the protective coating on those bridge decks that are constructed of steel grids and are open and unfilled.</p>	m <sup>2</sup> of exposed surface area
PBPD	<p><b>Protective Coating - Buckle Plate Deck</b>                      This element defines the protective coating on those bridge decks that are constructed of steel buckle plates.</p>	m <sup>2</sup> of exposed surface area
PCOD	<p><b>Protective Coating - Corrugated/Orthotropic/Etc. Deck</b>                      This element defines only the protective coating on those bridge decks that are constructed of corrugated metal filled with Portland cement concrete or asphaltic concrete or an orthotropic steel deck. The orthotropic deck may be covered with asphaltic concrete.</p>	m <sup>2</sup> of exposed surface area
PCBT	<p><b>Protective Coating - Cables/Hangers/Tension Ties (Not Embedded In Concrete)</b>                      This element defines only the protective coating including galvanising, painting, wrapping with grease or a protective outer wrapper on those steel cables, hangers and other tension ties (cables or rods) excluding steel bracings and steel tension members in trusses. This element includes the anchorages and other supports associated with the cables/ties that are not embedded in concrete.</p>	each

## STEEL PROTECTIVE COATING ELEMENTS

For each of the condition states, report the estimated area in square metres.

### Condition state descriptions

Condition State	Description
1	The protective coating is generally sound and unbroken. Some chalking or water staining may be evident.
2	<p>The protective coating is exhibiting:</p> <ul style="list-style-type: none"> <li>○ Minor speckled white or red rusting, and/or</li> <li>○ Localised pinhead rusting, and/or</li> <li>○ Localised peeling and/or flaking</li> </ul> <p>The top coat may exhibit one or more of the following conditions:</p> <ul style="list-style-type: none"> <li>○ Loss of thickness;</li> <li>○ Primer exposed over localised areas (except for lead primer)</li> <li>○ Shrinkage lines – minor localised splitting;</li> <li>○ Surface checking with slight localised splitting;</li> <li>○ Minor unbroken blistering.</li> </ul> <p>Rivets may be exposed at scattered locations.</p>
3	<p>The protective coating is exhibiting:</p> <ul style="list-style-type: none"> <li>○ Speckled white rusting in areas &gt;2% and &lt;5% of affected surface area,</li> <li>○ Speckled red rusting in areas &gt;0.5% and &lt;5% of affected surface area;</li> </ul> <p>The top coat may exhibit one or more of the following conditions:</p> <ul style="list-style-type: none"> <li>○ Primer exposed over large areas or in the case of lead primer, local areas</li> <li>○ Splitting;</li> <li>○ Peeling (loss of adhesion);</li> <li>○ Heavily checked;</li> <li>○ Blistering over large areas.</li> </ul> <p>Numerous rivets may be exposed.</p>
4	<p>The protective coating is no longer effective, signs include:</p> <ul style="list-style-type: none"> <li>○ Speckled rust &gt;5% (red and white) in affected areas.</li> <li>○ Failure of primer over large areas.</li> </ul>

**Key Areas to inspect** for any cracking, corrosion and other deterioration signs:

1. Edges of members
2. Connections
3. Splice Plates

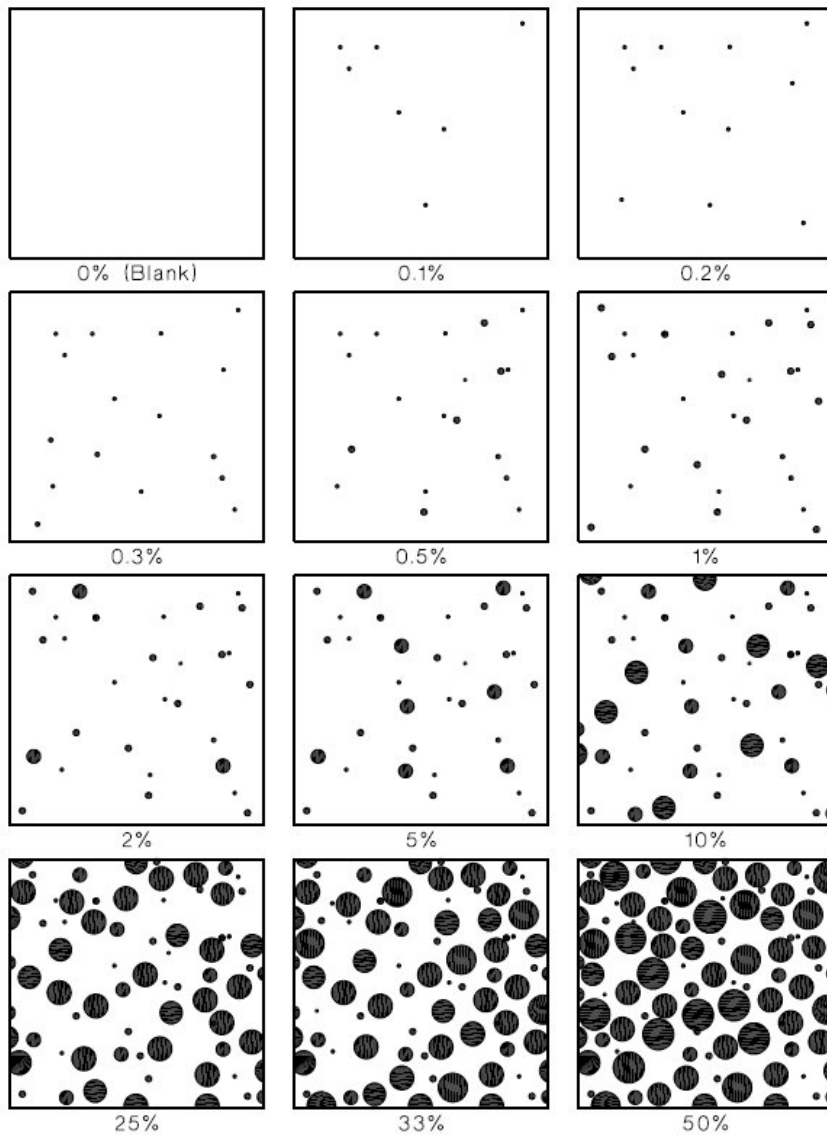
**Rating Guidance Notes:**

Checking is defined as crocodile cracking.

For further guidance please see next page.

**Rating Guidance Notes:**

To assist with the estimation of percentages of typical rust formation in painted steel elements, a diagram from the Australian Standards AS/NZ 2312 : 2002 is given below.



Schematic diagrammatic examples of estimating rust percentages  
(From AS/NZS 2312 : 2002)

Different parts of an element can be in different paint condition states.  
Consider the affected areas of the element and estimate the areas that have reached the condition definitions.

## Timber Elements of Timber Trusses

Element	Description	Units
<b>TPCH</b>	<b>Timber Truss - Principal/Top Chord/Bottom Chord</b> This element defines only timber truss principals/top chords/bottom chords. <i>Note - Count whole principals, top chords and bottom chords, not pieces of timber which are parts of principals, top chords and bottom chords.</i>	Each
<b>TSTT</b>	<b>Timber Truss - Strut</b> This element defines only timber truss struts (compression diagonals, compression verticals and upper lateral struts). <i>Note - Count whole struts, not pieces of timber which are parts of struts.</i>	Each
<b>TBJB</b>	<b>Timber Truss - Butting Block/Jacking Block</b> This element defines only butting blocks/jacking blocks in timber trusses.	Each
<b>TTCG</b>	<b>Timber Truss - Cross Girder</b> This element defines only timber cross girders in timber truss bridges.	Each
<b>TSTR</b>	<b>Timber Truss - Stringer</b> This element defines only stringers in a timber truss bridge.	Each truss bay length between cross girders

For each of condition states 1 to 4, report the estimated quantity of each element in its corresponding unit of measurement.

### Condition state descriptions

Condition state	Description
1	The timber is in good condition with no evidence of decay. There may be cracks, splits and checks having no effect on strength or serviceability. All connections are in good condition and bolts are tight.
2	Minor decay, insect infestation, splitting, cracking, checking or crushing may exist but none is sufficiently advanced to affect serviceability. Joint connections may be slightly loose but does not affect the serviceability.
3	Medium decay, insect infestation, splitting, cracking or crushing has produced loss of strength of the element but not of a sufficient magnitude to affect the serviceability of the bridge. Joint connections may be slightly loose but the serviceability of the bridge is not significantly affected.
4	Advanced deterioration. Heavy decay, insect infestation, splits, cracks or crushing has produced loss of strength that affects the serviceability of the bridge. Connections are very loose causing large movements, bolts are corroded and ineffective or missing and the serviceability of the bridge is affected.

### Key Areas to inspect:

1. Alignment of the whole truss and individual members.
2. Permanent slippage of truss members at the connections and/or at butting blocks with no vehicular load on the bridge.
3. Integrity of all connections and butting blocks with the movement of individual truss members and the overall sag of truss under a movement of a heavy vehicle.
4. Splice plates, keyways or shoes for timber deterioration

### Rating Guidance Notes:

As the visual appearance of timber elements can be deceptive, assessment of conditions must be made with sounding by hammer and confirmed with the judicious use of test boring if required. When the four yearly test boring program is being carried out, flashing should be removed to allow inspection underneath the flashing.

## Other Timber Elements

Element	Description	Units
<b>TGCG</b>	<b>Timber- Girder/Cross Girder (Beam Bridge)</b> This element defines only girders/cross girders in a timber beam bridge.	<b>Each</b>
<b>TCHS</b>	<b>Timber-Capwale/Headstock/Sill</b> This element defines only those capwales/headstocks/sills of timber construction.	<b>Each</b>
<b>TPIL</b>	<b>Timber - Pile</b> This element defines only those parts of timber piles down to 1 metre below ground level, including underwater inspection if appropriate.	<b>Each</b>
<b>TCOR</b>	<b>Timber-Corbel</b> This element defines only timber corbels.	<b>Each</b>
<b>TWBR</b>	<b>Timber Wale/Brace</b> This element defines only those wales/braces of timber construction.	<b>Each</b>
<b>TASG</b>	<b>Timber-Abutment Sheeting/Gravel Board</b> This element defines only abutment sheeting/gravel boards constructed of timber.	<b>m2</b> of exposed area
<b>TTDK</b>	<b>Timber - Transverse Deck Plank</b> This element defines only transverse deck planks constructed of timber.	<b>m2</b> of plan area
<b>TLSH</b>	<b>Timber - Longitudinal Sheeting/Decking</b> This element defines only longitudinal sheeting/decking constructed of timber.	<b>m2</b> of plan area

For each of condition states 1 to 4, report the estimated quantity of each element in its corresponding unit of measurement.

### Condition state descriptions

Condition state	Description
1	The timber is in good condition with no evidence of decay. There may be cracks, splits and checks having no effect on strength or serviceability.
2	Minor decay, insect infestation, splitting, cracking, checking or crushing may exist but none is sufficiently advanced to affect serviceability.
3	Medium decay, insect infestation, splitting, cracking or crushing has produced loss of strength of the element but not of a sufficient magnitude to affect the serviceability of the bridge.
4	Advanced deterioration. Heavy decay, insect infestation, splits, cracks or crushing has produced loss of strength that affects the serviceability of the bridge.

### Key Areas to inspect:

1. At and near interfaces of two timber members joined together or transfer load through bearing, especially where exposed to water or moisture.

### Rating Guidance Notes:

As the visual appearance of timber elements can be deceptive, assessment of conditions must be made with sounding by hammer and confirmed with the judicious use of test boring if required.

When the four yearly test boring program is being carried out, flashing should be removed to allow inspection underneath the flashing.

## Timber Truss - Steel Bottom Chord

**TSBC**

Units: Each

This element defines only steel bottom chords in timber trusses. For each of condition states 1 to 4, report the estimated number of steel bottom chords of timber trusses. (Note - Count whole steel bottom chords, not parts of steel bottom chords.)

### Condition state descriptions

Condition State	Description
1	There is no evidence of section loss
2	Surface rust or minor pitting has formed or is forming. There is no measurable loss of section. There may be minor deformations that do not affect the integrity of the element. There are no cracks in the steel or welds. All connectors are in sound condition.
3	Heavy pitting may be present. Some measurable section loss is present locally. There are no cracks in the steel or welds. There may be localised failure of connectors.
4	Significant section loss may be present. There may be cracks and/or deformations in the steel or welds. There may be numerous failed connectors.

### Key Areas to inspect:

1. Connections
2. End plates
3. Cross girder saddles
4. Weep holes
5. Flood damage
6. Alignment

### Rating Guidance Notes:

Defects are defined as notches, gauges or discontinuities.

Deformations are defined as buckled plate, bent members or sections

Section loss is defined as loss of original metal.

**Timber Truss – Tie / Kingbolt (Steel)**

Units: Each

This element defines only steel or wrought iron ties (suspension rods) in timber trusses. For each of condition states 1 to 4, report the estimated number of ties. (Note - Count whole ties, not rods which are parts of ties.

**Condition state descriptions**

Condition State	Description
1	The camber of the bottom chord is correct. There is no evidence of section loss.
2	The camber of the bottom chord is correct. Surface rust or minor pitting has formed or is forming. There is no measurable loss of section. There may be minor deformations that do not affect the integrity of the element. There are no cracks in the steel or welds. All connectors are in sound condition.
3	Suspension rods may need to be tightened to restore camber of bottom chords. Heavy pitting may be present. Some measurable section loss or necking is present locally. There are no cracks in the steel or welds. There may be missing locknuts but all connectors are in sound condition.
4	Suspension rods may need to be replaced to restore camber of bottom chord. Significant section loss may be present. There may be cracks and/or deformations in the steel or welds. There may be failed connectors. The bolts may have stretched

**Key Areas to inspect:**

1. Locknuts
2. Area of tie inside bottom shoe

**Rating Guidance Notes:**

## Timber Truss - Brace/Undertrussing

Units: Each

This element defines only side and wind braces and undertrussing rods and wires in timber trusses. For each of condition states 1 to 4, report the estimated number of braces.

### Condition state descriptions

Condition State	Description
1	The bracing/undertrussing is tight. There is no evidence of section loss.
2	The bracing/undertrussing is tight. Surface rust or minor pitting has formed or is forming. There is no measurable loss of section. There may be minor deformations that do not affect the integrity of the element. There are no cracks in the steel or welds. All connectors are in sound condition.
3	The bracing/undertrussing may need to be tightened. Heavy pitting may be present. Some measurable section loss or necking is present locally. There are no cracks and only minor deformations in the steel or welds. There may be localised failure of or occasional missing connectors.
4	The bracing/undertrussing may need to be replaced. Corrosion is advanced. Significant section loss may be present. There may be cracks and/or deformations in the steel or welds. There may be numerous failed or missing connectors.

### Key Areas to inspect:

1. End connection to bottom chords
2. Transition between threaded and unthreaded section

### Rating Guidance Notes:

## Timber Truss - Metal Shoe

**TSHO**

Units: Each

This element defines only metal shoes in timber trusses. For each of condition states 1 to 4, report the estimated number of metal shoes.

### Condition state descriptions

Condition State	Description
1	There is no evidence of section loss or damage or cracks.
2	Surface rust or minor pitting has formed or is forming. There is no measurable loss of section. There may be minor deformations that do not affect the integrity of the element. There are no cracks in the steel or welds. All connectors are in sound condition.
3	Heavy pitting may be present. Some measurable section loss is present locally. There may be minor cracks and/or deformations in the steel or welds. All connectors are in sound condition.
4	Significant section loss may be present. There may be cracks and/or deformations in the steel or welds. There may be numerous failed connectors.

### Key Areas to inspect:

1. Cracks in middle of the shoes

### Rating Guidance Notes:

## Timber - Protective System

TPRS

Units: m of bridge

This element defines only the protective system comprising any flashing, paint work, termite and fungicide or other protective treatment on timber bridges. This element does not include protective treatment of timber barriers.

For each of condition states 1 to 4, report the estimated lineal metres of bridge.

### Condition state descriptions

Condition state	Description
1	The protective system is sound and functioning as intended to protect the timber and metal.
2	The protective system may be chalking, peeling, checking or showing other early evidence of distress but there is no exposure of timber or metal.
3	The protective system is no longer effective on significant areas. There may be exposed timber or metal or early signs of fungal decay or termite infestation.
4	The protective system has failed.

### Key Areas to inspect:

1. Ends of timber members such as cross girders
2. Joints between timber members
3. Members where water can be trapped
4. Hidden parts of members such as behind shoes

### Rating Guidance Notes:

Flashing is not structural metal.

## Timber - Stress Laminated Deck

Units: m2 of plan area

This element defines only stress laminated timber deck. Protective treatment of the prestressing system of this element is covered under the element 'Timber - Protective System' (TPRS).

For each of condition states 1 to 4, report the estimated square meters of deck area.

### Condition state descriptions

Condition state	Description
1	The timber laminates are in good condition with no evidence of decay. The prestressing system and the tie downs are in good condition.
2	Minor reflective cracking on the wearing surface and/or minor decay of timber laminates may exist. No relative movement of laminates may be observed under traffic. The prestressing system is in good condition but the tie down bolts may be slightly loose.
3	Local decay, insect infestation, or crushing of some timber laminates may exist. Some relative movement between laminates may be observed under traffic. There may be local loss of prestress and the tie down bolts may be loose. The defects are only affecting the deck locally.
4	Advanced deterioration. Significant decay, insect infestation, or crushing of timber laminates may exist. The tie down bolts are sufficiently loose to enable significant movement of the deck. The prestressing system is sufficiently ineffective to cause loss of strength that affects the serviceability of the bridge. The defects are globally affecting the deck.

### Key Areas to inspect:

1. Surface seal
2. Flashing on side of laminates
3. Anchorages and bars
4. Noise from laminate movement under traffic
5. Joint cover plates

### Rating Guidance Notes:

## Timber – Deck Bolts

**TDBO**

Units: Each timber deck span

This element defines only bolts which fasten timber decks. For each of condition states 1 to 3, report the number of spans.

### Condition state descriptions

Condition state	Description
1	Bolts are generally tight.
2	Bolts are generally slightly loose.
3	Bolts are generally loose. There may be a few missing or broken bolts.
4	Bolts are generally very loose or missing or broken.

**Key Areas to inspect:**

**Rating Guidance Notes:**

## Fibre Reinforced Plastic Element

**FRPE**

Element	Description	Units
FRPE	<p><b>Fibre Reinforced Plastic Element</b>                      This element defines only those structural bridge elements made of (pultruded) fibre reinforced plastic.                       It does not cover the carbon fibre reinforced strengthening of other structural elements.</p>	m <sup>2</sup> of exposed surface area

For each of the condition states, report the estimated area in square metres.

### Condition state descriptions

Condition State	Description
1	The element is in good condition.
2	There may be signs of minor distress of the element.
3	<p>The element is under moderate distress.</p> <p>However, there is not sufficient concern to warrant an analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.</p>
4	<p>The element is under significant distress.</p> <p>There is sufficient concern to warrant an analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.</p>

### Key Areas to inspect:

### Rating Guidance Notes:

Following are some of the signs of deterioration that can affect the element significantly:

- Delamination
- Debonding
- Splitting
- Moisture ingress
- Blistering
- Bubbling
- Powdering

As the use of the material is relatively new in bridges, signs of distress should be rated conservatively.

If there is any doubt about the significance of any defect, it must be referred to the BMP for engineering or specialist assessment.

The definitions of condition states will be improved as more experience with the product is obtained.

## Pourable/Cork Joint Seal

**JPOS**

Element	Description	Units
<b>JPOS</b>	<b>Pourable/Cork Joint Seal</b> This element defines only those deck joints filled with a pourable or cork seal or asphaltic concrete plug seal including those under a flush seal or asphaltic concrete wearing surface and includes all of cold applied polymer joints	<b>m</b> of Joint Seal

For each of the condition states, report the estimated quantity in linear metres.

### Condition state descriptions

Condition State	Description
1	The element shows minimal deterioration. Adhesion is sound with no signs of leakage. There are no cohesion cracks. The adjacent deck and/or header is sound.
2	Minor fine adhesion and/or cohesion cracks may be present. Minor leakage may show underneath. Joint may be slightly impacted with debris. Minor spalls in deck and/or headers may be present adjacent to joint.
3	Moderate adhesion and/or cohesion cracks exist allowing reasonable leakage of moisture through the joint. Joint may be impacted with debris. Cracks or medium spalls in deck and/or headers may be present adjacent to joint.
4	The joints have failed allowing extensive moisture penetration. Joint sealant may be almost completely lost. Joint may be heavily impacted with debris and/or stones. Adjacent deck may be severely cracked or spalled.

**Key Areas to inspect** for any cracking, and other deterioration signs:

1. Joint and surrounding roadway
2. Deck underside for water leakage
3. Under footway slab and cavities
4. Extends up the kerb

### Rating Guidance Notes:

Take the joint gap shown on drawings at the stated temperature to site when rating

## Compression Joint Seal

JCOS

Element	Description	Units
JCOS	<p><b>Compression Joint Seal</b>                      This element defines only those deck joints filled with a pre-formed compression type seal.</p>	m of Joint

For each of the condition states, report the estimated quantity in linear metres.

### Condition state descriptions

Condition State	Description
1	The element shows minimal deterioration. Adhesion is sound with no signs of leakage. The adjacent deck and/or header is sound.
2	There may be small adhesion failures. The seal may show signs of abrasion or minor tearing. Minor spalls or cracking in the deck and/or headers may be present.
3	There may be moderate adhesion failures. The seal may show signs of abrasion or moderate tearing. Moderate spalls or cracking in the deck and/or headers may be present.
4	Significant adhesion failures may be prevalent with the seal possibly showing signs of failure from abrasion or tearing. The joint may be no longer operative. Significant spalls and/or cracking may be present in the deck and/or headers adjacent to the seal.

**Key Areas to inspect** for any cracking, corrosion and other deterioration signs:

1. Joint and surrounding roadway
2. Deck underside for water leakage
3. Under footway slab and cavities
4. Extends up the kerb

### Rating Guidance Notes:

Take the joint gap shown on drawings at the stated temperature to site when rating

## Assembly Joint/Seal

**JASS**

Element	Description	Units
<b>JASS</b>	<b>Assembly Joint/Seal</b> This element defines only those deck joints fitted with an assembly or stripseal mechanism such as a finger joint or modular bridge expansion joint that may or may not have a seal.	<b>m</b> of Joint

For each of the condition states, report the estimated quantity in linear metres.

### Condition state descriptions

### Condition state descriptions

Condition State	Description
1	The element shows minimal deterioration. The adjacent deck anchors are tight. There are no broken welds or fingers. There are no untoward noises upon impact. The adjacent deck is sound.
2	There may be minor weld cracking in non structural members. There are no untoward noises upon impact. The seal, if any, may show signs of abrasion or minor tearing. The adjacent deck shows no signs of anchors loosening. There may be minor spalling or cracking of the anchorage concrete. There may be minor misalignment of the fingers or transverse centre beams.
3	The seal, if any, may show signs of abrasion or tearing. Some anchorages may be loose. There may be significant spalling or cracking of the anchorage concrete. There may be misalignment of the fingers or transverse centre beams. There may be more noise from vehicle impact.
4	There may be weld cracking. The expansion joint/seal may not be functioning. The assembly may have broken loose because of anchorage failure. Deck may be spalling or severely cracked adjacent to the assembly. Broken fingers may be prevalent. Misaligned fingers or transverse centre beams. There may be very significant noise from vehicle impact.

**Key Areas to inspect** for any cracking, corrosion and other deterioration signs:

1. Joint and surrounding roadway
2. Deck underside for water leakage
3. Noise emanating from joint

### Rating Guidance Notes:

Take the joint gap shown on drawings at the stated temperature to site when rating

## Joint - No Seal

**JNOS**

Element	Description	Units
JNOS	<p><b>Joint - No Seal</b></p> <p>This element defines only those deck joints that are open and not sealed.</p>	m of Joint

For each of the condition states, report the estimated quantity in linear metres.

### Condition state descriptions

Condition State	Description
1	The element shows minimal deterioration. Joint protection, if present, is secure. The adjacent deck is sound.
2	There may be minor deck cracking but protection anchor is firm. There is no significant spalling of the deck adjacent to the joint. There may be corrosion on joint protection.
3	There may be medium deck cracking indicating anchor loosening. Spalling at joint edges or adjacent to protection may have begun. There is significant corrosion on joint protection. There may be debris blocking the joint. There may be loss of or excessive gap joint
4	Advanced corrosion causing section loss of joint protection. There may be large spalls at the joint edges or adjacent to protection. Protection anchors may be loose. The joint protection may be distorted. There may be debris blocking the joint. There may be loss of or excessive gap joint

**Key Areas to inspect** for any cracking, corrosion and other deterioration signs:

1. Joint and surrounding deck at wheel tracks
2. Noise from the joint under traffic

### Rating Guidance Notes:

Take the joint gap shown on drawings at the stated temperature to site when rating

## Elastomeric Bearing

**BELA**

Element	Description	Units
<b>BELA</b>	<b>Elastomeric Bearing</b> This element defines only those bearings that provide for rotation and/or longitudinal and/or transverse movement by means of elastomeric material and includes rubber strip bearing pads.	<b>ea</b> of bearing

For each of the condition states, report the estimated quantity in each.

### Condition state descriptions

Condition State	Description
1	The element shows minimal deterioration. Shear deformations are correct for existing temperatures.
2	Minor cracking, splitting or other deterioration may be present. Shear deformation may be slightly excessive. Minor misalignment or lateral movement may be present. Strength and/or serviceability are not affected. Dowels may be slightly corroded.
3	Significant cracking, splitting or bulging may be present. Moderate misalignment or lateral movement may be present. Dowels may be severely corroded.
4	Advanced deterioration. Shear deformations may be excessive. Top and bottom surfaces may not be parallel. Significant misalignment or lateral movement may be present. Loss of bearing function may be imminent. Dowels may be missing, distorted or severely corroded.

### Key Areas to inspect for any deterioration signs:

1. Bearing location in relation to support pads.
2. Condition of bearing and support pads.

### Rating Guidance Notes:

The bearing rating includes the rating of the bearing pads and any supporting headstock as well as any associated dowels.

Minor movement defined as still on bearing pad.

Moderate movement defined as starting to come off mortar pad.

Significant movement defined as already off the mortar pad.

## Metal Bearings

**BEXP, BFIX**

Element	Description	Units
<b>BEXP</b>	<b>Metal Expansion Bearing (Roller, sliding, etc)</b> This element defines only those metal bridge bearings that provide for rotation and longitudinal and/or transverse movement by means of metal roller, rocker or sliding mechanisms but not including pot bearings.	ea of bearing
<b>BFIX</b>	<b>Metal Fixed Bearing</b> This element defines only those metal bridge bearings that provide for rotation movement only but not including pot bearings.	ea of bearing

For each of the condition states, report the estimated quantity in each.

### Condition state descriptions

Condition State	Description
1	The element shows minimal deterioration. If a protective coating system is present, it is sound and functioning as intended to protect the metal. Vertical and horizontal alignment is within limits. Bearing support member is sound. Any lubrication system is functioning properly.
2	There may be some surface corrosion with no pitting. Debris buildup is affecting bearing movement. Bearing alignment is still tolerable. The lubrication system, if any, may have failed.
3	There may be some corrosion with minor pitting. The assemblies may have moved enough to cause minor cracking or spalling in the supporting concrete. Debris buildup is affecting bearing movement. Bearing alignment is at or near limits.
4	Corrosion is advanced. There may be loss of section of the supporting member sufficient to warrant supplemental supports or load restrictions. Bearing alignment may be beyond tolerable limits. Shear keys may have failed. The bearing assembly may have frozen

**Key Areas to inspect** for any deterioration signs:

1. Bearing location in relation to support pads
2. Condition of bearing and support pads

### Rating Guidance Notes:

The bearing rating includes the rating of the bearing pads and any supporting headstock as well as any associated dowels

Minor movement defined as still on bearing pad

Moderate movement defined as starting to come off mortar pad

Significant movement defined as already off the mortar pad.

## Enclosed/Concealed Bearings

**BENC**

Element	Description	Units
<b>BENC</b>	<b>Enclosed/Concealed Bearings</b> The element defines only those bridge bearings that are enclosed so they are not open for detailed inspection. This includes pot bearings but does not hidden elastomeric or other type of bearings	ea of bearing

For each of the condition states, report the estimated quantity in each.

### Condition state descriptions

Condition State	Description
1	The element shows no deterioration. There are no vertical or horizontal offsets. There is no cracking of support members. The support member is stable under traffic.
2	Both vertical and horizontal offsets are within the capability of the bearings and are not yet significant. The supported member may exhibit minimal vertical movement under traffic. There may be minor cracking or spalling of support members. There may be insignificant reduction of bearing due to superstructure shortening.
3	There may be minor leakage of rubber. There may be significant spalling or cracking of the support members. There may be significant reduction of bearing due to superstructure shortening.
4	There may be considerable leakage of rubber. Vertical and/or horizontal offsets are significant indicating bearing failures. There may be significant vertical movement under traffic. Support members may have failed.

**Key Areas to inspect** for any deterioration signs:

1. Bearing location in relation to support pads
2. Condition of bearing and support pads
3. Close inspection for extrusion of elastomer

### Rating Guidance Notes:

The potential for catastrophic failure due to reduction of bearing capacity because of prestress shortening should be considered when rating this element.

The bearing rating includes the rating of the bearing pads and any supporting headstock as well as any associated dowels

Minor movement defined as still on bearing pad

Moderate movement defined as starting to come off mortar pad

Significant movement defined as already off the mortar pad.

## Metal Bridge Railing

**RMET**

Element	Description	Units
RMET	<p><b>Metal Bridge Railing</b></p> <p>This element defines all types and shapes of metal bridge railing. Steel or aluminium hollow sections, rolled shapes, etc may all be part of this element. All components of the railing must be metal. It may or may not be painted or galvanised. Any concrete end posts are rated under RCON.</p>	m of railing

For each of the condition states, report the estimated quantity in linear metres.

### Condition state descriptions

Condition State	Description
1	There is little or no corrosion.
2	There may be minor surface corrosion or deformation of rail/posts or nicks.
3	Any section loss is minor and does not affect the strength or serviceability of the element. There may be accident damage such as tearing or moderate deformation or the rail/posts. There may be minor cracking of the welds. Bolts may be loose.
4	<p>Section loss is sufficient to warrant analysis to ascertain the impact on the ultimate strength and/or serviceability of the element.</p> <p>There may be significant impact damage with sections missing, heavily deformed or torn from supports. There may be significant cracking of the welds. Bolts may be missing.</p>

### Key Areas to inspect:

1. Joining pins
2. Post bases.
3. Welds

### Rating Guidance Notes:

## Concrete Bridge Railing/End Posts

**RCON**

Element	Description	Units
<b>RCON</b>	<b>Concrete Bridge Railing/End Posts</b> This element defines all types and shapes of reinforced concrete bridge railing and/or end posts. All elements of the railing must be concrete.	<b>m</b> of railing and/or end posts

For each of the condition states, report the estimated quantity in lineal metres.

### Condition state descriptions

Condition State	Description
1	The element shows no deterioration. There may be discolouration, efflorescence, and/or superficial cracking but without effect on strength and/or serviceability. There may be minor vehicle marks or scores.
2	Minor cracks, gouges or spalls may be present but there is no exposed reinforcement or surface evidence of corrosion of reinforcement.
3	Some delaminations and/or spalls and/or deformations may be present and some reinforcement may be exposed. Corrosion of reinforcement may be present but loss of section is minor and does not significantly affect the strength and/or serviceability of the element. There is no rotation of the end posts.
4	Advanced deterioration. Corrosion of reinforcement and/or loss of concrete section is sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of the element. Rail or posts may be impacted from their original position. End posts may show signs of significant impact or rotation.

### Key Areas to inspect:

1. Alignment and level of end posts and/or rail and posts
- 2.

### Rating Guidance Notes:

## Combined Bridge Railing

**RCMB**

Element	Description	Units
<b>RCMB</b>	<p><b>Combined Bridge Railing</b></p> <p>This element defines only specific combined concrete and metal traffic barriers, namely, full or part Type F concrete barriers with one or more metal rails on top. Metal components may or may not be painted or galvanised. This includes any concrete end post transitions to the approach barriers.</p>	m of railing and/or end posts

For each of the condition states, report the estimated quantity in lineal metres.

### Condition state descriptions

Condition State	Description
1	<p>There is little or no corrosion of metal.</p> <p>The concrete shows no deterioration. There may be discolouration, efflorescence, and/or superficial cracking but without effect on strength and/or serviceability. There may be minor vehicle marks or scores.</p>
2	<p>There may be minor surface corrosion or deformation of metal rail/posts or nicks.</p> <p>Minor cracks, gouges or spalls may be present in concrete but there is no exposed reinforcement or surface evidence of corrosion of reinforcement.</p>
3	<p>Any section loss of metal is minor and does not affect the strength or serviceability of the element. There may be accident damage such as tearing or moderate deformation of the rail/posts. There may be minor cracking of the welds, especially at the bases. Bolts may be loose.</p> <p>Some delaminations and/or spalls and/or deformations may be present in concrete and some reinforcement may be exposed. Corrosion of reinforcement may be present but loss of section is minor and does not significantly affect the strength and/or serviceability of the element. There is no rotation of the ends due to impact.</p>
4	<p>Section loss in metal railing is sufficient to warrant analysis to ascertain the impact on the ultimate strength and/or serviceability of the element. There may be significant impact damage with sections missing, heavily deformed or torn from supports. There may be significant cracking of the welds. Bolts may be missing.</p> <p>Advanced deterioration of concrete. Corrosion of reinforcement and/or loss of concrete section is sufficient to warrant analysis. Ends may show signs of significant impact or rotation.</p>

### Key Areas to inspect:

1. Metal welds
2. Post bases for cracked welds or loose/missing bolts
3. Alignment and level of end posts and/or rail and posts

### Rating Guidance Notes:

## Timber Bridge Railing

**RTIM**

Element	Description	Units
<b>RTIM</b>	<b>Timber Bridge Railing</b> This element defines all types and shapes of timber railing and includes timber kerb. All elements of the railing (except connectors) must be timber.	<b>m</b> of railing

For each of the condition states, report the estimated quantity in lineal metres.

### Condition state descriptions

Condition State	Description
1	The timber is in good condition with no evidence of decay. There may be cracks, splits and checks having no effect on strength or serviceability. There may be minor vehicle marks or scores.
2	Minor decay, insect infestation, splitting, cracking, checking or crushing may exist but none is sufficiently advanced to affect serviceability. There may be vehicle impact damage or scores.
3	Medium decay, insect infestation, splitting, cracking or crushing has produced loss of strength of the element but not of a sufficient magnitude to affect the serviceability. Rail or posts may be deflected from their original position.
4	Advanced deterioration. Decay, insect infestation, splits, cracks or crushing has produced loss of strength that may affect the serviceability of the element. Rail or posts may be broken or dislodged or deflected from their original position.

### Key Areas to inspect:

### Rating Guidance Notes:

## Miscellaneous Bridge Railing

**RMIS**

Element	Description	Units
<b>RMIS</b>	<p><b>Miscellaneous Bridge Railing</b>                      This element defines all types and shapes of railing except those already defined as metal, concrete, or timber. This element will include combinations of timber, concrete and metal, etc. Metal components may or may not be painted or galvanised. Note that concrete end posts are handled under RCON.</p>	<b>m</b> of railing

For each of the condition states, report the estimated quantity in lineal metres.

### Condition state descriptions

Condition State	Description
1	The element shows no deterioration. There may be minor cracking, corrosion and/or other minor deterioration including evidence of vehicle impact having no effect on strength or serviceability.
2	Minor cracking, gouging, spalls, decay of timber portions or corrosion of metal may be present. Reinforcement may be exposed but with no corrosion. Strength and/or serviceability are not affected.
3	Cracking, spalls, decay of timber portions or corrosion of metal may be present. There may be member deformation. Reinforcement may be exposed with some corrosion. Defects have produced a loss of strength of the element but not of a sufficient magnitude to affect the serviceability. There may be moderate distortion from vehicle impact.
4	Advanced deterioration. Corrosion, decay or loss of section is sufficient to warrant analysis to ascertain the impact on the serviceability or strength of the element. Rail or posts may be severely impacted from their original position.

### Key Areas to inspect:

1. Rail alignment and level.

### Rating Guidance Notes:

## Railing – Paint work

**RPNT**

Element	Description	Units
RPNT	<p><b>Railing Paint work</b></p> <p>This element defines only the paint work on bridge railings.</p>	m of railing

For each of condition states 1 to 4, report the estimated lineal metres of railing.

### Condition state descriptions

Condition state	Description
1	The paint work is sound and functioning as intended to protect the metal or timber and to improve the visibility of bridge railings.
2	The paint work may be chalking, peeling, checking or showing other early evidence of distress but there is no exposure of timber or metal or concrete.
3	The paint work is no longer effective on significant areas. There may be exposed timber or metal or concrete..
4	The paint work has failed.

### Key Areas to inspect:

1. Edges of members
2. Connections
3. Splice Plates

## Miscellaneous Structures & Batter Protection

**MMAS, MBAT**

Element	Description	Units
<b>MMAS</b>	<b>Masonry, Brick and Reinforced Earth</b> This element defines only those abutments, piers and arches constructed of masonry, brick or reinforced earth.	m <sup>2</sup> of exposed surface area
<b>MBAT</b>	<b>Batter Protection</b> This element defines only batter protection constructed of masonry, brick, stone filled gabions or mattresses, rubble, sand bags, concrete filled fabric mattress, or sprayed concrete.	m <sup>2</sup> of exposed surface area

For each of the condition states, report the estimated quantity in square metres of exposed surface area.

### Condition state descriptions

Condition State	Description
1	There is little or no vertical (differential) settlement, lateral or rotational movement, scour or failure of the construction material.
2	There may be vertical (differential) settlement, lateral or rotational movement, voids, scour or failure of the construction material but the strength and/or serviceability of either the element or the bridge are not significantly affected.
3	There may be vertical (differential) settlement, lateral or rotational movement, voids, scour or failure of the construction material to produce a loss of strength of the element but not of a sufficient magnitude to affect the serviceability of either the element or the bridge.
4	Vertical (differential) settlement, lateral or rotational movement, voids, scour, or failure of the construction material has occurred. There is sufficient concern to warrant an analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

### Key Areas to inspect for any deterioration signs:

1. Areas with the potential to be undermined due to scour
2. Protection adjacent to other members

### Rating Guidance Notes:

## Wearing Surface

**MWES**

Element	Description	Units
<b>MWES</b>	<b>Wearing Surface</b> This element defines only flush seal or asphaltic concrete (AC) wearing surface on bridge deck.	m <sup>2</sup> of surface area

For each of the condition states, report the estimated quantity in square metres of surface area.

### Condition state descriptions

Condition State	Description
1	The wearing surface on the deck has no repaired or cracked, shoved or stripped areas.
2	There are repaired and/or localised shoved or potholed areas of the wearing surface on the deck less than 0.5 m wide and/or 50mm deep. There may be some areas of cracking or stripping across bridge.
3	There may be repaired and/or shoved or potholed areas of the wearing surface on the deck greater than 0.5 m wide and/or 50mm deep. There may be large areas of cracking or some areas of stripping across entire bridge.
4	The wearing surface has failed. There may be large areas of shoved AC or potholes. Extensive cracking may be present with delamination of sections of wearing surface. There may be large areas of stripping across the bridge.

**Key Areas to inspect** for any deterioration signs:

1. Surface profile
2. Cracking with moist surface or viewed with the light in front.

**Rating Guidance Notes:**

## Approach Slab and Carriageway

**MAPP**

Element	Description	Units
<b>MAPP</b>	<b>Approach Carriageway</b> This element defines only the carriageway pavement immediately behind the bridge abutments or the approach slab up to 6m from the abutment.	<b>No.</b> of approach carriageways

For each of the condition states, report the number of approach carriageways.

### Condition state descriptions

Condition State	Description
1	There is a smooth transition between the carriageway pavement or the approach slab and the bridge deck. The carriageway pavement or approach slab is smooth, free of potholes and properly sloped for drainage. The expansion joint between the concrete approach slab and the abutment is functioning
2	There may be vertical settlement or deformations in the carriageway pavement or approach slab behind the abutment(s), less than 20 mm within 1m of the bridge. There may be a few potholes.
3	There may be vertical settlement or deformations in the carriageway pavement or approach slab behind the abutment(s), less than 40 mm within 1m of the bridge. The carriageway pavement or approach slab behind the abutment(s), may be cracking or showing signs of failure. The expansion joint between the concrete approach slab and the abutment may be not functioning. There may be moderate level of potholes.
4	There may be vertical settlement or deformations in the carriageway pavement or approach slab behind the abutment(s), more than 40 mm within 1m of the bridge, or the pavement or approach slab may be showing significant failure. The carriageway pavement or approach slab may have migrated toward the bridge damaging the abutment and/or the expansion joints in the bridge deck are not functioning. There may be large number of potholes. There may be adverse drainage causing ponding or scour.

**Key Areas to inspect** for any deterioration signs:

1. Profile
2. Drainage of the pavement

**Rating Guidance Notes:**

## Waterway

**MWWY**

Element	Description	Units
<b>MWWY</b>	<b>Waterway</b> This element defines only waterways at bridges or bridge size culverts.	<b>Item</b>

Report the waterway in the worst condition state that exists at the bridge.

### Condition state descriptions

Condition State	Description
1	There is little or no change in the location, shape or level of the channel from the natural or formed channel.
2	Sedimentation, vegetation or debris in the channel bed has reduced the waterway through the structure. Minor scour has occurred but it does not threaten to undermine footing(s) or culvert invert slabs or expose piles at pier(s) or abutment(s) or erode the embankment(s).
3	General or local scour or lateral erosion has the potential to undermine the footing(s) or culvert invert slabs or expose the piles at pier(s) or abutment(s) or has caused disturbance of embankment material. The waterway area may be partly blocked by debris. Sedimentation may have blocked more than 20% and less than 25% of waterway area.
4	General or local scour or lateral erosion has undermined the footing(s) or culvert invert slabs or has caused loss of embankment material or embankment protection material. Sedimentation may have blocked more than 25% of waterway area.

### Key Areas to inspect for any deterioration signs:

1. Downstream and upstream excavations or changes in the river for potential impact at the bridge
2. Scour holes near the bridge

### Rating Guidance Notes:

In natural waterways, growth of grasses and reeds in the waterway is generally a normal phenomenon and is acceptable under condition 1.

## Stormwater System

**MSWS**

Element	Description	Units
<b>MSWS</b>	<b>Stormwater System</b> This element defines only the scuppers and stormwater systems of bridges.	<b>Each span</b>

Report the stormwater system in the worst condition state that exists at the bridge.

### Condition state descriptions

Condition State	Description
1	Scuppers and stormwater system clear. Drainage system fully functional.
2	Some scuppers are blocked or partly blocked but drainage of deck is satisfactory. Drainage system is functional possibly with some minor leaky joints and/or some brackets may be broken.
3	Drainage pipes may have broken sections and/or large number of leaks. Scuppers / grates may be damaged. There may be large number of scuppers blocked affecting drainage of the deck. There may be some loose or missing hangers.
4	Blocked scuppers prevent or threaten to prevent satisfactory drainage of deck. Drainage system may be blocked or damaged and not functioning satisfactorily. There may be many loose or missing hangers.

**Key Areas to inspect** for any deterioration signs:

1. Inspect system from scuppers to outlet/s
2. Connections or hangers to bridge

### Rating Guidance Notes:

The stormwater system rated is only the stormwater components on the bridge.

## Safety Screen

**MSCR**

Element	Description	Units
<b>MSCR</b>	<b>Safety Screen</b> This element defines only the safety screen attachment on bridges.	m of safety screen.

For each of the condition states, report the estimated quantity in lineal metre of the attachment.

### Condition state descriptions

Condition State	Description
1	The safety screen is in good condition. There is little or no evidence of corrosion. The protective coating, if any, may be chalking, peeling, checking or showing other early evidence of distress but there is no exposure of metal.  The structural connections fixing the safety screen to the bridge are in good condition.
2	Surface or freckled rust has formed or is forming. The protective coating, if any, is no longer effective and there may be exposed metal but there is no loss of section.  The structural connections fixing the attachment to the bridge are good condition.
3	Surface pitting may be present but any section loss is minor and does not affect the strength or serviceability of the element.  The structural connections fixing the attachment to the bridge are in good condition.
4	Corrosion is advanced. Section loss is sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of the element.  There is doubt about the integrity of the connection(s). There may be advanced corrosion or cracking of the connectors and/or the supporting bridge element.

**Key Areas to inspect** for any deterioration signs:

1. The connections of the safety screen to the supporting bridge element.
2. Welds, especially at the base connectors

**Rating Guidance Notes:**

## Miscellaneous Attachments

**MATT**

Element	Description	Units
<b>MATT</b>	<p><b>Miscellaneous Attachments</b></p> <p>This element defines only the significant attachments on bridges such as major signs including advertising panels, architectural panels, noise walls, light poles, and any permanent fixtures such as ladders, gantries and access ways <b>intended for authorised personnel only</b>. It does not include power, telecommunications, water or similar service attachments of external ownership or permanent fixtures intended for public use.</p>	Item.

For each of the condition states, report the estimated quantity in lineal metre of the attachment.

### Condition state descriptions

Condition State	Description
1	<p>The attachment is in good condition. There is little or no evidence of corrosion or deterioration. The protective coating, if any, may be chalking, peeling, checking or showing other early evidence of distress but there is no exposure of metal.</p> <p>The structural connections fixing the attachment to the bridge are in good condition. Ladders, gantries or access ways are in good condition.</p>
2	<p><b>Metal:</b> Surface or freckled rust has formed or is forming. The protective coating, if any, is no longer effective and there may be exposed metal but there is no loss of section.</p> <p><b>Concrete:</b> Minor cracks or spalls. No exposed reinforcement or surface evidence of corrosion of reinforcement.</p> <p>The structural connections fixing the attachment to the bridge are good condition. Ladders, gantries or access ways have minor defects but are safe to use.</p>
3	<p><b>Metal:</b> Surface pitting may be present but any section loss is minor.</p> <p><b>Concrete:</b> Some delamination or corrosion of reinforcement may be present. Any section loss or deterioration does not affect the strength or serviceability of the element.</p> <p>The structural connections fixing the attachment to the bridge are in good condition. Ladders, gantries or access ways have moderate defects and there is doubt about adequacy of them for intended purpose.</p>
4	<p><b>Metal:</b> Corrosion is advanced. Section loss is significant.</p> <p><b>Concrete:</b> Advanced deterioration or corrosion of reinforcement. Deterioration of concrete or section loss of metal is sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of the element. There is doubt about the integrity of the connection(s). There may be advanced corrosion or cracking of the connectors and/or the supporting bridge element. Ladders, gantries or access ways have significant defects and are unsafe to use.</p>

**Key Areas to inspect** for any deterioration signs:

1. The connections of the attachment to the supporting bridge element.
2. Base plates of light poles.
3. Welds

### Rating Guidance Notes:

If third party attachments are in poor condition, the matter should be referred to the BMP.

When multiple attachments are affected, the defects shall be recorded under inspector's comments identifying the affected attachments.

## General Cleaning

**MGCL**

Element	Description	Units
<b>MGCL</b>	<b>General Cleaning</b> This element defines only the cleanliness of bridges.	<b>each</b> (span, including substructure)

For each of the condition states, report the number of spans on which the feasible actions are required.

### Condition state descriptions

Condition State	Description
1	No buildup of dirt or vegetation. No Graffiti.
2	There is a minor buildup of dirt or vegetation, but it does not affect joint or bearing or drainage movement. Graffiti is not of concern.
3	There is a moderate buildup of dirt or vegetation which threatens to affect joint or bearing or drainage movement. Drainage of deck is just adequate. Graffiti is of some concern. Overgrowth of vegetation threatening to cover bridge elements and road safety signs on the bridge and its immediate vicinity.
4	There is a significant buildup of dirt or vegetation which affects or threatens to affect joint or bearing or drainage movement. Graffiti is of concern. Overgrowth of vegetation covering bridge elements and road safety signs on the bridge and its immediate vicinity.

**Key Areas to inspect** for any deterioration signs:

- 1.
- 2.

**Rating Guidance Notes:**



Transport  
Roads & Maritime  
Services

# BRIDGE INSPECTION PROCEDURE MANUAL

## Element Sketches

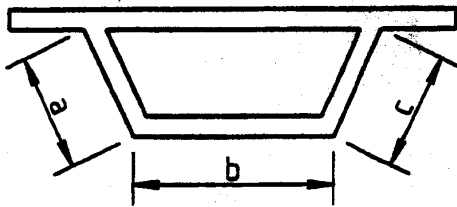
# **Element Sketches**

Sketch No. 1

**CONCRETE - POST-TENSIONED  
CAST-IN-PLACE OR PRECAST-BOX GIRDER/GIRDER/SLAB**

**CPOG**

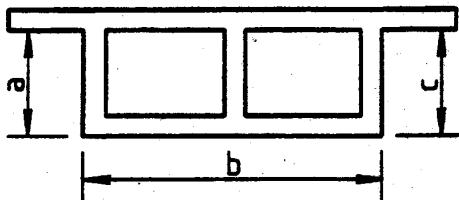
Box Girder



$$p = a + b + c$$

$$A = p \cdot l$$

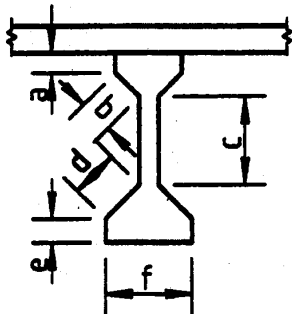
Box Girder



$$p = a + b + c$$

$$A = p \cdot l$$

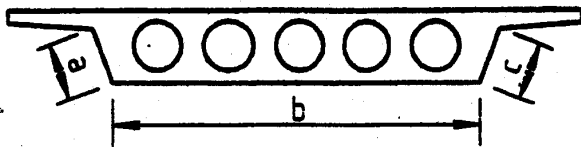
Girder



$$p = (a + b + c + d + e) \cdot 2 + f$$

$$A = p \cdot l$$

Voided Slab



$$p = a + b + c$$

$$A = p \cdot l$$

For Notes see Sketch No.2

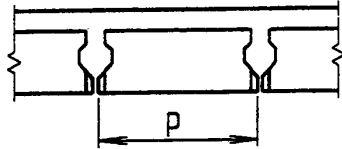
Sketch No.1

### Sketch No. 2

**CONCRETE - POST-TENSIONED  
 PRECAST-PLANK/UNIT/I-GIRDER/TROUGH GIRDER/  
 BROAD FLANGE GIRDER**

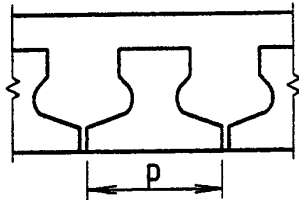
CPRG

Plank



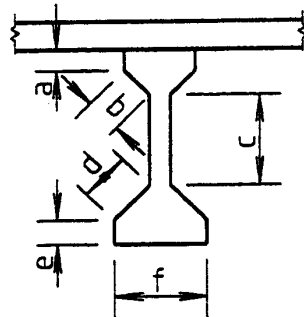
$$A = p \cdot l$$

Unit



$$A = p \cdot l$$

I-Girder



$$p = (a + b + c + d + e) \cdot 2 + f$$

$$A = p \cdot l$$

**Notes:**

$p$  = exposed external perimeter of girder.

$l$  = exposed length of girder; where the depth of the girder varies, the calculation should be adjusted to give correct area.

$A$  = exposed external surface area of girder.

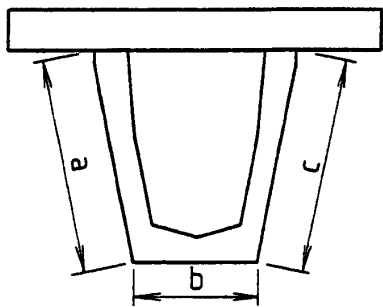
Sketch No.2

### Sketch No. 3

CONCRETE – POST-TENSIONED  
PRECAST-PLANK/UNIT/I-GIRDER/TROUGH GIRDER/  
BROAD FLANGE GIRDER

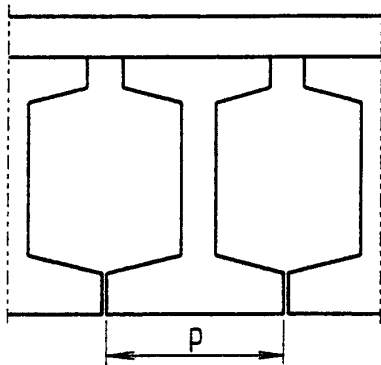
CPRG

Trough Girder



$$p = a + b + c$$
$$A = p \cdot l$$

Broad Flange Girder



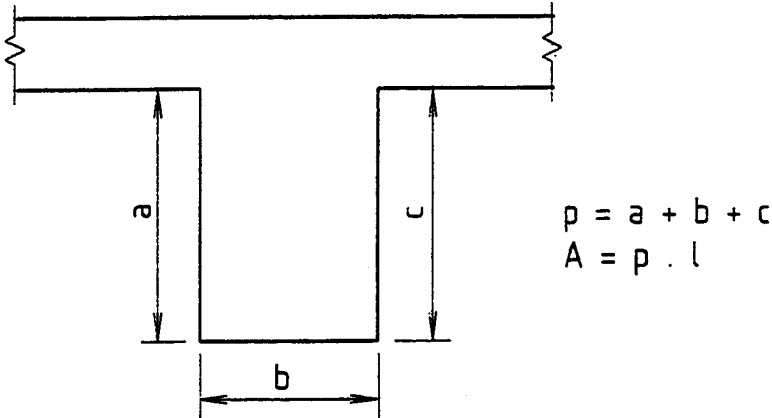
$$A = p \cdot l$$

Sketch No.3

### Sketch No. 4

CONCRETE-REINFORCED  
CAST-IN-PLACE BEAM/GIRDER /BOX GIRDER/ARCH

CRBM

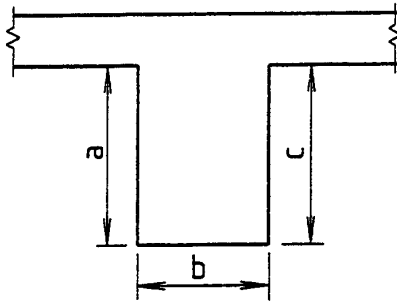


Sketch No.4

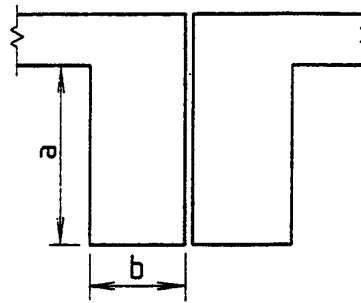
### Sketch No. 5

CONCRETE – REINFORCED/PRESTRESSED  
CROSS GIRDER/DIAPHRAGM

CCGD



$$p = a + b + c$$
$$A = p \cdot l$$



$$p = a + b$$
$$A = p \cdot l$$

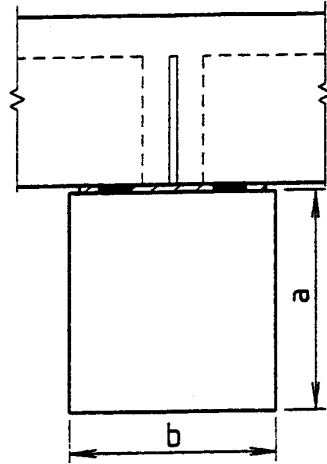
Sketch No.5

**Sketch No. 6**

**CONCRETE – REINFORCED/PRESTRESSED  
PIER HEADSTOCK (NON-INTEGRAL WITH SUPERSTRUCTURE)**

**CPHS**

Plank or Unit Deck

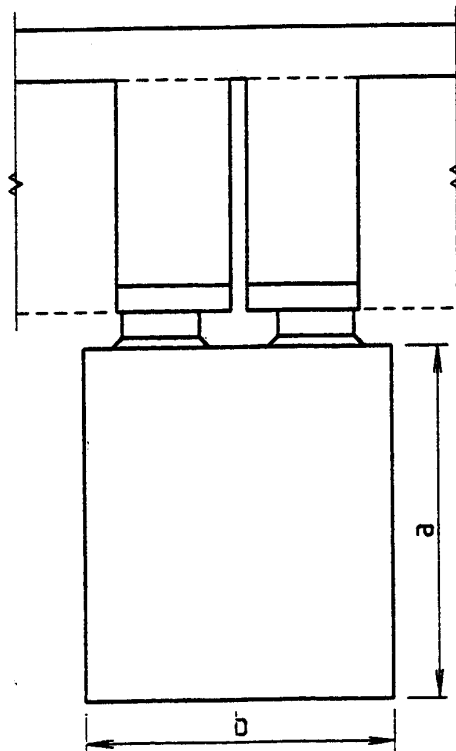


$$p = 2a + b$$

$$A = p \cdot l$$

- + areas of end faces of headstocks
- cross section areas of pier walls, columns or piles

Girder Deck



$$p = 2(a + b)$$

$$A = p \cdot l$$

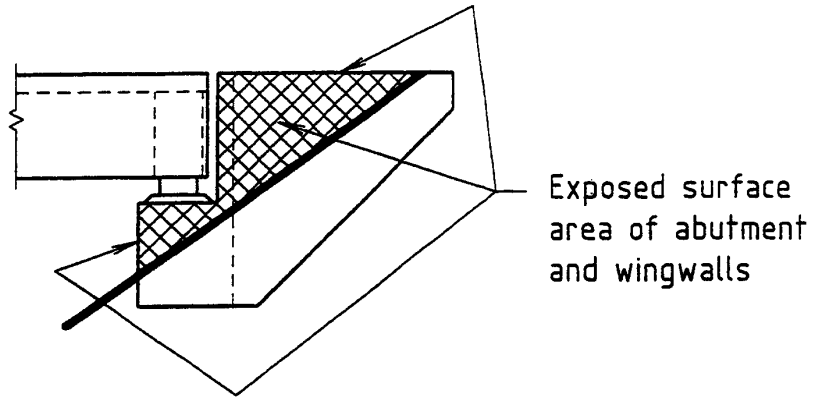
- + areas of end faces of headstocks
- cross section areas of pier walls, columns or piles

Sketch No.6

### Sketch No. 7

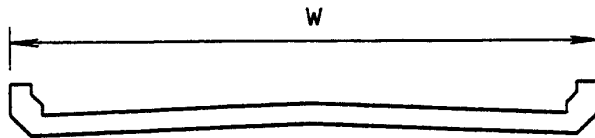
**CONCRETE – REINFORCED/PRESTRESSED  
PIER HEADSTOCK (NON-INTEGRAL WITH SUPERSTRUCTURE)**

CABW



**CONCRETE – REINFORCED/PRESTRESSED  
DECK SLAB (INCLUDING CONCRETE OVERLAY/KERB/PARAPET)**

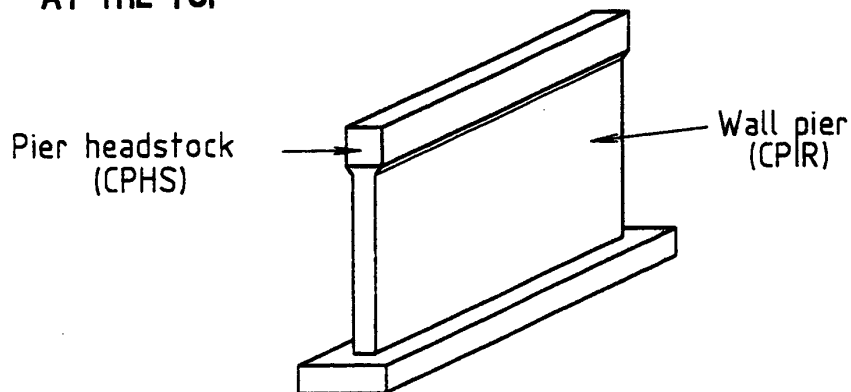
CDSL



$$A = w \cdot l$$

**REINFORCED CONCRETE WALL PIER WITH PROJECTION  
AT THE TOP**

CPIR  
CPHS

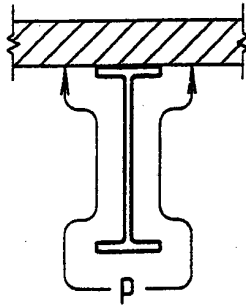


Sketch No.7

### Sketch No. 8

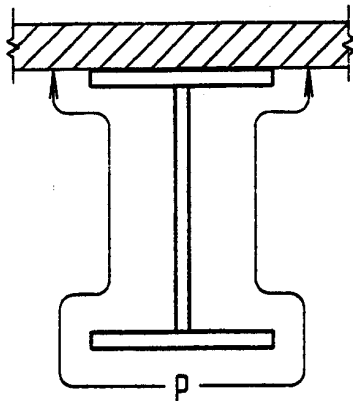
**STEEL-**  
**ROLLED BEAM/FABRICATED I-GIRDER/TROUGH GIRDER/BOX GIRDER,**  
**INCLUDING STRINGERS AND CROSS GIRDERS (LOAD BEARING)**  
**WITH LEAD BASE PAINT, e.g. RED LEAD OR CALCIUM PLUMBATE PRIMER**  
**WITH PROTECTIVE COATING OTHER THAN LEAD BASED PAINT**

**LBGI**  
**SBGI**



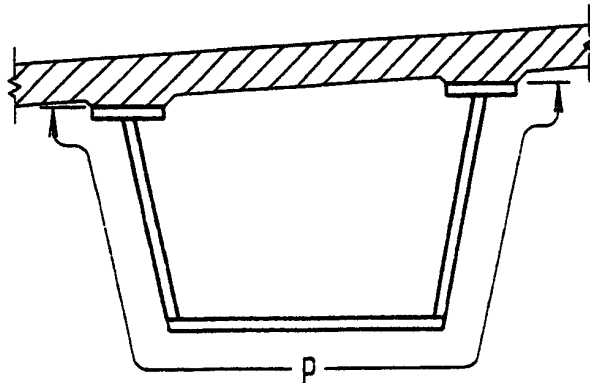
Rolled Beam

$$A = p \cdot l$$



Fabricated I-Girder

$$A = p \cdot l$$



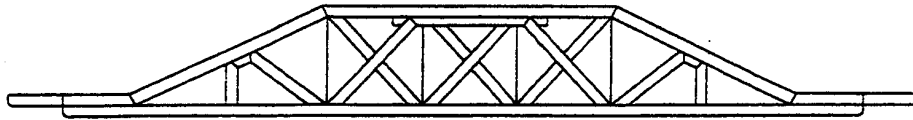
Trough Girder

$$A = p \cdot l$$

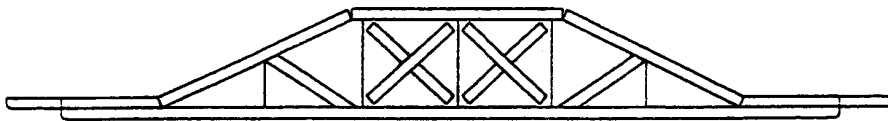
Sketch No.8

### Sketch No. 9

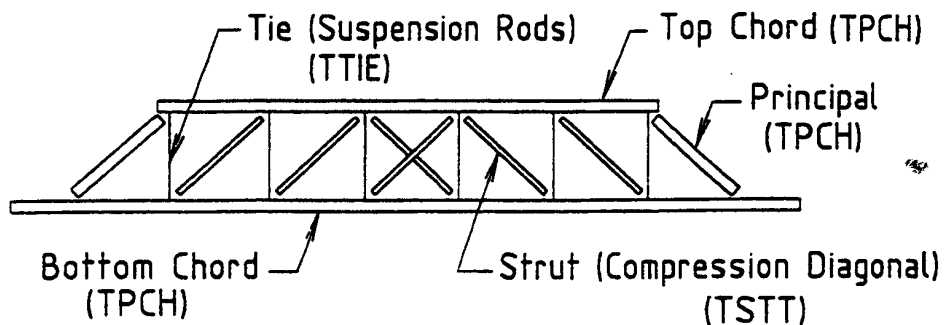
#### OUTLINES OF TIMBER TRUSS TYPES (1) Constructed between 1860 and 1936



OLD PUBLIC WORKS DEPARTMENT TYPE, 1860 - 1886



Mc DONALD, 1886 - 1893



ALLAN, 1893 - 1929

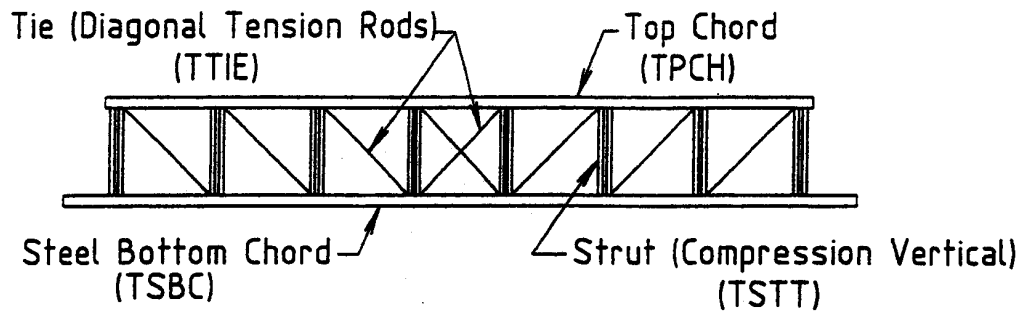
TPCH  
TTIE  
TSTT

Sketch No.9

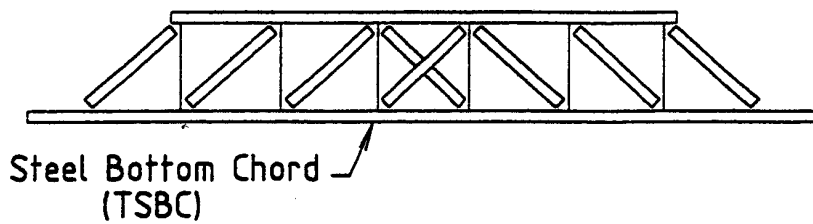
Sketch No. 10

OUTLINES OF TIMBER TRUSS TYPES (2)

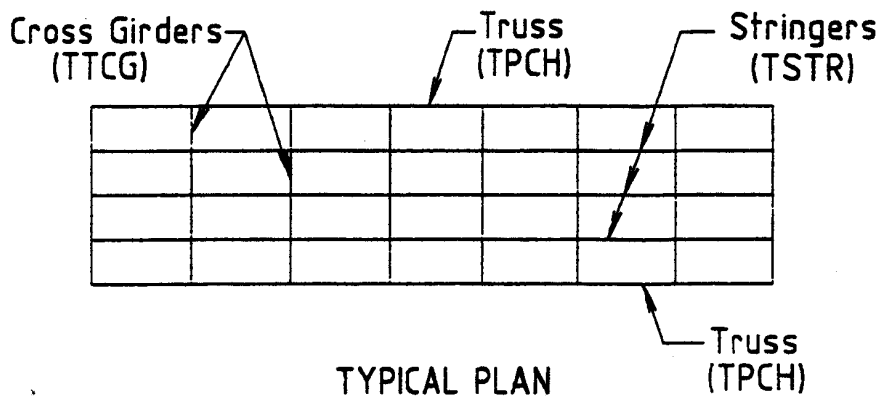
Constructed between 1860 and 1936



DE-BURGH, 1899 - 1905



DARE, 1903 - 1936



TYPICAL PLAN

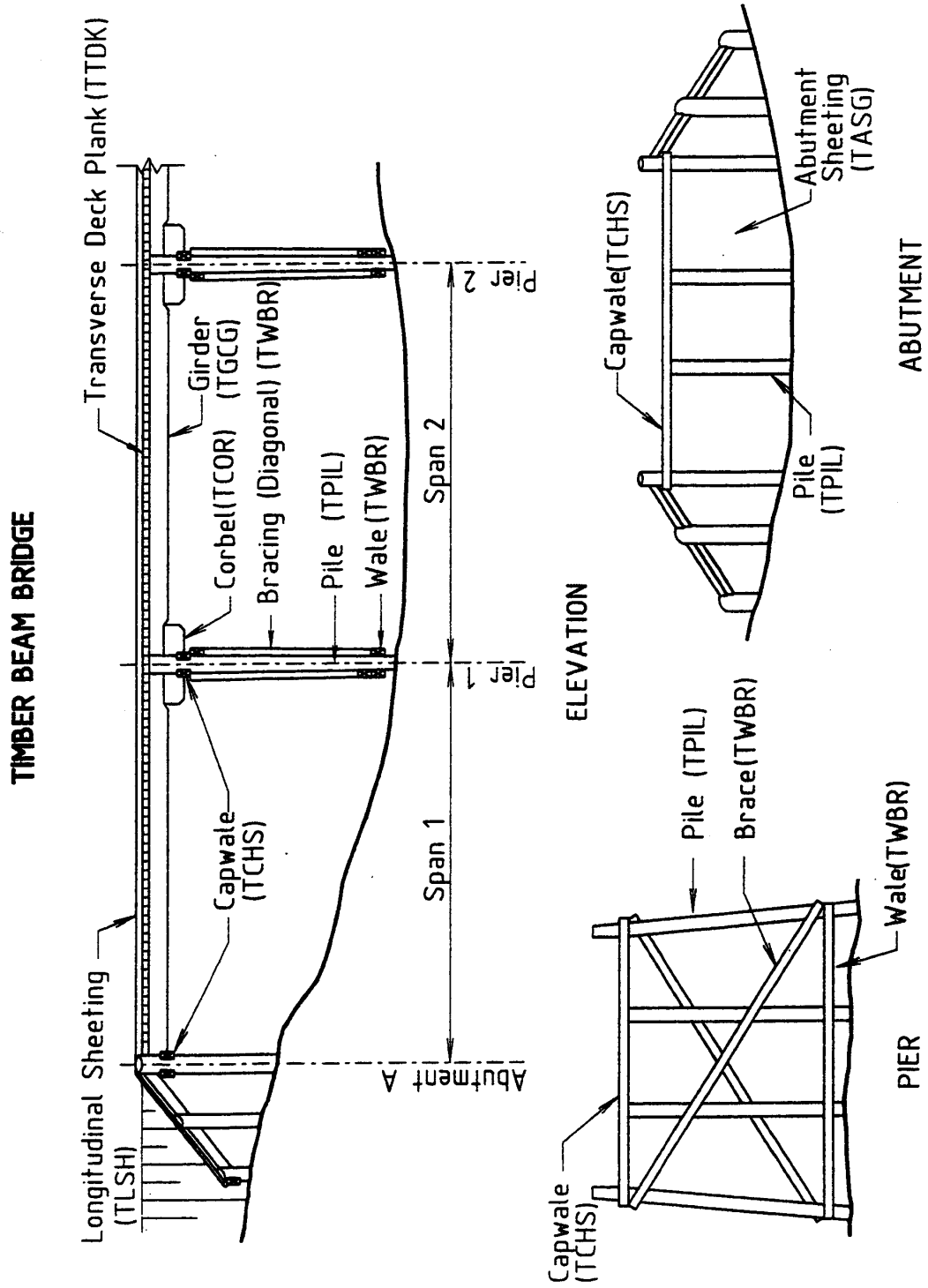
Sketch No.10

TPCH  
TTIE  
TSTT  
TS

TSBC

TPCH  
TSTR  
TTCG

Sketch No. 11



TCHS  
TASG  
TPIL

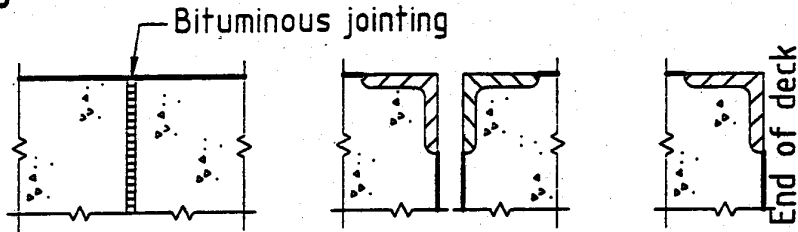
TLSH  
TTDK  
TGCG  
TCOR  
TCHS  
TWBR  
TPIL

TCHS  
TPIL  
TWBR

Sketch No.11

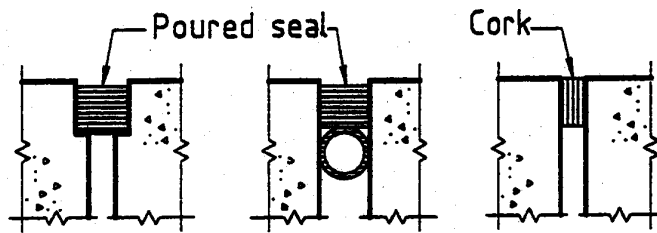
Sketch No. 12

JOINTS



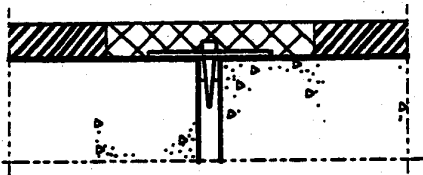
JOINT - NO SEAL

JNOS



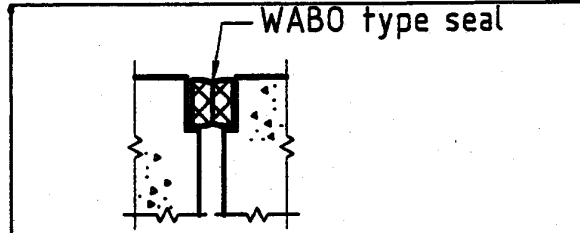
POURABLE/CORK JOINT SEAL

JPOS



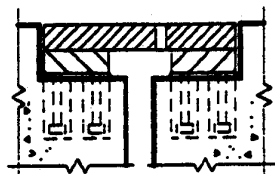
Polymer modified rubberised bitumen jointing, such as Thorma joint

JPOS

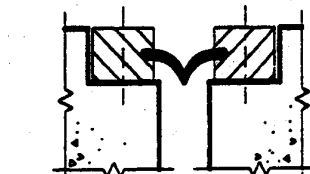


COMPRESSION JOINT SEAL

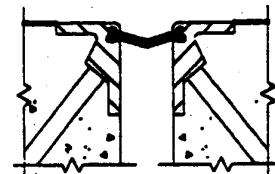
JCOS



Finger plates, and sliding plates



Proprietary joints bolted down, such as Felspan, Transflex, etc.



Strip seal (WABO-MAURER)

ASSEMBLY JOINT SEAL

JASS

Sketch No.12



Transport  
Roads & Maritime  
Services

# BRIDGE INSPECTION PROCEDURE MANUAL

## Photographs



Transport  
Roads & Maritime  
Services

# BRIDGE INSPECTION PROCEDURE MANUAL

## Concrete Elements

# **Prestressed Concrete Girders**

## Prestressed Concrete Girders

## CPOG, CPRG

Element	Description	Units
<b>CPOG</b>	<b>Concrete - Post-tensioned, Cast-in-place or Precast-Box Girder/Girder/Slab</b> This element defines only those box girders/girders/slabs constructed of cast-in-place or precast, post-tensioned concrete.	m <sup>2</sup> of exposed surface area of element
<b>CPRG</b>	<b>Trough Girder/Broad Flange Girder</b> This element defines only those planks/units/l girders/trough girders/broad flange girders constructed of precast, pre-tensioned concrete.	m <sup>2</sup> of exposed surface area of element

For each of condition states, report the estimated surface area in square metres.

Condition state	Description
1	The element shows no deterioration. There may be discolouration, efflorescence, and/or superficial cracking..
2	Minor cracks and spalls may be present but there is no evidence of corrosion of the non-prestressed reinforcement or deterioration of the prestress system.
3	Some delaminations, significant cracks or spalls may be present. There is no evidence of deterioration of the prestress system. Corrosion of non-prestressed reinforcement may be present but loss of section is minor. There is not sufficient concern to warrant an analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.
4	Delaminations or spalls or cracks or corrosion of non-prestressed reinforcement are prevalent. There may also be exposure and deterioration of the prestress system (manifested by loss of bond, broken strands or wire, corrosion or failed anchorages, etc). There is sufficient concern to warrant an analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

**Key Areas to inspect** for any crack, spall, leaching, signs of corrosion etc:

1. Anchorage Zone
2. Shear zones near supports (likely diagonal cracks)
3. Midspan of girders (likely vertical cracks)
4. Longitudinal cracks along member

### Rating Guidance Notes:

For Level 2 inspection of these elements, all diagonal cracks near supports shall be considered as significant distress that could affect the strength or serviceability of the element. The cracked area shall be rated as condition 4 even if there are no signs of corrosion or loss of section.

These cracks must be brought to the attention of Bridge Maintenance Planner for further review.

## Prestressed Concrete Girders

CPOG, CPRG

### Condition State 1

The element shows no deterioration. There may be discoloration, efflorescence, and/or superficial cracking.



Prestressed girders in good condition

## Prestressed Concrete Girders

CPOG, CPRG

### Condition State 2

Minor cracks and spalls may be present but there is no evidence of corrosion of the non-prestressed reinforcement or deterioration of the prestress system.



Minor spall in the prestressed girder bottom flange. No exposed reinforcement or prestressing strand.



Short cracks and leaching on the soffit of prestressed trough girder

## Prestressed Concrete Girders

CPOG, CPRG

### Condition State 3

Some delaminations, significant cracks or spalls may be present. There is no evidence of deterioration of the prestress system. Corrosion of non-prestressed reinforcement may be present but loss of section is minor. There is not sufficient concern to warrant an analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.



Diagonal cracking near pier 1, crack extending to the soffit.



Longitudinal crack along the bottom flange corner near support.

## Prestressed Concrete Girders

CPOG, CPRG

### Condition State 3

Some delaminations, significant cracks or spalls may be present. There is no evidence of deterioration of the prestress system. Corrosion of non-prestressed reinforcement may be present but loss of section is minor. There is not sufficient concern to warrant an analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.



Prestressing anchorage exposed.



Longitudinal cracks along the middle of planks. Minor leaching at one end.

## Prestressed Concrete Girders

CPOG, CPRG

### Condition State 4

Delaminations or spalls or cracks or corrosion of non-prestressed reinforcement are prevalent. There may also be exposure and deterioration of the prestress system (manifested by loss of bond, broken strands or wire, corrosion or failed anchorages, etc). There is sufficient concern to warrant an analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.



Spalling of a small area of plank soffit with exposed and corroding prestressing strands.



Badly deteriorated end of a prestressed plank girder at an abutment end.

## Prestressed Concrete Girders

CPOG, CPRG

### Condition State 4

Delaminations or spalls or cracks or corrosion of non-prestressed reinforcement are prevalent. There may also be exposure and deterioration of the prestress system (manifested by loss of bond, broken strands or wire, corrosion or failed anchorages, etc). There is sufficient concern to warrant an analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.



Cracked and spalled end of a 13.7m span pre-tensioned girder with exposed tendon.



Overheight vehicle impact damage to bottom of prestress girder

## **Reinforced Concrete Girders**

## Reinforced Concrete Beam/Girder/Arch

## CRBM

Element	Description	Units
CRBM	<b>Concrete-Reinforced, Cast-in-Place-Beam/Girder/Arch</b> This element defines only those beams/girders/arches constructed of cast-in-place reinforced concrete.	m <sup>2</sup> of exposed surface area of element

For each of condition states, report the estimated surface area in square metres.

### Condition state descriptions

Condition state	Description
1	The element shows no deterioration. There may be discolouration, efflorescence, and/or superficial cracking.
2	Minor cracks and spalls may be present but there is no exposed reinforcement or surface evidence of corrosion of reinforcement.
3	Some delaminations, significant cracks or spalls may be present or some reinforcement may be exposed. Corrosion of reinforcement may be present but loss of section is minor and is not sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.
4	Advanced deterioration. Corrosion of reinforcement and/or loss of concrete section is sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

**Key Areas to inspect** for any crack, spall, leaching, signs of corrosion etc:

1. Shear zones near supports (likely diagonal cracks)
2. Midspan of beams (likely vertical cracks)

### Rating Guidance Notes:

For level 2 inspections, all diagonal cracks > 0.5mm near the supports in the element shall be considered as significant distress that could affect the strength or serviceability of the element. The cracked area shall be rated as condition 4 even if there are no signs of corrosion or loss of section.

These cracks must be brought to the attention of Bridge Maintenance Planner for further review.

## Reinforced Concrete Beam/Girder/Arch

CRBM

### Condition State 1

The element shows no deterioration. There may be discolouration, efflorescence, and/or superficial cracking.



Concrete girders in good condition



Superficial crack.

## Reinforced Concrete Beam/Girder/Arch

CRBM

### Condition State 2

Minor cracks and spalls may be present but there is no exposed reinforcement or surface evidence of corrosion of reinforcement.



Minor spall.



Reinforced beam with vertical crack.

## Reinforced Concrete Beam/Girder/Arch

CRBM

### Condition State 2

Minor cracks and spalls may be present but there is no exposed reinforcement or surface evidence of corrosion of reinforcement.



Cracks (previously repaired).

## Reinforced Concrete Beam/Girder/Arch

CRBM

### Condition State 3

Some delaminations, significant cracks or spalls may be present or some reinforcement may be exposed. Corrosion of reinforcement may be present but loss of section is minor and is not sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.



Spall on external girder. Exposed reinforcement with corrosion setting in.



Bottom edge spalled. Exposed and corroding reinforcement with no significant loss of section.

## Reinforced Concrete Beam/Girder/Arch

CRBM

### Condition State 3

Some delaminations, significant cracks or spalls may be present or some reinforcement may be exposed. Corrosion of reinforcement may be present but loss of section is minor and is not sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.



Diagonal shear cracks near support



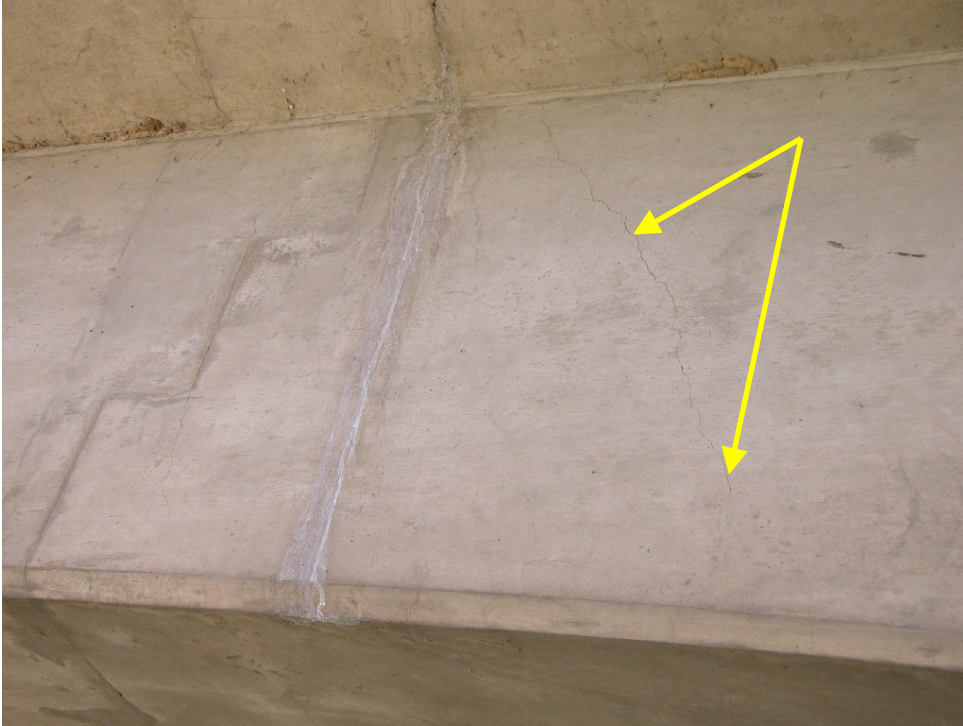
Typical flexural cracks 0.5 to 1.0mm wide at midspan with leaching through the cracks.

## Reinforced Concrete Beam/Girder/Arch

CRBM

### Condition State 3

Some delaminations, significant cracks or spalls may be present or some reinforcement may be exposed. Corrosion of reinforcement may be present but loss of section is minor and is not sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.



Diagonal crack near the support and construction joint.



Severe spalling and delamination. Exposed and corroding reinforcement.

## Reinforced Concrete Beam/Girder/Arch

**CRBM**

### **Condition State 4**

Advanced deterioration. Corrosion of reinforcement and/or loss of concrete section is sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.



## **Concrete Cross Girder/Diaphragm**

## Concrete Cross Girder/Diaphragm

**CCGD**

Element	Description	Units
<b>CCGD</b>	<b>Concrete – Reinforced/Prestressed - Cross Girder/Diaphragm</b> This element defines only those cross girders/diaphragms constructed of reinforced or prestressed concrete.	m <sup>2</sup> of exposed surface area of element

For each of condition states, report the estimated surface area in square metres.

### Reinforced Concrete - Condition state descriptions

Condition state	Description
1	The element shows no deterioration. There may be discolouration, efflorescence, and/or superficial cracking.
2	Minor cracks and spalls may be present but there is no exposed reinforcement or surface evidence of corrosion of reinforcement.
3	Some delaminations, significant cracks or spalls may be present or some reinforcement may be exposed. Corrosion of reinforcement may be present but loss of section is minor and is not sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.
4	Advanced deterioration. Corrosion of reinforcement and/or loss of concrete section is sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

### Prestressed Concrete - Condition state descriptions

Condition state	Description
1	The element shows no deterioration. There may be discolouration, efflorescence, and/or superficial cracking.
2	Minor cracks and spalls may be present but there is no evidence of corrosion of the non-prestressed reinforcement or deterioration of the prestress system.
3	Some delaminations, significant cracks or spalls may be present. There is no evidence of deterioration of the prestress system. Corrosion of non-prestressed reinforcement may be present but loss of section is minor. There is not sufficient concern to warrant an analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.
4	Delaminations or spalls or cracks or corrosion of non-prestressed reinforcement are prevalent. There may also be exposure and deterioration of the prestress system (manifested by loss of bond, broken strands or wire, corrosion or failed anchorages, etc). There is sufficient concern to warrant an analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

**Key Areas to inspect** for any crack, spall, leaching, signs of corrosion etc:

1. Anchorage Zone (for prestressed members)
2. Near the connections with main girders (likely diagonal cracks, if load transferring)
3. Midspan (likely vertical cracks, if load transferring)

### Rating Guidance Notes:

## Concrete Cross Girder/Diaphragm

CCGD

### Condition State 1

The element shows no deterioration. There may be discolouration, efflorescence, and/or superficial cracking.



Cross girder in good condition.

## Concrete Cross Girder/Diaphragm

CCGD

### Condition State 2 (Reinforced Concrete)

Minor cracks and spalls may be present but there is no exposed reinforcement or surface evidence of corrosion of reinforcement.

**(Prestressed Elements: Please refer to the element sheet for condition definitions.)**



Significant crack ready to delaminate.



Significant moisture ingress and leaching at the construction joint of the cross girder. No evidence of corrosion.

## Concrete Cross Girder/Diaphragm

CCGD

### Condition State 2 (Reinforced Concrete)

Minor cracks and spalls may be present but there is no exposed reinforcement or surface evidence of corrosion of reinforcement.

**(Prestressed Elements: Please refer to the element sheet for condition definitions.)**



Cracked cross girder.



Cracked diaphragm with access hole.

## Concrete Cross Girder/Diaphragm

CCGD

### Condition State 3 (Reinforced Concrete)

Some delaminations, significant cracks or spalls may be present or some reinforcement may be exposed. Corrosion of reinforcement may be present but loss of section is minor and is not sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

**(Prestressed Elements: Please refer to the element sheet for condition definitions.)**



Minor spall with exposed reinforcement in the cross girder



Spalled concrete with exposed reinforcement.

## Concrete Cross Girder/Diaphragm

CCGD

### Condition State 3 (Reinforced Concrete)

Some delaminations, significant cracks or spalls may be present or some reinforcement may be exposed. Corrosion of reinforcement may be present but loss of section is minor and is not sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

**(Prestressed Elements: Please refer to the element sheet for condition definitions.)**



Extensive delamination and exposed reinforcement.



Significant spalling at the bottom of diaphragm. Exposed reinforcement.

## Concrete Cross Girder/Diaphragm

CCGD

### Condition State 4 (Reinforced Concrete)

Advanced deterioration. Corrosion of reinforcement and/or loss of concrete section is sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

**(Prestressed Elements: Please refer to the element sheet for condition definitions.)**



Crushed concrete diaphragm with exposed reo.

## **Concrete Pier Headstock**

## Concrete Pier Headstock

CPHS

Element	Description	Units
CPHS	<p><b>Concrete - Reinforced/Prestressed - Pier Headstock (non-integral with superstructure)</b>                      This element defines only those pier headstocks (non-integral with the superstructure) constructed of reinforced or prestressed concrete.</p>	m <sup>2</sup> of exposed surface area of element

For each of condition states, report the estimated surface area in square metres.

### Reinforced Concrete - Condition state descriptions

Condition state	Description
1	The element shows no deterioration. There may be discolouration, efflorescence, and/or superficial cracking.
2	Minor cracks and spalls may be present but there is no exposed reinforcement or surface evidence of corrosion of reinforcement.
3	Some delaminations, significant cracks or spalls may be present or some reinforcement may be exposed. Corrosion of reinforcement may be present but loss of section is minor and is not sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.
4	Advanced deterioration. Corrosion of reinforcement and/or loss of concrete section is sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

### Prestressed Concrete - Condition state descriptions

Condition state	Description
1	The element shows no deterioration. There may be discolouration, efflorescence, and/or superficial cracking.
2	Minor cracks and spalls may be present but there is no evidence of corrosion of the non-prestressed reinforcement or deterioration of the prestress system.
3	Some delaminations, significant cracks or spalls may be present. There is no evidence of deterioration of the prestress system. Corrosion of non-prestressed reinforcement may be present but loss of section is minor. There is not sufficient concern to warrant an analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.
4	Delaminations or spalls or cracks or corrosion of non-prestressed reinforcement are prevalent. There may also be exposure and deterioration of the prestress system (manifested by loss of bond, broken strands or wire, corrosion or failed anchorages, etc). There is sufficient concern to warrant an analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

**Key Areas to inspect** for any crack, spall, leaching, signs of corrosion etc:

1. Anchorage Zone (for prestressed members)
2. Near the bearings and connections with columns/piles (likely diagonal cracks)
3. Near the support of cantilevered parts.

### Rating Guidance Notes:

## Concrete Pier Headstock

CPHS

### Condition State 1

The element shows no deterioration. There may be discoloration, efflorescence, and/or superficial cracking.



Concrete Headstock in good condition

## Concrete Pier Headstock

CPHS

### Condition State 2 (Reinforced Concrete)

Minor cracks and spalls may be present but there is no exposed reinforcement or surface evidence of corrosion of reinforcement.

(Prestressed Elements: Please refer to the element sheet for condition definitions.)



Vertical crack under the bearing



Crack with leaching on the end of headstock

## Concrete Pier Headstock

CPHS

### Condition State 3 (Reinforced Concrete)

Some delaminations, significant cracks or spalls may be present or some reinforcement may be exposed. Corrosion of reinforcement may be present but loss of section is minor and is not sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

**(Prestressed Elements: Please refer to the element sheet for condition definitions.)**



Severe AAR cracking on a headstock



Significant crack with hollow sounding concrete behind the affected area.

## Concrete Pier Headstock

CPHS

### Condition State 3 (Reinforced Concrete)

Some delaminations, significant cracks or spalls may be present or some reinforcement may be exposed. Corrosion of reinforcement may be present but loss of section is minor and is not sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

**(Prestressed Elements: Please refer to the element sheet for condition definitions.)**



Spalling of the concrete with exposed reinforcement. Some previously repaired area cracking again.



Significant spall under the beam on the headstock.

## Concrete Pier Headstock

CPHS

### Condition State 4 (Reinforced Concrete)

Advanced deterioration. Corrosion of reinforcement and/or loss of concrete section is sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

(Prestressed Elements: Please refer to the element sheet for condition definitions.)



Significant spall under the bearing on the headstock. No exposed reinforcement in the headstock.



Significant cracking of the headstock in all faces. Pattern is typical of AAR.

## Concrete Pier Headstock

CPHS

### Condition State 4 (Reinforced Concrete)

Advanced deterioration. Corrosion of reinforcement and/or loss of concrete section is sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

**(Prestressed Elements: Please refer to the element sheet for condition definitions.)**



Wide crack splitting the headstock under the bearing



Local failure of the headstock under the bearing threatening support of the beam. Reinforcement and holding bolt exposed

## Concrete Pier

## Concrete Pier

**CPIR**

Element	Description	Units
<b>CPIR</b>	<p><b>Concrete - Reinforced/Prestressed - Pier (excluding any headstock or piles)</b>                      This element defines only those piers constructed of reinforced or prestressed concrete but excluding any headstocks or piles. Where the top of a wall pier projects in the transverse or longitudinal directions, this is to be considered as a pier headstock (element CPHS).</p>	m <sup>2</sup> of exposed surface area of element

For each of condition states, report the estimated surface area in square metres.

### Reinforced Concrete - Condition state descriptions

Condition state	Description
1	The element shows no deterioration. There may be discolouration, efflorescence, and/or superficial cracking.
2	Minor cracks and spalls may be present but there is no exposed reinforcement or surface evidence of corrosion of reinforcement.
3	Some delaminations, significant cracks or spalls may be present or some reinforcement may be exposed. Corrosion of reinforcement may be present but loss of section is minor and is not sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.
4	Advanced deterioration. Corrosion of reinforcement and/or loss of concrete section is sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

### Prestressed Concrete - Condition state descriptions

Condition state	Description
1	The element shows no deterioration. There may be discolouration, efflorescence, and/or superficial cracking.
2	Minor cracks and spalls may be present but there is no evidence of corrosion of the non-prestressed reinforcement or deterioration of the prestress system.
3	Some delaminations, significant cracks or spalls may be present. There is no evidence of deterioration of the prestress system. Corrosion of non-prestressed reinforcement may be present but loss of section is minor. There is not sufficient concern to warrant an analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.
4	Delaminations or spalls or cracks or corrosion of non-prestressed reinforcement are prevalent. There may also be exposure and deterioration of the prestress system (manifested by loss of bond, broken strands or wire, corrosion or failed anchorages, etc). There is sufficient concern to warrant an analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

**Key Areas to inspect** for any crack, spall, leaching, signs of corrosion etc:

1. Anchorage Zone (for prestressed members)

### Rating Guidance Notes:

## Concrete Pier

CPIR

### Condition State 1

The element shows no deterioration. There may be discolouration, efflorescence, and/or superficial cracking.



The pier in good condition with minor leaching

## Concrete Pier

CPIR

### Condition State 2 (Reinforced Concrete)

Minor cracks and spalls may be present but there is no exposed reinforcement or surface evidence of corrosion of reinforcement.

**(Prestressed Elements: Please refer to the element sheet for condition definitions.)**



Horizontal crack at the bottom part of Pier. No sign of corrosion or exposed reinforcement.



Horizontal crack along the bottom edge. No exposed reinforcement

## Concrete Pier

CPIR

### Condition State 2 (Reinforced Concrete)

Minor cracks and spalls may be present but there is no exposed reinforcement or surface evidence of corrosion of reinforcement.

**(Prestressed Elements: Please refer to the element sheet for condition definitions.)**



Accident damage - Concrete chipped off the pier column



Patched up crack reopening

## Concrete Pier

CPIR

### Condition State 3 (Reinforced Concrete)

Some delaminations, significant cracks or spalls may be present or some reinforcement may be exposed. Corrosion of reinforcement may be present but loss of section is minor and is not sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

**(Prestressed Elements: Please refer to the element sheet for condition definitions.)**



Significant spall with corrosion of exposed reinforcement.



Some spalls and signs of corrosion of reinforcement.

## Concrete Pier

CPIR

### Condition State 3 (Reinforced Concrete)

Some delaminations, significant cracks or spalls may be present or some reinforcement may be exposed. Corrosion of reinforcement may be present but loss of section is minor and is not sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

**(Prestressed Elements: Please refer to the element sheet for condition definitions.)**



Corroding reinforcement and significant vertical crack on the side.

## Concrete Pier

CPIR

### Condition State 4 (Reinforced Concrete)

Advanced deterioration. Corrosion of reinforcement and/or loss of concrete section is sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

**(Prestressed Elements: Please refer to the element sheet for condition definitions.)**



Significant loss of section of reinforcement.

## Concrete Piles

## Concrete Piles

## CPIL

Element	Description	Units
CPIL	<b>Concrete – Reinforced/Prestressed –Pile</b> This element defines only those parts of reinforced or prestressed concrete piles that can be inspected, including underwater inspection if appropriate.	M <sup>2</sup> of exposed surface area of element

For each of condition states, report the estimated surface area in square metres.

### Reinforced Concrete - Condition state descriptions

Condition state	Description
1	The element shows no deterioration. There may be discolouration, efflorescence, and/or superficial cracking.
2	Minor cracks and spalls may be present but there is no exposed reinforcement or surface evidence of corrosion of reinforcement.
3	Some delaminations, significant cracks or spalls may be present or some reinforcement may be exposed. Corrosion of reinforcement may be present but loss of section is minor and is not sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.
4	Advanced deterioration. Corrosion of reinforcement and/or loss of concrete section is sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

### Prestressed Concrete - Condition state descriptions

Condition state	Description
1	The element shows no deterioration. There may be discolouration, efflorescence, and/or superficial cracking.
2	Minor cracks and spalls may be present but there is no evidence of corrosion of the non-prestressed reinforcement or deterioration of the prestress system.
3	Some delaminations, significant cracks or spalls may be present. There is no evidence of deterioration of the prestress system. Corrosion of non-prestressed reinforcement may be present but loss of section is minor. There is not sufficient concern to warrant an analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.
4	Delaminations or spalls or cracks or corrosion of non-prestressed reinforcement are prevalent. There may also be exposure and deterioration of the prestress system (manifested by loss of bond, broken strands or wire, corrosion or failed anchorages, etc). There is sufficient concern to warrant an analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

#### Key Areas to inspect:

1. Splash Zone / Tidal Zone of the piles.
- 2.

#### Rating Guidance Notes:

1. Remove skirting and/or marine growth.
2. Inspect at low tide.

## Concrete Piles

**CPII**

### Condition State 1

The element shows no deterioration. There may be discoloration, efflorescence, and/or superficial cracking.



Concrete piles in good condition.

## Concrete Piles

CPIL

### Condition State 2 (Reinforced Concrete)

Minor cracks and spalls may be present but there is no exposed reinforcement or surface evidence of corrosion of reinforcement.

(Prestressed Elements: Please refer to the element sheet for condition definitions.)



Some delamination of a corner of a pile ready to spall.



Fine cracks near the water level.

## Concrete Piles

CPIL

### Condition State 3 (Reinforced Concrete)

Some delaminations, significant cracks or spalls may be present or some reinforcement may be exposed. Corrosion of reinforcement may be present but loss of section is minor and is not sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

**(Prestressed Elements: Please refer to the element sheet for condition definitions.)**



Wide vertical cracks with some signs of corrosion.



Major cracking of corner of a pile with damaged area extending up to 500mm under water.

## Concrete Piles

**CPIL**

### Condition State 3 (Reinforced Concrete)

Some delaminations, significant cracks or spalls may be present or some reinforcement may be exposed. Corrosion of reinforcement may be present but loss of section is minor and is not sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge. **(Prestressed Elements: Please refer to the element sheet for condition definitions.)**



Significant spall with corroding reinforcement.



Significant spall with exposed reinforcement.

## Concrete Piles

**CPIL**

### Condition State 3 (Reinforced Concrete)

Some delaminations, significant cracks or spalls may be present or some reinforcement may be exposed. Corrosion of reinforcement may be present but loss of section is minor and is not sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

**(Prestressed Elements: Please refer to the element sheet for condition definitions.)**



Repaired piles cracking again.

## Concrete Piles

CPII

### Condition State 4 (Reinforced Concrete)

Advanced deterioration. Corrosion of reinforcement and/or loss of concrete section is sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge. (Prestressed Elements: Please refer to the element sheet for condition definitions.)



Advanced deterioration. Significant loss of section. Significant vertical cracks on all faces where the pile is braced in the steel frame.



Significant loss of section of the pile and heavy corrosion of reinforcement.

## Concrete Piles

CPIL

### Condition State 4 (Reinforced Concrete)

Advanced deterioration. Corrosion of reinforcement and/or loss of concrete section is sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge. (Prestressed Elements: Please refer to the element sheet for condition definitions.)



Advanced deterioration and significant loss of section.



Major vertical cracking and extensive spalling. Cathodic protection mesh exposed. Signs of corrosion.

## Concrete Piles

CPII

### Condition State 4 (Reinforced Concrete)

Advanced deterioration. Corrosion of reinforcement and/or loss of concrete section is sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

**(Prestressed Elements: Please refer to the element sheet for condition definitions.)**



Significant loss of section and corrosion of reinforcement.

## **Concrete Deck Slabs**

## Concrete Deck Slabs

**CDSL**

Element	Description	Units
CDSL	<p><b>Concrete - Reinforced, Deck Slab (Including Concrete Overlay/Kerb/Parapet)</b></p> <p>This element defines only reinforced concrete bridge deck slabs, bare or with a flush seal or asphaltic concrete wearing surface, and includes concrete overlays, kerbs and parapets. (Note: Where there is a wearing surface, rate the deck slab from the condition of its underside and of the wearing surface.)</p>	m <sup>2</sup> of exposed surface area of element

For each of condition states, report the estimated surface area in square metres.

### Reinforced Concrete - Condition state descriptions

Condition state	Description
1	The element shows no deterioration. There may be discolouration, efflorescence, and/or superficial cracking.
2	Minor cracks and spalls may be present but there is no exposed reinforcement or surface evidence of corrosion of reinforcement.
3	Some delaminations, significant cracks or spalls may be present or some reinforcement may be exposed. Corrosion of reinforcement may be present but loss of section is minor and is not sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.
4	Advanced deterioration. Corrosion of reinforcement and/or loss of concrete section is sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

**Key Areas to inspect:**

**Rating Guidance Notes:**

## Concrete Deck Slabs

CDSL

### Condition State 1

The element shows no deterioration. There may be discolouration, efflorescence, and/or superficial cracking.

## Concrete Deck Slabs

CDSL

### Condition State 2

Minor cracks and spalls may be present but there is no exposed reinforcement or surface evidence of corrosion of reinforcement.



Fine cracks on soffit of deck slab.



Transverse cracking of deck slab with minor leaching.

## Concrete Deck Slabs

CDSL

### Condition State 2

Minor cracks and spalls may be present but there is no exposed reinforcement or surface evidence of corrosion of reinforcement.



Repaired deck slab functioning well.



Exposed reinforcement of parapet.

## Concrete Deck Slabs

CDSL

### Condition State 3

Some delaminations, significant cracks or spalls may be present or some reinforcement may be exposed. Corrosion of reinforcement may be present but loss of section is minor and is not sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.



Cracked deck slab.



Significant fine cracking of deck slab.

## Concrete Deck Slabs

CDSL

### Condition State 3

Some delaminations, significant cracks or spalls may be present or some reinforcement may be exposed. Corrosion of reinforcement may be present but loss of section is minor and is not sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.



Longitudinal cracks on either side of the road centre line.



Concrete deck soffit with spalling, leaching and corroding reinforcement.

## Concrete Deck Slabs

CDSL

### Condition State 4

Advanced deterioration. Corrosion of reinforcement and/or loss of concrete section is sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

## **Concrete Abutment / Wingwalls**

## Concrete Abutment / Wingwalls

**CABW**

Element	Description	Units
CABW	<b>Concrete - Reinforced/Prestressed - Abutment and Wingwalls</b> This element defines only those abutments and wingwalls constructed of reinforced or prestressed concrete.	m <sup>2</sup> of exposed surface area of element

For each of condition states, report the estimated surface area in square metres.

### Reinforced Concrete - Condition state descriptions

Condition state	Description
1	The element shows no deterioration. There may be discolouration, efflorescence, and/or superficial cracking.
2	Minor cracks and spalls may be present but there is no exposed reinforcement or surface evidence of corrosion of reinforcement.
3	Some delaminations or spalls may be present or some reinforcement may be exposed. Corrosion of reinforcement may be present but loss of section is minor and <b>is not sufficient</b> to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge..
4	Advanced deterioration. Corrosion of reinforcement and/or loss of concrete section <b>is sufficient</b> to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

### Prestressed Concrete - Condition state descriptions

Condition state	Description
1	The element shows no deterioration. There may be discolouration, efflorescence, and/or superficial cracking.
2	Minor cracks and spalls or significant cracks may be present but there is no evidence of corrosion of the non-prestressed reinforcement or deterioration of the prestress system.
3	Some delaminations and/or spalls may be present. There is no evidence of deterioration of the prestress system. Corrosion of non-prestressed reinforcement may be present but loss of section is minor. There <b>is not sufficient</b> concern to warrant an analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.
4	Delaminations or spalls or cracks or corrosion of non-prestressed reinforcement are prevalent. There may also be exposure and deterioration of the prestress system (manifested by loss of bond, broken strands or wire, corrosion or failed anchorages, etc). There <b>is sufficient</b> concern to warrant an analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

**Key Areas to inspect:**

**Rating Guidance Notes:**

## Concrete Abutment / Wingwalls

CABW

### Condition State 1

The element shows no deterioration. There may be discolouration, efflorescence, and/or superficial cracking.



Minor spall

## Concrete Abutment / Wingwalls

CABW

### Condition State 2 (Reinforced Concrete)

Minor cracks and spalls may be present but there is no exposed reinforcement or surface evidence of corrosion of reinforcement.

**(Prestressed Elements: Please refer to the element sheet for condition definitions.)**



Spalled area at base of abutment.



Diagonal crack at wingwall. Voided slab is bearing against the curtain wall with minor spall.

## Concrete Abutment / Wingwalls

CABW

### Condition State 3 (Reinforced Concrete)

Some delaminations, significant cracks or spalls may be present or some reinforcement may be exposed. Corrosion of reinforcement may be present but loss of section is minor and is not sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

**(Prestressed Elements: Please refer to the element sheet for condition definitions.)**



Major delamination - corrosion of reinforcement.



Significant diagonal cracking.

## Concrete Abutment / Wingwalls

CABW

### Condition State 3 (Reinforced Concrete)

Some delaminations, significant cracks or spalls may be present or some reinforcement may be exposed. Corrosion of reinforcement may be present but loss of section is minor and is not sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

**(Prestressed Elements: Please refer to the element sheet for condition definitions.)**



Major spall near the bearing with exposed reinforcement.

## Concrete Abutment / Wingwalls

CABW

### Condition State 4 (Reinforced Concrete)

Advanced deterioration. Corrosion of reinforcement and/or loss of concrete section is sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

**(Prestressed Elements: Please refer to the element sheet for condition definitions.)**



## **Concrete Culverts**

## REINFORCED CONCRETE CULVERTS

### Reinforced Concrete Culverts

### CCUL, CCUP

Element	Description	Unit
<b>CCUL</b>	<b>Concrete - Culvert, Cast-in-Place</b> This element defines all cast-in-place reinforced concrete arch and box culverts that have an opening measured along the road centreline of six metres or more, measured between spring lines of arches, or extreme ends of openings for multiple boxes. For each of condition states 1 to 4, report the estimated surface area inside the culvert and on wingwalls, headwalls and apron slabs in square metres.	m <sup>2</sup> of exposed surface area of inside culvert and on wingwalls, headwalls and apron slabs.
<b>CCUP</b>	<b>Concrete - Culvert, Precast</b> This element defines all precast reinforced concrete arch and box culverts that have an opening measured along the road centreline of six metres or more, measured between spring lines of arches, or extreme ends of openings for multiple boxes.	m <sup>2</sup> of exposed surface area inside culvert.

For each of condition states 1 to 4, report the estimated surface area in square metres.

#### Condition state descriptions

Condition state	Description
1	Superficial cracks and spalls may be present, but there is no exposed reinforcement or evidence of reinforcement corrosion. There is little or no deterioration or separation of joints. <b>CCUL</b> : Minor scour & erosion at wingwalls or cut-off walls may exist.
2	Deterioration, minor chloride contamination, minor cracking and/or leaching may have begun. There may be deterioration and separation of joints. Minor scour of barrel may have occurred but is not affecting structural integrity.
3	There may be moderate to major deterioration, extensive cracking and/or leaching and large areas of spalls. Scour may be beginning to affect structural integrity. Minor to moderate distortion, settlement, or misalignment may have occurred. There may be considerable deterioration and separation of joints and/or minor roadway settlement.
4	Major deterioration, spalling, cracking, major distortion, deflection settlement, or misalignment of the barrel may be in evidence. Major separation of joints may have occurred. Holes may exist in floors and walls. Settlement of roadway may have occurred. Severe scour, if any, will affect structural capacity.

#### Key Areas to inspect:

1. Look for deformation of culvert.
2. Spring and the crown areas of an arch culvert.
3. check scour is not undermining the invert of the culvert.

#### Rating Guidance Notes:

## Concrete Culverts

**CCULV, CCULP**

### Condition State 1

Superficial cracks and spalls may be present, but there is no exposed reinforcement or evidence of reinforcement corrosion. There is little or no deterioration or separation of joints.

**CCUL :** Minor scour & erosion at wingwalls or cut-off walls may exist.



Concrete culvert in good condition.



Concrete culvert in good condition.

## Concrete Culverts

CCULV, CCULP

### Condition State 2

Deterioration, minor chloride contamination, minor cracking and/or leaching may have begun. There may be deterioration and separation of joints. Minor scour of barrel may have occurred but is not affecting structural integrity.



Vertical cracking on the wingwall culvert cell



Vertical crack near the construction joint on the wall. noticeable leaching.

## Concrete Culverts

CCULV, CCULP

### Condition State 2

Deterioration, minor chloride contamination, minor cracking and/or leaching may have begun. There may be deterioration and separation of joints. Minor scour of barrel may have occurred but is not affecting structural integrity.



Cracking, leaching and spalling around an area of poor concrete in the roof.



Spalls on the wall.

## Concrete Culverts

## CCULV, CCULP

### Condition State 3

There may be moderate to major deterioration, extensive cracking and/or leaching and large areas of spalls. Scour may be beginning to affect structural integrity. Minor to moderate distortion, settlement, or misalignment may have occurred. There may be considerable deterioration and separation of joints and/or minor roadway settlement.



(701)

Significant spalls on the roof near the outlet end. Exposed and corroding reinforcement. Signs of leaching and moisture.



Significant spalling and corrosion of exposed reinforcement in the roof of precast units.

### Concrete Culverts

### CCULV, CCULP

**Condition State 3**  
There may be moderate to major deterioration, extensive cracking and/or leaching and large areas of spalls. Scour may be beginning to affect structural integrity. Minor to moderate distortion, settlement, or misalignment may have occurred. There may be considerable deterioration and separation of joints and/or minor roadway settlement.



Delamination/spalling around scupper hole in roof. Exposed reinforcement.



Damage to the blade wall.

## Concrete Culverts

CCULV, CCULP

### Condition State 4

Major deterioration, spalling, cracking, major distortion, deflection settlement, or misalignment of the barrel may be in evidence. Major separation of joints may have occurred. Holes may exist in floors and walls. Settlement of roadway may have occurred. Severe scour, if any, will affect structural capacity.



Large delamination of cell wall at inlet end where wingwall is being forced away.



Heavy diagonal cracking of inlet wingwall.

## Concrete Culverts

CCULV, CCULP

### Condition State 4

Major deterioration, spalling, cracking, major distortion, deflection settlement, or misalignment of the barrel may be in evidence. Major separation of joints may have occurred. Holes may exist in floors and walls. Settlement of roadway may have occurred. Severe scour, if any, will affect structural capacity.



(654)

Large areas of spalling with exposed corroding reinforcements.



Severe lamination and spalling on all outside precast cell units.

## Concrete Culverts

CCULV, CCULP

### Condition State 4

Major deterioration, spalling, cracking, major distortion, deflection settlement, or misalignment of the barrel may be in evidence. Major separation of joints may have occurred. Holes may exist in floors and walls. Settlement of roadway may have occurred. Severe scour, if any, will affect structural capacity.



Extreme delamination and corrosion exposed reinforcement of precast units.



Extreme delamination and with falling off roof reinforcements of precast units.



Transport  
Roads & Maritime  
Services

# BRIDGE INSPECTION PROCEDURE MANUAL

## Steel Elements

# **Steel Elements**

## STEEL ELEMENTS

Element	Description	Units
STPR	<b>Steel – Truss – Principal</b> This element defines the principals of steel trusses only excluding the protective coating.	m <sup>2</sup> of exposed surface area
STTC	<b>Steel – Truss – Top Chord</b> This element defines the top chords of steel trusses only excluding the protective coating.	m <sup>2</sup> of exposed surface area
STBC	<b>Steel – Truss – Bottom Chord</b> This element defines the bottom chords of steel trusses only excluding the protective coating.	m <sup>2</sup> of exposed surface area
STDG	<b>Steel – Truss – Diagonals</b> This element defines the diagonals of steel trusses only excluding the protective coating.	m <sup>2</sup> of exposed surface area
STVT	<b>Steel – Truss – Verticals</b> This element defines the verticals of steel trusses only excluding the protective coating.	m <sup>2</sup> of exposed surface area
STGP	<b>Steel – Truss – Connection Gusset Plates</b> This element defines the connection gusset plates of steel trusses only excluding the protective coating.	m <sup>2</sup> of exposed surface area
STTB	<b>Steel – Truss – Top Bracings</b> This element defines the top bracings of steel trusses only excluding the protective coating.	m <sup>2</sup> of exposed surface area
STBB	<b>Steel – Truss – Bottom Bracings</b> This element defines the bottom bracings of steel trusses only excluding the protective coating.	m <sup>2</sup> of exposed surface area
STCG	<b>Steel – Truss – Cross Girder</b> This element defines the cross girders of steel trusses only excluding the protective coating.	m <sup>2</sup> of exposed surface area
STST	<b>Steel – Truss – Stringers</b> This element defines the stringers of steel trusses only excluding the protective coating.	m <sup>2</sup> of exposed surface area
SLST	<b>Steel – Truss – Lift Span Support Structure</b> This element defines the lift span support structure of steel trusses only excluding the protective coating.	m <sup>2</sup> of exposed surface area
SBGI	<b>Steel - Rolled Beam/Fabricated I Girder/Trough Girder/Box Girder, including Stringers and Cross Girders (Load bearing)</b> This element defines all steel (or wrought iron) rolled beams/I girders/trough girders/box girders including stringers and cross girders that are load bearing excluding the protective coating.	m <sup>2</sup> of exposed surface area
SDBR	<b>Steel - Diaphragm/Bracing/Secondary member</b> This element defines only steel diaphragms/braces /secondary members excluding the protective coating.	m <sup>2</sup> of exposed surface area
SPIR	<b>Steel - Pier (excluding any piles and secondary members)</b> This element defines steel piers, excluding any piles and secondary members excluding the protective coating.	m <sup>2</sup> of exposed surface area
SPIL	<b>Steel - Pile (including steel cased concrete pile or caisson)</b> This element defines only those parts of steel piles and that can be inspected, including underwater inspection if appropriate excluding the protective coating.	m <sup>2</sup> of exposed surface area
SASG	<b>Steel Abutment Sheeting / Gravel Board</b> This element defines only the abutment sheeting/Gravel Boards made of steel. The vertical steel supports are treated as steel piles.	m <sup>2</sup> of exposed surface area

## STEEL ELEMENTS

For each of the condition states, report the estimated area in square metres.

### Condition state descriptions

Condition State	Description
1	There is no evidence of section loss or damage or cracking.
2	<p>Surface rust or minor pitting has formed or is forming. There is no measurable loss of section.</p> <p>There may be minor deformations that do not affect the integrity of the element.</p> <p>There are no cracks in the steel or welds. All bolts and rivets are in sound condition.</p>
3	<p>Heavy pitting may be present. Some measurable section loss is present locally, but not critical to structural integrity and/or serviceability of the element.</p> <p>There may be some loose or missing bolts or rivets. Defects have been assessed as not sufficient to impact on the ultimate strength and/or serviceability of the element.</p>
4	<p>Section loss is sufficient to warrant analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge.</p> <p>There may be cracks and/or deformations in the steel or welds. There may be numerous failed or missing bolts or rivets. Defects may impact on the ultimate strength and/or serviceability of the element.</p>

**Key Areas to inspect** for any cracking, section loss and other deterioration signs:

1. Edges of members
2. Connections
3. Splice Plates
4. End plates of girders
5. Bottom chords of trusses

### Rating Guidance Notes:

Defects are defined as notches, gauges or discontinuities.

Deformations are defined as buckled plate, bent members or sections

Section loss is defined as loss of original metal.

**Steel Elements**                      **STPR, STTC, STBC, STDG, STVT, STGP, STTB,**  
**Trusses, Girders, Piers & Piles**    **STBB, STCG, STST, STSL, SBGI, SDBR, SPIR, SPIL**

**Condition State 1**  
There is no evidence of section loss or damage or cracking.



Minor coating deterioration but no steel deterioration.



Girders in new or near new condition.

**Steel Elements**                      **STPR, STTC, STBC, STDG, STVT, STGP, STTB,**  
**Trusses, Girders, Piers & Piles**    **STBB, STCG, STST, STSL, SBGI, SDBR, SPIR, SPIL**

**Condition State 1**  
There is no evidence of section loss or damage or cracking.



Element in new or near new condition.



Element in new or near new condition.

**Steel Elements**                      **STPR, STTC, STBC, STDG, STVT, STGP, STTB,**  
**Trusses, Girders, Piers & Piles**    **STBB, STCG, STST, STSL, SBGI, SDBR, SPIR, SPIL**

**Condition State 1**  
There is no evidence of section loss or damage or cracking.



Element in new or near new condition.



Element in new or near new condition.

**Steel Elements**                      **STPR, STTC, STBC, STDG, STVT, STGP, STTB,**  
**Trusses, Girders, Piers & Piles**    **STBB, STCG, STST, STSL, SBGI, SDBR, SPIR, SPIL**

**Condition State 1**  
There is no evidence of section loss or damage or cracking.



Element in new or near new condition.



Element in new or near new condition.

**Steel Elements** STPR, STTC, STBC, STDG, STVT, STGP, STTB,  
**Trusses, Girders, Piers & Piles** STBB, STCG, STST, STSL, SBGI, SDBR, SPIR, SPIL

**Condition State 2**

Surface rust or minor pitting has formed or is forming. There is no measurable loss of section. There may be minor deformations that do not affect the integrity of the element. There are no cracks in the steel or welds. All bolts and rivets are in sound condition.



Crevice corrosion at splice plate on underside of girder. Some minor mechanical impact damage also evident.



Surface rusting on web of girder.

**Steel Elements**                      **STPR, STTC, STBC, STDG, STVT, STGP, STTB,**  
**Trusses, Girders, Piers & Piles**    **STBB, STCG, STST, STSL, SBGI, SDBR, SPIR, SPIL**

**Condition State 2**  
Surface rust or minor pitting has formed or is forming. There is no measurable loss of section. There may be minor deformations that do not affect the integrity of the element. There are no cracks in the steel or welds. All bolts and rivets are in sound condition.



Uniform surface rusting on pile.



Extensive surface rusting.

**Steel Elements** STPR, STTC, STBC, STDG, STVT, STGP, STTB,  
**Trusses, Girders, Piers & Piles** STBB, STCG, STST, STSL, SBGI, SDBR, SPIR, SPIL

**Condition State 2**

Surface rust or minor pitting has formed or is forming. There is no measurable loss of section. There may be minor deformations that do not affect the integrity of the element. There are no cracks in the steel or welds. All bolts and rivets are in sound condition.



Light surface rusting on sheeting and supports.



Uniform surface rust on principal. Rusting heavier on the edges and near rivets.

**Steel Elements**                      **STPR, STTC, STBC, STDG, STVT, STGP, STTB,**  
**Trusses, Girders, Piers & Piles**    **STBB, STCG, STST, STSL, SBGI, SDBR, SPIR, SPIL**

**Condition State 2**  
Surface rust or minor pitting has formed or is forming. There is no measurable loss of section. There may be minor deformations that do not affect the integrity of the element. There are no cracks in the steel or welds. All bolts and rivets are in sound condition.



Uniform surface rust on diagonal.



Uniform surface rust on vertical.

**Steel Elements**

**Trusses, Girders, Piers & Piles**

**STPR, STTC, STBC, STDG, STVT, STGP, STTB,  
STBB, STCG, STST, STSL, SBGI, SDBR, SPIR, SPIL**

**Condition State 2**

Surface rust or minor pitting has formed or is forming. There is no measurable loss of section. There may be minor deformations that do not affect the integrity of the element. There are no cracks in the steel or welds. All bolts and rivets are in sound condition.



Surface rust on bottom chord.



Surface rusting on rivets.

**Steel Elements**                      **STPR, STTC, STBC, STDG, STVT, STGP, STTB,**  
**Trusses, Girders, Piers & Piles**    **STBB, STCG, STST, STSL, SBGI, SDBR, SPIR, SPIL**

**Condition State 3**  
Heavy pitting may be present. Some measurable section loss is present locally, but not critical to structural integrity and/or serviceability of the element. There may be some loose or missing bolts or rivets. Defects have been assessed as not sufficient to impact on the ultimate strength and/or serviceability of the element.



Extensive corrosion at flange edges.



Heavy pitting on steel pier.

**Steel Elements** STPR, STTC, STBC, STDG, STVT, STGP, STTB,  
**Trusses, Girders, Piers & Piles** STBB, STCG, STST, STSL, SBGI, SDBR, SPIR, SPIL

**Condition State 3**

Heavy pitting may be present. Some measurable section loss is present locally, but not critical to structural integrity and/or serviceability of the element. There may be some loose or missing bolts or rivets. Defects have been assessed as not sufficient to impact on the ultimate strength and/or serviceability of the element.



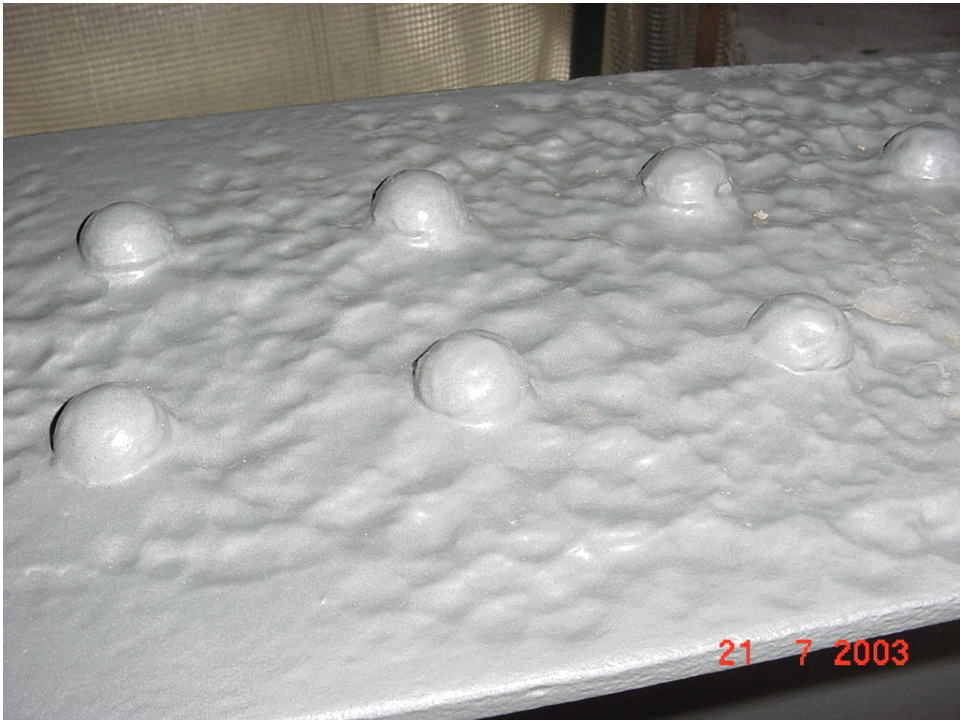
Corrosion and section loss at gusset plate welded connections.



Heavy pitting on piles localised to the splash line.

**Steel Elements**                      **STPR, STTC, STBC, STDG, STVT, STGP, STTB,**  
**Trusses, Girders, Piers & Piles**    **STBB, STCG, STST, STSL, SBGI, SDBR, SPIR, SPIL**

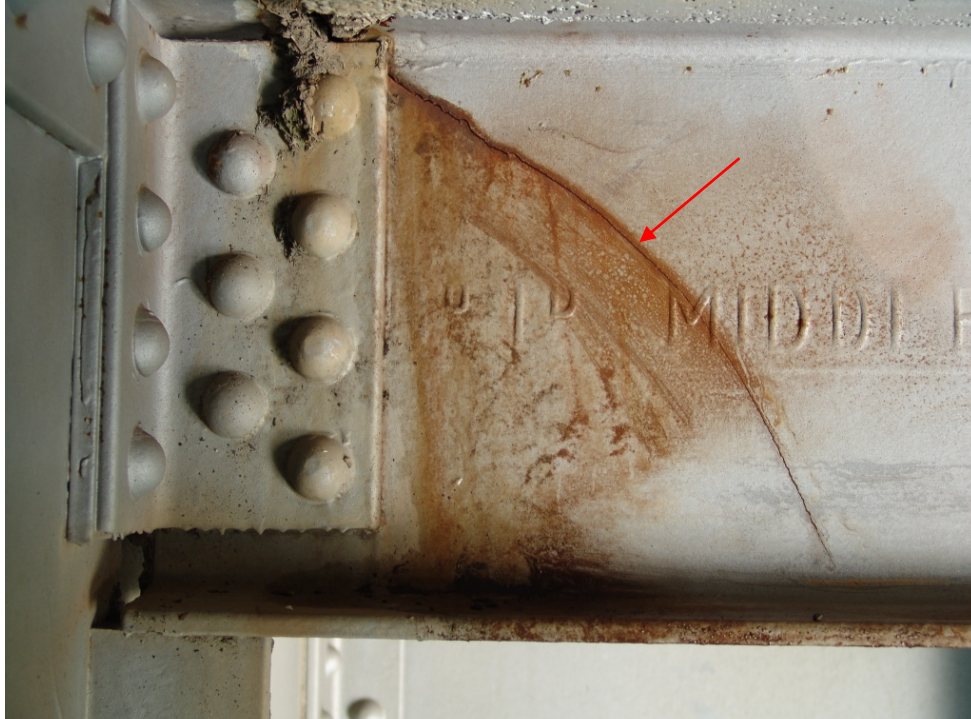
**Condition State 3**  
Heavy pitting may be present. Some measurable section loss is present locally, but not critical to structural integrity and/or serviceability of the element. There may be some loose or missing bolts or rivets. Defects have been assessed as not sufficient to impact on the ultimate strength and/or serviceability of the element.



Repaired heavy pitting on cross girder – measurable section loss still evident. *However if a condition assesment of the element from a previous Level 3 inspection is available, that Level 3 inspection rating shall be used as the basis for rating the element with due considertions for any subsequent deterioration.*

**Steel Elements** STPR, STTC, STBC, STDG, STVT, STGP, STTB,  
**Trusses, Girders, Piers & Piles** STBB, STCG, STST, STSL, SBGI, SDBR, SPIR, SPIL

**Condition State 4**  
Section loss is sufficient to warrant analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge. There may be cracks and/or deformations in the steel or welds. There may be numerous failed or missing bolts or rivets. Defects may impact on the ultimate strength and/or serviceability of the element.



Fatigue crack in stringer.



Fatigue crack in stringer.

**Steel Elements** STPR, STTC, STBC, STDG, STVT, STGP, STTB,  
**Trusses, Girders, Piers & Piles** STBB, STCG, STST, STSL, SBGI, SDBR, SPIR, SPIL

**Condition State 4**  
Section loss is sufficient to warrant analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge. There may be cracks and/or deformations in the steel or welds. There may be numerous failed or missing bolts or rivets. Defects may impact on the ultimate strength and/or serviceability of the element.



Typical corrosion of the bottom chord on the upstream side of the bridge

Heavy pitting inside cross girder – measurable section loss.



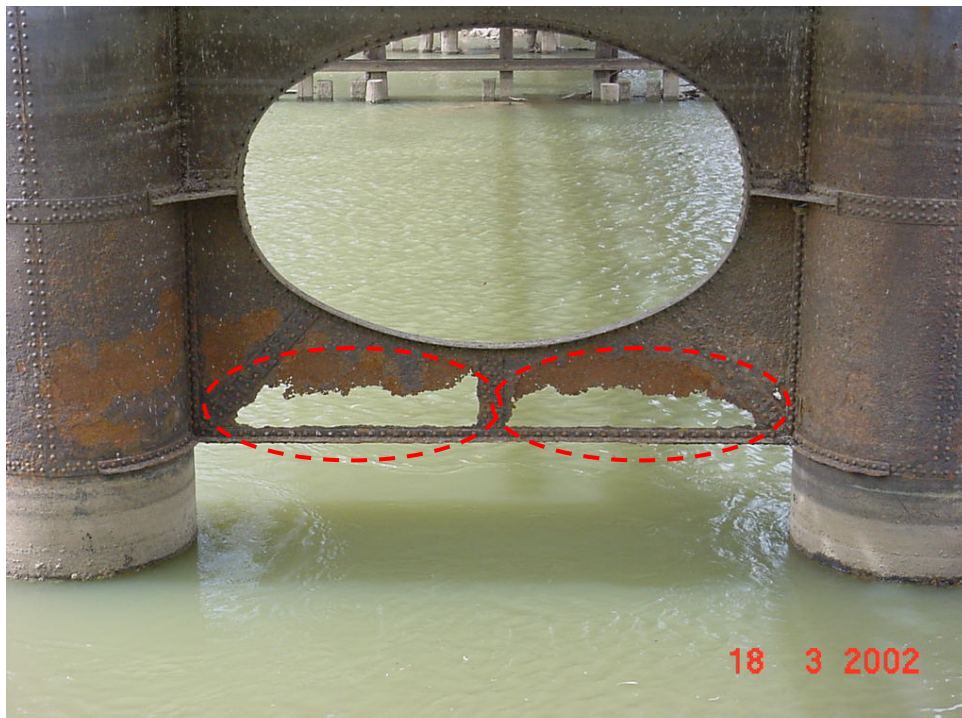
Failed rivets at connection with cross girder.

**Steel Elements** STPR, STTC, STBC, STDG, STVT, STGP, STTB,  
**Trusses, Girders, Piers & Piles** STBB, STCG, STST, STSL, SBGI, SDBR, SPIR, SPIL

**Condition State 4**  
Section loss is sufficient to warrant analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge. There may be cracks and/or deformations in the steel or welds. There may be numerous failed or missing bolts or rivets. Defects may impact on the ultimate strength and/or serviceability of the element.



Crack in weld at connection with cross girder.



Significant section loss in diaphragm of pier.

## **Steel – Cables / Hangers / Tension Ties**

## Steel - Cables/Hangers/Tension Ties (Not Embedded In Concrete)

**SCBT**

Element	Description	Units
<b>SCBT</b>	<p><b>Steel - Cables/Hangers/Tension Ties (Not Embedded In Concrete)</b></p> <p>This element defines only those steel cables, hangers and other tension ties (cables or rods) excluding steel bracings and steel tension members in trusses, and external post tensioning systems including those for correction of deformations.. This element includes the anchorages and other supports associated with the cables/ties and any cable dampening systems. These tension members may be galvanised, painted, coated or wrapped in grease with a protective outer wrapper, but are not embedded in concrete. The protective coating systems are not included in this element.</p>	Each

For each of condition states, report the number of units affected..

### Condition state descriptions

Condition State	Description
1	There is no evidence of corrosion. There are no signs of distress at anchors, sockets or saddles.
2	Surface or spot rust has formed or is forming. There are no signs of distress at anchors or sockets but the saddles may be rusty and in need of lubrication.
3	Minor corrosion. Surface pitting may be present but the extent is minor and does not yet affect the strength or serviceability of either the element or the bridge. The cables may have slackened off slightly or the hangers are slipping on the cable. Cables may be beginning to abrade but there are no wire breakages. Anchors may have minor cracking, sockets may be a little loose or saddles may have fine cracks in the metal.
4	Pitting or general corrosion is advanced. Section loss is sufficient to warrant analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge. Cables may be abraded with broken wire(s). Units may have slackened noticeably or differentially and/or are not fully effective. Anchorages may have cracked or have moved or slipped. Sockets may have loosened or saddles are badly damaged.

### Key Areas to inspect :

1. Where cables change direction and at anchorages
2. At saddles, bulldog clamps, swages..
3. Where water can infiltrate or pond

### Rating Guidance Notes:

Any measurable section loss warrants an analysis.  
There is a higher tolerance for defects in any cable dampening system.

## Steel - Cables/Hangers/Tension Ties

SCBT

### Condition State 1

There is no evidence of corrosion. There are no signs of distress at anchors, sockets or saddles.



Cables in good condition.



External pre-stressing system at the bottom of a timber truss in good condition.

## Steel - Cables/Hangers/Tension Ties

SCBT

### Condition State 2

Surface or spot rust has formed or is forming. There are no signs of distress at anchors or sockets but the saddles may be rusty and in need of lubrication.



Surface rust on lift span wire cable and connection.



Minor surface corrosion on cable anchorage block in a pedestrian bridge.

## Steel - Cables/Hangers/Tension Ties

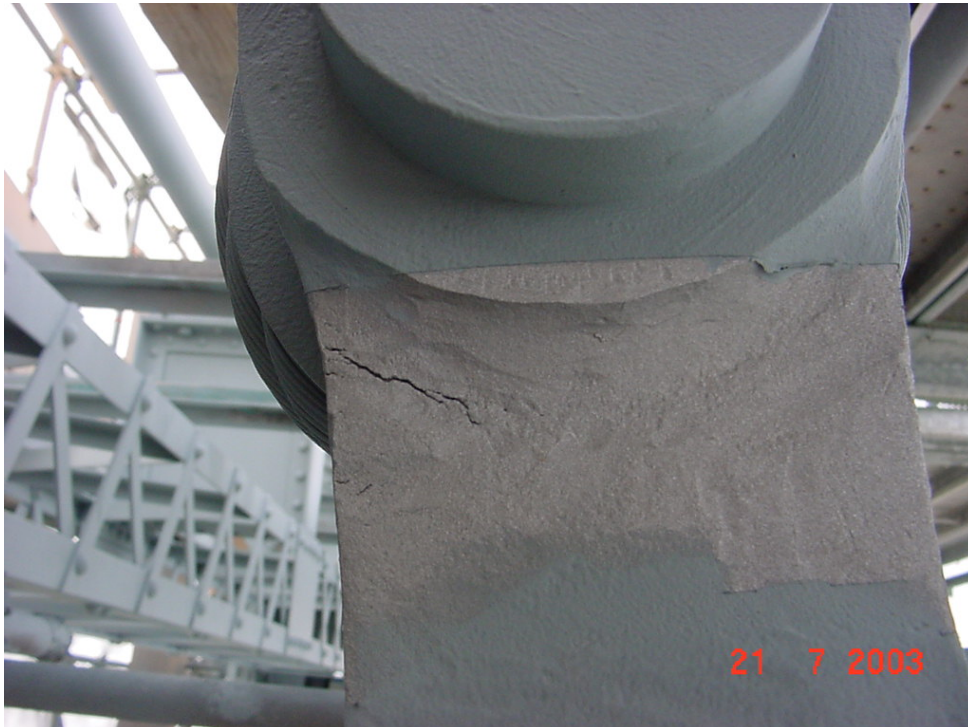
SCBT

**Condition State 3** - Minor corrosion. Surface pitting may be present but the extent is minor and does not yet affect the strength or serviceability of either the element or the bridge. The cables may have slackened off slightly or the hangers are slipping on the cable. Cables may be beginning to abrade but there are no wire breakages. Anchors may have minor cracking, sockets may be a little loose or saddles may have fine cracks in the metal.

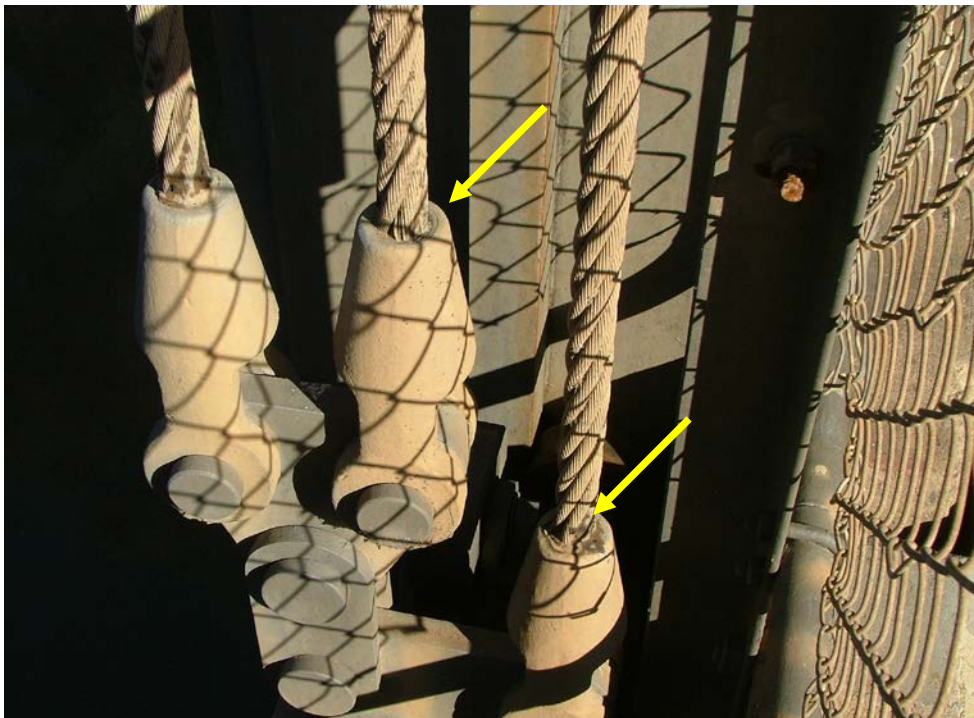
## Steel - Cables/Hangers/Tension Ties

SCBT

**Condition State 4** - Pitting or general corrosion is advanced. Section loss is sufficient to warrant analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge. Cables may be abraded with broken wire(s). Units may have slackened noticeably or differentially and/or are not fully effective. Anchorages may have cracked or have moved or slipped. Sockets may have loosened or saddles are badly damaged.



Crack on steel tie.



Lift span wire rope cables with broken wires near the anchor sockets.

## Steel - Cables/Hangers/Tension Ties

SCBT

**Condition State 4** - Pitting or general corrosion is advanced. Section loss is sufficient to warrant analysis to ascertain the impact on the ultimate strength and/or serviceability of either the element or the bridge. Cables may be abraded with broken wire(s). Units may have slackened noticeably or differentially and/or are not fully effective. Anchorages may have cracked or have moved or slipped. Sockets may have loosened or saddles are badly damaged.



Lift span cable with broken wires.



## **Steel – Deck Elements**

## Steel – Deck Elements

## SOGD, SBPD, SCOD

Element	Description	Units
<b>SOGD</b>	<b>Steel - Open Grid Deck</b> This element defines only those bridge decks that are constructed of steel grids and are open and unfilled excluding the protective coating.	m <sup>2</sup> of exposed surface area
<b>SBPD</b>	<b>Steel - Buckle Plate Deck</b> This element defines only those bridge decks that are constructed of steel buckle plates and support a layer of reinforced concrete or gravel, excluding the protective coating.	m <sup>2</sup> of exposed surface area
<b>SCOD</b>	<b>Steel - Corrugated/Orthotropic/Etc. Deck</b> This element defines only those bridge decks that are constructed of corrugated metal filled with Portland cement concrete or asphaltic concrete or an orthotropic steel deck. The orthotropic deck may be covered with asphaltic concrete. The protective coating is not included in this element.	m <sup>2</sup> of exposed surface area

For each of the condition states, report the estimated area in square metres.

### Condition state descriptions

Condition State	Description
1	There is no corrosion. The connectors (welds, rivets, etc) are sound. The surfacing on the deck (if any) has no repaired areas and there are no potholes.
2	Surface rust or minor pitting has formed. There is no loss of section. The connectors may be starting to show signs of distress - cracked welds or broken rivets. Potholes may exist in the surfacing at scattered locations and there may be cracking in the infill pavement (if any). There may be minor deformations that do not affect the integrity of the element.
3	Corrosion is moderate. Surface pitting may be present but any section loss is minor. Numerous connectors are failing at scattered locations. There may be minor cracks and/or deformations in the steel or welds which have been assessed as not sufficient to impact on the ultimate strength and/or serviceability of the element.  Potholes may expose the metal decking. There may be significant cracking in the infill pavement (if any).
4	Corrosion is advanced. Numerous connectors have failed. Section loss, connectivity loss, cracks, deformations or holes in the steel or welds may impact on the ultimate strength and/or serviceability of the element.  The infill pavement (if any) has failed.

**Key Areas to inspect** for any cracking, corrosion and other deterioration signs:

1. Deck surface for cracking, potholes
2. Soffit of deck for leakage, cracking, corrosion
3. Connections to stringers

### Rating Guidance Notes:

## Steel – Deck Elements

SOGD, SBPD, SCOD

### Condition State 1

There is no corrosion. The connectors (welds, rivets, etc) are sound. The surfacing on the deck (if any) has no repaired areas and there are no potholes.



Buckle plate deck in good condition.



Buckle plates are still in good condition although the paint has failed.

## Steel – Deck Elements

SOGD, SBPD, SCOD

### Condition State 2

Surface rust or minor pitting has formed. There is no loss of section. The connectors may be starting to show signs of distress - cracked welds or broken rivets. Potholes may exist in the surfacing at scattered locations and there may be cracking in the infill pavement (if any). There may be minor deformations that do not affect the integrity of the element.



Buckle plate deck with minor leakage and corrosion at the edges.

### Steel – Deck Elements

SOGD, SBPD, SCOD

**Condition State 3** - Corrosion is moderate. Surface pitting may be present but any section loss is minor. Numerous connectors are failing at scattered locations. There may be minor cracks and/or deformations in the steel or welds which have been assessed as not sufficient to impact on the ultimate strength and/or serviceability of the element. Potholes may expose the metal decking. There may be significant cracking in the infill pavement (if any).



Failed connectors and localised failure of decking.



Moderate corrosion at all deck connections.

## Steel – Deck Elements

SOGD, SBPD, SCOD

### Condition State 4 -

Corrosion is advanced. Numerous connectors have failed. Section loss, connectivity loss, cracks, deformations or holes in the steel or welds may impact on the ultimate strength and/or serviceability of the element. The infill pavement (if any) has failed.



Severe corrosion of buckle plate with complete section loss over large areas.

## **Steel – Culvert**

## Steel – Culvert

## SCUL

Element	Description	Units
SCUL	<p><b>Steel – Culvert</b></p> <p>This element defines all steel culverts, including arches, round or elliptical pipes etc that have an opening measured along the road centreline of six metres or more, measured between spring lines of arches, or extreme ends of openings for multiple pipes.</p>	m <sup>2</sup> of exposed surface area

For each of the condition states, report the estimated area in square metres.

### Condition state descriptions

Condition State	Description
1	The element shows little or no deterioration. Some discolouration or surface corrosion with no pitting may exist. Very little or no scour or erosion is evident.
2	There may be minor to moderate corrosion and pitting, especially at the barrel invert. The connectors may be starting to show signs of distress. Little or no distortion exists. Minor scouring may be evident.
3	Significant corrosion, deep pitting or some holes in the invert may exist. Numerous connectors are failing at scattered locations. Significant scour or erosion not affecting structural integrity. Minor to moderate distortion and deflection may exist. There is little or no roadway settlement.
4	<p>Major corrosion, extreme pitting or holes in the barrel may exist. Major distortion, deflection, or settlement may be evident. There may be severe scour affecting the structural capacity. Minor to major roadway settlement may be evident.</p> <p>Section loss, connectivity loss, cracks and/or deformations may impact on the ultimate strength and/or serviceability of the element.</p>

**Key Areas to inspect** for any cracking, corrosion and other deterioration signs:

1. Roadway for settlement
2. Roof for distortion/out of shape.
3. Inlet and outlet of culvert for scour
4. Near barrel invert for corrosion

### Rating Guidance Notes:

## Steel – Culvert

SCUL

### Condition State 1

The element shows little or no deterioration. Some discolouration or surface corrosion with no pitting may exist. Very little or no scour or erosion is evident.



Surface discolouration near the base but culvert is still in good condition.

## Steel – Culvert

SCUL

### Condition State 2

There may be minor to moderate corrosion and pitting, especially at the barrel invert. The connectors may be starting to show signs of distress. Little or no distortion exists. Minor scouring may be evident.



Loss of galvanised protective coating but there is no significant corrosion.

## Steel – Culvert

SCUL

### Condition State 3

Significant corrosion, deep pitting or some holes in the invert may exist. Numerous connectors are failing at scattered locations. Significant scour or erosion not affecting structural integrity. Minor to moderate distortion and deflection may exist. There is little or no roadway settlement.



Significant corrosion with missing bolts.

## Steel – Culvert

SCUL

### Condition State 4

Major corrosion, extreme pitting or holes in the barrel may exist. Major distortion, deflection, or settlement may be evident. There may be severe scour affecting the structural capacity. Minor to major roadway settlement may be evident. Section loss, connectivity loss, cracks and/or deformations may impact on the ultimate strength and/or serviceability of the element.



Major corrosion with some distortion.



Transport  
Roads & Maritime  
Services

# BRIDGE INSPECTION PROCEDURE MANUAL

## Protective Coatings

# **Protective Coating**

## STEEL PROTECTIVE COATING ELEMENTS

Element	Description	Units
<b>PTPR</b>	<b>Protective Coating – Truss – Principal</b> This element defines the protective coating on principals of steel trusses only.	m <sup>2</sup> of exposed surface area
<b>PTTC</b>	<b>Protective Coating – Truss – Top Chord</b> This element defines the protective coating on top chords of steel trusses only.	m <sup>2</sup> of exposed surface area
<b>PTBC</b>	<b>Protective Coating – Truss – Bottom Chord</b> This element defines the protective coating on bottom chords of steel trusses only.	m <sup>2</sup> of exposed surface area
<b>PTDG</b>	<b>Protective Coating – Truss – Diagonals</b> This element defines the protective coating on diagonals of steel trusses only.	m <sup>2</sup> of exposed surface area
<b>PTVT</b>	<b>Protective Coating – Truss – Verticals</b> This element defines the protective coating on verticals of steel trusses only.	m <sup>2</sup> of exposed surface area
<b>PTGP</b>	<b>Protective Coating – Truss – Connection Gusset Plates</b> This element defines the protective coating on connection gusset plates of steel trusses only.	m <sup>2</sup> of exposed surface area
<b>PTTB</b>	<b>Protective Coating – Truss – Top Bracings</b> This element defines the protective coating on top bracings of steel trusses only.	m <sup>2</sup> of exposed surface area
<b>PTBB</b>	<b>Protective Coating – Truss – Bottom Bracings</b> This element defines the protective coating on bottom bracings of steel trusses only.	m <sup>2</sup> of exposed surface area
<b>PTCG</b>	<b>Protective Coating – Truss – Cross Girder</b> This element defines the protective coating on cross girders of steel trusses only.	m <sup>2</sup> of exposed surface area
<b>PTST</b>	<b>Protective Coating – Truss – Stringers</b> This element defines the protective coating on stringers of steel trusses only.	m <sup>2</sup> of exposed surface area
<b>PTLS</b>	<b>Protective Coating – Truss – Lift Span Support Structure</b> This element defines the protective coating on the lift span support structure of steel trusses only.	m <sup>2</sup> of exposed surface area
<b>PBGI</b>	<b>Protective Coating - Rolled Beam/Fabricated I Girder / Trough Girder/Box Girder, including Stringers and Cross Girders (Load bearing)</b> This element defines the protective coating on all steel (or wrought iron) rolled beams/I girders/trough girders/box girders including stringers and cross girders that are load bearing.	m <sup>2</sup> of exposed surface area
<b>PDBR</b>	<b>Protective Coating - Diaphragm/Bracing/Secondary member</b> This element defines the protective coating on steel diaphragms/braces/secondary members.	m <sup>2</sup> of exposed surface area

Element	Description	Units
<b>PPIR</b>	<b>Protective Coating - Pier (excluding any piles and secondary members)</b> This element defines the protective coating on steel piers, excluding any piles and secondary members.	<b>m<sup>2</sup></b> of exposed surface area
<b>PPIL</b>	<b>Protective Coating - Pile (including steel cased concrete pile or caisson)</b> This element defines only the protective coating on those parts of steel piles and that can be inspected, including underwater inspection if appropriate.	<b>m<sup>2</sup></b> of exposed surface area
<b>PASG</b>	<b>Protective Coating – Abutment Sheeting / Gravel Board</b> This element defines only the protective coating on the abutment sheeting/Gravel Boards made of steel. The vertical steel supports are treated as steel piles.	<b>m<sup>2</sup></b> of exposed surface area
<b>POGD</b>	<b>Protective Coating - Open Grid Deck</b> This element defines only the protective coating on those bridge decks that are constructed of steel grids and are open and unfilled.	<b>m<sup>2</sup></b> of exposed surface area
<b>PBPD</b>	<b>Protective Coating - Buckle Plate Deck</b> This element defines the protective coating on those bridge decks that are constructed of steel buckle plates.	<b>m<sup>2</sup></b> of exposed surface area
<b>PCOD</b>	<b>Protective Coating - Corrugated/Orthotropic/Etc. Deck</b> This element defines only the protective coating on those bridge decks that are constructed of corrugated metal filled with Portland cement concrete or asphaltic concrete or an orthotropic steel deck. The orthotropic deck may be covered with asphaltic concrete.	<b>m<sup>2</sup></b> of exposed surface area
<b>PCBT</b>	<b>Protective Coating - Cables/Hangers/Tension Ties (Not Embedded In Concrete)</b> This element defines only the protective coating including galvanising, painting, wrapping with grease or a protective outer wrapper on those steel cables, hangers and other tension ties (cables or rods) excluding steel bracings and steel tension members in trusses. This element includes the anchorages and other supports associated with the cables/ties that are not embedded in concrete.	<b>each</b>

## STEEL PROTECTIVE COATING ELEMENTS

For each of the condition states, report the estimated area in square metres.

### Condition state descriptions

Condition State	Description
1	The protective coating is generally sound and unbroken. Some chalking or water staining may be evident.
2	<p>The protective coating is exhibiting:</p> <ul style="list-style-type: none"> <li>○ Minor speckled white or red rusting, and/or</li> <li>○ Localised pinhead rusting, and/or</li> <li>○ Localised peeling and/or flaking</li> </ul> <p>The top coat may exhibit one or more of the following conditions:</p> <ul style="list-style-type: none"> <li>○ Loss of thickness;</li> <li>○ Primer exposed over localised areas (except for lead primer)</li> <li>○ Shrinkage lines – minor localised splitting;</li> <li>○ Surface checking with slight localised splitting;</li> <li>○ Minor unbroken blistering.</li> </ul> <p>Rivets may be exposed at scattered locations.</p>
3	<p>The protective coating is exhibiting:</p> <ul style="list-style-type: none"> <li>○ Speckled white rusting in areas &gt;2% and &lt;5% of affected surface area,</li> <li>○ Speckled red rusting in areas &gt;0.5% and &lt;5% of affected surface area;</li> </ul> <p>The top coat may exhibit one or more of the following conditions:</p> <ul style="list-style-type: none"> <li>○ Primer exposed over large areas or in the case of lead primer, local areas</li> <li>○ Splitting;</li> <li>○ Peeling (loss of adhesion);</li> <li>○ Heavily checked;</li> <li>○ Blistering over large areas.</li> </ul> <p>Numerous rivets may be exposed.</p>
4	<p>The protective coating is no longer effective, signs include:</p> <ul style="list-style-type: none"> <li>○ Speckled rust &gt;5% (red and white) in affected areas.</li> <li>○ Failure of primer over large areas.</li> </ul>

**Key Areas to inspect** for any cracking, corrosion and other deterioration signs:

1. Edges of members
2. Connections
3. Splice Plates

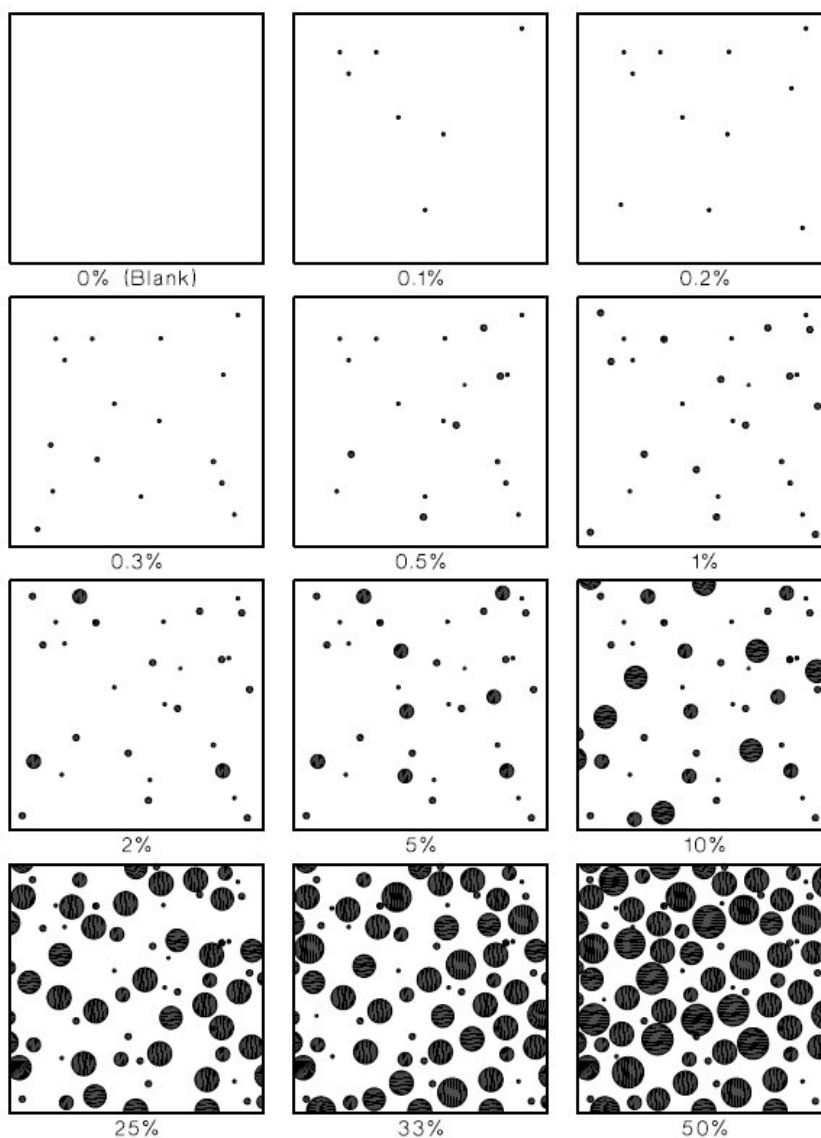
**Rating Guidance Notes:**

Checking is defined as crocodile cracking

For further guidance please see next page.

**Rating Guidance Notes:**

To assist with the estimation of percentages of typical rust formation in painted steel elements, a diagram from the Australian Standards AS/NZ 2312 : 2002 is given below.



Schematic diagrammatic examples of estimating rust percentages  
(From AS/NZS 2312 : 2002)

Different parts of an element can be in different paint condition states. Consider the affected areas of the element and estimate the areas that have reached the condition definitions.

## Steel Protective Coating Elements

## All Steel Elements

### Condition State 1

The protective coating is generally sound and unbroken. Some chalking or water staining may be evident.



Water staining evident but coating in good condition.



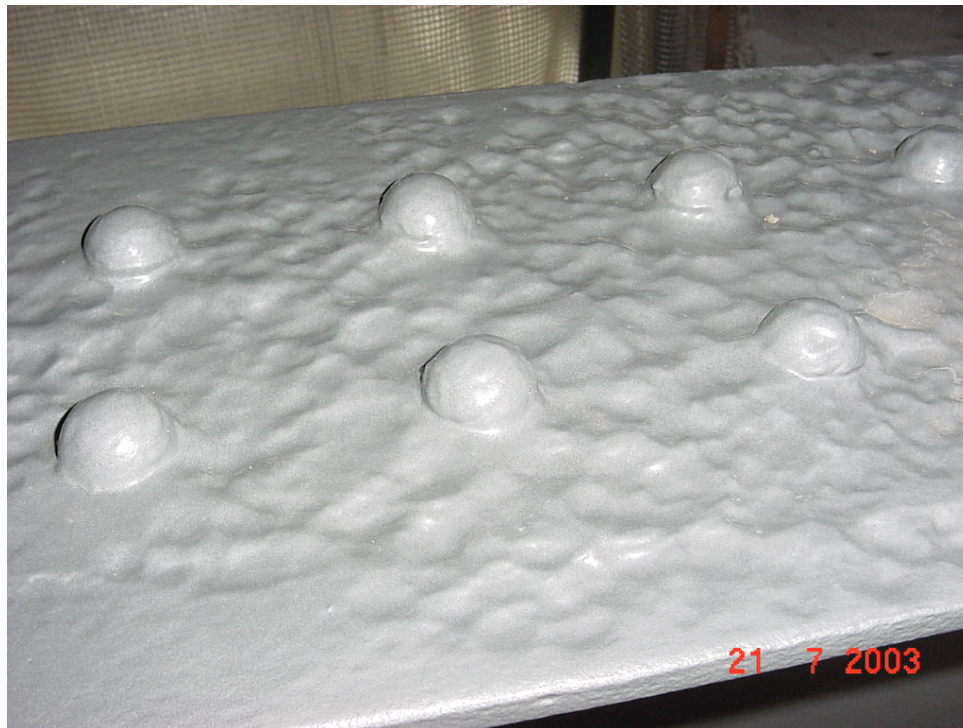
Coating in near new condition.

## Steel Protective Coating Elements

## All Steel Elements

### Condition State 1

The protective coating is generally sound and unbroken. Some chalking or water staining may be evident.



Coating in near new condition.



Coating in near new condition.

## Steel Protective Coating Elements

## All Steel Elements

**Condition State 2** - The protective coating is exhibiting minor speckled white or red rusting, and/or localised pinhead rusting, and/or localised peeling and/or flaking. The top coat may exhibit one or more of the following conditions: loss of thickness; primer exposed over localised areas (except for lead primer); shrinkage lines – minor localised splitting; surface checking with slight localised splitting; minor unbroken blistering. Rivets may be exposed at scattered locations.



Localised breakdown at end of girder.



Localised breakdown of zinc primer (white salts evident) on edges of girder.

## Steel Protective Coating Elements

## All Steel Elements

**Condition State 2** - The protective coating is exhibiting minor speckled white or red rusting, and/or localised pinhead rusting, and/or localised peeling and/or flaking. The top coat may exhibit one or more of the following conditions: loss of thickness; primer exposed over localised areas (except for lead primer); shrinkage lines – minor localised splitting; surface checking with slight localised splitting; minor unbroken blistering. Rivets may be exposed at scattered locations.



Localised failure of zinc primer with white salts evident.



Localised patches of topcoat breakdown.

## Steel Protective Coating Elements

## All Steel Elements

**Condition State 2** - The protective coating is exhibiting minor speckled white or red rusting, and/or localised pinhead rusting, and/or localised peeling and/or flaking. The top coat may exhibit one or more of the following conditions: loss of thickness; primer exposed over localised areas (except for lead primer); shrinkage lines – minor localised splitting; surface checking with slight localised splitting; minor unbroken blistering. Rivets may be exposed at scattered locations.



Blistering of topcoat.



Localised failure of zinc primer.

## Steel Protective Coating Elements

## All Steel Elements

**Condition State 3** - The protective coating is exhibiting speckled white rusting in areas  $>2\%$  and  $<5\%$  of affected surface area, and/or speckled red rusting in areas  $>0.5\%$  and  $<5\%$  of affected surface area. The top coat may exhibit one or more of the following conditions: primer exposed over large areas or in the case of lead primer, local areas; splitting; peeling (loss of adhesion); heavily checked; blistering over large areas. Numerous rivets may be exposed.



Failed patch of top coat.



Primer and top coat breakdown over large areas.

## Steel Protective Coating Elements

## All Steel Elements

**Condition State 3** - The protective coating is exhibiting speckled white rusting in areas  $>2\%$  and  $<5\%$  of affected surface area, and/or speckled red rusting in areas  $>0.5\%$  and  $<5\%$  of affected surface area. The top coat may exhibit one or more of the following conditions: primer exposed over large areas or in the case of lead primer, local areas; splitting; peeling (loss of adhesion); heavily checked; blistering over large areas. Numerous rivets may be exposed.



Zinc primer failure on all cross members.



Breakdown of top coat with primer exposed over large areas.

## Steel Protective Coating Elements

## All Steel Elements

**Condition State 3** - The protective coating is exhibiting speckled white rusting in areas >2% and <5% of affected surface area, and/or speckled red rusting in areas >0.5% and <5% of affected surface area. The top coat may exhibit one or more of the following conditions: primer exposed over large areas or in the case of lead primer, local areas; splitting; peeling (loss of adhesion); heavily checked; blistering over large areas. Numerous rivets may be exposed.



Breakdown of top coat with primer exposed over large areas.



Deterioration of entire topcoat.

## Steel Protective Coating Elements

## All Steel Elements

**Condition State 3** - The protective coating is exhibiting speckled white rusting in areas  $>2\%$  and  $<5\%$  of affected surface area, and/or speckled red rusting in areas  $>0.5\%$  and  $<5\%$  of affected surface area. The top coat may exhibit one or more of the following conditions: primer exposed over large areas or in the case of lead primer, local areas; splitting; peeling (loss of adhesion); heavily checked; blistering over large areas. Numerous rivets may be exposed.



Large areas of topcoat deterioration with primer exposed.



Large areas of topcoat deterioration with primer exposed.

## Steel Protective Coating Elements

## All Steel Elements

**Condition State 3** - The protective coating is exhibiting speckled white rusting in areas >2% and <5% of affected surface area, and/or speckled red rusting in areas >0.5% and <5% of affected surface area. The top coat may exhibit one or more of the following conditions: primer exposed over large areas or in the case of lead primer, local areas; splitting; peeling (loss of adhesion); heavily checked; blistering over large areas. Numerous rivets may be exposed.



Large areas of topcoat deterioration with primer exposed.



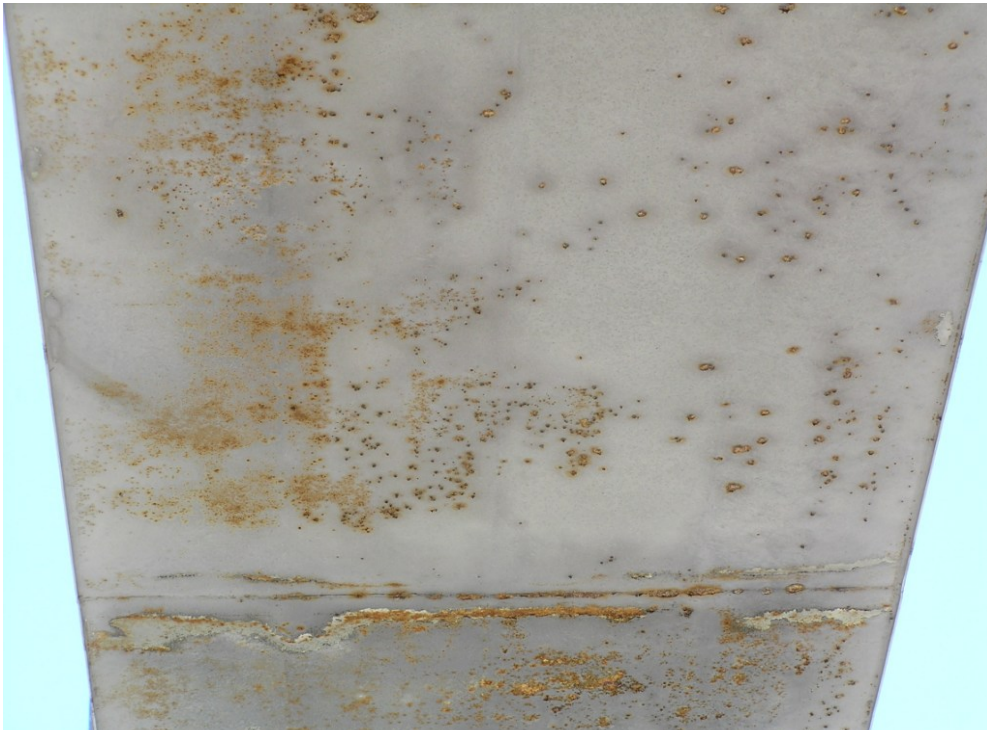
Large areas of topcoat deterioration with primer exposed.

## Steel Protective Coating Elements

## All Steel Elements

### Condition State 4

The protective coating is no longer effective, signs include speckled rust >5% (red and white) in affected areas and/or failure of primer over large areas



Extensive speckled red rust, coating no longer protecting steel.



Large areas of delaminated coating. No longer providing effective protection.

## Steel Protective Coating Elements

## All Steel Elements

### Condition State 4

The protective coating is no longer effective, signs include speckled rust >5% (red and white) in affected areas and/or failure of primer over large areas



Coating no longer present.



Failed coating and significant corrosion of pier bracing.

## Steel Protective Coating Elements

## All Steel Elements

### Condition State 4

The protective coating is no longer effective, signs include speckled rust >5% (red and white) in affected areas and/or failure of primer over large areas



Coating no longer present.



Coating no longer present.



Transport  
Roads & Maritime  
Services

# BRIDGE INSPECTION PROCEDURE MANUAL

## Timber Elements

# **Timber Truss Elements**

## Timber Elements of Timber Trusses

Element	Description	Units
<b>TPCH</b>	<b>Timber Truss - Principal/Top Chord/Bottom Chord</b> This element defines only timber truss principals/top chords/bottom chords. <i>Note - Count whole principals, top chords and bottom chords, not pieces of timber which are parts of principals, top chords and bottom chords.</i>	Each
<b>TSTT</b>	<b>Timber Truss - Strut</b> This element defines only timber truss struts (compression diagonals, compression verticals and upper lateral struts). <i>Note - Count whole struts, not pieces of timber which are parts of struts.</i>	Each
<b>TBJB</b>	<b>Timber Truss - Butting Block/Jacking Block</b> This element defines only butting blocks/jacking blocks in timber trusses.	Each
<b>TTCG</b>	<b>Timber Truss - Cross Girder</b> This element defines only timber cross girders in timber truss bridges.	Each
<b>TSTR</b>	<b>Timber Truss - Stringer</b> This element defines only stringers in a timber truss bridge.	Each truss bay length between cross girders

For each of condition states 1 to 4, report the estimated quantity of each element in its corresponding unit of measurement.

### Condition state descriptions

Condition state	Description
1	The timber is in good condition with no evidence of decay. There may be cracks, splits and checks having no effect on strength or serviceability. All connections are in good condition and bolts are tight.
2	Minor decay, insect infestation, splitting, cracking, checking or crushing may exist but none is sufficiently advanced to affect serviceability. Joint connections may be slightly loose but does not affect the serviceability.
3	Medium decay, insect infestation, splitting, cracking or crushing has produced loss of strength of the element but not of a sufficient magnitude to affect the serviceability of the bridge. Joint connections may be slightly loose but the serviceability of the bridge is not significantly affected.
4	Advanced deterioration. Heavy decay, insect infestation, splits, cracks or crushing has produced loss of strength that affects the serviceability of the bridge. Connections are very loose causing large movements, bolts are corroded and ineffective or missing, and the serviceability of the bridge is affected.

### Key Areas to inspect:

1. Alignment of the whole truss and individual members.
2. Permanent slippage of truss members at the connections and/or at butting blocks with no vehicular load on the bridge.
3. Integrity of all connections and butting blocks with the movement of individual truss members and the overall sag of truss under a movement of a heavy vehicle.
4. Splice plates, keyways or shoes for timber deterioration

### Rating Guidance Notes:

As the visual appearance of timber elements can be deceptive, assessment of conditions must be made with sounding by hammer and confirmed with the judicious use of test boring if required.

When the four yearly test boring program is being carried out, flashing should be removed to allow inspection underneath the flashing.

## Timber Truss Elements

TPCH, TSTT, TBJB, TTCG, TSTR

### Condition State 1

The timber is in good condition with no evidence of decay. There may be cracks, splits and checks having no effect on strength or serviceability. All connections are in good condition and bolts are tight.



Timber truss in good condition.



Timber truss in good condition.

## Timber Truss Elements

TPCH, TSTT, TBJB, TTCG, TSTR

### Condition State 2

Minor decay, insect infestation, splitting, cracking, checking or crushing may exist but none is sufficiently advanced to affect serviceability.

Joint connections may be slightly loose but does not affect the serviceability.



Minor splits on the members of the butting block.



Slightly loose vertical splice bolts at top chord.

## Timber Truss Elements

## TPCH, TSTT, TBJB, TTCG, TSTR

### Condition State 2

Minor decay, insect infestation, splitting, cracking, checking or crushing may exist but none is sufficiently advanced to affect serviceability.

Joint connections may be slightly loose but does not affect the serviceability.



Minor decay on a strut.



Minor rot on a principal.

## Timber Truss Elements

TPCH, TSTT, TBJB, TTCG, TSTR

### Condition State 3

Medium decay, insect infestation, splitting, cracking or crushing has produced loss of strength of the element but not of a sufficient magnitude to affect the serviceability of the bridge. Joint connections may be slightly loose but the serviceability of the bridge is not significantly affected.



Significant piping in one of the members of the butting block.



Medium decay of the bottom chord.

## Timber Truss Elements

## TPCH, TSTT, TBJB, TTCG, TSTR

### Condition State 4

Advanced deterioration. Heavy decay, insect infestation, splits, cracks or crushing has produced loss of strength that affects the serviceability of the bridge. Connections are very loose causing large movements, bolts are corroded and ineffective or missing, and the serviceability of the bridge is affected.



Significant out of alignment of the top chord with major decay.



Badly rotten top chord crushing near the support of steel verticals.

## Timber Truss Elements

## TPCH, TSTT, TBJB, TTCG, TSTR

### Condition State 4

Advanced deterioration. Heavy decay, insect infestation, splits, cracks or crushing has produced loss of strength that affects the serviceability of the bridge. Connections are very loose causing large movements, bolts are corroded and ineffective or missing, and the serviceability of the bridge is affected.



Major rot on end of top chord with crushing of timber and tilting of tension rod bearings.



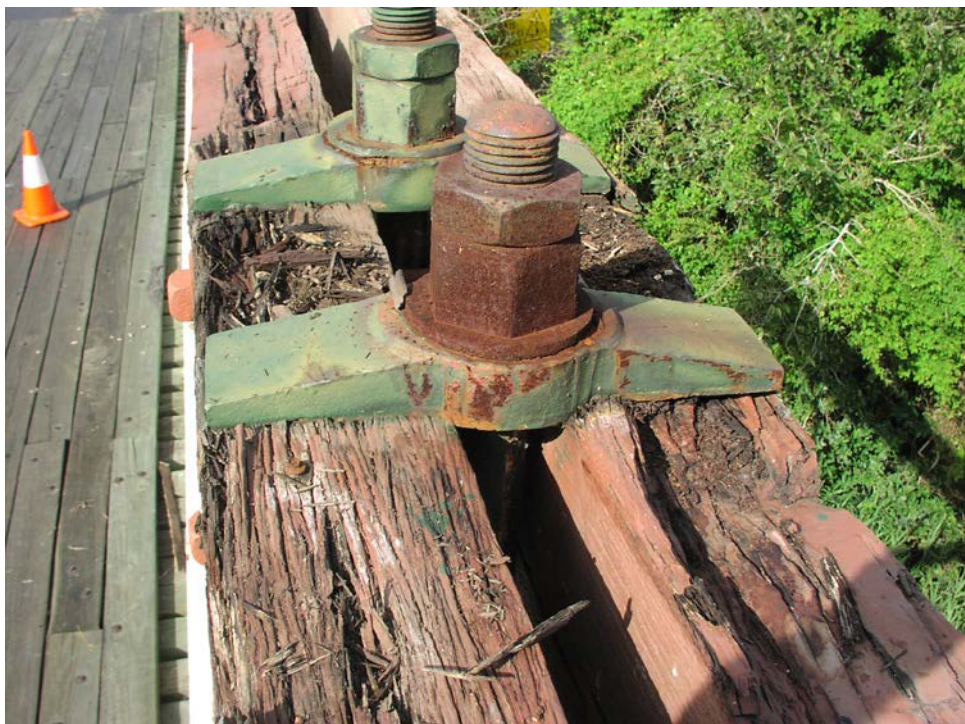
Badly split and rotting top chord.

### Timber Truss Elements

### TPCH, TSTT, TBJB, TTCG, TSTR

#### Condition State 4

Advanced deterioration. Heavy decay, insect infestation, splits, cracks or crushing has produced loss of strength that affects the serviceability of the bridge. Connections are very loose causing large movements, bolts are corroded and ineffective or missing, and the serviceability of the bridge is affected.



Heavy decay of the top chord.



Significant crushing of the top chord.

## Timber Truss Elements

TPCH, TSTT, TBJB, TTCG, TSTR

### Condition State 4

Advanced deterioration. Heavy decay, insect infestation, splits, cracks or crushing has produced loss of strength that affects the serviceability of the bridge. Connections are very loose causing large movements, bolts are corroded and ineffective or missing, and the serviceability of the bridge is affected.



Major rot near the bottom of the principal.



Advanced decay of principals

### Timber Truss Elements

### TPCH, TSTT, TBJB, TTCG, TSTR

#### Condition State 4

Advanced deterioration. Heavy decay, insect infestation, splits, cracks or crushing has produced loss of strength that affects the serviceability of the bridge. Connections are very loose causing large movements, bolts are corroded and ineffective or missing, and the serviceability of the bridge is affected.



Rot on the principal



Failed diagonal strut flitch.

## Timber Truss Elements

TPCH, TSTT, TBJB, TTCG, TSTR

### Condition State 4

Advanced deterioration. Heavy decay, insect infestation, splits, cracks or crushing has produced loss of strength that affects the serviceability of the bridge. Connections are very loose causing large movements, bolts are corroded and ineffective or missing, and the serviceability of the bridge is affected.



Rotting at the bottom chord flitch at the splice.



Rotten section of bottom chord.

## Timber Truss Elements

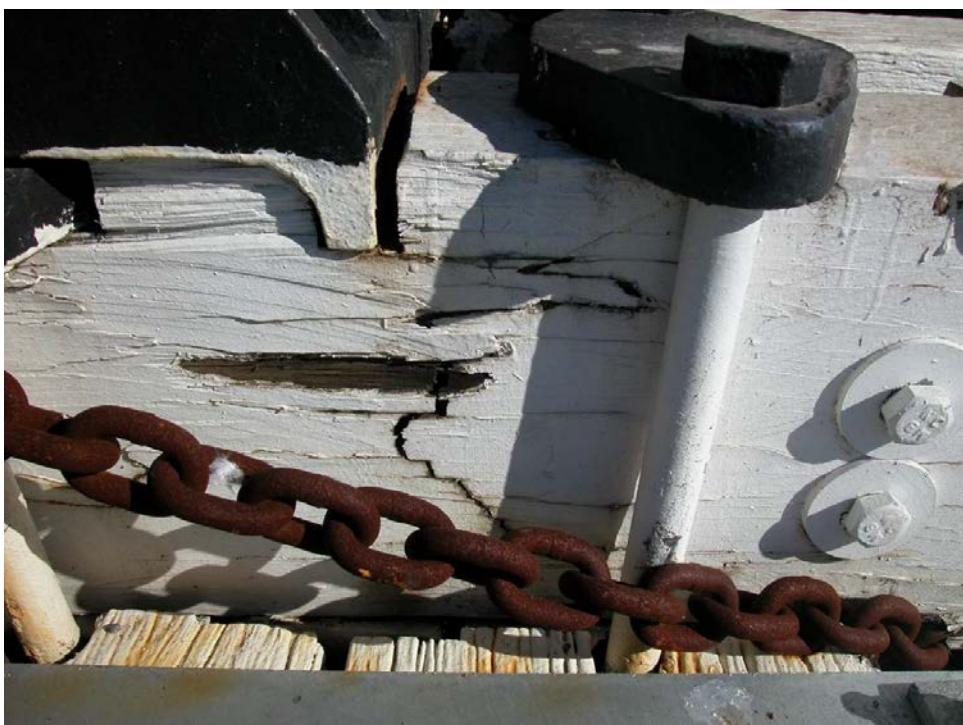
## TPCH, TSTT, TBJB, TTCG, TSTR

### Condition State 4

Advanced deterioration. Heavy decay, insect infestation, splits, cracks or crushing has produced loss of strength that affects the serviceability of the bridge. Connections are very loose causing large movements, bolts are corroded and ineffective or missing, and the serviceability of the bridge is affected.



Bottom chord crushing and splitting.



Failure of a timber bottom chord in tension.

## Timber Truss Elements

TPCH, TSTT, TBJB, TTCG, TSTR

### Condition State 4

Advanced deterioration. Heavy decay, insect infestation, splits, cracks or crushing has produced loss of strength that affects the serviceability of the bridge. Connections are very loose causing large movements, bolts are corroded and ineffective or missing, and the serviceability of the bridge is affected.



Badly rotten butting block.



Integrity of the shear key is doubtful with significant separation of the butting block members.

### Timber Truss Elements

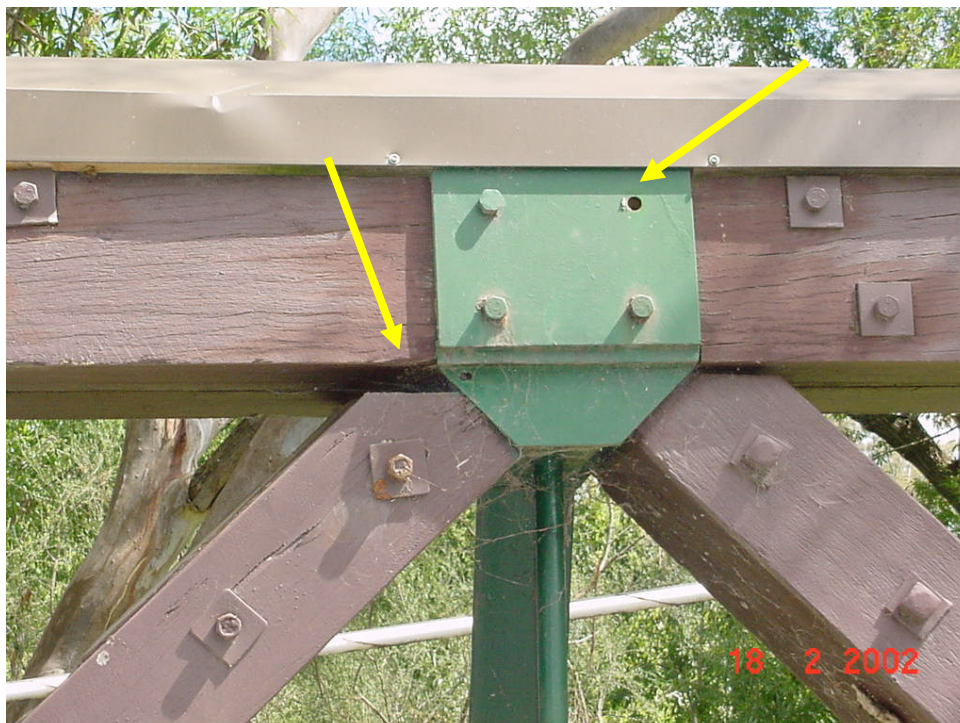
### TPCH, TSTT, TBJB, TTCG, TSTR

#### Condition State 4

Advanced deterioration. Heavy decay, insect infestation, splits, cracks or crushing has produced loss of strength that affects the serviceability of the bridge. Connections are very loose causing large movements, bolts are corroded and ineffective or missing, and the serviceability of the bridge is affected.



Timber strut in good condition has partially slipped off the joint. The movement is significant to affect the serviceability of truss.



Unsound connection with slipping strut member and missing bolt.

## Timber Truss Elements

TPCH, TSTT, TBJB, TTCG, TSTR

### Condition State 4

Advanced deterioration. Heavy decay, insect infestation, splits, cracks or crushing has produced loss of strength that affects the serviceability of the bridge. Connections are very loose causing large movements, bolts are corroded and ineffective or missing, and the serviceability of the bridge is affected.



Badly split and cracked cross girder.

## **Timber Truss - Steel Bottom Chord**

## Timber Truss - Steel Bottom Chord

TSBC

Units: Each

This element defines only steel bottom chords in timber trusses. For each of condition states 1 to 4, report the estimated number of steel bottom chords of timber trusses. (Note - Count whole steel bottom chords, not parts of steel bottom chords.)

### Condition state descriptions

Condition State	Description
1	There is no evidence of section loss or damage or cracking.
2	Surface rust or minor pitting has formed or is forming. There is no measurable loss of section. There may be minor deformations that do not affect the integrity of the element. There are no cracks in the steel or welds. All connectors are in sound condition.
3	Heavy pitting may be present. Some measurable section loss is present locally. There are no cracks in the steel or welds. There may be localised failure of connectors.
4	Significant section loss may be present. There may be cracks and/or deformations in the steel or welds. There may be numerous failed connectors.

### Key Areas to inspect:

1. Connections
2. End plates
3. Cross girder saddles
4. Weep holes
5. Flood damage
6. Alignment

### Rating Guidance Notes:

Defects are defined as notches, gauges or discontinuities.  
Deformations are defined as buckled plate, bent members or sections  
Section loss is defined as loss of original metal.

## Timber Truss - Steel Bottom Chord

TSBC

### Condition State 1

There is no evidence of section loss or damage or cracking.



Bottom chord in good condition.

## Timber Truss - Steel Bottom Chord

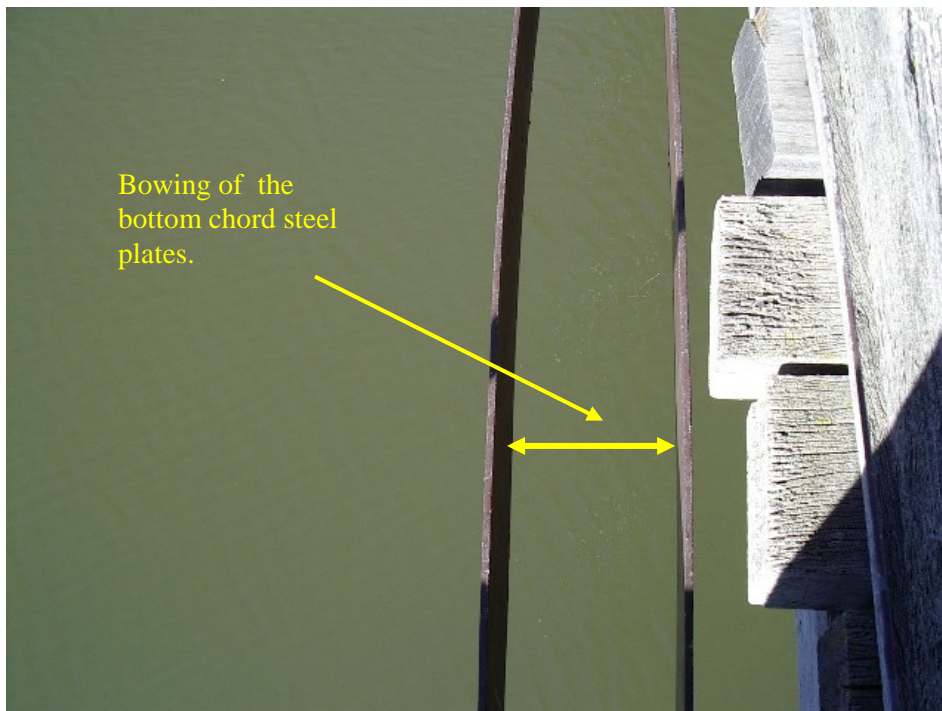
TSBC

### Condition State 2

Surface rust or minor pitting has formed or is forming. There is no measurable loss of section. There may be minor deformations that do not affect the integrity of the element. There are no cracks in the steel or welds. All connectors are in sound condition.



Surface rust and minor pitting at the bottom.



Bowing of the steel bottom chord in tension.

## Timber Truss - Steel Bottom Chord

TSBC

### Condition State 3

Heavy pitting may be present. Some measurable section loss is present locally. There are no cracks in the steel or welds. There may be localised failure of connectors.



Number of rivet heads missing

## Timber Truss - Steel Bottom Chord

TSBC

### Condition State 4

Significant section loss may be present. There may be cracks and/or deformations in the steel or welds. There may be numerous failed connectors.



Heavy corrosion.



Heavy pitting and the bolt heads corroding away.

## **Timber Truss – Tie / Kingbolt (Steel)**

## Timber Truss – Tie / Kingbolt (Steel)

**TTIE**

Units: Each

This element defines only steel or wrought iron ties (suspension rods) in timber trusses. For each of condition states 1 to 4, report the estimated number of ties. (Note - Count whole ties, not rods which are parts of ties.)

### Condition state descriptions

Condition State	Description
1	The camber of the bottom chord is correct. There is no evidence of section loss.
2	The camber of the bottom chord is correct. Surface rust or minor pitting has formed or is forming. There is no measurable loss of section. There may be minor deformations that do not affect the integrity of the element. There are no cracks in the steel or welds. All connectors are in sound condition.
3	Suspension rods may need to be tightened to restore camber of bottom chords. Heavy pitting may be present. Some measurable section loss or necking is present locally. There are no cracks in the steel or welds. There may be missing locknuts but all connectors are in sound condition.
4	Suspension rods may need to be replaced to restore camber of bottom chord. Significant section loss may be present. There may be cracks and/or deformations in the steel or welds. There may be failed connectors. The bolts may have stretched.

### Key Areas to inspect:

1. Locknuts
2. Area of tie inside bottom shoe

### Rating Guidance Notes:

## Timber Truss – Tie / Kingbolt (Steel)

TTIE

### Condition State 1

The camber of the bottom chord is correct. There is no evidence of section loss.



Tie rods in good condition.



Tie rods in good condition.

## Timber Truss – Tie / Kingbolt (Steel)

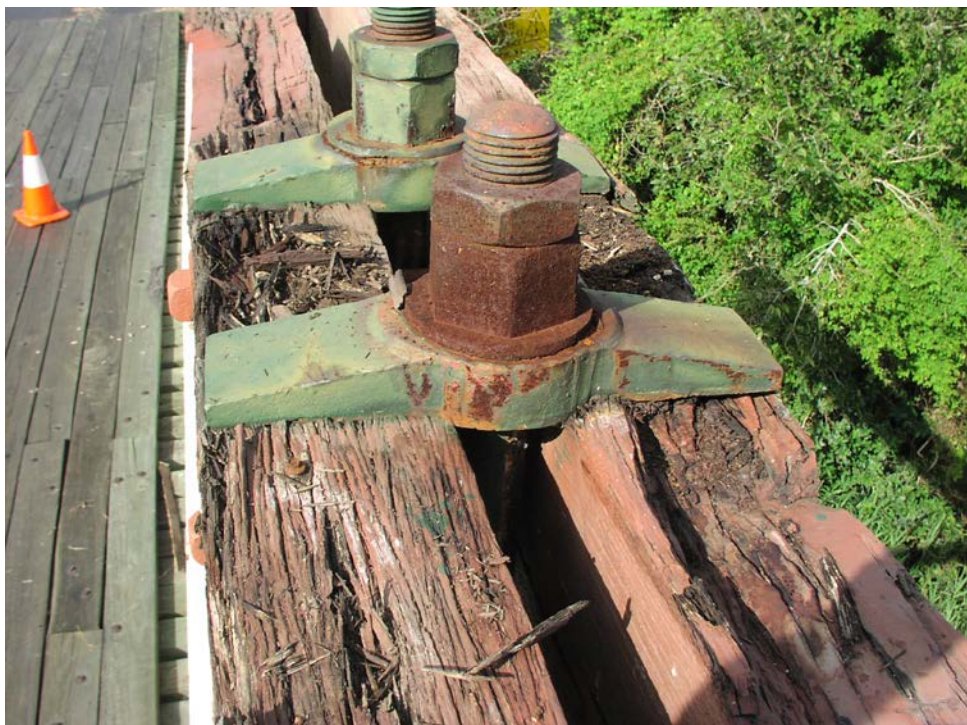
TTIE

### Condition State 2

The camber of the bottom chord is correct. Surface rust or minor pitting has formed or is forming. There is no measurable loss of section. There may be minor deformations that do not affect the integrity of the element. There are no cracks in the steel or welds. All connectors are in sound condition.



Surface rust is forming.



Corrosion of nuts and surface rust on tie bearings

## Timber Truss – Tie / Kingbolt (Steel)

TTIE

### Condition State 3

Suspension rods may need to be tightened to restore camber of bottom chords. Heavy pitting may be present. Some measurable section loss or necking is present locally. There are no cracks in the steel or welds. There may be missing locknuts but all connectors are in sound condition.



Minor to moderate corrosion.

## Timber Truss – Tie / Kingbolt (Steel)

TTIE

### Condition State 4

Suspension rods may need to be replaced to restore camber of bottom chord. Significant section loss may be present. There may be cracks and/or deformations in the steel or welds. There may be failed connectors. The bolts may have stretched.



Advanced corrosion with significant loss of section.

## **Timber Truss - Brace/Undertrussing**

## Timber Truss - Brace/Undertrussing

Units: Each

This element defines only side and wind braces and undertrussing rods and wires in timber trusses. For each of condition states 1 to 4, report the estimated number of braces.

### Condition state descriptions

Condition State	Description
1	The bracing/undertrussing is tight. There is no evidence of section loss.
2	The bracing/undertrussing is tight. Surface rust or minor pitting has formed or is forming. There is no measurable loss of section. There may be minor deformations that do not affect the integrity of the element. There are no cracks in the steel or welds. All connectors are in sound condition.
3	The bracing/undertrussing may need to be tightened. Heavy pitting may be present. Some measurable section loss or necking is present locally. There are no cracks and only minor deformations in the steel or welds. There may be localised failure of or occasional missing connectors.
4	The bracing/undertrussing may need to be replaced. Corrosion is advanced. Significant section loss may be present. There may be cracks and/or deformations in the steel or welds. There may be numerous failed or missing connectors.

### Key Areas to inspect:

1. End connection to bottom chords
2. Transition between threaded and unthreaded section

### Rating Guidance Notes:

## Timber Truss – Brace/undertrussing

TSBR

### Condition State 1

The bracing/undertrussing is tight. There is no evidence of section loss.



Bracing in good condition.

## Timber Truss – Brace/undertrussing

TSBR

### Condition State 2

The bracing/undertrussing is tight. Surface rust or minor pitting has formed or is forming. There is no measurable loss of section. There may be minor deformations that do not affect the integrity of the element. There are no cracks in the steel or welds. All connectors are in sound condition.

## Timber Truss – Brace/undertrussing

TSBR

### Condition State 3

The bracing/undertrussing may need to be tightened. Heavy pitting may be present. Some measurable section loss or necking is present locally. There are no cracks and only minor deformations in the steel or welds. There may be localised failure of or occasional missing connectors.



Brace tie rods with missing clips on pins.

## Timber Truss – Brace/undertrussing

TSBR

### Condition State 4

The bracing/undertrussing may need to be replaced. Corrosion is advanced. Significant section loss may be present. There may be cracks and/or deformations in the steel or welds. There may be numerous failed or missing connectors.

## **Timber Truss - Metal Shoe**

## Timber Truss - Metal Shoe

TSHO

Units: Each

This element defines only metal shoes in timber trusses. For each of condition states 1 to 4, report the estimated number of metal shoes.

### Condition state descriptions

Condition State	Description
1	There is no evidence of section loss or damage or cracks.
2	Surface rust or minor pitting has formed or is forming. There is no measurable loss of section. There may be minor deformations that do not affect the integrity of the element. There are no cracks in the steel or welds. All connectors are in sound condition.
3	Heavy pitting may be present. Some measurable section loss is present locally. There may be minor cracks and/or deformations in the steel or welds. All connectors are in sound condition.
4	Significant section loss may be present. There may be cracks and/or deformations in the steel or welds. There may be numerous failed connectors.

### Key Areas to inspect:

1. Cracks in middle of the shoes

### Rating Guidance Notes:

## Timber Truss – Metal Shoe

TSHO

### Condition State 1

There is no evidence of section loss or damage or cracks.



Metal shoe in good condition.



No evidence of corrosion.

## Timber Truss – Metal Shoe

TSHO

### Condition State 2

Surface rust or minor pitting has formed or is forming. There is no measurable loss of section. There may be minor deformations that do not affect the integrity of the element. There are no cracks in the steel or welds. All connectors are in sound condition.



Shoe showing surface rust and minor pitting.

## Timber Truss – Metal Shoe

TSHO

### Condition State 3

Heavy pitting may be present. Some measurable section loss is present locally. There may be minor cracks and/or deformations in the steel or welds. All connectors are in sound condition.



Crack on the shoe.



Cracked shoe.

## Timber Truss – Metal Shoe

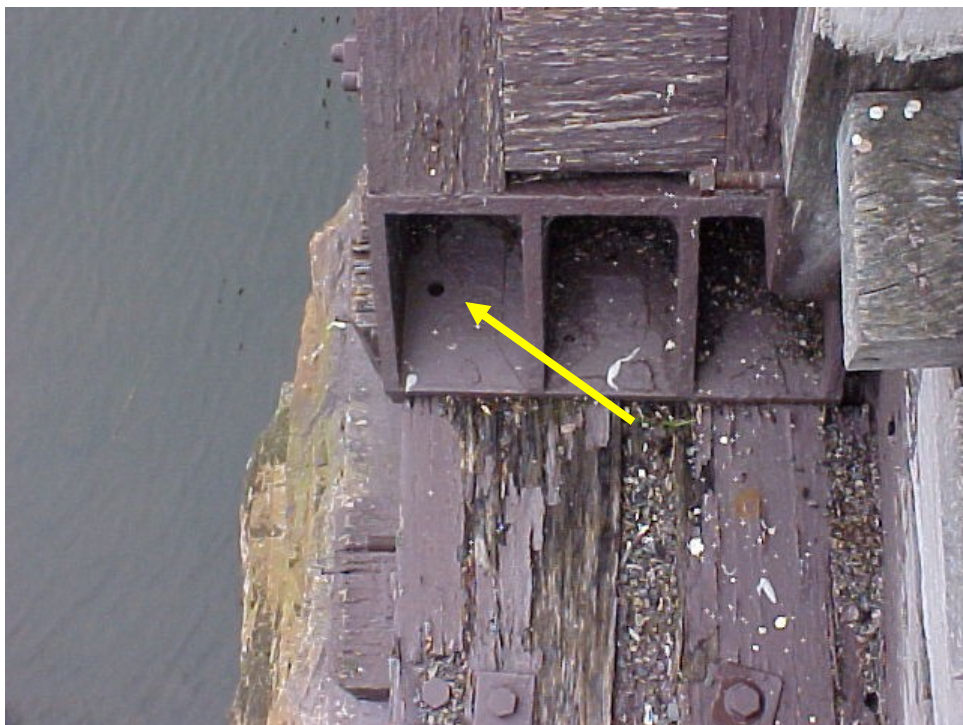
TSHO

### Condition State 4

Significant section loss may be present. There may be cracks and/or deformations in the steel or welds. There may be numerous failed connectors.



Broken shoe.



Bolt missing

# Timber Protective System

## Timber - Protective System

TPRS

Units: m of bridge

This element defines only the protective system comprising any flashing, paint work, termite and fungicide or other protective treatment on timber bridges. This element does not include protective treatment of timber barriers.

For each of condition states 1 to 4, report the estimated lineal metres of bridge.

### Condition state descriptions

Condition state	Description
1	The protective system is sound and functioning as intended to protect the timber and metal.
2	The protective system may be chalking, peeling, checking or showing other early evidence of distress but there is no exposure of timber or metal.
3	The protective system is no longer effective on significant areas. There may be exposed timber or metal or early signs of fungal decay or termite infestation.
4	The protective system has failed.

### Key Areas to inspect:

1. Ends of timber members such as cross girders
2. Joints between timber members
3. Members where water can be trapped
4. Hidden parts of members such as behind shoes

### Rating Guidance Notes:

Flashing is not structural metal.

## Timber - Protective System

TPRS

### Condition State 1

The protective system is sound and functioning as intended to protect the timber and metal.



Truss paint in good condition.



Truss paint and flashing in good condition.

## Timber - Protective System

TPRS

### Condition State 2

The protective system may be chalking, peeling, checking or showing other early evidence of distress but there is no exposure of timber or metal.

## Timber - Protective System

TPRS

### Condition State 3

The protective system is no longer effective on significant areas. There may be exposed timber or metal or early signs of fungal decay or termite infestation.



Coating has failed in significant areas.



Coating has failed in significant areas.

## Timber - Protective System

TPRS

### Condition State 4

The protective system has failed.



Paint has failed and timber is deteriorating.

## **Other Timber Elements**

## Other Timber Elements

Element	Description	Units
<b>TGCG</b>	<b>Timber- Girder/Cross Girder (Beam Bridge)</b> This element defines only girders/cross girders in a timber beam bridge.	<b>Each</b>
<b>TCHS</b>	<b>Timber-Capwale/Headstock/Sill</b> This element defines only those capwales/headstocks/sills of timber construction.	<b>Each</b>
<b>TPIL</b>	<b>Timber - Pile</b> This element defines only those parts of timber piles down to 1 metre below ground level, including underwater inspection if appropriate.	<b>Each</b>
<b>TCOR</b>	<b>Timber-Corbel</b> This element defines only timber corbels.	<b>Each</b>
<b>TWBR</b>	<b>Timber Wale/Brace</b> This element defines only those wales/braces of timber construction.	<b>Each</b>
<b>TASG</b>	<b>Timber-Abutment Sheeting/Gravel Board</b> This element defines only abutment sheeting/gravel boards constructed of timber.	<b>m2</b> of exposed area
<b>TTDK</b>	<b>Timber - Transverse Deck Plank</b> This element defines only transverse deck planks constructed of timber.	<b>m2</b> of plan area
<b>TLSH</b>	<b>Timber - Longitudinal Sheeting/Decking</b> This element defines only longitudinal sheeting/decking constructed of timber.	<b>m2</b> of plan area

For each of condition states 1 to 4, report the estimated quantity of each element in its corresponding unit of measurement.

### Condition state descriptions

Condition state	Description
1	The timber is in good condition with no evidence of decay. There may be cracks, splits and checks having no effect on strength or serviceability.
2	Minor decay, insect infestation, splitting, cracking, checking or crushing may exist but none is sufficiently advanced to affect serviceability.
3	Medium decay, insect infestation, splitting, cracking or crushing has produced loss of strength of the element but not of a sufficient magnitude to affect the serviceability of the bridge.
4	Advanced deterioration. Heavy decay, insect infestation, splits, cracks or crushing has produced loss of strength that affects the serviceability of the bridge.

### Key Areas to inspect:

1. At and near interfaces of two timber members joined together or transfer load through bearing, especially where exposed to water or moisture.

### Rating Guidance Notes:

As the visual appearance of timber elements can be deceptive, assessment of conditions must be made with sounding by hammer and confirmed with the judicious use of test boring if required.

When the four yearly test boring program is being carried out, flashing should be removed to allow inspection underneath the flashing.

## Timber- Girder/Cross Girder

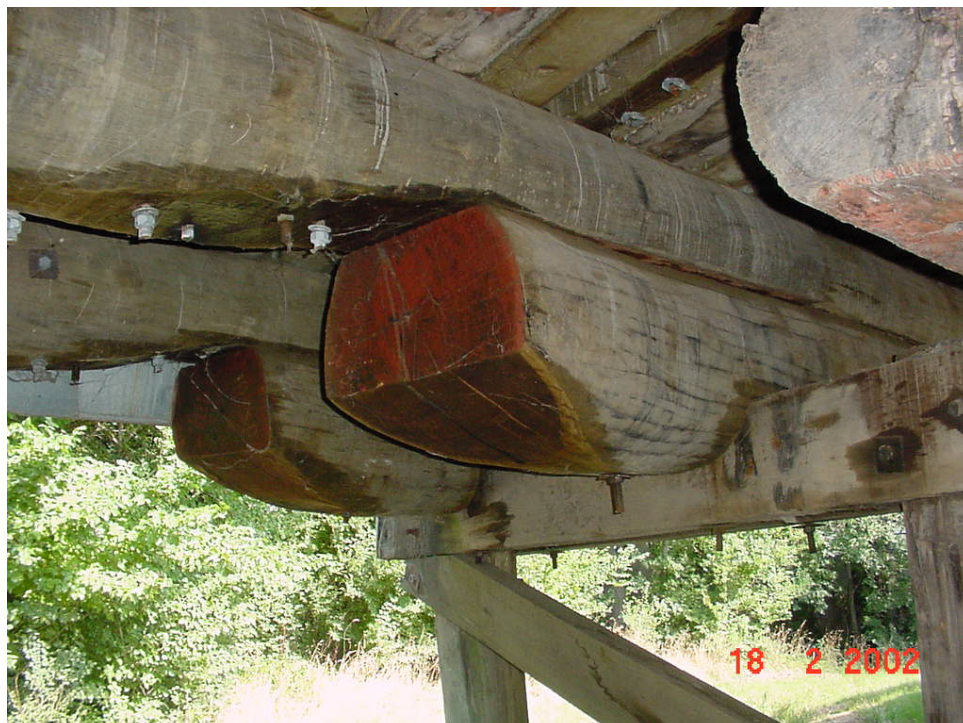
TGCG

### Condition State 1

The timber is in good condition with no evidence of decay. There may be cracks, splits and checks having no effect on strength or serviceability.



Timber girders in good condition.



Girders and corbels in good condition.

## Timber- Girder/Cross Girder

TGCG

### Condition State 2

Minor decay, insect infestation, splitting, cracking, checking or crushing may exist but none is sufficiently advanced to affect serviceability.



Minor split on the girder.

## Timber- Girder/Cross Girder

TGCG

### Condition State 3

Medium decay, insect infestation, splitting, cracking or crushing has produced loss of strength of the element but not of a sufficient magnitude to affect the serviceability of the bridge.



Vertically split girder with other horizontal splits at the snipe.



Split and checks

## Timber- Girder/Cross Girder

### Condition State 4

Advanced deterioration. Heavy decay, insect infestation, splits, cracks or crushing has produced loss of strength that affects the serviceability of the bridge.



Girders in poor condition with heavy splits and checks.



Broken girder.

## Timber-Capwale/Headstock/Sill

TCHS

### Condition State 1

The timber is in good condition with no evidence of decay. There may be cracks, splits and checks having no effect on strength or serviceability.



## Timber-Capwale/Headstock/Sill

### Condition State 2

Minor decay, insect infestation, splitting, cracking, checking or crushing may exist but none is sufficiently advanced to affect serviceability.



Headstock with minor check.

## Timber-Capwale/Headstock/Sill

TCHS

### Condition State 3

Medium decay, insect infestation, splitting, cracking or crushing has produced loss of strength of the element but not of a sufficient magnitude to affect the serviceability of the bridge.



Medium rot and splitting of the headstock.

## Timber-Capwale/Headstock/Sill

### Condition State 4

Advanced deterioration. Heavy decay, insect infestation, splits, cracks or crushing has produced loss of strength that affects the serviceability of the bridge.



Badly rotten sill beam.



Badly rotten timber headstock.

## Timber-Capwale/Headstock/Sill

TCHS

### Condition State 4

Advanced deterioration. Heavy decay, insect infestation, splits, cracks or crushing has produced loss of strength that affects the serviceability of the bridge.



Timber headstock with significant crack under the girder.

## Timber- Piles

TPIL

### Condition State 1

The timber is in good condition with no evidence of decay. There may be cracks, splits and checks having no effect on strength or serviceability.



Timber piles in good condition.

## Timber- Piles

TPIL

### Condition State 2

Minor decay, insect infestation, splitting, cracking, checking or crushing may exist but none is sufficiently advanced to affect serviceability.



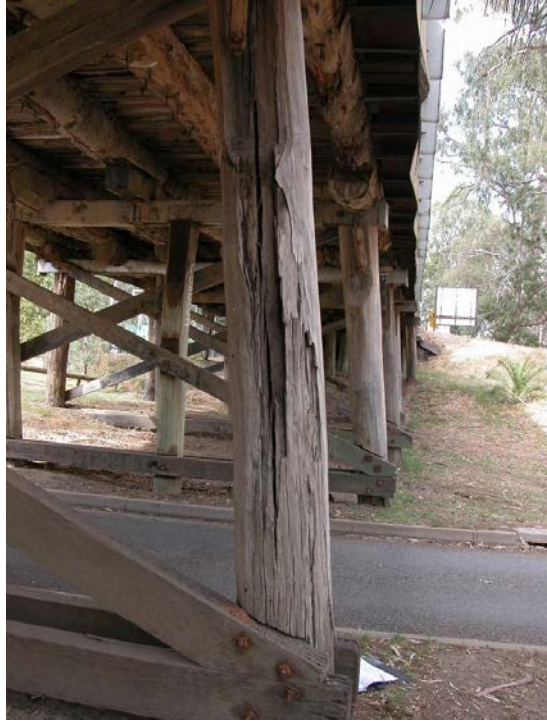
Minor split in the pile.

## Timber- Piles

TPIL

### Condition State 3

Medium decay, insect infestation, splitting, cracking or crushing has produced loss of strength of the element but not of a sufficient magnitude to affect the serviceability of the bridge.



Timber pile split and with indications of damage below ground.

## Timber- Piles

TPIL

### Condition State 4

Advanced deterioration. Heavy decay, insect infestation, splits, cracks or crushing has produced loss of strength that affects the serviceability of the bridge.



Significant rot and major loss of section just below the ground surface.



Failed timber piles.

## Timber- Piles

TPIL

### Condition State 4

Advanced deterioration. Heavy decay, insect infestation, splits, cracks or crushing has produced loss of strength that affects the serviceability of the bridge.



Major split on the pile.



Badly rotten pile.

## Timber- Corbel

TCOR

### Condition State 1

The timber is in good condition with no evidence of decay. There may be cracks, splits and checks having no effect on strength or serviceability.



Timber corbels in good condition.

## Timber- Corbel

### Condition State 2

Minor decay, insect infestation, splitting, cracking, checking or crushing may exist but none is sufficiently advanced to affect serviceability.



Minor end splits, mainly vertical.



Fungal growth on a corbel.

## Timber- Corbel

TCOR

### Condition State 3

Medium decay, insect infestation, splitting, cracking or crushing has produced loss of strength of the element but not of a sufficient magnitude to affect the serviceability of the bridge.



Piping with moderate horizontal split.

## Timber- Corbel

### Condition State 4

Advanced deterioration. Heavy decay, insect infestation, splits, cracks or crushing has produced loss of strength that affects the serviceability of the bridge.



Cracked corbel



Severely split and splintering corbel

# Timber- Wale/Brace

TWBR

**Condition State 1**  
The timber is in good condition with no evidence of decay. There may be cracks, splits and checks having no effect on strength or serviceability.



Timber elements in good condition.



## Timber- Wale/Brace

TWBR

### Condition State 2

Minor decay, insect infestation, splitting, cracking, checking or crushing may exist but none is sufficiently advanced to affect serviceability



Minor decay of the wale.

## Timber- Wale/Brace

TWBR

### Condition State 3

Medium decay, insect infestation, splitting, cracking or crushing has produced loss of strength of the element but not of a sufficient magnitude to affect the serviceability of the bridge.



Wale showing end rot.

## Timber- Wale/Brace

TWBR

### Condition State 4

Advanced deterioration. Heavy decay, insect infestation, splits, cracks or crushing has produced loss of strength that affects the serviceability of the bridge.



Rotten ends of wale.



## Timber- Abutment Sheeting/Gravel Board

TASG

### Condition State 1

The timber is in good condition with no evidence of decay. There may be cracks, splits and checks having no effect on strength or serviceability.



Abutment sheeting in good condition.

## Timber- Abutment Sheeting/Gravel Board

### Condition State 2

Minor decay, insect infestation, splitting, cracking, checking or crushing may exist but none is sufficiently advanced to affect serviceability.



Abutment sheeting with some termite infestation.



Timber abutment sheeting showing differential settlement.

## Timber- Abutment Sheeting/Gravel Board

TASG

### Condition State 3

Medium decay, insect infestation, splitting, cracking or crushing has produced loss of strength of the element but not of a sufficient magnitude to affect the serviceability of the bridge.



Abutment sheeting with termite infestation and some rotten boards.

## Timber- Abutment Sheeting/Gravel Board

TASG

### Condition State 4

Advanced deterioration. Heavy decay, insect infestation, splits, cracks or crushing has produced loss of strength that affects the serviceability of the bridge.



Broken abutment sheeting.



Missing sheeting with erosion problems.

## Timber- Transverse Deck Plank

TTDK

### Condition State 1

The timber is in good condition with no evidence of decay. There may be cracks, splits and checks having no effect on strength or serviceability.



Transverse Deck planks in good condition.

## Timber- Transverse Deck Plank

TTDK

### Condition State 2

Minor decay, insect infestation, splitting, cracking, checking or crushing may exist but none is sufficiently advanced to affect serviceability.

## Timber- Transverse Deck Plank

TTDK

### Condition State 3

Medium decay, insect infestation, splitting, cracking or crushing has produced loss of strength of the element but not of a sufficient magnitude to affect the serviceability of the bridge.



Medium decay of cross decking.

## Timber- Transverse Deck Plank

### Condition State 4

Advanced deterioration. Heavy decay, insect infestation, splits, cracks or crushing has produced loss of strength that affects the serviceability of the bridge.



Advanced deterioration of transverse decking.



Missing sections of cross decking.

## Timber- Longitudinal Sheeting/Decking

TLSH

### Condition State 1

The timber is in good condition with no evidence of decay. There may be cracks, splits and checks having no effect on strength or serviceability.



## Timber- Longitudinal Sheeting/Decking

TLSH

### Condition State 2

Minor decay, insect infestation, splitting, cracking, checking or crushing may exist but none is sufficiently advanced to affect serviceability.



Longitudinal sheeting with minor splitting. Large gap near the kerb and a missing plank.

## Timber- Longitudinal Sheeting/Decking

TLSH

### Condition State 3

Medium decay, insect infestation, splitting, cracking or crushing has produced loss of strength of the element but not of a sufficient magnitude to affect the serviceability of the bridge.



Damaged ends of longitudinal sheeting on rotten cross decking.



Deck in poor condition with loose bolts and damaged sheetings

## Timber- Longitudinal Sheeting/Decking

TLSH

### Condition State 4

Advanced deterioration. Heavy decay, insect infestation, splits, cracks or crushing has produced loss of strength that affects the serviceability of the bridge.



Unsafe longitudinal sheeting with holes, rot and splits.

## **Timber Stress Laminated Deck**

## Timber - Stress Laminated Deck

Units: m2 of plan area

This element defines only stress laminated timber deck. Protective treatment of the prestressing system of this element is covered under the element 'Timber - Protective System' (TPRS).

For each of condition states 1 to 4, report the estimated square meters of deck area.

### Condition state descriptions

Condition state	Description
1	The timber laminates are in good condition with no evidence of decay. The prestressing system and the tie downs are in good condition.
2	Minor reflective cracking on the wearing surface and/or minor decay of timber laminates may exist. No relative movement of laminates may be observed under traffic. The prestressing system is in good condition but the tie down bolts may be slightly loose.
3	Local decay, insect infestation, or crushing of some timber laminates may exist. Some relative movement between laminates may be observed under traffic. There may be local loss of prestress and the tie down bolts may be loose. The defects are only affecting the deck locally.
4	Advanced deterioration. Significant decay, insect infestation, or crushing of timber laminates may exist. The tie down bolts are sufficiently loose to enable significant movement of the deck. The prestressing system is sufficiently ineffective to cause loss of strength that affects the serviceability of the bridge. The defects are globally affecting the deck.

### Key Areas to inspect:

1. Surface seal
2. Flashing on side of laminates
3. Anchorages and bars
4. Noise from laminate movement under traffic
5. Joint cover plates

### Rating Guidance Notes:

## Timber - Stress Laminated Deck

TSLD

### Condition State 1

The timber laminates are in good condition with no evidence of decay. The prestressing system and the tie downs are in good condition.



Stress laminated deck in good condition.

## Timber - Stress Laminated Deck

TSLD

### Condition State 2

Minor reflective cracking on the wearing surface and/or minor decay of timber laminates may exist. No relative movement of laminates may be observed under traffic. The prestressing system is in good condition but the tie down bolts may be slightly loose.

## Timber - Stress Laminated Deck

TSLD

### Condition State 3

Local decay, insect infestation, or crushing of some timber laminates may exist. Some relative movement between laminates may be observed under traffic. There may be local loss of prestress and the tie down bolts may be loose. The defects are only affecting the deck locally.



Edge laminates breaking away from the deck.



Water seeping through laminates.

## Timber - Stress Laminated Deck

### Condition State 4

Advanced deterioration. Significant decay, insect infestation, or crushing of timber laminates may exist. The tie down bolts are sufficiently loose to enable significant movement of the deck. The prestressing system is sufficiently ineffective to cause loss of strength that affects the serviceability of the bridge. The defects are globally affecting the deck.



Stress laminated deck in poor condition.



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# BRIDGE INSPECTION PROCEDURE MANUAL

## Joints

## **Pourable/Cork Joint Seal**

## Pourable/Cork Joint Seal

**JPOS**

Element	Description	Units
<b>JPOS</b>	<b>Pourable/Cork Joint Seal</b> This element defines only those deck joints filled with a pourable or cork seal or asphaltic concrete plug seal including those under a flush seal or asphaltic concrete wearing surface and includes all of cold applied polymer joints	<b>m</b> of Joint Seal

For each of the condition states, report the estimated quantity in linear metres.

### Condition state descriptions

Condition State	Description
1	The element shows minimal deterioration. Adhesion is sound with no signs of leakage. There are no cohesion cracks. The adjacent deck and/or header is sound.
2	Minor fine adhesion and/or cohesion cracks may be present. Minor leakage may show underneath. Joint may be slightly impacted with debris. Minor spalls in deck and/or headers may be present adjacent to joint.
3	Moderate adhesion and/or cohesion cracks exist allowing reasonable leakage of moisture through the joint. Joint may be impacted with debris. Cracks or medium spalls in deck and/or headers may be present adjacent to joint.
4	The joints have failed allowing extensive moisture penetration. Joint sealant may be almost completely lost. Joint may be heavily impacted with debris and/or stones. Adjacent deck may be severely cracked or spalled.

**Key Areas to inspect** for any cracking, and other deterioration signs:

1. Joint and surrounding roadway
2. Deck underside for water leakage
3. Under footway slab and cavities
4. Extends up the kerb

### Rating Guidance Notes:

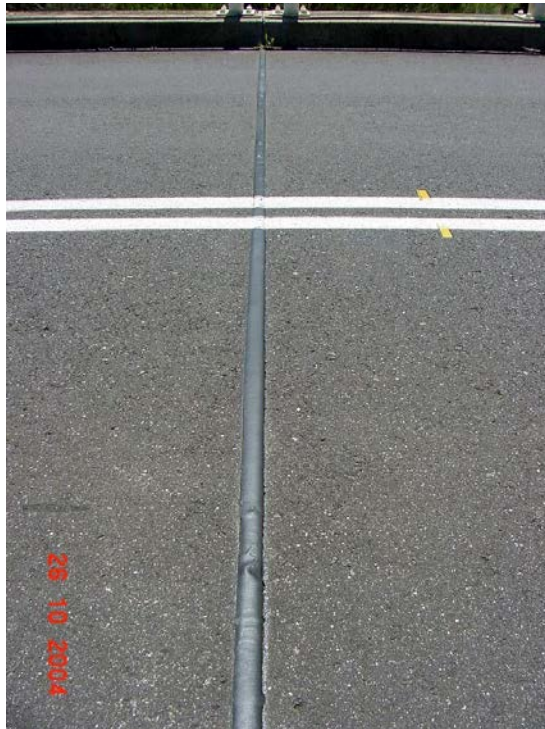
Take the joint gap shown on drawings at the stated temperature to site when rating

## Pourable/Cork Joint Seal

JPOS

### Condition State 1

The element shows minimal deterioration. Adhesion is sound with no signs of leakage. There are no cohesion cracks. The adjacent deck and/or header is sound.



Joint in good condition.



Joint in good condition.

## Pourable/Cork Joint Seal

JPOS

### Condition State 2

Minor fine adhesion and/or cohesion cracks may be present. Minor leakage may show underneath. Joint may be slightly impacted with debris. Minor spalls in deck and/or headers may be present adjacent to joint.



Joint with minor spalls not showing any major leakage under the bridge.



Asphaltic concrete above pourable joint is cracked indicating loss of adhesion

## Pourable/Cork Joint Seal

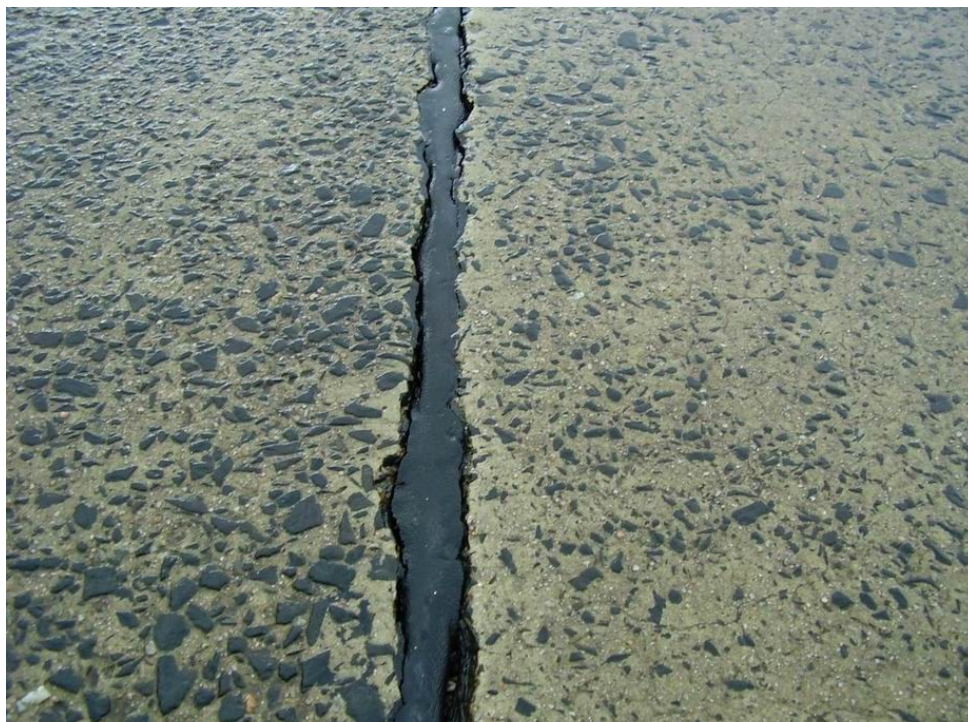
JPOS

### Condition State 3

Moderate adhesion and/or cohesion cracks exist allowing reasonable leakage of moisture through the joint. Joint may be impacted with debris. Cracks or medium spalls in deck and/or headers may be present adjacent to joint.



Large spall and debris blocking the joint.



Moderate loss of adhesion allowing moisture onto the pier.

## Pourable/Cork Joint Seal

JPOS

### Condition State 4

The joints have failed allowing extensive moisture penetration. Joint sealant may be almost completely lost. Joint may be heavily impacted with debris and/or stones. Adjacent deck may be severely cracked or spalled.



Significant loss of sealant.



Seal has failed leading to extensive water leakage through the joint.

## **Compression Joint Seal**

## Compression Joint Seal

JCOS

Element	Description	Units
JCOS	<p><b>Compression Joint Seal</b>                      This element defines only those deck joints filled with a pre-formed compression type seal.</p>	m of Joint

For each of the condition states, report the estimated quantity in linear metres.

### Condition state descriptions

Condition State	Description
1	The element shows minimal deterioration. Adhesion is sound with no signs of leakage. The adjacent deck and/or header is sound.
2	There may be small adhesion failures. The seal may show signs of abrasion or minor tearing. Minor spalls or cracking in the deck and/or headers may be present.
3	There may be moderate adhesion failures. The seal may show signs of abrasion or moderate tearing. Moderate spalls or cracking in the deck and/or headers may be present.
4	Significant adhesion failures may be prevalent with the seal possibly showing signs of failure from abrasion or tearing. The joint may be no longer operative. Significant spalls and/or cracking may be present in the deck and/or headers adjacent to the seal.

**Key Areas to inspect** for any cracking, corrosion and other deterioration signs:

1. Joint and surrounding roadway
2. Deck underside for water leakage
3. Under footway slab and cavities
4. Extends up the kerb

### Rating Guidance Notes:

Take the joint gap shown on drawings at the stated temperature to site when rating

## Compression Joint Seal

JCOS

### Condition State 1

The element shows minimal deterioration. Adhesion is sound with no signs of leakage. The adjacent deck and/or header is sound.



Compression joint in reasonably good condition.

## Compression Joint Seal

JCOS

### Condition State 2

There may be small adhesion failures. The seal may show signs of abrasion or minor tearing. Minor spalls or cracking in the deck and/or headers may be present.



Loose protection angle and a level difference of about 10mm at the joint.

## Compression Joint Seal

JCOS

### Condition State 3

There may be moderate adhesion failures. The seal may show signs of abrasion or moderate tearing. Moderate spalls or cracking in the deck and/or headers may be present.



Moderate deterioration of the seal.



Moderate loss of adhesion on either side of the compression seal.

## Compression Joint Seal

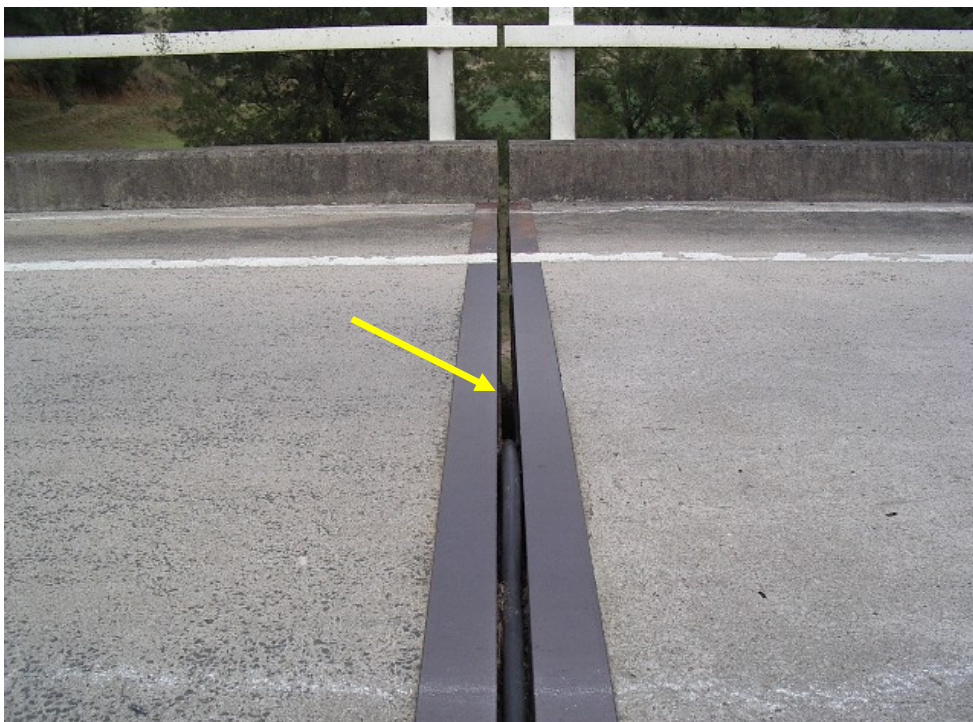
JCOS

### Condition State 4

Significant adhesion failures may be prevalent with the seal possibly showing signs of failure from abrasion or tearing. The joint may be no longer operative. Significant spalls and/or cracking may be present in the deck and/or headers adjacent to the seal.



Significant spall and loose nut.



Part of the compression seal dropped down to the pier and significant loss of adhesion in the rest.

## **Assembly Joint/Seal**

## Assembly Joint/Seal

**JASS**

Element	Description	Units
<b>JASS</b>	<b>Assembly Joint/Seal</b> This element defines only those deck joints fitted with an assembly or stripseal mechanism such as a finger joint or modular bridge expansion joint that may or may not have a seal.	<b>m</b> of Joint

For each of the condition states, report the estimated quantity in linear metres.

### Condition state descriptions

#### Condition state descriptions

Condition State	Description
1	The element shows minimal deterioration. The adjacent deck anchors are tight. There are no broken welds or fingers. There are no untoward noises upon impact. The adjacent deck is sound.
2	There may be minor weld cracking in non structural members. There are no untoward noises upon impact. The seal, if any, may show signs of abrasion or minor tearing. The adjacent deck shows no signs of anchors loosening. There may be minor spalling or cracking of the anchorage concrete. There may be minor misalignment of the fingers or transverse centre beams.
3	The seal, if any, may show signs of abrasion or tearing. Some anchorages may be loose. There may be significant spalling or cracking of the anchorage concrete. There may be misalignment of the fingers or transverse centre beams. There may be more noise from vehicle impact.
4	There may be weld cracking. The expansion joint/seal may not be functioning. The assembly may have broken loose because of anchorage failure. Deck may be spalling or severely cracked adjacent to the assembly. Broken fingers may be prevalent. Misaligned fingers or transverse centre beams. There may be very significant noise from vehicle impact.

**Key Areas to inspect** for any cracking, corrosion and other deterioration signs:

1. Joint and surrounding roadway
2. Deck underside for water leakage
3. Noise emanating from joint

#### Rating Guidance Notes:

Take the joint gap shown on drawings at the stated temperature to site when rating

## Assembly Joint/Seal

JASS

### Condition State 1

The element shows minimal deterioration. The adjacent deck anchors are tight. There are no broken welds or fingers. There are no untoward noises upon impact. The adjacent deck is sound.



Joint in good condition.



Joint in good condition.

## Assembly Joint/Seal

JASS

### Condition State 2

There may be minor weld cracking in non structural members. There are no untoward noises upon impact. The seal, if any, may show signs of abrasion or minor tearing. The adjacent deck shows no signs of anchors loosening. There may be minor spalling or cracking of the anchorage concrete. There may be minor misalignment of the fingers or transverse centre beams.



Minor misalignment.

## Assembly Joint/Seal

JASS

### Condition State 1

The seal, if any, may show signs of abrasion or tearing. Some anchorages may be loose. There may be significant spalling or cracking of the anchorage concrete. There may be misalignment of the fingers or transverse centre beams. There may be more noise from vehicle impact.



Significant spalling of concrete adjacent to the joint.

## Assembly Joint/Seal

JASS

### Condition State 4

There may be weld cracking. The expansion joint/seal may not be functioning. The assembly may have broken loose because of anchorage failure. Deck may be spalling or severely cracked adjacent to the assembly. Broken fingers may be prevalent. Misaligned fingers or transverse centre beams. There may be very significant noise from vehicle impact.



Joint in poor condition.



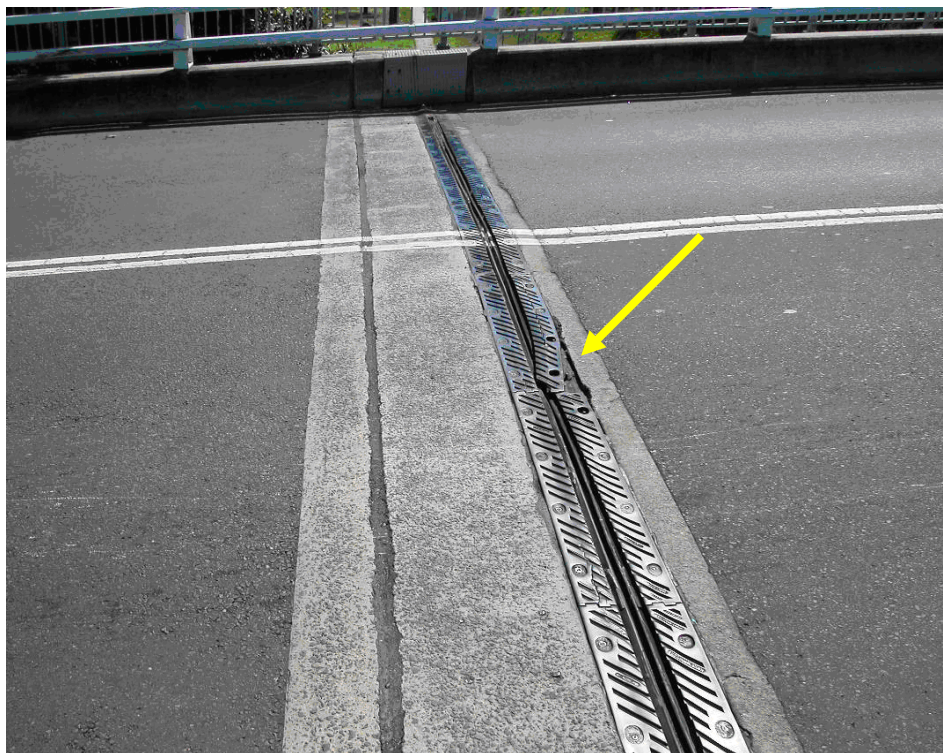
Joint in poor condition.

## Assembly Joint/Seal

JASS

### Condition State 4

There may be weld cracking. The expansion joint/ seal may not be functioning. The assembly may have broken loose because of anchorage failure. Deck may be spalling or severely cracked adjacent to the assembly. Broken fingers may be prevalent. Misaligned fingers or transverse centre beams. There may be very significant noise from vehicle impact.



Broken anchor bolts and assembly breaking loose.



Joint in poor condition.



## **Joint - No Seal**

## Joint - No Seal

**JNOS**

Element	Description	Units
<b>JNOS</b>	<b>Joint - No Seal</b> This element defines only those deck joints that are open and not sealed.	<b>m</b> of Joint

For each of the condition states, report the estimated quantity in linear metres.

### Condition state descriptions

Condition State	Description
1	The element shows minimal deterioration. Joint protection, if present, is secure. The adjacent deck is sound.
2	There may be minor deck cracking but protection anchor is firm. There is no significant spalling of the deck adjacent to the joint. There may be corrosion on joint protection.
3	There may be medium deck cracking indicating anchor loosening. Spalling at joint edges or adjacent to protection may have begun. There is significant corrosion on joint protection. There may be debris blocking the joint. There may be loss of or excessive gap joint.
4	Advanced corrosion causing section loss of joint protection. There may be large spalls at the joint edges or adjacent to protection. Protection anchors may be loose. The joint protection may be distorted. There may be debris blocking the joint. There may be loss of or excessive gap joint.

**Key Areas to inspect** for any cracking, corrosion and other deterioration signs:

1. Joint and surrounding deck at wheel tracks
2. Noise from the joint under traffic

### Rating Guidance Notes:

Take the joint gap shown on drawings at the stated temperature to site when rating

## Joint - No Seal

**JNOS**

### Condition State 1

The element shows minimal deterioration. Joint protection, if present, is secure. The adjacent deck is sound.



Joint in good condition.

## Joint - No Seal

JNOS

### Condition State 2

There may be minor deck cracking but protection anchor is firm. There is no significant spalling of the deck adjacent to the joint. There may be corrosion on joint protection.



Loose protection angle removed. Minor spall at concrete edge.

## Joint - No Seal

**JNOS**

### Condition State 3

There may be medium deck cracking indicating anchor loosening. Spalling at joint edges or adjacent to protection may have begun. There is significant corrosion on joint protection. There may be debris blocking the joint. There may be loss of or excessive gap joint.



Joint blocked with debris. Minor spalls at joint edges.

## Joint - No Seal

JNOS

### Condition State 4

Advanced corrosion causing section loss of joint protection. There may be large spalls at the joint edges or adjacent to protection. Protection anchors may be loose. The joint protection may be distorted. There may be debris blocking the joint. There may be loss of or excessive gap joint.



Loose and broken protection angle.



Protection angle is loose and noisy.



Transport  
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# BRIDGE INSPECTION PROCEDURE MANUAL

## Bearings

# **Elastomeric Bearing**

## Elastomeric Bearing

**BELA**

Element	Description	Units
<b>BELA</b>	<b>Elastomeric Bearing</b> This element defines only those bearings that provide for rotation and/or longitudinal and/or transverse movement by means of elastomeric material and includes rubber strip bearing pads.	<b>Ea</b> of bearing

For each of the condition states, report the estimated quantity in each.

### Condition state descriptions

Condition State	Description
1	The element shows minimal deterioration. Shear deformations are correct for existing temperatures.
2	Minor cracking, splitting or other deterioration may be present. Shear deformation may be slightly excessive. Minor misalignment or lateral movement may be present. Strength and/or serviceability are not affected. Dowels may be slightly corroded.
3	Significant cracking, splitting or bulging may be present. Moderate misalignment or lateral movement may be present. Dowels may be severely corroded.
4	Advanced deterioration. Shear deformations may be excessive. Top and bottom surfaces may not be parallel. Significant misalignment or lateral movement may be present. Loss of bearing function may be imminent. Dowels may be missing, distorted or severely corroded.

**Key Areas to inspect** for any deterioration signs:

1. Bearing location in relation to support pads.
2. Condition of bearing and support pads.

### Rating Guidance Notes:

The bearing rating includes the rating of the bearing pads and any supporting headstock as well as any associated dowels.

Minor movement defined as still on bearing pad.

Moderate movement defined as starting to come off mortar pad.

Significant movement defined as already off the mortar pad.

## Elastomeric Bearing

**BELA**

### Condition State 1

The element shows minimal deterioration. Shear deformations are correct for existing temperatures.



Elastomeric bearings in good condition



Elastomeric bearing in good condition. General cleaning required.

## Elastomeric Bearing

**BELA**

### Condition State 2

Minor cracking, splitting or other deterioration may be present. Shear deformation may be slightly excessive. Minor misalignment or lateral movement may be present. Strength and/or serviceability are not affected. Dowels may be slightly corroded.



Minor cracking and splitting.

## Elastomeric Bearing

**BELA**

### Condition State 3

Significant cracking, splitting or bulging may be present. Moderate misalignment or lateral movement may be present. Dowels may be severely corroded.



Significant splitting and bulging of bearing pads.



Significant splitting and bulging of bearing pads.

## Elastomeric Bearing

**BELA**

### Condition State 3

Significant cracking, splitting or bulging may be present. Moderate misalignment or lateral movement may be present. Dowels may be severely corroded.



Significant bulging of bearing pad.

## Elastomeric Bearing

**BELA**

### Condition State 4

Advanced deterioration. Shear deformations may be excessive. Top and bottom surfaces may not be parallel. Significant misalignment or lateral movement may be present. Loss of bearing function may be imminent. Dowels may be missing, distorted or severely corroded.



Elastomeric bearing showing excessive shear deformation.



Elastomeric strip bearing slipping out in a skewed PPLNK bridge.



# Metal Bearings

## Metal Bearings

**BEXP, BFIX**

Element	Description	Units
<b>BEXP</b>	<b>Metal Expansion Bearing (Roller, sliding, etc)</b> This element defines only those metal bridge bearings that provide for rotation and longitudinal and/or transverse movement by means of metal roller, rocker or sliding mechanisms but not including pot bearings.	<b>Ea</b> of bearing
<b>BFIX</b>	<b>Metal Fixed Bearing</b> This element defines only those metal bridge bearings that provide for rotation movement only but not including pot bearings.	<b>Ea</b> of bearing

For each of the condition states, report the estimated quantity in each.

### Condition state descriptions

Condition State	Description
1	The element shows minimal deterioration. If a protective coating system is present, it is sound and functioning as intended to protect the metal. Vertical and horizontal alignment is within limits. Bearing support member is sound. Any lubrication system is functioning properly.
2	There may be some surface corrosion with no pitting. Debris buildup is affecting bearing movement. Bearing alignment is still tolerable. The lubrication system, if any, may have failed.
3	There may be some corrosion with minor pitting. The assemblies may have moved enough to cause minor cracking or spalling in the supporting concrete. Debris buildup is affecting bearing movement. Bearing alignment is at or near limits.
4	Corrosion is advanced. There may be loss of section of the supporting member sufficient to warrant supplemental supports or load restrictions. Bearing alignment may be beyond tolerable limits. Shear keys may have failed. The bearing assembly may have frozen

**Key Areas to inspect** for any deterioration signs:

1. Bearing location in relation to support pads
2. Condition of bearing and support pads

### Rating Guidance Notes:

The bearing rating includes the rating of the bearing pads and any supporting headstock as well as any associated dowels

Minor movement defined as still on bearing pad

Moderate movement defined as starting to come off mortar pad

Significant movement defined as already off the mortar pad.

## Metal Bearings

**BEXP, BFIX**

### Condition State 1

The element shows minimal deterioration. If a protective coating system is present, it is sound and functioning as intended to protect the metal. Vertical and horizontal alignment is within limits. Bearing support member is sound. Any lubrication system is functioning properly.



**Bearings at the centre pier**

Bearing in good condition.



Bearing in good condition.

## Metal Bearings

**BEXP, BFIX**

### Condition State 2

There may be some surface corrosion with no pitting. Debris buildup is affecting bearing movement. Bearing alignment is still tolerable. The lubrication system, if any, may have failed.



Signs of corrosion at the edges of interface.



Signs of surface corrosion.

## Metal Bearings

**BEXP, BFIX**

### Condition State 2

There may be some surface corrosion with no pitting. Debris buildup is affecting bearing movement. Bearing alignment is still tolerable. The lubrication system, if any, may have failed.



Surface corrosion of the bearing.



Surface corrosion and some accumulation material at the interface.

## Metal Bearings

**BEXP, BFIX**

### Condition State 3

There may be some corrosion with minor pitting. The assemblies may have moved enough to cause minor cracking or spalling in the supporting concrete. Debris buildup is affecting bearing movement. Bearing alignment is at or near limits.



Corrosion of the base plate with minor pitting.



Significant buildup of debris.

## Metal Bearings

**BEXP, BFIX**

### Condition State 4

Corrosion is advanced. There may be loss of section of the supporting member sufficient to warrant supplemental supports or load restrictions. Bearing alignment may be beyond tolerable limits. Shear keys may have failed. The bearing assembly may have frozen.



Significant loss of support under the bearing.



Significant loss of support under the bearing.

## Metal Bearings

**BEXP, BFIX**

### Condition State 4

Corrosion is advanced. There may be loss of section of the supporting member sufficient to warrant supplemental supports or load restrictions. Bearing alignment may be beyond tolerable limits. Shear keys may have failed. The bearing assembly may have frozen.



Advanced corrosion of the base plate.



Significant corrosion with pitting.

## **Enclosed/Concealed Bearings**

## Enclosed/Concealed Bearings

**BENC**

Element	Description	Units
<b>BENC</b>	<b>Enclosed/Concealed Bearings</b> The element defines only those bridge bearings that are enclosed so they are not open for detailed inspection. This includes pot bearings but does not hidden elastomeric or other type of bearings	ea of bearing

For each of the condition states, report the estimated quantity in each.

### Condition state descriptions

Condition State	Description
1	The element shows no deterioration. There are no vertical or horizontal offsets. There is no cracking of support members. The support member is stable under traffic.
2	Both vertical and horizontal offsets are within the capability of the bearings and are not yet significant. The supported member may exhibit minimal vertical movement under traffic. There may be minor cracking or spalling of support members. There may be insignificant reduction of bearing due to superstructure shortening.
3	There may be minor leakage of rubber. There may be significant spalling or cracking of the support members. There may be significant reduction of bearing due to superstructure shortening.
4	There may be considerable leakage of rubber. Vertical and/or horizontal offsets are significant indicating bearing failures. There may be significant vertical movement under traffic. Support members may have failed.

### Key Areas to inspect for any deterioration signs:

1. Bearing location in relation to support pads
2. Condition of bearing and support pads
3. Close inspection for extrusion of elastomer

### Rating Guidance Notes:

The potential for catastrophic failure due to reduction of bearing capacity because of prestress shortening should be considered when rating this element.

The bearing rating includes the rating of the bearing pads and any supporting headstock as well as any associated dowels

Minor movement defined as still on bearing pad

Moderate movement defined as starting to come off mortar pad

Significant movement defined as already off the mortar pad.

## Enclosed/Concealed Bearings

**BENC**

### Condition State 1

The element shows no deterioration. There are no vertical or horizontal offsets. There is no cracking of support members. The support member is stable under traffic.



Enclosed bearing in good condition.



Enclosed bearing in good condition.

## Enclosed/Concealed Bearings

**BENC**

### Condition State 2

Both vertical and horizontal offsets are within the capability of the bearings and are not yet significant. The supported member may exhibit minimal vertical movement under traffic. There may be minor cracking or spalling of support members. There may be insignificant reduction of bearing due to superstructure shortening.



Loose studs on the top plate.



Enclosed bearing with surface corrosion.

## Enclosed/Concealed Bearings

**BENC**

### Condition State 3

There may be minor leakage of rubber. There may be significant spalling or cracking of the support members. There may be significant reduction of bearing due to superstructure shortening.



Minor leakage of rubber.



Moderate leakage of rubber.

## Enclosed/Concealed Bearings

**BENC**

### Condition State 3

There may be minor leakage of rubber. There may be significant spalling or cracking of the support members. There may be significant reduction of bearing due to superstructure shortening.



Bearings have reached their extension limit with possibility of further deck movement.



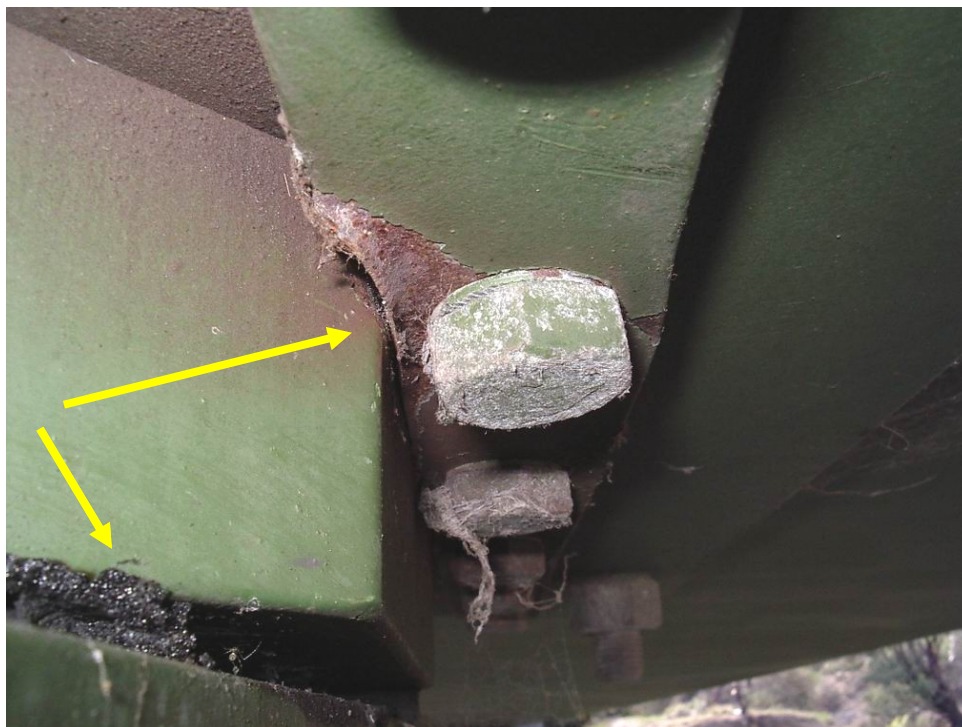
Broken seal.

## Enclosed/Concealed Bearings

**BENC**

### Condition State 4

There may be considerable leakage of rubber. Vertical and/or horizontal offsets are significant indicating bearing failures. There may be significant vertical movement under traffic. Support members may have failed.



Excessive damage to the guide/shear key and significant leakage of rubber.



Excessive gap at the concrete bearing interface indicating rotational limits of the bearings may have been reached.

## Enclosed/Concealed Bearings

**BENC**

### Condition State 4

There may be considerable leakage of rubber. Vertical and/or horizontal offsets are significant indicating bearing failures. There may be significant vertical movement under traffic. Support members may have failed.



Significant leakage of rubber.



Transport  
Roads & Maritime  
Services

# BRIDGE INSPECTION PROCEDURE MANUAL

## Railings

## **Metal Railing**

## Metal Bridge Railing

**RMET**

Element	Description	Units
RMET	<p><b>Metal Bridge Railing</b></p> <p>This element defines all types and shapes of metal bridge railing. Steel or aluminium hollow sections, rolled shapes, etc may all be part of this element. All components of the railing must be metal. It may or may not be painted or galvanised. Any concrete end posts are rated under RCON.</p>	m of railing

For each of the condition states, report the estimated quantity in linear metres.

### Condition state descriptions

Condition State	Description
1	There is little or no corrosion. .
2	There may be minor surface corrosion or deformation of rail/posts or nicks.
3	Any section loss is minor and does not affect the strength or serviceability of the element. There may be accident damage such as tearing or moderate deformation or the rail/posts. There may be minor cracking of the welds. Bolts may be loose.
4	<p>Section loss is sufficient to warrant analysis to ascertain the impact on the ultimate strength and/or serviceability of the element.</p> <p>There may be significant impact damage with sections missing, heavily deformed or torn from supports. There may be significant cracking of the welds. Bolts may be missing.</p>

### Key Areas to inspect:

1. Joining pins
2. Post bases.
3. Welds

### Rating Guidance Notes:

## Metal Bridge Railing

**RMET**

### Condition State 1

There is little or no corrosion.



Metal railing in good condition.



Protective coating showing signs of distress but is still reasonably effective.

## Metal Bridge Railing

**RMET**

### Condition State 2

There may be minor surface corrosion or deformation of rail/posts or nicks.



Minor corrosion and nicks.



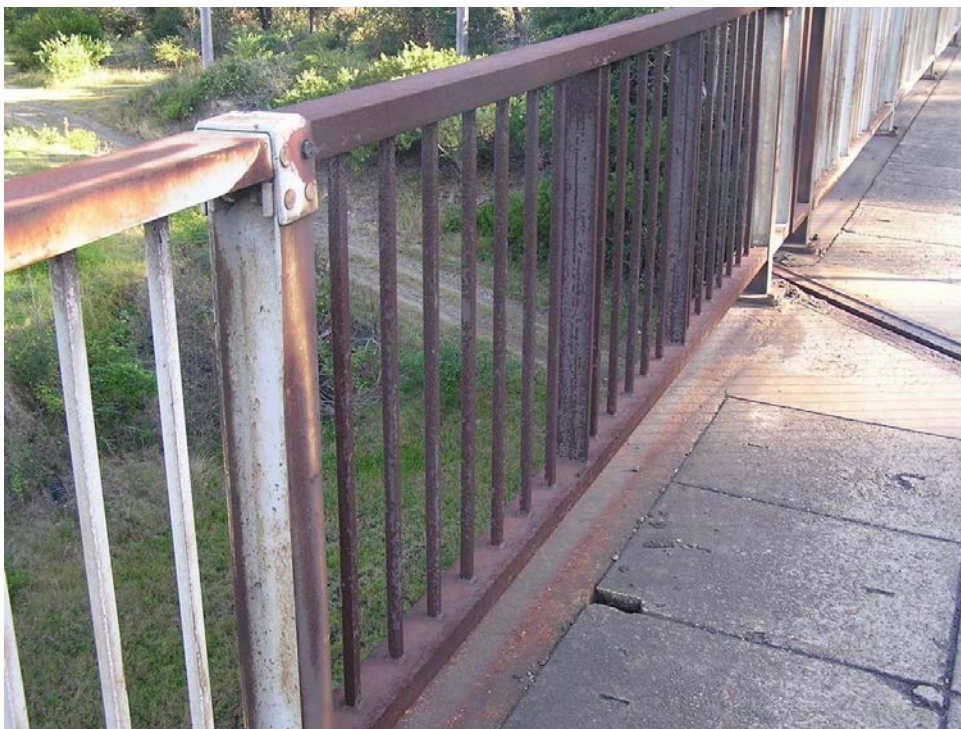
Corrosion of nuts at the base plate.

## Metal Bridge Railing

**RMET**

### Condition State 3

Any section loss is minor and does not affect the strength or serviceability of the element. There may be accident damage such as tearing or moderate deformation or the rail/posts. There may be minor cracking of the welds. Bolts may be loose.



Significant rust and minor pitting.



Impact damage.

## Metal Bridge Railing

RMET

### Condition State 3

Any section loss is minor and does not affect the strength or serviceability of the element. There may be accident damage such as tearing or moderate deformation or the rail/posts. There may be minor cracking of the welds. Bolts may be loose.



Loose and missing nuts in the connection.



Damaged hold-down bolts and mortar pads.

## Metal Bridge Railing

**RMET**

### Condition State 3

Any section loss is minor and does not affect the strength or serviceability of the element. There may be accident damage such as tearing or moderate deformation or the rail/posts. There may be minor cracking of the welds. Bolts may be loose.



Loose nut.



Weld crack at the base and corrosion of nut.

## Metal Bridge Railing

RMET

### Condition State 4

Section loss is sufficient to warrant analysis to ascertain the impact on the ultimate strength and/or serviceability of the element. There may be significant impact damage with sections missing, heavily deformed or torn from supports. There may be significant cracking of the welds. Bolts may be missing.



Accident damage with unsupported railing over a short length.



Badly damaged metal railing with missing post and torn guard fence rail.

## Metal Bridge Railing

**RMET**

### Condition State 4

Section loss is sufficient to warrant analysis to ascertain the impact on the ultimate strength and/or serviceability of the element. There may be significant impact damage with sections missing, heavily deformed or torn from supports. There may be significant cracking of the welds. Bolts may be missing.



All the nuts and parts of bolts completely corroded off.



Rail connector missing



# Concrete Railing

## Concrete Bridge Railing/End Posts

**RCON**

Element	Description	Units
<b>RCON</b>	<b>Concrete Bridge Railing/End Posts</b> This element defines all types and shapes of reinforced concrete bridge railing and/or end posts. All elements of the railing must be concrete.	<b>m</b> of railing and/or end posts

For each of the condition states, report the estimated quantity in lineal metres.

### Condition state descriptions

Condition State	Description
1	The element shows no deterioration. There may be discolouration, efflorescence, and/or superficial cracking but without effect on strength and/or serviceability. There may be minor vehicle marks or scores.
2	Minor cracks, gouges or spalls may be present but there is no exposed reinforcement or surface evidence of corrosion of reinforcement.
3	Some delaminations and/or spalls and/or deformations may be present and some reinforcement may be exposed. Corrosion of reinforcement may be present but loss of section is minor and does not significantly affect the strength and/or serviceability of the element. There is no rotation of the end posts.
4	Advanced deterioration. Corrosion of reinforcement and/or loss of concrete section is sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of the element. Rail or posts may be impacted from their original position. End posts may show signs of significant impact or rotation.

### Key Areas to inspect:

1. Alignment and level of end posts and/or rail and posts
- 2.

### Rating Guidance Notes:

## Concrete Bridge Railing/End Posts

**RCON**

### Condition State 1

The element shows no deterioration. There may be discolouration, efflorescence, and/or superficial cracking but without effect on strength and/or serviceability. There may be minor vehicle marks or scores.



Concrete railing in good condition.

## Concrete Bridge Railing/End Posts

**RCON**

### Condition State 2

Minor cracks, gouges or spalls may be present but there is no exposed reinforcement or surface evidence of corrosion of reinforcement.



Concrete railing with minor spall.

## Concrete Bridge Railing/End Posts

RCON

### Condition State 3

Some delaminations and/or spalls and/or deformations may be present and some reinforcement may be exposed. Corrosion of reinforcement may be present but loss of section is minor and does not significantly affect the strength and/or serviceability of the element. There is no rotation of the end posts.



Spalls and exposed reinforcements.



Spalls and exposed reinforcement.

## Concrete Bridge Railing/End Posts

RCON

### Condition State 4

Advanced deterioration. Corrosion of reinforcement and/or loss of concrete section is sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of the element. Rail or posts may be impacted from their original position. End posts may show signs of significant impact or rotation.



Advanced deterioration.



Badly damaged concrete end post and railing.

## **Combined Bridge Railing**

## Combined Bridge Railing

**RCMB**

Element	Description	Units
RCMB	<p><b>Combined Bridge Railing</b></p> <p>This element defines only specific combined concrete and metal traffic barriers, namely, full or part Type F concrete barriers with one or more metal rails on top. Metal components may or may not be painted or galvanised. This includes any concrete end post transitions to the approach barriers.</p>	m of railing and/or end posts

For each of the condition states, report the estimated quantity in lineal metres.

### Condition state descriptions

Condition State	Description
1	<p>There is little or no corrosion of metal.</p> <p>The concrete shows no deterioration. There may be discolouration, efflorescence, and/or superficial cracking but without effect on strength and/or serviceability. There may be minor vehicle marks or scores.</p>
2	<p>There may be minor surface corrosion or deformation of metal rail/posts or nicks.</p> <p>Minor cracks, gouges or spalls may be present in concrete but there is no exposed reinforcement or surface evidence of corrosion of reinforcement.</p>
3	<p>Any section loss of metal is minor and does not affect the strength or serviceability of the element. There may be accident damage such as tearing or moderate deformation of the rail/posts. There may be minor cracking of the welds, especially at the bases. Bolts may be loose.</p> <p>Some delaminations and/or spalls and/or deformations may be present in concrete and some reinforcement may be exposed. Corrosion of reinforcement may be present but loss of section is minor and does not significantly affect the strength and/or serviceability of the element. There is no rotation of the ends due to impact.</p>
4	<p>Section loss in metal railing is sufficient to warrant analysis to ascertain the impact on the ultimate strength and/or serviceability of the element. There may be significant impact damage with sections missing, heavily deformed or torn from supports. There may be significant cracking of the welds. Bolts may be missing.</p> <p>Advanced deterioration of concrete. Corrosion of reinforcement and/or loss of concrete section is sufficient to warrant analysis. Ends may show signs of significant impact or rotation.</p>

### Key Areas to inspect:

1. Metal welds
2. Post bases for cracked welds or loose/missing bolts
3. Alignment and level of end posts and/or rail and posts

### Rating Guidance Notes:

## Combined Bridge Railing

RCMB

**Condition State 1 :** There is little or no corrosion of metal. The concrete shows no deterioration. There may be discolouration, efflorescence, and/or superficial cracking but without effect on strength and/or serviceability. There may be minor vehicle marks or scores.



Combined railing in good condition.



Railing in good condition.

## Combined Bridge Railing

RCMB

**Condition State 2 :** There may be minor surface corrosion or deformation of metal rail/posts or nicks. Minor cracks, gouges or spalls may be present in concrete but there is no exposed reinforcement or surface evidence of corrosion of reinforcement.

## Combined Bridge Railing

RCMB

**Condition State 3 :** Any section loss of metal is minor and does not affect the strength or serviceability of the element. There may be accident damage such as tearing or moderate deformation of the rail/posts. There may be minor cracking of the welds, especially at the bases. Bolts may be loose. Some delaminations and/or spalls and/or deformations may be present in concrete and some reinforcement may be exposed. Corrosion of reinforcement may be present but loss of section is minor and does not significantly affect the strength and/or serviceability of the element. There is no rotation of the ends due to impact.



Damage to concrete support requiring repairs.



Moderate deformation of rails due to vehicular impact.

## Combined Bridge Railing

RCMB

**Condition State 4 :** Section loss in metal railing is sufficient to warrant analysis to ascertain the impact on the ultimate strength and/or serviceability of the element. There may be significant impact damage with sections missing, heavily deformed or torn from supports. There may be significant cracking of the welds. Bolts may be missing. Advanced deterioration of concrete. Corrosion of reinforcement and/or loss of concrete section is sufficient to warrant analysis. Ends may show signs of significant impact or rotation.



Significant damage to the metal rail base connection and moderate distortion at the end.



Metal railing without suitable end piece with significant risk to the safety of road users.

# Timber Railing

## Timber Bridge Railing

**RTIM**

Element	Description	Units
<b>RTIM</b>	<b>Timber Bridge Railing</b> This element defines all types and shapes of timber railing and includes timber kerb. All elements of the railing (except connectors) must be timber.	<b>m</b> of railing

For each of the condition states, report the estimated quantity in lineal metres.

### Condition state descriptions

Condition State	Description
1	The timber is in good condition with no evidence of decay. There may be cracks, splits and checks having no effect on strength or serviceability. There may be minor vehicle marks or scores.
2	Minor decay, insect infestation, splitting, cracking, checking or crushing may exist but none is sufficiently advanced to affect serviceability. There may be vehicle impact damage or scores.
3	Medium decay, insect infestation, splitting, cracking or crushing has produced loss of strength of the element but not of a sufficient magnitude to affect the serviceability. Rail or posts may be deflected from their original position.
4	Advanced deterioration. Decay, insect infestation, splits, cracks or crushing has produced loss of strength that may affect the serviceability of the element. Rail or posts may be broken or dislodged or deflected from their original position.

### Key Areas to inspect:

### Rating Guidance Notes:

## Timber Bridge Railing

RTIM

### Condition State 1

The timber is in good condition with no evidence of decay. There may be cracks, splits and checks having no effect on strength or serviceability. There may be minor vehicle marks or scores.



Timber railing in good condition.



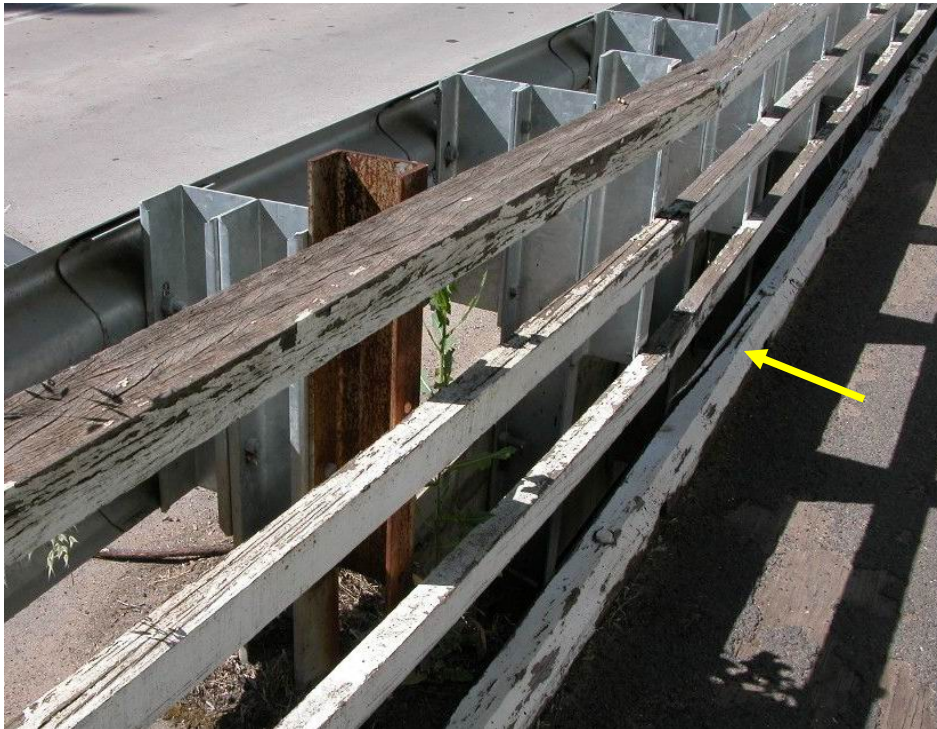
Timber railing in good condition with failed paint coating.

## Timber Bridge Railing

RTIM

### Condition State 2

Minor decay, insect infestation, splitting, cracking, checking or crushing may exist but none is sufficiently advanced to affect serviceability. There may be vehicle impact damage or scores.



Split in the kerb.

## Timber Bridge Railing

RTIM

### Condition State 3

Medium decay, insect infestation, splitting, cracking or crushing has produced loss of strength of the element but not of a sufficient magnitude to affect the serviceability. Rail or posts may be deflected from their original position.



Timber railing and kerb with significant splits.

## Timber Bridge Railing

RTIM

### Condition State 4

Advanced deterioration. Decay, insect infestation, splits, cracks or crushing has produced loss of strength that may affect the serviceability of the element. Rail or posts may be broken or dislodged or deflected from their original position.



Timber kerbs split and rotten.



Timber railing requiring immediate repair.

## Timber Bridge Railing

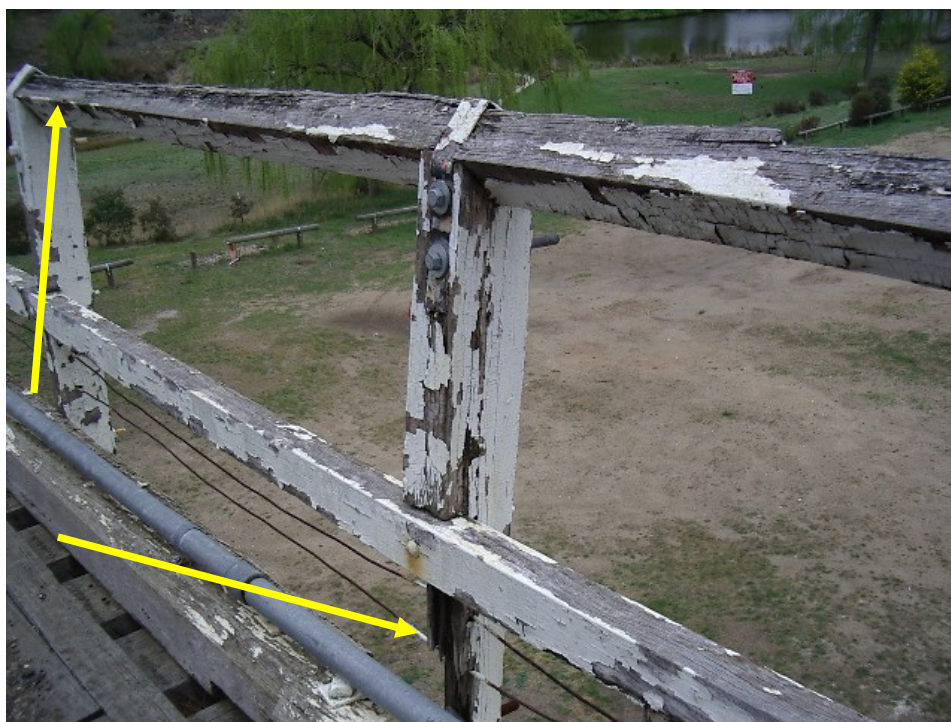
RTIM

### Condition State 4

Advanced deterioration. Decay, insect infestation, splits, cracks or crushing has produced loss of strength that may affect the serviceability of the element. Rail or posts may be broken or dislodged or deflected from their original position.



Badly deteriorated timber rail post.



Rotten timber post and rails.



## Miscellaneous Railing

## Miscellaneous Bridge Railing

**RMIS**

Element	Description	Units
<b>RMIS</b>	<p><b>Miscellaneous Bridge Railing</b>                      This element defines all types and shapes of railing except those already defined as metal, concrete, or timber. This element will include combinations of timber, concrete and metal, etc. Metal components may or may not be painted or galvanised. Note that concrete end posts are handled under RCON.</p>	<b>m</b> of railing

For each of the condition states, report the estimated quantity in lineal metres.

### Condition state descriptions

Condition State	Description
1	The element shows no deterioration. There may be minor cracking, corrosion and/or other minor deterioration including evidence of vehicle impact having no effect on strength or serviceability.
2	Minor cracking, gouging, spalls, decay of timber portions or corrosion of metal may be present. Reinforcement may be exposed but with no corrosion. Strength and/or serviceability are not affected.
3	Cracking, spalls, decay of timber portions or corrosion of metal may be present. There may be member deformation. Reinforcement may be exposed with some corrosion. Defects have produced a loss of strength of the element but not of a sufficient magnitude to affect the serviceability. There may be moderate distortion from vehicle impact.
4	Advanced deterioration. Corrosion, decay or loss of section is sufficient to warrant analysis to ascertain the impact on the serviceability or strength of the element. Rail or posts may be severely impacted from their original position.

### Key Areas to inspect:

1. Rail alignment and level.

### Rating Guidance Notes:

## Miscellaneous Bridge Railing

RMIS

### Condition State 1

The element shows no deterioration. There may be minor cracking, corrosion and/or other minor deterioration including evidence of vehicle impact having no effect on strength or serviceability.



Miscellaneous railing in good condition.

(Note: Removal of graffiti is covered under General Cleaning MGCL element).

## Miscellaneous Bridge Railing

RMIS

### Condition State 2

Minor cracking, gouging, spalls, decay of timber portions or corrosion of metal may be present. Reinforcement may be exposed but with no corrosion. Strength and/or serviceability are not affected.



Corrosion of metal components.

## Miscellaneous Bridge Railing

RMIS

### Condition State 3

Cracking, spalls, decay of timber portions or corrosion of metal may be present. There may be member deformation. Reinforcement may be exposed with some corrosion. Defects have produced a loss of strength of the element but not of a sufficient magnitude to affect the serviceability. There may be moderate distortion from vehicle impact.



Some damage to the wire fence along the railing but the serviceability is not significantly affected. .

## Miscellaneous Bridge Railing

RMIS

### Condition State 4

Advanced deterioration. Corrosion, decay or loss of section is sufficient to warrant analysis to ascertain the impact on the serviceability or strength of the element. Rail or posts may be severely impacted from their original position.



Miscellaneous railing with broken timber post,



Badly corroded steel tube rail.

## **Railing Paint work**

## Railing – Paint work

**RPNT**

Element	Description	Units
RPNT	<p><b>Railing Paint work</b></p> <p>This element defines only the paint work on bridge railings.</p>	m of railing

For each of condition states 1 to 4, report the estimated lineal metres of railing.

### Condition state descriptions

Condition state	Description
1	The paint work is sound and functioning as intended to protect the metal or timber and to improve the visibility of bridge railings.
2	The paint work may be chalking, peeling, checking or showing other early evidence of distress but there is no exposure of timber or metal or concrete.
3	The paint work is no longer effective on significant areas. There may be exposed timber or metal or concrete.
4	The paint work has failed.

### Key Areas to inspect:

1. Edges of members
2. Connections
3. Splice Plates

## Railing – Paint work

RPNT

### Condition State 1

The paint work is sound and functioning as intended to protect the metal or timber and to improve the visibility of bridge railings.



Paint work on metal railing in good condition.



Timber railing with paint work in good condition.

## Railing – Paint work

RPNT

### Condition State 2

The paint work may be chalking, peeling, checking or showing other early evidence of distress but there is no exposure of timber or metal or concrete.



Protective coating showing signs of distress but is still reasonably effective.



## Railing – Paint work

RPNT

### Condition State 3

The paint work is no longer effective on significant areas. There may be exposed timber or metal or concrete.



The paint work is no longer effective on significant areas.



The paint work is no longer effective on significant areas. Some exposed metal

## Railing – Paint work

RPNT

### Condition State 3

The paint work is no longer effective on significant areas. There may be exposed timber or metal or concrete.

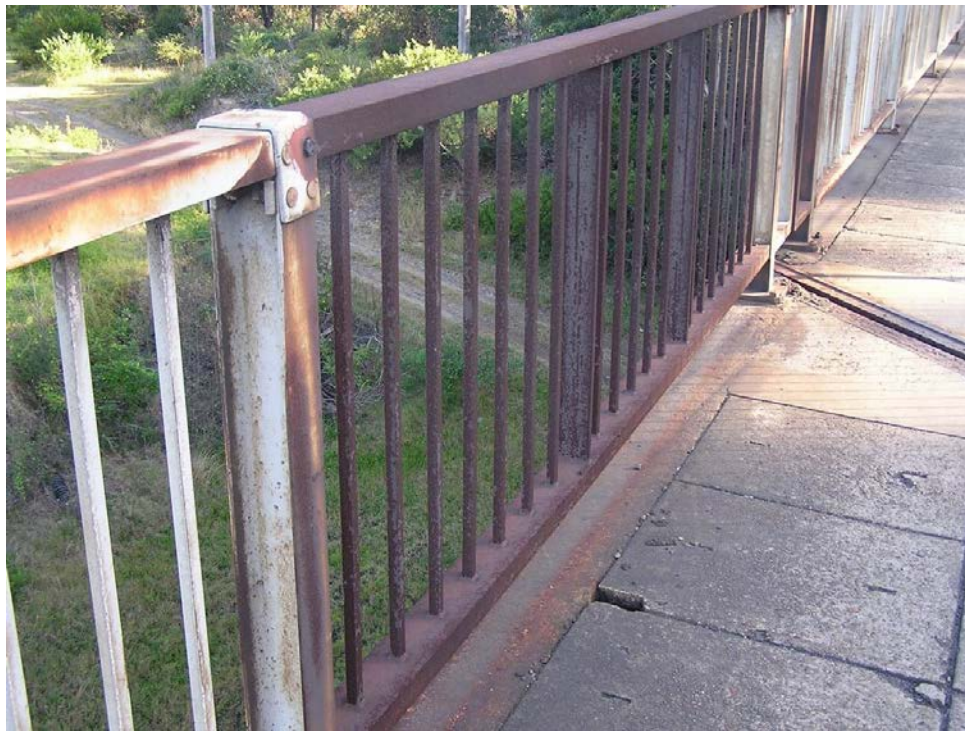


Paint work is no longer effective in significant areas.

## Railing – Paint work

RPNT

**Condition State 4**  
The paint work has failed.



Failed paint work on a metal railing.



Failed paintwork on a timber railing.



Transport  
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Services

# BRIDGE INSPECTION PROCEDURE MANUAL

## Miscellaneous Elements

**Miscellaneous Structures  
And  
Batter Protection**

## Miscellaneous Structures & Batter Protection

## MMAS, MBAT

Element	Description	Units
<b>MMAS</b>	<b>Masonry, Brick and Reinforced Earth</b> This element defines only those abutments, piers and arches constructed of masonry, brick or reinforced earth.	m <sup>2</sup> of exposed surface area
<b>MBAT</b>	<b>Batter Protection</b> This element defines only batter protection constructed of masonry, brick, stone filled gabions or mattresses, rubble, sand bags, concrete filled fabric mattress, or sprayed concrete.	m <sup>2</sup> of exposed surface area

For each of the condition states, report the estimated quantity in square metres of exposed surface area.

### Condition state descriptions

Condition State	Description
1	There is little or no vertical (differential) settlement, lateral or rotational movement, scour or failure of the construction material.
2	There may be vertical (differential) settlement, lateral or rotational movement, voids, scour or failure of the construction material but the strength and/or serviceability of either the element or the bridge are not significantly affected.
3	There may be vertical (differential) settlement, lateral or rotational movement, voids, scour or failure of the construction material to produce a loss of strength of the element but not of a sufficient magnitude to affect the serviceability of either the element or the bridge.
4	Vertical (differential) settlement, lateral or rotational movement, voids, scour, or failure of the construction material has occurred. There is sufficient concern to warrant an analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.

### Key Areas to inspect for any deterioration signs:

1. Areas with the potential to be undermined due to scour
2. Protection adjacent to other members

### Rating Guidance Notes:

## Miscellaneous Structures & Batter Protection

MMAS, MBAT

### Condition State 1

There is little or no vertical (differential) settlement, lateral or rotational movement, scour or failure of the construction material.



Masonry abutment on good condition.

## Miscellaneous Structures & Batter Protection

MMAS, MBAT

### Condition State 2

There may be vertical (differential) settlement, lateral or rotational movement, voids, scour or failure of the construction material but the strength and/or serviceability of either the element or the bridge are not significantly affected.



Moderate scour at the base of batter protection.



Settlement of the embankment.

### Miscellaneous Structures & Batter Protection

MMAS, MBAT

**Condition State 3**  
There may be vertical (differential) settlement, lateral or rotational movement, voids, scour or failure of the construction material to produce a loss of strength of the element but not of a sufficient magnitude to affect the serviceability of either the element or the bridge.



Batter protection undermined by scour at the base.



Cracked fabric protection and gaps allowing water to run under and erode the base

## Miscellaneous Structures & Batter Protection

MMAS, MBAT

### Condition State 4

Vertical (differential) settlement, lateral or rotational movement, voids, scour, or failure of the construction material has occurred. There is sufficient concern to warrant an analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.



Significant erosion of embankment.



Significant undermining and scour under abutment and approaches.

## Miscellaneous Structures & Batter Protection

MMAS, MBAT

### Condition State 4

Vertical (differential) settlement, lateral or rotational movement, voids, scour, or failure of the construction material has occurred. There is sufficient concern to warrant an analysis to ascertain the impact on the strength and/or serviceability of either the element or the bridge.



Fabric protection partially collapsed due to settlement.



# **Wearing Surface**

## Wearing Surface

**MWES**

Element	Description	Units
<b>MWES</b>	<b>Wearing Surface</b> This element defines only flush seal or asphaltic concrete (AC) wearing surface on bridge deck.	m <sup>2</sup> of surface area

For each of the condition states, report the estimated quantity in square metres of surface area.

### Condition state descriptions

Condition State	Description
1	The wearing surface on the deck has no repaired or cracked, shoved or stripped areas.
2	There are repaired and/or localised shoved or potholed areas of the wearing surface on the deck less than 0.5 m wide and/or 50mm deep. There may be some areas of cracking or stripping across bridge.
3	There may be repaired and/or shoved or potholed areas of the wearing surface on the deck greater than 0.5 m wide and/or 50mm deep. There may be large areas of cracking or some areas of stripping across entire bridge.
4	The wearing surface has failed. There may be large areas of shoved AC or potholes. Extensive cracking may be present with delamination of sections of wearing surface. There may be large areas of stripping across the bridge.

**Key Areas to inspect** for any deterioration signs:

1. Surface profile
2. Cracking with moist surface.

**Rating Guidance Notes:**

## Wearing Surface

MWES

### Condition State 1

The wearing surface on the deck has no repaired or cracked, shoved or stripped areas.



Wearing surface in good condition.

## Wearing Surface

MWES

### Condition State 2

There are repaired and/or localised shovled or potholed areas of the wearing surface on the deck less than 0.5 m wide and/or 50mm deep. There may be some areas of cracking or stripping across bridge.



Stripping of wearing surface in small area.



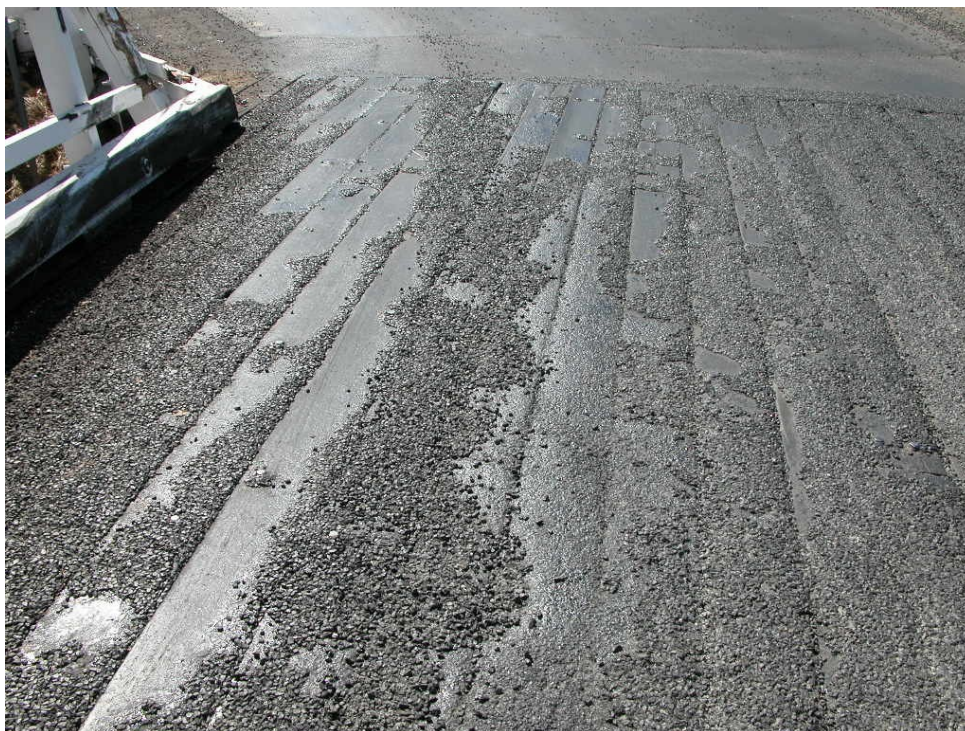
Wearing surface breaking up near some repaired areas.

## Wearing Surface

MWES

### Condition State 3

There may be repaired and/or shoved or potholed areas of the wearing surface on the deck greater than 0.5 m wide and/or 50mm deep. There may be large areas of cracking or some areas of stripping across entire bridge.



Stripped and bleeding wearing surface.



Cracking of large areas of the wearing surface on the bridge.

## Wearing Surface

MWES

### Condition State 4

The wearing surface has failed. There may be large areas of shoved AC or potholes. Extensive cracking may be present with delamination of sections of wearing surface. There may be large areas of stripping across the bridge.



Wearing surface with extensive damage.



Wearing surface in poor condition.

# Approach Carriageway

## Approach Slab and Carriageway

**MAPP**

Element	Description	Units
<b>MAPP</b>	<b>Approach Carriageway</b> This element defines only the carriageway pavement immediately behind the bridge abutments or the approach slab up to 6m from the abutment.	<b>No.</b> of approach carriageways

For each of the condition states, report the number of approach carriageways.

### Condition state descriptions

Condition State	Description
1	There is a smooth transition between the carriageway pavement or the approach slab and the bridge deck. The carriageway pavement or approach slab is smooth, free of potholes and properly sloped for drainage. The expansion joint between the concrete approach slab and the abutment is functioning.
2	There may be vertical settlement or deformations in the carriageway pavement or approach slab behind the abutment(s), less than 20 mm within 1m of the bridge. There may be a few potholes.
3	There may be vertical settlement or deformations in the carriageway pavement or approach slab behind the abutment(s), less than 40 mm within 1m of the bridge. The carriageway pavement or approach slab behind the abutment(s), may be cracking or showing signs of failure. The expansion joint between the concrete approach slab and the abutment may be not functioning. There may be moderate level of potholes.
4	There may be vertical settlement or deformations in the carriageway pavement or approach slab behind the abutment(s), more than 40 mm within 1m of the bridge, or the pavement or approach slab may be showing significant failure. The carriageway pavement or approach slab may have migrated toward the bridge damaging the abutment and/or the expansion joints in the bridge deck are not functioning. There may be large number of potholes. There may be adverse drainage causing ponding or scour.

**Key Areas to inspect** for any deterioration signs:

1. Profile
2. Drainage of the pavement

**Rating Guidance Notes:**

## Approach Carriageway

MAPP

### Condition State 1

There is a smooth transition between the carriageway pavement or the approach slab and the bridge deck. The carriageway pavement or approach slab is smooth, free of potholes and properly sloped for drainage. The expansion joint between the concrete approach slab and the abutment is functioning.



Approach carriageway in good condition.

## Approach Carriageway

MAPP

### Condition State 2

There may be vertical settlement or deformations in the carriageway pavement or approach slab behind the abutment(s), less than 20 mm within 1m of the bridge. There may be a few potholes.



Nominal drop of the approach carriageway.



A noticeable drop of the approach carriageway wearing surface level at the bridge.

## Approach Carriageway

MAPP

**Condition State 2** - There may be vertical settlement or deformations in the carriageway pavement or approach slab behind the abutment(s), less than 40 mm within 1m of the bridge. The carriageway pavement or approach slab behind the abutment(s), may be cracking or showing signs of failure. The expansion joint between the concrete approach slab and the abutment may be not functioning. There may be moderate level of potholes.



Significant settlement of approach carriageway.

## Approach Carriageway

MAPP

### Condition State 4

There may be vertical settlement or deformations in the carriageway pavement behind the abutment(s), more than 40 mm within 1 m of the bridge, or the pavement may be showing significant failure. The carriageway pavement may have migrated toward the bridge damaging the abutment and/or the expansion joints in the bridge deck are not functioning. There may be large number of potholes. There may be adverse drainage causing ponding or scour.



Settlement cracking of approach slab.

# Waterway

## Waterway

**MWWY**

Element	Description	Units
MWWY	<p><b>Waterway</b></p> <p>This element defines only waterways at bridges or bridge size culverts.</p>	Item

Report the waterway in the worst condition state that exists at the bridge.

### Condition state descriptions

Condition State	Description
1	There is little or no change in the location, shape or level of the channel from the natural or formed channel.
2	Sedimentation, vegetation or debris in the channel bed has reduced the waterway through the structure. Minor scour has occurred but it does not threaten to undermine footing(s) or culvert invert slabs or expose piles at pier(s) or abutment(s) or erode the embankment(s).
3	General or local scour or lateral erosion has the potential to undermine the footing(s) or culvert invert slabs or expose the piles at pier(s) or abutment(s) or has caused disturbance of embankment material. The waterway area may be partly blocked by debris. Sedimentation may have blocked more than 20% and less than 25% of waterway area.
4	General or local scour or lateral erosion has undermined the footing(s) or culvert invert slabs or has caused loss of embankment material or embankment protection material. Sedimentation may have blocked more than 25% of waterway area.

### Key Areas to inspect for any deterioration signs:

1. Downstream and upstream excavations or changes in the river for potential impact at the bridge
2. Scour holes near the bridge

### Rating Guidance Notes:

Growth of grasses and reeds in the waterway is generally a natural phenomenon and is acceptable under condition 1.

## Waterway

MWWY

### Condition State 1

There is little or no change in the location, shape or level of the channel from the natural or formed channel.



Waterway clear except for reeds which help stabilise.

## Waterway

MWWY

### Condition State 2

Sedimentation, vegetation or debris in the channel bed has reduced the waterway through the structure. Minor scour has occurred but it does not threaten to undermine footing(s) or culvert invert slabs or expose piles at pier(s) or abutment(s) or erode the embankment(s).



Waterway with some debris but not significant.

## Waterway

MWWY

### Condition State 3

General or local scour or lateral erosion has the potential to undermine the footing(s) or culvert invert slabs or expose the piles at pier(s) or abutment(s) or has caused disturbance of embankment material. The waterway area may be partly blocked by debris. Sedimentation may have blocked more than 20% and less than 25% of waterway area.



Waterway showing about 20% siltation with ponding water.



Waterway with some scour and debris buildup.

## Waterway

MWWY

### Condition State 4

General or local scour or lateral erosion has undermined the footing(s) or culvert invert slabs or has caused loss of embankment material or embankment protection material. Sedimentation may have blocked more than 25% of waterway area.



Waterway almost completely blocked inside culvert.

# Stormwater System

## Stormwater System

**MSWS**

Element	Description	Units
<b>MSWS</b>	<b>Stormwater System</b> This element defines only the scuppers and stormwater systems of bridges.	<b>Each span</b>

Report the stormwater system in the worst condition state that exists at the bridge.

### Condition state descriptions

Condition State	Description
1	Scuppers and stormwater system clear. Drainage system fully functional.
2	Some scuppers are blocked or partly blocked but drainage of deck is satisfactory. Drainage system is functional possibly with some minor leaky joints and/or some brackets may be broken.
3	Drainage pipes may have broken sections and/or large number of leaks. Scuppers / grates may be damaged. There may be large number of scuppers blocked affecting drainage of the deck. There may be some loose or missing hangers.
4	Blocked scuppers prevent or threaten to prevent satisfactory drainage of deck. Drainage system may be blocked or damaged and not functioning satisfactorily. There may be many loose or missing hangers.

**Key Areas to inspect** for any deterioration signs:

1. Inspect system from scuppers to outlet/s
2. Connections or hangers to bridge

### Rating Guidance Notes:

The stormwater system rated is only the stormwater components on the bridge.

## Stormwater System

MSWS

### Condition State 1

Scuppers and stormwater system clear. Drainage system fully functional.



Clear scuppers and stormwater system.



External storm water attachment in good condition.

## Stormwater System

MSWS

### Condition State 2

Some scuppers are blocked or partly blocked but drainage of deck is satisfactory. Drainage system is functional possibly with some minor leaky joints and/or some brackets may be broken.



Minor leak at joint with broken collar on a drainage pipe attachment.

## Stormwater System

MSWS

### Condition State 3

Drainage pipes may have broken sections and/or large number of leaks. Scuppers / grates may be damaged. There may be large number of scuppers blocked affecting drainage of the deck. There may be some loose or missing hangers.



Drainage downpipe with holes.



Broken joint in the drainage system.

## Stormwater System

**MSWS**

### **Condition State 4**

Blocked scuppers prevent or threaten to prevent satisfactory drainage of deck. Drainage system may be blocked or damaged and not functioning satisfactorily. There may be many loose or missing hangers.

# Safety Screens

## Safety Screen

**MSCR**

Element	Description	Units
<b>MSCR</b>	<b>Safety Screen</b> This element defines only the safety screen attachment on bridges.	m of safety screen.

For each of the condition states, report the estimated quantity in lineal metre of the attachment.

### Condition state descriptions

Condition State	Description
1	The safety screen is in good condition. There is little or no evidence of corrosion. The protective coating, if any, may be chalking, peeling, checking or showing other early evidence of distress but there is no exposure of metal.  The structural connections fixing the safety screen to the bridge are in good condition.
2	Surface or freckled rust has formed or is forming. The protective coating, if any, is no longer effective and there may be exposed metal but there is no loss of section.  The structural connections fixing the attachment to the bridge are good condition.
3	Surface pitting may be present but any section loss is minor and does not affect the strength or serviceability of the element.  The structural connections fixing the attachment to the bridge are in good condition.
4	Corrosion is advanced. Section loss is sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of the element.  There is doubt about the integrity of the connection(s). There may be advanced corrosion or cracking of the connectors and/or the supporting bridge element.

**Key Areas to inspect** for any deterioration signs:

1. The connections of the safety screen to the supporting bridge element
2. Welds, especially at the base connectors

**Rating Guidance Notes:**

## Safety Screens

MSCR

### Condition State 1

The safety screen is in good condition. There is little or no evidence of corrosion. The protective coating, if any, may be chalking, peeling, checking or showing other early evidence of distress but there is no exposure of metal. The structural connections fixing the safety screen to the bridge are in good condition.



Safety screen in good condition.



Safety screen in good condition.

## Safety Screens

MSCR

### Condition State 2 :

Surface or freckled rust has formed or is forming. The protective coating, if any, is no longer effective and there may be exposed metal but there is no loss of section. The structural connections fixing the attachment to the bridge are good condition.



Rust forming on the screen.



Corrosion of bolt.

## Safety Screens

MSCR

### Condition State 2 :

Surface or freckled rust has formed or is forming. The protective coating, if any, is no longer effective and there may be exposed metal but there is no loss of section. The structural connections fixing the attachment to the bridge are good condition.



No mortar pad under the screen post.

## Safety Screens

MSCR

### Condition State 3 :

Surface pitting may be present but any section loss is minor and does not affect the strength or serviceability of the element. The structural connections fixing the attachment to the bridge are in good condition.

## Safety Screens

MSCR

### Condition State 4 :

Corrosion is advanced. Section loss is sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of the element. There is doubt about the integrity of the connection(s). There may be advanced corrosion or cracking of the connectors and/or the supporting bridge element.



## **Miscellaneous Attachments**

## Miscellaneous Attachments

**MATT**

Element	Description	Units
<b>MATT</b>	<p><b>Miscellaneous Attachments</b></p> <p>This element defines only the significant attachments on bridges such as major signs including advertising panels, architectural panels, noise walls, light poles, and any permanent fixtures such as ladders, gantries and access ways <b>intended for authorised personnel only</b>. It does not include power, telecommunications, water or similar service attachments of external ownership or permanent fixtures intended for public use.</p>	<b>Item.</b>

For each of the condition states, report the estimated quantity in lineal metre of the attachment.

### Condition state descriptions

Condition State	Description
1	<p>The attachment is in good condition. There is little or no evidence of corrosion or deterioration. The protective coating, if any, may be chalking, peeling, checking or showing other early evidence of distress but there is no exposure of metal.</p> <p>The structural connections fixing the attachment to the bridge are in good condition. Ladders, gantries or access ways are in good condition.</p>
2	<p><b>Metal:</b> Surface or freckled rust has formed or is forming. The protective coating, if any, is no longer effective and there may be exposed metal but there is no loss of section.</p> <p><b>Concrete:</b> Minor cracks or spalls. No exposed reinforcement or surface evidence of corrosion of reinforcement.</p> <p>The structural connections fixing the attachment to the bridge are good condition. Ladders, gantries or access ways have minor defects but are safe to use.</p>
3	<p><b>Metal:</b> Surface pitting may be present but any section loss is minor.</p> <p><b>Concrete:</b> Some delamination or corrosion of reinforcement may be present. Any section loss or deterioration does not affect the strength or serviceability of the element.</p> <p>The structural connections fixing the attachment to the bridge are in good condition. Ladders, gantries or access ways have moderate defects and there is doubt about adequacy of them for intended purpose.</p>
4	<p><b>Metal:</b> Corrosion is advanced. Section loss is significant.</p> <p><b>Concrete:</b> Advanced deterioration or corrosion of reinforcement. Deterioration of concrete or section loss of metal is sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of the element. There is doubt about the integrity of the connection(s). There may be advanced corrosion or cracking of the connectors and/or the supporting bridge element. Ladders, gantries or access ways have significant defects and are unsafe to use.</p>

**Key Areas to inspect** for any deterioration signs:

1. The connections of the attachment to the supporting bridge element.
2. Base plates of light poles.
3. Welds

### Rating Guidance Notes:

If third party attachments are in poor condition, the matter should be referred to the BMP.

When multiple attachments are affected, the defects shall be recorded under inspector's comments identifying the affected attachments.

## Miscellaneous Attachments

**MATT**

### Condition State 1

The attachment is in good condition. There is little or no evidence of corrosion or deterioration. The protective coating, if any, may be chalking, peeling, checking or showing other early evidence of distress but there is no exposure of metal. The structural connections fixing the attachment to the bridge are in good condition. Ladders, gantries or access ways are in good condition.

## Miscellaneous Attachments

MATT

### Condition State 2 :

**Metal:** Surface or freckled rust has formed or is forming. The protective coating, if any, is no longer effective and there may be exposed metal but there is no loss of section. **Concrete:** Minor cracks or spalls. No exposed reinforcement or surface evidence of corrosion of reinforcement. The structural connections fixing the attachment to the bridge are good condition. Ladders, gantries or access ways have minor defects but are safe to use.



Cracks on a noise wall and supporting frame.

## Miscellaneous Attachments

MATT

### Condition State 3 :

**Metal:** Surface pitting may be present but any section loss is minor.

**Concrete:** Some delamination or corrosion of reinforcement may be present. Any section loss or deterioration does not affect the strength or serviceability of the element. The structural connections fixing the attachment to the bridge are in good condition. Ladders, gantries or access ways have moderate defects and there is doubt about adequacy of them for intended purpose.



Minor pitting corrosion of the light pole.



Noise wall attachment with cracks running along the holding bolts.

## Miscellaneous Attachments

MATT

### Condition State 4 :

**Metal:** Corrosion is advanced. Section loss is significant. **Concrete:** Advanced deterioration or corrosion of reinforcement. Deterioration of concrete or section loss of metal is sufficient to warrant analysis to ascertain the impact on the strength and/or serviceability of the element. There is doubt about the integrity of the connection(s). There may be advanced corrosion or cracking of the connectors and/or the supporting bridge element. Ladders, gantries or access ways have significant defects and are unsafe to use.



There is significant loss of section on one side of the ladder rendering it unsafe for use.

# General Cleaning

## General Cleaning

**MGCL**

Element	Description	Units
MGCL	<b>General Cleaning</b> This element defines only the cleanliness of bridges.	<b>each</b> (span, including substructure)

For each of the condition states, report the number of spans on which the feasible actions are required.

### Condition state descriptions

Condition State	Description
1	No buildup of dirt or vegetation. No Graffiti.
2	There is a minor buildup of dirt or vegetation, but it does not affect joint or bearing or drainage movement. Graffiti is not of concern.
3	There is a moderate buildup of dirt or vegetation which threatens to affect joint or bearing or drainage movement. Drainage of deck is just adequate. Graffiti is of some concern. Overgrowth of vegetation threatening to cover bridge elements and road safety signs on the bridge and its immediate vicinity.
4	There is a significant buildup of dirt or vegetation which affects or threatens to affect joint or bearing or drainage movement. Graffiti is of concern. Overgrowth of vegetation covering bridge elements and road safety signs on the bridge and its immediate vicinity.

**Key Areas to inspect** for any deterioration signs:

- 1.
- 2.

**Rating Guidance Notes:**

## General Cleaning

MGCL

### Condition State 1

No buildup of dirt or vegetation. No Graffiti.



A clean deck.

## General Cleaning

MGCL

### Condition State 2

There is a minor buildup of dirt or vegetation, but it does not affect joint or bearing or drainage movement. Graffiti is not of concern.



Tree close to the structure. To be removed.



Dirt accumulation inside structural element.

## General Cleaning

MGCL

### Condition State 3

There is a moderate buildup of dirt or vegetation which threatens to affect joint or bearing or drainage movement. Drainage of deck is just adequate. Graffiti is of some concern. Overgrowth of vegetation threatening to cover bridge elements and road safety signs on the bridge and its immediate vicinity.



Dirt buildup retaining moisture that can result in corrosion at the base.



Moderate build up of dirt.

## General Cleaning

MGCL

### Condition State 3

There is a moderate buildup of dirt or vegetation which threatens to affect joint or bearing or drainage movement. Drainage of deck is just adequate. Graffiti is of some concern. Overgrowth of vegetation threatening to cover bridge elements and road safety signs on the bridge and its immediate vicinity.



Graffiti is of some concern.

## General Cleaning

MGCL

### Condition State 4

There is a significant buildup of dirt or vegetation which affects or threatens to affect joint or bearing or drainage movement. Graffiti is of concern.



Significant buildup of dirt affecting drainage movement.



Overgrowth of vegetation covering bridge railing and any delineator sign on the end post.

