Appendix 4

Ardmore Park Quarry – Modification 3

Engineering Assessment of the Culverts and Bridges on the Product Delivery Route

prepared by

Bridge Designs Pty Ltd

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Multiquip
Attention: Steve Wall

B1833-R-01

03 September 2018

Bungonia Culverts - Engineering Assessment

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1 Introduction

Bridge Design were commissioned by Multiquip to assess ten (10) structures along the quarry haulage route on their suitability under General Mass Limit (GML) loading. The structures are listed in Table 1.1.

Table 1.1: List of Structures

Crossing	Type	Road	Chainage
A (Marulan Creek)	1 x 2.1H x 3.1W box culvert	Jerrara Road	1333
B	3 x 1.8H x 1.9W box culvert	Jerrara Road	3161
C (Stony Creek)	2 x 2.1H x 2.1W box culvert	Jerrara Road	3430
D	1 x 2.7H x 3.3W box culvert	Jerrara Road	5130
E (Sawyers Creek)	1 span steel girder bridge	Jerrara Road	5940
F	1 x 1.8H x 2.1W box culvert	Jerrara Road	8370
G (Jerrara Creek)	2 span PSC bridge	Jerrara Road	9720
H (Springponds Ck)	5 x 1.2H x 2.1W box culvert	Jerrara Road	11916
I	2 x Ø1500 pipe culvert	Mountain Ash Rd	474
J (Woodwards Ck)	1 x Ø1500 pipe culvert	Oallen Ford Rd	N/A

The haulage route has been widened recently to improve access to and from the quarry. This involved widening a number of culverts and bridges along the route. Additional culvert units were added adjacent to most of the existing structures.

The bridge over Jerrara Creek (G) was widened by adding two new prestressed concrete girders on the eastern side of the existing bridge. These girders are supported by new steel headstocks which are bolted to the existing concrete headstocks. A concrete deck has been poured adjacent to the existing deck such that there is no load transfer between the two. The design for the widening of this bridge was undertaken by Bridge Design.

Two of the structures (C and D) are new culverts constructed as part of the road widening. These culverts were designed to SM1600 loading and are therefore suitable for GML loading.

2 Condition Assessment

A level 2 inspection was performed on all ten structures. The reports for these inspections may be found in Appendix A.

The overall condition of the structures varied from good to fair. No condition 4 elements were identified as part of the assessments. The structural capacity of each of the structures is therefore not compromised by their defects.

The six culverts were determined to be safe to proof load (see Section 4).

3 Mass Limits

The structures were assessed for General Mass Limit (GML) loading. This refers to the allowable mass for of heavy vehicles which are permitted on the general road network.

The maximum permissible axle loads are 6.5t for a steer axle group with a FUPS bar fitted to the prime mover, 9.0t for a single axle, 16.5t for a double axle and 20.0t for a triple axle. The typical axle spacing is 1.25m.

For Concessional Mass Limit (CML) loading the corresponding limits are 6.5t, 9.5t, 17.0t and 21.0t respectively. For Higher Mass Limit (HML) loading the limits are 6.5t, 9.5t, 17.0t and 22.5t respectively.

The axles loads are critical for the culverts. For Bridge G the critical vehicles are a 26.5t rigid and a 42.5t semi-trailer.

4 Load Testing

The six culverts that were proof load tested were A, B, F, H, I and J.

The target load across the three axles was 31.2 tonnes, which is the 20 tonne GML tri-axle load times a dynamic load factor of 1.3 and times a proof load factor of 1.2. The 31.2 tonne load represents and overload condition of 114% for CML loading and 107% for HML loading. The culverts were load tested incrementally with an initial load of 20.0 tonnes, an intermediate load of 26.0 tonnes, and a final load of 31.2 tonnes. The loads were measured using a weighbridge at the Multiquip quarry prior to load testing. Two separate vehicles were used for the testing; one with a 20 tonne triple bogey and another with a 26 tonne triple bogey to which an additional 5.2 tonnes was added to make 31.2 tonnes.

Deflections were measured at midspan using a dial gauge as shown in Figures 4.1 and 4.2. The dial gauge was secured to a ladder and positioned underneath the wheel path. The position of the dial gauge was kept the same for the three tests. Readings were taken before loading, under loading and after loading to determine the deflection and the return. The dial gauge was accurate to 0.01mm.

The axles were positioned as close as possible to the midspan of the culvert to generate the maximum bending in the slab. The same position was used for the three different loads.

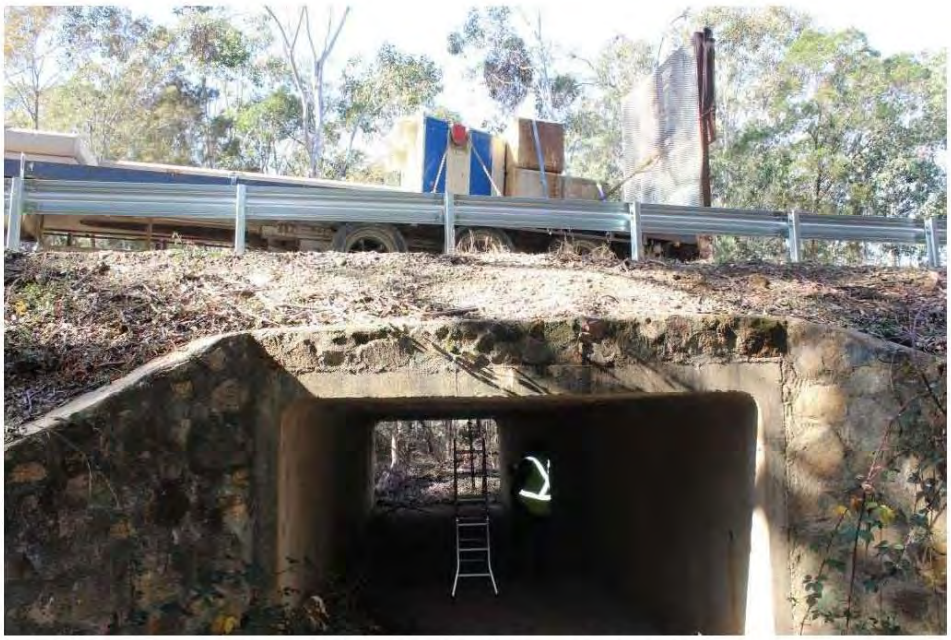

Figure 4.1: Test Setup at Culvert A

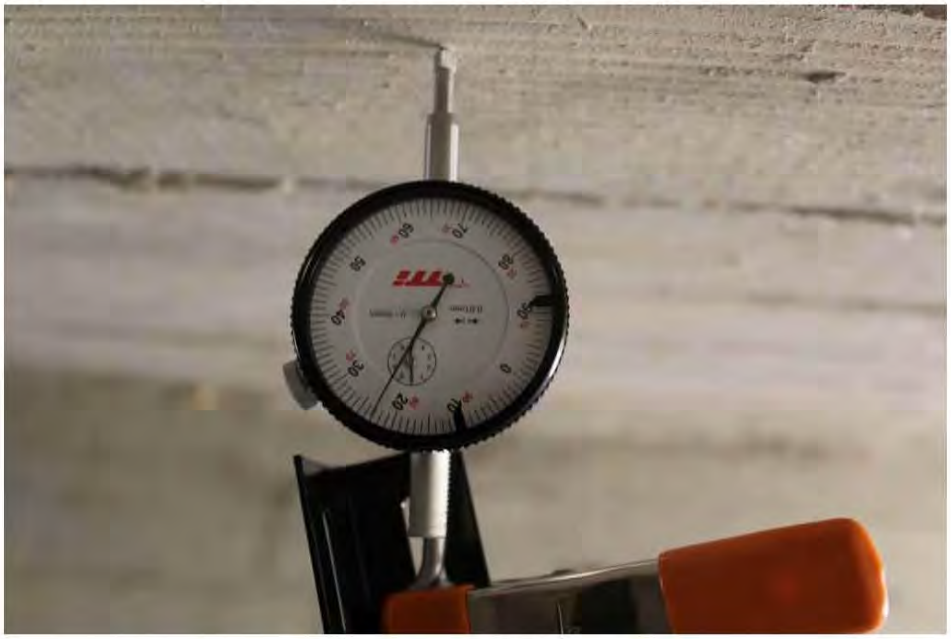

Figure 4.2: Dial Gauge

No visible distress was observed in any of the structures tested. The results of the testing can be found below.

4.1 Culvert A

Lane tested: Northbound
Cell tested: 1 of 1
Gauge position: Unit 5
Approximate fill height: 1.0m

Table 4.1: Culvert A results

	20t	26t	31.2t
Deflection under load	0.19	0.24	0.28
Return	0.18	0.23	0.26
Cracking unloaded	Nil	Nil	Nil
Cracking under load	Nil	Nil	Nil

4.2 Culvert B

Lane tested: Northbound
Cell tested: 1 of 3
Gauge position: 2m from eastern edge
Approximate fill height: 0.3m above top of headwall

Table 4.2: Culvert B results

	20t	26t	31.2t
Deflection under load	0.01	0.02	0.02
Return	0.01	0.02	0.03
Cracking unloaded	Nil	Nil	Nil
Cracking under load	Nil	Nil	Nil

4.3 Culvert F

Lane tested: Northbound
Cell tested: 1 of 1
Gauge position: Unit 13
Approximate fill height: 1m

Table 4.3: Culvert F results

	20t	26t	31.2t
Deflection under load	0.11	0.12	0.10
Return	0.14	0.14	0.10
Cracking unloaded	Nil	Nil	Nil
Cracking under load	Nil	Nil	Nil

4.4 Culvert H

Lane tested: Southbound
Cell tested: 3 of 5
Gauge position: Unit 2
Approximate fill height: 1.2m

Table 4.4: Culvert H results

	20t	26t	31.2t
Deflection under load	0.15	0.20	0.27
Return	0.16	0.20	0.25
Cracking unloaded	0.2mm @ 200mm	0.2mm @ 200mm	0.2mm @ 200mm
Cracking under load	0.2mm @ 200mm	0.2mm @ 200mm	0.2mm @ 200mm

4.5 Culvert I

Lane tested: Eastbound turn lane
Cell tested: 1 (east) of 2
Gauge position: Unit 12
Approximate fill height: 2.0m

Table 4.5: Culvert I results

	20t	26t	31.2t
Deflection under load	0.00	0.00	0.00
Return	0.00	0.00	0.00
Cracking unloaded	0.1mm @ 75	0.1mm @ 75	0.1mm @ 75
Cracking under load	0.1mm @ 75	0.1mm @ 75	0.1mm @ 75

4.6 Culvert J

Lane tested: Southbound
Cell tested: 1 of 1
Gauge position: Unit 6
Approximate fill height: 2.5m

Table 4.6: Culvert J results

	20t	26t	31.2t
Deflection under load	0.16	0.22	0.29
Return	0.19	0.22	0.28
Cracking unloaded	0.4-0.5mm	0.4-0.5mm	0.4-0.5mm
Cracking under load	0.4-0.5mm	0.4-0.5mm	0.4-0.5mm

4.7 Summary

AS5100.2 states that the maximum deflection under live load is span/600. The maximum culvert deflection observed was Culvert H which recorded a deflection under live load of span/7800 which is substantially less than the limit stated in AS5100.2.

All six culverts remained in the elastic range during testing with the deflection returning to effectively zero after the test. The maximum difference between the deflection before loading and after unloading was 0.02mm. This discrepancy is extremely small and could be attributed to the accuracy of the instrument or any movement in the apparatus.

The roof slabs of Culverts A, B and F were uncracked before loading and remained uncracked under the 31.2t load. Culverts H, I and J had cracks in the roof unloaded and these cracks did not widen under the 31.2t load.

These results suggest that all six culverts are capable of carrying GML loads. There was no discernible change in the crack widths and very minor deflections under the 31.2 tonne load which suggests there is sufficient additional capacity for CML and HML loading.

5 Load Rating

5.1 Bridge E

The bridge over Sawyers Creek (E) consists of five steel beams which support steel plate decking and approximately 600mm of fill. The steel beams sit on masonry abutments and have a clear span of 4.4m.

The dimensions of the steel beams were measured on site and do not correspond to a standard section. The beams were not marked but the steel grade was assumed to be 250MPa.

The GML and HML axle loads were considered and were assumed to be distributed by the fill material. A dynamic load allowance (DLA) of 0.25 was adopted for the steel bridge as the depth of fill material allows for a reduced DLA.

Table 5.1: Bridge E Analysis Results

	GML Maximum Effect	HML Maximum Effect	Estimated Capacity
Girder Bending	174 kNm	184 kNm	186 kNm
Girder Shear	184 kN	201 kN	743 kN

The masonry walls showed no signs of distress and are assumed to capable of carrying the required loads.

The loads under GML and HML were less than the estimated capacity so Bridge E is therefore deemed to be capable of safely carrying GML, CML and HML loading.

5.2 Bridge G

The original design drawings for structure G were made available to Bridge Design during the bridge widening. The scan quality of these drawings is extremely poor and it is difficult to determine the details of the reinforcement.

The clear deck width of the original bridge is 6.45m which is wide enough to accommodate two 3.2m wide lanes. The new deck is not connected to the original deck so the analysis considered the case where two vehicles were supported entirely by the original structure, with a lane factor of 0.8 for the second lane. The dynamic load allowance (DLA) was taken as 0.3. Both the 26.5t rigid and 42.5t semi-trailer were modelled and the maximum effects are displayed in Table 5.2.

The girders contain eleven strands in the bottom layer, five in the middle and three in the top layer. These strands were assumed to be 3/8″ (9.5mm) strands in line with other designs from the period. Shear reinforcement consists of two stirrups which were assumed to be 1/4″ bars and spaced at 9″ (225mm) in the critical shear zone.

The reinforcement in the abutment and pier headstocks consists of four straight bars in each face and four bars which are bent such that they are in the top face at the columns and in the bottom face in the middle. The bar size could not be definitively determined from the drawings but appear to be 4 x 7/8″ bars and 4 x 9/8″ bars. Shear reinforcement consists of four legs assumed to be 1/2″ bars. The bar spacing is 7.5″ (190mm) at the abutments and 6″ (150mm) at the piers.

Assumed material properties:

- Concrete compressive strength — 20 MPa abutments, pier, deck; 38 MPa girders
- Steel yield strength — 275 MPa
- Strand yield strength — 1050 MPa

Table 5.2: Bridge G Analysis Results

	GML Maximum Effect	HML Maximum Effect	Estimated Capacity
Girder Bending	310 kNm	329 kNm	427 kNm
Girder Shear	137 kN	145 kN	202 kN
Abutment Bending	+502 kNm / -214 kNm	+536 kNm / -232 kNm	573 kNm
Abutment Shear	376 kN	399 kN	667 kN
Pier Bending	+422 kNm / -309 kNm	+435 kNm / -320 kNm	573 kNm
Pier Shear	449 kN	462 kN	796 kN

The loads under GML and HML were less than the estimated capacity so Bridge G (Jerrara Creek) is therefore deemed to be capable of safely carrying GML, CML and HML loading.

6 Conclusion

All ten structures are in good to fair condition with no defects sufficient to compromise their structural capacity.

Culverts C and D are assumed to be satisfactory due to their design codes. Culverts A, B, F, H, I and J were load tested and determined to be capable of carrying the required loads. Bridges E and G were analysed and determined to be capable of carrying the required loads.

Yours faithfully,

Mitchell Kramer

Bridge Engineer

Appendix A - Condition Assessment Reports

Bridge Design

Level 2 Structure Condition Report

Job No.	B1833		
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LOCATION DETAILS			
Structure Name	Culvert A	**Structure ID**	1333.162
Road Name	Jerrara Rd	**Road Class**	local
Speed Limit (km/h)	80	**Latitude**	-34.7417
Suburb	Marulan	**Longitude**	149.9762
LGA	Goulburn Mulwaree	**Crossing**	Marulan Creek (A)
From	Marulan	**Catchment Name**	N/A
To	Bungonia	**Catchment Area (km^2)**	N/A
Location Description	Chainage 1333.162		

STRUCTURE DETAILS			
Culvert Type	precast box	**Skew**	0
Construction Material	concrete	**Number of cells**	1
Construction Date		**No. units per cell**	6
Waterway area (m2)	6.5604	**Unit length (m)**	2.5
Cell height/diameter (m)	2.13	**Overall length (m)**	15
Cell width (m)	3.08	**Clear spacing (m)**	
Height over culvert (m)	1	**No. traffic lanes**	2
Wall thickness (mm)	125-175	**Road width (m)**	9.7
Roof thickness (mm)	190		

INSPECTION DETAILS			
Inspected by	Mitchell Kramer	**Last Level 2 Inspection**	unknown
Date of Inspection	8/06/2018	**Next Level 2 Inspection**	N/A
Time of Inspection	9am	**Structure plans available?**	no
Weather	overcast	**Access equipment required?**	none
Tidal Conditions			

GENERAL COMMENTS

Some exposed reinforcement at edges and corners of units.
Single 3mm crack in base slab.
No signs of flexural cracking in units.

OVERALL STRUCTURE CONDITION RATING

	Good	Fair	Poor	Very Poor	Close	Comments
Overall Structure Condition Rating	X					

Bridge Design

Level 2 Structure Condition Report

Structure Name	Culvert A				
Inspected by	Mitchell Kramer				
Date of Inspection	8/06/2018				
Job No.	B1833	Page	2	of	6

Component Inventory and Condition Assessment

Element Type	RMS Code	Description	Environment	Unit	Quantity	Quantity in Condition Rating				Comments - type of defect - location of defect - size and severity
						1	2	3	4	
Concrete	CCUP	Precast Box Culvert	M	m2	110	0	100	10	0	- unit 1 (u1) taken as easternmost unit - u6n exposed reo at fillet, bars at 120 ctrs, same at u4n u2n u1n u2s u3s u5s bottom - spall u2 top easr end, also west end - u3 top west end exposed reo 20 cover - roof free of cracks
Concrete	CCUL	In Situ Base Slab	M	m2	46	0	46	0	0	3mm crack in middle of base slab for length of culvert
Miscellaneous	MAPP	Approaches	M	ea	2	2	0	0	0	
Railing	RMET	Steel Bridge Barrier	M	m	70	70	0	0	0	

Bridge Design

Level 2 Structure Condition Report

Structure Name		Culvert A			
Inspected by		Mitchell Kramer			
Date of Inspection		8/06/2018			
Job No.	B1833	**Page**	3	of	6

Required Maintenance Actions

Element Description	Quantity	Condition State	Defect Description	Required Action			
				Monitor	Repair	Level 3 Inspection	Other
Precast Box Culvert	10	3	Exposed reinforcement in corners of most units, spalling and exposed reinforcement at joints	X			

Bridge Design

Level 2 Structure Condition Report

	Structure Name	Culvert A				
	Inspected by	Mitchell Kramer				
	Date of Inspection	8/06/2018				
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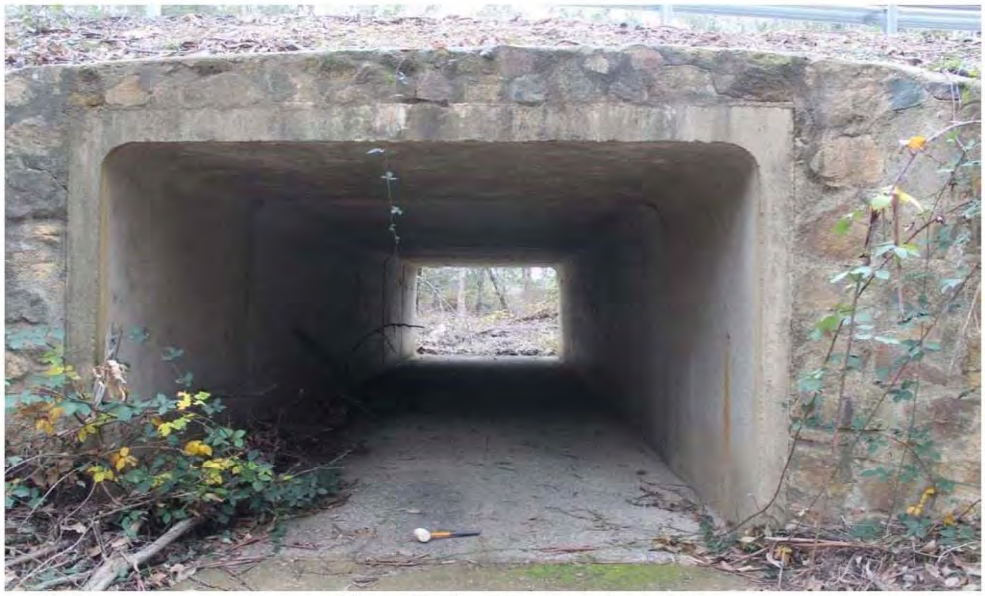
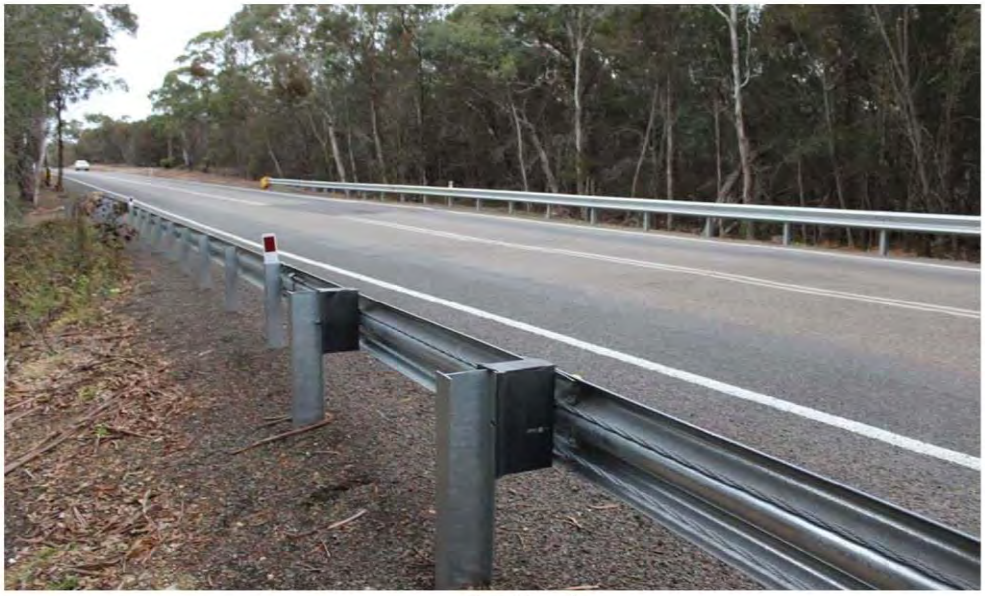


View of culvert from western side



Road level

Bridge Design

Level 2 Structure Condition Report

	Structure Name	Culvert A				
	Inspected by	Mitchell Kramer				
	Date of Inspection	8/06/2018				
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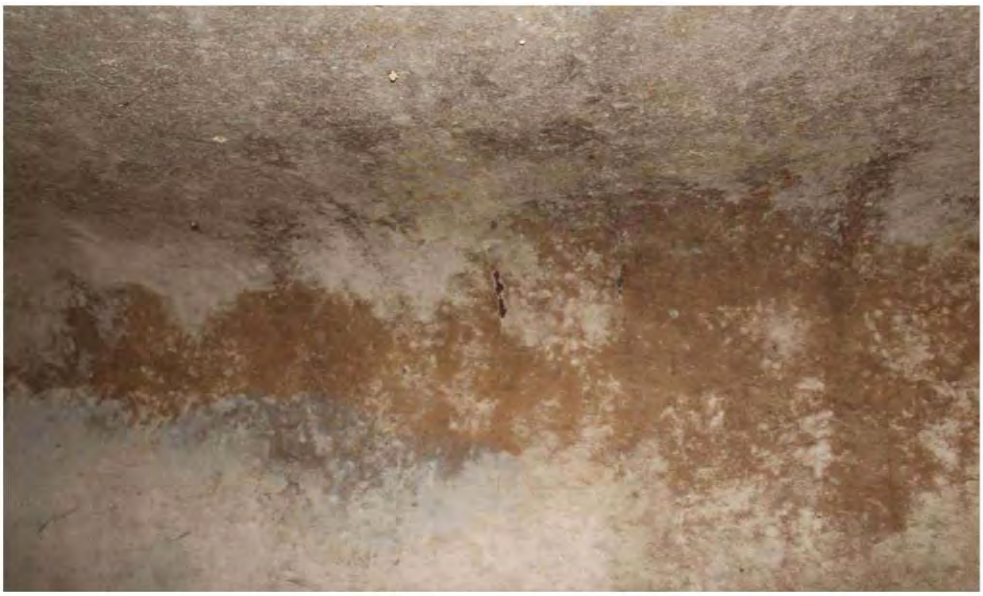
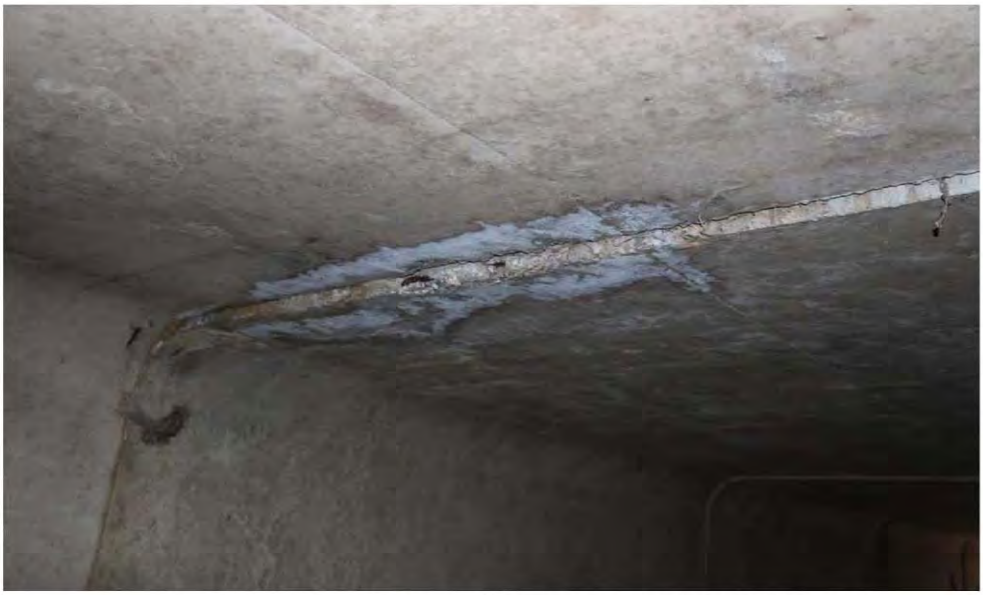


Exposed reinforcement at top corners



Exposed reinforcement and efflourescence in edge of culvert roof

Bridge Design

Level 2 Structure Condition Report

	Structure Name	Culvert A				
	Inspected by	Mitchell Kramer				
	Date of Inspection	8/06/2018				
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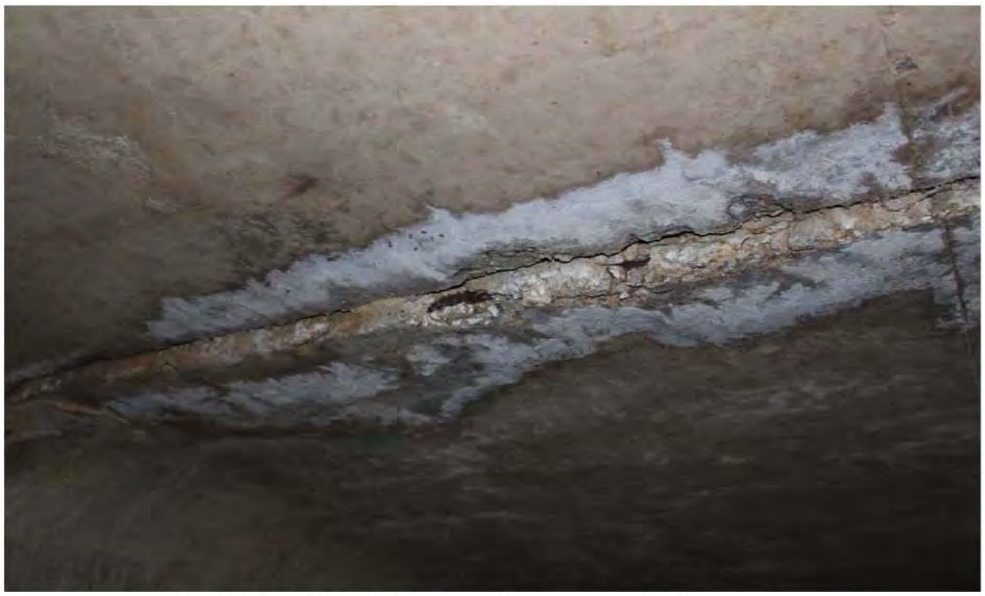
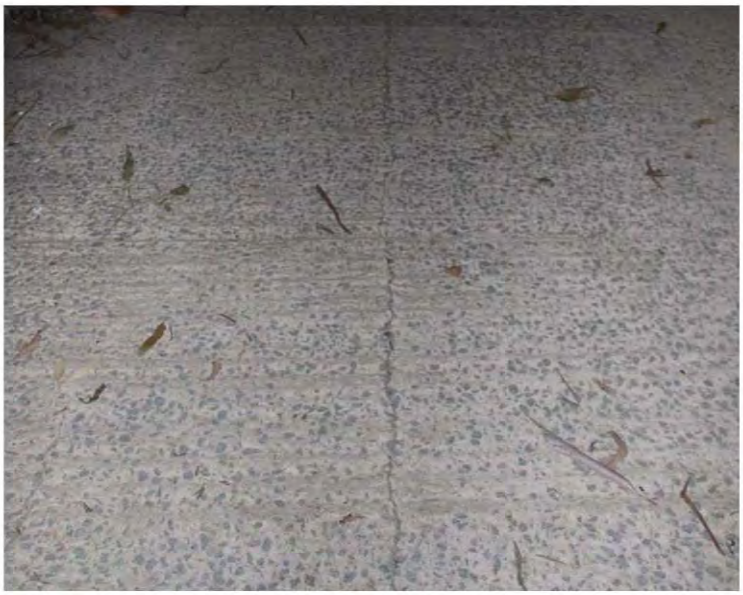


Exposed reinforcement and efflourescence in edge of culvert roof



0.3mm crack in base slab

Bridge Design

Level 2 Structure Condition Report

Job No.	B1833		
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LOCATION DETAILS

Structure Name	Culvert B	**Structure ID**	3161.622
Road Name	Jerrara Rd	**Road Class**	local
Speed Limit (km/h)	80	**Latitude**	-34.7566
Suburb	Marulan	**Longitude**	149.9700
LGA	Goulburn Mulwaree	**Crossing**	Unknown Creek (B)
From	Marulan	**Catchment Name**	n/a
To	Bungonia	**Catchment Area (km^2)**	n/a
Location Description	Chainage 3161.622		

STRUCTURE DETAILS

Culvert Type	in situ box	**Skew**	45°
Construction Material	concrete	**Number of cells**	3
Construction Date		**No. units per cell**	n/a
Waterway area (m2)	10.5	**Unit length (m)**	4.57m new 9.2m old
Cell height/diameter (m)	1.8	**Overall length (m)**	13.77
Cell width (m)	1.94	**Clear spacing (m)**	0
Height over culvert (m)	0.3m above headwall	**No. traffic lanes**	2
Wall thickness (mm)	115	**Road width (m)**	9.0
Roof thickness (mm)	150 old, new unknown		

INSPECTION DETAILS

Inspected by	Mitchell Kramer	**Last Level 2 Inspection**	unknown
Date of Inspection	7/06/2018	**Next Level 2 Inspection**	n/a
Time of Inspection	5pm	**Structure plans available?**	no
Weather	overcast	**Access equipment required?**	none
Tidal Conditions	-		

GENERAL COMMENTS

Only defect is 0.1mm Vertical crack in cell 3.
Structure is in good condition.

OVERALL STRUCTURE CONDITION RATING

	Good	Fair	Poor	Very Poor	Close	Comments
Overall Structure Condition Rating	X					

Bridge Design

Level 2 Structure Condition Report

Structure Name	Culvert B			
Inspected by	Mitchell Kramer			
Date of Inspection	7/06/2018			
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Component Inventory and Condition Assessment

Element Type	RMS Code	Description	Environment	Unit	Quantity	Quantity in Condition Rating				Comments - type of defect - location of defect - size and severity
						1	2	3	4	
Concrete	CCUL	In Situ Box Culvert - original	M	m2	130	0	130	0	0	- Cell 1 taken as northernmost 0.1 mm vertical crack 5m from eastern edge of Cell 3
Concrete	CCUL	In Situ Box Culvert - new	M	m2	65	65	0	0	0	No defects
Miscellaneous	MAPP	Approaches	M	ea	2	2	0	0	0	
Railing	RMET	Steel Bridge Barrier	M	m	60	60	0	0	0	

Bridge Design

Level 2 Structure Condition Report

Required Maintenance Actions

Structure Name	Culvert B
Inspected by	Mitchell Kramer
Date of Inspection	7/06/2018
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Element Description	Quantity	Condition State	Defect Description	Required Action				
				Monitor	Repair	Level 3 Inspection	Other
			No required maintenance actions				

Bridge Design

Level 2 Structure Condition Report

Structure Name	Culvert B
Inspected by	Mitchell Kramer
Date of Inspection	7/06/2018

PHOTOS

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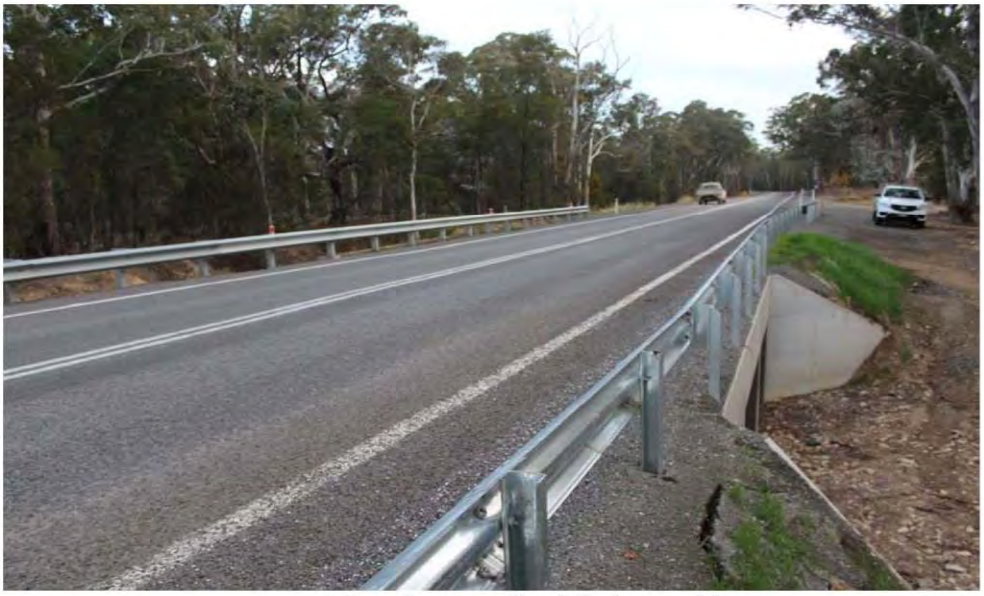
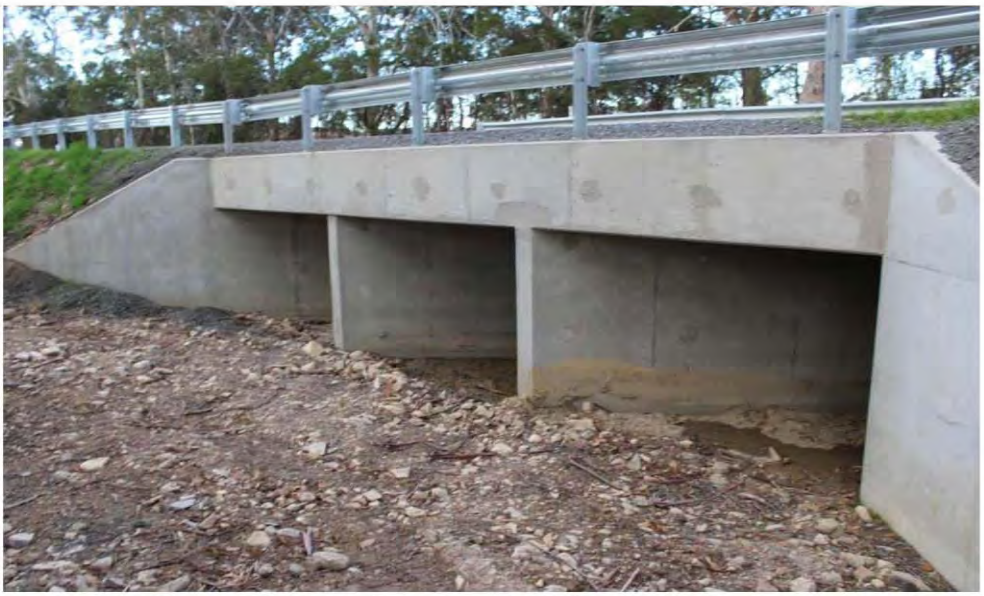


Culvert from road level (facing south)



Culverts from western side (recent extension)

Bridge Design

Level 2 Structure Condition Report

Structure Name	Culvert B
Inspected by	Mitchell Kramer
Date of Inspection	7/06/2018

PHOTOS

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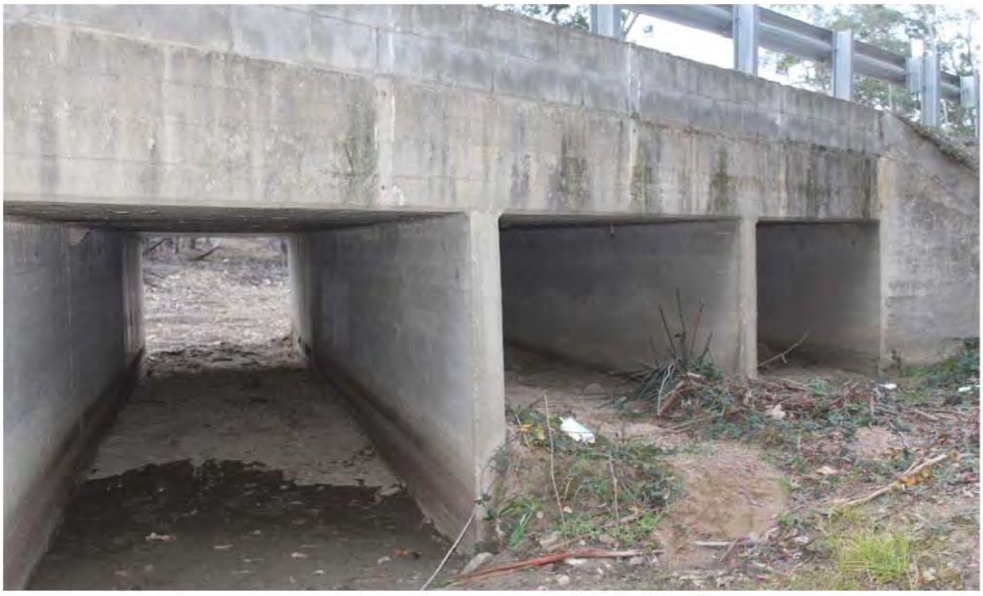
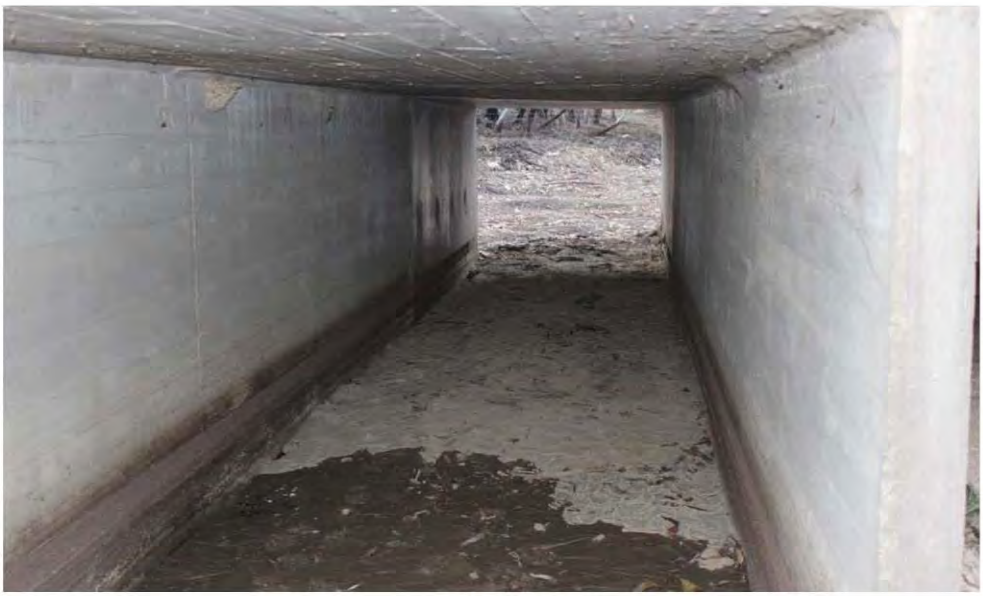


Culverts from eastern side (original)



Cell 3 from east

Bridge Design

Level 2 Structure Condition Report

Structure Name	Culvert B
Inspected by	Mitchell Kramer
Date of Inspection	7/06/2018

PHOTOS

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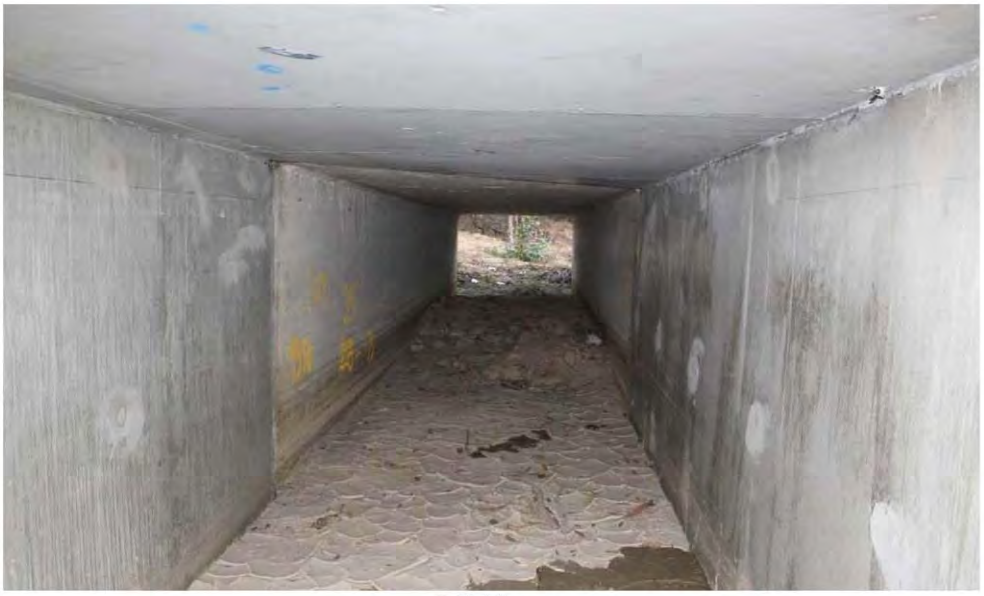

Cell 1 from west

0.1mm vertical crack in Cell 3

Bridge Design

Level 2 Structure Condition Report

Job No.	B1833		
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LOCATION DETAILS

Structure Name	Culvert C	**Structure ID**	3430
Road Name	Jerrara Rd	**Road Class**	local
Speed Limit (km/h)	80	**Latitude**	-34.7590
Suburb	Marulan	**Longitude**	149.969
LGA	Goulburn Mulwaree	**Crossing**	Stony Creek (C)
From	Marulan	**Catchment Name**	n/a
To	Bungonia	**Catchment Area (km^2)**	n/a
Location Description	Chainage 3430		

STRUCTURE DETAILS

Culvert Type	box culvert	**Skew**	0
Construction Material	concrete	**Number of cells**	2
Construction Date		**No. units per cell**	4
Waterway area (m2)	8.7	**Unit length (m)**	2.45
Cell height/diameter (m)	2.07	**Overall length (m)**	9.8
Cell width (m)	2.1	**Clear spacing (m)**	0
Height over culvert (m)	0.3	**No. traffic lanes**	2
Wall thickness (mm)	215 top 100 base	**Road width (m)**	9
Roof thickness (mm)	205		

INSPECTION DETAILS

Inspected by	Mitchell Kramer	**Last Level 2 Inspection**	unknown
Date of Inspection	8/06/2018	**Next Level 2 Inspection**	n/a
Time of Inspection	2pm	**Structure plans available?**	no
Weather	overcast	**Access equipment required?**	none
Tidal Conditions	-		

GENERAL COMMENTS

New culvert. No defects.

OVERALL STRUCTURE CONDITION RATING

	Good	Fair	Poor	Very Poor	Close	Comments
Overall Structure Condition Rating	X					

Bridge Design

Level 2 Structure Condition Report

Structure Name	Culvert C			
Inspected by	Mitchell Kramer			
Date of Inspection	8/06/2018			
Job No.	B1833	Page	2	of 5

Component Inventory and Condition Assessment

Element Type	RMS Code	Description	Environment	Unit	Quantity	Quantity in Condition Rating				Comments - type of defect - location of defect - size and severity
						1	2	3	4	
Concrete	CCUP	Precast Box Culverts	M	m2	150	150	0	0	0	Recent construction. No issues
Miscellaneous	MAPP	Approaches	M	ea	2	2	0	0	0	
Railing	RMET	Steel Bridge Barrier	M	m	80	80	0	0	0	

Bridge Design

Level 2 Structure Condition Report

Required Maintenance Actions

Structure Name	Culvert C
Inspected by	Mitchell Kramer
Date of Inspection	8/06/2018
Job No. B1833	Page 3 of 5

Element Description	Quantity	Condition State	Defect Description	Required Action				
				Monitor	Repair	Level 3 Inspection	Other
			No required maintenance actions				

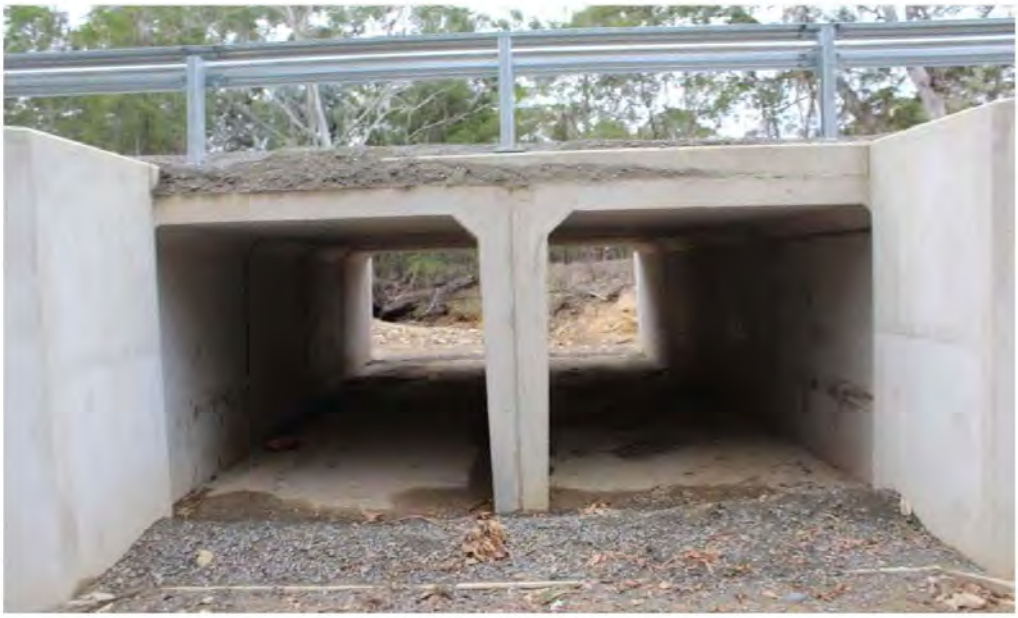
Bridge Design

Level 2 Structure Condition Report

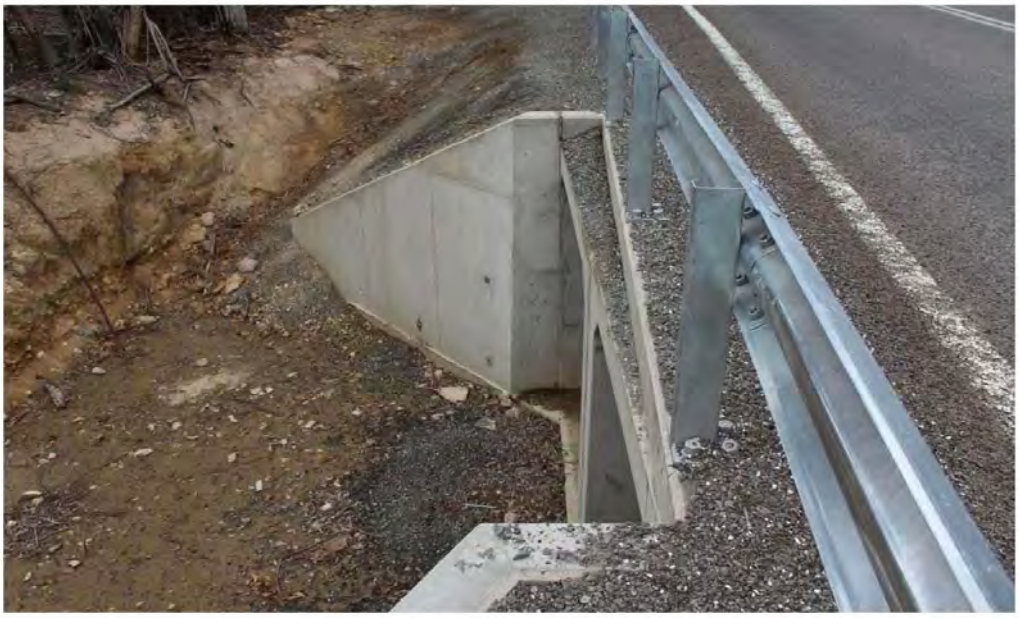
Structure Name	Culvert C
Inspected by	Mitchell Kramer
Date of Inspection	8/06/2018

PHOTOS

Job No.	B1833	Page	4	of	5



View of culvert from side



Culvert from road level

Bridge Design

Level 2 Structure Condition Report

Structure Name	Culvert C
Inspected by	Mitchell Kramer
Date of Inspection	8/06/2018

PHOTOS

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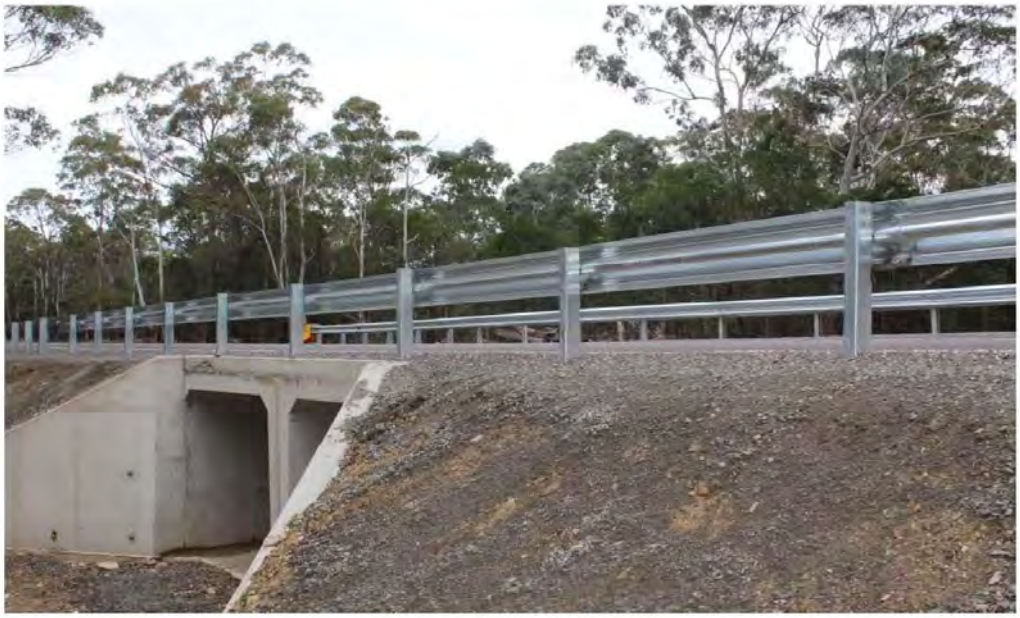
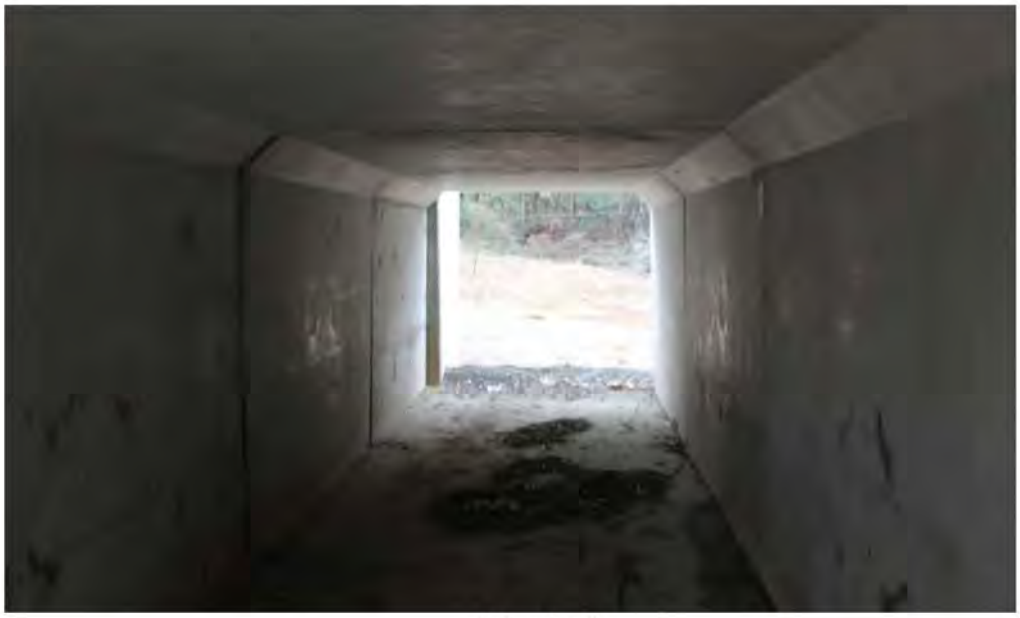


View of culvert from side



Culvert cell

Bridge Design

Level 2 Structure Condition Report

Job No.	B1833		
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LOCATION DETAILS			
Structure Name	Culvert D	Structure ID	5130
Road Name	Jerrara Rd	Road Class	local
Speed Limit (km/h)	80	Latitude	-34.7736
Suburb	Marulan	Longitude	149.9640
LGA	Goulburn Mulwaree	Crossing	Unnamed Ck (D)
From	Marulan	Catchment Name	n/a
To	Bungonia	Catchment Area (km^2)	n/a
Location Description	Chainage 5130		

STRUCTURE DETAILS			
Culvert Type	box	Skew	0
Construction Material	concrete	Number of cells	1
Construction Date		No. units per cell	4
Waterway area (m2)	8.9	Unit length (m)	2.43
Cell height/diameter (m)	2.7	Overall length (m)	9.72
Cell width (m)	3.3	Clear spacing (m)	0
Height over culvert (m)	0	No. traffic lanes	2
Wall thickness (mm)	unknown	Road width (m)	9
Roof thickness (mm)	460 at ends		

INSPECTION DETAILS			
Inspected by	Mitchell Kramer	Last Level 2 Inspection	unknown
Date of Inspection	8/06/2018	Next Level 2 Inspection	n/a
Time of Inspection	2pm	Structure plans available?	no
Weather	clear	Access equipment required?	none
Tidal Conditions	-		

GENERAL COMMENTS

New culvert. No defects

OVERALL STRUCTURE CONDITION RATING

	Good	Fair	Poor	Very Poor	Close	Comments
Overall Structure Condition Rating	X					

Bridge Design

Level 2 Structure Condition Report

Structure Name		Culvert D			
Inspected by		Mitchell Kramer			
Date of Inspection		8/06/2018			
Job No.	B1833	**Page**	2	of	5

Component Inventory and Condition Assessment

Element Type	RMS Code	Description	Environment	Unit	Quantity	Quantity in Condition Rating				Comments - type of defect - location of defect - size and severity
						1	2	3	4	
Concrete	CCUP	Precast Box Culvert	M	m2	145	145	0	0	0	No defects
Miscellaneous	MAPP	Approaches	M	ea	2	2	0	0	0	
Railing	RMET	Steel Bridge Barrier	M	m	90	90	0	0	0	

Bridge Design

Level 2 Structure Condition Report

Required Maintenance Actions

Structure Name	Culvert D
Inspected by	Mitchell Kramer
Date of Inspection	8/06/2018
Job No. B1833	Page 3 of 5

Element Description	Quantity	Condition State	Defect Description	Required Action				
				Monitor	Repair	Level 3 Inspection	Other
			No required maintenance actions				

Bridge Design

Level 2 Structure Condition Report

Structure Name	Culvert D
Inspected by	Mitchell Kramer
Date of Inspection	8/06/2018

PHOTOS

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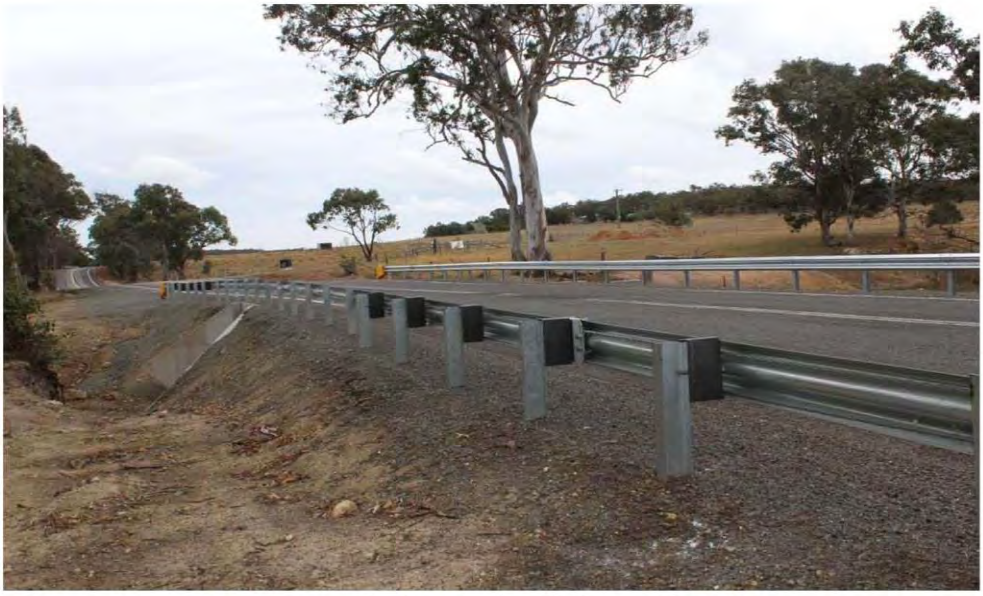

Road over culvert facing south

Side view of culvert

Bridge Design

Level 2 Structure Condition Report

Structure Name	Culvert D
Inspected by	Mitchell Kramer
Date of Inspection	8/06/2018

PHOTOS

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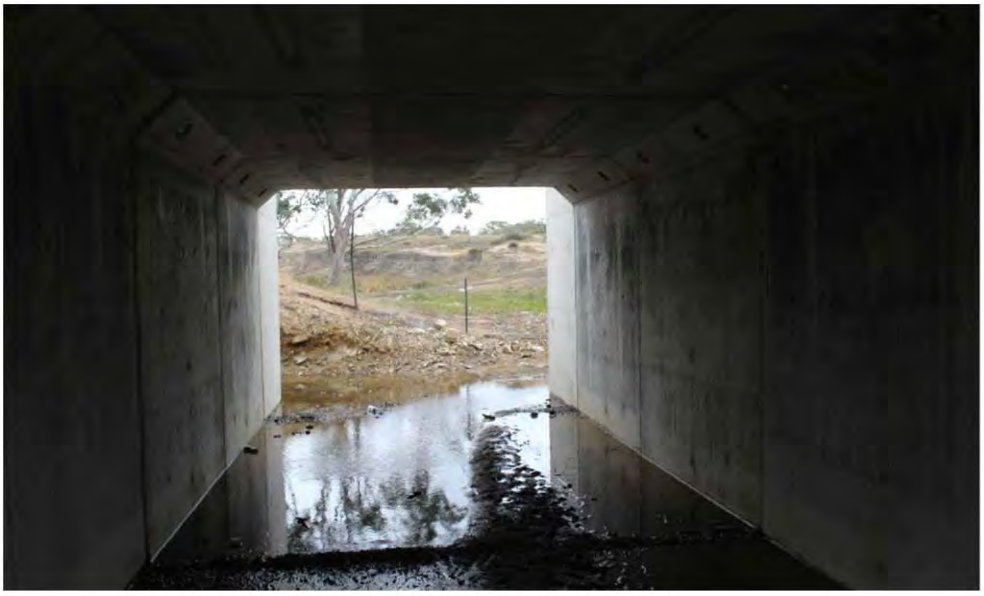
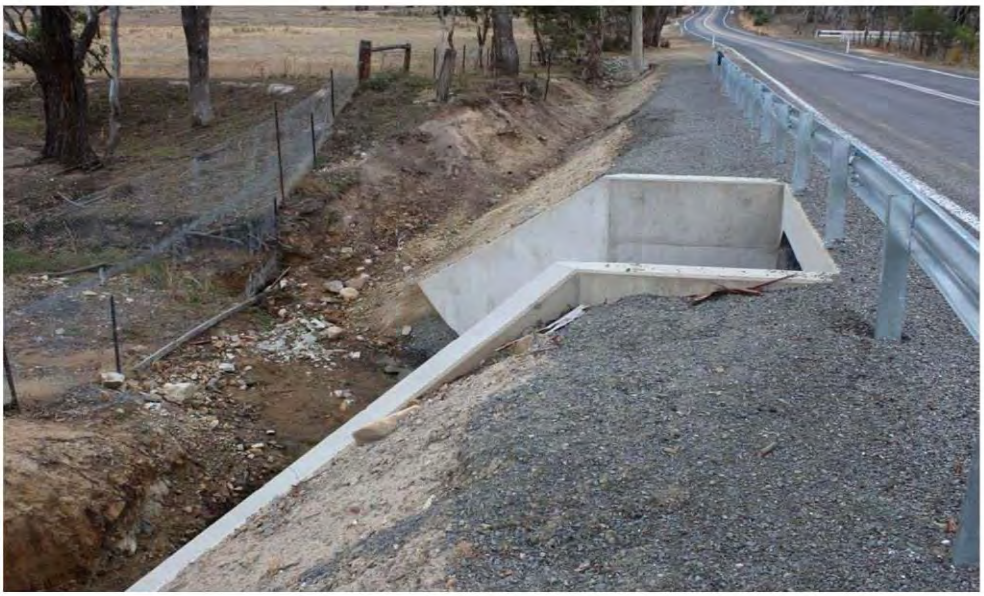


Inside the culvert facing west



Eastern edge of culvert from top

Bridge Design

Level 2 Structure Condition Report

Job No.	B1833		
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LOCATION DETAILS

Structure Name	Bridge E	**Structure ID**	5940
Road Name	Jerrara Rd	**Road Class**	local
Speed Limit (km/h)	80	**Latitude**	-34.7806
Suburb	Marulan	**Longitude**	149.9613
LGA	Goulburn Mulwaree	**Crossing**	Sawyers Creek (E)
From	Marulan	**Catchment Name**	n/a
To	Bungonia	**Catchment Area (km^2)**	n/a
Location Description	Chainage 5940		

STRUCTURE DETAILS

Overall length (m)	4.4 clear	**Skew angle**	0
Overall width (m)	9.2m total	**Structure Type**	bridge
Clear width (m)	8.6m	**Construction Date**	
Height above ground (m)	1.2	**Construction Type**	
No. of traffic lanes	2	**Construction Materials**	steel beams, masonry abuts, concrete culverts
Current load limit (T)	none		

Span	No. of girders	Length		Span	No. of girders	Length
1	1 x box culvert	3.7				
1	5 steel girders	4.4				
1	2 x box culvert	3.7				

INSPECTION DETAILS

Inspected by	Mitchell Kramer	**Last Level 2 Inspection**	unknown
Date of Inspection	7/06/2018	**Next Level 2 Inspection**	n/a
Time of Inspection	3:40pm	**Structure plans available?**	no
Weather	clear	**Access equipment required?**	none
Tidal Conditions	-		

GENERAL COMMENTS

New box culverts added to western side. Single box culvert had previously been added to the eastern side. Steel beams and decking is corroded but there was no apparent section loss. Masonry abutments are free of defects.

OVERALL STRUCTURE CONDITION RATING

	Good	Fair	Poor	Very Poor	Close	Comments
Overall Structure Condition Rating		X				

Bridge Design

Level 2 Structure Condition Report

Structure Name		Bridge E			
Inspected by		Mitchell Kramer			
Date of Inspection		7/06/2018			
Job No.	B1833	**Page**	2	of	7

Component Inventory and Condition Assessment

Element Type	RMS Code	Description	Environment	Unit	Quantity	Quantity in Condition Rating				Comments - type of defect - location of defect - size and severity
						1	2	3	4	
Concrete	CCUP	Box Culvert (east)	M	m2	15	14	1	0	0	Single precast box culvert added adjacent to bridge. No base. Exposed reo north wall
Steel	SBGI	Steel Girders	M	m2	19	0	16	3	0	- 5 beams total. 2 edge beams sit 300mm higher than 3 inner beams. Top of edge beam is at culvert soffit. - 305 deep, 160 x 15 flange, sit 300 higher than inner beams, 160-2x70= 20 web, no markings, 1.32m centres. - Paint is largely intact although there are sections of corrosion particularly at the beam ends and along the top flanges. - No apparent loss of section.
Steel	SBPD	Buckle Plate Decking	M	m2	20	0	15	5	0	Steel decking betweem beams, bolted to top flanges Bolts corroded but present, loss of paints and corrosion of some sections particularly around joints. Unknown thickness.
Concrete	CCUP	Box Culvert (west)	M	m2	32	32	0	0	0	3.67 wide, 1.52 high, 1.23 long each, 210 roof, 150-165 wall, base slab present. Road seal is 100mm over top of culvert
Miscellaneous	MMAS	Masonry Abutments	M	m2	16	16	0	0	0	no issues
Miscellaneous	MAPP	Approaches	M	ea	2	2	0	0	0	
Railing	RMET	Steel Bridge Barrier	M	m	70	70	0	0	0	

Bridge Design

Level 2 Structure Condition Report

Structure Name		Bridge E			
Inspected by		Mitchell Kramer			
Date of Inspection		7/06/2018			
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Required Maintenance Actions

Element Description	Quantity	Condition State	Defect Description	Required Action			
				Monitor	Repair	Level 3 Inspection	Other
Steel Girders	$3m^2$	3	Loss of paint coating and corrosion in some sections should be monitored.	X			
Steel Buckle Plate Decking	$5m^2$	3	Loss of paint coating and corrosion in some sections should be monitored.	X			

Bridge Design

Level 2 Structure Condition Report

Structure Name	Bridge E
Inspected by	Mitchell Kramer
Date of Inspection	7/06/2018

PHOTOS

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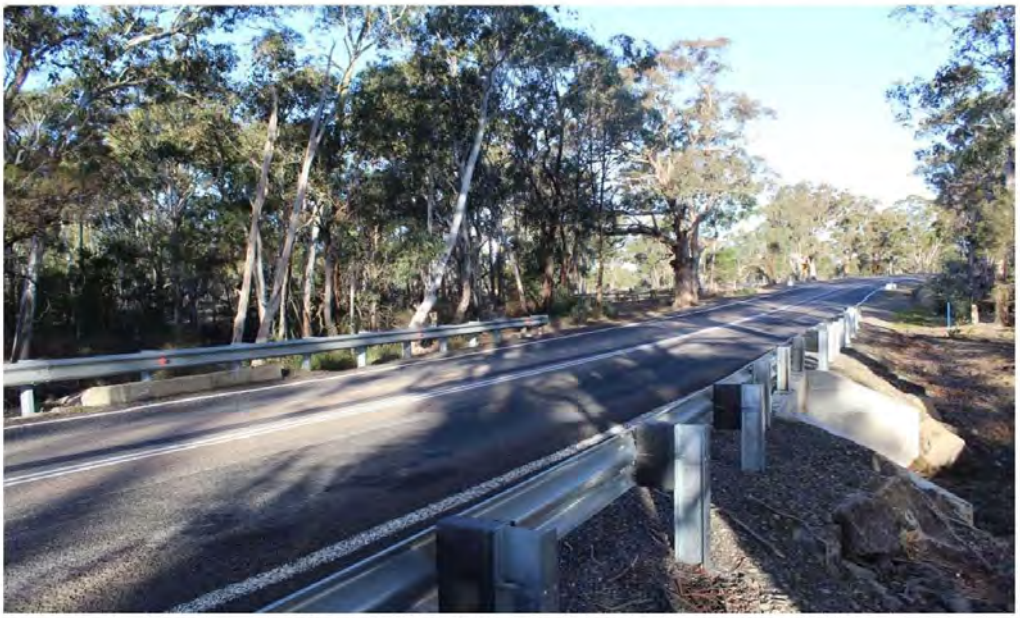
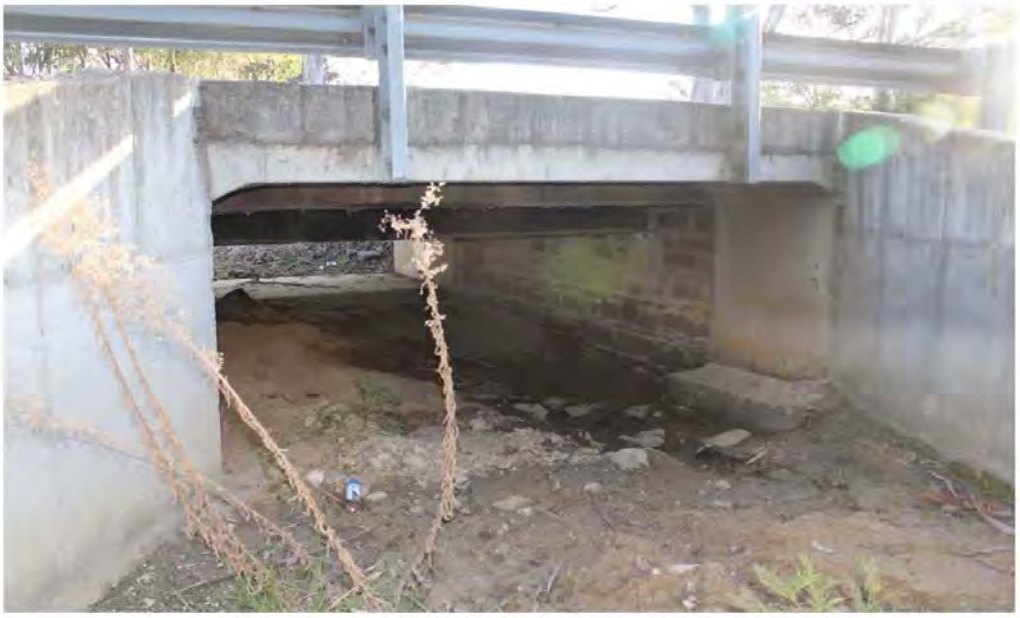


View of culvert from road level facing south



View from eastern side (including northern abutment)

Bridge Design

Level 2 Structure Condition Report

Structure Name	Bridge E
Inspected by	Mitchell Kramer
Date of Inspection	7/06/2018

PHOTOS

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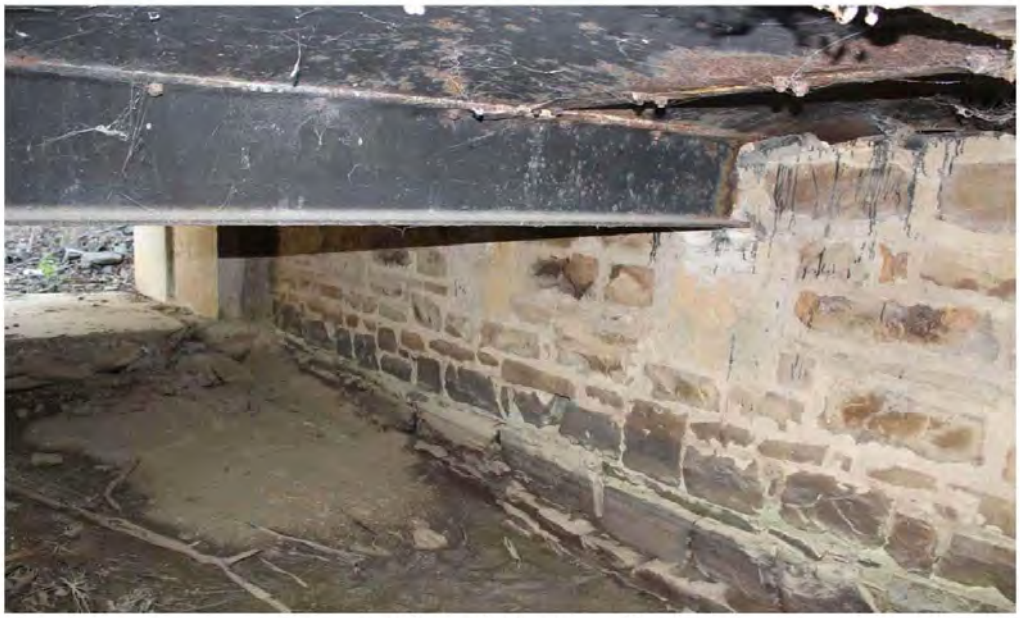
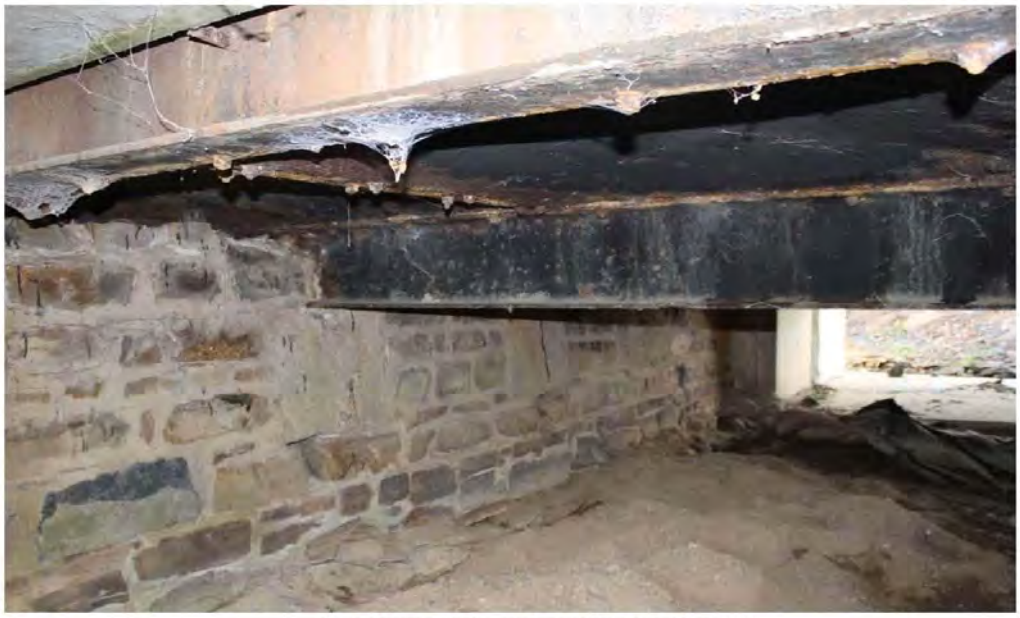


Southern abutment and beam 4



Southern abutment and beams 1 and 2

Bridge Design

Level 2 Structure Condition Report

Structure Name	Bridge E
Inspected by	Mitchell Kramer
Date of Inspection	7/06/2018

PHOTOS

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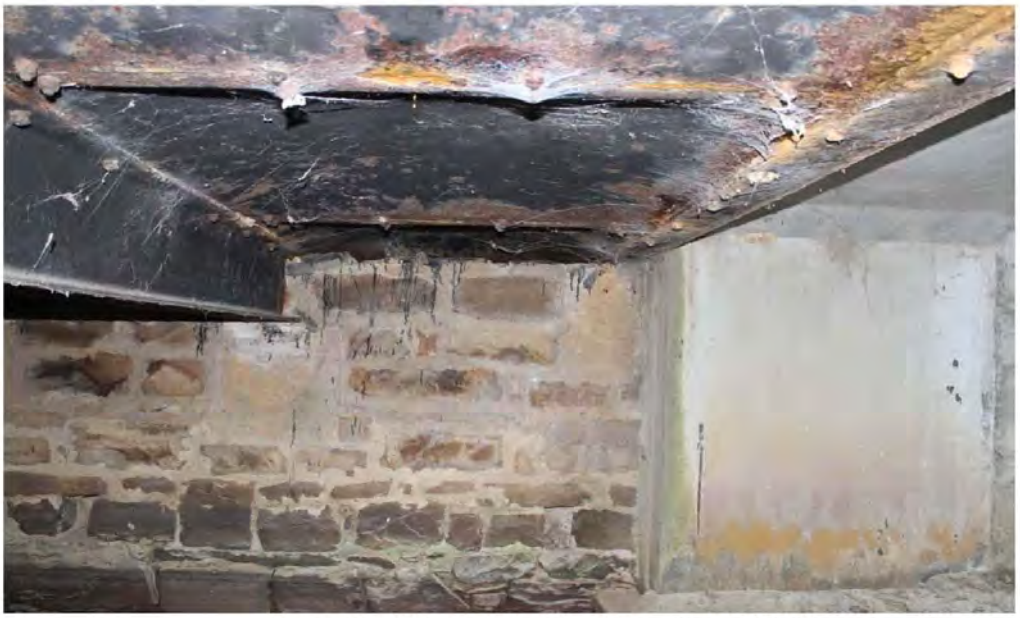
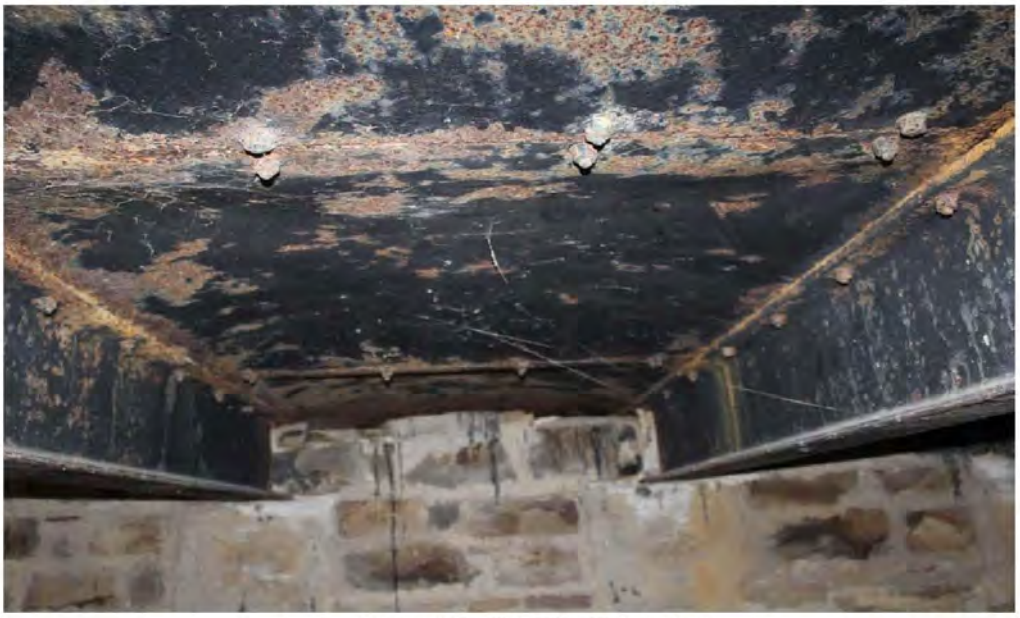


Beams 1 and 2, steel decking and eastern culvert



Beams 2 and 3 and steel decking

Bridge Design

Level 2 Structure Condition Report

Structure Name	Bridge E
Inspected by	Mitchell Kramer
Date of Inspection	7/06/2018

PHOTOS

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Corrosion of southern end of beam 4

Bridge Design

Level 2 Structure Condition Report

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LOCATION DETAILS			
Structure Name	Culvert F	**Structure ID**	8370
Road Name	Jerrara Rd	**Road Class**	local
Speed Limit (km/h)	80	**Latitude**	-34.8015
Suburb	Marulan	**Longitude**	149.9563
LGA	Goulburn Mulwaree	**Crossing**	Unknown (F)
From	Marulan	**Catchment Name**	n/a
To	Bungonia	**Catchment Area (km^2)**	n/a
Location Description	Chainage 8370		

STRUCTURE DETAILS			
Culvert Type	box culvert	**Skew**	0
Construction Material	concrete	**Number of cells**	1
Construction Date		**No. units per cell**	16 orig +1new
Waterway area (m2)	3.8553	**Unit length (m)**	1.23
Cell height/diameter (m)	1.81	**Overall length (m)**	20.91
Cell width (m)	2.13	**Clear spacing (m)**	
Height over culvert (m)	1	**No. traffic lanes**	2
Wall thickness (mm)	135	**Road width (m)**	9
Roof thickness (mm)	150		

INSPECTION DETAILS			
Inspected by	Mitchell Kramer	**Last Level 2 Inspection**	unknown
Date of Inspection	7/06/2018	**Next Level 2 Inspection**	n/a
Time of Inspection	3pm	**Structure plans available?**	no
Weather	clear	**Access equipment required?**	none
Tidal Conditions			

GENERAL COMMENTS

Spalled concrete and corroded reinforcement is present in the walls and roof of some units. Cracking and spalling in walls is likely due to skewed braking forces pushing the units together. No signs of flexural cracking in the units suggests they are structurally sound. Repairs should be undertaken to prevent further deterioration.

OVERALL STRUCTURE CONDITION RATING

	Good	Fair	Poor	Very Poor	Close	Comments
Overall Structure Condition Rating		X				

Bridge Design

Level 2 Structure Condition Report

Structure Name		Culvert F			
Inspected by		Mitchell Kramer			
Date of Inspection		7/06/2018			
Job No.	B1833	Page	2	of	7

Component Inventory and Condition Assessment

Element Type	RMS Code	Description	Environment	Unit	Quantity	Quantity in Condition Rating				Comments - type of defect - location of defect - size and severity
						1	2	3	4	
Concrete	CCUP	Precast Box Culvert	M	m2	130	15	100	10	5	- unit 1 taken as easternmost - unit 2 south 1.3mm Vert crack next to unit 3 and spall - u3 north exposed corroded reo at base - 6N16 vrtical, N16 horiz - u7 north exposed vert reo, u8n horiz reo, u11n-u13n spalled corner - u14 spall mid top, u13 exposed reo mid, u11 spall corroded reo mid at u12 END 20 cover, 2N16 at 50 spacing, u10s spall end, u7s spall 2mm VC end, u4s 1mm vc end - no cracking in roof of culverts - cracking in walls likely due to braking forces on skew
Miscellaneous	MAPP	Approaches	M	ea	2	2	0	0	0	
Railing	RMET	Steel Bridge Barrier	M	m	100	100	0	0	0	

Bridge Design

Level 2 Structure Condition Report

Structure Name	Culvert F				
Inspected by	Mitchell Kramer				
Date of Inspection	7/06/2018				
Job No.	B1833	Page	3	of	7

Required Maintenance Actions

Element Description	Quantity	Condition State	Defect Description	Required Action			
				Monitor	Repair	Level 3 Inspection	Other
Precast Box Culvert	$5m^2$	4	Exposed and corroded reinforcement in walls and roof should be patched to prevent further deterioration		X		
Precast Box Culvert	$10m^2$	3	Vertical cracking and spalls in walls to be monitored.	X			

Bridge Design

Level 2 Structure Condition Report

Structure Name	Culvert F
Inspected by	Mitchell Kramer
Date of Inspection	7/06/2018

PHOTOS

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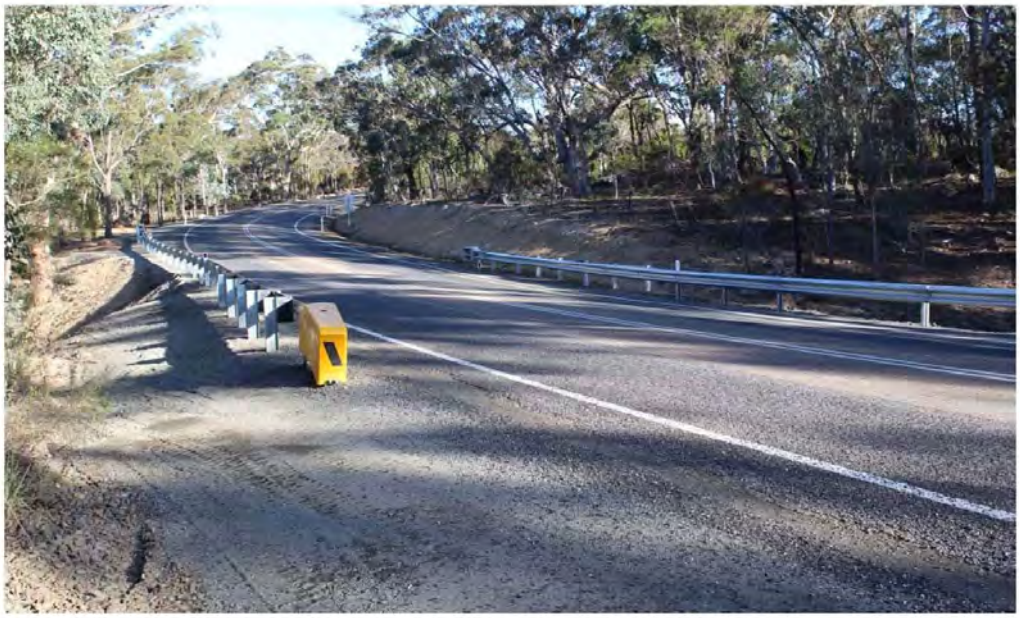
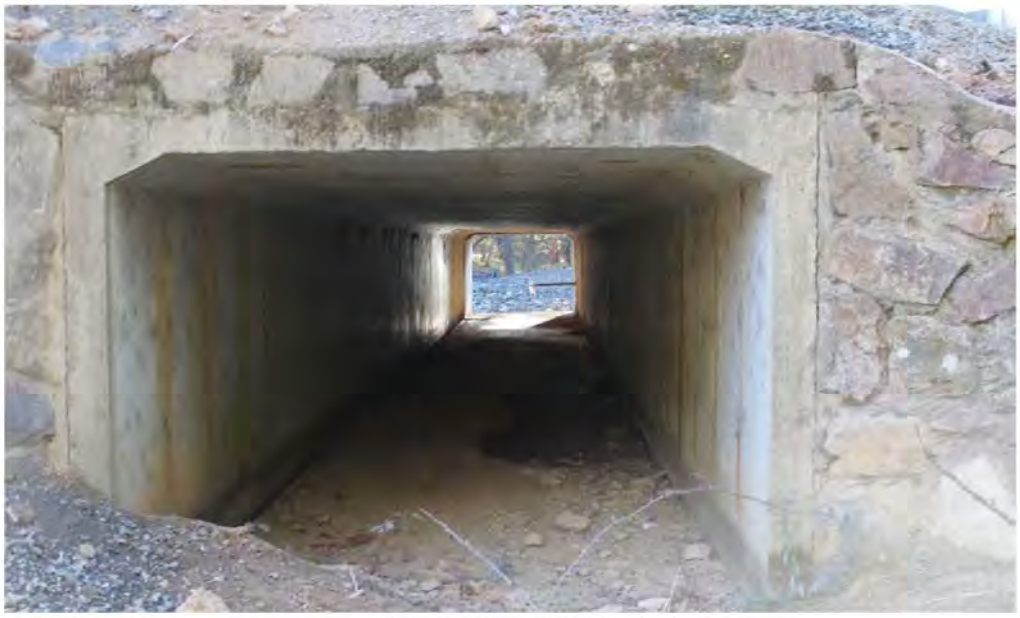


View of culvert from road level facing south



View from east (original side)

Bridge Design

Level 2 Structure Condition Report

Structure Name	Culvert F
Inspected by	Mitchell Kramer
Date of Inspection	7/06/2018

PHOTOS

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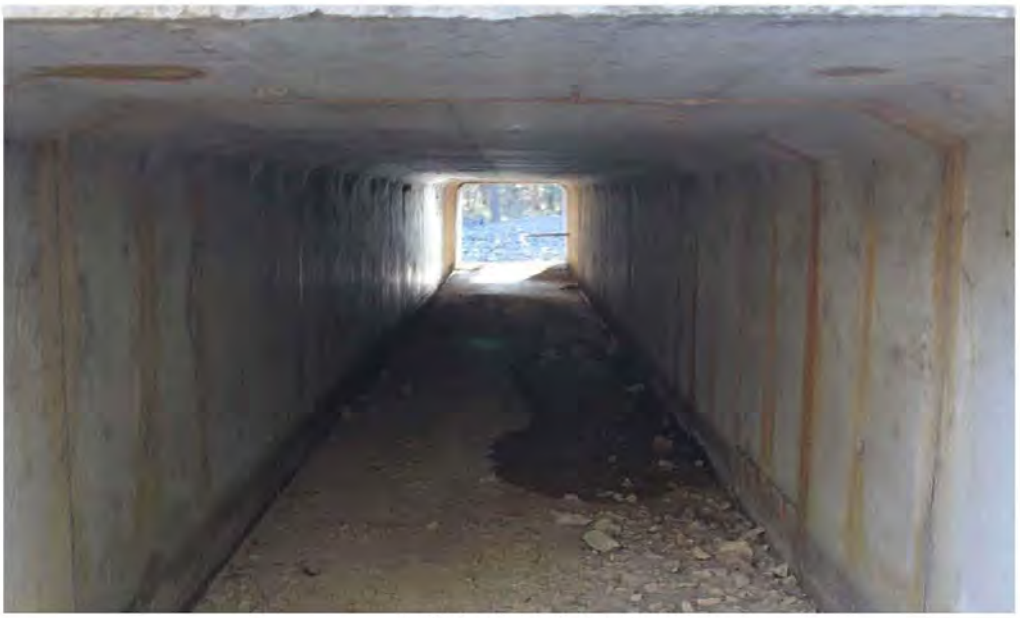

Inside culvert facing west

View from west (new side)

Bridge Design

Level 2 Structure Condition Report

Structure Name	Culvert F
Inspected by	Mitchell Kramer
Date of Inspection	7/06/2018

PHOTOS

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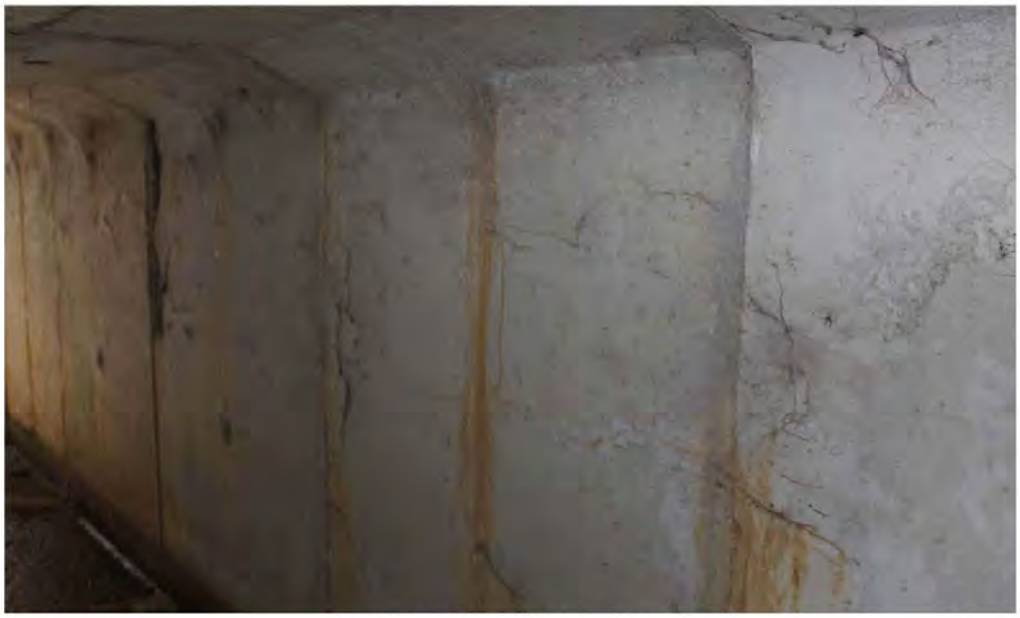

Cracking and spalling on sides of units

Exposed reinforcement (unit 3 north side)

Bridge Design

Level 2 Structure Condition Report

Structure Name	Culvert F
Inspected by	Mitchell Kramer
Date of Inspection	7/06/2018

PHOTOS

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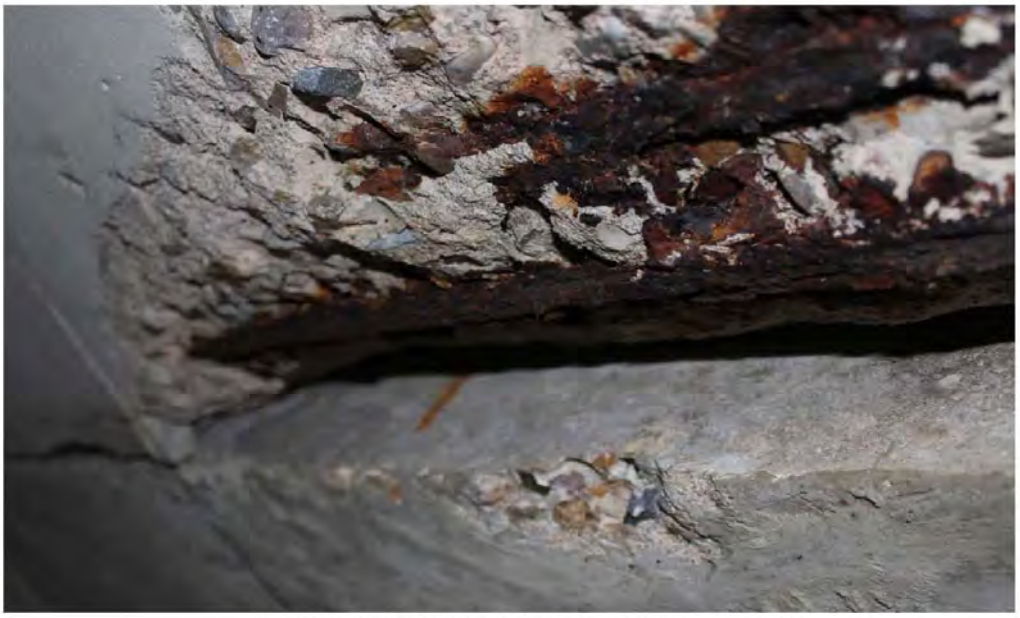
Exposed reinforcement (units 7 and 8 north side)



Spall and corroded reinforcement in top of unit 11

Bridge Design

Level 2 Structure Condition Report

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LOCATION DETAILS

Structure Name	Bridge G	**Structure ID**	9720
Road Name	Jerrara Rd	**Road Class**	local
Speed Limit (km/h)	80	**Latitude**	-34.8127
Suburb	Bungonia	**Longitude**	149.9514
LGA	Goulburn Mulwaree	**Crossing**	Jerrara Ck (G)
From	Marulan	**Catchment Name**	n/a
To	Bungonia	**Catchment Area (km^2)**	n/a
Location Description	Chainage 9720		

STRUCTURE DETAILS

Overall length (m)	21.2	**Skew angle**	0
Overall width (m)	8.3	**Structure Type**	Bridge
Clear width (m)	8	**Construction Date**	1960
Height above ground (m)	4.5	**Construction Type**	Beam bridge
No. of traffic lanes	2	**Construction Materials**	Concrete structure. New steel headstocks
Current load limit (T)	none		

Span	No. of girders	Length		Span	No. of girders	Length
1 old	11	10.3				
1 new	2	10.3				
2 old	11	10.3				
2 new	2	10.3				

INSPECTION DETAILS

Inspected by	Mitchell Kramer	**Last Level 2 Inspection**	unknown
Date of Inspection	7/06/2018	**Next Level 2 Inspection**	n/a
Time of Inspection	2:20pm	**Structure plans available?**	no
Weather	clear	**Access equipment required?**	none
Tidal Conditions	n/a		

GENERAL COMMENTS

2 new prestressed concrete beams were added to the eastern side of the bridge in 2017 supported by steel headstocks cantilevering from the existing structure. The approach surface on the northern side is around 100mm higher than the bridge level causing a sudden drop at the bridge. Structure is sound.

OVERALL STRUCTURE CONDITION RATING

	Good	Fair	Poor	Very Poor	Close	Comments
Overall Structure Condition Rating	X					

Bridge Design

Level 2 Structure Condition Report

Structure Name		Bridge G			
Inspected by		Mitchell Kramer			
Date of Inspection		7/06/2018			
Job No.	B1833	Page	2	of	7

Component Inventory and Condition Assessment

Element Type	RMS Code	Description	Environment	Unit	Quantity	Quantity in Condition Rating				Comments - type of defect - location of defect - size and severity
						1	2	3	4	
Miscellaneous	MAPP	Approaches	M	ea	2	1	1	0	0	raised asphalt north right side 100mm
Railing	RMET	Steel Bridge Barrier	M	m	80	80	0	0	0	thrie beam new left, w beam old right
Concrete	CDSL	Deck Concrete - original	M	m2	150	0	150	0	0	wear on top but no cracking
Concrete	CDSL	Deck Concrete - new	M	m2	35	35	0	0	0	No issues
Concrete	CPRG	Prestressed Girders - original	M	m2	132	132	0	0	0	11 beams per span, 600 wide spaced together, some chips but no cracking or staining, 55 deep flange
Concrete	CPRG	Prestressed Girders - new	M	m2	4	100	0	0	0	No issues
Concrete	CABW	Abutment Headstocks - original	M	m2	x	x	x	x	x	obscured by steel headstocks
Concrete	CPHS	Pier Headstock - original	M	m2	5	5	x	x	x	615 wide , good condition under, sides obscured by steel headstocks
Steel	SPGI	Steel Headstocks - new	M	m2	20	100	0	0	0	No issues
Concrete	CPIR	Pier Columns - original	M	m2	17	17	0	0	0	615x615. No issues

Bridge Design

Level 2 Structure Condition Report

Structure Name		Bridge G			
Inspected by		Mitchell Kramer			
Date of Inspection		7/06/2018			
Job No.	B1833	Page	3	of	7

Required Maintenance Actions

Element Description	Quantity	Condition State	Defect Description	Required Action			
				Monitor	Repair	Level 3 Inspection	Other
			No required maintenance actions				

Bridge Design

Level 2 Structure Condition Report

Structure Name	Bridge G
Inspected by	Mitchell Kramer
Date of Inspection	7/06/2018

PHOTOS

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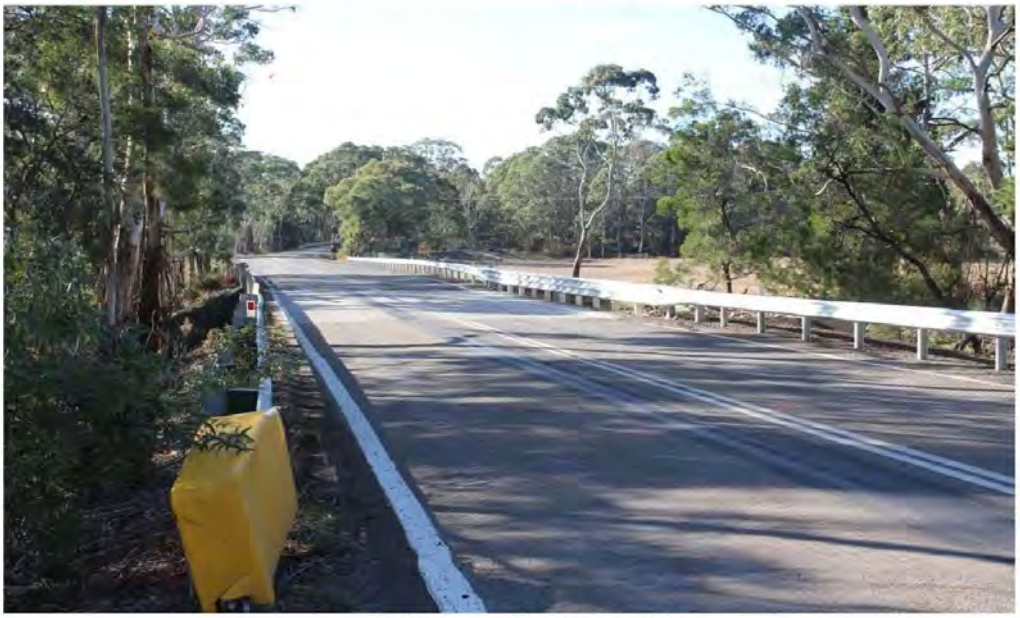
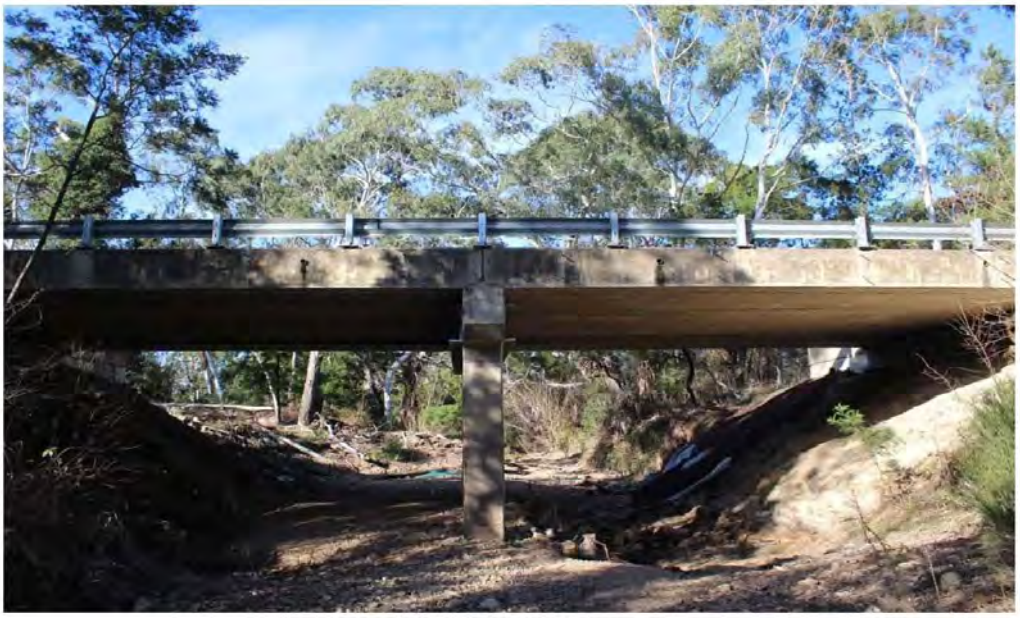


View of bridge from south



View of bridge from west

Bridge Design

Level 2 Structure Condition Report

Structure Name	Bridge G
Inspected by	Mitchell Kramer
Date of Inspection	7/06/2018

PHOTOS

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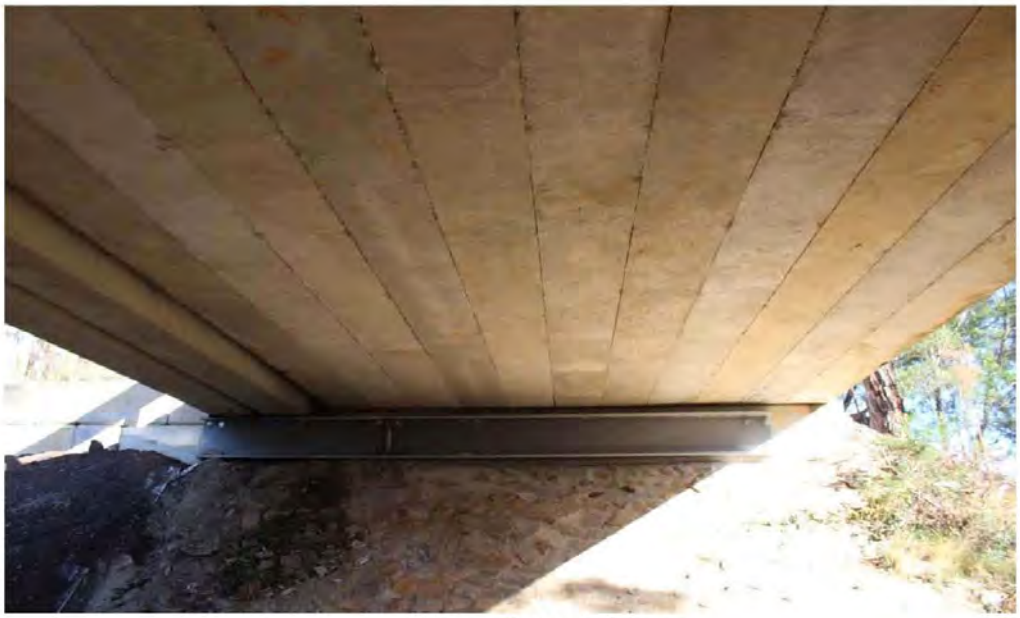
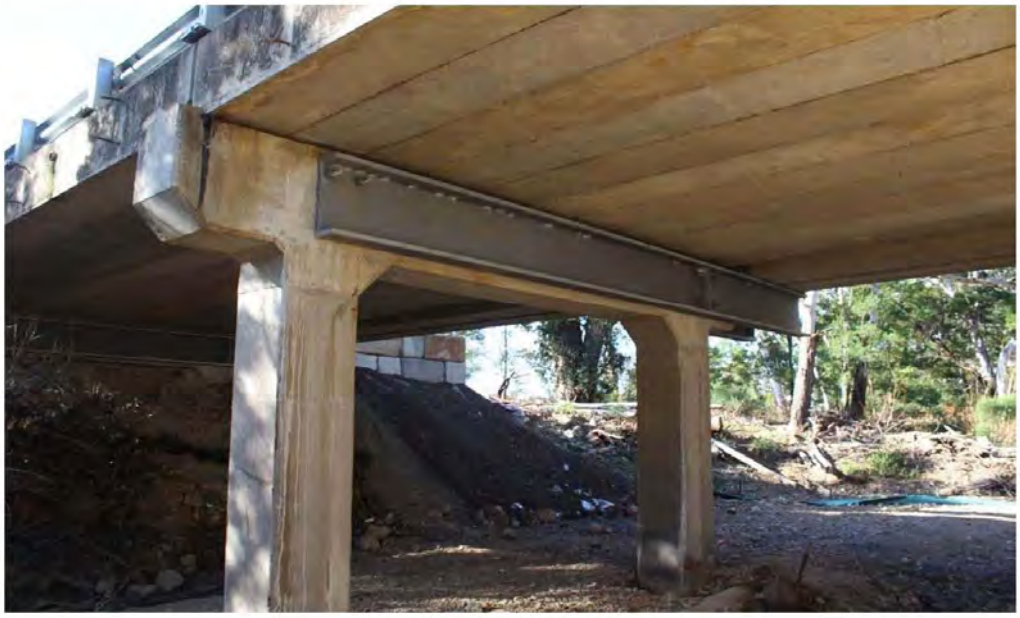


Abutment A and girders



Pier from south west

Bridge Design

Level 2 Structure Condition Report

Structure Name	Bridge G
Inspected by	Mitchell Kramer
Date of Inspection	7/06/2018

PHOTOS

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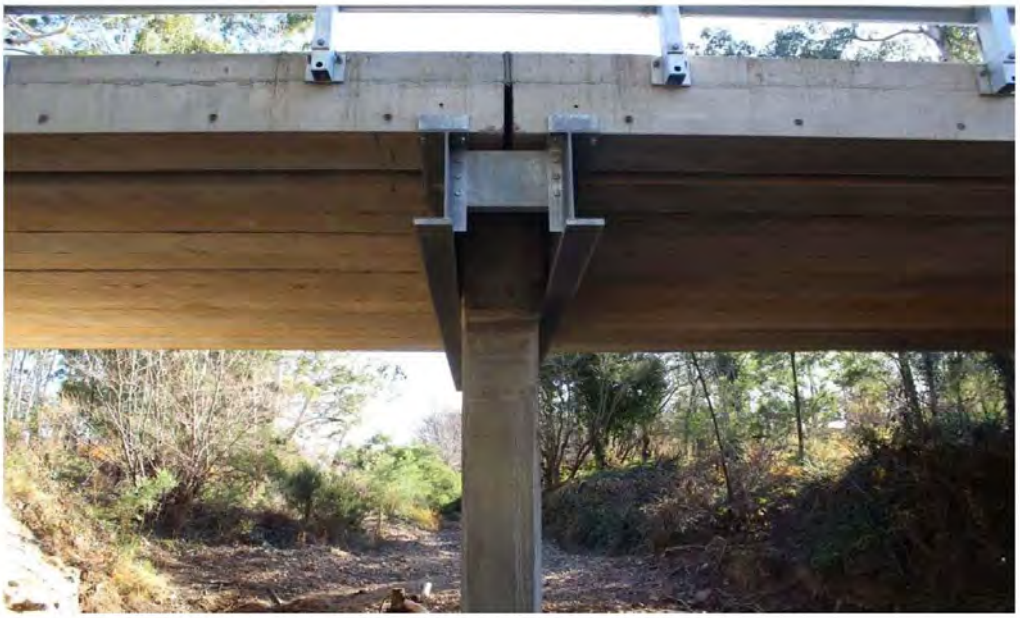
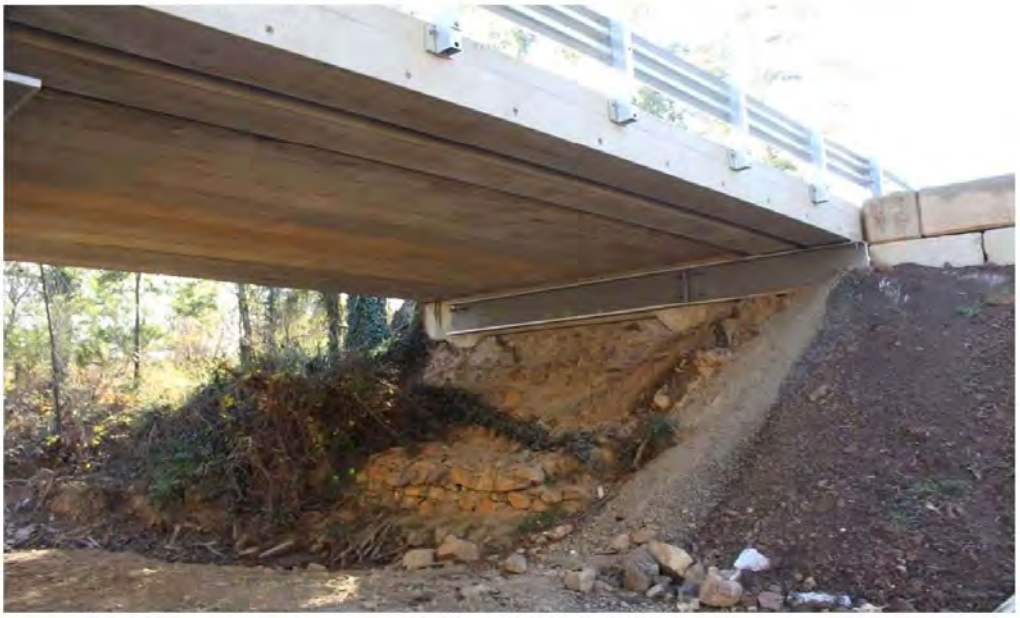


View of pier from east



Abutment B and girders

Bridge Design

Level 2 Structure Condition Report

Structure Name	Bridge G
Inspected by	Mitchell Kramer
Date of Inspection	7/06/2018

PHOTOS

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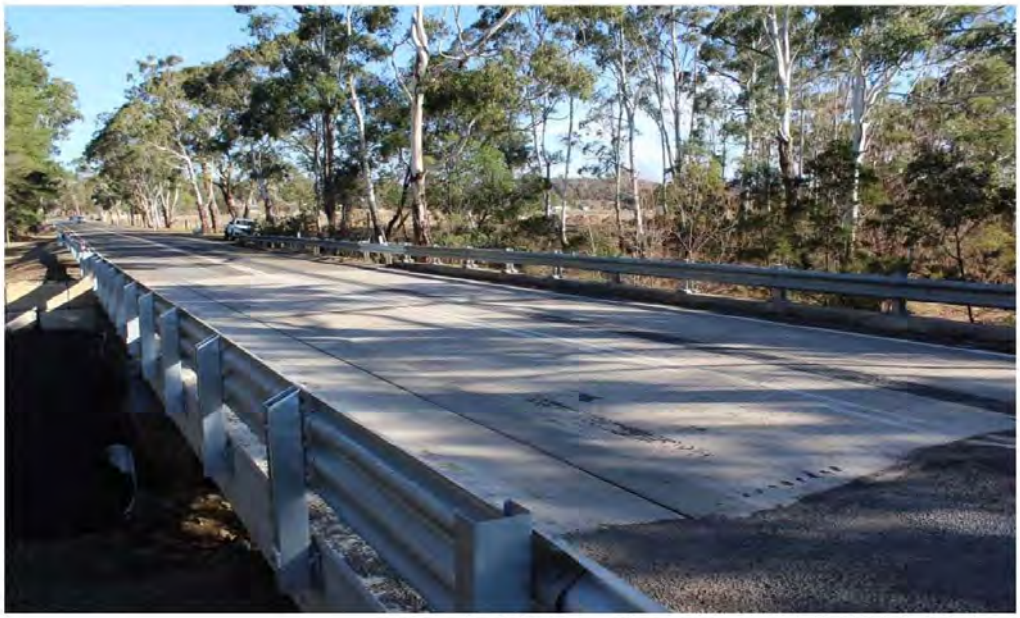
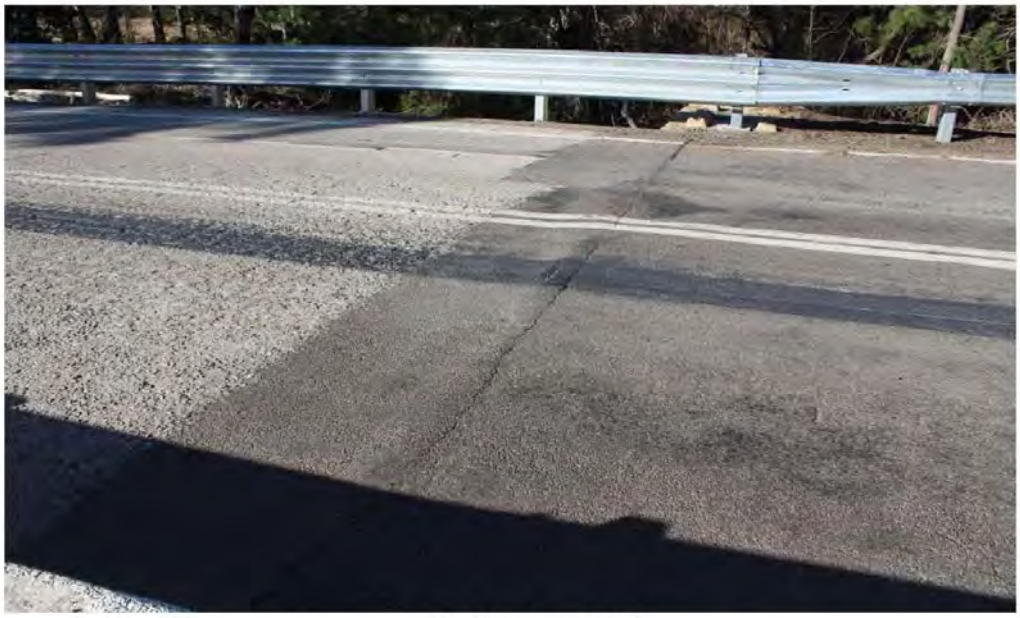


Bridge deck from north east



Northern approach

Bridge Design

Level 2 Structure Condition Report

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LOCATION DETAILS			
Structure Name	Culvert H	**Structure ID**	11916.038
Road Name	Jerrara Rd	**Road Class**	local
Speed Limit (km/h)	80	**Latitude**	-34.8312
Suburb	Bungonia	**Longitude**	149.9528
LGA	Goulburn Mulwaree	**Crossing**	Springponds Ck (H)
From	Marulan	**Catchment Name**	n/a
To	Bungonia	**Catchment Area (km^2)**	n/a
Location Description	Chainage 11916.038		

STRUCTURE DETAILS			
Culvert Type	box	**Skew**	0
Construction Material	concrete	**Number of cells**	5
Construction Date	20/02/1980	**No. units per cell**	4
Waterway area (m2)	12.9	**Unit length (m)**	2.5
Cell height/diameter (m)	1.21	**Overall length (m)**	10
Cell width (m)	2.13	**Clear spacing (m)**	0
Height over culvert (m)	0.8m / 1.4m	**No. traffic lanes**	2
Wall thickness (mm)	115	**Road width (m)**	
Roof thickness (mm)	170		

INSPECTION DETAILS			
Inspected by	Mitchell Kramer	**Last Level 2 Inspection**	unknown
Date of Inspection	7/06/2018	**Next Level 2 Inspection**	n/a
Time of Inspection	1pm	**Structure plans available?**	no
Weather	clear	**Access equipment required?**	none
Tidal Conditions	-		

GENERAL COMMENTS

Spalled concrete and exposed reinforcement in some walls. Flexural cracking present in the roof of most culverts but not sufficient to compromise the structure.

OVERALL STRUCTURE CONDITION RATING

	Good	Fair	Poor	Very Poor	Close	Comments
Overall Structure Condition Rating	X					

Bridge Design

Level 2 Structure Condition Report

Structure Name		Culvert H			
Inspected by		Mitchell Kramer			
Date of Inspection		7/06/2018			
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Component Inventory and Condition Assessment

Element Type	RMS Code	Description	Environment	Unit	Quantity	Quantity in Condition Rating				Comments - type of defect - location of defect - size and severity
						1	2	3	4	
Concrete	CCUP	Precast Box Culverts	M	m2	360	340	10	10	0	- Cell 1 is north, unit 1 is east - 1980 construction - 900 high headwall left, 300 right, fill is 500 above headwall - 0.1mm vertical cracks mid length of units Cell 2, 3,4,5 all units, spalling and exposed corroded reo in most - cell 3 unit 1 south side has 0.2mm vertical crack mid length to 0.2mm horiz crack at 150mm from top - 0.2mm cracks in roof, cell 3 unit 2,3,4. From south wall at 500,800,1000
Miscellaneous	MAPP	Approaches	M	ea	2	2	0	0	0	
Railing	RMET	Steel Bridge Barrier	M	m	100	100	0	0	0	

Bridge Design

Level 2 Structure Condition Report

Structure Name	Culvert H		
Inspected by	Mitchell Kramer		
Date of Inspection	7/06/2018		
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Required Maintenance Actions

Element Description	Quantity	Condition State	Defect Description	Required Action			
				Monitor	Repair	Level 3 Inspection	Other
Concrete Box Culvert	10m^2	3	Spalled concrete in some walls and exposed reinforcement should be patched. Monitor cracking.	X	X		

Bridge Design

Level 2 Structure Condition Report

Structure Name	Culvert H
Inspected by	Mitchell Kramer
Date of Inspection	7/06/2018

PHOTOS

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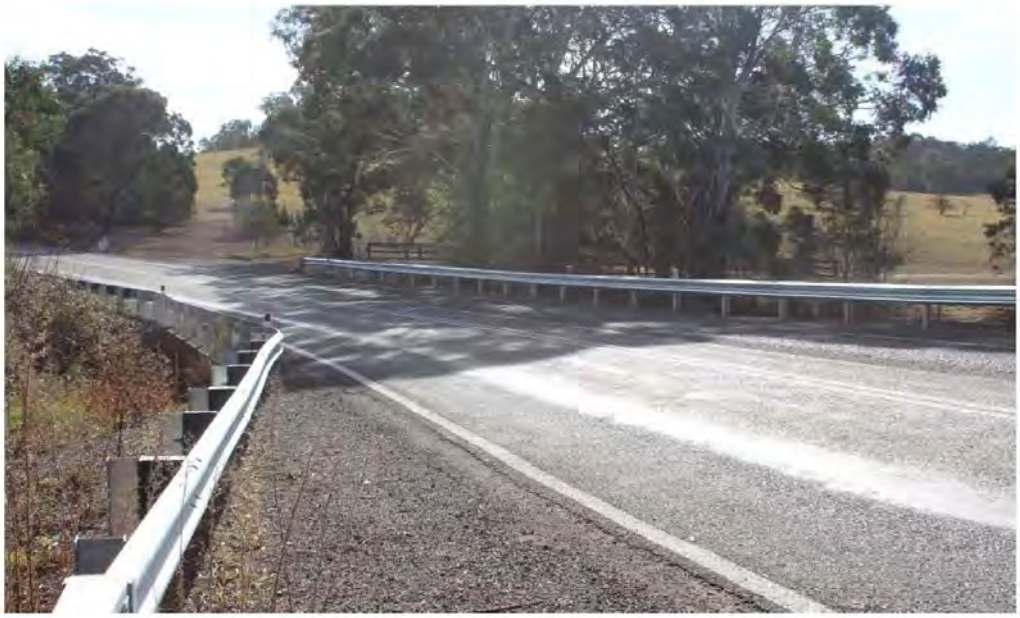
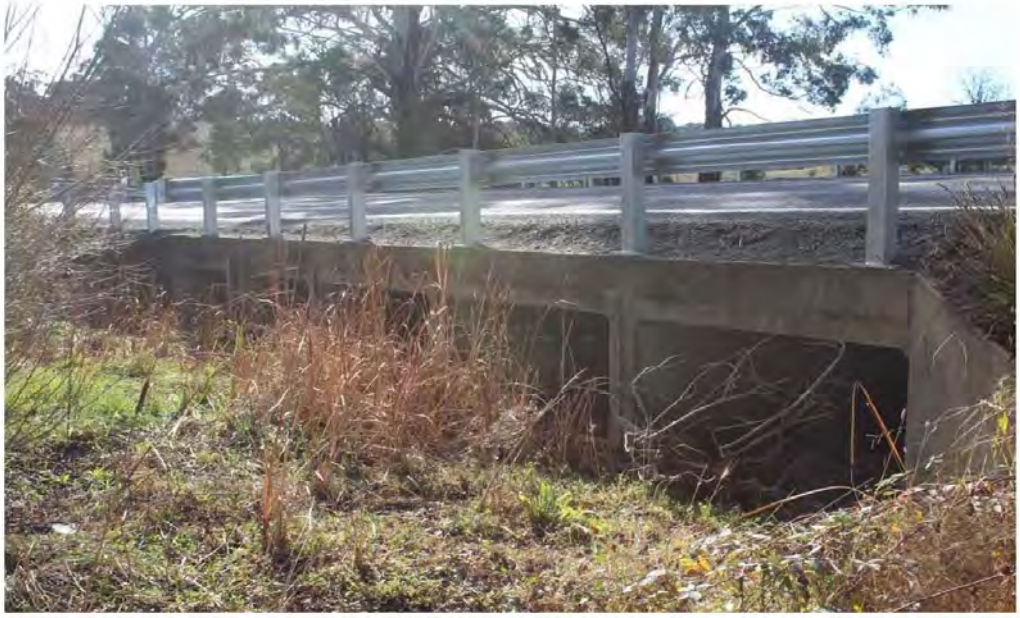


View of culvert at road level facing north



View from south western corner

Bridge Design

Level 2 Structure Condition Report

Structure Name	Culvert H
Inspected by	Mitchell Kramer
Date of Inspection	7/06/2018

PHOTOS

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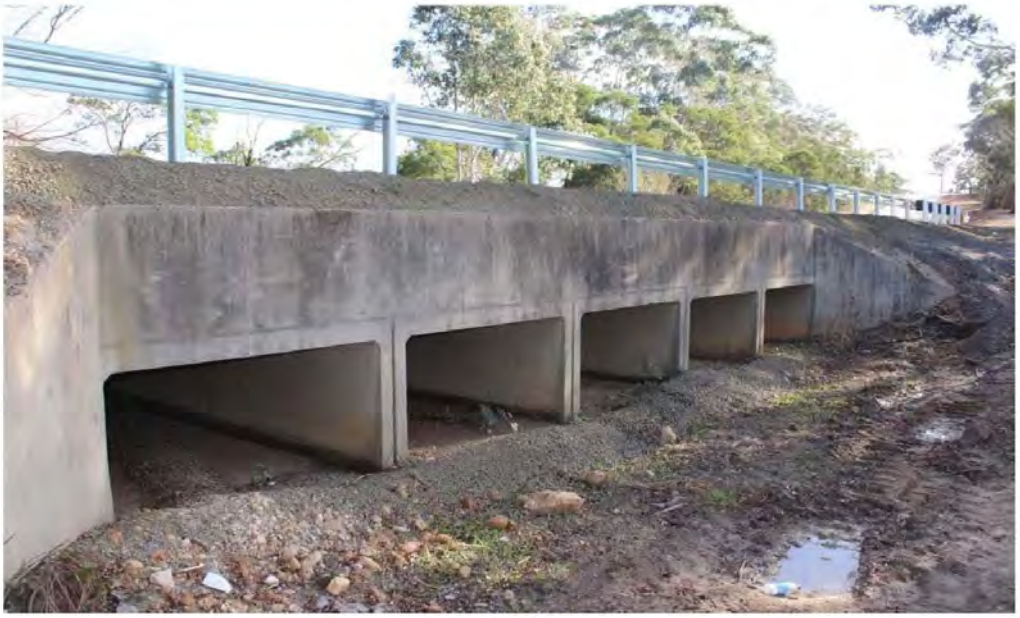
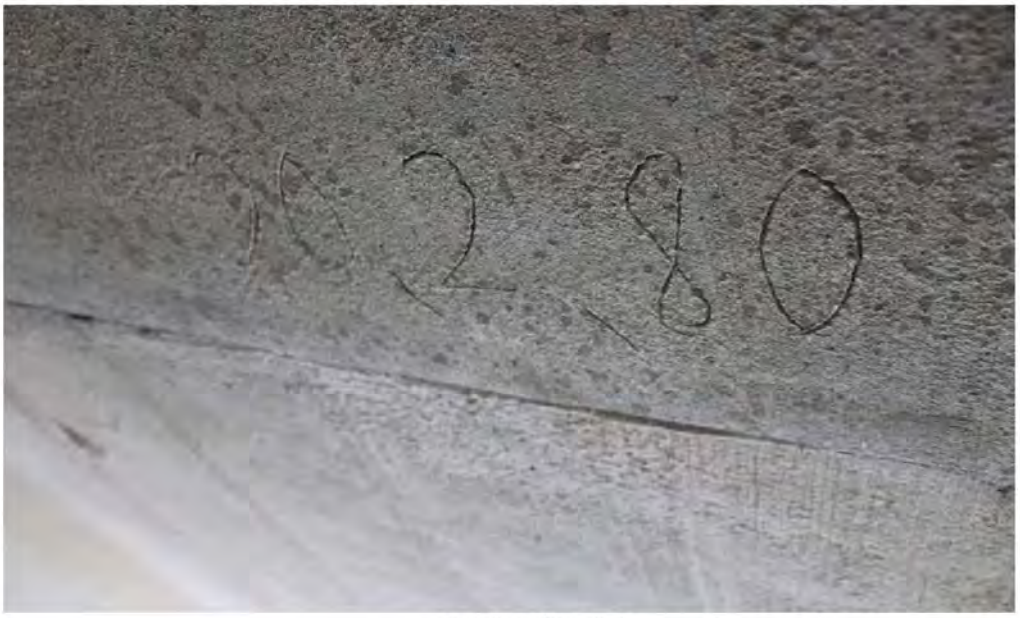


View from south eastern corner



Construction date

Bridge Design

Level 2 Structure Condition Report

Structure Name	Culvert H
Inspected by	Mitchell Kramer
Date of Inspection	7/06/2018

PHOTOS

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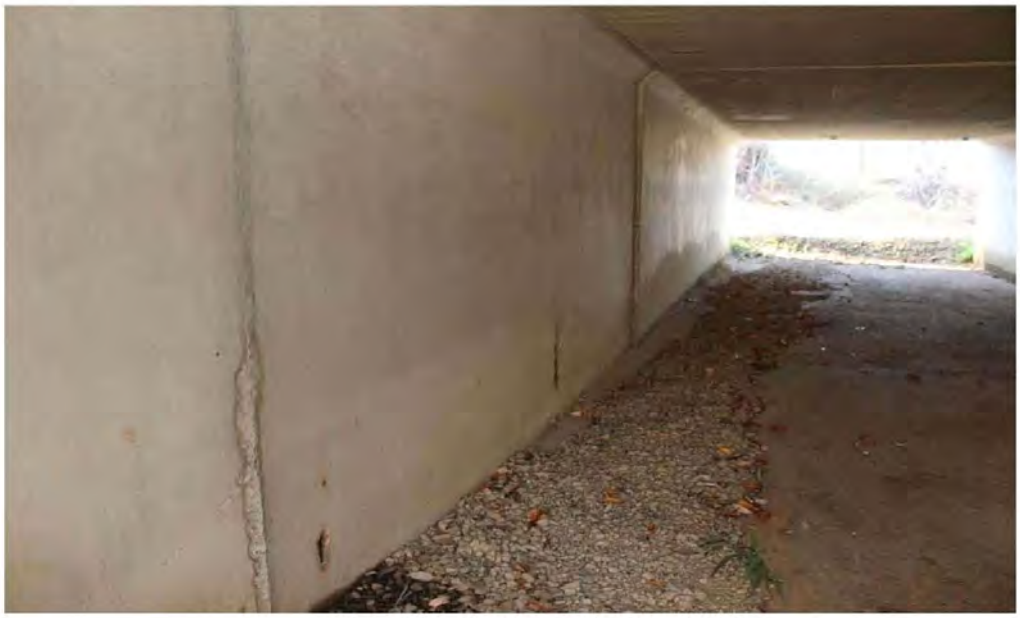
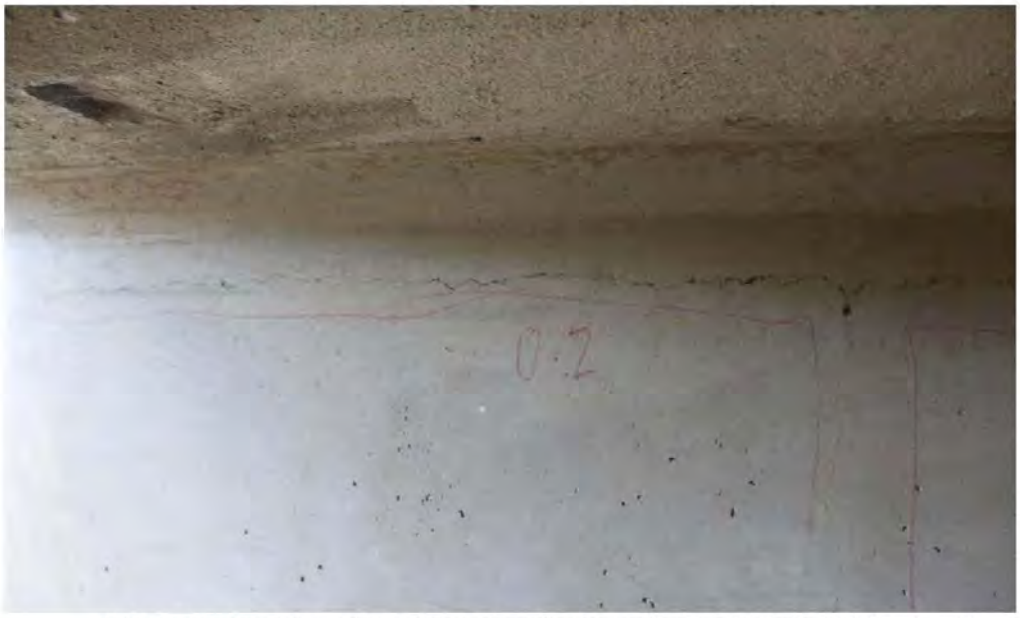


Exposed reinforcement in culvert wall



0.2mm horizontal cracking at top of wall and vertical cracking in middle of unit

Bridge Design

Level 2 Structure Condition Report

Structure Name	Culvert H
Inspected by	Mitchell Kramer
Date of Inspection	7/06/2018

PHOTOS

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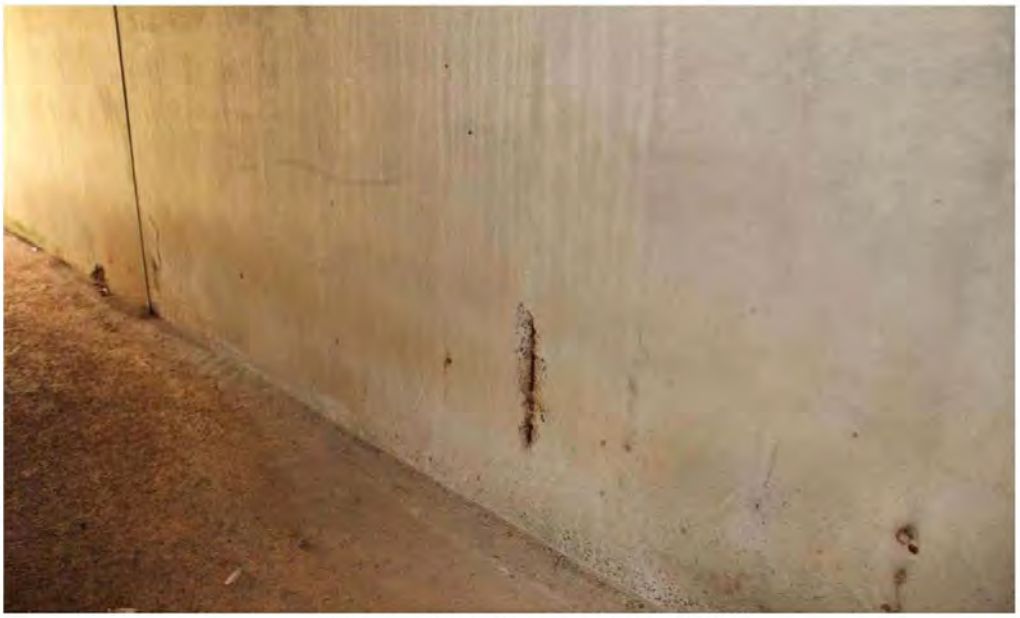
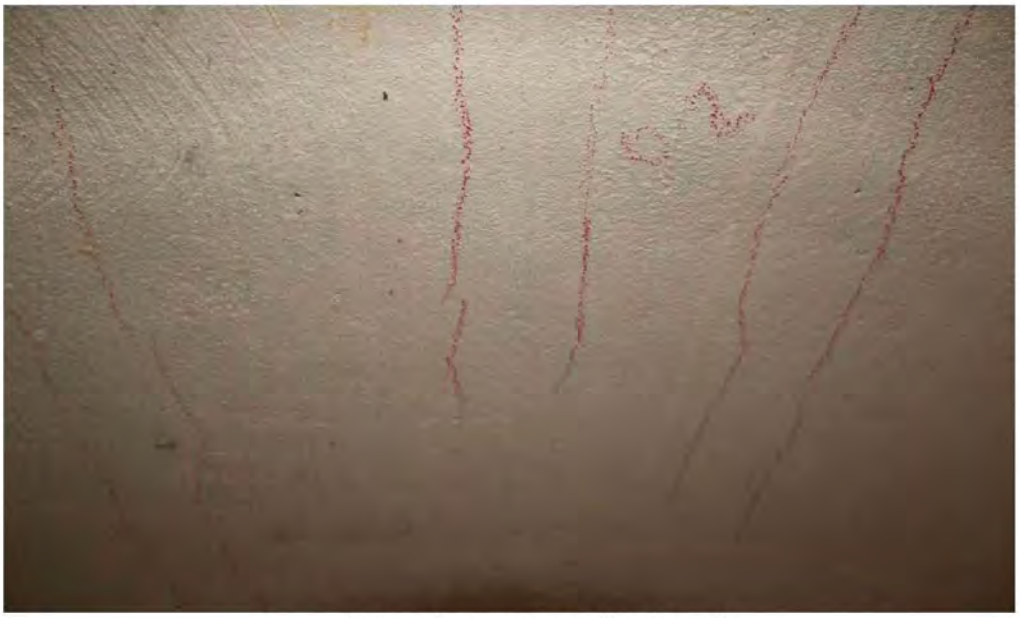


Exposed reinforcement in culvert wall



0.2mm transverse cracking in roof

Bridge Design

Level 2 Structure Condition Report

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LOCATION DETAILS

Structure Name	Culvert I	**Structure ID**	Mountain Ash 474
Road Name	Mountain Ash Rd	**Road Class**	local
Speed Limit (km/h)	80	**Latitude**	-34.8522
Suburb	Bungonia	**Longitude**	149.9415
LGA	Goulburn Mulwaree	**Crossing**	Unknown Ck (I)
From	Bungonia	**Catchment Name**	n/a
To	Goulburn	**Catchment Area (km^2)**	n/a
Location Description	Chainage 474. Just west of junction with Jerrara Road		

STRUCTURE DETAILS

Culvert Type	pipe	**Skew**	0
Construction Material	concrete	**Number of cells**	2
Construction Date	1953	**No. units per cell**	13 old 3 new
Waterway area (m2)	1.8	**Unit length (m)**	1.2m old 2.45 new
Cell height/diameter (m)	1.5 old 1.4 new	**Overall length (m)**	22.95
Cell width (m)	n/a	**Clear spacing (m)**	700
Height over culvert (m)	2.0-3.0	**No. traffic lanes**	2
Wall thickness (mm)	70	**Road width (m)**	
Roof thickness (mm)	-		

INSPECTION DETAILS

Inspected by	Mitchell Kramer	**Last Level 2 Inspection**	unknown
Date of Inspection	8/06/2018	**Next Level 2 Inspection**	n/a
Time of Inspection	12pm	**Structure plans available?**	no
Weather	overcast	**Access equipment required?**	none
Tidal Conditions	-		

GENERAL COMMENTS

Original pipes are in good condition with some fine cracking in the top of the barrels. The base is silted on the southern side. There is a spall with corroded reinforcement on the newer northern side which should be repaired.

OVERALL STRUCTURE CONDITION RATING

	Good	Fair	Poor	Very Poor	Close	Comments
Overall Structure Condition Rating	X					

Bridge Design

Level 2 Structure Condition Report

Structure Name	Culvert I				
Inspected by	Mitchell Kramer				
Date of Inspection	8/06/2018				
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Component Inventory and Condition Assessment

Element Type	RMS Code	Description	Environment	Unit	Quantity	Quantity in Condition Rating				Comments - type of defect - location of defect - size and severity
						1	2	3	4	
Concrete	CCUP	Precast Pipe Culvert (original)	M	m2	94	90	4	0	0	- Cell 1 is east, unit 1 is south - Bases of original culverts silted with stagnant water through most - 0.1mm cracks in top of original culverts - Spall and exposed reo cell 1, north eastern side
Concrete	CCUP	Precast Pipe Culvert (new)	M	m2	100	99	0	1	0	- Spall and exposed reo cell 1 unit 16, north eastern side
Miscellaneous	MAPP	Approaches	M	ea	2	2	0	0	0	
Railing	RMET	Steel Bridge Barrier	M	m	60	60	0	0	0	

Bridge Design

Level 2 Structure Condition Report

Structure Name		Culvert I			
Inspected by		Mitchell Kramer			
Date of Inspection		8/06/2018			
Job No.	B1833	**Page**	3	of	8

Required Maintenance Actions

Element Description	Quantity	Condition State	Defect Description	Required Action			
				Monitor	Repair	Level 3 Inspection	Other
Precast Pipe Culvert	$1m^2$	3	Spall in cell 1 has exposed reinforcement which is corroding and should be patched.		X		

Bridge Design

Level 2 Structure Condition Report

Structure Name	Culvert I
Inspected by	Mitchell Kramer
Date of Inspection	8/06/2018

PHOTOS

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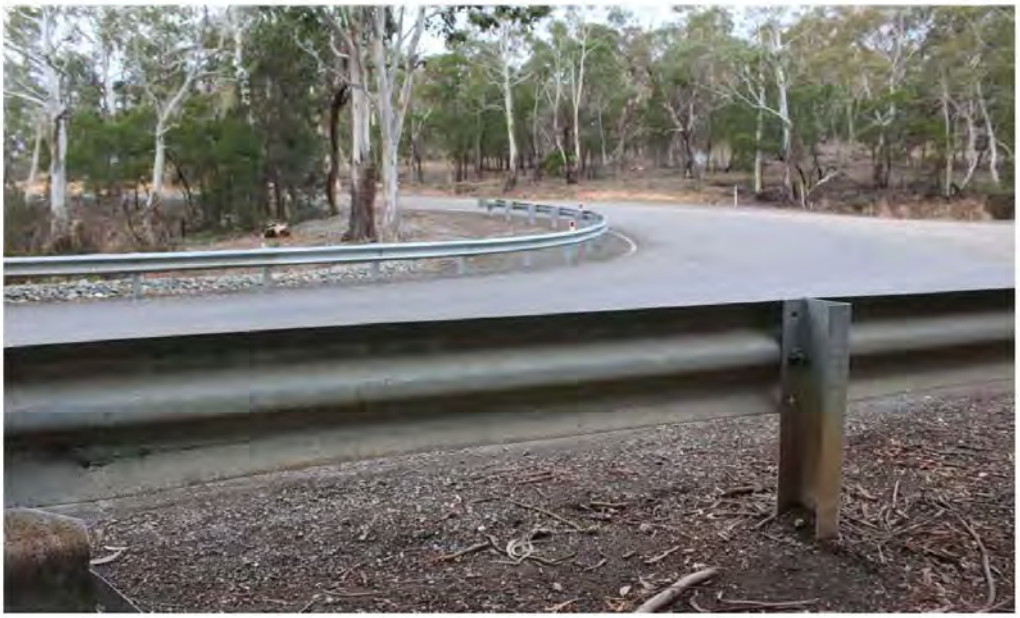
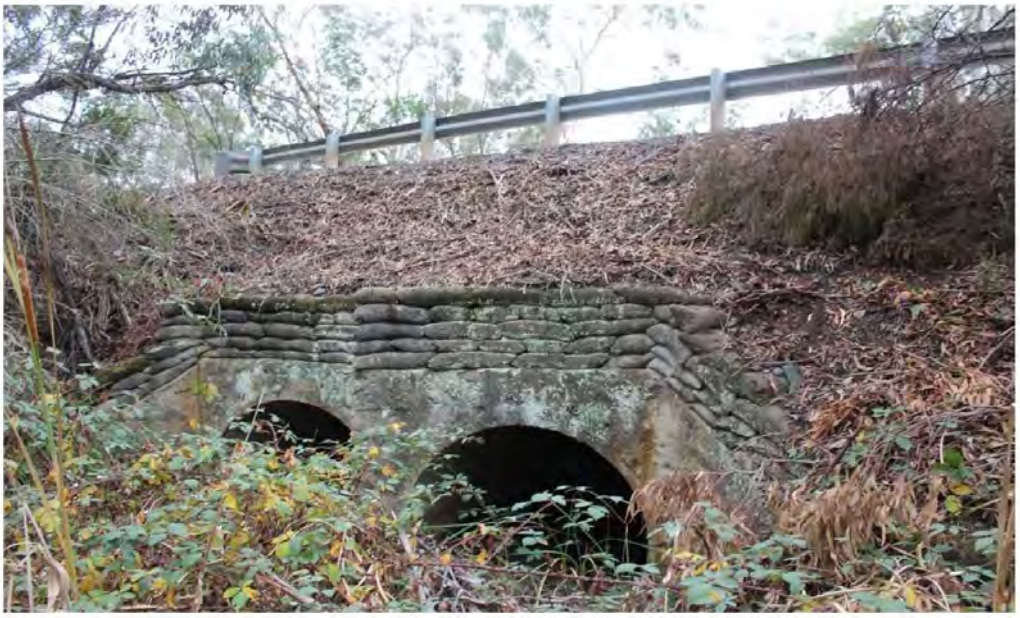


View at road level facing north



Southern (original) side

Bridge Design

Level 2 Structure Condition Report

Structure Name	Culvert I
Inspected by	Mitchell Kramer
Date of Inspection	8/06/2018

PHOTOS

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Inside culvert looking north

Northern (new) side

Bridge Design

Level 2 Structure Condition Report

Structure Name	Culvert I
Inspected by	Mitchell Kramer
Date of Inspection	8/06/2018

PHOTOS

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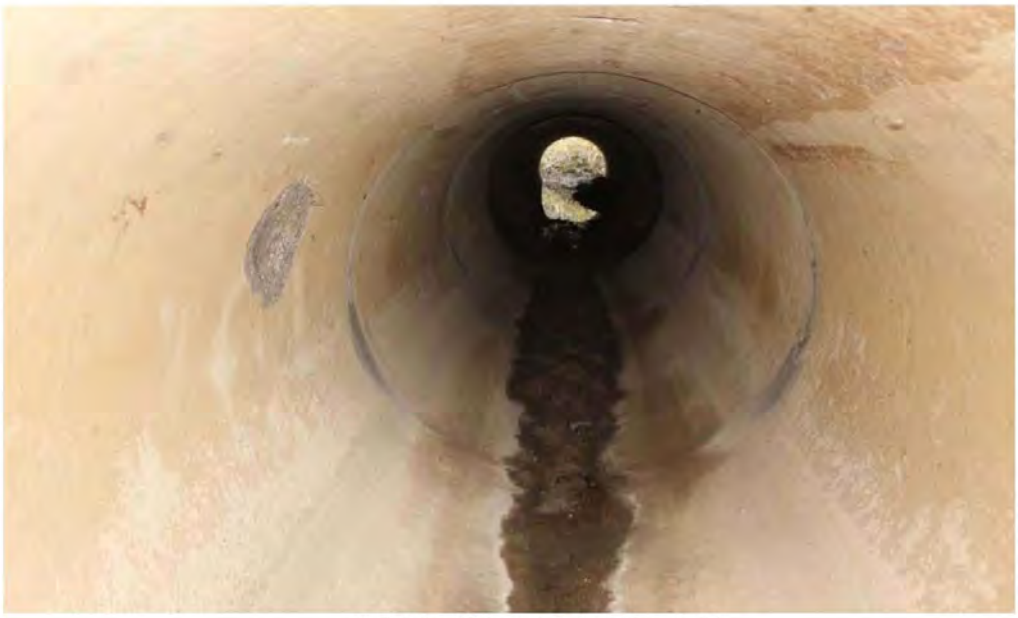

Cell 1 looking south (spall on left)

Spall in new section of cell 1

Bridge Design

Level 2 Structure Condition Report

Structure Name	Culvert I
Inspected by	Mitchell Kramer
Date of Inspection	8/06/2018

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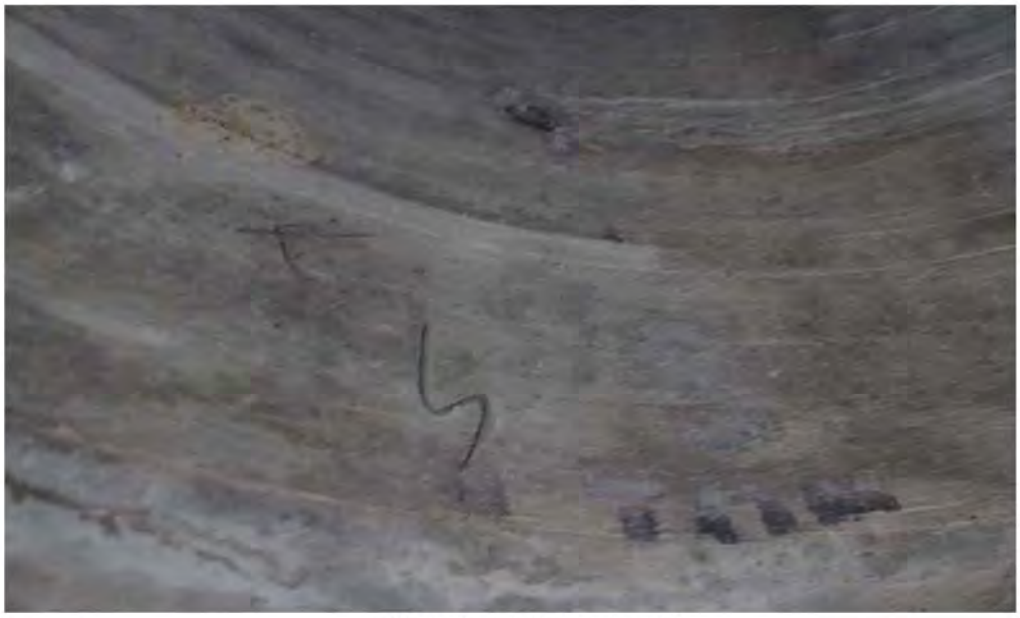
Construction date



Pipe class noted as S and Y

Bridge Design

Level 2 Structure Condition Report

Structure Name	Culvert I
Inspected by	Mitchell Kramer
Date of Inspection	8/06/2018

PHOTOS

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Original pipes

Cell 2 looking south

Bridge Design

Level 2 Structure Condition Report

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LOCATION DETAILS

Structure Name	Culvert J	**Structure ID**	Oallen Ford
Road Name	Oallen Ford Rd	**Road Class**	local
Speed Limit (km/h)	80	**Latitude**	-34.8745
Suburb	Bungonia	**Longitude**	149.9381
LGA	Goulburn Mulwaree	**Crossing**	Woodwards Creek (J)
From	Bungonia	**Catchment Name**	n/a
To	Windellama	**Catchment Area (km^2)**	n/a
Location Description	2km south of Bungonia		

STRUCTURE DETAILS

Culvert Type	pipe	**Skew**	0
Construction Material	concrete	**Number of cells**	1
Construction Date	1955	**No. units per cell**	12
Waterway area (m2)	1.8	**Unit length (m)**	1.23
Cell height/diameter (m)	1.53	**Overall length (m)**	22.95
Cell width (m)	n/a	**Clear spacing (m)**	0.7
Height over culvert (m)	2.50	**No. traffic lanes**	2
Wall thickness (mm)	75	**Road width (m)**	8.25
Roof thickness (mm)	-		

INSPECTION DETAILS

Inspected by	Mitchell Kramer	**Last Level 2 Inspection**	unknown
Date of Inspection	8/06/2018	**Next Level 2 Inspection**	n/a
Time of Inspection	2:30pm	**Structure plans available?**	no
Weather	overcast	**Access equipment required?**	none
Tidal Conditions	-		

GENERAL COMMENTS

Cracking is present in most pipe units but can be expected for 60+ year old structure. Culvert is structurally sound.

OVERALL STRUCTURE CONDITION RATING

	Good	Fair	Poor	Very Poor	Close	Comments
Overall Structure Condition Rating		X				

Bridge Design

Level 2 Structure Condition Report

Structure Name	Culvert J				
Inspected by	Mitchell Kramer				
Date of Inspection	8/06/2018				
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Component Inventory and Condition Assessment

Element Type	RMS Code	Description	Environment	Unit	Quantity	Quantity in Condition Rating				Comments - type of defect - location of defect - size and severity
						1	2	3	4	
Concrete	CCUP	Precast Pipe Culvert	M	m2	110	0	105	5	0	- unit 1 easternmost. - unit 1 horizontal crack in roof 0.3mm middle to 1.5mm contiunuing east and west - 0.1mm cracks in top of Units 2,4,10 and 12 - 0.2mm cracks in top of units 3, 5 and 11 - 0.4mm crack in top of unit 6 - 0.3mm crack in top of units 7 and 9 - 0.5mm crack on northern side of units 6 to 8, 300mm long - 0.5mm crack in top of unit 8 along entire length - 1mm crack base of unit 11 westward running for 300mm - Pipes marked as 'XY' and 'Y'
Concrete	CCUL	Culvert Headwall and Slab	M	m2	40	38	2	0	0	- New headwall and slab constructed on western side - 0.3mm vertical crack in west headwall
Miscellaneous	MAPP	Approaches	M	ea	2	2	0	0	0	
Railing	RMET	Steel Bridge Barrier	M	m	100	100	0	0	0	

Bridge Design

Level 2 Structure Condition Report

Structure Name	Culvert J		
Inspected by	Mitchell Kramer		
Date of Inspection	8/06/2018		
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Required Maintenance Actions

Element Description	Quantity	Condition State	Defect Description	Required Action				
				Monitor	Repair	Level 3 Inspection	Other
Precast Pipe Culvert	5m^2	3	Cracking in top and sides of most units. Monitor	X			

Bridge Design

Level 2 Structure Condition Report

Structure Name	Culvert J
Inspected by	Mitchell Kramer
Date of Inspection	8/06/2018

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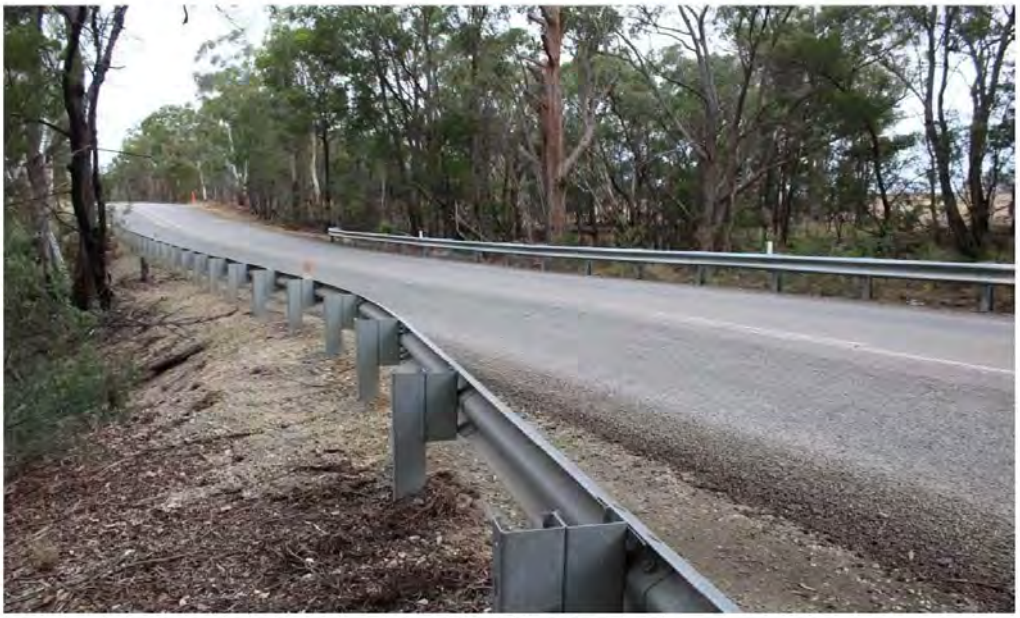

Road level looking south

Pipe inlet (western side)

Bridge Design

Level 2 Structure Condition Report

Structure Name	Culvert J
Inspected by	Mitchell Kramer
Date of Inspection	8/06/2018

PHOTOS

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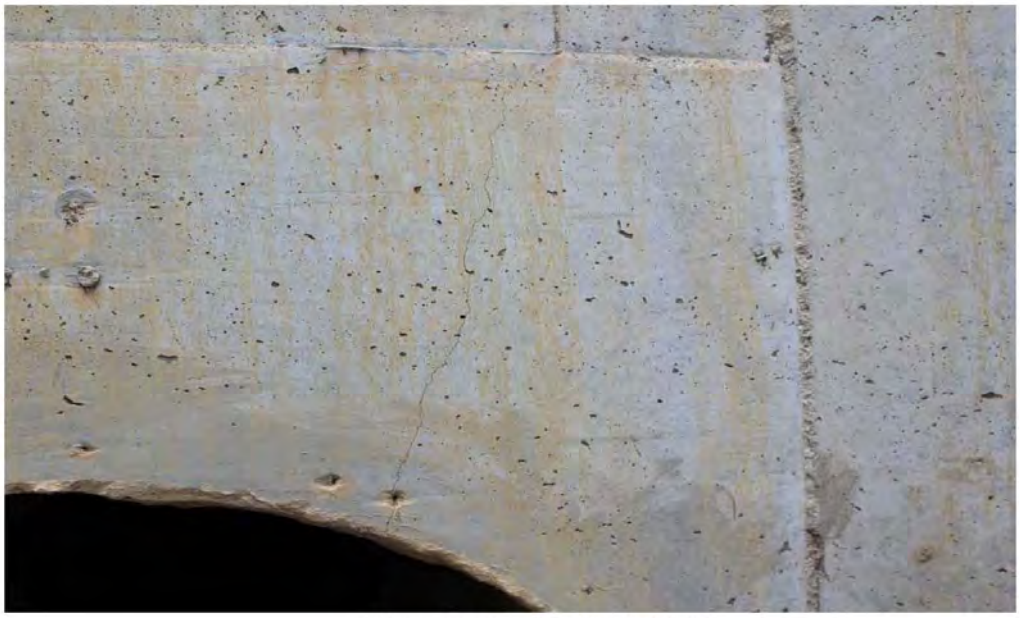
Pipe inlet (western side)



0.3mm crack in headwall at inlet

Bridge Design

Level 2 Structure Condition Report

Structure Name	Culvert J
Inspected by	Mitchell Kramer
Date of Inspection	8/06/2018

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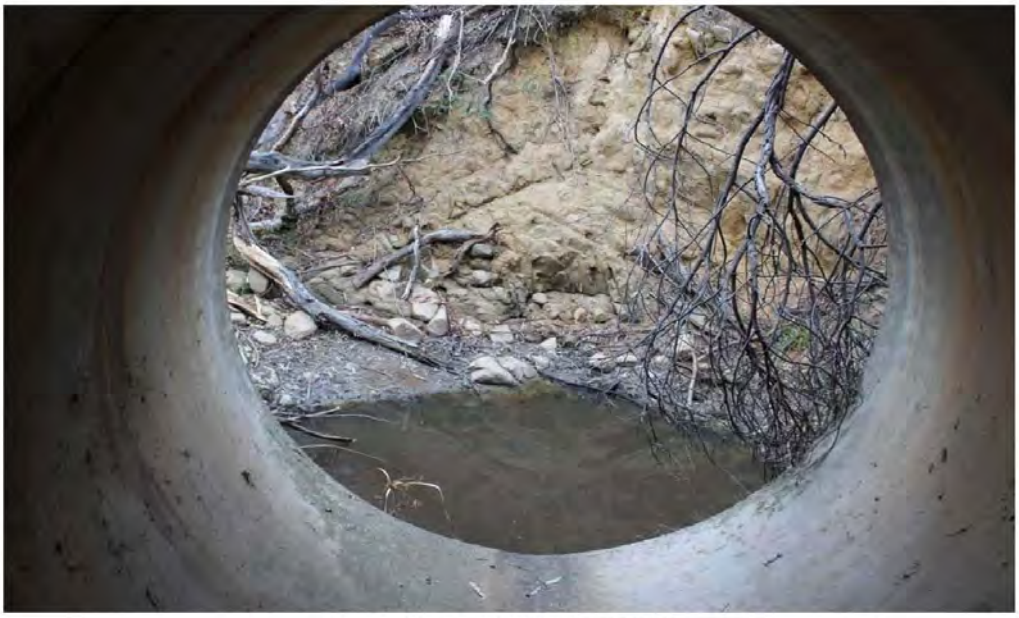
Inside pipe



Pipe outlet (eastern side)

Bridge Design

Level 2 Structure Condition Report

Structure Name	Culvert J
Inspected by	Mitchell Kramer
Date of Inspection	8/06/2018

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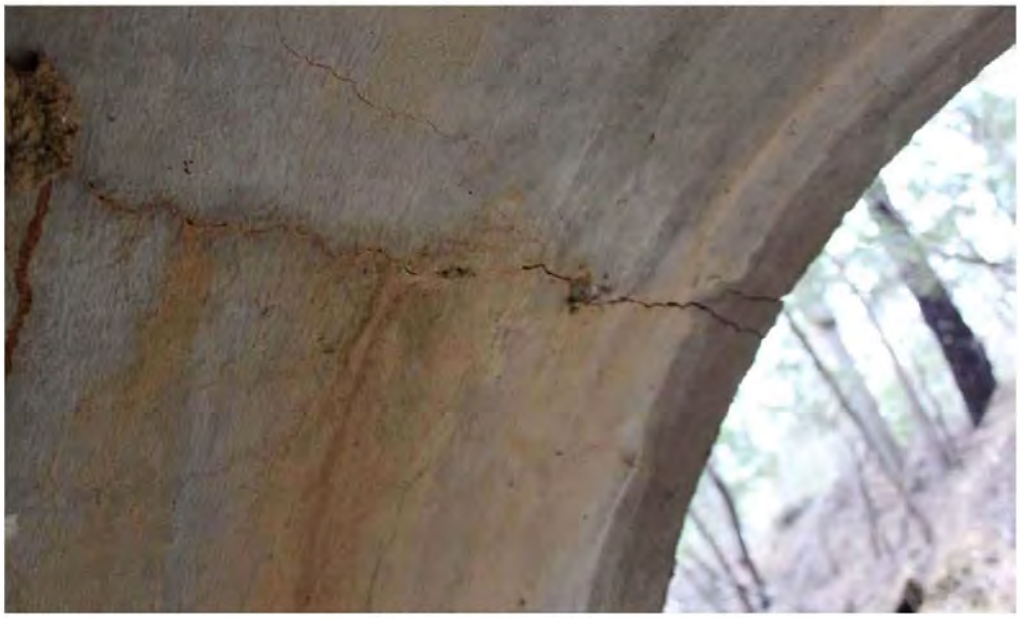

Cracking in side of unit 1 northern side

0.5mm cracking in pipe

Bridge Design

Level 2 Structure Condition Report

Structure Name	Culvert J
Inspected by	Mitchell Kramer
Date of Inspection	8/06/2018

PHOTOS

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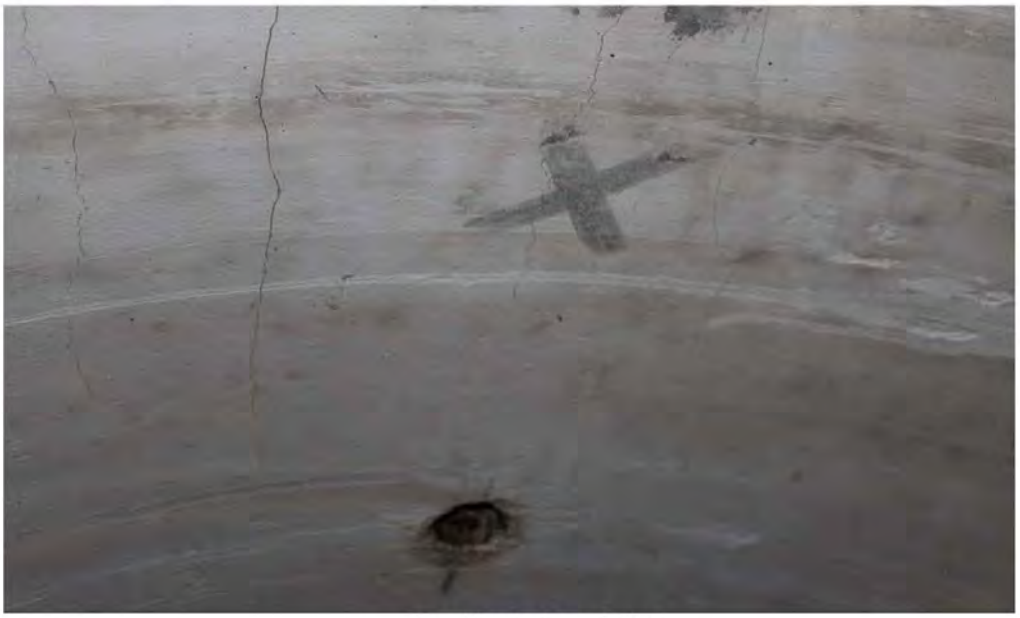
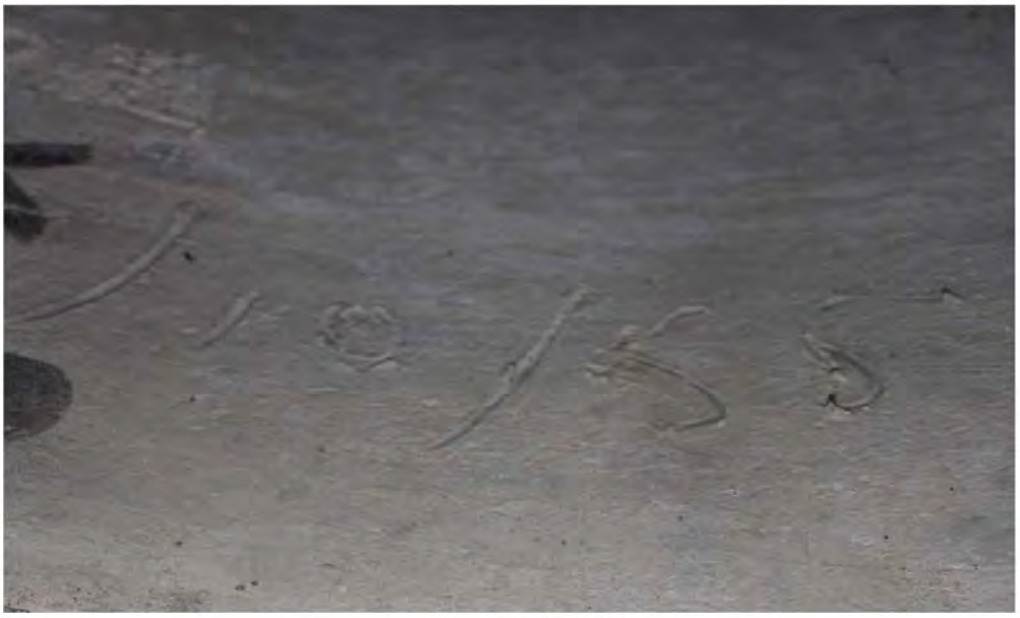


Cracking in top of pipe



Construction date

Bridge Design

Level 2 Structure Condition Report

Structure Name	Culvert J
Inspected by	Mitchell Kramer
Date of Inspection	8/06/2018

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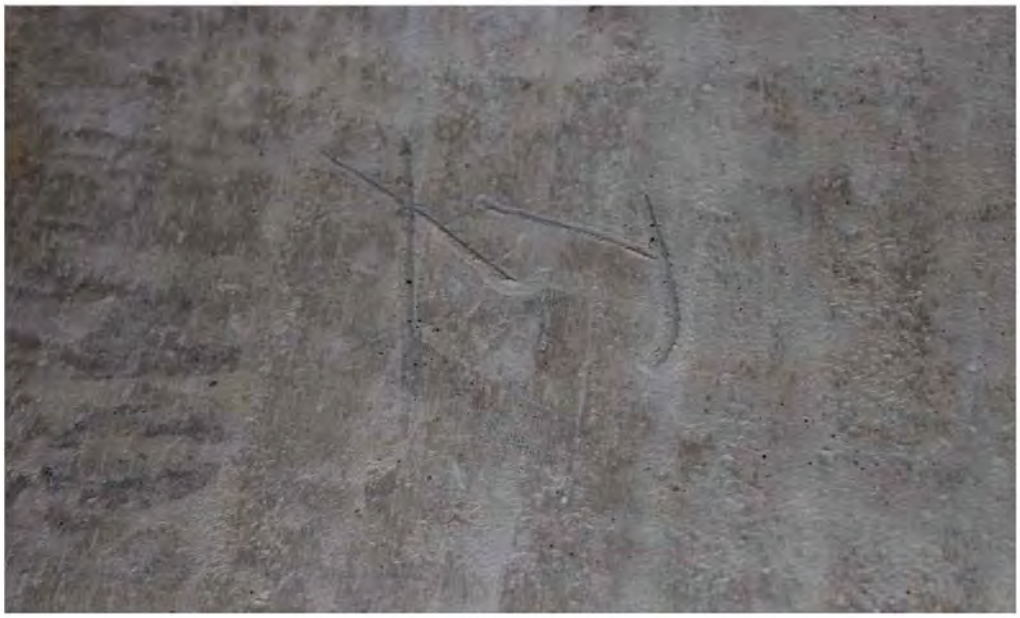
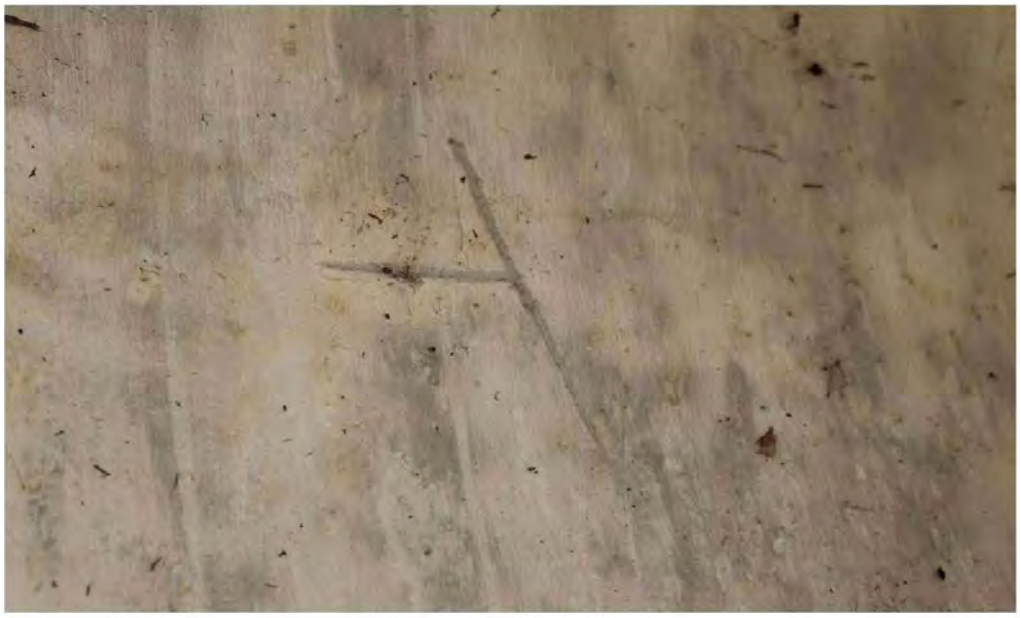


Pipe class 'XY'



Pipe class 'Y'

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