

Bridge Information System Structure Level Report

Structure Id 7799 Name Barron River	
Overview	
Structure Type BRDG Bridge Construction Type Construction Material	Owner SW Region SW District Risk Threshold Level Risk Index Threshold
Location Road Section Code Id Description S Cway S	Tdist Start End
Order By Column Name As Column Name S Column Name Colu	
BMPSTR	Page 1 of 2 Printed on 03-Feb-2021 at 11:4



Bridge Information System Structure Level Report

										Risk	No.			Condition	
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Structure Id							Name						
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Weight F	Restriction			 The bridge should be restricted to vehicles that comply with general mass limits and concessional mass limits as defined in Schedules 1 and 2 of the Heavy Vehicle (Mass, Dimension and Loading) National Regulation. Vehicles loaded to higher mass limits as defined in Schedule 5 of the Heavy Vehicle (Mass, Dimension and Loading) National Regulation are no permitted No Class 1 heavy vehicles are permitted to cross the bridge except: Special purpose vehicles operating under the national Class 1 Special Purpose Vehicle Notice 2016 (No 1) issued by the NHVR The heaviest vehicles permitted are the following: 20m long, 50.5t truck and dogs 19m long, 50.5t B-doubles 19m long, 43.5t semi-trailers 						of the e are not			
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Structures Management Plan SMP1



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Construct Sidetrack						
Sign Detour						10-
Install Height Bars						
Monitor Structure		Refer to Life Inter and Investigation	im Extension Scope	Report and Ass	essmer	t of Short-term Risks
Load Testing						
Other (e.g. Inspection Freq.)	⊠	Refer to Life Inter and Investigation	im Extension Scope	Report and Ass	essmer	t of Short-term Risks
Approval of Structures Mana	agem	ent Plan				
District Director (Signature:	NR		Date	Click to enter date
Deputy Chief Engineer (Struct	ures)	Signature:	NR		Date	Click to enter date
Departures				$\frac{1}{2}$	Þ	
Reasons						

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Install Height Bars		
Monitor Structure		
Load Testing		
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Approval of Departures		

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SMP1



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Life Extension Interim Report Barron River Bridge (7799)

Version No: Date:



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TMR OnQ Template Version 3.0 (06/09/2017)

Project Summary

Region/District	North Queensland Region Far North District
Road Name/Location/Local Government	32A Kennedy Highway Bridge over Barron River at Kuranda Mareeba Shire Council
Program	Structures Rehabilitation Program (Element 19)
Project Number	364373
Project Description	Barron River Bridge Investigation

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0.1	23 Nov 2018	NR	Final draft
0.2	30 Nov 2018	(6)	Approved document
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Endorsement and Approval

Customer

I accept that this project has been completed and handed over to my organisation:

Name	NR					
Position	Manager (Delivery & Operations)					
Signature		Date				
Comments						
		<	$\langle \rangle \rangle$			

The following officers have endorsed this document:

The followin	g officers have endorsed this document:	
Name	NR	
Position	Principal Engineer (Civil)	
Signature		Date

Name	NR			
Position	Engineer (Civil)			
Signature		02	Date	

Name	NR			
Position	Contract Engineer			
Signature		07	Date	

Sponsor

This project has been completed and this report hands it over to the project customer:

Name	NR		
Position	Deputy Chief Engineer (Structures)		\sim
Signature		Date	
Comments	5		

The following officers have **endorsed** this document:

Name	NR	
Position	Director, Structures Management	
Signature		Date

Name	NR
Position	Manager, Structures Stewardship
Signature	Date

Name	NR		
Position	Manager, Structures Stewardship		
Signature		Date	

Project manager & Technical lead:

Name	NR		
Position	Contract Engineer		
Signature	R	Date	

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	Kuranda	:

Executive summary



Figure 1 Barron River Bridge¹

The 256 m long Barron River Bridge at Kuranda is an iconic major bridge on a strategic route that services Kuranda, the Atherton Tablelands and areas further to the west of Cairns. The expectation is that this high long bridge will remain in-service for the foreseeable future.

The bridge was designed for the H20S16 design load (33 t truck) and featured tall concrete piers and fabricated steel girders with spans of 45.7m (150 feet) and 36.6 m (120 feet). The superstructure is continuous over the piers with drop-in spans and steel halving joints. The deck wearing surface is concrete.

The unverified Tier 1 assessment indicates that the girders and the headstock cantilevers are operating at margins less than current Australian standards for general access semi-trailers (42.5 t) and the 50.5t 19m B-doubles / truck and dogs that can access the route. This assessment is consistent with other long span bridges designed to the H20S16 design load and with long spans such as this bridge.

The drawings for the Barron River Bridge at Kuranda were progressively released over a period of 18 months between December 1960 and June 1962 with the steel for the girders pre-purchased by the Department of Transport and Main Roads and supplied to the successful tenderer for the superstructure. This accelerated construction program appears related to the construction of the Barron Gorge Hydro scheme, which was commissioned in 1963 and flooded the previous low-level bridge.

Significantly, the steel girders were retrofitted with stressed Macalloy bars before the bridge was opened. The drawings for the retrofit were signed in March 1963 – more than 18 months after the drawings for the steel girders were signed. The reason for the retrofit has not been identified, but it was possibly in response to the

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failure by brittle fracture² of the steel girder Kings Bridge in Melbourne in July 1962. An alternative hypothesis is that an independent review recommended strengthening. This retrofit is now compromised through both pitting corrosion and wear of the stressing bars vibrating against the girders raising concerns of brittle failure in the bars.

There are also concerns about stability of bearings due to the inclination of the rockers, wear, and corrosion with total loss of section in some of the bolts that provide the stability of the bearings. Leaking deck joints contributes both to the deterioration of the bearings and the steelwork in general. There is some suggestion that the protective coating may be reaching the end of its economic life and if access is required for other actions then repainting may be appropriate at the same time.

The abutment deck joints are now noisy and expensive to maintain, and issues have been identified with the guardrails.

After 55 years of service, it is considered timely to develop and implement a detailed Life Extension Plan for the Barron River Bridge to manage the identified risks and prepare the bridge for its remaining life. The purpose of the Life Extension Plan is to ensure that the operation, capacity and condition of a specific structure is systematically managed and monitored to ensure; safety of the road user, network efficiency, and prevent occurrences (load or condition) which may lead to severe structural damage or collapse.

An indicative timeline for the development and implementation of the Life Extension Plan follows:

Phase			20)18								20)19	<	\leq	_		7				20	20			
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l Risk Management													Ĺ	2												
II Investigations												(2		\geq											
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² Brittle fracture is uncommon in Queensland but can occur. Factors that mitigate against brittle fracture at Barron River include the moderate temperatures at Kuranda and the detailing of the welding to avoid transverse fillet welds.

1. Purpose of this document

The purpose of this document is to hand over the completed deliverables to the customer with details of the investigations necessary to safely manage and extend the life of the Barron River Bridge at Kuranda.

2. Governance

2.1 Key Roles

The key project management roles were:



Project Customer	NR Manager (Delivery & Operations)
Project Sponsor	NR Deputy Chief Engineer (Structures)
Project Manager	NR Contract Engineer
Advisory Group	NR

2.2 Related documents

Documents related to the Barron River Bridge at Kuranda include:

- TMR Structures, November 2018, "Assessment of Short-term Risks and Investigation Scope Barron River Bridge (7799)"
- TMR Structures Management, November 2018, "Life Extension Interim Report Barron River Bridge (7799)". Note: The initial 29 June 2018 draft of this report titled "Structure Management Plan – Barron River Bridge (7799)". It was renamed at the time of issue. This document.
- RoadTek, May 2017, "Inspection Report -- Barron River Inspection BIS ID 7799: Defect Repair options Report #1"³
- RoadTek, May 2017, "Level 2 Inspection"⁴
- TMR BCM&AM, Dec 2015, "Level 3 Inspection Barron River Bridge BIS IS 7799"5

3. Objectives and scope

3.1 Objectives

• Develop a framework for the life extension of the bridge.

⁴ A copy of this report is included as Appendix B of "Life Extension Investigation – Interim Report – Barron River Bridge (7799)"

⁵ A copy of this report is included as Appendix A of "Life Extension Investigation – Interim Report – Barron River Bridge (7799)"

³ A copy of this report is included as Appendix C of "Life Extension Investigation – Interim Report – Barron River Bridge (7799)"

3.2 In scope

- Review existing inspection reports and drawings.
- Identify and recommend the appropriate investigations necessary to safely manage and extend the life of the bridge.

3.3 Out of scope

- Risk assessments
- Conduct of detailed investigations.
- Development of a Structure Management Plan for the bridge.

4. Background

The Barron River Bridge at Kuranda is the first high level bridge built at this location and carries the Kennedy Highway across the Barron River.

The Kennedy Highway serves Kuranda, the Atherton Tablelands and areas to the west of Cairns. The highway has high strategic significance to the State road network and is generally used by industry and tourists. Traffic volumes are AADT (2017) = 8871 vehicles per day with 12.23% HV = 1085 heavy vehicles per day.

The road is a General Access Route. Vehicles such as semi-trailers and truck and dogs access the route. The road geometry of the Kuranda Range is restrictive in terms of access by longer heavier vehicles such as B-doubles and road trains, however the increased power and manoeuvrability of modern trucks is enabling larger trucks to access the route.

The two-lane fabricated steel girder bridge is long (840 feet or 256 m) and high (deck up to 66 feet or 20 m above the top of the concrete spread footings).

The bridge was constructed during 1961 to 1963:

- The design drawings were released progressively over 18 months between December 1960 and June 1962.
- The steel for the bridge was pre-ordered and supplied by the then Department of Main Roads to the steel fabrication contractor.
- It appears the accelerated construction was related to the construction of the Barron River hydro scheme, which flooded the existing lower level bridge.
- The steel girders in the Kings Bridge in Melbourne collapsed via brittle fracture on the 10th July 1962 prior to the opening of the bridge Barron River Bridge at Kuranda. The report of the Royal Commission into the failure of the Kings Bridge was published in 1963.
- Drawings detailing the "Prestressing of the lower flange" were signed 15 March 1963 8 months after the collapse of the Kings Bridge and more than 18 months after the girder drawings were signed. One hypothesis is that concerns over the potential brittle fracture of the Barron River Bridge led to the strengthening on the tension flange via external post-tensioning.

Overview of Bridge 5.

5.1 **Bridge Details**

Table 1 Details of the Barron River Bridge at Kuranda

Route Type:	General Access
Loading Level (HML/GML)	GML
Route MCV:	GA (semi-trailer, 19 m B-double)
Design Class	H20S16 (1960's).
Superstructure Description	Continuous welded steel I Girder (4) with cantilevers and drop-in spans acting compositely (shear studs) with RC deck. Span 1 & 6 120 ft 36.58 m Span 2, 3, 4 & 5 150 ft 45.69 m Span 2 & 5 drop-in spans 90 ft 27.43 m cantilevers 30 ft 9.14 m Overall length: 256 m
Substructure Description	Abutments: Concrete sill beam Pier: Reinforced Concrete column with cantilevered headstocks on spread footings.
Carriageway width (m):	8.195 m (28' 0") between kerbs
No. marked lanes:	2 marked lanes offset for a too way on the Cairns bound shoulder
Skew:	0°

5.2 **Bridge Location**

The location of the bridge is illustrated in Figure 2.

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Figure 2 Barron River Bridge location (arrow)

5.3 Drawing Summary

Selected extracts from the drawings follow:



Figure 3 General Arrangement





Figure 5 Piers 2, 3 & 4 (Piers 1 & 5 similar)



Figure 6 Expansion joint rocker bearings at drop-in spans. Note: Bottom radius of rocker (6³/₄") rotates on a flat surface. Top radius of rocker (1³/₈") rotates in a greased cylindrical grove in the sole plate. Grease nipples and PVC seals / washers provided to lubricate movement of rocker against sole plate.







Figure 8 Prestressing of lower flanges – Span 3 & 4 shown. All sag moment regions treated this way

5.4 Deck Wearing Surface and Line Marking

The bridge has a concrete wearing surface (refer Figure 9). The line marking is eccentric with a wider shoulder on the northern side to accommodate a pedestrian walkway.

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Figure 9 Deck wearing surface, line-marking and 'footway' looking towards Cairns away from Kuranda (eastbound)

5.5 Dates

The drawings for the Barron River Bridge at Kuranda were progressively released over a period of 18 months between December 1960 and June 1962 with the steel for the girders pre-purchased by the Department of Transport and Main Roads and supplied to the successful tenderer for the superstructure. This accelerated construction program appears related to the construction of the Barron Gorge Hydro scheme, which was commissioned in 1963 and flooded the previous low-level bridge (refer Table 2).

Significantly, the steel girders were retrofitted with stressed Macalloy bars before the bridge was opened. The drawings for the retrofit were signed in March 1963 – more than 18 months after the drawings for the steel girders were signed. The reason for the retrofit has not been identified, but it was possibly in response to the failure by brittle fracture⁷ of the steel girder Kings Bridge in Melbourne in July 1962. An alternative hypothesis is that an independent review recommended strengthening. This retrofit is now compromised through both pitting corrosion and wear of the stressing bars vibrating against the girders raising concerns of brittle failure in the bars.

⁷ Brittle fracture is uncommon in Queensland but can occur. Factors that mitigate against brittle fracture at Barron River include the moderate temperatures at Kuranda and the detailing of the welding to avoid transverse fillet welds.

Table 2 Summary of the dates the drawings were signed

Drawings	Date drawings signed:
General Arrangement	16/12/1960
Piers	1/11/1960 16/12/1960
Abutments	19/05/1961 15/06/1961
Pier Bearings	16/06/1961
Steel girders	10/08/1961 22/08/1961
Suspended span bearings	22/08/1961
Shear connectors	22/08/1961
Temporary works for girder erection	31/10/1961
Deck	19/12/1961
Inspection gantry rails	6/03/1962 2/05/1962
Deck joints	27/03/1962
Guardrail	20/06/1962 25/06/1962
Collapse of Kings Bridge (Melbourne)	10/07/1962
Prestressing of lower flange	15/03/1963 23/04/1963
Barron Gorge Hydro commissioned	1963

6. Current Situation

Current Risk Rating = 2578 - relatively high

A Tier 1 Bridge Assessment has been undertaken by KBR but has not been independently reviewed⁸. The assessment was made using standard assumptions including the presence of multiple vehicles simultaneously on the bridge. This assessment identifies the following areas as operating at margins less that Australian Standard margins for GML semi-trailers (42.5 t)⁹:

- Girder bending (hog) over piers (minimum SAR¹⁰ ~ 0.6)
- Girder bending (sag) (minimum SAR ~ 0.8)

⁸ Independent review / higher level assessment is recommended

⁹ Current access is for GML vehicles which include 50.5 t 19 m B-doubles and truck and dog.

¹⁰ SAR = Strength Assessment Ratio is defined in Appendix D. A SAR of 0.6 means that the bridge has 60% of the capacity required for current loading as per AS 5100.7 based on standard assumptions such a live load factor = 2.0, dynamic load allowance = 40%, multiple vehicles on the bridge simultaneously, nominal material properties.

• Pier cantilever bending (hog) (minimum SAR ~ 0.8)

Recent Inspection Reports:

- Level 3 Inspection Barron River Bridge BIS ID 7799 (BCM&AM, Dec 2015) recommended replacement of corroded nuts and bolts in bearings, replacement of expansion joint bearings, monitoring of movement joints, replacement of compression seals and a repair. For further information, refer Appendix A.
- Level 2 inspection Barron River Bridge BIS ID 7799 (May 2017, refer Appendix B) rated the bridge in CS3 for both the original structure and the strengthening (Macaliey bars)
- Inspection Report Barron River Inspection BIS ID 7799: Defect Repair Options Report #1 (RoadTek, May 2017) – refer Appendix C. Recommended the repair / replacement of bearings / nuts and bolts, assessment of the Abutment joints and an options analysis of the protective coating.

The issues identified in these inspection reports are summarised in Table 3, along with some comments from a ground level inspection by ________ on 28 May 2018:

Component	Inspection outcomes	Comments from visual inspection 28/5/2018
Bridge Barriers	Barrier posts: Insufficient thread lengths on the base attachments, no washers and corrosion appearing on base plates. Level 3 inspection requested	Agree
Pedestrian walkway	Poor delineation	Agree
Deck Slab	Some abrasion and cracking – not severe	Agree
Deck Joints	Abutments – Cover plates to expansion joints are noisy and maintenance intensive (refer Figure 10) Drop-in span pinned joints – compression seals deteriorated & leaking Drop-in span expansion joints finger plates operating well. Water discharging onto steelwork and bearings causing deterioration of bearings and steelwork (refer Figure 12 and Figure 13).	Agree. Structure borne vibration / noise from abutment joints transmits through girders. Expansion joint drainage system for finger plates is as per design with overflows able to discharge onto steelwork for the full length of the joint with most water egress concentrated at kerbs and edge girder bearings.

Table 3 Summary of outcomes from inspections

Component	Inspection outcomes	Comments from visual inspection 28/5/2018
Girders	Concern that the protective coatings are beginning to fail – especially near joints (refer Figure 12 and Figure 13). Applies both to girders and post-tensioning bars applied to the bottom flanges. Recommended an options analysis re protective coating	Agree Macalloy bars vibrating against girder stiffeners and brackets causing notches in bars in the Kuranda end span (refer Figure 14) Pitting corrosion observed in Macalloy bars and bottom flange in Kuranda end span.
Bearings	Severe corrosion to bolts restraining bearings – in some locations the nuts and bolts missing to levels below plates (refer Figure 16 and Figure 17) Pitting to base, rocker and sole plates Water from joints increasing the rate of corrosion (refer Figure 12 and Figure 13). Concerns about over rotation of bearings leading to extended road closures / severe damage / collapse (Figure 17).	Agree Red iron oxide deposits evident at Kuranda abutment consistent with fretting of movement joint between the rocker and sole plate (refer Figure 11). Possible wear evident in other bearings (refer Figure 17).
Inspection gantry	Not operational – deterioration of track and WHS issues	Agree
Headstocks	No signs of any severe cracks, spall or exposed reinforcement	Agree
Piers	No signs of any severe cracks, spall or exposed reinforcement	Agree
Footings	Below water / ground	Agree



Figure 10 Barron River Bridge: Abutment deck plates are noisy and difficult to maintain (Kuranda abutment 28 May 2018)



(a) General arrangement

(b) View of underside of bottom flange, sole plate and rocker plate

Figure 11 Barron River Bridge: Kuranda abutment downstream rocker bearing. Note: Grease nipples, 'red' iron oxide dust from fretting of rocker rubbing on sole plate (28 May 2018)



Figure 12 Barron River Bridge. Note: Fabricated steel girders, cross-girders, drop-in span joints, services, rail for inspection gantry, piers (26 May 2018)



Figure 13 Barron River Bridge at an expansion joint of the drop-in span. Note halving-joint, rocker bearings, opportunity for water to penetrate the deck at joint, discolouration from coating holding coat (26 May 2018)



Figure 14 Barron River Bridge: Wear in Macalloy bars vibrating against stiffeners (Kuranda end span, 28 May 2018)



Figure 15 Barron River Bridge: Pitting corrosion in Macalloy bar (Kuranda end span, 28 May 2018)



Figure 16

Barron River Bridge: Rocker bearing at a drop-in span expansion joint. Note: Missing nut and bolt to rocker bearing and possible residue 'flakes' from bolt and nut (image supplied by TMR Cairns)



Figure 17 Barron River Bridge: Rocker bearing at a drop-in span expansion joint. Note: Inclination of rocker; missing nut and top half of bolt through rocker although head of the bolt is still in position, partial loss of head to bolt at the top of the rocker, the visible gap between the shank of the bolt and the restraining bracket (image supplied by TMR Cairns).



Figure 18 Barron River Bridge: Span 2 expansion rocker bearing at Pier 3. Note 'depression' in left end of base plate where it contacts the rocker (Figure 14 from Defect Repair Options Report #1, 20 May 2017)



Figure 19 Barron River Bridge: Fixed bearing at Pier 3. Note stiffeners, two bolts, corroded nut (Figure 7 from Defect Repair Options Report #1, 20 May 2017)



Figure 20 Barron River Bridge: Expansion rocker bearing at Pier 4. Note improved condition away from the deck joints and the unstiffened 'kinks' in the bottom flange of the girders (Figure 22 from Defect Repair Options Report #1, 20 May 2017)

7. Management Strategy

The current management strategy is to maintain the bridge for an expected life of at least 50 years by investigating and managing current risks and taking steps to prevent further deterioration and reduce ongoing maintenance costs for this strategic asset.

Consider developing a business case to support the rehabilitation and life extension works for this major asset.

7.1 Stewards Review

The Barron River Bridge is an iconic major bridge on a strategic route that services Kuranda, the Atherton Tablelands and areas further to the west of Cairns.

It has been servicing the community since its opening in 1963 (55 years). While this is encouraging from a past performance perspective, it is not a guarantee of future performance given the deterioration evident and the increasing traffic demand.

The bridge is a continuous H20S16 bridge with long spans (150 ft or 45.7 m) for its era. The average span of bridges on TMR's current road train and B-double routes in the early 1960s was approximately 11 m – less than ¼ of the span of the Barron Rive Bridge. The Barron River Bridge is a large bespoke bridge and one of few large span steel girder bridges in Queensland from this era (e.g. Fitzroy Bridge in Rockhampton and the David Trumpy Bridge in Ipswich).

The bridge is located on a General Access route and the traffic is restricted by the range between Kuranda and Cairns. However, modern trucks and trailers as well as improvements in the alignment are enabling larger trucks to access the route. An aspirational goal for this route would be for HML B-doubles to access the route. Access by cranes, low loaders and load platform trailers should also be considered for those vehicles that can traverse the range.

Water penetrating the deck joints has exacerbated the deterioration in the vicinity of the joints, especially around the steel rocker expansion bearings. Away from the leaking deck joints, the rocker bearings are in much better condition. Improving the waterproofing of the deck joints will improve the life / reduce the maintenance costs associated with the bearings and the structural steelwork.

The bridge was repainted in the early 1990's. The original Red lead coating system was over coated rather than removed. There is currently evidence of spots of cerrosion including pitting corrosion of the girder flanges and the Macalloy bars.

The pitting corrosion of the Macalloy bars and the notches induced by wear of the Macalloy bars due to vibration are of particular concern because of the high levels of stress (620 MPa) in the Macalloy bars may lead to stress corrosion cracking in these bars and an increased risk of sudden failure of the bars. A plan is required for the corrosion protection of the steelwork and corrosion / abrasion of the Macalloy bars. One option is to replace the Macalloy bars.

Some of the nuts and parts of the bolts that restrain the rocker bearings have deteriorated severely with some portions missing altogether. Corrosion is a likely cause, but this may have been exacerbated by rotations of the rocker eccentrically loading? stressing the bearing restraint bolts and nuts (refer Figure 21). This raises concerns about the restraint of the bearings. Short-term risk interventions are recommended to manage the associated risks.

The fretting corrosion evident at Kuranda abutment rocker bearings suggests the bearings may be suffering significant wear with the rockers 'eating into' the sole plate or vice versa11. There is also some suggestion that the rocker may be wearing into the base plate at some locations. For example, Figure 18 (Figure 14 of Barron River Defect Options Report #1 (Appendix C)) suggests a possible wear depression in the base plate. The Defect Options Report #1 also summarises the measurements between the base plate and the edge of the curved rocker surface (e.g., Figure 17 of Appendix C). A comparison of these field measurements with the

¹¹ One interpretation of Figure 17 is that the bolt through the sole plate to the rocker is closer to the top of the sole plate than shown on the drawings and this is a consequence of wear.

theoretical 'as new' measurements summarised in Figure 21 of this report for the drop-in span rocker bearings suggests that:

- Either there is a build-up of paint and debris on the base plate or there is some wear of the rocker / base plate interface, or a combination.
- The rotations at the time of the measurement were moderate (approximately equivalent to Figure 21 (b)) and potentially enough to load the bolts.



Figure 21 Barron River Bridge: Drop-in span expansion rocker bearing schematic for various relative travel.

Rocker bearings that exceed their travel have the potential to cause significant disruption as the bridge may drop significantly with the resulting dynamics potentially overloading / damaging / collapsing the bridge. The movement studies undertaken to date have focused on the movements due to thermal effects. However, there will also be substantial movements due to traffic loads / crowd loadings (e.g. a fun run starting from the bridge...) due to the haunched girders and the articulation. An audit of the circumstances required for the bearings to exceed their travel should be part of the management plan for this bridge.

The likely increased friction in the rocker bearings is of concern as it leads to unpredictable behaviour, increased forces in the bridge that must be restrained by severely deteriorated restraining bolts and tall pier bearings. These risks should be addressed in the short-term potentially by greasing the rocker bearings and safely restraining potential longitudinal movement by, for example, replacing critical severely deteriorated bolts and nuts or by the addition of restraint blocks.

The bridge was retrofitted with stressed Macalloy bars on the lower flanges in 1963. Information collated to date has not identified the reasons for the retrofit. The timing of the retrofit suggests it may be related to the brittle fracture of the steel Kings Bridge in Melbourne which was designed and constructed at around the same time. The Royal Commission into the collapse of the Kings Bridge was critical of the supply and testing of the higher tensile steel and its fabrication / inspection. The steel for the Barron River Bridge was pre-purchased and supplied to the fabricator (Evans Deakin Industries) by the then Department of Main Roads. The specification indicates that the steel was to Australian Standard A33 (1935) and Class D Plate. This standard is not well-known, brief and does not specify testing for brittle fracture considered essential by the Royal Commission, for example. There is also a wide range of ultimate tension strengths and yield strengths (refer Appendix D for further information). A hypothesis is that concerns about the steel led to the bottom flanges

being pre-compressed in order to reduce the tension stresses in the flanges for the then H20S16 design load and thereby reduce the risk of brittle fracture. An alternative hypothesis is that an independent review indicated that the bridge needed to be strengthened. Given that current traffic loads exceed the H20S16 design load it is prudent that properties of the steel and the reasons for the now compromised retrofit inform the management of and access to this bridge.

Assessment experience indicates that bridges with spans significantly larger than the norm for the era do not assess as well for current traffic loads compared to assessments of bridges with typical spans for the era. The available assessment is consistent with this general observation with SARs as low as 0.6. This assessment needs independent validation and a critical review of the sensitivity of the assessment to the assumptions in the assessment, including the issues associated with brittle fracture.

It is noted that the critical elements in the assessments are identified as the edge girders and the pier cantilevers. The critical drive-line for these elements is heavy vehicle adjacent to the kerb. The line marking of a pedestrian walkway on the northern side of the bridge encourages the westbound traffic to travel adjacent to the kerb thereby loading the critical elements more compared to vehicles travelling in lanes centred on the bridge.

The bridge is high, long and over water on a heavily trafficked route. Consequently, access for bridge rehabilitation is difficult / expensive. An access inspection gantry was incorporated in the design but is no longer considered safe to use because of corrosion of the rails and current WHS issues. The type of access required will vary depending on the refurbishment activity. Some activities could be conducted from an UBIU whereas others will require a partial or full scaffold or moveable access platform. Given the significant cost of access it will be prudent to consider the overall demands for access and to schedule multiple activities to utilise the access. For example, if access is required to jack the bearings then it may be prudent to update the protective coating at the same time or to develop a reusable access system that would be suitable for accessing the entire bridge.

A visual summary of the issues is presented in Figure 22.



- O Component operating at less than Australian Standard margins for current as-of-right traffic (unverified assessment)
- e-e Retrofitted Macalloy bars potentially pitted and worn form vibration raising concerns about failure
- Severely corroded nuts of bearing anchor boils.
- Severely corroded hex bolts connecting between the sole plate and rocker of bearings at suspended span
- Concern expressed about the residual travel of expansion bearings
- Fretting wear of the rocker / sole plate (observed at Kuranda abutment (B) and inferred as occurring throughout.
- Expansion deck joints leaking causing deterioration of steel and bearings and noise
- Fixed deck joints leaking causing deterioration of steel and bearings
- Residual life of protective coating girders, stressing bars and bearings
- ••• Traffic barrier anchor bolt condition / capacity

Figure 22 Summary of issues
7.2 Life Extension Plan

The 256 m long Barron River Bridge at Kuranda is an iconic major bridge on a strategic route that services Kuranda, the Atherton Tablelands and areas further to the west of Cairns. The expectation is that this high long bridge will remain in-service for the foreseeable future.

The bridge was designed for the H20S16 design load (33 t truck) and featured tall piers and fabricated steel girders with spans of 45.7m (150 feet) and 36.6 m (120 feet). The superstructure is continuous over the piers with drop-in spans and steel halving joints. The unverified Tier 1 assessment indicates that the girders and the headstock cantilevers are operating at margins less than current Australian standards for general access semi-trailers (42.5 t) and the 50.5t 19m B-doubles / truck and dogs that can access the route.

The drawings for the Barron River Bridge at Kuranda were progressively released over a period of 18 months between December 1960 and June 1962 with the steel for the girders pre-purchased by the Department of Transport and Main Roads and supplied to the successful tenderer for the superstructure. This accelerated construction program appears related to the construction of the Barron Gorge Hydro scheme, which was commissioned in 1963 and flooded the previous low-level bridge.

Significantly, the steel girders were retrofitted with stressed Macalloy bars before the bridge was opened. The drawings for the retrofit were signed in March 1963 – more than 18 months after the drawings for the steel girders were signed. The reason for the retrofit has not been identified, but it was possibly in response to the failure by brittle fracture¹² of the steel girder Kings Bridge in Melbourne in July 1962. An alternative hypothesis is that an independent review recommended strengthening. This retrofit is now compromised through both pitting corrosion and wear of the stressing bars vibrating against the girders raising concerns of brittle failure in the bars.

There are also concerns about stability of bearings due to the inclination of the rockers, wear, and corrosion with total loss of section in some of the bolts that provide the stability of the bearings. Leaking deck joints contributes both to the deterioration of the bearings and the steelwork in general. There is some suggestion that the protective coating may be reaching the end of its economic life and if access is required for other actions then repainting may be appropriate at the same time.

The abutment deck joints are now noisy and expensive to maintain, and issues have been identified with the guardrails.

After 55 years of service, it is considered timely to develop and implement a detailed Structure Management Plan (SMP) for the Barron River Bridge to manage the identified risks and prepare the bridge for its remaining life. The purpose of the Life Extension Plan is to ensure that the operation, capacity and condition of a specific structure is systematically managed and monitored to ensure; safety of the road user, network efficiency, and prevent occurrences (load or condition) which may lead to severe structural damage or collapse.

¹² Brittle fracture is uncommon in Queensland but can occur. Factors that mitigate against brittle fracture at Barron River include the moderate temperatures at Kuranda and the detailing of the welding to avoid transverse fillet welds.

An indicative outline of the development and implementation of the Life Extension Plan is presented in Table 4:

Phase		2018 2019												2020											
	J	Α	S	0	Ν	D	J	F	Μ	А	М	J	J	А	S	0	Ν	D	J	F	М	A N	1 J	J	Α
l Risk Management																					_	6		4	
II Investigations																				<	$\langle \rangle$		\mathbf{i}		
III Rehabilitation / Life extension	I Plan 	nin	g																\bigwedge		\leq	5	7		
IV Implementation																		L				7			
V Management																<					>				

 Table 4
 Live Extension Plan – Indicative program

Further details are summarised in Table 5.

Table 5 Development and implementation of a Life Extension Plan for the Barron River Bridge at Kuranda

Activity	Issue / Comments	Priority							
<u>Phase I Risk Management</u>									
Review Risks	Establish a risk register including consequences Workshop risks	A							
Short-term risk management	For example: Issue an Interim SMP (Access) - Communication of risks associated with heavy vehicle access and keeping loads at current levels during investigations / life extension works. Interim Bearing Stabilisation – Develop safe procedures and reinstate restraints no longer provided by deteriorated bolts to prevent unexpected bearing movements (e.g., replace corroded nuts / bolts / add restraint brackets)	A							
Strategic Review	Articulate and confirm long-term aspirations for the bridge	А							
	HOLD POINT								
Phase II Investigations									
Bearing Investigation	Issue – stability of bearings due to inclined rockers, wear, and corrosion (some bolts are largely missing) Movement Audit – identify possible circumstances where travel due to thermal and traffic effects (overloads / braking) could exceed Movement allowance of rocker expansion bearings Wear Audit – quantify wear / friction / behaviour and consequences								
	Capacity Audit – vertical loads; lateral & longitudinal loads from braking / wind / earthquake Options Analysis Recommendations								

Protective coating investigation	 Issue – Pitting corrosion evident in girders and Macalloy bars rising concerns about the remaining life of the coating system. Coating history (over coated red lead) / pitting / section loss Estimate remaining life Options analysis 	В
Steel Girder material investigation	 Issue – Retrofit of girders with Macalloy bars in the tension zone shortly after the collapse of the Kings Bridge in Melbourne raises questions about the properties of the steel that should be used in the assessment of the bridge and the assessment philosophy. Determine metallurgical & engineering properties, including brittle fracture Archive search for reasons for retrofit by prestressing tension fiange (TMR, KBR, Libraries, Museums, retired personnel¹³) NDT testing of girders – hardness tests Recommendations for assessment 	A
Macalloy Bar Investigation	Issue – the Macalloy bars exhibit pitting corrosion and wear at locations where Macalloy bars rub against restraint brackets and stiffeners. These notches combined with high initial stress may result in premature failure due to loss of section and stress corrosion cracking of bars Review structural and metallurgical properties Options analysis Recommendations	A
Bridge Assessment for traffic loads	Issue – Tier 1 assessment concludes girders and pier headstocks operating at margins substantially less than Australian standard margins. Independent assessment Sensitivity analysis to inform management options / aspirational goals for bridge (e.g., sensitivity to steel properties, heavy vehicles using the route, dynamic loading, drive-line, multiple presence) Management Options Recommendations	A
¹³ Possible contacts include:	NR	

Abutment Deck Joints	Issue – water penetration causing deterioration of steelwork, noise causing community concern, maintenance intensive. Options Analysis (e.g., replace with modern bridge joint) Recommendations	В
Span 2 & 5 Fixed deck joints	Issue – water penetration causing deterioration of steelwork and excessive maintenance costs Options Analysis Recommendations Implementation	В
Span 2 & 5 Expansion deck joints	Issue – Drainage from current finger plates is discharging onto the bearings are steel work below causing severe deterioration of the steelwork and	В
Underwater inspection	Issue – below water portion of the bridge may never have been inspected. Inspection of condition of the piers / footings below the water line. Recommendations	В
Access Investigation	Issue – The bridge is high and crosses water and a railway making access for maintenance / life extension works difficult and expensive. The current access gantry is considered unsafe. Utilising access for multiple activities prudent. Different activities, including long-term maintenance have different access demands Identify requirements for access – bearing replacement, bearing maintenance, protective coating removal / replacement / maintenance, Macalloy bar maintenance / replacement, deck joints Options Analysis Recommendations	В
Traffic Barriers	issue – Level 2 inspection identified anchor bolts without washers and sufficient length to penetrate the nuts and cracking investigate. Develop recommendations	В

Investigation Summary	Summarise the results of the investigations & options	А							
	Preliminary costing								
	Recommendations								
Phase III Rehabilitation / Life Extension Planning									
Rehabilitation / Life Extension Implementation Plan	Develop a plan to address the issues in the light of the investigations								
Strategic Asset Management Plan	Develop Strategic Asset Management Plan for bridge and business case for funding								
and & Business Case									
	HOLD POINT								
Phase IV Implementation									
Implementation	Design and construction of life extension works as identified from investigations								
Structure Management Strategy	Develop an ongoing structure management strategy for bridge, including:								
(SMS)	1. Operation Management Plan								
	2. Inspection Plan								
	3. Structure Maintenance Plan								
Phase V Management									
Inspect, maintain and manage	Implement the SMS								
	SCON								

Appendix A Level 3 Inspection – Barron River Bridge BIS IS 7799 (BCM&AM, Dec 2015)





Level 3 Inspection

Barron River Bridge BIS ID 7799

The information contained in this report may only be relied upon strictly in accordance with the project under which the information was commissioned. The State of Queensland makes no statements, representations or warranties regarding the accuracy or usefulness of the information for any other use whatsoever. Any party using the information for any purpose does so at their own risk, and releases and indemnifies the State of Queensland against all responsibility and liability (including negligence, negligent misstatement and pure economic loss) for all expenses, losses, damages and costs incurred as a consequence of such use

Prepared by: Bridge Construction Maintenance & Asset Management

December 2015

EXECUTIVE SUMMARY

In response to a request from the North Queensland Region, a Level 3 inspection of Barron River Bridge BIS ID 7799 on Kennedy Highway (32A) was undertaken on the 21st and 22nd of May 2015. The level 3 inspection was to assess the potential risks posed by large rotation of expansion bearings and by continuing corrosion to a number of bearing anchor/ restrained bolts.

The level 3 inspection also was to provide advice on the rectification of any deficiencies identified, and to recommend further investigative works where necessary.

RECOMMENDATIONS

To effectively manage this structure, the following list of works is recommended as early as possible (no latter than 2 years):

- Replace the corroded nuts of bearing anchor bolts at pier P2, P3 P4 and suspended span bearings of (P1-P2) and (P4-P5).
- Replace the defective hex bolts connecting between the sole plate and rocker of bearings at suspended span (P4-P5)
- Jack up to reinstall the expansion bearings at suspended spans (P1-P2) and (P4-P5)
- Monitor further the gap opening at expansion finger joints, particularly in the coldest time
- Replace the aged rubber inserts at suspended span (P1-P2) and (P4-P5) expansion joints
- Repaint the steel components such as girders, stressing bars and bearings

Notes from the District to Bridge Constructi	on Maintenance & Asset Management
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Inspected by: NR	Date: 17 th Dec 2015
Report Accepted by:	Date: 17 December 2015

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1 INTRODUCTION

Bridge Construction, Maintenance and Asset Management (BCM&AM) was commissioned by the North Queensland Region of Transport and Main Roads to carry out a Level 3 inspection of Barron River Bridge, BIS ID 7799, located on the Kennedy Highway (Road 32A) at chainage 12.599 km.

In addition to bridge condition issues identified by the Region, a Tier 1 assessment undertaken by a consultant has indicated a very low girder capacity for the traffic loads (Semi trailer 45.5T) which are currently trafficking the bridge. Therefore a close inspection of the girders was required to ascertain any presence of structural distress which may further compromise girder capacity.

NR (BCM&AM of the Structures Branch) undertook a site inspection of the bridge on the 21^{st} and 22^{nd} of May 2015. Accompanying him were:

NR Structural Engineer, (Far North District/ Cairns Office) on the first day.

NR Structural Engineer, (RoadTek/ Cairns Office) on the second day.

The aim of this Level 3 inspection was to assess the condition and structural adequacy of the bridge and to outline any remedial measures necessary.

This report presents the issues and deficiencies identified and details rectification works required to address these deficiencies. Appendix A contains photographs of the condition of the bridge taken during the Level 3 inspection.

2 DESCRIPTION OF BRIDGE

The Bridge Information System (BIS) indicates that the bridge was opened to traffic in January 1963. Other details are as follows:

- a. The structure is a composite steel girder and concrete slab bridge, which is 256 m long, 8.5344m wide between kerbs;
- b. The bridge consists of six spans of either 36.576m or 45.720m with no skew;
- c. The bridge is on 0.7% longitudinal slope, up from A1 to A2 abutment;
- d. The bridge is continuous over all piers with hinges creating a simple supported section on spans 2 and 5;
- e. The bridge deck consists of a 165mm to 229mm thick composite concrete deck with 4 welded beam (WB); Steel girders used for various spans with varying depth; 1^{1/4} inch Macalloy bars used to strengthen all spans;
- f. The pier headstocks are supported by a single reinforced concrete column. Each column rests on a reinforced concrete pad footing which bears directly on the foundation material;
- g. Abutment A and B consist of reinforced concrete wing wall and abutment walls supported by a pad footing bearing directly on the foundation material;
- h. The overall condition of the bridge is rated in BIS as Condition State 3 due to reported rocker bearing problems;
- i. The bridge was designed for H20 S16 loading;
- j. The structure currently is not on a designated B-double or Road Train route.

3 INSPECTION DETAILS

Traffic control was used during this inspection with the southbound lane closed to traffic. An underbridge inspection unit (UBIU) was used to inspect the underside of the superstructure and pier headstocks and was positioned in the southbound lane. The road surface including the kerbs and bridge barriers were inspected from the closed lane. The ambient temperature at inspection time was about 25 degree C. Permanent water existed at all pier locations, therefore the footing and bottom part of piers and abutments could not be inspected.

The most recent routine level 2 inspection of the bridge was undertaken on 17th June 2014. As the bridge has been rated as Condition State 3 since 2008, due to the rotation of movable bearings and corrosion of anchor bolts, the inspection frequency for level 2 inspections is currently every 3 years.

4 BRIDGE SURFACE

4.1 Approaches

Both approaches appeared to be in reasonable condition and were providing a smooth transition onto and off the bridge.

4.2 Bridge Barriers

The kerbs and barriers appeared to be in reasonable condition with no obvious defects observed.

4.3 Bridge Surface

The traffic travels directly on the concrete deck which has a cross fall of 1 in 4. There is a 1.4m wide marked lane for pedestrians on the right side. Overall, the deck surface appeared to be in reasonable condition. (Refer to Photo 1, Appendix A).

4.4 Expansion Joints

On the bridge decks, there are 6 joints (two fixed hinge joints with rubber insert, two finger joints and two sliding steel plate joints at both abutments). In general, they all appear to be in fair condition, except for some swelling of the rubber inserts at the suspended span (P1-P2) and (P4-P5) expansion joints. Below is the summary table of the design and measured joint gaps and observed condition

Location	Type of joint	Design gap	Actual	Condition	Photo
		at 24°C	gap (mm)		
		(mm)			
A1	Expansion	38	25	Fair	2
P1-P2	Fixed	25	42	Swelling rubber	4
				insert	

P1-P2	Expansion	83	92	Fair	5
	finger joint				
P4-P5	Expansion	83	97	Fair	6
	finger joint				
P4-P5	Fixed	25	33	Swollen rubber	7
				insert	
A2	Expansion	38	50	Fair	3

The bridge is in Region I and in a Coastal area. According to AS5100, the maximum and minimum design average temperatures are 58°C and 3°C respectively. Therefore from the actual measured gap 92mm and 97mm at span (P1-P2) and (P4- P5), the maximum gap of finger joint is expected to be between 105mm and 120mm accordingly. These gaps are still less than the movable capacity of finger joints 165mm.

4.4.1 Remedial Actions

• Replace the aged rubber insert at suspended span (P1-P2) and (P4-P5) expansion joints.

5 SUPERSTRUCTURE

5.1 Deck

On the soffit of the concrete slab between the steel girders, some small cracks (perpendicular to traffic direction) have been observed (Refer to Photo 8, Appendix A). It was difficult to get close to this area due to limitations with the UBIU and therefore the crack widths could not be measured. No sign of any stain due to water leakage from the top through the deck slab was observed. The cracks are likely caused by shrinkage of concrete

5.1.1 Remedial Actions

• No repair works for the above component are required at this time.

5.2 Girders and cross girders

In general, all steel components are in fair condition despite the presence of some localised spot corrosion appearing on the steel girders (Refer to Photo 9, Appendix A). By visual inspection, the weld connections look good with no sign of cracking. All steel plates appeared in good condition with no sign of distress or buckling. The stressing forces in Maccaloy bars haven't been checked due to time constraints and the unavailability of appropriate equipment. However a hammer tap survey of the stressing bars revealed no sign of abnormal behaviour or cause for concern. The bolts at anchor blocks and bar couples are in good condition.

5.2.1 Remedial Actions

• To protect the steel from further corrosion, it is recommended that it be repainted. However from observing the delamination of paint at the bearing, the presence of red lead paint was detected (Refer orange colour in Photo 12, Appendix A). This will need to be taken into account in determining an appropriate paint system and a methodology to prepare the areas prior to painting.

6 SUBSTRUCTURE

6.1 Bearings

The bridge consists of 4 welded beams sitting on rocker bearings. Currently all expansion bearings have a movement towards Abutment A1. Because of the 0.7% longitudinal grade, the level of Abutment A1 is about 1.79m lower than that of Abutment A2. This may have been the primary cause for the rotation and movement of bearings. Current bearing movement is not deemed to adversely affect the structure capacity or performance. The table below provides a summary of the measured movement and condition of each bearing

Location	Type of bearing	Measured	Condition	Photo
		movement		
		(mm)		
A1	Expansion	-8	Fair	10
P1	Fixed	0	Fair	11
Suspended	Fixed hinge	0	Severe corrosion of	12
span (P1-P2)		\geq	anchor bolts and	
)*	exposed red lead	
			paint	
Suspended	Expansion hinge	-15	Fair	13
span (P1-P2)				
P2	Fixed	0	Corrosion of	14
			anchor bolts	
P3	Fixed	0	Corrosion of	15
	(775)		anchor bolts	
P4 7	Expansion	-22	Severe corrosion	16
(\mathcal{O})	6		anchor bolt	
Suspended	Expansion hinge	+22		17
span (P4-P5)				
Suspended	Fixed hinge	0		
span (P4-P5)				
P5	Fixed	0		18
A2/3)	Expansion	-8		19

Note:

Inclination towards A2 is a positive value (+)

6.1.1 Remedial Actions

• Replace the corroded nuts of anchor bolts of bearings at pier P2, P3, P4 and suspended span (P1-P2) and (P4-P5)

- Replace the defective hex bolts between the sole plate and rocker (Photo 17).
- Jack up to reinstall the expansion bearings at suspended spans (P1-P2) and (P4-P5)

6.2 Abutments

Both abutments were in sound condition no evidence of cracking or concrete spalling

A minor scour hole was observed adjacent to the front face of Abutment A2 wall. The abutment footings are buried and as such could not be inspected.

6.2.1 Remedial Actions

• No repair works are required at this time.

6.3 Piers

All of the headstocks were in sound condition with no cracking. The footing and lower part of the pier walls were in the water and could not be inspected.

6.3.1 Remedial Actions

• No repair works are required at this time.

7 CONCLUSION

Although movement of expansion bearings and an excessive gap were observed at the finger joints, none of these require urgent attention. However they should be monitored further during future level 2 inspections. If they deteriorate further, then this office should be contacted. However it is recommended that the severe corroded bearings should be repaired as soon as possible.

The repaint of corroded steel components such as steel girders and stressing bars is required within 2 years because of mid aggressive environment. During inspection, the red lead paint has been observed. Therefore the repaint work would be expensive. The fully assessment of existing paint to fund the work needed to implement now.

Appendix A – Photos





Photo 3: Abutment 2 expansion joint





Photo 5: P1 – P2 finger joint



Photo 6: P4 – P5 finger joint



Photo 7: P4 – P5 fixed joint



Photo 8: Crack on concrete slab



Photo 9: Steel corrosion



Photo 10: A1 expansion bearing



Photo 11: P1 fixed bearing



Photo 12: Suspended span (P1-P2) fixed bearing. (Evidence of Red Lead Paint)



Photo 13: Suspended span (P1-P2) expansion bearing.



Photo 14: P2 fixed bearing



Photo 15: P3 fixed bearing



Photo 16: P4 fixed bearing



Photo 17: Suspended span (P4-P5) expansion bearing



Photo 18: P5 fixed bearing





Appendix B Level 2 Inspection (RoadTek, May 2017)

Life Extension Interim Report – Barron River Bridge (7799)

Structure Condit	ion Ir	ispe	ctio	n Re	eport				B2/1	I	Sheet	
		•			-						1 Of 9	
Structure Id	7	799				Name						
Crossing Name	Barror	n Rive	er		Alt	. Name						
Structure Type	Bridge)				Owner	MR	DEPA	RTMF	ENT OF	MAIN R(
Construction Type	Girder	/Bea1	n		I	District		Far N				
Construction Material	Steel				L	GA Id	277	MAR	EEBA	SHIRE (COUNCII	
Inspector		N				Date	09-M	AY-201 ′	7	/	\mathcal{A}	
Inspection Level 2 [X] Programmed [X] Undersize Components []												
Level 3				tiona	<u></u>						vaver []	
Road Section					Start	ł	I	End		TĐi	<u> </u>	
Id Description		S C	way §	S RI		Dist			ist 🗸	Start	s. End	
32A CAIRNS - MAI			•			0.000	5	0.2		12.535	12.792	
Overall Ratings	1 2	2 3	4	5	Commen	its						
Original Structure (O)		Х							$\langle \rangle$			
L3 Insp (17/12/2015) has recom						e complexi	ity of the w	vorks requi	v red contac	t with SMS	Roadteck engi	neers should
be considered for a possible bud	get & sco	pe of wo	orks to	be und	ertaken.			$\langle \rangle \rangle$				
Substructure is in a fair to good of Protective coating throughout the required to find out current cover L3 Insp is required for recommer washers also noted was corrosio	e structure r levels. ndations fo	e is show	ving sig & BR2 (gns of fa due to i	ailure due to nsufficient t	hread leng	ucture, the	e protective st base atta	e coating is	s a lead base	e paint some fi	urther testing
Pier 1 J2 & Pier 4 J3 Compression	on Joint se	eals are	faililing) & requ	uire replacin	g steel nos	sing is sou	ind.				
Concrete WS showing signs of n in the near future # 061,062.	ninor abra	sion & ti	ransvei	rs crack	ks, no signs	of heavy s	palling or	exposed re	eo possible	e water proo	fing on top ma	y be required
Strengthening (St)		Х				\sim						
Transvers tension bars have bee were installed in 1963.	en retro fitt	ed eithe	er side (of each	girder with	single bar	s in Spans	5 1, 2, 5 & 6	à & double	bars in Spa	ns 3 & 4. BIS 9	show the bars
CS3 protective coating starting to	o fail in Sp	ans 3 &	4. All a	attachm	nents throug	Jhout appe	ar to be so	ound & inta	ict.			
Widening (WLn, WRn), Leng	thening (L1. L2)	. Raise	ed (Ra)	. Redecked	l (Re). Sh	ortening ((S1, S2), S	trengthen	ung (St)		
		,,	,, 			(),		(*-, *-), *		B ()		
				\geq	>							
				S								
			(\mathcal{V}))								
		(J	$\widetilde{\mathcal{A}}$									
	/	\sim	9									
		5(D) ²										
	$\langle 0 \rangle$											
	\mathbb{N}											
()	78											
	9											
	7											

S	Structure Condition Inspection Report												B2/2	Sheet	
														2 Of 9	
			ture Id		77					ame					
	Inspe	ectio	n Date	-09	9-МАҮ	-2017	_ In	specti	on Le	vel 2	X] Level 3	[] Un	derwater []	
Co	omponen	t Loca	ation						ıantity Per		pbə	Commen	ıts		
Modification	Group	Component	Standard	Exposure Class	Quantity	Unit	1	Co	ndition State 3	4	Maintenance Reqd	 * Location of item/condition * Description of defects by location type, magnitude,extent * References of sketches and photos (Roll/Exposure Nos) 			
0	AP1	GR	72 S	3	2.0	EACH		1.0		1.0		CS4 GR1 has	heavy impact	damage to 2 sections of rail & 1 post GR section requires replacing.	
0	AP1	AP	70 O	3	1.0	EACH		1.0				Spacer block i		on costion requires replacing.	
	20m inspected. No signs of any major defects some minor sections of the WS pulling away at the Abutment joint nosing possible allowing water to penetrate lown to the bearings below #058,059,060.														
0	AP1	FY	40	3	20.0	LINM		20.0					\sim		
0	AP1	PRO	53 O	3	180.0	M2		180.0				20m inspected (1.2m L x 500)		appearing at A1 end under GR1	
0	A1	J1	14 S	3	8.5	LINM		8.5				~~~	itting & surfac	e rust showing on cover plate, joint	
0	<mark>S1</mark>	BR	25	3	86.0	LINM				86.0			<u>-</u>		
												bost base attach		ty are flush with the nuts & have no	
0	S1	К	3 C	3		LINM		73.0			X			,	
Mino	Minor vertical shrinkage cracks appearing on the outer faces of both kerbs, cracks range from H/L to 0.3mm no signs of any large spalls or exposed reo.														
Scup O	per outlet S1	s on u WS	nderside 1 C	of the	e kerbs ha 310.0		rate rust	appeari 310.0		. Scuppe	irs re X	equire rust treati	ment & protec	tive coating applied.	
-							svers cra			beaw sr		a or exposed re	eo poss ble w	ater proofing on top may be required	
	e near futu							,		$\sum_{i=1}^{n}$.g		F	
			d - Poord og lines re				trian foot	tway with	14 traffic	bollards	s mis	sing & fog lines	s getting harde	er to see # 062. Missing bollards	
0	A1	J2	150	3	8.5			8.5	\bigcirc			Fixed joint in V	VS at E2 of S	pan 1.	
0	P1	J1	150	3	8.5	LINM	~	8.5	r			Fixed joint in V	VS at E1 of Sp	pan 2.	
0	P1	J2	110	3	8.5	LINM	\geq		8.5						
			WS at E1 the joint g			ans of pe	rishing a)) Ilso a sm	all section	on of the	rubł	ber gland has w	orked up to th	e road surface over the pedestrian	
footw O	ay # 063, P1	064,0 J3	65 (Monito 14 S		8.5	LINM-		8.5				-	-	-	
-			VS at E2 o			<u>Up</u>)	0.0							
Meas		s taker			(()	nger joint	refer to	(Sketch (008 to 0	12). No s	igns	of excessive h	eight & differe	ntial difference noticed, catch drain	
			catch drai				tly over:	the struc	tures ou	iter rocke	er be	arings adding to	o rust & corro	sion problems of the bearings # 015,	
022,	P1	J4	150			LINM		8.5				Fixed joint in V	VS at E2 of Sp	pan 2.	
0	S2	BR	28	3	91.2	LINM				91.2					
												bost base attach		ty are flush with the nuts & have no	
0	S2	K	3 C	3	91.2		aso piat	91.2	montal	puus ta	X		501, 014, 010	, 010.	
Mino	r vertical s	shrinka	age cracks	s app	pearing or	the oute	r faces o	of both ke	erbs, cra	cks rang	e fro	n H/L to 0.3mm	n no signs of	any large spalls or exposed reo.	
Scup	per outlet	s on u	nderside	of the	e kerbs ha	ave mode	rate rust	appeari	ng #007	Scuppe	ers re	equire rust treat	ment & protec	tive coating applied.	

St	ructu	ire	Cond	itio	on Ins	B2/2	Sheet 3 Of 9											
	St	ruct	ure Id		77	99			N	ame								
					-MAY		 In	snecti			<u> </u>	7 Level 3	[] Un	derwater []				
	шэр						111	speen		vei 2								
Co	mponen	t Loca	tion					-	antity		pb	Comment	ts					
ų		Ţ		class					Per ndition		Maintenance Reqd	* Locatio	on of item/co	ndition				
icatic		onen	ard	ure (ity			State				-	otion of defe ude,extent	cts by location type,				
Modification	Group	Component	Standard	Exposure Class	Quantity	Unit						* Refere	nces of skete	ches and photos				
0	S2	WS	20 1 C	⊒ 3	388.0	M2	1 2 3 4 388.0					(Roll/Exposure Nos)						
_									signs of	boow	X			ater proofing on top may be required				
	near futu			i min	or abrasic	on & trans	svers cra	icks, no s	signs of	neavy sp	aiiin	g or exposed re	o possible wa	ater probling on top may be required				
	Maintenance required - Poor delineation of the pedestrian footway with 1 traffic bollard missing & fog lines getting harder to see # 062. Missing bollards equire replacing & fog lines require refreshing. O P2 J1 15 O 3 8.5 LINM 8.5 Fixed joint in WS at £1 of Span 3.																	
O											Fixed joint in W	/S at E1 of Sp	ban 3.					
0	P2 J2 15O 3 8.5 LINM 8.5									Fixed joint in W	S at E2 of Sp	pan 3.						
0	S3	BR	2 S	3	91.2	LINM				91.2			~					
														ty are flush with the nuts & have no				
washers also noted was corrosion appearing on the base plates due to mortar pads cast above the base # 061, 074, 075, 076. O S3 K 3 C 3 91.2 X												ō, 076.						
Minor	O S3 K 3 C 3 91.2 LINM 91.2 X Minor vertical shrinkage cracks appearing on the outer faces of both kerbs, cracks range from H/L to 0.3mm no signs of any large spalls or exposed reo.																	
Scup	per outlet	s on u	nderside	of the	e kerbs ha	ave mode	erate rust	appeari	ng #007	Scuppe	ers re	quire rust treatm	ment & protec	tive coating applied.				
0	S3	WS	1 C	3	388.0	M2		388.0		\langle	×							
	rete WS s near futu			f min	or abrasio	on & tran	svers cra	icks, no s	signs of	heavy s	ba'lin	g or exposed re	o poss ble wa	ater proofing on top may be required				
Maint	enance r	equire	d - Poor d	leline	ation fog	lines are	getting h	narder to	see # 0	62. Fog	ines	require refreshi	ng.					
0	P3	J1	150	3	8.5	LINM		8.5	\mathcal{D}	Ŋ		Fixed joint in W	/S at E1 of Sp	ban 4.				
0	P3	J2	15 O	3	8.5	LINM		8,5	\sum			Fixed joint in W	/S at E2 of Sp	ban 4.				
0	S4	BR	28	3	91.2	LINM		$\overline{\langle}$	\sum	91.2								
												ost base attach ove the base # (ty are flush with the nuts & have no				
0	S4	K	3 C	3	91.2			91.2	montai	paus ca	X		001, 014, 013	, 070.				
				f min	or abrasio	on & tran	svers cra	icks, no s	signs of	heavy sp	allin	g or exposed re	o poss ble wa	ater proofing on top may be required				
	near futu			ofth	korbe be	w. mod		oppoori	ng #007	Scuppo		quiro quet troote	nont 9 protoc	tive coating applied				
0	S4	WS	1 C		388.0			388.0	ng #007	Scuppe	X	quire rust treat	nent a protec	tive coating applied.				
Conc	rete WS s	showin	g signs o	f min	or abrasic	n & tran	svers cra	icks, no s	signs of	heavy sp	allin	l g or exposed re	o # 061,062 .					
							trian foot	way with	o 3 traffic	bollards	s mis	sing & fog lines	getting harde	er to see # 062. Missing bollards				
O	P4	J1	15 O		e reiteshir 8.5			8.5				Fixed joint in W	/S at E1 of Sp	pan 5.				
0	P4	J2	14 S (3	8.5	LINM		8.5										
Steel	finger joi	nt in W	IS et E1 o	of Spa	an 5.													
	urements lear # 06		between	end	s of the fir	nger joint	refer to	(Sketch (013 to 0 ⁴	16). No s	signs	of excessive he	eight & differe	ntial difference noticed, catch drain				
									tures ou	ter rocke	er be	arings adding to	o rust & corros	sion problems of the bearings # 024,				
<u>050,</u> 0	P4	J3	² OSSIDIE I 11 O	equir 3	e re-desiç 8.5	INM	asti shielo	J.	8.5									
Steel	nosing jo	int in V	WS at E2	of Sp	oan 5.							l						
									also a s	mall sec	tion	of the rubber gla	and has work	ed up above the road surface over the				
pedes	strian foot	way #	068,069,	υ <i>1</i> 0.	Rubber g	land requ	uires rep	acing.										

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S	Structure Condition Inspection Report													Sheet 4 Of 9		
			ture Id n Date		779 9-MAY		 In	specti		ame evel 2	[<u>×</u>] Level 3	[] Un	derwater []		
С	mponen	t Loca	ation					Qu	antity		þþ	Commen	ts			
Modification	Group	Component	Standard	Exposure Class	Quantity	Unit	1	State State				* Descrij magnit * Refere	ocation of item/condition escription of defects by location type, lagnitude,extent References of sketches and photos Roll/Exposure Nos)			
0	P4	J4	150	3	8.5	LINM		8.5	•			Fixed joint in W	- /S at E2 of Si	ban 5.		
0	S5	BR	2 S	3	91.2	LINM				91.2						
L3 Insp required for recommendations for BR1 & BR2 due to insufficient thread lengths on post base attachments majority are flush with the nuts & have no washers also noted was corrosion appearing on the base plates due to mortar pads cast above the base # 061, 074, 075, 076. O S5 K 3 C 3 91.2 LINM 91.2 X Minor vertical shrinkage cracks appearing on the outer faces of both kerbs, cracks range from H/L to 0.3mm no signs of any large spalls or exposed reo. Scupper outlets on underside of the kerbs have moderate rust appearing #007. Scuppers require rust treatment & protective coating applied.																
Scup O	per outlet S5	s on u WS	nderside 1 C	of the	e kerbs ha 388.0		rate rust	appeari 388.0	ng #007	. Scuppe	rs re X	quire <u>rust treatr</u>	ment & protec	tive coating applied.		
Concrete WS showing signs of minor abrasion & transvers cracks, no signs of heavy spalling or exposed reo poss ble water proofing on top may be required in the near future # 061.062.																
	n the near future # 061,062.															
requi	Maintenance required - Poor delineation of the pedestrian footway with 1 traffic bollard missing & fog lines getting harder to see # 062. Missing bollards require replacing & fog lines require refreshing. O P5 J1 150 3 8.5 LINM 8.5 Fixed joint in WS at E1 of Span 6.															
0	S6	BR	25		74.0			0.0		74.0				Jan O.		
-							due to i	nsufficie	nt thread			ost base attach	ments maiori	ty are flush with the nuts & have no		
wash	ers also r S6	noted v	was corros 3 C	sion	appearing	on the b	ase plate	es due to	montar	pads ca	st ab	ove the base #	061, 074, 075	j, 076.		
-							r faces o		-(C	cks rang		m H/L to 0.3mn	n no signs of a	any large spalls or exposed reo.		
				of the		ave mode		(ng #207				C C	tive coating applied.		
Conc in the	rete WS s e near futu	showir ıre # 0	ng signs o 061,062.	f min	or abrasio	on & trans	svers cra	icks, no	signs of	heavy sp	ballin	g or exposed re	eo poss ble wa	ater proofing on top may be required		
Main O	tenance r A2	equire J1	d - Poord 14 S		eation fog 8.5		getting h	narder to	see # 0 1.0		ines	require refreshi	ing.			
							k pear o	/			a the	steel plate to s	lap at location	1 #073. Broken anchor tab requires		
	elding.	PRO		3	120.0	M2		120.0				20m inspected				
0	AP2	GR	72 S	3	2.0	EACH	/	2.0				GR1 has some	e minor impac	t damage at the bridge connection, nal end still sound.		
0	AP2	AP	70 O	3	1.0	EACH		1.0						ny major issues #071		
0	A1	PED	44 0	3	4.0	EACH		4.0								
0	A1	В	43 S	3	4.0	EACH		4.0								
Rock	er Bearin	gs on	top of A1	Abui	ment. Ref	fer to Ske	tch 001	(Bearing	measur	ements l	betw	een Rocker & S	ole Plates)			
Some	e minor pi A1	tting ir A	1 B4 rocke			also B1 8 EACH	& B4 hav	e leachir 1.0	ng stains	at the h	inge	attachment #0	01, 002, 003 <u>,</u>	004 (Monitor).		
			\sim				ing stain		hout the	Abutme	nt &	bearing shelf w	here both drv	at the time of the Inspection #005.		
0	A1	F	59 C	-		EACH	X	X	X	X		Component is				

St	ructu	ire	Cond	litio	on Ins		B2/2	Sheet 5 Of 9								
			ure Id n Date		77 <u>:</u> 9-MAY		 In	specti		ame vel 2	[<u>x</u>] Level 3	[] Un	derwater []		
Co	omponen	t Loca	tion					-	antity Per		pba	Commen	ts			
Modification	Group	Component	Standard	Exposure Class	Quantity	Unit	1	Co	rer ndition State 3	4	Maintenance Reqd	* Descrij magnit * Refere	tude,extent	ets by location type, thes and photos		
0	S1	D	20 C	3	354.0	M2		354.0			Х		17			
Maint Rest mode O	No signs of any major defects, poss ble brake down of the protective coating in girders due to age of structure #008. Protective coating is a lead base paint some further testing required to find out current cover levels.															
Single transvers tension bars have been retro fitted either side of each girder, protective costing & attachments are sound refer to #008,014.																
0	S1	XG	31 C	3		EACH		1.0	3	4			section in the	underside of the XG in bay 3, no		
0	S1	XG	31 S	3	4.0	EACH		4.0								
					no signs urther tes							ne protective co	ating due to a	ge of structure #008. Protective		
0	S1	W						1.0			X					
with a E1 U	O S1 W 71 O 3 1.0 EACH 1.0 X Moderate scour appearing in front of the abutment below the water pipe valve, approximately (500mm D x 1m W) #005,006 scour requires backfilling possible with a concrete pad. E1 Upstream 1st location possible incorrect, previous & current have minimal change. MS Downstream Local scour against 1st, previous & current have no change.															
_	P1	B	40 O ed on top	3 of Di		EACH		4.0	\geq							
						rforming			to otivo o	ooting o	till o	aund #000				
0	_	PED	44 O	3		EACH	as desig	4.0		.oaung s	un se	ound #009.				
0	P1	в	43 S	3	4.0	EACH	7/6	2.0		2.0						
plate conta	with mois ict with SM	ture s //S Ro	taining ev adtek enç	ident ginee	t #010, 01 ers should	1. L3 Insp be consi	0 (17/12) dered fo	/2015) ha r a poss l	as recom	mendat	ions		taken. Due to	bitting appearing on the rocker & sole the complexity of the works required		
0	P1	H H	54 C	are s	still functio	EACH	iesignea	1.0				No signs of an	y sever cracks	s, spalls or exposed reo.		
0	P1	С	56 C	3	$\left(\frac{1}{2} \right)$	EACH		1.0				No signs of an	v sever crack	s, spalls or exposed reo.		
0	Р1	F	59 C	3	\sim	EACH	Х	1.0 X	Х	Х		Component is	·			
0	S2	D	20 0	3	<u>})</u> 442.0	M2		440.0	2.0							
CS3 treati		derate	spalls wi	th ex	posed rus	sty reo ap	pearing	under so	offit of the	e finger	oint	at E2 of the dec	k in bays 2 &	4 #024,025. Rusty reo requires		
	•	ner ha	s some m	noder	rate corros	sion appe	earing #0	27. Serv	ice asse	t owner	need	Is to be notified	of issue.			
					with no si rust treatr		rge spall	s or seve	er cracks	. It has	been	noted in the str	ructures kerbs	that the scupper outlets have		

St	Structure Condition Inspection Report													Sheet 6 Of 9		
					77	00								0.01.7		
			ture Id		9-MAY					ame				downston [77]		
	Inshe	ectio	II Date			2017	In	specti	on Le	vel 2	<u> </u>	j Level 5		derwater []		
Co	omponen	t Loca	ation					Qı	ıantity Per		pba	Comments				
Modification	dn	Component	Standard	Exposure Class	Quantity		Condition State				Maintenance Reqd	* Descrij magnit	tude,extent	cts by location type,		
Moc	Group	Con	Star	Exp	Qua	Unit	1	2	3	4	Mai		rences of sketches and photos Exposure Nos)			
0	S2	G	22 S	3	4.0	EACH		4.0			х					
	Maintenance required - Some spot rust appearing in all 4 girders with mould building up on some outer faces #012,013,014. Spot rust & mould build up requires cleaning & treating.															
	lo signs of any major defects, poss ble brake down of the protective coating in girders due to age of structure #008. Protective coating is a lead base paint															
some	Starts of any major defects, possible brace down of the protective coating in girders due to age of structure 7000. Protective coating is a fead base paint some further testing required to find out current cover levels. ST S2 G 22 S 3 4.0 EACH 4.0															
	Single transvers tension bars have been retro fitted either side of each girder, protective coating & attachments are sound refer to #008,014.															
Single transvers tension bars have been retro fitted either side of each girder, protective coating & attachments are sound refer to #008,014. O S2 XG 31 S 3 8.0 EACH 8.0																
All attachments are sound & intatct, no signs of any major defects, possible brake down of the protective coating due to age of structure #008. Protective																
coating is a lead base paint some further testing required to find out current cover levels.																
-	0 S2 W 710 3 1.0 EACH 1.0															
	1 & MS Upstream Local scour against 1st, previous & current have minimal or no change															
0	E2 Downstream Local scour against 1st, previous & current have minimal change. O P2 B 43S 3 4.0 EACH 2.0 2.0															
Rock	er Bearin	gs loca	ated at E2	of S	62 Girders	. Refer to	Sketch	003 (Be	aring me	esureme	ent?s	between Rock	er & Sole Plat	es)		
												e hinge pin & up ock #015,016,0		nts also bearing appears to have 20.		
					lt & nut ha #021,022		decayed	with mo	derate co	orrosion	in th	e hinge pin & u	pper attachme	ents, no signs of sever cracks at the		
	B4 sit dir from the			inge	r joint cate	ch tray ou	ıtlet a de	sign rec	emmend	ation ha	s bee	en suggested in	the Pier joint	to poss ble direct water & debris		
			ossible rot te require			mits #028	8,029. N	o signs o	f sever o	racks at	t the	bearing support	ts to the Head	stock some dirt is building up around		
					endations scope of				to the c	omplexit	y of t	the works requi	red contact wi	th SMS Roadtek engineers should be		
0	P2	B	40 O	_		EACH		3.0	1.0							
Fixed	Bearings	s locat	ed on top	of P	ier 2.	R	$\underline{\bigcirc}$					I				
												3 Insp (17/12/20 taken should be		nmendations yet to be undertaken.		
Maint O		B4 ou PED	tside lowe 44 O	eran 3	chor show		s of mino	r pitting, 4.0	pitting re	equires t	reati	ng.				
				\square	$\langle \langle V \rangle \rangle$											
0	P2	н	54 C	3	1.0			1.0					-	s, spalls or exposed reo.		
0	P2	С	56 C	3) 1.0	EACH		1.0				No signs of any	y sever cracks	s, spalls or exposed reo.		
0	P2	F	59 C	3	1.0	EACH	X	Х	Х	Х		Component is	buried #032.			
0	S3	D	20 C	3	442.0	M2		442.0								
Smal	spalled s	sectior	ns with ex	pose	ed rusty re	o in bay '	1 at mid-	span & i	n bay 4 a	at E1 #03	33. R	l Rusty reo require	es treating.			
					with no s rust treat		rge spall	s or seve	er cracks	. It has I	been	noted in the str	ructures kerbs	that the scupper outlets have		

St	Structure Condition Inspection Report													Sheet 7 Of 9	
	54		ture Id		77	99			N					/ 01 9	
			n Date				 In	snecti		ame	 r v	T Level 3	Un/	derwater []	
	шэр		n Date				10	specu		vei 2					
Co	mponen	t Loca	ation					Qı	ıantity Per		pba	Commen	ts		
E		t		Class				Co	rer ndition		ce Re		on of item/co		
Modification	d	Component	ard	Exposure Class	tity			:	State		Maintenance Reqd	-	ption of defec tude,extent	ets by location type,	
Modil	Group	Comp	Standard	sodx	Quantity	Unit	1		2	4	Maint		ences of sketo Exposure Nos	ches and photos	
0	S3	G	22 S	3	-	$\begin{array}{c c c c c c c c c c c c c c c c c c c $									
				_			applied t			spot rus		earing on the g	irders some s	ections have not been covered &	
			,043,044.					,	,			3		\geq	
			or defects, required to					tective c	oating in	girders	due t	o age of structu	ure #008. Prot	ective coating is a lead base paint	
ST	S3	G	22 S	3		EACH		1.0	3.0						
Doubl	e transve	ers ten	ision bars	have	e been ret	ro fitted e	either sid	e of eac	h girder,	attachm	ents	are sound.	\square		
<u>CS3 (</u>	62, G3 & S3	G4 pr XG	otective c 31 S			to fail at EACH		the tensi 6.0		efer to #	034,0 X	35,036. Ends c	of tension bars	s require cleaning & treating.	
_										spotrus		earing on the X) (G.6 some se	ctions have not been covered &	
	e treating			ustu	outmont		applied	to majon	ly of the	Sportus			0 0 50110 50		
All XG coatin	Il XG attachments are sound & intatct, no signs of any major defects, possible brake town of the protective coating due to age of structure #008. Protective oating is a lead base paint some further testing required to find out current cover levels.														
0	S3	W	710	3		EACH		1.0		0		\bigcirc			
E2 Up	stream L	ocal s	scour agai	nst 1	st, previo	ous & cur	rent have	e minima	l change).	2				
MS Do	ownstrea P3	m Loc B	al scour a 40 O	again 3		evious & EACH	current l	nave min 2.0		nge. 2.0					
_		_	ed on top			LACH		2.0	_2]	2.0					
	-		-			aved awa	v with m	oderate	rocosion) in the l	ninae	pin & upper att	achments no	signs of sever cracks at the bearing	
			Istock #03			.jou unu	,			in the i	ingo	pin a appor au	dennionto, no	signs of sever stacks at the bouning	
CS2 N	laintenai	nce - E	B3 Protect	tive c	oating fai	ling on bo	ottom su	b assem	bly flang	e #038,0	039 re	equires cleaning	g & treating.		
			attachmen he Heads				with mod	lerate co	rrosion a	lso deca	ay &	corrosion in the	upper attachi	ments, no signs of sever cracks at the	
L3 Ins	p (17/12	/2015)	has reco	mme	ndations	yet to be	undertal	en. Due	to the c	omplexi	ty of t	he works requi	red contact wi	th SMS Roadtek engineers should be	
consid	P3	a pos H	sible budg 54 C	get & 3		works to EACH		ríaken. 1.0				No signs of an	v sever cracks	s, spalls or exposed reo.	
0	P3	C	56 C	3		EACH		1.0						s, spalls or exposed reo.	
						\bigcirc)					5	,	s, spalls of exposed leo.	
0	P3	F	59 C	3	()	EACH		1.0				Component is	buried.		
0	S4	D	20 C	3	442.0			442.0							
			appearing		\sim	-									
	ate rust	appea	ring & req	uire	rust treat	ment.	rge spall			. It has	been	noted in the str	uctures kerbs	that the scupper outlets have	
0	S4	G	225			EACH		4.0			Х				
			d - Spot n to #042,0			nas been	applied t	to majori	ty of the	spot rus	st app	earing on the g	jirders some s	ections have not been covered &	
								tective c	oating in	girders	due t	o age of structu	ure #008. Prot	ective coating is a lead base paint	
some ST	further te S4	esting G	required to 22 S	o fino 3		ent cover EACH	levels.	3.0	1.0						
Double	e transve	ers ten	ision bars	have			either sid			attachm	ents	are sound.			
												6. Tension bar	s require clear	ning & treating.	

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St	Structure Condition Inspection Report													Sheet 8 Of 9			
	St	ruct	ture Id		77	99			N	ame							
			n Date				 In	snecti				T Level 3	Uno	lerwater []			
	шэр		n Dutt					specu		vei 2		_ Level 5					
Co	mponen	t Loca	ation						antity		pba	Commen	ts				
E		Ţ		Class					Per ndition		Maintenance Reqd	* Locatio	on of item/co	ndition			
Modification		Component	ard	ure (ity			\$	State		enan		ption of defec tude,extent	ets by location type,			
Aodif	Group	omp	Standard	Exposure	Quantity	Unit					Iaint	* Refere	ences of sketc	hes and photos			
					-		1	2	3	4	~	(Koll/E	(Roll/Exposure Nos)				
0	S4	XG	31 S	3	6.0		aior dof	6.0	oible bra	ko dour		o protoctivo os		an afritautura #000 Dratactiva			
coatir	ng is a lea	d bas	e paint so	me f	urther tes	ting requ		nd out cu				te protective co	aung due to a	ge of structure #008. Protective			
0	S4	W	710	3		EACH	0	1.0					$\langle \rangle$	~			
	A MS Upstream Local scour against 1st, previous & current have minimal or no change. A MS Downstream Local scour against previous at E1 & 1st at MS.																
0	P4	B	m Local s 43 S	cour 3		EACH	TE1 & 19	st at MS. 4.0	1.0	3.0			17				
B1, B	2, B3, B4	Rock	er Bearing	gs lo	cated on t	top of Pie	r 4. Refe	er to Sket	tch 004 (Bearing	mea	surement?s bet	√ tween Rocker	& Sole Plates)			
CS4 I crack	B1, B2, B3, B4 Rocker Bearings located on top of Pier 4. Refer to Sketch 004 (Bearing measurement?s between Rocker & Sole Plates) CS4 B1 lower attachment nuts showing signs of decayed with moderate corrosion also decayed with moderate corrosion in the hinge pin, no signs of sever racks at the bearing supports to the Headstock #045.																
	racks at the bearing supports to the Headstock #045.																
B1, B	upports to the Headstock #046. 31, B2, B3 & B4 Rocker possible rotated to their limits #047,048,049.																
B5, B	31, B2, B3 & B4 Rocker possible rotated to their limits #047,048,049. 35, B6, B7 & B8 Rocker Bearings located at E1 of S5 Girders. Refer to Sketch 005 (Bearing measurement?s between Rocker & Sole Plates)																
			attachmer	nt bol	t & nut ha	as decaye	ed away	with mod	lerate co	nosica	in the	hinge pins, als	o bearing app	ears to have rotated to its tolerance			
	#050,051							-0	\sim	$\underline{\bigcirc}$		1					
	#055,056		attachmer	it doi	t & nut na	as decaye	a away	with mod			in the	ninge pins, als	o bearing app	ears to have rotated to its tolerance			
B6 &	B7 have	also p	ossible ro	tated	to their li	imits #052	2,053,05	4. Some	dirt is bu	uilding u	p aro	und the rocker	& sole plate re	equires clearing.			
L3 Ins	sp (17/12	/2015) a pos	has reco sible budg	mme	ndations	yet to be	undertal	ken. Due	to the c	omplexi	ty of t	he works requir	red contact wit	th SMS Roadtek engineers should be			
0		PED		3		EACH		4.0	<u>~</u>								
0	P4	н	54 C	3	1.0	EACH		1.0				No signs of any	y sever cracks	s, spalls or exposed reo.			
0	P4	С	56 C	3	1.0	EACH		1.0				No signs of any	y sever cracks	s, spalls or exposed reo.			
0	P4	F	59 C	3	1.0	EACH	////x	Х	Х	Х		Component is	buried.				
0	S5	D	20 C	3	442.0			438.0	4.0								
						$\sum U$	pearing				ioint	at E2 of the dec	k in havs 1.2	3,4 & 5 refer to #024,025. Rusty reo			
	res treatin		, spans wi	ui ca			pearing		Juit of the	c ninger	joint t		κ in Duys 1,2,	5,4 & 5 TOTOL TO #024,025. Rusty Too			
Wate	r main joi	ner ha	s some m	nçder	ate corro	sion appe	earing #0	27. Serv	vice asse	t owner	need	s to be notified	of issue.				
			deck is so ring & red				rge spall	s or seve	er cracks	s. It has	been	noted in the str	uctures kerbs	that the scupper outlets have			
0	S5	G	22.5			EACH		4.0			Х						
			d - Spot n to #042,0			nas been	applied	to majori	ty of the	spot rus	st app	earing on the g	jirders some s	ections have not been covered &			
No si	gns of an	y majo	or defects,	pos	s ble brak			tective c	oating in	girders	due t	o age of structu	ure #008. Prot	ective coating is a lead base paint			
some further testing required to find out current cover levels. ST S5 G 22 S 3 4.0 </td <td>_ '</td>												_ '					
							ther side			protectiv	e roa	ting & attachme	ents are sour	d refer to #008,014.			
O	S5	XG	31 S			EACH		8.0									
	attachments are sound & intatct, no signs of any major defects, possible brake down of the protective coating due to age of structure #008. Protective																
			e paint so									-		-			

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St	Structure Condition Inspection Report													Sheet 9 Of 9	
			ture Id n Date	09	77) 9-MAY		 In	specti		ame vel 2	[<u>x</u>] Level 3	[] Un	derwater []	
Co	mponen	t Loca	ation					Qu	antity		þþ	Commen	ts		
Modification	Group	Component	Standard	Exposure Class	Quantity	Unit	Per Condition State				Maintenance Reqd	* Descrij magnit * Refere	tude,extent	cts by location type, ches and photos	
0	S5	W	710	3	1.0	EACH		1.0							
MS U	1 Upstream Local scour against 1st, previous & current have minimal change. 1 & E2 Downstream Local scour against 1st, previous & current have minimal or no change. 0 P5 B 43S 3 4.0 EACH 4.0														
0	P5	В	43 S	3	4.0	EACH			4.0				\bigtriangledown		
CS3 I recon	B1, B2, B nmendatio	3, B4 ons ye	protective	coa derta	ting failing aken. Due	with sign to the co	ns of me	duim cor	rsion ap	pearing	on ro		tes #057. L3 I	tes) nsp (17/12/2015) has rs should be considered for a possible	
			ed on top			<i>.</i>									
NO SI O		y majo PED	44 O	all b 3	earings pe 4.0		as desig	ned, pro 4.0	otective			ound refer to #0	09.		
0	P5	Н	54 C	3	1.0	EACH		1.0				No signs of any	y sever cracks	s, spalls or exposed reo.	
0	P5	С	56 C	3	1.0	EACH		1.0			\triangleright	No signs of any	y sever cracks	s, spalls or exposed reo.	
0	P5	F	59 C	3	1.0	EACH	Х	Х	X	X		Component is	buried.		
0	S6	D	20 C	3	354.0	M2		354.0	(C	70					
No si treatr		ge spa	alls or sev	ег сг	acks. It ha	as been n	oted in t	he struct	ures ker	bs that t	he so	cupper outlets h	ave moderate	e rust appearing & require rust	
0	S6	G	22 S	3	4.0	EACH		4.0	$\langle \rangle$						
All att Prote ST	tachments ctive coat S6	s are s ing is G	ound & in a lead ba 22 S	tatci se p 3	t, no signs aint some 4.0	further te	najor defe esting rec	ects, pos quired to 4.0	sible bra find out	ike dow current	n of t cove	he protective co r levels.	bating in girde	rs due to age of structure #008.	
Single	e transvei	rs tens		nave				/		protectiv	e coa	ating & attachm	ents are soun	d refer to #008,014.	
0	S6	XG	31 S	3		EACH	O	4.0							
All att	ng is a lea	d bas	sound & in e paint so	tatci me f	further tes	ting requi	ajor defe ired to fir	ects, pos nd out cu	sible bra	ike dow ver level	n of t s.	he protective co	bating due to a	age of structure #008. Protective	
0	S6	XG	31 C	3		EACH		1.0							
0	S6	W	710	3	(a)	EACH		1.0				E1, MS & E2 D current have m		ocal scour against 1st, previous & change.	
0	A2	В	43 S	3		EACH		4.0							
B1, B Maint	2, B3 hav enance -	e no s	signs of a	NA LU	sjor defec	ts all bea	rings pe	rforming	as desig	ined, pro	otecti	ht?s between Re ive coating still s ning as designe	sound.	Plates) equires cleaning & protective coating	
applie O		PED	440	3	4.0	EACH		4.0							
0	A2	А	50 C	3	1.0	EACH		1.0				No signs of an	y sever cracks	s, spalls or exposed reo.	
0	A2	F	59 C	3	1.0	EACH	Х	Х	Х	Х		Component is	buried.		

Do	Defective Components Report B2/3												
De	lective	Comp	onents	<u>л</u>	(el	Jon	62/3	1	1 Of 4				
	Stru	icture Id	7799			Name							
	Crossi	ng Name	Barron	Ri	ver	Alt. Name							
	Structu	ire Type	Bridge			Owner MR DEP	ARTME	NT OF	MAI	NR			
	Constructi	ion Type	Girder/	Be	am	District 403 Far	North	\bigcirc					
Cons	Construction Type Girder/BeamDistrict 403Far NorthConstruction Material SteelLGA Id 277MAREEBA SHIF												
	Inspector NR Date 09-MAY-2017												
In	Inspection Level 2 X Programmed X												
111	-	Level 3				nderwat	water []						
		d Sectio				Exceptional Start End							
Т				C (o			TDist		- 4			
Id 32								Start 2.535	E 12.'	nd 792			
		15 - MA			1			2.333	12.	172			
	Compone	ent Location	n			Description of Defect		I	Require	ed			
	compone		-	ss	ıte	* Detailed Description * Estimated Quantity			Action				
tion		ent	_	Exposure Class	Condition State	* "Other" action required * Urgency of action (what, who, when, how)			(X)				
Modification	đ	Component	dard	osure	ditio	* Recommended Testing		Monitor	Level 3 Inspection	H			
Mod	Group	Com	Standard Number	Expo	Con	* Reference of Sketches and Photos (Roll/Expos	ure Nos)	Mon	Level 3 Inspecti	Other			
0	AP1	GR1	72 S	3	4					X			
										~			
CS4 G	R1 has heavy	/ impact dan				rail & 1 post spacer block #072. Damage GR section	requires repl	acing.	_				
0	S1	BR1	2 S	3	4				х				
						o insufficient tirread lengths on post base attachments g on the base plates due to mortar pads cast above th				&			
O	S1	BR2	2 S	_		on the base plates due to monar pads cast above th	e Dase # 001	, 074, 075, 0	X				
13 Inst	o required for	recommend	lations for B	R2 d	ue t	insufficient thread lengths on post base attachments	maiority are	flush with th	e nuts	<u>و</u>			
have n	o washers als	so noted wa	s corrosion a	appe	arin	g on the base plates due to mortar pads cast above th		, 074, 075,					
0	P1	J2	11 0	3	3			х					
	ibber gland in destrian footw				ofp	erishing also a small section of the rubber gland has w	orked up to	the road sur	face ov	er			
O	S2	BR1	2 S	3	4				Х				
L3 Inst	o required for	recommend	lations for B		ve t	o insufficient thread lengths on post base attachments	majority are	flush with th	e nuts	&			
have n	o washers als	so noted wa	s corrosion a	appe	arin	g on the base plates due to mortar pads cast above th	e base # 061	, 074, 075,	076.				
0	S2	BR2	(7,2 ^{\$}	3	4				Х				
L3 Ins have n	o required for o washers als	recommend	lations for B	R2 d	lue to	o insufficient thread lengths on post base attachments g on the base plates due to mortar pads cast above th	majority are e base # 061	flush with th	e nuts 076	&			
0	S3	BR1	2 S	-	4			, 01 1, 01 0, 1	X				
L3 Inst	p required for	recommend	ations for B	R2 d	ue te	o insufficient thread lengths on post base attachments	majority are	flush with th	e nuts	ـــــــــــــــــــــــــــــــــــــ			
have n	o washers als \$3	BR2	s corrosion a	appe 3	arin	on the base plates due to mortar pads cast above th	e base # 061	, 074, 075,	076.				
0									Х				
						o insufficient thread lengths on post base attachments g on the base plates due to mortar pads cast above th				&			
0	S4	BR1	2 S	3		,			X				
L3 Ins	o required for	recommend	lations for B	R1 d	ue to	o insufficient thread lengths on post base attachments	majority are	flush with th	e nuts	&			
have n	o washers als S4	so noted was BR2	s corrosion a	appe 3	aring 4	on the base plates due to mortar pads cast above the	e base # 061	, 074, 075, I	076. X				
<u> </u>	54		23	3	1				^				

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De	Defective Components Report B2/3					She	eet Of 4				
	Struc Inspectio	ture Id on Date	77 09-MAY	99 (-2	017	Name Inspection Level 2 X Level 3	; [] U ;	nderv			
	Compone	ent Location	n			Description of Defect * Detailed Description		\bigcirc		equire Action	
Modification	Group	Component	Standard Number	Exposure Class	Condition State	 * Estimated Quantity * "Other" action required * Urgency of action (what, who, when, how) * Recommended Testing * Reference of Sketches and Photos (Roll/Exposed) 	ure Nos)			Level 3 (X)	
L3 Ins	p required for		ations for Bl	R2 d	lue t	o insufficient thread lengths on post base attachments g on the base plates due to mortar pads cast above th			ith the	e nuts a	
0	P4	J3	11 O	3	3	/7					X
Steel r	nosing joint in	WS at E2 of	f Span 5.					Ľ			
						noderate perishing also a small section of ihe rubber gl Rubber gland requires replacing.	and has wor	ked up	above	e the ro	ad
O	S5	BR1	2 S	3	4					X	[
						o insufficient thread lengths on post base attachments g on the base plates due to mortar pads cast above the					&
0	S5	BR2	2 S	3	4					Х	
						o insufficient thread lengths on post base attachments					&
have n	o washers als S6	BR1	2 S	appe 2	arin 4	g on the base plates due to mortar pads cast above the	e base # 061	, 074, 0	J75, O	76. X	
						o insufficient thread lengths on post base attachments g on the base plates due to mortar pads cast above the					<u>&</u>
0	S6	BR2	2 S	2	4			, 07 1, 0	, 0	X	
						l o insuរ៍ត្រcient thread lengths on post base attachments					&
have n	o washers als A2	o noted was	s corrosion a 14 S		arin 3	g on the base plates due to mortar pads cast above the	e base # 061	, 074, 0	075, 0	76.	X
CS3 S	teel plate has	broken its a	nchor tab in	to S	6 de	ck pear centre dividing line causing the steel plate to s	lan at locatio	on #073	Brok	en an	chor
tab rec	uires re-weldi	ing.			\geq		ap at locate		. Dron		
0	P1	B1	43 S	Ż	1			l			Х
rocker	& sole plate w exity of the wo	vith moisture	e staining ev	iden	nt #0	osion with some loss of section to the nuts also rust fla 10, 011. L3 Insp (17/12/2015) has recommendations y coadtek engineers should be considered for a possible	et to be unde	ertaken	Due	to the	
0	P1	B4	43 S	3	4						X
rocker	& sole plate w exity of the wo	vith moisture	staining ev contact wit	iden	nt #0	psion with some loss of section to the nuts also rust fla 10, 011. L3 Insp (17/12/2015) has recommendations y coadtek engineers should be considered for a possible	et to be unde	ertaken	Due	to the	
0	S2	D1	20 C	3	3						X
require	es treating.	>	-			ppearing under soffit of the finger joint at E2 of the dec	-		4,025	. Rusty	/ reo
Water O	main collar joi P2	n has some B1	moderate c 43 S	огго 3	sion 4	appearing #027. Service asset owner needs to be not	IIIEU OT ISSUE				X
Rocke	r Bearings loc	ated at F2 o	f S2 Girders	Re	efer t	o Sketch 003 (Bearing measurement?s between Rock	er & Sole Pl	ates)			
CS4 B	1 lower outer	attachment	bolt & nut ha	as de	ecay	ed away with moderate corrosion in the hinge pin & up ns of sever cracks at the bearing supports to the Head	per attachm	ents als			0.

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Defective Components Report B2/3	Sheet								
	Of 4								
Structure Id7799NameInspection Date09-MAY-2017Inspection Level 2 [x]Level 3 []									
	ter []								
Component Location Description of Defect * Detailed Description	Required								
Image: Second state in the se	Action (X)								
	a tion								
uitig uitig <td< td=""><td>Level 3 Inspection Other</td></td<>	Level 3 Inspection Other								
B1 sit directly under the finger joint catch tray outlet a design recommendation has been suggested in the Pier joint to possible di debris away from the bearings #026.	ect water &								
L3 Insp (17/12/2015) has recommendations yet to be undertaken. Due to the complexity of the works required contact with SMS	Roadtek								
engineers should be considered for a possible budget & scope of works to be undertaken. O P2 B4 43 S 3 4	X								
Rocker Bearings located at E2 of S2 Girders. Refer to Sketch 003 (Bearing measurement?s between Rocker & Sole Plates).									
CS4 B4 lower outer attachment bolt & nut has heavy decayed with moderate corrosion in the hinge pin & upper attachments, no	igns of sever								
cracks at the bearing supports to the Headstock #021,022,023.									
B4 sit directly under the finger joint catch tray outlet a design recommendation has been suggested in the Pier joint to possible di debris away from the bearings #026.	ect water &								
L3 Insp (17/12/2015) has recommendations yet to be undertaken. Due to the complexity of the works required contact with SMS	Roadtek								
engineers should be considered for a possible budget & scope of works to be undertaken. O P2 B1 40 O 3 3	X								
Fixed Bearings located on top of Pier 2.									
CS3 B1 has some moderate decay with loss of section to the lower attachment nut #031. L3 Insp (17/12/2015) has recommenda	ions yet to be								
undertaken. Contact with SMS Roadteck engineers for possible budgeting & scope of works to be undertaken should be conside	ed.								
Maintenance - B4 outside lower anchor showing signs of minor pitting, pitting requires treating. ST S3 G2 22 S 3 3	X								
CS3 G2 protective coating starting to fail at E2 of the tension bar refer to #034,035,036. Tension bars require cleaning & treating									
ST S3 G3 22 S 3 3	X								
CS3 G3 protective coating starting to fail at E2 of the tension bar refer to #034,035,036. Tension bars require cleaning & treating									
ST S3 G4 22 S1 3 3	X								
CS3 G4 protective coating starting to rail at E2 of the tension bar refer to #034,035,036. Tension bars require cleaning & treating									
O P3 B1 400 3 4	X								
Fixed Bearings located on top of Pier 3.									
CS4 B1 lower outer attachment nut has decayed away with moderate corrosion in the hinge pin & upper attachments, no signs of sever cracks at the bearing supports to the Headstock #037. L3 Insp (17/12/2015) has recommendations yet to be undertaken. Due to the complexity of the									
works required contact with SMS Roadtek engineers should be considered for a possible budget & scope of works to be undertained of P3 B4 40 0 3 4	x								
Fixed Bearings located on top of Pier 3.									
CS4 B4 lower inner attachment bolt & nut has decay with moderate corrosion also decay & corrosion in the upper attachments, no signs of sever cracks at the bearing supports to the Headstock #040,041. L3 Insp (17/12/2015) has recommendations yet to be undertaken. Due to the complexity of the works required contact with SMS Roadtek engineers should be considered for a possible budget & scope of works to be									
	n. Due to the ks to be								
complexity of the works required contact with SMS Roadtek engineers should be considered for a possible budget & scope of work undertaken. ST S4 G4 22 S 3 3	n. Due to the rks to be								

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De	Defective Components Report B2/3							Sheet 4 Of 4			
		-			_			4	01 4		
	Structure Id 7799 Name Inspection Date 09-MAY-2017 Inspection Level 2 [x] Level 3 []										
	Compone	nt Locatio	n			Description of Defect * Detailed Description			Require Action		
Modification	Group	Component	Standard Number	Exposure Class	Condition State	 * Estimated Quantity * "Other" action required * Urgency of action (what, who, when, how) * Recommended Testing * Reference of Sketches and Photos (Roll/Exposed) 	vre Nos)	Monitor	Level 3 (Inspection (
0	P4	B1	43 S	3	4		\sum			Х	
B1, B2	2, B3, B4 Rock	er Bearings	located on	top	of Pi	er 4. Refer to Sketch 004 (Bearing measurement?s be	tween Rocke	er & Sole Pla	ates)		
signs of the co	CS4 B1 lower attachment nuts showing signs of decayed with moderate corrosion also decayed with moderate corrosion in the hinge pin, no signs of sever cracks at the bearing supports to the Headstock #045. L3 Insp (17/12/2015) has recommendations yet to be undertaken. Due to the complexity of the works required contact with SMS Roadtek engineers should be considered for a possible budget & scope of works to be undertaken.										
0	P4	B4	43 S	3	3					X	
B1, B2	, B3, B4 Rock	er Bearings	located on	top	of Pi	er 4. Refer to Sketch 004 (Bearing measurement?s be	tween Rocke	er & Sole Pla	ates)		
the be	CS3 B4 lower attachments showing signs of moderate corrosion also decay & corrosion in the upper attachments, no signs of sever cracks at the bearing supports to the Headstock #046. L3 Insp (17/12/2015) has recommendations yet to be undertaken. Due to the complexity of the works required contact with SMS Roadtek engineers should be considered for a possible budget & scope of works to be undertaken.										
0	P4	B5	43 S	3	4					Х	
CS4 B its tole	5 lower outer rance limits #0	attachment 050,051. L3	bolt & nut ha Insp (17/12	as d /201	ecay 5) h	5 Girders. Refer to Sketch 005 (Bearing measurement red away with moderate corrosion in the hinge pins, als as recommendations yet to be undertaken. Due to the sidered for a possible budget & scope of works to be u	so bearing ap complexity c	opears to ha	ve rotat	ted to	
0	P4	B8	43 S	3	4					Х	
CS4 B its tole	8 lower outer rance limits #0	attachment 055,056. L3	bolt & nut ha Insp (17/12	as d /201	ecay 5) h	5 Girders. Refer to Sketch 005 (Bearing measurement red away with moderate corrosion in the hinge pins, all as recommendations yet to be undertaken. Due to the sidered for a possible budget & scope of works to be u	so bearing ap complexity c	opears to ha	ve rotat	ted to	
0	S5	D1	20 C	3	3					X	
#024,0 Water Rest o	CS3 Some moderate spalls with exposed rusty rec appearing under soffit of the finger joint at E2 of the deck in bays 1,2,3,4 & 5 refer to #024,025. Rusty reo requires treating. Water main joiner has some moderate correction appearing #027. Service asset owner needs to be notified of issue. Rest of the concrete deck is sound with no signs of large spalls or sever cracks. It has been noted in the structures kerbs that the scupper outlets have moderate rust appearing & require rust treatment.										
0	P5	B1	43 S	3	3					Х	
CS3 B recom	1, B2, B3, B4 mendations ye	protective c	pating failing ertaken. Due	g wit e to f	h sig the c	J to Sketch 006 (Bearing measurement?s between Rock gns of meduim corrsion appearing on rocker & sole pla complexity of the works required contact with SMS Roa o be undertaken.	ites #057. L3	Insp (17/12		has	

St	andard	Proce	dure E	хс	epti	ions	s Re	200	rt		B2/4	Sheet
					-			1.0	-			1 Of 1
	Stru	acture Id	1 77	799)				Name			
	Crossing Name Barron River Alt. Name Structure Type Bridge Owner MR DEP											
	Struct	ure Type	e Bridge						Owner MR	DEP	ARTMEN	T OF MAIN R
	Constant		~ t+rner/	/ ne					District 40.3	rar r	NOFLI	
Con	struction	Materia	Steel						LGA Id 277			HIRE COUNCI
	I	Inspector	r	N	√R				Date 09-MA	AY-201'	7	$Q \succeq$
I	Construction Type On dot/Deam District 100 Full North Construction Material Steel LGA Id 277 MAREEBA SHIRE COUN Inspector NR Date 09-MAY-2017 Inspection Level 2 X Programmed X											
]	Level 3				E	xcept	tions	al []		Ua	derwater []
	Road Section Start End TDist								TDist			
Id	l Descri	ption		S (Cway	y S	RPC	i •	Dist RPC	ľ	vist S	Start End
32	A CAIR	NS - MA	REEBA	С	1	С	5		0.000 5	(0.1	257 12	2.535 12.792
		ent Locatio							Exception (
Modification	Group	Component	Standard Number	Exposure Class	Undefined Component	Component Not Inspected	Less than 25% Comp Inspected	Other	Comments * Description of u * Photograph/sket * Reasons compon * Any other except	tch referen ient not in	nces	
0	A1	F	59 C	3		x			Component is buried	I #005 .		
0	P1	F	59 C	3		x			Component is buried	I #030		
0	P2	F	59 C	3		x	\leq		Component is buried	l #032.		
0	P4	F	59 C	3		х		\bigcirc	Component is buried	I.		
0	P5	F	59 C	3		x <	\bigcirc	\geq	Component is buried	I.		
0	A2	F	59 C	3	4	×	\sum		Component is buried	l.		

Level 2 Inspection Report - Photos & Sketches Record B2/6								
							1 0	Of 29
	ture Id7799		 .		Name			
Crossing	Name Barron Ri	iver		Al	t. Name Owner <u>MR</u> DF			
Structur	e Type Bridge						CNT OF MA	AIN R
Construction	a Type Gracibe				District 403 Fa	r North		
Construction M					GA Id 277 M		SHIKE CO	UNCI
	pector h				Date 09-MAY-20	1/		7
-			_	gramme				
	Level 3		Exc	eptional			nderwater	<u>LJ</u>
	Section	6	6 D	Star DG			TDist	
					Dist RPC 0.000 5 (Start	End 2.792
	5 - MAREEDA C		<u> </u>	5	0.000 5			
					Description			
			Loca	ntion				
		ion		Ŧ	 Deck Surface (full wid) Side View (waterway, second se		· ·	
Film/Exposure		Modification	<u> </u>	Component	* Underside (deck and p	ier constructi	on)	
Number	Sketch No	Modi	Group	Com	 Deficient Component a Undefined Elements 	ind Major De	fects	Id
001		0	A1	B1	B1 full view			562203
002		0	A1	B1	B1 Leaching stains on hinge	1		562204
003		0	A1	B4	B4 Micor pitting on rocker &	sole plate		562205
004		0	A1	B4	B4 Minor pitting on rocker &	sole plate		562206
005		0	A1	A	Full view of A1 Abutment			562210
006		0	A1 <	A	Scour in front of A1 Abutme	nt		562211
007		0	Sì	K1	Rust scupper outlet			562212
008		0	S1	D	Underside of S1 E2 to E1			562213
009		Ô	Pí	B 1	Pier 1 B1 to B4			562214
010	(d	0	P1	B 1	Pier 1 B1 Span 2 G1 at E1			562216
011		Ø	P1	B4	Pier 1 B4 Span 2 G4 at E1			562217
012	<u> </u>	0	S2	G4	Span 2 G4 outer face E1			562218
013		0	S2	G3	Span 2 G3 E2 to E1 spot rus	st		562219
014	$(\overline{\alpha})$	0	S2	G4	Spot rust on Span 2 G3 & G	4 & unused ga	ntry frame	562221
015		0	P2	B1	Pier 2 B1 Span 2 G1 E2 con	rosion at top at	tachments	562222
016	\leq	0	P2	B1	Pier 2 B1 Span 2 G1 E2 con	rosion on top a	ttachments	562225
017	~	0	P2	B1	Pier 2 B1 Span 2 G1 E2 con	rosion on hinge	e bolt	562226
018		0	P2	B1	Pier 2 B1 Span 2 G1 E2 con	rosion on rocke	er & sole plate	562227
019		0	P2	B1	Pier 2 B1 Span 2 G1 E2 con	rosion on top a	ttachments & hii	562228

Level 2 Inspection Report - Photos & Sketches Record B2/6								
	52/0	2 0	f 29					
Structu Inspection	re Id 7799 Date 09-MAY-2	017	_ Insj	pection l	Name Level 2 X Level 2	3[<u>]</u> U	nderwater	
			Loca	ation	Description			
Film/Exposure Number	Sketch No	Modification	Group	Component	 Deck Surface (full width Side View (waterway, spatiation) Underside (deck and pier Deficient Component and Undefined Elements 	tc) orz)	Id	
020		0	P2	B1	Pier 2 B1 Span 2 G1 E2 corros	sion on top at	ttachments & ro	562229
021		0	P2	B4	Pier 2 B4 Span 2 G4 E2 corros	sion on hinge	bolt	562231
022		0	P2	B4	Pier 2 B4 Span 2 G4 E2 corros	sion on lower	attachment	562232
023		0	P2	B4	Pier 2 B4 Span 2 G4 E2 corros	sion on lower	attachment bol	562234
024		0	S2	D1	Spalls in deck around soffit of t	the finger joir	nt	561664
025		0	S2	D1	Spalls in deck around sofiit of t	the finger joir	nt	561666
026		0	P1	J3	Water discharge over Pier 2 B	4 Span 2 G4	from figure joint	562239
)27		0	S2	D1	Water main joiner rusty			561667
028		0	P2	B2	Pier 2 B2 Span 2 G2 E2			562241
029		0	P2	B3	Pier 2 83 Span 2 G3 E2			562243
030		0	P1	PW	Pier 1 Span 2 side			562245
031		0	P2	B1	Pier 2 B1 on top of Pier 2 deca	y on lower a	ttachment	562246
032		0	P3 <	FW	Pier 3 to A2 Side 2			562247
033		0	S3	्वत	Small spalls in bay 4 at E1			562249
034		ST	S3	G4	Protective coating failing on ter	nsion bars		561682
035		ST	\$3	G4	Protective coating failing on ter	nsion bars		561683
036		ST	S3	G4	Protective coating failing on ter	nsion bars		561684
037		0	P3	B1	B1 on top of Pier 3 decay on lo	wer attachm	ent	562250
038	(10)	0	P3	В3	B3 on top of Pier 3 corrosion o	f flanges		562251
039		0	P3	В3	B3 on top of Pier 3 corrosion o	f flange		562252
040		0	P3	B4	B4 on top of Pier 3 corrosion o	n attacheme	nts	562253
041		0	P3	B4	B4 on top of Pier 3 corrosion o	n attacheme	nts	562254
042		0	S3	G2	Span 3 G2 E2 some spot rust	& minor pittin	ng untreated	562255
043	~	0	S3	G2	Span 3 G2 E2 some spot rust	& minor pittin	ng untreated	562256
044		0	S3	G2	Span 3 G2 E2 some areas of s	pot rust trea	ted & untreated	562257
045		0	P4	B1	B1 on top of Pier 4 corrosion 8	decay on at	tachements	562258

evel 2 Inspection Report - Photos & Sketches Record						B2/6	Sheet	
	•				Name Level 2 [X] Level			f 29
•								
			Loca	ation	Description			
Film/Exposure Number	Sketch No	Modification	Group	Component	 Deck Surface (full width Side View (waterway, sp Underside (deck and pie Deficient Component an Undefined Elements 	ans, piers, e r constructio	te)	Id
046		0	P4	B4	B4 on top of Pier 4 corrosion 8	decay on at	tachements	562259
047		0	P4	B3	B3 to B1 on top of Pier 4 Span	4 side.	\rightarrow	562260
048		0	P4	B4	B4 on top of Pier 4.	\bigcirc		562261
049		0	P4	B3	B3 to B1 on top of Pier 4 Span	5 side.		562262
050		0	P4	B1	Pier 4 B1 Span 5 G1 E1 decay	around hing	e bolt & possibl	562264
051		0	P4	B1	Pier 4 B1 Span 5 G1 E1 decay	around hing	e bolt & possibl	562265
)52		0	P4	B2	Pier 4 B2 Span 5 G2 E1 possi	ble over rotat	ed.	562764
)53		0	P4	B3	Pier 4 B3 Span 5 G3 E1 possi	ble over rotat	ed.	562765
)54		0	P1	B3	Pier / 63 Span 5 G3 E1 possi	ble over rotat	ed.	562769
055		0	P4	B4	Pier 4 84 Span 5 G4 E1 decay	around hing	e bolt & lower a	562770
056		0	P4	B4	Pier 4 B4 Span 5 G4 E1 decay	around hing	e bolt & lower a	562771
057		0	P5	64	Pier 5 B4 Span 5 G4 E2 loss c	f protective o	coating	562772
058		0	AP1 <	AP	AP1 AP with chainage			562773
059		0	AP1	AP	Top of A1 Joint & end of AP1	\ Ρ		562774
060		0	AP1	AP	Top of A1 Joint & end of AP1	\ Ρ		562776
061		0	51	WS	Top of Structure S1 to S6			562778
062		C	S1	WS	Showing general abrasion & n	iinor cracks i	n WS, applicabl	562783
063		0	P1	J2	Rubber gland over the pedestr	ian footway		561521
064	(10)	0	P1	J2	Rubber gland showing signs o	f perishing		561522
065		0	P1	J2	Rubber gland showing signs o	f perishing		561525
066		0	P1	J3	Top of Pier 1 J3 finger joint			562786
067	<u>199</u>	0	P4	J2	Top of Pier 4 J2 finger joint			562787
068		0	P4	J3	Rubber gland perishing in the	joint gap		561541
069		0	P4	J3	Rubber gland above WS			561542
070		0	P4	J3	Rubber gland perishing in the	joint gap		561544
071		0	AP2	AP	AP2 AP with chainage			562788

Level 2 Inspection Report - Photos & Sketches Record B2/6 Sheet								
Structu Inspection	re Id Date 09-MAY-2	017	 Insj	pection	Name Level 2 X Level 3	3[] U		
			Loca	ation	Description			
Film/Exposure Number	Sketch No	Modification	Group	Component	 Deck Surface (full width Side View (waterway, spatherway) Underside (deck and pient Deficient Component and Undefined Elements 	ans, piers, et r constructio	tc) prz)	Id
)72		0	AP1	GR1	AP1 GR1 impact damage		\searrow	561500
)73		0	A2	J1	Steel cover plate slaping under	Isadi	\rightarrow	561554
)74		0	S3	BR1	S3 BR1 Post cast below MP &	fuish anchor	nuts, applicable	562790
)75		0	S3	BR1	S3 BR1 Post cast below MP &	fulsh anchor	nuts, applicable	562793
076		0	S3	BR1	S3 BR1 Post cast below MP &	fulsh anchor	nuts, applicable	562795
Sketch 001		0	A1	В	Sketch 001 to 007 Bearing me	asurement?s	between Rock	562193
ketch 008 to 016		0	P1	J3	Sketch 008 to 016 Finger joint	gaps		563229
Pictures			Y-2017		n Level 2 🔀 Level 3		ages printed for	
Description		<		9		1	Tak and May	
AP1 GR1 impact Mod Category O AP	damage Number Comp Code 1 GR		p Nc					

lovel 2 Increation Penert - Photos & Skatabas Penerd	P2/6	Sheet		
Level 2 Inspection Report - Photos & Sketches Record	B2/6	5 Of 29		
Structure Id7799NameInspection Date09-MAY-2017Inspection Level 2[X]Level	3 [] U	nderwater []		
Pictures	** All ima	ages printed for this report.		
Id 561521 Date 09-MAY-2017				
Film / Exposure Number Sketch No 063				
Description Rubber gland over the pedestrian footway	R			
Mod Category Number Comp Code Comp No O P 1 J2	Ó			
Id 561522 Date 09-MAY-2017				
Film / Exposure Number Sketch No 064		-		
Description Rubber gland showing signs of perishing				
Mod Category Number Comp Code Comp No O P 1 J2				
Id 561525 Date 09-MAY-2017	28555	and the second second		
Film / Exposure Number Sketch No 065	E			
Mod Category Number Comp Code Comp No O P 1 J2	19			

lovel 2 Increation Penert - Photos & Skatches Peserd	P0/6	Sheet		
Level 2 Inspection Report - Photos & Sketches Record	B2/6	6 Of 29		
Structure Id7799NameInspection Date09-MAY-2017Inspection Level 2[X]Level 3	3 [<u>]</u> U	nderwater []		
Pictures	** All ima	ages printed for this report.		
Id 561541 Date 09-MAY-2017				
Film / Exposure Number Sketch No 068				
Description	X			
Rubber gland perishing in the joint gap				
Mod Category Number Comp Code Comp No O P 4 J3				
Id 561542 Date 09-MAY-2017				
Film / Exposure Number Sketch No 069 Image: Comparison of the system of		13		
Description	- all	and the second		
Rubber gland above WS				
Mod Category Number Comp Code Comp No O P 4 J3				
Id 561544 Date 09-MAY-2017	P			
Film / Exposure Number Sketch No 070				
Mod Category Number Comp Code Comp No O P 4 J3				

Loval 2 Increation Panart Photos 9 Skatches Preserd	P0/6	Sheet		
Level 2 Inspection Report - Photos & Sketches Record	B2/6	7 Of 29		
Structure Id7799NameInspection Date09-MAY-2017Inspection Level 2 XLevel 3	3 [] U	nderwater []		
Pictures	** All ima	ages printed for this report.		
Id 561554 Date 09-MAY-2017	- The second			
Film / Exposure Number Sketch No 073				
Description Steel cover plate slaping under load	12			
Mod Category Number Comp Code Comp No O A 2 J1				
Id 561682 Date 09-MAY-2017				
Film / Exposure Number Sketch No 034				
Description Protective coating failing on tension bars	-	Contraction of the local division of the loc		
Mod Category Number Comp Code Comp No ST S 3 G 4				
Id 561683 Date 09-MAY-2017 Film / Exposure Number Sketch No 035 Description Protective coating failing on tension bars				
Mod Category Number Comp Code Comp No ST S 3 G 4	133			

Level 2 Inspection Report - Photos & Sketches Record	B2/6	Sheet 8 Of 29
Structure Id 7799 Name Inspection Date 09-MAY-2017 Inspection Level 2[X] Level 3	3 [<u>[]</u> U	nderwater []
Nume Inspection Level 2 [X] Inspection Level 2 [X] Pictures Id 561684 Date D=MAY-2017 Film / Exposure Number Sketch No 036		
Description B1 Leaching stairs on pinge Mod Category Number O A 1 B 1 B		

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lovel 2 Increation Penert - Photos & Skatahas Pesard	B2/6	Sheet
Level 2 Inspection Report - Photos & Sketches Record		9 Of 29
Structure Id7799NameInspection Date09-MAY-2017Inspection Level 2[X]Level 3	3 [<u>]</u> U	nderwater []
Pictures	** All ima	ages printed for this report.
Id 562205 Date 09-MAY-2017	MARCHINE TO THE	
Film / Exposure Number Sketch No		
Description	A	
B4 Minor pitting on rocker & sole plate		
Mod Category Number Comp Code Comp No O A 1 B 4		
Id 562206 Date 09-MAY-2017		
Film / Exposure Number Sketch No 004	A A	
Description	5 Y	
B4 Minor pitting on rocker & sole plate Mod Category Number Comp Code O A 1 B 4		
Id 562210 Date 09-MAY-2017 Film / Exposure Number Sketch No		R. S.
005	1	Sector B Martin
Description Full view of A1 Abutment	A.	
Mod Category Number Comp Code Comp No O A 1 A		

lovel 2 Increation Penert - Photos 9 Skatahas Pesard	B2/6	Sheet
Level 2 Inspection Report - Photos & Sketches Record		10 Of 29
Structure Id7799NameInspection Date09-MAY-2017Inspection Level 2 XLevel 3	3 [] U	nderwater []
Pictures	** All ima	ages printed for this report.
Id 562211 Date 09-MAY-2017		
Film / Exposure Number Sketch No 006 Image: Constraint of the second se		
Description	- Lorrit	
Scour in front of A1 Abutment		
Mod Category Number Comp Code Comp No O A 1 A		
Id 562212 Date 09-MAY-2017	and the	
Film / Exposure Number Sketch No 007	-	
Description Rust scupper outlet		
Mod Category Number Comp Code Comp No O S 1 K 1		
Id 562213 Date 09-MAY-2017	No. Con	
Film / Exposure Number Sketch No 008 Image: Constraint of the second se		
Description	-	ALLAN .
Underside of S1 E2 to E1	N	
Mod Category Number Comp Code Comp No O S 1 D		

Loval 2 Increation Benert Bhoton & Skatches Bessed	B2/6	Sheet
Level 2 Inspection Report - Photos & Sketches Record		11 Of 29
Structure Id7799NameInspection Date09-MAY-2017Inspection Level 2[X]Level 3	3 [] U	nderwater[]
Pictures	** All im	ages printed for this report.
Id 562214 Date 09-MAY-2017		
Film / Exposure Number Sketch No 009		
Description Pier 1 B1 to B4		
Mod Category Number Comp Code Comp No O P 1 B 1		
Id 562216 Date 09-MAY-2017		
Film / Exposure Number Sketch No		
Description	1000	
Pier 1 B1 Span 2 G1 at E1 Mod Category Number Comp Code Comp No O P 1 B 1		
Id 562217 Date 09-MAY-2017		
Film / Exposure Number Sketch No 011 Description Pier 1 B4 Span 2 G4 at E1 Mod Category Number O P 1 B 4		

Loval 2 Inspection Report Photos 9 Skatches Record	B2/6	Sheet
Level 2 Inspection Report - Photos & Sketches Record		12 Of 29
Structure Id7799NameInspection Date09-MAY-2017Inspection Level 2[X]Level 3	3 [] U	nderwater []
Pictures	** All ima	ages printed for this report.
Id 562218 Date 09-MAY-2017	1 187	
Film / Exposure Number Sketch No 012		
Description Span 2 G4 outer face E1	R	
Mod Category Number Comp Code Comp No O S 2 G 4		
Id 562219 Date 09-MAY-2017	111	
Film / Exposure Number Sketch No 013		The second of
Mod Category Number Comp Code Comp No O S 2 G 3		
Id 562221 Date 09-MAY-2017	and a second and a	AN PROVIDE
Film / Exposure Number Sketch No 014		
Mod Category Number Comp Code Comp No O S 2 G 4		

Loval 2 Increation Panart Photos 9 Skatabas Desard	B2/6	Sheet
Level 2 Inspection Report - Photos & Sketches Record		13 Of 29
Structure Id7799NameInspection Date09-MAY-2017Inspection Level 2[X]Level 3	3 [<u>]</u> U	nderwater []
Pictures	** All ima	ages printed for this report.
Id 562222 Date 09-MAY-2017		
Film / Exposure Number Sketch No 015		
Description Pier 2 B1 Span 2 G1 E2 corrosion at top attachments	K	
Mod Category Number Comp Code Comp No O P 2 B 1		
Id 562225 Date 09-MAY-2017		
Film / Exposure Number Sketch No 016	(giz	
Description Pier 2 B1 Span 2 G1 E2 corrosion on top attachments	North State	
Mod Category Number Comp Code Comp No O P 2 B 1		
Id 562226 Date 09-MAY-2017	A Const	
Film / Exposure Number Sketch No 017		
Description Pier 2 B1 Span 2 G1 E2 corrosion on hinge bolt	and the second	and the same
Mod Category Number Comp Code Comp No O P 2 B 1	* /	

Lovel 2 Increation Report - Photos 9 Skatches Record	B2/6	Sheet
Level 2 Inspection Report - Photos & Sketches Record		14 Of 29
Structure Id7799NameInspection Date09-MAY-2017Inspection Level 2 XLevel 3	3 [] U	nderwater []
Pictures	** All ima	ages printed for this report.
Id 562227 Date 09-MAY-2017		
Film / Exposure Number Sketch No 018	1	
Pier 2 B1 Span 2 G1 E2 corrosion on rocker & sole plate Mod Category O P 2 B 1		
Id 562228 Date 09-MAY-2017		
Film / Exposure Number Sketch No 019		
Id 562229 Date D9-MAY-2017 Film / Exposure Number Sketch Ne D20		

Loval 2 Increation Panart Photos 9 Skatabas Pasard	B D/6	Sheet
Level 2 Inspection Report - Photos & Sketches Record	B2/6	15 Of 29
Structure Id7799NameInspection Date09-MAY-2017Inspection Level 2 XLevel 3	3 [] U	nderwater []
Pictures	** All ima	ages printed for this report.
Id 562231 Date 09-MAY-2017	lines	
Film / Exposure Number Sketch No 021		
Description Pier 2 B4 Span 2 G4 E2 corrosion on hinge bolt	K	S' C
Mod Category Number Comp Code Comp No O P 2 B 4		
Id 562232 Date 09-MAY-2017		
Film / Exposure Number Sketch No 022		
Id 562234 Date 09-MAY-2017 Film / Exposure Number Sketch Ne 023 Description Pier 2 B4 Span 2 G4 E2 corrosion on lower attachment bolt Mod Category Number Comp Code Comp No O P 2 B 4		

lovel 2 Increation Penert Photos & Skatches Pecerd	B2/6	Sheet
Level 2 Inspection Report - Photos & Sketches Record		16 Of 29
Structure Id7799NameInspection Date09-MAY-2017Inspection Level 2[X]Level 3	3 [<u>]</u> U	nderwater []
Pictures	** All ima	ages printed for this report.
Id 562239 Date 09-MAY-2017	14	
Film / Exposure Number Sketch No 026	1	
Description Water discharge over Pier 2 B4 Span 2 G4 from figure joint	R	
Mod Category Number Comp Code Comp No O P 1 J3		
Id 562241 Date 09-MAY-2017		
Film / Exposure Number Sketch No 028		
Id 562243 Date 09-MAY-2017 Film / Exposure Number Sketch No 029 Description Pier 2 B3 Span 2 G3 E2 Mod Category Number Comp Code Comp No O P 2 B 3		

Loval 2 Inspection Penart Photos & Skatabas Peaard	B2/6	Sheet
Level 2 Inspection Report - Photos & Sketches Record		17 Of 29
Structure Id7799NameInspection Date09-MAY-2017Inspection Level 2[X]Level	3 [] U	nderwater []
Pictures	** All ima	ages printed for this report.
Id 562245 Date 09-MAY-2017	100	
Film / Exposure Number Sketch No 030		
Description Pier 1 Span 2 side		
Mod Category Number Comp Code Comp No O P 1 PW		
Id 562246 Date 09-MAY-2017		
Film / Exposure Number Sketch No 031 031	2	and the second
Description Pier 2 B1 on top of Pier 2 decay on lower attachment		K 12
Mod Category Number Comp Code Comp No O P 2 B 1		
Id 562247 Date 09-MAY-2017	200	
Film / Exposure Number Sketch No 032 032		
Description	THE	
Pier 3 to A2 Side 2		1 TRACT
Mod Category Number Comp Code Comp No O P 3 PW Image: Comp No	And a	

lovel 2 Inspection Penert Photos & Skatabas Penerd	B2/6	Sheet
Level 2 Inspection Report - Photos & Sketches Record	B2/0	18 Of 29
Structure Id7799NameInspection Date09-MAY-2017Inspection Level 2[X]Level	3 [] U	nderwater []
Pictures	** All im	ages printed for this report.
Id 562249 Date 09-MAY-2017		
Film / Exposure Number Sketch No 033		
Description Small spalls in bay 4 at E1		
Mod Category Number Comp Code Comp No O S 3 D		
Id 562250 Date 09-MAY-2017		
Film / Exposure Number Sketch No 037		
Id 562251 Date 09-MAY-2017 Film / Exposure Number Sketch No 038		

Level 2 Inspection Report - Photos & Sketches Record	B2/6	Sheet
Lever 2 inspection Report - Photos & Sketches Record		19 Of 29
Structure Id7799NameInspection Date09-MAY-2017Inspection Level 2[X]Level 3	3 [] U	nderwater []
Pictures	** All ima	ages printed for this report.
Id 562252 Date 09-MAY-2017		
Film / Exposure Number Sketch No 039		
Description	S.	
B3 on top of Pier 3 corrosion of flange		
Mod Category Number Comp Code Comp No O P 3 B 3		
Id 562253 Date 09-MAY-2017		
Film / Exposure Number Sketch No Q40		
Id 562254 Date 09-MAY-2017 Film / Exposure Number Sketch No 041		

lovel 2 Inspection Penert Photos 2 Skatches Peserd	B2/6	Sheet
Level 2 Inspection Report - Photos & Sketches Record	B2/0	20 Of 29
Structure Id7799NameInspection Date09-MAY-2017Inspection Level 2[x]Level	3 [] U	nderwater []
Pictures	** All ima	ages printed for this report.
Id 562255 Date 09-MAY-2017		
Film / Exposure Number Sketch No 042 042	1	
Description Span 3 G2 E2 some spot rust & minor pitting untreated	K	
Mod Category Number Comp Code Comp No O S 3 G 2		
Id 562256 Date 09-MAY-2017		
Film / Exposure Number Sketch No 043	200°.	24
Description Span 3 G2 E2 some spot rust & minor pitting untreated	Mar	
Mod Category Number Comp Code Comp No O S 3 G 2		Cara
Id 562257 Date 09-MAY-2017		
Film / Exposure Number Sketch No 044		
Span 3 G2 E2 some areas of spot rust treated & untreated	1	C. T. Land
Mod Category Number Comp Code Comp No O S 3 G 2		A State State
	A	The los

lovel 2 Increation Penert Photos & Skatches Pecerd	P2/6	Sheet		
Level 2 Inspection Report - Photos & Sketches Record	B2/6	21 Of 29		
Structure Id7799NameInspection Date09-MAY-2017Inspection Level 2[X]Level 3	3 [<u>]</u> U	nderwater []		
Pictures	** All ima	ages printed for this report.		
Id 562258 Date 09-MAY-2017				
Film / Exposure Number Sketch No 045	~			
Description B1 on top of Pier 4 corrosion & decay on attachements	X			
. Taka 94		The second second		
Mod Category Number Comp Code Comp No O P 4 B 1				
Id 562259 Date 09-MAY-2017	1.0.6			
Film / Exposure Number Sketch No				
046				
Description				
B4 on top of Pier 4 corrosion & decay on attachements				
Mod Category Number Comp Code Comp No O P 4 B 4	y Ares			
Id 562260 Date 09-MAY-2017				
Film / Exposure Number Sketch No 047 Image: Constraint of the second se				
Description		Carlos Sel 10		
B3 to B1 on top of Pier 4 Span 4 side.	FIL	and and a		
Mod Category Number Comp Code Comp No O P 4 B 3				
		-		

lovel 2 Inspection Penert Photos 2 Skatabas Basard	P2/6	Sheet		
Level 2 Inspection Report - Photos & Sketches Record	B2/6	22 Of 29		
Structure Id7799NameInspection Date09-MAY-2017Inspection Level 2[X]Level 3	3 [] U	nderwater []		
Pictures	** All ima	ages printed for this report.		
Id 562261 Date 09-MAY-2017				
Film / Exposure Number Sketch No 048				
Description	A.			
B4 on top of Pier 4.	K			
Mod Category Number Comp Code Comp No O P 4 B 4				
Id 562262 Date 09-MAY-2017				
Film / Exposure Number Sketch No 049		2		
Description B3 to B1 on top of Pier 4 Span 5 side.	Sales -			
Mod Category Number Comp Code Comp No O P 4 B 3				
Id 562264 Date 09-MAY-2017	1	The second		
Film / Exposure Number Sketch No				
050				
Description Pier 4 B1 Span 5 G1 E1 decay around hinge bolt & possible over rotated.				
Mod Category Number Comp Code Comp No O P 4 B 1				

Loval 2 Inspection Penert Photos 9 Skatabas Pasard	P2/6	Sheet
Level 2 Inspection Report - Photos & Sketches Record	B2/6	23 Of 29
Structure Id7799NameInspection Date09-MAY-2017Inspection Level 2[X]Level 3	3 [] U	nderwater []
Pictures	** All ima	ages printed for this report.
Id 562265 Date 09-MAY-2017		
Film / Exposure Number Sketch No 051 051		
Description Pier 4 B1 Span 5 G1 E1 decay around hinge bolt & possible over rotated.	X	
Mod Category Number Comp Code Comp No O P 4 B 1		
Id 562764 Date 09-MAY-2017		
Film / Exposure Number Sketch No 052		
Id 562765 Date 09-MAY-2017 Film / Exposure Number Sketch No 053		

lovel 2 Increation Penert - Photos & Skatches Pecerd	P2/6	Sheet
Level 2 Inspection Report - Photos & Sketches Record	B2/6	24 Of 29
Structure Id7799NameInspection Date09-MAY-2017Inspection Level 2 XLevel 3	3 [] U	nderwater[]
Pictures	** All ima	ages printed for this report.
Id 562769 Date 09-MAY-2017		
Film / Exposure Number Sketch No 054 054	Te	
Description		
Pier 4 B3 Span 5 G3 E1 possible over rotated.		
Mod Category Number Comp Code Comp No O P 1 B 3		
Id 562770 Date 09-MAY-2017		
Film / Exposure Number Sketch No 055 Description	A	
Pier 4 B4 Span 5 G4 E1 decay around hinge bolt & lower anchor missing Mod Category Number Comp Code O P 4 B 4 B		
Id 562771 Date 09-MAY-2017		COMPANY OF MIL
Film / Exposure Number Sketch No 056		
Description Pier 4 B4 Span 5 G4 E1 decay around hinge bolt & lower anchor missing	in the	
Mod Category Number Comp Code Comp No O P 4 E 4		

Loval 2 Increation Banart Bhotos & Skatches Basard	P0/6	Sheet
Level 2 Inspection Report - Photos & Sketches Record	B2/6	25 Of 29
Structure Id7799NameInspection Date09-MAY-2017Inspection Level 2[X]Level 3	3 [<u>]</u> U	nderwater []
Pictures	** All ima	ages printed for this report.
Id 562772 Date 09-MAY-2017		
Film / Exposure Number Sketch No 057		
Description Pier 5 B4 Span 5 G4 E2 loss of protective coating		
Mod Category Number Comp Code Comp No O P 5 B 4		
Id 562773 Date 09-MAY-2017		
Film / Exposure Number Sketch No 058	Contra la	
Description AP1 AP with chainage		
Mod Category Number Comp Code Comp No O AP 1 AP		A A A A A A A A A A A A A A A A A A A
Id 562774 Date 09-MAY-2017		
Film / Exposure Number Sketch No 059 059		
Description		
Top of A1 Joint & end of AP1 AP		- A MARINE
Mod Category Number Comp Code Comp No O AP 1 AP 1 AP	1	2

Loval 2 Increation Benert Bhoton & Skatchen Benerd	P0/6	Sheet		
Level 2 Inspection Report - Photos & Sketches Record	B2/6	26 Of 29		
Structure Id7799NameInspection Date09-MAY-2017Inspection Level 2[X]Level 3	3 [] U	nderwater []		
Pictures	** All ima	ages printed for this report.		
Id 562776 Date 09-MAY-2017				
Film / Exposure Number Sketch No 060				
Description	X			
Top of A1 Joint & end of AP1 AP				
Mod Category Number Comp Code Comp No O AP 1 AP				
Id 562778 Date 09-MAY-2017				
Film / Exposure Number Sketch No D61				
Mod Category Number Comp Code Comp No O S 1 WS Image: Second s	P			
Id 562783 Date 09-MAY-2017				
Film / Exposure Number Sketch No 062 Description Showing general abrasion & minor cracks in WS, applicable throughout all spans Image: Comp Code Comp No	2			
Mod Category Number Comp Code Comp No O S 1 WS				

Loval 2 Increation Banart Bhotos & Skatches Basard	DO/6	Sheet		
Level 2 Inspection Report - Photos & Sketches Record	B2/6	27 Of 29		
Structure Id7799NameInspection Date09-MAY-2017Inspection Level 2[X]Level 3	3 [] U	nderwater []		
Pictures	** All ima	ages printed for this report.		
Id 562786 Date 09-MAY-2017				
Film / Exposure Number Sketch No	-			
Description				
Top of Pier 1 J3 finger joint				
Mod Category Number Comp Code Comp No O P 1 J3	AND MAD			
Id 562787 Date 09-MAY-2017				
Film / Exposure Number Sketch No		CONTRACTOR CONTRACTOR		
067				
Description Top of Pier 4 J2 finger joint	-			
	HIN			
Mod Category Number Comp Code Comp No O P 4 J2 Image: Comp No <	W			
	MANN	63		
Id 562788 Date 09-MAY-2017				
Film / Exposure Number Sketch No 071				
Description	TE			
AP2 AP with chainage	1	A REAL PROPERTY AND IN THE REAL PROPERTY AND INTERPORT AND INTERPORTANT AND INTERPORT AND INTERPORT AND		
Mod Category Number Comp Code Comp No O AP 2 AP Image: Comp Image: Comp Image: Comp				

Loval 2 Increation Papart Photos & Skatabas Pagard	D2/6	Sheet
Level 2 Inspection Report - Photos & Sketches Record	B2/6	28 Of 29
Structure Id7799NameInspection Date09-MAY-2017Inspection Level 2[X]Level	3 [] U	nderwater []
Pictures	** All ima	ages printed for this report.
Id 562790 Date 09-MAY-2017		
Film / Exposure Number Sketch No 074		
Description S3 BR1 Post cast below MP & fulsh anchor nuts, applicable throughout all spans.		
Mod Category Number Comp Code Comp No O S 3 BR 1		
Id 562793 Date 09-MAY-2017		
Film / Exposure Number Sketch No 075 Image: Constraint of the second se		
Description S3 BR1 Post cast below MP & fulsh anchor nuts, applicable throughout all spans. Mod Category Number O S 3 BR 1		
Id 562795 Date 09-MAY-2017 Film / Exposure Number Sketch No		Children and the
076		
Description S3 BR1 Post cast below MP & fulsh anchor nuts, applicable throughout all spans.		
Mod Category Number Comp Code Comp No O S 3 BR 1	Y	
Id 563229 Date 09-MAY-2017		
Film / Exposure Number Sketch No Sketch 008 to 016		
Description Sketch 008 to 016 Finger joint gaps		
Mod Category Number Comp Code Comp No O P 1 J3		

Loval 2 Increation Panart - Photos & Skatahas Desard	Pale	Sheet
Level 2 Inspection Report - Photos & Sketches Record	B2/6	29 Of 29
Structure Id7799NameInspection Date09-MAY-2017Inspection Level 2[X]Level	13 [] U	Inderwater []
Pictures	** All im	ages printed for this report.
Id 561664 Date		
Film / Exposure Number Sketch No 024		
Description Spalls in deck around soffit of the finger joint		
Mod Category Number Comp Code Comp No O S 2 D 1		
Id 561666 Date		
Film / Exposure Number Sketch No 025 Description		
Spalls in deck around soffit of the finger joint	1 area	Contraction of the local
Mod Category Number Comp Code Comp No O S 2 D 1		
Id 561667 Date		
Film / Exposure Number Sketch Ne 027 Description Water main joiner rusty Mod Category Number Comp Code Comp No O S 2 0 1		

St	ruct	ure	e S	cour So	oun	din	gs F	Re	port							B2/7	, <u> </u>		heet Of 3	
		C ta		uno Id	7	799					N	ıme						_		
	C			ure Id Nama B			ver	-												
	Crossing Name Barron River Structure Type Bridge									A	Alt. Name Owner MR DEPARTMENT OF MAIN R									
	Su	ruci		n Type G	irde	r/Reg					Dist		_	403						
Cor	const	ruc	uor M	aterial S	teel						Dist LGA					REEBA	SHI		INC	
Con	struc						JR			¹				2-MA						
				pector							L	Jaie				 D (* 1) 	
I	nspec	tion							d [Partia	I Inspe Under	~ 7		
				evel 3	_i	Exce	eptio	nal	L								<u> </u>	$\overline{}$	<u>LJ</u>	
_				Section		~ ~		~		Sta			_		nd		\sim	Dist	_	
Ic		escr							RPC			Dist				ist	Star		End	
32	A CA	41K	IN2	- MARE	EBA	C	1	С	5		0.	000		5	0.2	21	12.53	5	12.792	
5	Soundir	ıg		Permanent			S	ound	ling D	epth (i	m)						Commer	ıts		
	Locatio	-		Reference		-														
				Feature					Strea	m Bed	L		d							
				Top of	е							ate	Critical Scour Dip	\mathbf{x}						
Modification		_		kerb, deck or	Water Surface					Ŧ	Current Diff	Condition State	Scou	\mathcal{D}	7 First Sc	cour Surv	ev: 17-N	/AP_200	18	
lifics	dn	Location		concrete	er S	t	Previous	ab	Current	First Diff	rent	ditio	ica!	La		Bed Reh		1AIC-200		
Mod	Group	Loc	Side	parapet	Wat	First	Prev	Rehab	Cur	Firs	Cur	Con	Crit	Pr	evious Se	cour Surv	ey: 09-N	1AY-20	17	
0	S1	E1	U	Top Of Ker		1.8	4.2		4.3	2.5	0.1	3		>						
1st lo	cation p	ossib	le ind	correct, previo	ous & c	current	have	minii	mal cha	ange.	$\overline{}$		9	_1						
0	S1	MS	U	Top Of Ker		8.0	8.2		8.2	0.2	0.0	N								
0	S1	E2	U	Top Of Ker		12.7	13.0		13.1	0.4	0.1	2								
0	S2	E1	U	Top Of Ker		12.7	14.0		14.0	1.3	0.0	2		Local	scour ag	ainst 1st,	previous	s & curre	nt no cha	inge.
0	S2	MS	U	Top Of Ker		15.5	14.7		14.9	0.6	0.2	2								
-	scour a		_											-'						
0	S2	E2	U	Top Of Ker	17.2	20.7	20.2		20.5	0.2	0.3	2								
							$(\mathbb{Z}$	3)							[Depth (metres)		
So	undin	g L	oca	tions		6	5						CS	61	CS	S 2	CS	3	CS	5 4
Gro	սթ	1	Loc	ation (Ab	brez	iatio			scribe		r (0)	=		ii.	=	1	=	L.	=	I
in comments,									nts)		Change in	_	Local scour depth	nge i h	ll sco h	nge i h	ıl sco h	nge i h	ıl sco h	
												Char	depth	Local depth	Change in depth	Local scour depth	Change in depth	Local scour depth	Change in depth	Local scour depth
					7							-			0.2	0.5	0.5	2.0		
Spar	Span End1 (E1), Midspan (MS), End 2 (E2), Other (O))	<0	.2	<0.5	to	to	to	to	>1.0	>4.0	
			/		/	-				-					0.49	1.99	1.0	4.0		
			$\overline{\langle}$									-				· · · · ·			-	

St	ruct	ure	S	cour So	oun	din	gs F	Rep	oort						B2/7	Sheet 2 Of 3
St	ructur	e Id	ł	7799)						N	am	e			
Survey Date 09-MAY-17 Inspection Level 2 X Level 3										_] U	nderwater []					
	Soundin Locatio			Permanent Reference			S	ound	ling Do	epth (1	n)				mments	
				Feature					Stream	m Bed	l		qiC			
Modification	Group	Location	Side	Top of kerb, deck or concrete parapet	Water Surface	First	Previous	Rehab	Current	First Diff	Current Diff	Condition State	Critical Scour Dip	Last Stream	n Bed Rehab	7: 17-MAR-2008 .: : 09-MAY-2017
0	S3	E1	U	Top Of Ker	17.2	20.7	20.4		20.6	0.1	0.2	2			$\langle \langle \rangle \rangle$)
0	S3	MS	U	Top Of Ker	17.2	21.0	21.4		21.2	0.2	0.2	2				
0	S3	E2	U	Top Of Ker	17.2	20.0	20.7		21.1	1.1	0.4	2				
	scoura S4		_	, previous &				_		1.0	0.0	2				
0		E1		Top Of Ker					21.0	1.0	0.0	2				
O	SCOUL a	MS	_	, previous & Top Of Ker	_	_		inge.	20.8	0.2	0.6	2	$\overline{\mathcal{L}}$			
Local	scour ag	jainst	t pre	vious, 1st & c	urrent	have	minima	l cha	ange.							
0	S4	E2		Top Of Ker					21.3	0.3	0.3	2	2			
0	S5	E1	U	Top Of Ker	17.2	21.0	21.7		21.5	0.5	0.2	2	\sim			
				, previous &				al ch			\sum					
0	S5	MS		Top Of Ker		18.2	18.1		17.5	0.7	0.6			Local scour ag	jainst 1st.	
0	S5	E2	U	Top Of Ker		15.7	15.6		15.8	0.1	0.2	2				
0	S6	E1	U	Top Of Ker		15.7	15.6		15.5	0.2	0.1	2				
0	S6	MS	U	Top Of Ker		6.6	6.7	7	6.7	0.1	0.0	1				
0	S6	E2	U	Top Of Ker		1.7	1.8	C	2.0	0.3	0.2	2				
0	S1	E1	D	Top Of Ker		4.8	48		5.0	0.2	0.2	2				
0	S 1	MS	D	Top Of Ker		91	8.5	7	8.5	0.6	0.0	2				
_				, previous &										•		
0	S1	E2	D	Top Of Ker	0	13.6	13.6		13.5	0.1	0.1	1				
0	S2	E1	D	Top Of Ker	7}	14.2	14.2		14.0	0.2	0.2	2				
0	S2	MS		Top Of Ker	\geq		15.0		15.0		0.0	2				
0	S2			Top Of Ker	()				20.3	0.7	0.3	2				
Local	scour a	gainst	t 1st	, previous &	curren	t have	minim	al ch	ange.							

St	Structure Scour Soundings Report													B2/7	Sheet 3 Of 3	
	ructur		_	7799 0 MAX 1			-					am				
Su	rvey l	Date	e <u>u</u>	9-MAY-1	L /		Insp	pect	tion]	Leve		<u>X i</u>		Level 3	_] U	nderwater []
	Soundin Locatio	_		Permanent Reference			S	ound	ling D	epth (n)				Co	mments
				Feature					Strea	m Bed	L		d			
Modification	Group	Location	Side	Top of kerb, deck or concrete parapet	Water Surface	First	Previous	Rehab	Current	First Diff	Current Diff	Condition State	Critical Scour Dip	Last Stream	n Bed Rehab	: 17-MAR-2008 : : 09-MAY-2017
0	S3	E1	D	Top Of Ker	17.4	20.9	20.5		20.5	0.4	0.0	2			$\langle \langle \rangle \rangle$	
0	<mark>S</mark> 3	MS	D	Top Of Ker	17.4	20.6	21.4		21.4	0.8	0.0	2			$\overline{}$	
_		_		, previous &											/	
0	S3	E2		Top Of Ker					21.3	0.2	0.3	2				
0	S4	E1	D	Top Of Ker	17.4	21.2	22.2		21.6	0.4	0.6	2		Local scour ag	jainst previo	JS.
0	S4	MS		Top Of Ker					20.8	0.5	0.4	2		Local scour ag	jainst 1st.	
0	S4	E2	D	Top Of Ker	17.4	20.9	21.2		20.9	0.0	0.3	2				
0	S5	E1	D	Top Of Ker	17.4	21.8	21.0		21.0	0.8	0.0	2	\sum	Ĩ		
Local	scour a	gains	t 1st	, previous &	curren	t have	no cha	ange				\overline{a}	$\overline{\mathbf{x}}$	1		
0	S5	MS	D	Top Of Ker		16.8	17.2		17.2	0.4	0.0	2)			
0	S5	E2	D	Top Of Ker		16.2	14.6		15.0	1.2	0.4	2				
Local	scour a	gains	t 1st	, previous &	curren	t have	minim	al ch	ange.		Ż	/				
0	S6	E1	D	Top Of Ker		16.0	13.9		14.0	2.0	0.1	3				
Local				, previous &		t have	minim	al ch		22						
0	S6	MS	D	Top Of Ker		7.0	6.5		6.5	0.5	0.0	2				
Local	scour a	gains	t 1st	, previous &	curren	t have	no cha	ange								
0	S6	E2	D	Top Of Ker		2.6	2.0	\sum_{i})2.0	0.6	0.0	2				
Local	scour a	gains	t 1st	, previous &	curren	t have	rio cha	inge	-					•		
						-6										
					/	\sim	Ð									
					\bigcirc	(0)	7									
				\sim	(1))										
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				2 -												
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				Ŧ												
Structure Maintenance Schedule		M1	Sheet 1 of 13													
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C/ / II 7700 N			1 01 15													
Structure Id 7799 Nam																
Crossing Name Barron River Alt. Nam	e	DTMEN														
			T OF MAIN R(
	t 403 Far N	orth	IRE COUNCI													
Inspector NR Dat	e 09-MAY-2017															
Inspection Level 1 2 X 3 Overall Condition	Rating	UD	derwater []													
	-	\sim \sim \sim \sim	Measures []													
Road Section Start	End	TDist														
Id Description S Cway S RPC Dist RPC	Dist	Start	End													
Inspector's Comments	Dist	Start	End													
	no to the copyris	with of the	works													
L3 Insp (17/12/2015) has recommendations yet to be undertaken. D required contact with SMS Roadteck engineers should be considered																
to be undertaken.																
	$\langle \rangle$															
	~															
Steward's Comments																
Stewart s Comments																
$\sim (7)^{\sim}$																
Vermin Screen Comments																
Vermin screen comments																
(7/3)																
Security Measures Comments																
Total Maintenance Backlog Amount <u>\$</u>	39687.4															

Structu	re Maintenance Schedule				Ν	11	She 2 of		
Struct	ure Id 7799	Na	me						
Inspection	n Date 09-MAY-2017		Insp	ection]	Level 1	2	x 3		
	ocation and Details (from B2 form	ns)							
Componer	nt Location (Modification/Group/ ent DescriptionJoin rails	Component/Stand	lard N Signif	umber licance	0 / 1 2		/ J1 /	14	4S 7
Defect Def	ent Description	Co	nditio	n State	1 2	Ø	3 2 4	[1
CS3 Steel plate requires re-wel	has broken its anchor tab into S6 deck near cer	ntre dividing line causing t	he steel	plate to sla	p at location #)73. Bro	oken anchor ta	ıb	
Activity No	Description		Unit	Quantity	Urait Rate		Amount	Priority	Completed
859	Bridgework, general		\$	1 <	150	כ	1500	2	N
900A3	Traffic management (including TMP)		P/SUM	1	120	ו	1200	2	N
			\sim						
			\mathbb{Z}	<u>></u>	Sub-total S	s	2700		
Defect L	ocation and Details (from B2 for	ns)		\geq					
Compon Defect Def	ent Description Guard] cails leavy impact damage to 2 sections of rail & 1 pos	Rails Co	Signif nditio	ficance n State	1 x 2 1 2		/ GR1 / 3 4 3 4	, <u>,</u>	2S]]
Activity No	Description		Unit	Quantity	Unit Rate		Amount	Priority	Completed
72S1	Replace guardrail section	22	M	9.4	37	1	3487.4	2	N
900E3	Traffic management (including Traffic Managen	nent Plan)	P/SUM	1	120	ז	1200	2	N
				5	Sub-total S	5	4687.4		
Defect L	ocation and Details (from B2 form	ns)							
Compon Defect Det		ngs	Signif	umber ficance n State	1 2	P2	/ B1 / 3[4 3[x 4	40) O]]
_	located on top of Pier 2.								
CS3 B1 has so No Vctivity Activity	me moderate decay with loss of section to the lo Description	wer attachment nut #031.	L3 Insp	Quantity Quantity	2) has recomm Rate Cuit Kate	endatio	ons yet to be u tunouut	Priority	Completed
				\$	Sub-total S	5			

Structu	re Maintenance Schedule			M	1	neet of 13	
Struct	ıre Id7799	Name					
Inspection	Date 09-MAY-2017	Insp	ection I	Level 1	2 x 3		
Defect L	ocation and Details (from B2 forms)						
Componen Compone Defect Det	t Location (Modification/Group/Component/St ent DescriptionBearings ails	andard N Signif Condition	umber ïcance n State	O / 1 2 1 2	P3 / B1	/ 40 4[
Fixed Bearings	ocated on top of Pier 3.						
CS4 B1 lower of	uter attachment nut has decayed away with moderate corrosion in the	e hinge pin &	upper atta	chments, no sig	as of sever cracks	at the l	bear
Activity No	Description	Unit	Quantity	Urait Rate	Amount	Priority	Completed
				\checkmark		_	
			<u> </u>	ub-total \$			
Defect L	ocation and Details (from B2 forms)						
Compon Defect Det	t Location (Modification/Group/Component/St ent Description Bearings ails ocated on top of Pier 3.	andærd N Signif Condition	umber ïcance n State	O / 1 2 1 2		/ 40 4[)0]]
CS4 B4 lower in	ner attachment bolt & nut has decay with moderate corrosion also de apports to the Headstock #040,041. L3 Insp (17/12/2015) has record	cay & corrosi mendations y	ion in the u et to be un	ipper attachmer dertaken. Due t	nts, no signs of sev o the complexity o	ver crac f the wo	ks orks
Activity No	Description	Unit	Quantity	Unit Rate	Amount	Priority	Completed
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Defect Det		Condition			[] 3[]	4 x	-
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Activity No	Description	Unit	Quantity	Unit Rate	Amount	Priority	Completed
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Structu	re Maintenance Sch	edule			M	11	Sheet 4 of 13		
Struct	ure Id7799		Name						
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	s located at E2 of S2 Girders. Refer to								
	uter attachment boit & nut has heavy		ion in the hinge	e pin & up	per attachments	, no signs of se	ver crack		
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Page	Num	ber:	110	of 1	187

Structu	re Maintenance Schedule				N	11	She 5 of		
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	tachments showing signs of moderate corrosion also	decay & corrosion in the	e upp	er attachn	nents, no signs	of sevel	r cracks at the	e bea	
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	tachment nuts showing signs of decayed with modera Description	ate corrosion also decay	/ea w	ith modera	ite corrosion in	the hing	je pin, no sigi	ns of s	
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Structu	re Maintenance Schedule			M	1	She 6 of			
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	Rocker Bearings located at E1 of S5 Girders. Refer to Sketch 005 (B				$\langle \ \rangle$		ite tel		
	uter attachment bolt & nut has decayed away with moderate corrosion Description	i in the ninge	e pins, also			e rotated to			
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Defect Det	alls nt in WS at E2 of Span 5.	c	onuntio	n State				' L	<u> </u>
	nd in the joint gap showing signs of mo	nderate perishing also a small sec	tion of the	rubber ala	nd has worked	un above th	e road su	rface	OVA
	Descrip						ic roud su		
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50004	Repair of compression joint seal expa	ansion joints	EA	1	3500)	3500	2	N
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			Ŕ	<u>></u>	Sub-total \$		4700		
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washers also no	ted was corrosion appearing on the b	ase plates due to mortar pads cas	t above th	e base # 0	61, 074, 075, 0	76.			
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L3 Insp required	I for recommendations for BR2 due to ted was corrosion appearing on the b	insufficient thread lengths on pos ase plates due to mortar pads cas	t base atta t above th	ichments n e base # 0	najority are flust 061, 074, 075, 0	n with the n 76.	uts & have	e no	
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Structu	re Maintenance Scl	hedule			м	1 Sh 8 o	eet f 13	
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Structu	re Maintenance Schedule				M1	She 11 of		
Struct	ure Id 7799 Na	ame		•				
	Date 09-MAY-2017	Insp	ection]	Level 1	2	x 3		
Defect L	ocation and Details (from B2 forms)							
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Defect Deta	alls I for recommendations for BR2 due to insufficient thread lengths on post			naiority are fl(
washers also no	ted was corrosion appearing on the base plates due to mortar pads cas	t above th	e base # 0	61, 074, 075,	076.	· · · · · · · · · · · · · · · · · · ·		
Activity No	Description	Unit	Quantity	Urát Rate		Amount	Priority	Completed
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				Sub-total	\$			
Defect L	ocation and Details (from B2 forms)							
Component Location (Modification/Group/Component/Standard Number O S2 D1 20C Component Description Deck Significance 1 2 3 X 4 4 Defect Details Condition State 1 2 3 X 4 4								
CS3 Some mod treating.	erate spalls with exposed rusty reo appearing under soffit of the finger id	bint at E2 o	of the deck	in bays 2 & 4	4 #024,02	5. Rusty reo r	equire	es
Activity No	Description	Unit	Quantity	Unit Rate		Amount	Priority	Completed
100S3	Clean and paint steelwork	L/SUM	1		00	1500	3	N
945A4	Access using Elevated Work Platform (EWP)	P/SUM	1	35	00	3500	3	N
900E3	Traffic management (including Traffic Management Plan)	P/SUM	1	12	00	1200	3	N
			S	Sub-total	\$	6200		
Defect L	ocation and Details (from B2 forms)							
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Compone Defect Det	ent Description	onditio		1	2		Ľ	1
	erate spalls with exposed rusty reo appearing under soffit of the finger jo			in bays 1,2,3				
Activity No	Description	Unit	Quantity	Unit Rate		Amount	Priority	Completed
100S3	Clean and paint steelwork	L/SUM	1	25	00	2500	3	N
945A1	Access from deck (UBIU)	P/SUM	1	35	00	3500	3	N
900E3	Traffic management (including Traffic Management Plan)	P/SUM	1	12	00	1200	3	N
			8	Sub-total	\$	7200		

Structu	re Maintenance Scheo	dule			м	1 Sho		
Struct	ure Id 7799	Na	me					
Inspectior	Date 09-MAY-2017		Insp	ection]	Level 1	2 x 3		
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Defect Det	ent Description	Co	nditio	n State	1 2		<u>ا</u>]
	ive coating starting to fail at E2 of the ten							
							_	_
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100S3	Clean and paint steelwork		L/SUM	1 <	1200	1200	3	N
945A1	Access from deck (UBIU)		P/SUM	1	3500	3500	3	N
900E3	Traffic management (including Traffic M	lanagement Plan)	P/SUM	1	1200	1200	3	N
			R	2	Sub-total \$	5900		
Defect L	ocation and Details (from B	2 forms)					-	
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Activity No	Description	on	Unit	Quantity	Unit Rate	Amount	Priority	Completed
10053	Clean and paint steelwork		L/SUM	1	1200	1200		N
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				5	Sub-total \$	1200	•	
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Component Location (Modification/Group/Component/Standard Number ST / S3 / G4 / 22S Component Description Girders Significance 1 2 3 4 4 1 Defect Details Condition State 1 2 3 4 4 1]	
CSS G4 protect	ive coating starting to fail at E2 of the ten	ision dar reier to #034,035,036.	Tension D	ars require	e cleaning & trea	ung.		
No	Descriptio	01			0			pa
Activity No		-	Unit	Quantity	Unit Rate	Amount	Priority	Completed
100S3	Clean and paint steelwork		L/SUM	1	1200	1200	3	N
				5	Sub-total \$	1200	-	

Structu	ure Maintenance Schedule				M1		Shee 3 of		
Struc	ture Id7799	Name							
Inspectio	n Date 09-MAY-2017	Insp	ection 1	Level 1		2 x	3 [
Defect I	Location and Details (from B2 forms)								
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Compor	nent Description Girders		icance			3		X	
Defect De	tails tive coating starting to fail at MS to E2 of the tension bar refer to #034	Condition				3 X	4	[<u> </u>
CS3 G4 protec		,035,030. Ten	SIULIDAIS	require ci		ireaung.			
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Activity No		Unit	Quantity	Urait Rate	>	Amount		Priority	Completed
100S3	Clean and paint steelwork	5 L/SUM	<u>ō</u> 1		1200		200	آ 3	C N
945A1	Access from deck (UBIU)	P/SUM	1		3500		500	3	N
900E3	Traffic management (including Traffic Management Plan)	P/SUM	1		1200	1	200	3	N
	•		$\overline{}$	- Sub-tot	al S	5	900		

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Appendix C Inspection Report – Barron River Inspection BIS ID 7799: Defect Repair options Report #1 (RoadTek, May 2017)

Inspection Report

Barron River Inspection BIS ID 7799

Defect Repair Options Report # 1 May, 2017



Great state. Great opportunity.

Inspection Details

Job Name:	Barron River
Job Number:	N/A
Region:	Far North
Road:	Gold Coast Highway (Helensvale – Southport) – Road 11A
Administrator:	TMR – South Coast
Administrator Contact:	NR @tmr.qld.gov.au
Contractor:	TMR – RoadTek
Contractor Contact:	NR @tmr.qld.gov.au

		 <u></u>	
BIS Number	7799	\checkmark	

Inspection Date	29 May 2017
Inspection Location	Desk Top Review
Inspection Team	NR @tmr.qld.gov.au NR @tmr.qld.gov.au

		-	<u></u>	 -	
Items Inspected	Bearing Inspection	\leq	-	~	·

Report Approval:



Principal Manager (Structures Management Services)

Introduction

On the 29th May 2017, a desk top review of the previous Level 2 inspection of the Barron River Bridge on the Cairns to Kuranda Road was undertaken.

The bridge structure consists of a steel girder superstructure with a reinforced concrete deck.

The Level 2 inspection report had identified the following defects:

- A number of the bearings were showing signs of distress;
- Joint sealant at the expansion joints have failed;
- The paint system is showing signs of breaking down;
- Drainage catch tray at the expansion joints is too short;

Inspection Review

The purpose of the inspection review was to determine the severity of the defects found in the Level 2 inspection and determine a suitable course of action to repair the defects.

Bearings

Abutment Expansion Bearing - Defects

The abutment bearings are situated at locations 1 and 11, refer to Figure 1. The bearings consist of a rocker bearing, refer to Figure 2. The main defects found at the abutments was the corrosion of the top 1.5" British Standard Whitworth (B.S.W) bolt, refer to Figure 3. There is pitting corrosion occurring between the sole plate and the lower rocker surface, refer to Figure 4.

The bearing lower contact surfaces were measured to determine the extent of the range of movement available. Figure 5 shows the bearing is positioned centrally about the abutment. There are no concerns with the range of movement of the abutment bearings.

Abutment Expansion Bearing - Consequence of Undertaking the Repair

The top connecting bolt could fail in shear. This could lead to the rocker bearing being displaced, which could lead to the closure of the structure for an extended period.

Abutment Expansion Bearing -- Repairs Required

It is recommended the following repair works are undertaken.

- Replace the 1.5" BSW bolt with a new 1.5" BSW bolt.
- Abrasive blast the entire bearing, but in particular the exposed contact surfaces. Then patch paint with a zinc rich paint.
- Apply grease to the contact surfaces between the lower and upper contact surfaces.



Pier Fixed Bearing - Defects

The pier fixed bearings are situated at locations 2, 5, 6 and 10, refer to Figure 1. The bearings consist of a fixed base with a hinge over the top of the bearing to allow rotation of the girder. The main defects found at the pier bearings was the corrosion of the lower 1.5" holding down nut, refer to Figure 6 and Figure 7. The bearings have minor surface corrosion of the bearing frame, refer to Figure 8.

Pier Fixed Bearing - Consequence of Undertaking the Repair

There is only a minor consequence to the structural performance if the holding down nut is lost. If refurbishment work is being undertaken on other bearings, then the nuts should be replaced.

Pier Fixed Bearing - Repairs Required

It is recommended the following repair works are undertaken.

- Replace the 1.5" corroded nut with a new 1.5" nut.
- Abrasive blast the bearing and patch paint with a zinc rich paint.
- Apply grease to the upper contact surfaces.

Fixed Hinge Bearing - Defects

The fixed hinge bearings are situated at locations 3 and 9, refer to Figure 1. The bearings consist of a curved upper plate which allows the bridge drop-in span to rotate. The main defect with this bearing is corrosion of the holding down bolt and the corrosion of the contact surfaces between the curved plate and the sole plate, refer to Figure 9, Figure 10 and Figure 11.

The bearing lower contact surfaces were measured to determine the extent of the range of movement available. Figure 12 and Figure 13 shows the bearing is positioned centrally about the fixed hinge. There are no concerns with the range of movement of the bearings.

Fixed Hinge Bearing - Consequence of Undertaking the Repair

If the bolt which connects the cantilever span to the drop-in span was to fail, then the fixed end of the dropin span would not be restraint which could lead to the expansion end over rotating and collapse of the drop-in span. This would result in the closure of the structure for months.

Fixed Hinge Bearing - Repairs Required

It is recommended the following repair works are undertaken.

- Replace the corroded 1.25" B.S.W bolt and nut with a new 1.25" B.S.W bolt and nut.
- Abrasive blast the bearing and patch paint with a zinc rich paint.
- Apply grease to the contact surfaces.



Expansion Hinge Bearing - Defects

The expansion hinge bearings are situated at locations 4 and 8, refer to Figure 1. The bearings consist of a rocker bearing which allows the bridge drop-in span to rotate and thermally expand, refer to Figure 14. The main pin bolt which connects the rocker to the structure is showing signs of corrosion, refer to Figure 15. The bearing contact surfaces have pitting corrosion and debris around the bearing, refer to Figure 16.

The bearing lower contact surfaces were measured to determine the extent of the range of movement available. Figure 16 and Figure 17 shows the span 2 bearing is leaning towards the Abutment A. Figure 18 and Figure 19 shows the span 2 bearing is leaning towards the Abutment B.

As the bridge was inspected on a cooler morning, there is a concern the bearing travel limit will be reached if the structure cools beyond the range of the bearings.

The cause of the corrosion of the outside bearings can be attributed to the fact that the drainage does not extend beyond the structure, refer to Figure 20. The water discharges onto the outside bearing increasing the corrosion of the bearing.

Expansion Hinge Bearing - Consequence of Undertaking the Repair

If the bearings were to over rotate this could lead to the collapse of the drop-in span. This would result in the closure of the structure for months.

Expansion Hinge Bearing - Repairs Required

It is recommended the following repair works are undertaken.

- Fabricate a new replica rocker bearing where the range of rotation of the lower curved surface can be increased. Figure 21 shows the typical detail of the increase of the lower curved surface.
- Jack up the suspended span and replace existing bearing with a new replica bearing.
- Replace the corroded B.S.W bolts and nuts with a new metric EN 14399 bolts and nuts.
- Abrasive blast the bearing contact areas and patch paint with a zinc rich paint.
- Apply grease to the contact surfaces.
- Lower the bridge onto the new bearings.

For the above operation the bridge will need to be closed to all traffic while the bearings are being replaced.

Pier Expansion Bearing - Defects

The pier expansion hinge bearings are situated at location 7, refer to Figure 1. The bearings consist of a rocker bearing, refer to Figure 22. The bearing lower contact surfaces were measured to determine the extent of the range of movement available. Figure 23 shows the bearing is leaning towards the Abutment A. As the bridge was inspected on a cooler morning, there is a concern the bearing travel limit will be reached if the structure cools beyond the range of the bearings.

The rotation of the bearing is likely to have occurred when the bridge was originally constructed.

Pier Expansion Bearing - Consequence of Undertaking the Repair

If the bearings at this pier were to over rotate this could lead to the collapse of the superstructure. This would result in the closure of the structure for months.

Pier Expansion Bearing - Repairs Required

It is recommended the following repair works are undertaken.

- Replace the corroded 1.25" B.S.W bolt and nut with a new 1.25" B.S.W bolt and nut.
- Abrasive blast the bearing and patch paint with a zinc rich paint.
- Apply grease to the contact surfaces.
- Monitor the movement of the pier 4 bearings over a period of 6 months to determine the extent of the bearing movement.

Joints

Fixed Joints - Defects

The rubber gland which is located within the steel angle nosing has reached the end of their design life, refer to Figure 24.

Fixed Joints - Consequence of Undertaking the Repair

The performance of the joints has no impact on the structural performance of the structure. The defect only effects the long term durability of the structure.

Fixed Joint - Repairs Required

It is recommended the following repair works are undertaken.

- Remove the existing rubber gland.
- Abrasive blast the steel angle;
- Install a foam backing rod.
- Install Dow Corning 902 RCS or approved equivalent proprietary expansion joint system.

Abutment Joints - Defects

The steel plate which spans over the abutment has a tendency to work loose and rattle, refer to Figure 25 and Figure 26. The plate rattling has resulted in the concrete deck developing a drummy area on the trailing edge of the plate.

Abutment Joints - Consequence of Undertaking the Repair

The performance of the joints has no impact on the structural performance of the structure. The defect only effects the long term durability of the structure.

Abutment Joints - Repairs Required

The desk top review was not able to clearly define the extent of the defect. It is recommended that a Level 3 inspection of the abutment joint needs to be undertaken, to determine the following.

- Cause of the defect;
- Is joint rehabilitation possible;
- Is joint replacement required?

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Painting

Painting - Defects

The steelwork components are showing signs that the current paint system is no longer projecting the structure.

Painting - Consequence of Undertaking the Repair

Based on the current condition of the paint. The paint system has no structural performance impacts on the structure.

However, if the paint system is permitted to degrade, the paint system will not provide protection to the structure. This could affect the long term durability and structural performance of the structure. The degradation of the structure over time would lead to load restrictions being applied to the structure.

Painting - Repairs Required

It is recommended the following repair works are undertaken.

• Carry out a Level 3 inspection of the existing paint system to determine the condition of the paint. This will lead to the development of a possible options analysis for the structure.

Recommendation

This document outlines defects outlined in the Level 2 report. The recommended repairs outline in the report are a basic outline of the works to be undertaken. If works are to be undertaken, more comprehensive repair procedures need to be developed.

From an asset management priority perspective, it is recommended the following works are prioritised.

- Replace the Drop-in span expansion hinges bearings;
- Repair the drainage above the Drop-in span expansion hinges bearings;
- Monitor the Pier 4 expansion hinge bearings;
- Repair the Drop-in span fixed hinge bearings;
- Repair the abutment expansion bearings;
- Assess the abutment joints;
- Repair the fixed joints;
- Replace the fixed bearing hold down nuts;
- Assess the existing paint for the development of a possible options analysis.

A Level 3 inspection is required to confirm all the dimensions which are be based on the developed repair procedures.



Figure 1 View of the bridge articulation



Figure 2 View of the typical abutment A bearing





Figure 3 View of the corroded bolt



Figure 4 View of the corrosion between the rocker surface and the sole plate



Temp 24% Time 9.00am A1 Abutment - Gap between Rocker & Soul Plate 3 4 Location 1 2 13mm 8mm 12mm 9mm B1 11mm 13mm 12mm B2 9mm 83 8mm 8mm 12mm 12mm 14mm 15mm 8mm 9mm B4

Figure 5 View of the movements at the abutment A1



Figure 6 View of the corroded nut on the Pier 2 fixed bearing

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Figure 7 View of the corroded nut on the Pier 3 fixed bearing



Figure 8 View of the corrosion on the Pier 3 fixed bearing



Figure 9 View of Span 2 Fixed Hinge bearing



Figure 10 View of Span 2 Fixed Hinge bearing



Figure 11 View of the corrosion on the Span 5 Fixed Hinge bearing

Sketch 002

Date 09/05/17



1 2	
Chalnage 🔶)}
4 3	
	21220220

Time 9.00a	Temp 24%			
P1 Span 2	G E1 - Gap l	between Ro	cker & Soul	Plate
Location	1	2	3	4
B1	15mm	13mm	12mm	15mm
B2	13mm	13mm	12mm	12mm
B3	12mm	12.mm	12mm	13mm
B4	17mm	14mm	13mm	15mm

Figure 12 View of Span 2 Fixed Hinge bearing movements



Time 9.00a	m		-	Temp 24%					
P5 Span5 (P5 Span5 G E2 - Gap between Rocker & Soul Plate								
Location	1	2	3	4					
B1	14mm	13mm	14mm	12mm					
B2	13mm	13mm	12mm	12mm					
83	10mm	14mm	13mm	14mm					
B4	11mm	15mm	13mm	14mm					

Figure 13 View of the Span 5 Fixed Hinge bearing movements



Figure 14 View of the Span 2 expansion hinge (dishing of sole plate ?)





Figure 15 View of the corroded top bolt



Figure 16 View of span 2 expansion bearing

Sketch 003



Time 9.00a	m			Temp 24%			
P2 Span 2 G E2 - Gap between Rocker & Soul Plate							
Location	1	2	3	4			
B1	5mm	14mm	14mm	6mm			
B2	5mm	16mm	17mm	5mm			
B3	5mm	15mm	15mm	4mm			
B4	8mm	12mm	14mm	5mm			

Figure 17 View of the Span 2 expansion movements



Figure 18 View of the corrosion on the Span 5 expansion bearing



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Sketch 005



Time 9.00a	m			Temp 24%			
P4 Span 5 G E1 - Gap between Rocker & Soul Plate							
Location	1	2	3	4			
B1	19mm	2mm	2mm	17mm			
B2	15mm	7mm	8mm	16mm			
B3	16mm	6mm	5mm	17mm			
B4	13mm	6mm	8mm	10mm			

Figure 19 View of the span 5 expansion bearing movements



Figure 20 View of drainage which discharges onto the bearings



Figure 21 View of extension of the lower curved surface



Figure 22 View of the corrosion on the Pier 4 expansion bearing

Sketch 004



Time 9.00a	m			Temp 24%				
Pier 4 - Gap between Rocker & Soul Plate								
Location	1	2	3	4				
B1	2mm	16mm	18mm	3mm				
B2	2mm	16mm	14mm	2mm				
83	3mm	15mm	13mm	3mm				
B4	2mm	15mm	14mm	3mm				





Figure 24 View of the fixed pier joint







Figure 25 View of the abutment A expansion plate



Figure 26 View of the abutment B expansion plate

Appendix D Miscellaneous BIS ID 7799

Material	Property					
Concrete	21 MPa (3,000 psi) uno					
Reinforcement	f _{sy} = 230 MPa (Structural Grade A81)					<u> </u>
Structural steel	No information of th Specification provid			as supplied	d by the C	ommissioner
	Square edge flats Australian Standard A1(1956)					
	Girder flats Rolled steel beams Rolled Steel angles	Material	Nominal thickness in.	Ultimate tensile stress tons/sq. in.	Yield stress min. tons/sq. in.	Elongation min. per cent
			Below 1	MPa	MPa Tests only	Test piece A B F required.
		Rolled sections Flat bars Round and square bars (other than rivet bars)	1 up to but excluding 3 up to and including 4 Over 4	28-38 386 - 455 28-33 28-33	15-25 207 - 345 15-25 14-75	20 16 20 20 20 20 24
		or British Standard Specification BS 15 (1959)				
	Universal beams	BS 15 (1959)				
	Plates (for girders)	Australian Standard A33 (1937) for Class D Plate 28 tons/in ² < UTS < 33 tons/in ² or 386 MPa < UTS < 455 MPa 20% elongation Yield strength not less than 50% UTS Sulphur and phosphorus: both <0.06% No other chemical requirements or British Standard Specification BS 15 (1959)				
	(167 7/6					
Bearing Steel	Cast Steel or	Australian Standard Specification E.7-1938 for Grade B Cast Steel. Forged Steel complying with SAA Specification E.17-44 for Class L Forgings may be used in lieu of Structural Steel or Cast Steel for Expansion bearing Sole Plate.				
	Structural Steel	Structural steel produced by the acid or basic Open Hearth process complying with Australian Standard Specification A1 1956 or British Standard Specification BSS 15 – 1948.				

Barron River Bridge: Material Properties

Strength Assessment Ratio (SAR)

Assessment ratios such as the Strength Assessment Ratio (SAR) are defined in the Tier 1 Bridge Heavy Load Assessment Criteria. An extract from the T1BHLAC follows. For further information refer to the T1BHLAC:

For the purposes of Tier 1 assessments in accordance with this Brief, the general strength equation for bridges is expressed as follows:

$$\phi R_{u} \geq \gamma_{G}G + \gamma_{GS}G_{S} + \gamma_{Q_{RV}}(1 + \alpha_{RV})Q_{RV} + \sum_{i=1}^{n} \gamma_{Q_{AV}}(1 + \alpha_{AV_{i}})AVF_{AV_{i}}Q_{AV_{i}}$$

The general strength equation can be rearranged to define the following Assessment Ratios:

a) Strength Assessment Ratio (SAR)

b)

$$SAR = \frac{\phi R_u}{\left(\gamma_G G + \gamma_{GS} G_S\right) + \gamma_{Q_RV} (1 + \alpha_{RV}) Q_{RV} + \sum_{i=1}^n \gamma_{Q_AV} (1 + \alpha_{AV_i}) AVF_{AV_i} Q_{AV_i}}$$

$$= \frac{\phi R_u}{G^* + Q_{RV}^* + Q_{AV}^*}$$

$$= \frac{ULS \text{ capacity}}{\text{Total ULS load effects}}$$
Equivalence Ratio Traffic (ERT)
$$ERT = \frac{\phi R_u - (\gamma_G G + \gamma_{GS} G_S)}{\gamma_{Q_RV} (1 + \alpha_{RV}) Q_{RV} + \sum_{i=1}^n \gamma_{Q_AV} (1 + \alpha_{AV_i}) AVF_{AV_i} Q_{AV_i}}$$

$$= \frac{\phi R_u - G^*}{Q_{RV}^* + Q_{AV}^*}$$

$$= \frac{\text{Available ULS bridge capacity for live load effects}}{\text{ULS loading applied by Reference and Accompanying Vehicles}}$$

c) Equivalence Ratio Bridge (ERB)

$$ERB = \frac{\phi R_u - (\gamma_G G + \gamma_{GS} G_S) - \sum_{i=1}^n \gamma_{Q_-AV} (1 + \alpha_{AV_-i}) AVF_{AV_-i} Q_{AV_-i}}{\gamma_{Q_-RV} (1 + \alpha_{RV}) Q_{RV}}$$
$$= \frac{\phi R_u - G^* - Q_{AV}^*}{Q_{RV}^*}$$
$$= \frac{Available ULS bridge capacity for Reference Vehicle effects}{ULS loading applied by Reference Vehicle}$$

The Assessment Ratios are calculated at the component level for a given loading scenario. The minimum values of the Assessment Ratios correspond to the weakest link in the bridge and are therefore of prime interest.

Assessment Ratios can be recorded for both a particular location and effect of interest or for groups of components incorporating data from a range of locations, components and effects. The Assessment Ratio reported for groups of components are the minimum Assessment Ratios for the grouping.
Definition of Fretting

Fretting damage in steel can be identified by the presence of a pitted surface and fine 'red' iron oxide dust resembling cocoa powder. Strictly this debris is not 'rust' as its production requires no water. The particles are much harder than the steel surfaces in contact, so abrasive wear is inevitable; however, particulates are not required to initiate fret.

The fundamental way to prevent fretting is to design for no relative motion of the surfaces at the contact. Surface roughness plays an important role as fretting normally occurs by the contact of the asperities of the mating surfaces. Lubricants are often employed to mitigate fretting because they reduce friction and inhibit oxidation (https://en.wikipedia.org/wiki/Fretting).

Life Extension Interim Report – Barron River Bridge (7799)

Assessment of Short-term Risks and Investigation Scope Barron River Bridge (7799)

Version No: Date:



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TMR OnQ Template Version 3.0 (06/09/2017)

Project Summary

Region/District	North Queensland Region Far North District
Road Name/Location/Local Government	32A Kennedy Highway Bridge over Barron River at Kuranda Mareeba Shire Council
Program	Structures Rehabilitation Program (Element 19)
Project Number	364373
Project Description	Barron River Bridge Investigation

Document Control

Prepared by:	NR
Title:	Contract Engineer
Branch:	Engineering & Technology Structures
Division/Region:	Infrastructure Management & Delivery
Location:	313 Adelaide Street, Brisbane
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File/Doc no:	

Version history

Version no.	Date	Changed by	Nature of amendment
	12 Oct 2018		Initial draft "Assessment of Short-term risks"
	16 Oct 2018		Initial draft of combined document.
0.1	23 Nov 2018		Final draft
0.2	30 Nov 2018		Approved document
	(907		

Endorsement and Approval

Customer

I accept that this project has been completed and handed over to my organisation:

Name	NR				
Position	Manager (Delivery	& Operations)			
Signature				Date	
Comments	Comments				
				<	$\langle \rangle \rangle$

The following officers have **endorsed** this document:

The followin	g officers have endorsed this document:	
Name	NR	
Position	Principal Engineer (Civil)	
Signature		Date

Name	NR			
Position	Engineer (Civil)			
Signature		03	Date	

Name	NR			
Position	Contract Engineer			
Signature		O_{2}	Date	

Sponsor

This project has been completed and this report hands it over to the project customer:

Name	NR		
Position	Deputy Chief Engineer (Structures)		\frown
Signature		Date	
Comment	S		

The following officers have **endorsed** this document:

Name	NR	
Position	Director, Structures Management	
Signature		Date

Name	NR
Position	Manager, Structures Stewardship
Signature	Date

Name	NR	
Position	Manager, Structures Stewardship	
Signature		Date

Project Manager & Technical Lead:

Name	NR		
Position	Contract Engineer		
Signature		Date	

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1. Purpose of this document

The purpose of this document is to hand over the completed deliverables to the customer with details of the risks and the recommendations for investigating and managing the risks associated with the Barron River Bridge at Kuranda.

The document was actioned following a review and a Skype meeting between Structures and Far North District on 6 September 2018 to discuss the draft "Structure Management Plan – Barron River Bridge (7799)", which was subsequently renamed to the Life Extension Investigation – Interim Report – Barron River Bridge (7799) when issued as an approved document in November 2018.

2. Governance

2.1 Key Roles

Project Customer	NR Manager (Delivery & Operations)			
Project Sponsor	NR Deputy Chief Engineer (Structures)			
Project Manager	NR Contract Engineer			
Advisory Group	NR			

2.2 Reviews and reporting

The assessment of the short-term risks and the recommendations were reviewed by members of TMR's Engineering Technology | Structures Branch and Far North District. The report was updated after consideration of the comments.

The draft report was discussed during a Skype meeting between Structures and Far North District on 24 October 2018. The report has been updated to reflect the discussion at this meeting. At this meeting it was agreed that an initial investigation be undertaken subject to an approval of the Project Management Plan for the initial investigations and budget. An initial budget of \$280,000 was discussed.

2.3 Related documents

Documents related to the Barron River Bridge at Kuranda include:

- TMR Structures, November 2018, "Assessment of Short-term Risks and Investigation Scope Barron River Bridge (7799)" – this document
- TMR Structures Management, November 2018, "Life Extension Interim Report Barron River Bridge (7799)". Note: The initial 29 June 2018 draft of this report titled "Structure Management Plan – Barron River Bridge (7799)". It was renamed at the time of issue.

- RoadTek, May 2017, "Inspection Report Barron River Inspection BIS ID 7799: Defect Repair options Report #1"¹
- RoadTek, May 2017, "Level 2 Inspection"²
- TMR BCM&AM, Dec 2015, "Level 3 Inspection Barron River Bridge BIS IS 7799"3

3. Objectives and scope

3.1 Objectives

- Develop a plan to manage the short-term risks identified in the "Life Extension Interim Report"
- Preparation of a scope of works and budget estimate for the investigation and short-term risk management of the bridge.

3.2 In scope

- Assess the short-term risks associated with:
 - o Fracture of the Macalloy Bars
 - o Stability of the rocker bearings
 - o Vehicle effects exceeding the residual capacity
- Develop recommendations for the management of the short-term risks
- Identify an initial scope and budget for the investigation of the risks

3.3 Out of scope

- Conduct of detailed investigations.
- Development of a Structure Management Plan for the bridge.

A copy of this report is included as Appendix C of	"Life Extension Investigation -	- Interim Report – Barron	River Bridge (7799)"
reopy of this report is mended as rependix c of	Ene Extension investigation	Internit Report Duiton	River Bridge (11))

² A copy of this report is included as Appendix B of "Life Extension Investigation – Interim Report – Barron River Bridge (7799)"

³ A copy of this report is included as Appendix A of "Life Extension Investigation – Interim Report – Barron River Bridge (7799)"

Assessment of Short-term Risks and Investigation Scope - Barron River Bridge (7799)

4. Introduction



Figure 1 Bridge over Barron River at Kuranda: View of underside of deck looking towards Cairns abutment

Assessment of Short-term Risks and Investigation Scope – Barron River Bridge (7799)

This report follows the draft Structure Management Plan (29 June 2018) and the 6 September 2018 Skype meeting between E&T Structures and the Far North District to discuss the plan where it was agreed that an assessment of the short-term risks and scope for the investigations would be prepared. The following risks are considered:

- Fracture of Macalloy bars
- Stability of rocker bearings
- Assessment & Brittle Fracture

This report summarises:

- The assessment of the threats and the precautionary and mitigating control measures for the shortterm while further investigation is undertaken.
- The scope, timing and budget estimates for the proposed investigations of the risks

It is intended that risk assessments be updated and communicated as the results of the investigations become available.

5. Past performance

The bridge has supported the applied traffic loads for many years. The road is classified as a General Access route and so has been accessible to GML semitrailers, 19 m B-doubles and truck and dog heavy vehicles for many years.

The Kuranda range provides a natural 'choke' to the number of heavy vehicles that access the bridge. However, improvements to the road geometry and the increasing capability of trucks means larger vehicles (possibly travelling without a permit) may be able to access the bridge.

There is ongoing deterioration, although the condition of the steelwork and bearings currently appear better than a decade ago (2008 Level 2 Inspection). For example, there is significantly less active rust visible and much less debris around the bearings (and plants growing in the debris) in 2018 compared with 2008.

The Macalloy bars applied to the bottom flange as a retrofit immediately before opening have also performed satisfactorily despite their high levels of prestress, brittle nature, corrosion and the ongoing wear caused by the bars vibrating against the stiffeners and their restraint brackets.

While past performance in no guarantee for future performance, it does however provide some confidence for the bridge to remain in-service in the short-term while investigations and rehabilitation occurs provided (AS 13822):

- The loads on the bridge do not increase
- The condition of the structure does not deteriorate

Unfortunately, the condition of the Macalloy bars is continually, albeit gradually, deteriorating due to the vibrations between the Macalloy bars and the girders leading to wear and loss of section.

6. Assessment of short-term risks

6.1 Introduction

The following sections discuss the short-term risks under the following headings:

- Background
- Threat-barrier diagrams
- Loss of control
- Threats
- Consequences
- Precautionary barriers
- Mitigating barriers

The threat-barrier diagrams have been used to present the threats, consequences, precautionary barriers and mitigating barriers as articulated by Robinson, Francis and Procter (2018) in their book titled "Engineering Due Diligence". The authors state that *threat barrier diagrams, are another representation of the cause-consequence models. They can be particularly useful in showing barriers that have effects on multiple threats as shown in the generic diagram following.*



Threat-barrier diagrams are also referred to as a "bow-tie" and provide a useful discipline and method to present the threats, consequences and barriers.

Assessment of Short-term Risks and Investigation Scope - Barron River Bridge (7799)

In the threat-barrier diagrams that follow the barriers are presented by vertical blue lines with thicker lines representing more effective barriers. The focus is on the short-term barriers. In some cases, green lines are included and refer to long-term barriers that may be an outcome of further investigations.

The primary focus is on the precautionary barriers.

Recommendations are discussed after the discussion of each of the risks considered.

6.2 Fracture of Macalloy bars

6.2.1 Background

The Macalloy bars were installed on the bottom flange of the 'sag' regions of the steel girders prior to the bridge opening. It was hypothesised in the draft Structure Management Plan that this was done to manage the risk of brittle fracture of the girders by applying a compression stress to the fianges that would be under tension under operational loads. This hypothesis has subsequently been strengthened via an extract from "Roads in the wilderness: Development of the main road network in far north Queensland: The first 100 years" (Ford, Lyall R, 2009), which states "The original design did not include post-tensioning, but after one span of Melbourne's King Street Bridge collapsed in July 1962 due to brittle fracture of the steel girders, the design of the Kuranda Bridge was checked and the post-tensioning added to provide additional strength."

Groups of either 2 or 4 Macalloy bars were used to post-tension the bottom flanges. In total, 64 Macalloy bars were installed with a total length of almost 2 km, as summarised in Table 1.

Span No	Description	Туре	Dia (inch)	Dia (mm)	(Ht & in)	Length (m)	Bars per span	Bars per girder	Length per Span (m)
1	End span	Type 2	1.25	32	96' 3"	29.34	8	2	234.7
2	Suspended Span	Туре 1	1.25	32	79' 8"	24.28	8	2	194.3
3	Continuous span	Туре 3	1.25	32	109' 8"	33.43	16	4	534.8
4	Continuous span	Туре 3	1/25	32	109' 8"	33.43	16	4	534.8
5	Suspended Span	Type 172	1.25	32	79' 8"	24.28	8	2	194.3
6	End span	Type 2	1.25	32	96' 3"	29.34	8	2	234.7
					Total Num	ber	64		1928

 Table 1
 Details of Macalloy bars used to post-tension the bottom flanges

The prestressing bars were stressed to 110,000 lb (489 kN) after draw-in losses but before relaxation, shrinkage, creep and the like. This corresponds to a nominal stress of 618 MPa (force over nominal area before consideration of the threaded section). AS A144 (1963) indicates that Alloy steel Bars had a tensile strength of 989 MPa. The bars would have most likely been supplied to MP13 (1957) but a copy of this standard has not been located. This suggests the bars were stressed to 62% of their tensile strength.

Relaxation is anticipated to be of the order of 5% over the last 55 years. There is no creep or shrinkage of the steel girder but there will be some of the concrete deck. As the deck is above the neutral axis, the shrinkage of the deck may result in an additional tension rather than a loss of prestress.

Traffic loads will induce additional tension stresses in the bars. Future investigations should identify the magnitude of these live load stresses, but for the purpose of this preliminary review an increase of 50 MPa under service live loads has been estimated.

In addition, some Macalloy bars are worn on one side (or two sides) leading to reduced cross-sectional area of the bar and an eccentricity resulting in local bending stresses. The notch will also locally increase stresses because of the discontinuity and therefore increase the likelihood of fatigue. Again, further investigation is required to quantify the changes in stress.

Thus, if we assume the bars were jacked to 618 MPa (that is, as per drawings; relaxation and shrinkage cancel each other); a 50 MPa increase in stress due to live load and a further 20% increase from the effects of wear and stress concentrations, then the local in-service stress would be of the order of 1.2x(618+50) = 800 MPa or 80% of the ultimate tension strength.

The bars are showing signs of corrosion and have done so in the past. Thus, there is likely to be pitting corrosion, which also causes higher local stresses and stress corrosion cracking. The anchorages provide another potential area of corrosion that is difficult to inspect.

As noted, the stress in the bars will vary during the passage of heavy vehicles and consequently there is the potential for fatigue, especially at the notches induced by wear. Macalloy bars can fail in a brittle manner at notches such as fatigue cracks at room temperature as the transition temperature is well above ambient levels (Macalloy technical data).

6.2.2 Threat Barrier Diagram

Threat - Barrier Diagram

Project:	Barron River Bridge at Kuranda
Hazard:	Wearing, corroding, highly stressed Macalloy bars
Loss of Control	Fracture of Macalloy Bar

Credible threats	Precautionary Barriers	Loss of Control	Mitigation Barriers	Consequences
Threats that may	Actions to avoid LOC	LOC	Actions to reduce impact of consequences	Consequences of



Adapted from: "Risk and Reliability - Engineering Due Diligence", 9th Edition by r2a Due Diligence Engineers

6.2.2.1 Loss of control

Fracture of one or more of the 64 Macalloy bars.

6.2.2.2 Threats

Combined effects of.

- Highly stressed bars
- · Wear at locations where Macalloy bars cross stiffeners / positioning brackets
- Intermittent corrosion / corrosion at anchorages
- Corrosion at anchorages

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- Live load stresses
- Fatigue

6.2.2.3 Consequences

• Local distress: Large eccentric force released from one side of the thin web of the girder of leaving and unbalanced eccentric force applied to the thin web (see anchorage details in Figure 2).

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The anchorages for the two bar post-tensioning system are close to flange and stiffeners in Span 1, 2, 5 & 6 but the anchorages for the 4 bar tensioning system are located in the deep webs and away from the flanges (refer Figure 2). Consequently, without detailed investigation, it is difficult to predict the outcomes of a fractured bar. Advice from suppliers indicates that these bars typically fail in a ductile manner but can fail in a brittle manner where a notch / crack has been generated by wear / fatigue.

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Brittle forces result in a sudden force release resulting in dynamic effects as well as static. The stretch in these bars is also large (of the order of 3 mm / m or 100 mm in the 33 m long bars) and there will be a lot of energy released possibly resulting in substantial plastic deformations of web / flange, damage to the prestressing bar on the opposite side of the web leading to access restrictions due to loss of strengthening and deformation / loss of capacity of girder.

- Temporary closure of bridge during investigation / assessment of options (such as cars only, single lane operation...) / rehabilitation
- Restricted access
- Collapse worst case scenario should distortion compromise load carrying capacity and a heavy load crosses the bridge. The fact that the bridge is redundant (4 girders) and bar anchorages are in regions of small moment and high shear reduces this risk.

6.2.2.4 Precautionary Barriers

Short-term only:

- GML vehicles only: Limit access to Regulation GML heavy vehicles (i.e., exclude permit vehicles): Reduces live load stresses in bars
- Refine assessment: Refine assessment by quantifying bar stresses & wear:
- Residual force e.g., lift off tests
- Traffic Loads e.g., strain measurement under traffic
- Environmental effects e.g., differential temperature, shrinkage
- Amount of wear in each bar e.g., inspection & measurement
- Material properties risk of brittle fracture
- Replace a sample of bars and test bars to inform risk
- Regular inspections unlikely to spot distress
- Damp vibrations: Damp the transverse vibrations (if possible) to reduce the wearing of the Macalloy bars as they repeatably vibrate against the stiffeners

Long-term options include:

- Replace prestressing bars: Removes effects of notches and corrosion as well as utilising modern
 materials that are more ductile and less susceptible to corrosion. Completion before next winter is
 prudent as cooler weather will likely increase stress levels in the bars and increase likelihood of brittle
 fracture.
- Upgrade prestressing bars: There may be an opportunity to increase ductility, durability and load carrying capacity through adding more bars with less prestress and making them act compositely with the girders, for example. It is noted that the Kings Bridge in Melbourne was also strengthened with external prestress, but the prestress was protected and arranged such that the loss of a tendon would be unlikely to damage the bridge.
- Alternate systems.

6.2.2.5 Mitigating Barriers

Given the expected brittle nature of these bars, it is unlikely that there will be any warning of a fracture. Thus, the mitigating barriers relate to minimising the time the potentially compromised bridge is open to traffic. These include:

- Regular inspections: Determine if bars are fractured and respond to limit the risk of failure due to overload on a compromised structure
- Monitor bridge for shocks / loss of force in the Macalloy bars
- Rapid closure protocols: Establish the protocols necessary to close the bridge with zero notice.

6.3 Stability of rocker bearings

6.3.1 Background

6.3.1.1 Description of bearings

The Barron River Bridge at Kuranda has 5 expansion bearings. Che at each of the abutments, one in each of the two suspended spans and one between Pier 4 and the continuous girder over (refer Figure 3, Figure 4 and Figure 5).



Figure 3 General Arrangement – expansion bearings highlighted



- (a) Rocker bearing with top portion of bolt corroded away
- (b) Inclined rocker bearing with missing bolt and possible wear of hole around the bolt that the bearing pivots around

Figure 4 Barron River Bridge: Rocker bearing at a suspended span expansion joint.



(a) Fixed bearing at Pier 3 with corroded nuts to
 (b) Expansion rocker bearings at Pier 4 hold down bolts

Figure 5 Barron River Bridge: Pier bearings

The piers are pinned to the girders via tall bearings with hinges at the top, except for Pier 4 which has an expansion bearing (refer Figure 3 and Figure 5).

There is a total of 20 steel expansion rocker bearings and 16 steel hinged bearings. Details of the suspended span rocker bearings are presented in Figure 6.



Figure 6 Expansion joint rocker bearings at suspended spans. Note: Bottom radius of rocker (6³/₄") rotates on a flat surface. Top radius of rocker (1³/₈") rotates in a greased cylindrical grove in the sole plate. Grease nipples and PVC seals / washers provided to lubricate movement of rocker relative to the sole plate.

6.3.1.2 International Comparison

These rocker bearings are uncommon within TMR although they appear to have been common in North America in the 1960s. The USA examples were referred to as pintle rocker bearings with a pin (pintle) restraining the shoe from sliding over the masonry plate (refer Figure 4 and Figure 5). The Kuranda rockers are different in that the holding down bolts extend through an extension of the rocker shoe with lock nuts (refer Figure 4 and Figure 6).



Figure 7 Pintle Rocker bearings (NYSDOT, 2005; Cohen & Wetzk, 2016)

6.3.1.3 Effective coefficient of friction

Marzon et al (1983) tested rocker bearing to determine their effective coefficient of friction and noted circumstances where the expected 2.5% coefficient of friction was considerably exceeded though rust buildup, debris on masonry plate or manufacturing errors in the matching cylindrical surfaces between the top of the rocker and the sole plate. Effective coefficients of friction up to 14% were recorded.

Movement of the rocker bearings requires slip between the matching cylindrical surfaces in the sole plate and rocker and hence friction will restrain the movement. The Kuranda bearings include two grease nipples to facilitate greasing the sliding interface. However, fretting corrosion evident in the Kuranda abutment rocker bearings indicates that the grease has not been fully effective. Furthermore, the fretting corrosion may be making the sliding surfaces uneven and further increasing the effective coefficient of friction.

The increasing effective coefficient of friction and the built up of rust and debris around the bearings can also lead to 'ratcheting', especially when associated with tall / flexible piers, as illustrated in Figure 8.





The height of these bearings means the bridge could drop by the height of the bearing should its travel be exceeded.

6.3.1.4 Failures

Failures appear to be uncommon, although the two failures illustrated in Figure 9 and Figure 10 indicate all the bearings can collapse together and that spans can fall.



- (a) 8 rocker bearings at a double expansion joint collapsed dropping main span by 625 mm (25 inches), which was wedged onto the edge of the pier.
- (b) Toppled rocker bearings





Figure 10 Rocker Bearing Collapse, Sullivan Square, Boston MA, 23 May 1952 (Getty images; Cohen & Wetzk, 2016)

6.3.1.5 Discussion

The steel rocker bearings have been corroding for many years, although they are currently in better condition in terms of rust and debris around the bearings than they were a decade ago (refer 2008 Level 2 Inspection Report).

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The bearings continue to serve despite their inclination and loss of bolts in some locations (refer Figure 4 and Figure 5). For further details of bearings refer to the inspection reports and the draft SMP from 23 June 2018.

The articulation of the suspended span rocker bearings is illustrated in Figure 11. Note that the through bolts and nuts will contact the bearing shoe at modest travels and hence tend to restrain / redistribute the travel unless the bolts yield or fail or are lost to corrosion.



Figure 11 Barron River Bridge: Suspended span expansion rocker bearing schematic for various amounts of travel.

AS 5100.2 recommends a serviceability limit state (SLS) bridge temperature range of 55°C (3°C to 58°C) for Kuranda. The corresponding axial thermal movements are summarised in Table 2, assuming the expansion bearings do not restrain movement (i.e., points of zero movement at Pier 1, centre of Span 3 & Pier 5). The SLS movements are increased by 25% for the ultimate limit state.

Table 2 Thermal movements at expansion joints

Expansion bearing (Length or bridge contributing to thermal movement	Range of thermal movement (AS5100.2)
$\langle \rangle$	(m)	(mm)
Abut A	36.6	22
Span 2	68.6	42
Spain 5	114.3	69
Abut B	36.6	22
Totals	256.1	155

Other influences on longitudinal bearing movements that need to be considered when assessing the toppling ricks include:

- Bearing setup at the time of construction
- Traffic and pedestrian loads, especially given the large depth of the girders and haunches in the girders at the piers

- Differential temperature deformations
- Shrinkage and creep of the bridge deck
- Foundation movements
- Braking and acceleration forces
- Earthquakes
- Construction tolerances

The movements summarised in Table 2 indicate that the Span 5 expansion joint is likely the most vulnerable joint with the AS5100.2 estimated range of longitudinal movements being almost half the available range before other effects (to be quantified as part of proposed investigations) and margins are considered.

Measurements of gaps in the finger plates and the inclination of the bearings (9 May 2017 – 24°C at 9:00 AM) indicated:

- Substantial movement capacity remaining in the finger plate joints.
- Bearing inclinations consistent with expansion (assumes vertical bearings correspond to the typical position)
- The largest inclinations were measured at the Span 5 expansion joint and the smallest inclinations were measured at the abutments and broadly consistent with Table 2.
- The Span 5 rocker bearing inclinations were consistent with Figure 11 (b).

Cohen & Wetzk (2016) quote a German designer as suggesting that only the middle third of the shoe be used to cover the maximum thermal expansion and contraction and that the outer thirds are safety precautions to prevent toppling. One-third of the Kuranda suspended span shoe corresponds to a travel of 2x71/3 = 47 mm or +/- 25 mm say, which corresponds to the approximate position of the bearings observed in photos.

Concerns have been expressed regarding the collapse of the bearings should the available travel be exceeded and the bearing 'topple-over' or the rocker slides on the base plate (masonry plate).

6.3.2 Threat Barrier Diagram

Threat - Barrier Diagram

Project:	Barron River Bridge at Kuranda
Hazard:	Deteriorated rocker bearings
Loss of Control	Toppling of a bearing



Adapted from: "Risk and Reliability - Engineering Due Diligence", 9th Edition by r2a Due Diligence Engineers

6.3.2.1 Loss of control

Toppling of a bearing: Bearings include expansion rocker bearings and pinned bearings at the piers.

6.3.2.2 Threats

- Redistribution of movement: Should the friction in the bearings become too high, the movement may accumulate at another location and increase the risks of bearing toppling / sliding, the axial forces in the bridge decks and the forces resisted by the tall piers and their associated tall bearings. Increased bearing friction in expansion rocker bearings is caused by corrosion, debris / road grime build-up under the shoe and fretting corrosion in rocker to sole plate sliding surface.
- 2. Ratcheting: The process of increasing movements with each cycle. This was evident the Dunn St failure in NY, which included a pier that was flexible and cracked / yielded under the thermal cycle. This may not be the case at Kuranda. All the piers are reported as in Condition State 2, with no reported cracking above the water line.

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- 3. Abnormally heavy vehicles: Larger vehicles induce larger bearing movements
- 4. Braking and acceleration: Longitudinal forces applied to the tops of tall piers will cause longitudinal movements in bearings
- 5. Crowd Loading / Queue of traffic: Crowd loads (e.g., starts of fun runs) and traffic queues from road maintenance / accidents could induce larger loading events than usual
- 6. Foundation settlements: Foundation settlements will induce longitudinal movements in bearings. Unlikely given history
- 7. Earthquake: Unlikely

6.3.2.3 Consequences

- 1. Short-term closure: Local effects only Load is redistributed to the other bearings at the same joint (4 bearings per expansion joint)
- 2. Medium-term closure: Suspended spans drop onto halving joints but do not fall or severely damage supporting halving joint / cantilever.
- 3. Long-term closure / loss of life: Suspended span falls / partial collapse of bridge

6.3.2.4 **Precautionary Barriers**

Short-term only

- 1. Refine assessment: Quantify current condition and position of bearings and likely movements. Could include: Inspection / measurement; theoretical modelling to include longitudinal movements due to rotation, in-service movement monitoring
- 2. Maintain: Keep bearings clear of corrosion and debris. Grease sliding interface between sole plate and rocker.
- 3. Restrict access > threshold: Monitor movements and pre-emptively restrict access if movement exceeds a threshold. Options include: visual, inspections, camera on a stick, fixed cameras, remote surveillance cameras, movement monitoring, alarms.
- 4. GML vehicles only: Limit access to as-of-right heavy vehicles and therefore reduce abnormal movements. Prevent crowd loads on the bridge (crowd loads can be heavier than traffic loads). Avoid queues of traffic across bridge from road maintenance and where possible accidents.

Longer-term options include bearing upgrades.

6.3.2.5 Mitigating Barriers

- 1. Rapid closure protocols: Be prepared to close the bridge with zero notice.
- 2. Bearing restraints: Restrain rocker bearing shoe and masonry plates in locations where holding down bolts to the bearings have been compromised. Restraints could be friction grip bolted to steelwork without drilling, cutting or welding.
- 3. Catch Stools: Add catch stools to minimise consequences of rocker toppling

6.4 Vehicle effects exceed residual capacity

6.4.1.1 Background

The bridge is a long span bridge for the H20S16 design class (33 t truck) carrying heavier and longer loads (50 t B-doubles) than it was designed to carry. Experience has shown that these bridges tend to be operating at reduced margins.

A Tier 1 Bridge Assessment has been undertaken by KBR but is to a superseded assessment brief and has not been independently peer reviewed⁴. The assessment was made using standard assumptions including the presence of multiple vehicles simultaneously on the bridge. The assessment notes that no steel properties are specified on the drawings and assumes the yield strength of the steel in the girders is 170 MPa based on the likely design stresses of the era. The steel plates were supplied as Class D Plate to Australian Standard A33 (1937) for Class D Plate which specifies a yield strength of not less than 50% of the ultimate tensile strength (UTS) where 386 MPa < UTS < 455 MPa suggesting the 170 MPa assumed in the assessment could be conservative. This assessment identifies the following areas as operating at margins less than Australian Standard margins for GML semi-trailers (42.5 t)⁵¹.

- Girder bending (hog) over piers (minimum SAR⁶ ~ 0.6)
- Girder bending (sag) (minimum SAR ~ 0.8)
- Pier cantilever bending (hog) (minimum SAR ~ 0.8)

However, as discussed, the bridge was retro-fitted with Macalloy bars before opening seemingly out of concerns about brittle fracture and/or the capacity of the girders. The retrofitted Macalloy bars are now compromised through wear and corrosion. In addition, there are severely corroded bolts fixing the bearings into position. These factors are unlikely to have been considered fully in the assessments undertaken to date. A review of the material properties, including the risk of brittle fracture, is recommended along with a new assessment of the bridge.

The most onerous regulation mass general access vehicle accessing the bridge is the 19m long 50t B-double which has load effects 15% greater than the 42.5t semi-trailer. A line model comparison of the unfactored effects induced by various individual heavy vehicles is summarised in Table 3.⁷

42.5 t semi-trailer effects / Vehicle effects
0.87
0.4
0.72
0.75
0.77
1.6

Table 3 Line model comparison of effects induced by different vehicles

⁴ A new independent higher-level assessment is recommended

⁵ Current access is for GML vehicles which include 50 t 19 m B-doubles and truck and dog.

 6 SAR = Strength Assessment Ratio. A SAR of 0.6 means that the bridge has 60% of the capacity required for current loading as per AS 5100.7 based on standard assumptions such a live load factor = 2.0, dynamic load allowance = 40%, multiple vehicles on the bridge simultaneously, nominal material properties.

⁷ Extracted from email from TMR Structural Assessment of 11 September 2018.

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Semi-trailers, 19 m B-doubles and truck and dogs have accessed this bridge for many years and so provide a benchmark for its past satisfactory performance.

Currently, the bridge is not on the 'do not cross' list for 48 t cranes nor in the Conditions Database for restriction on excess mass movements and so some permit vehicles could theoretically cross the bridge. Restricting access to vehicles that generate less effects than Regulation GML heavy vehicles (as-of-right general access vehicles) is helpful in managing the risks associated with vehicles heavier than the typical vehicles crossing the bridge.

The Barron River Bridge at Kuranda provides two-lane two-way access. The relatively small numbers of heavy vehicles on this route and the two-way two-lane access across the bridge indicate that multiple vehicle events are infrequent but possible. This suggests that extreme multiple vehicle events may not have occurred in the past but could occur in the future and thus represent an ongoing risk.

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6.4.1.2 Threat-Barrier Diagram

Threat - Barrier Diagram

Project:	Barron River Bridge at Kuranda
Hazard:	Potentially brittle steel in girders
Loss of Control	Vehicle effects exceed residual capacity



Adapted from: "Risk and Reliability - Engineering Due Diligence", 9th Edition by r2a Due Diligence Engineers

6.4.1.3 Loss of control

Vehicle effects exceed residual capacity

6.4.1.4 Threats

- 1. Brittle fracture: Steel properties are not well known. Strengthening after the brittle fracture induced collapse of Kings Bridge in Melbourne suggests concerns. Risk much higher if cracking in tension flange observed / detected.
- 2. Fatigue: Relatively light traffic indicates traffic unlikely to induce fatigue damage. However, the presence of notch inducing defects in the tension flanges may provide a crack initiator.

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- 3. Abnormally heavy vehicles: Larger vehicles induce larger stresses
- 4. Multiple heavy vehicles: Combinations of heavy vehicles induce larger stresses in the bridge
- 5. Crowd Loading / Queues of traffic: Crowd loads (e.g., starts of fun runs) and traffic queues from road maintenance / accidents could induce larger loading events than usual

6.4.1.5 Consequences

- 1. Medium-term closure: Local effects only Load is redistributed to other members / should the materials prove ductile
- 2. Long-term closure / potential loss of life: Partial collapse of bridge, particularly if the materials prove to be subject to brittle fracture

6.4.1.6 Precautionary Barriers

Short-term only

- 1. Refine assessment of materials: Investigate the material properties and the potential for brittle fracture of the steel in the girders / Macalloy bars at this location. Update the assessment.
- 2. NDT of girders: Undertake NDT of girders to identify cracking and / or crack inducing defects.
- 3. Regulation GML vehicles only: Limit access to as-of-right heavy vehicles and therefore reduce abnormal loads that may not be consistent with past performance. Avoid queues of traffic across bridge from road maintenance and where possible accidents.
- 4. Signs to advertise limits for heavy vehicle access
- 5. Prevent crowd loads on the bridge (crowd loads can be heavier than traffic loads).
- 6. Compliance Monitoring: Monitoring and compliance activities to help ensure only regulation GML vehicles are accessing the bridge. Monitoring options include:
 - Classifiers to identify non-conforming vehicle configurations
 - Weigh-in-motion with images of heavy vehicles
 - Calibrated BiSP (bridge in-service performance) monitoring of key components to quantify live load effects and record images of events inducing large effects

Longer-term options to be informed by refined assessment.

6.4.1.7 Mitigating Barriers

1. Rapid closure protecol: Establish the protocols necessary to close the bridge with zero notice.



7. Recommendations

7.1 Introduction

The recommendations that follow acknowledge:

- 1. The bridge has performed satisfactorily for over 50 years despite the concerns about brittle fracture, wearing Macalloy bars and deteriorated bearings.
- 2. Comparison with the 2008 Inspection Report indicates that the girders / bearings are likely to be better maintained now than a decade ago, although some bolts have been lost through corrosion and the residual stubs are likely to be continuing to corrode.
- 3. There are no proposed changes to the traffic loading (for example, GML to HML) on the route
- 4. There is a commitment to investigate and refine the assessment / risk management plans in the short-term.

7.2 Recommendations

The recommendations are summarised below. It is noted that the findings from some of the recommendations will inform other recommendations. For example, the material properties and the in-service response to traffic will inform the load carrying capacity. An indicative program is presented in Section 5 below.

- 1. Limit access to likely historic load levels:
 - 1.1. Regulation GML vehicles to be the upper bound for vehicles accessing this bridge until more refined assessment / rehabilitation works are complete. Access should not be granted for Class 1 vehicles which would include all Group 1 and Group 2 SPV's, platforms and load carrying combinations (including Form 11) subject to due diligence that the alternate routes are acceptable. Access for GML vehicles, including 50t B-doubles and truck and dogs, as well as 24t pick and carry cranes can continue.
 - 1.2. Implement a Communications Plan to inform interested stakeholders, including the transport industry. Utilise existing VMS signs to advise access restrictions
 - 1.3. Avoid queues of traffic across the bridge where possible. For example, position traffic control before the bridge in both directions.
 - 1.4. Exclude crowd loads occurring on the bridge.
- 2. Macalloy bar audit:
 - 2.1. Inspect bars to identify extent and magnitude of wear / damage
 - 2.2. Seek advice re risks associated with wear
 - 2.3. Review short-term risk assessment
- 3. Remove, replace and test a <u>sample</u> of Macalloy bars exhibiting signs of wear (within 3 months)
 - 3.1. Develop procedures to safely remove Macalloy bars. To include consideration of any further vehicle restrictions during removal and replacement of bars.
 - 3.2. Determine the force induced in the bars from heavy vehicle traffic
 - 3.3. Determine residual forces in a sample of bars

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- 3.4. Replace the sample of bars with new bars
- 3.5. Test the residual fatigue life and residual capacity of the worn bars
- 3.6. Review short-term risk assessment
- 4. Bearing movement audit:
 - 4.1. Collect bearing and expansion joint position with enough detail and recoverable reference points to facilitate future measurements and the replacement of the bearings, should this be necessary (within 6 weeks).
 - 4.2. Theoretical modelling of longitudinal movements due to effects such as thermal effects; heavy vehicles; braking; and earthquake. Modelling to include the movements at the piers and joints due to the depth of the girders.
 - 4.3. Identify the scenarios that could cause the bridge bearings to topple and the appropriate precautions.
- 5. Bearing restraints:
 - 5.1. Restrain rocker bearing shoes and masonry plates in locations where the holding down bolts to the bearings have been compromised. Restraints could be friction grip bolted to steelwork without drilling, cutting or welding.
 - 5.2. Add catch stools to Span 5 rocker bearings.
- 6. Regularly maintain the bearings (routine): Keep bearings clear of corrosion and debris. Grease sliding interface between sole plate and rocker.
- 7. Investigate risks and longer-term risk management strategies associated with (within 6 months):
 - 7.1. Macalloy bars
 - 7.2. Bearing toppling (both fixed and expansion bearings)
 - 7.3. Girder materials and brittle fracture
 - 7.4. Load carrying capacity, including sensitivity to operational factors to inform access and risk management
- 8. Monitor in-service performance:
 - 8.1. Monitor movements of bearings / expansion joint (Span 5 say) due to traffic and environmental effects
 - 8.2. Monitor response of selected girders and Macalloy bars
 - 8.3. Collect images of vehicles inducing large events to support compliance and risk management.
 - 8.4. Quantify dynamic load effects and their sensitivity to speed to inform risk management and precautionary barriers such as speed restrictions.
- 9. Rapid closure protocol: Establish the protocols necessary to close the bridge with zero notice as part of the Communications Plan.

8. Risk Management & Investigations: Scope

8.1 Introduction

The Barron River Bridge at Kuranda is a large, tall, bespoke steel bridge. It was designed for a 33t truck (H20S16) and is now carrying much larger 50.5t B-double and truck and dog vehicles as well as cranes and possibly load platforms transporting indivisible loads.

The 45.7 m spans are long compared to the average span length of about 12 m being constructed during the 1960s, making it more susceptible to these longer heavier loads and hence is operating at reduced margins compared to Australian Standards.

The steel in the bridge was apparently not specified with potential brittle fracture in mind and following the collapse of the Kings Bridge in Melbourne due to brittle fracture, the girders were retrofitted with stressed Macalloy bars. This retrofit has been gradually compromised through vibration and wear of the bars.

The bearings are also deteriorating through corrosion and wear.

Figure 12 provides an overview of the proposed program of investigations and works. This program, risks and scope of works will be updated as new information is received. Supplementary investigations may be recommended depending on the findings of the initial investigations.



Figure 12 Indicative Program

The investigations are multi-faceted and interdependent. A more detailed program will be developed should the investigations proceed.

The scope of the different activities is discussed below. The budget estimate follows the discussion of the scope.

8.2 Project Management & Governance

8.2.1 Scope

- Establish
- Project Governance Group
- Program
- Project Team
- Risk Register
- Communication Plan
- Manage Investigations

8.3 Action Short-Term Precautionary and Mitigating Barriers

8.3.1 Introduction

The scope for the precautionary and mitigating barriers (refer Section 7) that are generic and can be implemented without further investigation is presented below.

8.3.2 Scope

- Limit access to Regulation GML Vehicles or equivalent.
- Add signs advising access restrictions.
- Protocols:
- Implement protocols to avoid queues of traffic across the bridge where possible.
- Implement protocols to exclude crowd loads occurring on the bridge.
- Implement protocols for escalation and rapid closure of the bridge
- Six monthly Targeted Level 2 Inspections
- Prepare guidelines for Targeted Level 2 Inspections
- Regular bearing maintenance
- Bearing stops & catch stools: Design, fabricate and install bearing stops and catch stools to:
- Restrain rocker bearing shoes and masonry plates in locations where the holding down bolts to the bearings have been compromised.
- Catch Span 5 rocker bearings should excessive movements occur.

8.4 Initial Investigations of Risks

8.4.1 Brittle Fracture and Materials Properties of Girders

8.4.1.1 Background

Refer Section 6.4 and 7.2.

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8.4.1.2 Introduction

- Steel supplied to A33 Class D Plate, which is a relatively open standard with very limited chemical composition / material property requirements (for example, there is no ductility testing such as Charpy V-notch).
- The tension flanges were post-tensioned as a retrofit, most likely due to concerns about brittle fracture.
- The material properties are central to the assessment and management of the bridge.

8.4.1.3 Strategy

- Seek further historical information on the properties of the steel and the reasons for post-tensioning the bottom flanges.
- Seek advice from VicRoads re the management of the Kings Bridge (failed by brittle fracture and also post-tensioned).
- Collect a small sample of the steel and benchmark properties against modern standards for ductility / brittle fracture.
- Review the outcomes and identify further investigations as appropriate.

8.4.1.4 Objectives

- Investigate threat of brittle fracture to inform further targeted investigation and long-term management of bridge.
- Obtain steel material properties to inform load assessment and management of access.
- Update risk assessment and recommendations.

8.4.1.5 Scope

- Search archives (TMR, KBR...) and meet with the engineers involved (______NR ____) to identify further information about the steel properties and the reason for the retrofit with the Macalloy Bars.
- Establish and benchmark material properties and ductility (Metallurgical / testing specialists):
- Collect steel samples from low stress areas (2/100 mm diameter cores from girder webs, 2/120 mm long x 20mm wide slices from girder flanges say) and in-situ hardness tests
- Test samples to establish:
- Mechanical properties (Hardness, UTS, Yield, elongation, stress strain)
- Brittle fracture potential
- Charpy V-notch at operating temperatures at 15C below operating temperature
- Chemical composition and microstructure
- Report material properties and ductility / brittle fracture assessment & recommendations
- Review outcomes and impacts
- Update Risk Assessment and Recommendations (including further investigations if required to be undertaken as part of the Supplementary Investigations see also Section 8.5)

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8.4.2 Brittle Fracture of Macalloy Bars

8.4.2.1 Introduction

- Risk of brittle fracture of bars due to wear / fatigue without warning.
- Potential for brittle fracture to damage girder due to eccentric brackets supported by the web. The drawings do not have a jacking sequence and so brackets may have been designed for bar to be jacked individually rather than in pairs. Forces exerted during a brittle failure will be dynamic and potentially more damaging than during jacking. If the brackets and girders can survive a brittle fracture, then the risks reduce substantially.
- 60 bars, almost 2,000 m in total length.

8.4.2.2 Strategy

- Remove a sample of the bars and subject the worn sections to fatigue tests corresponding to 5 years (say) of remaining life and then test to failure.
- Investigate the ability of the Macalloy bar anchorages to withstand the fracture or a bar.

8.4.2.3 Objective

- Improve understanding of the risks & consequences.
- Investigate the feasibility of delaying the replacement of the bars during the investigation phase.
- Recommendations

8.4.2.4 Scope

- Audit of Macalloy Bar Condition
- Investigate potential damage due to brittle fracture in one bar (dynamic finite element analysis)
- Determine residual force in bars
- Develop safe work method statement for the jacking and replacement of the bars
- Prepare jacking couplers to match old thread (epoxy mould)
- Lift-off tests to determine residual force in bars specialist contractor.
- Determine properties / remaining life of a sample of existing Macalloy bars
- Remove and replace two bars (by specialist contractor scaffold under girder on Cairns end of the bridge, say).
- Measure bar wear
- Estimate fatigue cycles due to traffic using finite element model (Refer Section 8.4.5)
- Testing of worn bars under fatigue and then to ultimate
- Report, update risk assessment, recommendations

8.4.2.5 Alternate Strategy – Replace bars immediately

- An alternate strategy is to replace the bars immediately.
- Advantages:

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- Reduces the risk as soon as possible
- Reduces the cost associated with the investigation phase (some of the work will have to be done as part of the replacement)
- Disadvantages:
 - o Substantial cost now:
 - Like for like bar replacement cost of the order of \$300,000 + access. Previous estimates of access for painting were of the order of \$750,000 indicating a bar replacement cost in excess of \$1million.
 - If access is provided, it would be prudent to use the access for a range of activities and so time for planning would be helpful.
 - Cost efficiencies associated with multiple uses of access (for example: bearing replacement, painting) may be lost.
 - The work may need to be redone / augmented as alterations to the details of the prestressing bar installation (for example, removing wear points and improving corrosion resistance) and improving robustness in the event of a bar failure or improving assessment ratios may also be prudent.

8.4.3 Bearing Stability

8.4.3.1 Background

Refer Section 6.3 Stability of rocker bearings and Section 7.2 Recommendations.

This section focuses on the gathering field data and refining the assessment for planning longer-term risk management. Other aspects of the bearing stability investigations included in other sections are:

- Recommendations for implementing short-term measures are included in Section 8.3.
- Assess thermal and live load movements (included in Section 8.4.4)
- Identify the scenarios that could cause the bridge bearings to topple and the appropriate precautions (included in Section 8.4.4)

8.4.3.2 Objectives

• Gathering field data and refiring the assessment for planning longer-term risk management

8.4.3.3 Scope

- Gather field data and refine assessment:
- Measure bearing and expansion joint movements summer and winter (assumed to be part of regular bearing maintenance program and costs not included in this project)

8.4.4 Load Assessment

8.4.4.1 Background

Refer Section 6.4 and Section 7.2.

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8.4.4.2 Objectives

- Inform long-term risks associated with heavy vehicle access and appropriate access management strategies considering:
- the material properties of the girders and Macalloy bars
- the ability of the tall piers and tall slender rocker bearings to support modern braking loads and environmental loads
- Provide information for a review of the imposed access restrictions.
- Identify locations that may be sensitive to fatigue damage.
- Identify components that may require strengthening to ensure long-term performance for current and aspirational traffic loads.

8.4.4.3 Strategy

- Procure an advanced assessment from engineers with expertise in the assessment of steel girders with stiffened webs, brittle fracture and fatigue.
- Assess for as-of-right and permit vehicles (see scope)
- Assess the piers and pier fixed bearings for longitudinal effects (braking, temperature, shrinkage...)

8.4.4.4 Scope

- Procure assessment. Assessment brief to include:
- Heavy Vehicle loads: Truck and Dog; Crane; LPT10; HLP320⁸
- Components to be assessed for vertical loads
- Deck slab (6.5 inch thick)
- Girders considering the measured material steel properties; web buckling; flange bends without stiffeners; unbonded stressed Macailoy Bars...
- Halving joints
- Bearings
- Pier headstocks
- Identify fatigue sensitive locations including locations with
 - Low fatigue detail classifications
 - o Distortion induced fatigue,
 - Constraint Induced Fracture (CIF)
- Components to be assessed for vertical loads and longitudinal loads (braking and environmental effects)
- Fixed piers
- Fixed bearings at piers

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⁸ Details of the assessment vehicles to be agreed with Structural Assessment prior to commencement of the assessment.

- Rocker bearings
- Components to be assessed for longitudinal movements
- Movements due to traffic and environmental effects
- Identification of the loading scenarios required to topple bearings
- Report
- Review assessment
- Review implications for access restrictions, general access and possible
- Update Risk Assessment and Recommendations (including further investigations if required to be undertaken as part of Supplementary Investigations refer Section 8.5)

8.4.5 Structural Behaviour

8.4.5.1 Introduction

• This bridge is unique and incorporates many details that are not standard. A quality structural analysis model is essential for the technical management of this project.

8.4.5.2 Objectives

- Provide an independent structural analysis model to:
- inform / validate risks (Macalloy bars, bearing movements, assessment, brittle fracture);
- support / validate the investigations (for example, the independent review of the assessment, stresses in prestressing bars due to live load);
- inform assessment of permit applications, and
- the design / validation of temporary works for likely bearing replacements.

8.4.5.3 Scope

- Develop FE Model of Bridge
- FE Model (shell) deck slab, girders, halving joints, bearing linkages, piers
- Loading: Self-weight, Ext P/S. Temperature (average and differential), shrinkage
- Loading: Truck and dog; Crane; LPT10⁹
- Validate & Document
- Investigate:
 - o Movements at bearings: Displacement and rotation, SLS and ULS (elastic)
 - o Stress in prestressing bars due to traffic
 - Stress hot spots halving joints, hog regions, anchorages, sag regions

⁹ Details of the assessment vehicles to be agreed with Structural Assessment prior to commencement of the investigation.

8.4.6 In-service Performance:

8.4.6.1 Background

• Refer Section 6.4 and Section 7.2

8.4.6.2 Objectives

- Know the loads and the effects they induce in the girders (strain) and bearings (movement)
- Inform assessment:
- Independent validation of modelled behaviour
- Natural frequencies
- Fatigue spectra
- Improve credibility of the assessment and access management of the bridge (experience indicates freight vehicles may induce less damage than expected but vehicles carrying indivisible loads may generate effects larger than considered acceptable)
- Inform risk management:
- Bridge specific live load models incorporating actual heavy vehicles, drive lines, load levels and dynamic effects
- Identification and management of vehicles exceeding acceptable bridge response thresholds
- Quantify the movement of the bearings and 'stick-slip' actions associated with bearing operations.

8.4.6.3 Strategy

• Use instrumentation to monitor the response of the bridge and to trigger a camera to retrieve images of the heavy vehicles inducing large effects.

8.4.6.4 Scope

- Monitor movements of bearings / expansion joint (Span 5 say) due to traffic and environmental effects
- Monitor response of selected girders and Macalloy bars
- Collect images of vehicles inducing large events to support compliance and risk management.
- Calibrate the response with known vehicles
- Report

8.4.7 Update Risk Assessment

8.4.7.1 Scope

• Progressively update risk assessment with new information.

8.4.8 Rehabilitation Plan & Budget

8.4.8.1 Scope

- May flag items of importance that are critical for urgent action.
- Provide a clear statement of the scope and estimate of costs where the scope is clear

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- Identify projects where there are potential efficiencies for doing them together
- Provide information to support funding applications.

8.5 Supplementary Investigations of Risks

Supplementary investigation of risks will depend on the outcomes of the Initial Investigations of Risks and approval of their scope. If recommended these investigations will not proceed unless agreed.

A brief discussion of follows:

Brittle Fracture and Material Properties: The initial investigation will inform the problem and likely lead to further investigation. If the test results are consistent with a low risk of brittle fracture, then the testing may need to be extended to include a larger sample of the steel supplied through a combination of NDT and further sample collection. If the samples indicate a concern about brittle fracture, then more extensive investigations may be required. As well as more extensive material sampling and testing, this could include ultrasonic or ACFM testing of the welds to identify cracks or defects that may induce cracks that are a precursor to brittle fracture.

Brittle Fracture of Macalloy Bars: It is possible that the initial investigation conclude that the risks are unacceptable and need to be managed in the short term.

Load Assessment: Further targeted assessment of specific issues may be appropriate.

In-service Performance Monitoring: Extension / retargeting of instrumentation may be necessary.

8.6 Budget Estimate

A budget estimate of costs for the Initial Investigation of Risks is summarised in Table 4. These costs are a guesstimate based on estimates of time, rates and discussion with industry.

Budget estimates for the supplementary investigations are not included as the scope is not yet defined.

Table 4 Budget Estimate of Costs

Item	Cost (Excluding GST)	Distribution
Project Management & Governance	\$ 147,000	16%
Action Short-Term Precautionary and Mitigating Barriers	\$ 158,400	18%
Brittle Fracture and Material Properties of Girders	\$ 44,200	5%
Brittle Fracture of Macalloy Bars	\$ 130,400	15%
Bearing Stability	\$ 20,000	2%
Load Assessment	\$ 122,00	14%
Structural Behaviour	\$ 28,800	3%
In-service Performance	\$ 156,200	18%
Update Risk Assessment	\$ 17,600	2%
Rehabilitation Plan & Budget Estimate	\$ 59,400	7%
Subtotal	\$ 884,000	100%
Contingency (20%)	\$ 176,800	
Total	\$ 1,060,800	

The costs include the costs of TMR Cairns, TMR Structures, RoadTek, Consultants and specialist contractors. The split between these groups is summarised in Table 5.

Table 5 Distribution of costs between groups

Group	Cost (Excluding GST)	Distribution
Management & Governance	\$ 147,000	16%
TMR Cairns	\$ 72,800	8%
TMR Structures	\$ 252,800	29%
RoadTek	\$ 69,000	8%
Traffic Control	\$ 32,400	4%
Under Bridge Inspection Unit	\$ 3,3000	4%
Consultants, Construction & Costs	\$ 277,000	31%
Subtotal	\$ 884,000	100%
Contingency (20%)	\$ 176,800	
Total	\$ 1,060,800	

10. Future Actions

10.1 Planning and Design

Not part of this report

Rehabilitation items may include:

- Girders & Macalloy Bars
- Bearings
- Headstocks
- Expansion Joints
- Guardrail
- Paint

Access will be an important consideration.

10.2 Rehabilitation

Not part of this report.

11. References

NYSDOT, 2005, "Structural Forensic Investigation Report: Partial Failure of Ramp AC, Dunn Memorial Bridge Interchange, BIN 109299A, City of Albany, Albany County, New York, July 27 2005", Prepared by New York State Department of Transport (NYSDOT), Albany, New York, October 20, 2005.

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Macalloy Bar Systems, "Macalloy Bars for Use in Post-tensioning applications – Design data", Sheffield, S9 2LN.

Structure Maintenance Schedule	M1	Sheet
		1 of 16
Structure Id 7799 Name		
Crossing Name Barron River Alt. Name		
Structure Type Bridge Owner MR DEPA		T OF MAIN R
Construction Type Girder/Beam District 403 Far N	lorth	
Construction Material Steel LGA Id 277 MAR	EEBA SH	IRE COUNCI
Inspector NR Date 19-NOV-2020		
4		·····
Inspection Level 1 2 X 3 Overall Condition Rating	$\wedge \vee \vee \vee$	derwater []
		Measures []
Road Section Start End	TDist	;
Id Description S Cway S RPC Dist RPC Dist	Start	End
Inspector's Comments		
Structure is in poor condition.		
		.,
Structure undergoing investigations due to brittle failure/fatigue concerns. At time or several sites have had lead coating removed for NDT testing (specifically MPI) of c		
welds. Cross girder-girder interfaces and stiffeners have also been examined for cra		
	<u>8</u>	
Steward's Comments		
Vermin Screen Comments		
Ver min Screen Comments		
(7b)		
$\langle \mathcal{P} \rangle$		
907		
Security Measures Comments		
Total Maintenance Backlog Amount \$ 28660	_	_

Structu	re Maintenance Sc	hedule			м	1 She		
Struct	ure Id 7799		Name					
Inspectior	Date 19-NOV-2020		Insp	ection]	Level 1	2 x 3		
	ocation and Details (from	n B2 forms)						
	t Location (Modification						43 1	3S 7
Compon Defect Det	ent Description ails	gs	Condition	1 State	1 2		• <u></u>	1
	ans in B4 sole plate especially on the b				A		nt face	e
also. Recommend tre	eatment of treatment of B4 sole plate	e. NB - steel components in str	ucture typically h	ave red le	ead coatings.			
Activity No	Desc	ription	Unit	Quantity	Urit Rate	Amount	Priority	Completed
100S1	Spot clean and paint steelwork		L/SUM	1 <	780	780	3	N
945A2	Access using scaffolding		P/SUM	1	650	650	3	Ν
			~					
				\	Sub-total \$	1430		
Defect L	ocation and Details (from	n B2 forms)		\geq				
Compon Defect Det	Component Location (Modification/Group/Component/Standard Number O / A2 / I1 / 14S Component Description Joint Significance 1 2 3 4 1 Defect Details Condition State 1 2 3 X 4 1 2 steel plate anchors missing at side 2 lane - roughly at wheel paths (012). Steel plate slapping noisily under traffic. Recommend reestablishment of anchors. Condition State Commend reestablishment of anchors.							
Activity No	Desc	ription	Unit	Quantity	Unit Rate	Amount	Priority	Completed
823	Replace/repair expansion joints (st	eel)	m	3.5	650			N
900A3	Traffic management (including TM	P)	P/SUM	1	850	850	3	N
		7/6	I I	5	Sub-total \$	3125		L
Defect L	ocation and Details (from	a B2 forms)					•	
Compon Defect Det		Guard Rails	Signif Condition	ïcance 1 State	1 X 2 1 2	.P1 / GR1 / 3[4 3[4	4 4 4	2S]]
Single bolt conn	nection to end posts in both GR (002	2 - typical). Requires provision	of connections to	current s	tandards.			
0								_
Activity No	Desc	ription	Unit	Quantity	Unit Rate	Amount	Priority	Completed
72S4	Provide connections to end posts of	or rails	L/SUM	2	680	1360	3	Ν
900A3	Traffic management (including TM	P)	P/SUM	1	850	850	3	N
				5	Sub-total \$	2210	•	

Structu	re Maintenance Schedule			м	1	heet of 16				
Structu	ıre Id 7799	Name								
Inspection	Date 19-NOV-2020	Insp	ection]	Level 1	2 x 3					
	ocation and Details (from B2 forms)									
Componen	t Location (Modification/Group/Component	/Standard N	umber		P2 / B1		00			
Componen	ent Description Bearings	Signif	ficance	1 2	x 3	4[]			
Defect Det	ent Description Bearings	Condition	n State	1[2	<u>(())[7]</u>	4[]			
	ocated on pier 2.									
	de anchor nut has severe loss of section (037). Minor corrosion e	evident under coat	ting. Previ	ous L3 inspectio	n recommendatio	n of repl				
Activity No	Description	Unit	Quantity	Urát Rate	Amount	Priority	Completed			
						_				
	Sub-total \$ Defect Location and Details (from B2 forms)									
Defect L	ocation and Details (from B2 forms)									
Component Location (Modification/Group/Component/Standard Number O P3 B1 400 Component Description Bearings Significance 1 2 3 4 4 Defect Details Condition State 1 2 3 4 4										
B1 - CS4. Lower	r attachment nut has nearly completely corroded away (047) with	moderate corros	ion in the l	ninge pin and up	per attachments.					
Activity No	Description	Unit	Quantity	Unit Rate	Amount	Priority	Completed			
			5	Sub-total \$						
Defect L	ocation and Details (from B2 forms)									
-	t Location (Modification/Group/Component nt Description Bearings		umber ficance	<u>-</u>	P3 / B4	/ 40 4)0 1			
Defect Det		Condition			3	4 x]			
B4 - CS4. Minor hinge pin under	loss of section in lower attachments. Minor corrosion evident for coating. Upper attachments are untreated and have corrosion wint on top of (over flange of girder (050).						e-			
Activity No	Description	Unit	Quantity	Unit Rate	Amount	Priority	Completed			
×		Ð	0	D	×	Ā	0			
						+				
		I	5	Sub-total \$			•			

Structu	re Maintenance Sch	edule			м	1	eet f 16	
Struct	ure Id 7799		Name					
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Componen	t Location (Modification/	Group/Component/ Bearings	Standard N Signif	umber ficance	0 /] 1[] 2	P1 / B1	/ 43 4	3S 7
Defect Det	ent Description ails		Condition	n State	1 2		4[7
Fixed rocker bea B1 and B4 have	arings at halving joint 1, E1 of span 2 been coated since previous inspecti n undersides of both rockers and in s	(026 - typical). on however moderate-sever					eviden	nt
Activity No	Descr	iption	Unit	Quantity	Urát Rate	Amount	Priority	Completed
							+	<u> </u>
				\rightarrow	~			
					Sub-total \$		-	
Defect L	ocation and Details (from	B2 forms)						
Compon Defect Det	Component Location (Modification/Group/Component/Standard Number O / P1 / B4 / 43S Component Description Bearings Significance 1 2 3 X 4 4 Defect Details Condition State 1 2 3 X 4 4							
B1 and B4 have under coating of	been coated since previous inspection n undersides of both rockers and in s	on however moderate-sever	e joss of section i	remains in	anchor nuts (02	7, 028). Corrosion	eviden	ıt
Activity No	Descr	iption	Unit	Quantity	Unit Rate	Amount	Priority	Completed
	6			5	Sub-total \$		_	
Defect L	ocation and Details (from	B2 forms)						
-	t Location (Modification/	Group/Component/ Bearings		umber ficance		P2 / B1	/ 43 4	3S 7
Compon Defect Det	ent Description		Condition		1 2		4 x	
	r attachment on downstream side ha	s completely corroded away						-
40	Descr	intion						p
Activity No	Descr	ibrion	Unit	Quantity	Unit Rate	Amount	Priority	Completed
				5	Sub-total \$			

Structu	re Maintenance Sc	hedule				м	1	heet of 16	
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Compon	ent Description ails	Bearings		Signif	licance	1 2	3 X	4	
								4 x	
B4 - CS4. Lowel severe.	r attachment on downstream side h	has completely corroded av	vay (036). Co	orrosion	evident in	hinge pin. Corro	sion in hinge pin a	appears	5
Activity No	Desc	cription		Unit	Quantity	Urait Rate	Amount	Priority	Completed
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	Component Description Bearings Significance 1 2 3 X 4								
Defect L									
Compone Defect Det	Component Description Bearings Significance 1[] 2[] 3[x] 4[] Defect Details Condition State 1[] 2[] 3[] 4[x]								
	re loss of section in anchor attachm	~ ($\left(/ \right)$				ating (059) Active		sion v
Activity No		cription		Unit	Quantity	Jnit Rate	Amount	Priority	Completed
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Compon Defect Det	ent Description	Dearings		<u> </u>	n State		3 x	4[
	pear to have rotated to their tolerar	nce limits. Refer to Sketch	14 for measu	rements	at rocker				
B2 - CS3. Mode	rate loss of section in hinge pin nu	it with active corrosion. Min	or loss of se	ction in a	anchor atta	achments with a	ctive corrosion (06	61)	
Activity No	Desc	cription		Unit	Quantity	Unit Rate	Amount	Priority	Completed
									\square
					5	Sub-total \$			

Structu	re Maintenance Schedule			N	11		eet f 16			
Struct	ure Id 7799 Na	ame								
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Defect Det	ails	onditio	n State	1[2	Ø	3 7	4[]		
Bearings 1-4 ap	pear to have rotated to their tolerance limits. Refer to Sketch 14 for mea	surements	s at rocker	-bed plates.	\sim	\geq				
	rally fine. Minor amounts of corrosion under recent recoating (062).					*	_			
Activity No	Description	Unit	Quantity	Urdt Rate		Amount	Priority	Completed		
							_			
		R	<u>></u>	Sub-total \$			-			
Defect L	Sub-total \$ Defect Location and Details (from B2 forms)									
Component Location (Modification/Group/Component/Standard Number O P4 B4 43S Component Description Bearings Significance 1 2 3 4 1 Defect Details Condition State 1 2 3 X 4 1										
Bearings 1-4 ap	pear to have rotated to their tolerance limits. Refer to Sketch 14 for mea	surements	s at rocker	-bed plates.						
	rally fine. Minor spot corrosion.	_					_			
Activity No	Description	Unit	Quantity	Unit Rate		Amount	Priority	Completed		
						-				
			5	Sub-total \$			_			
Defect L	ocation and Details (from B2 forms)						_			
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Defect Det	<u> </u>	onditio	n State	1[] 2		3[]	4 x]		
Bearings 5-8 are	e rotated in opposite direction to bearings 1-4. Refer to Sketch 15 for me	asuremer	nts at rocke	er-bed plates.						
	chor bolts through tocker-bed plate possibly bent. Build up of dirt at rock	er-bed pla	te interfac	e requires clear	ning.			_		
Activity No	Description	Unit	Quantity	Unit Rate		Amount	Priority	Completed		
			5	Sub-total \$. <u></u>					

Structu	re Maintenance Schedule			Ν	/11	Sheet 7 of 1	5	
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	e rotated in opposite direction to bearings 1-4. Refer to				$\langle \rangle$			
	chor bolts through rocker-bed plate possibly bent. Build	d up of dirt at rocker-bed	plate interfa	ace requires clear	ning.	_		
Activity No	Description	Curit	Quantity	Urdt Rate	Amount	Priority	Completed	
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Defect L	ocation and Details (from B2 forms)							
Component Location (Modification/Group/Component/Standard Number O P4 B7 43S Component Description Bearings Significance 1 2 3 4 1 Defect Details Condition State 1 2 3 X 4 4 Bearings 5-8 are rotated in opposite direction to bearings 1-4. Refer to Sketch 15 for measurements at rocker-bed plates. 4 4 4								
-		$\sim (\sqrt{3})$		-				
	chor bolts through rocker-bed plate possibly bent. Build Description	a up of cirt at focker-bed	plate interra		ning.		p	
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				Sub-total S	5			
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_	t Location (Modification/Group/Com ent DescriptionBearings	Sig	nificanc	e 1 2	P4 / B 2 3 x	<u>,</u>] 4[43S	
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-	e rotated in opposite direction to bearings 1-4. Refer to			-	nin a			
	chor bolts through rocker-bed plate possibly bent. Build Description	d up of dift at rocker-bed	plate intena		ning.		p	
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				Sub-total S	§			

Structu	re Maintenance Sched	ule				M1	She 8 of		
Struct	ure Id 7799	Na	me				·		
Inspection	ure Id 7799 Date 19-NOV-2020		Insp	ection]	Level 1	<u> </u>	x 3		
Defect L	ocation and Details (from B2	forms)							
Componen	t Location (Modification/Gro	oup/Component/Stand	lard N	umber	0			11	10
Compon	ent Description	Joint	Signif	icance	1			L /	 -1
	ails ression seal joint with steel nosings at E1 o								<u></u>
	bs between nosings both sides 47mm (Ter							onya	•
Activity No	Description	n	Unit	Quantity	Urát Rate		Amount	Priority	Completed
50009	Replacement of compression joint seal ex	kpansion joints	EA	1 <	\square	2250	2250	3	N
900A3	Traffic management (including TMP)		P/SUM	1		850	850	3	N
			\sim						
			R	<u>></u> s	Sub-tot	al \$	3100		
Defect L	ocation and Details (from B2	forms)		\geq					
Compone Defect Det Refers to component seperated from	at Location (Modification/Gro ent Description ails resion joint with steel nosing at E2 of span nosing at side 2 potentially allowing moistu ement of compression seal.	Joint Co 5. Rubber gland is peristing w	Signif ndition	icance n State and breaki	1 1	2 sections (0	3[] 4 3[x] 4 011). Gland has	s pints	
Activity No	Description	a	Unit	Quantity	Unit Rate		Amount	Priority	Completed
50009	Replacement of compression joint seal ex	pansion joints	EA	1		2250	2250	2	N
900A3	Traffic management (including TMP)		P/SUM	1		850	850	2	Ν
		\sum							
	(7)	9		5	Sub-tot	al \$	3100		
Defect L	ocation and Details (from B2	forms)							
Compon Defect Det All BR posts har top of base plate		ge Barriers Co ack washers (004 - typical). Bas ases. Minor surface corrosion a	Signif ndition se plates	icance n State are recess	1 x 1 sed into ke	2 rbs. Mortar	3 4 applied up to le	x x evel w	vith
Activity No	Description	•	Unit	Quantity	Unit Rate		Amount	Priority	Completed
				S	Sub-tot	al \$			

Structu	re Maintenance S	chedule				M	11	She 9 of		
Struct	are Id7799		Name	e		-				
Inspection	Date 19-NOV-2020	-	I	[nsp	ection]	Level 1	2 [x 3]	-
Defect L	ocation and Details (fr	om B2 forms)								
Componen	t Location (Modificati	on/Group/Componer Bridge Barriers	nt/Standar Si	rd N ignif	umber licance	O / 1 x 2	S2	/ BR1 /	2	S 1
Defect Det	ent Description		Cond	itio	n State	1 2			x]
All BR posts have top of base plate	ve insufficient thread at anchor b - mortar missing/spalled away i ickers on BR posts. Requires en	olts and lack washers (004 - ty n many cases. Minor surface	/pical). Base p	lates	are recess	ed into kerbs. N				
Activity No	De	escription		Unit	Quantity	Urdt Rate		Amount	Priority	Completed
					\leq	\sum				
				\sim						
			/	$\overline{\mathbb{Z}}$	S 5	Sub-total \$				
Defect L	ocation and Details (fr	om B2 forms)			\geq					
Compone Defect Det: All BR posts hav with top of base	Component Location (Modification/Group/Component/Standard Number O / S3 / BR1 2S Component Description Bridge Barriers Significance 1 x2 3 4 x1 Defect Details Condition State 1 2 3 4 x1 All BR posts have insufficient thread at anchor bolts and lack washers (004, 005 - typical). Base plates are recessed into kerbs. Mortar applied up to level with top of base plate - mortar missing/spalled away in many cases. Minor surface corrosion at lower portion of base plates typical. Delineation provided by retroreflective stickers on BR posts. Requires engineering input.									
Activity No	De	escription		Unit	Quantity	Unit Rate		Amount	Priority	Completed
								7		
					S	Sub-total \$				
Defect L	ocation and Details (fr	ona B2 forms)								
-	t Location (Modification ent Description ails	ca/Group/Componer Bridge Barriers	Si	ignif	umber ficance n State		S4 [] []	/ BR1 / 3 4 3 4	2]
All BR posts have	ve insufficient thread at anchor b plate - morter missing/spalled av e stickers on BR posts. Requires	way in many cases. Minor sur								
Activity No	D	escription		Unit	Quantity	Unit Rate		Amount	Priority	Completed
										<u> </u>
					S	Sub-total \$				

Structu	re Maintenance S	chedule			м	1 Sho				
Struct	ure Id 7799		Name							
	Date 19-NOV-2020	-		pection	Level 1	2 x 3				
	ocation and Details (fr	om B2 forms)								
		· · ·			0 / 9	85 / BR1	/ 2S			
Componen Compone	nt Location (Modificati ent Description ails	on/Group/Compone Bridge Barriers	ent/Standard Sigi	Number lificance	1 <u>x</u> 2[4[]			
							4 x			
with top of base	ve insufficient thread at anchor b plate - mortar missing/spalled a e stickers on BR posts. Requires	way in many cases. Minor su								
Activity No	D	escription	Unit	Quantity	Urát Rate	Amount	Priority Completed			
							$\left \right $			
	Sub-total \$									
Defect L	Defect Location and Details (from B2 forms)									
Compone Defect Det All BR posts hav with top of base	Component Location (Modification/Group/Component/Standard Number O / S6 / BR1 2S Component Description Bridge Barriers Significance 1 x 2 3 4 x Defect Details Condition State 1 z 2 3 4 x									
Activity No	D	escription	Unit	Quantity	Unit Rate	Amount	Priority Completed			
					Sub-total \$					
Defect I	ocation and Details (fr	(P2 forms)					-			
Componen Compone Defect Det	nt Location (Modification	en/Group/Compone Deck	Sigi Condit	ificance on State	1 2[1 2[20C 4[] 4[]			
No	D	escription			9		ed			
Activity No			Unit	Quantity	Unit Rate	Amount	Priority Completed			
140S1	Clean corroded reinforcing		L/SU	VI 1	1500	1500	2 N			
945A1	Access from deck (UBIU)		P/SU	M 1	850	850	2 N			
900A3	Traffic management (including	rmp)	P/SU	M 1	850	850	2 N			
			•		Sub-total \$	3200	-			

Structu	re Maintenance Schedule				M1	Shee 11 of		
Struct	ure Id 7799 Na	me		•		•		
		Insp	ection l	Level 1	2	x 3	<u> </u>	
Defect L	ocation and Details (from B2 forms)							
Componer	it Location (Modification/Group/Component/Stand	lard N	umber	o <u>/</u>		<u>/</u> D1 <u>/</u>	20	C
Compon	ent Description	Signif	icance	1]
							<u> </u>	<u> </u>
		.1 and in l	D4 at E1 II	kely due to po	DOL COAET	. Requires squ	aring	to
No	Description		-		$\overline{\mathbf{T}}$			ed
ivity			untity		Ì	ount	ority	uplet
Acti		Unit	Qua	Úráit		Amo	Prio	Con
105C1	Cleaning and Priming Reinforcement	P/SUM	1 <	7	50	750	3	Ν
100C4	Treatment Preparation Grade 4 - Squaring and Removal of Concrete (be	m2	1	15	80	1580	3	Ν
115C3	Reinstate repair area with concrete reinstatement mortar	m2	1	14	55	1455	3	Ν
945A1	Access from deck (UBIU)	P/SOM		22	00	2200	3	Ν
		$\langle \rangle$	ં ક	Sub-total	\$	5985		
Defect L	ocation and Details (from B2 forms)	$) \ge -$						
Componer	at Location (Modification/Group/Component/Stand	dard N	umber	0 /	S 5	/ D1 /	20	C
-				1[]	2	3[x] 4	[7
	ent Description	-		1	2		<u> </u>	1
		70). Requ	uires treatio	ng.				
ctivity No	Structure Id 7799 Name It is it is uspection Date 19-NOV-2020 Inspection Level 1 2 Is 3 3 Defect Location and Details (from B2 forms) pomponent Description Deck Significance 1 2 3 IS 4 4 dect Details Condition State 1 2 3 IS 4 4 4 all sectors of spalling with apposed and corroled reinforcement in D1 at MS, D5 at E1 and in D4 at E1 likely due to poor cover. (Requires squaring to more resonance) 9							
100S1	Spot clean and paint steelwork	_		_	00			
900A3	Traffic management (including TMP)	P/SUM	1	8	50	850	3	N
945A1	Access from deck (UBIU)	P/SUM	1	20	00	2000	3	N
		<u> </u>		ub total	•	5350		
Defect I	Details (from D2 forms)		N	uu-ioiai	<u> </u>			
	VIOr			•	61	C 3	21	
Componen	• / / / / /			<u> </u>	-11 21	<u> </u>		
_	ent Description	-		1 <u>∟_</u>] ₁,,	2			-
								-
			Igone test	ing, specifica	ly weius	at spice joins,	LIU3.	5
No	Description		y	ite		_		ted
tivity	\sim	.=	antit	it Ra		unot	ority	mple
Aci		Ū	Qu	Un		An	Pri	C
					_			
			S	Sub-total	\$			

Structu	Inspection Level 1 2 [] 3 eet Location and Details (from B2 forms) onent Location (Modification/Group/Component/Standard Number 0 51 7 G4 225 apponent Description Girders Significance 1 2 3 4 Undergoing Investigations due to brittle failure/fatigue concorns. Several sites have undergone testing, specificatly wide at splice joins, cross der interfaces and at stiffeners. Description 1<						
Struct	are Id7799	Name					
Inspection	Date <u>19-NOV-2020</u>	Insp	ection]	Level 1	2 <u>x</u>	3 []	
Defect L	ocation and Details (from B2 forms)						
Componen	t Location (Modification/Group/Component	/Standard N	umber	0 <u>/</u>	S1 <u>/</u> G4	<u>/</u> 2	2S
Compon	ent Description Girders	Signif	ficance	1 2	3	4 x	
Defect Det	ails		n State				<u>_</u>
girder-girder inte	orfaces and at stiffeners.		igone test	ing, specifically	weids at splice	juins, crus	5
Activity No	Description	Unit	Quantity	Urit Rate	Amount	Priority	Completed
			\sim	\sum			
			^				
		\square	<u>></u> s	Sub-total \$			
Defect L	ocation and Details (from B2 forms)		\geq				
Compone Defect Det	ent Description Girders ails going investigations due to brittle failure/fatigue concerns. Sever	Signif Condition	ficance n State	1 [] 2 1 [] 2 ing, specifically	3 3 3	4 x 4	
ctivity No	If J of 16 tructure Id 7799 Name						
×		Ū	δ	n	¥	<u> </u>	Ŭ
		I	5	Sub-total \$			-
Defect L	ocation and Details (from B2 forms)		~				
Compon	ent Description Girders	Signif	ficance	1 2	<u></u>	4 <u>x</u>]
Structure underg	going investigations due to brittle failure/fatigue concerns. Sever						is
Activity No	Description	Unit	Quantity	Unit Rate	Amount	Priority	Completed
	Clure Maintenance Schedule M1 12 of 16 ructure Id 7799 Name Inspection Level 1 2 [] 3 [] etion Date 19-NOV-2020 Inspection Level 1 2 [] 3 [] 4 [] etion Coation (Modification/Group/Component/Standard Number 0 / S1 / C4 / 225 ponent Description Girders Significance 1 2 3 [] 4 [] 1 Undergong medipators due to brittle laharofulgue concerns. Several size have undergone losing, specifically weld: a spice part, cross M						
			\$	Sub-total \$			

Structu	re Maintenance Sch	edule			м	1		
Structu	ure Id 7799		Name					
Inspection	Date 19-NOV-2020		Insp	ection]	Level 1	2 x 3		
		B2 forms)						
Componen	t Location (Modification/	Group/Component/S	tandard N	umber	0 /	_	<u>'</u>	
Compone	ent Description	Girders	Signif	îcance			4 <u>x</u>	_ <u>_</u>
					<u>^</u>			. <u> </u>
						weids at splice joi	15, 005	3
Activity No	spection Date 19-NOV-2020 Inspection Level 1 2 [x] 3 Defect Location and Details (from B2 forms) mponent Location (Modification/Group/Component/Standard Number 0 / S4 / G2 / 22S) Component Description Girders Significance 1 2 3 4 [x] fect Details Condition State 1 2 3 4 [x] ture undergoing investigations due to brittle failure/fatigue concerns. Several sites have undergone testing, specifically welds at splice joins, cross regirder interfaces and at stiffeners. Refer to Sketch 18 - Post inspection Tech note and Sketch 19 - Summary Plans.							
					\square			
			\sim					
			$\overline{\mathcal{A}}$	<u> </u>	Sub-total \$			
Defect L	ocation and Details (from	B2 forms)		>				
Compone Defect Det	ent Description ails going investigations due to brittle faile	Girders	Signif Condition	icance n State	1 2 1 2 1 2	3[] 3[] 3[]	4 x 4 _]
ctivity No	runcture Id 7799 Name Issection Level 1 2 [S] 3 1 ect Location and Details (from B2 forms) onent Location (Modification/Group/Component/Standard Number 0 / S4 / G2 / 225 sponent Description Griders Significance 1 2 3 4 IS Undergoin modification/Group/Component/Standard Number 0 / S4 / G2 / 225 undergoin modification/Group/Component/Standard Number 0 / S4 / G2 / 225 undergoin modification/Group/Component/Standard Number 0 / S4 / G3 / 225 sponent Location (Modification/Group/Component/Standard Number 0 / S4 / G3 / 225 sponent Location (Modification/Group/Component/Standard Number 0 / S4 / G3 / 225 undergoin providuations due to brittle influendentificue concers Stanificance 1 2 3 4 1 1 2 3 4 1 2 3 4 1							
Ā			D	ð	n	V	<u> </u>	0
							+	<u> </u>
							+	
					C1 4-4-1 6			L
	(7				Sud-total 5			
Defect L	ocation and Details (from	B2 forms)			_		_	
Componen	t Location (Modification/				0 <u>/</u>	S4 <u>/</u> G4	<u>'</u>	
Compone	ent Description	Girders			1 2	3		
						welds at splice joi	ns, cros	s
Activity No	ture ld 7799 Name							
	Clure Maintenance Schedule M1 13 of 16 ructure Id 7799 Name Itspection Level 1 2 [S] 3 [] ettion Date 9-NOV-2020 Inspection Level 1 2 [S] 3 [] onent Location and Details (from B2 forms) Significance 1 [] 2 [] 3 [] 4 [S] Details Condition State 1 [] 2 [] 3 [] 4 [S] Details Order inspection generative and state in the state of the state							
	Clure Maintenance Schedule M1 13 of 16 ructure Id 7799 Name Inspection Level 1 2 [S] 3 [] ettion Dati 19-NOV-2020 Inspection Level 1 2 [S] 3 [] ettion Dati 10-NOV-2020 Bonent Location (Modification/Group/Component/Standard Number 0 / S4 / G2 / 22S ponent Description [] Details Condition State Details Condition State Description [] g g g							
				S	Sub-total \$			

Structu	re Maintenance Sch	edule			м	1		
Struct	ure Id 7799		Name					
Inspection	Date 19-NOV-2020		Insp	ection l	Level 1	2 <u>x</u> 3		
		B2 forms)						
Componen	t Location (Modification/	Group/Component/S	tandard N	umber	0 <u>/</u> 9	85 <u>/</u> G1	<u>/</u> 22	2S
Compon	ent Description	Girders	Signif	icance	1 2	3		
Defect Det	ails	rolfatique concorne. Coveral d	Condition	n State				-
							5, 005	5
y No	Descri	iption		ty	fe		~	eted
Activity No			ij	uanti		unou	iorit	omple
Y			Ũ	ō		A)	Ŀ	Ŭ
			~	\frown				
				<u> </u>	Sub-total \$	l		•
Defect L	ocation and Details (from	B2 forms)		$\overline{}$			-	
Componen	t Location (Modification/	Group/Component/S	tandard N	umber	0 / 9	S6 / G1	/ 22	2S
Compone	ent Description	Girders	Signif	ïcance	1[2[-	4 x]
Defect Det	ails		Condition	n State	1[] 2[3[]	4 x]
Structure underg girder-girder inte	going investigations due to brittle failuerfaces and at stiffeners. Refer to Ske	ure/fatigue concerns. Several setch 18 - Post inspection Tech	note and Sketc	rgone test h 19 - Sur	ing, specifically v nmary Plans.	velds at splice join	s, cros	s
No	Descri	iption		y	fe			ted
tivity No			.=	antiț	it Ra	nount	ority	mple
Ac			Un	Qu	Un	An	Pri	Co
		-						
	(7	<u>X</u>		5	Sub-total \$			
Defect L	ocation and Details (from	B2 forms)						
Componen	t Location (Modification/				<u>/</u>	<u> </u>	<u>/</u> 71	10
-		Waterway					4	
Defect Det		am side relative to original read					4	
				<i>J.</i> 2000				
No	Descri	iption		y	te			ted
Activity No	n Date <u>19-NOV-2020</u> Inspection Level 1 [2 [3]] Jocation and Details (from B2 forms) Int Location (Modification/Group/Component/Standard Number 0 / S5 / G1 / 22S tent Description							
Act	Intervention Image: Construction Image: Construction Image: Construction Intervention Constitution State Image: Construction Image: Construction Intervention Constitution Image: Construction Image: Construction Image: Construction Intervention Constitution Image: Construction Image: Construction Image: Construction Image: Construction Intervention Image: Construction Image: Construction Image: Construction Image: Construction Image: Construction Intervention Image: Construction Image: Construction							
	Structure Id 7799 Name							
								L
				S	Sub-total \$		-	

Structu	re Maintenance Schedule				M1	She 15 of		
Struct	ıre Id7799 Na	ame						
Inspection	Date 19-NOV-2020	Insp	ection]	Level 1	2	x 3 []	-
Defect L	ocation and Details (from B2 forms)							
Componen	t Location (Modification/Group/Component/Stan	dard N	umber	0	<u>/</u> S6	<u>/</u> W	-	
Compon	ent Description Waterway	Signi	ficance	1	2	3	4]
					211		4 <u>i</u>	j
Significant local	sea baile up at El 1 of administream side (024, 075). Noter to sedar sound	ngs ropor	t. Monitor.	[.	\square			
Activity No	Description	Unit	Quantity	Urit Rate		Amount	Priority	Completed
			\sim					
			<u>> </u>	Sub-tota	I \$		-	
Defect L	ocation and Details (from B2 forms)							
Compon Defect Det	ent DescriptionGirders ails	Signi onditio	ficance n State	1[] 1[]	2[] 2[]	3 3 4 3 x 4	4 x 4]
Activity No	Description	Jnit	Quantity	Jnit Rate		Amount	riority	Completed
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Compone Defect Det	ent Description Girders ails Co	Signi Signi Signi	ficance	1	2		4 <u>x</u>]
_			ondo narti	icularly of gi	rdoro 4 (04			
Activity No	Description	Duit	Quantity	Unit Rate		5 - typical). tunouut	Priority	Completed
	ucture Id 7799 Name							
			8	Sub-tota	I \$		-	

Structu	re Maintenance	Schedule				M1		leet If 16	
Struct			Name						
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Defect L	ocation and Details ((from B2 forms)							
Componen	nt Location (Modific:	ation/Group/Componen	t/Standard N	umber	ST	/ S6	<u>/</u> G1	<u>/</u> 22	2S
		Girders	Signif	ïcance	1	2	3[]	4 x	
Defect Det	ails		Condition	n State	1[]	20	3 7	4]
	essing bars retro-fitted to eithe		ue (092)		_	$\langle h \rangle$			
	emoved and replaced in 2018	as part of investigations into fatig Description	ue (083).			$\overline{\mathbf{n}}$			p
Activity No		Description		Quantity	Urát Rate		mt	rity	Completed
Activ			Unit	Qual	Urait	\sim	Amount	Priority	Com
120S2	Replace or install bolts		each	2	\sum	580	116	0 3	Ν
					\sim				
				S S	ub-tota	al \$	116)	

St	ruct	ure	e S	cour So	oun	din	gs F	Re	port							B2/7	/		heet Of 3	
	6			ure Id		799		-				ıme								
				Name $\frac{B}{B}$			ver			AI	t. Na			MR	DED	ARTM	IFNT	OF M	AIN D	;
				e Type B	irde		am				Ow Dist			403		North				
					teel						LGA			277		REEBA	SHI	RE/CO	UNC	i
COL	stiuc			pector		NR				- '			•	-NOV				$\overline{\langle}$		
T	nsnec			evel 2	1	Prog	ram	me	d [רי						 Partia	l Inspa	ection		
	пэрсс	tion		evel 3													Under	~ >		
		Ro	ad	Section						Sta	rt			E	nd		<u> </u>	Dist		
Ic		escr					way	S	RPC	2		Dist		PC	D	ist	Star		End	l
32	A C	AIR	NS	- MARE	EBA	С	1	С	5		0.	000		5	0.2	57	12.53	5	12.792	
	Soundii Locatio	-		Permanent Reference			S	oune	ling Do	e pth (1	m)				\sim		Comme	ıts		
				Feature					Stream	m Bed	I									
Modification	Image: Construction of the state of the																			
0																				
Side	2 = upst Rehab I	ream	side	. Large differe	ence fr	om firs	st readi	ing li	kely du	e to re	locatio	on of	sour	nding site	e. Current	reading	similar to	previous	readings	S -
0	S1	MS		a. Top Of Ker		8.0	8.2		8.2	0.2	0.0	2								
0	S1	E2	U	Top Of Ker		12.7	13.1		13.2	0.5	0.1	2		Local	ised scou	r from firs	st reading	js - CS2.		
0	S2	E1	U	Top Of Ker		12.7	14.0	-	14.1	14	<u>></u> 0.1	2		Local	ised scou	r from firs	st reading	js - CS2.		
0	S2	MS	U	Top Of Ker		15.5	14.9		14.9	0.6	0.0	2		Local	ised build	up from	first read	ings - CS	52 .	
0	S2	E2	U	Top Of Ker	17.6	20.7	20.5		20.2	0.5	0.3	2		Local	ised build	up from	first read	ings - CS	52 .	
0	S3	E1	U	Top Of Ker	17.6	20.7	20.6		20.3	0.4	0.3	2								
						(0										Depth (metres	;)		
So	undin	g L	oca	tions		\sim	Ð						CS	61		S 2		3 3	CS	6 4
Gro	սթ]	Loc	ation (Ab	obrev	viatio			scribe ommei		· (0)	Change in	depth	Local scour depth	Change in depth	Local scour depth	Change in depth	Local scour depth	Change in depth	Local scour depth
Spar	ı	I	End	1 ()E1), Mids	span	(MS),	End 2	2 (E:	2), Oth	ner (O)	<0).2	<0.5	0.2 to 0.49	0.5 to 1.99	0.5 to 1.0	2.0 to 4.0	>1.0	>4.0
				\sim																

				-			_	_								Sheet
St	ructi	ure	S	cour So	bun	din	gs F		oort						B2/7	2 Of 3
Sti	ructur	re Id	1_	7799							Ν	am	e			
Su	rvey l	Dat	e 1	9-NOV-2	0		Insp	pect	tion l	Leve	12[X		Level 3] U	nderwater []
	Soundin Locatio	-		Permanent Reference			S	ound	ling Do	epth (1	m)				Co	mments
				Feature					Stream	m Bed	1		đ			
Modification	Group	Location	Side	Top of kerb, deck or concrete parapet	Water Surface	First	Previous	Rehab	Current	First Diff	Current Diff	Condition State	Critical Scour Dip	Last Stream	Bed Rehab	: 17-MAR-2008 : 19-NOV-2020 : 19-NOV-2020
0	S3	MS	U	Top Of Ker	17.8	21.0	21.2		21.6	0.6	0.4	2		Localised scou	r from first a	nd reading - CS2.
0	S3	E2	U	Top Of Ker	18.0	20.0	21.1		21.4	1.4	0.3	2		Localised scou	r from first r	eading - CS2.
0	S 4	E1	U	Top Of Ker	18.0	20.0	21.0		21.2	1.2	0.2	2		Localised scou	r/rom first r	eading - CS2.
0	S4	MS	U	Top Of Ker	18.1	21.0	20.8		21.0	0.0	0.2	2		$\overline{\langle \rangle \rangle}$,	
0	S 4	E2	U	Top Of Ker	18.3	21.0	21.3		21.4	0.4	0.1	2				
0	S5	E1	U	Top Of Ker	18.3	21.0	21.5		21.3	0.3	0.2	2	$\langle \langle \rangle$			
0	S5	MS	U	Top Of Ker		18.2	17.5		17.8	0.4	0.3	2		\diamond		
0	S5	E2	U	Top Of Ker		15.7	15.8		15.9	0.2	0.1	2	$\left \right\rangle$			
0	S6	E1	U	Top Of Ker		15.7	15.5		15.5	0.2	0.0	2	Ĵ			
0	S 6	MS	U	Top Of Ker		6.6	6.7		<mark>6.8</mark>	0.2	0.1	2				
0	S6	E2	U	Top Of Ker		1.7	2.0		2.2	0.5	0.2	2		Localised scou	r from first r	eading - CS2.
0	S 1	E1	D	Top Of Ker		4.8	5.0		5.0	0.2	0.0	2		Side 1 = downs	stream side.	
0	S 1	MS	D	Top Of Ker		9.1	8.5		8.5	0.6	0.0	2		Localised build	up from firs	t reading - CS2.
0	<mark>S</mark> 1	E2	D	Top Of Ker		13.6	13.5	ÌĊ	13,5	0.1	0.0	1				
0	S2	E1	D	Top Of Ker		14.2	14.0		14.2	0.0	0.2	2				
0	S2	MS	D	Top Of Ker		15.2	15.0	-	15.2	0.0	0.2	2				
0	S2 E2 D Top Of Ker 17.6 21.0 20.3 18.2 2.8										2.1	3		Significant loca	llised build u	ıp - CS3.
0	S3	E1	D	Top Of Ker	17.6	20.9	20.5		20.1	0.8	0.4	2		Localised build	up from firs	t reading - CS2.
0	S3	MS	D	Top O(Ker	17.8	20.6	21.4		21.4	0.8	0.0	2		Localised build	up from fire	st reading - CS2.
0	S3	E2	D	Top Of Ker	17.9	21.1	21.3		21.3	0.2	0.0	2				
0	S4	E1	2	Top Of Ker	17.9	21.2	21.6		22.0	0.8	0.4	2		Localised scou	r from first r	eading - CS2.
				\sim												

St	ructi	Jre	S	cour So	oun	din	as F	Rei	oort						B2/7	Sheet			
	1400				Jan	u	90.									3 Of 3			
	ructur rvey]		-	7799 9-NOV-2			Insp	pect	tion 1	Leve		am X		Level 3	_] U	nderwater []			
	Soundin Locatio	-		Permanent Reference			Se	ound	ling D	e pth (1	n)				Co	mments			
				Feature					Stream	m Bed	L		ij						
Modification	Group	Location	Side	Top of kerb, deck or concrete parapet	Water Surface	First	Previous	Rehab	Current	First Diff	Current Diff	Condition State	Critical Scour Dip	Last Stream	n Bed Rehab	: 17-MAR-2008 : 19-NOV-2020 : 19-NOV-2020			
0	S4	MS	D	Top Of Ker	18.1	21.3	20.8		20.4	0.9	0.4	2		Localised build	d up from firs	t reading - CS2.			
0	S4	E2	D	Top Of Ker	18.3	20.9	20.9		20.9	0.0	0.0	1			$\overline{\checkmark}$				
0	S5	E1	D	Top Of Ker	18.3	21.8	21.0		21.0	0.8	0.0	2		Localised buik	up from firs	t reading - CS2.			
0	S5	MS	D	Top Of Ker		16.8	17.2		17.2	0.4	0.0	2			>				
0	S5	E2	D	Top Of Ker		16.2	15.0		14.9	1.3	0.1	2		Significant localised build up from first reading - CS2.					
0	S6	E1	D	Top Of Ker		16.0	14.0		12.4	3.6	1.6	3	$\langle \langle \rangle$						
Signi	īcant loc	alise	d bu	ild up from firs	st and	previo	us rea	dings	s - CS3					\sim					
0	S6	MS	D	Top Of Ker		7.0	6.5		6.5	0.5	0.0	2	\sum	Localised build	d up from firs	t reading - CS2.			
0	S6	E2	D	Top Of Ker		2.6	2.0		2.0	0.6	0.0	2	5	Localised build	d up from firs	t reading - CS2.			

Level 2 Insp	ection Report	t - P	hoto	s & Sk	etches Record	B2/6		eet
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	ure Id 7799				Name			
Crossing	Name Barron Ri	iver		Al	t. Name Owner <u>MR DEI</u>			
Structure	e Type Bridge						NT OF MA	AIN R
Construction	1 Type On delibe	am			District 403 Far	North		
Construction Ma					GA Id 277 MA		SHIRE CO	UNCI
					Date 19-NOV-2020			7
	Level 2 X			gramme				~
	Level 3		Exc	eptional			nderwater	<u>LJ</u>
	Section	~	~ •	Star			TDist	
							Start 2.535 1	End 2.792
	- MAREEDA C		<u> </u>	5	0.000 5 0.		2.355	2.192
			Loca		Description			
			Loca	luon	< <	/		
		tion		ent	 Deck Surface (full width Side View (waterway, sp 		· · · · · · · · · · · · · · · · · · ·	
Film/Exposure	Sketch No	Modification	ę.	Component	 * Underside (deck and pie * Deficient Component an 			
Number	Sketten 140	Mod	Group	Con	* Undefined Elements	u Major Del	iccis	Id
001		0	AP1	AP	General view of approach			1560295
002		0	AP1	GR	Typical post connection in AP	1 GR		1560296
003		0	A1	J1	ATjoint			1560297
004		0	S1	BR	Typical lack of thread in BR ar	nchor bolts		1560298
005		0	S2	BR	∑) ∛ýpical lack of thread in BR ar	nchor bolts		1560299
006		0	S1 <	ws	View across deck			1560300
007		0	S1	K2	Survey marker S1 K2			1560301
008		0	A1_	J2	Showing A1 J2			1560302
009		Ô	Pí	J1	Showing P1 J1 - typical of fixe	d joints		1565723
010	0	Õ	P1	J2	Showing P1 J2			1565725
011		Ø	P4	J3	Showing P4 J3			1565727
012		0	A2	J1	Showing A2 joint			1565730
013		0	S6	BR	Spall in side 2 end post AP2			1565733
014		0	A1	B4	A1 B4			1565739
015		0	A1	B4	Corosion in A1 B4 bed plate			1565740
016	\sum	0	A1	А	View of A1			1565741
017		0	A1	А	Showing minor cracking in A1			1565742
018		0	S1	D	Example of spall in S1 deck			1565743
019		0	S1	G2	S1 G2 splice			1565744

Level 2 Insp	ection Report	t - P	hoto	s & Sk	etches Record	B2/6		eet
							2 0	of 39
Structu	re Id7799		-		Name Level 2 X Level 3			
Inspection	Date <u>19-NOV-2</u>	020	_ Ins	pection]	Level 2 X Level	3[] U	nderwater	[]]
			Loca	ation	Description			
Film/Exposure Number	Sketch No	Modification	Group	Component	 Deck Surface (full width Side View (waterway, spatcher sp	ans, piers, et • constructio	tc)	Id
020		0	S1	G3	S1 G3 splice 3		\bigtriangledown	1565745
021		0	S1	G4	S1 G4 splice 3		\rightarrow	1565746
022		0	P1	н	View of P1	\bigcirc		1565747
023		0	S1	XG3	Fine cracking in weld at G2 int	erface		1565748
024		0	S1	W	General side view			1565749
025		0	P1	В	P1 fixed bearings			1565750
026		0	P1	В	Fixed halving joint S2 E1			1565752
027		0	P1	B1	Fixed rocker E1 at halving joint	:1		1565754
028		0	P1	B4	Fixed rocker B4 at halving joint	1		1565756
029		0	P1	Н	Minor spall in P1 H			1565758
030		0	S2	D	Spailing in S2 deck under finge	er joint		1565760
031		0	P2	H	View of P2			1565761
032		0	P2 <	В	Expansion halving joint S2 E2			1565763
033		0	P2	DB1	P2 B1 at expansion HJ2			1565764
034		0	P2	1	Corrosion in hinge pin			1565765
035		0	P2	B2	P2 B1 at expansion HJ2			1565766
036		C	P2	B4	P2 B4 at expansion HJ2			1565767
037	G	0	P2	B1	P2 B1 at P2			1565768
038	(70)	0	P2	B4	P2 B4 at P2			1565769
039		0	S3	D	Example of spalls in S3 deck			1565770
040		0	S3	G	Example of surface discontinui	ties in S3 gir	ders	1565771
041		0	S3	G	Example of corrosion at S3 spl	ice welds		1565772
042		0	S3	G	Example of corrosion in S3 gire	lers		1565773
043	~	0	S3	G	Example of corrosion in S3 gire	lers		1565774
044		0	S3	XG	Typical spot corrosion in XG3 a	and stressing	bars	1565775
045		ST	S3	G	Coating failure in stressing bar	ends		1565776

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Structu	re Id7799		-		Name Level 2 X Level .			
Inspection	Date <u>19-NOV-2</u>	020	_ Insp	ection 1	Level 2 X Level	3[<u>]</u> U	nderwater	
			Loca	tion	Description			
Film/Exposure Number	Sketch No	Modification	Group	Component	 * Deck Surface (full width * Side View (waterway, sp. * Underside (deck and pies * Deficient Component and * Undefined Elements 	ans, piers, e r constructio	te)	7 Id
046		0	P3	н	View of P3			1565781
047		0	P3	B1	P3 B1		\rightarrow	1565782
048		0	P3	B3	P3 B3	\bigcirc		1565783
049		0	P3	B4	P3 B4	>		1565784
050		0	P3	B4	P3 B4			1565785
051		0	S4	D	Example of spalling in S4 deck			1565786
052		0	S4	G	Example cí spot corrosion in S	4 girders		1565787
053		0	S4	G1	Example of cracks in welds at	S4 splice 2 ir	n girders	1565788
054		0	S4	G2	Example of cracks in welds at	S4 splice 2 ir	n girders	1565789
055		0	S4	G	Example of corrosion at many	splice welds	S4	1565790
056		0	P4	н	View of P4			1565791
057		0	S4	G	Example of spot corrosion in S	4 girders		1565792
058		0	P4 <	B	Showing expansion halving joi	nt E1 of S5		1565793
059		0	P4	B 1	P4 B1			1565796
060		0	P4	B1	P4 B1			1565797
061		0	P4	B2	P4 B2			1565798
062		C	P4	B3	P4 B3			1565799
063		0	P4	B4	P4 B4			1565800
064	(0)	0	P4	B5	P4 B5 downstream side			1565803
065		0	P4	B5	P4 B5 upstream side			1565806
066		0	P4	B6	P4 B6			1565808
067		0	P4	B7	P4 B7			1565810
068		0	P4	B8	P4 B8 upstream side			1565813
069	~	0	P4	B8	P4 B8 downstream side			1565816
070		0	S5	D	Example of spalling in S5 deck	at finger joir	nt	1565818
071		0	S5	G1	Example of fine cracking at sp	ice 2 S5		1565820

Level 2 Insp	evel 2 Inspection Report - Photos & Sketches Record						Sheet	
	er 2 mapeerion Report - Photos & Sketches Record				B2/6	4 Of 39		
Structu Inspection	re Id 7799 Date 19-NOV-2	020	Ins	pection]	Name Level 2 X Level 3	3[] U	nderwater	[]]
		Loc	ation	Description				
Film/Exposure Number	Sketch No	Modification	Group	Component	 Deck Surface (full width and alignment) Side View (waterway, spans, piers, etc) Underside (deck and pier construction) Deficient Component and Major Defects Undefined Elements 			Id
072		0	S5	G1	Crack in weld S5 G1-XG3 inter	face	\bigtriangledown	1565821
073		0	P5	н	View of P5		\rightarrow	1565822
074		0	P5	В	Showing fixed halving joint S5	E2		1565823
075		0	P5	В	Example of P5 bearing condition	on		1565824
076		0	P5	В	Showing P5 bearings on P5			1565825
077		0	S6	G2	Cracking at S6 G2-XG1 interfa	се		1565826
)78		0	S6	G1	Cracking in weld S6 Gi splice	3		1565827
)79		0	A2	Α	View of A2			1565828
080		0	A2	B3	A2 B3			1565829
081		0	A2	B4	A2 84			1565830
082		0	S6	XG4	Example of cracking in S6 XG4	1		1565831
083		ST	S6	G1	Showing replaced stressing ba	r		1565832
084		ST	S6	G1	Example of loss of bolts in stre	ssing bar atta	achments	1565833
085		0	sí	G3	Crack removal S1 G3 splice 3			1565834
086		0	S5	G1	Crack removal S5 G1 splice 2			1565835
087		0	SG	G1	Crack removal S6 G1 splice 3			1565836
Sketch 1-5		C	P1	J3	P1 J3 Finger Joint			1560353
Sketch 11-17	G	\mathcal{D}			Rocker Bearing Measurements	6		1560355
Sketch 18	2707	,			Post Inspection Tech note			1560288
Sketch 19					Summary plans			1560289
Sketch 20					Site Inspection: Bearings and I	Macalloy bars	5	1560290
Sketch 21	<u> </u>	0	S1	G3	S1 G3 Splice 3			1560294
Sketch 22		0	S5	G1	S5 G1 Splice 2			1560292
Sketch 23		0	S6	G1	S6 G1 Splice 2			1560293
Sketch 24					Barron Kuranda NDT and cack	removal		1565844
Sketch 25					LMAT NDT			1566263

Level 2 Inspection Report - Photos & Sketches Record					B2/6	Sheet			
						5 0)f 39		
Structure Id 7799 Name Inspection Date 19-NOV-2020 Inspection Level 2 [X] Level 3 []] Underwater []]									
	Location Description								
		_			* Deck Surface (full width	and alignm	ent)		
		Modification		nent	 * Side View (waterway, spa * Underside (deck and pier 	ans, piers, e	tc)	7	
Film/Exposure Number	Sketch No	odific	Group	Component	* Deficient Component and				
Number		Ň	G	Ŭ	* Undefined Elements			Id	
Sketch 6-10		0	P4	J2	P4 J2 Finger Joint		\rightarrow	1560354	
Structur					Name	\bigcirc			
Inspection 1	Date 19-NOV-20	20	_ Ins	pection	Level 2 X Level 3	3 🛄 C	Inderwater		
Pictures		** No	ot all ima	ges printe	d. Total size of images allow	ed for this	report has bee	n exceeded.	
	560288 Date 1				\neg				
Film / Exposure N Sketch 18	umber Sket	ch No							
Description Post Inspection T	ech note								
Mod Category	Number Comp Code	e Com	p No		(0))				
				\sim					
Id 15	560289 Date 1	4-NO\	/-2020	((\rightarrow				
Film / Exposure Number Sketch No									
Sketch 19				\bigcirc					
Description									
Summary plans			\geq						
Mod Category Number Comp Code Comp No									
Id 1560290 Date 14-NOV-2020									
Film / Exposure Number Sketch No									
Sketch 20									
Description Site Inspection: Bearings and Macalloy bars									
Mod Category Number Comp Code Comp No									

Level 2 Inspection Report - Photos & Sketches Record	B2/6	Sheet	
		6 Of 39	
Structure Id7799NameInspection Date19-NOV-2020Inspection Level 2[X]Level 3	; [] U	nderwater []	
Pictures ** Not all images printed. Total size of images allow Id 1560292 Date 14-NOV-2020	ed for this r	report has been exceeded.	
Id 1560292 Date 14-NOV-2020 Film / Exposure Number Sketch No Sketch 22			
Description S5 G1 Splice 2	E.		
Mod Category Number Comp Code Comp No O S 5 G 1	$\langle \rangle$	\geq	
Id 1560293 Date 14-NOV-2020 Film / Exposure Number Sketch No Sketch 23			
Description S6 G1 Splice 2			
Mod Category Number Comp Code Comp No O S 6 G 1			
Id 1560294 Date 14-NOV-2020			
Film / Exposure Number Sketch No Sketch 21			
Description S1 G3 Splice 3			
Mod Category Number Comp Code Comp No O S 1 G 3			
Id 1560295 Date 14-NGV-2020			
Film / Exposure Number Sketch No 001 Image: Constraint of the second se	an		
Description General view of approach			
Mod Category Number Comp Code Comp No O AP 1 AP			

Lovel 2 Increation Percett, Photos 9 Clusters	B2/6	Sheet	
Level 2 Inspection Report - Photos & Sketches Record			7 Of 39
Structure Id7799NameInspection Date19-NOV-2020Inspection Level 2		3 [<u>]</u> U	Inderwater []
Pictures ** Not all images printed. Total s Id 1560296 Date 14-NOV-2020 Film / Exposure Number Sketch No 002 Description	size of images allow	red for this	report has been exceeded.
Id 1560297 Date 14-NOV-2020 Film / Exposure Number Sketch No 003			

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Level 2 Inspection Report - Photos & Sketches Record	B2/6	8 Of 39	
Structure Id7799NameInspection Date19-NOV-2020Inspection Level 2[X]Level 3		nderwater[]	
** Not all images printed. Total size of images allow	ed for this r	report has been exceeded.	
Id 1560298 Date 14-NOV-2020			
Film / Exposure Number Sketch No 004			
Description Typical lack of thread in BR anchor bolts	IN		
Mod Category Number Comp Code Comp No O S 1 BR			
Id 1560299 Date 14-NOV-2020			
Film / Exposure Number Sketch No 005			
Description Typical lack of thread in BR anchor bolts		and the second second	
		8	
Mod Category Number Comp Code Comp No O S 2 BR	Y		
	1997 - C. 2.4		
Id 1560300 Date 14-NOV-2023			
Film / Exposure Number Sketch No 006 Image: Sketch No Description Image: Sketch No View across deck Image: Sketch No			
Mod Category Number Comp Code Comp No		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
Level 2 Inspection Report - Photos & Sketches Record	B2/6	Sheet 9 Of 39	
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Structure Id 7799 Name Inspection Date 19-NOV-2020 Inspection Level 2 X Level 3	() U		
Pictures ** Not all images printed. Total size of images allows Id 1560301 Date 14-NOV-2020 Film / Exposure Number Sketch No 007 Image: Sketch No D07 Description Image: Survey marker S1 K2 Image: Since S1 K2 Mod Category Number Comp Code Comp No Image: Since S1 K2 Image: Since S1 K2 Mod Since S1 K2 Image: Since S1 K2 Image: Since S1 K2 Image: Since S1 K2 Mod Since S1 K2 Image: Since S1 K2 Image: Since S1 K2 Image: Since S1 K2 Image: Since S1 K2 Image: Since S1 K2 Image: Since S1 K2 Image: Since S1 K2 Image: Since S1 K2 Image: Since S1 K2 Image: Since S1 K2 Image: Since S1 K2 Image: Since S1 K2 Image: Since S1 K2 Image: Since S1 K2 Image: Since S1 K2 Image: Since S1 K2 Image: Since S1 K2 Image: Since S1 K2 Image: Since S1 K2 Image: Since S1 K2 Image: Since S1 K2 Image: Since S1 K2 Image: Since S1 K2 Image: Since S1 K2 Image: Since S1 K2 Image: Since S1 K2 Image: Since S1 K2 Image: Since S1 K2 Image: Since S1 K2 Image: Since S1 K2 Ima			
Id 1560302 Date 14-NOV-2020			
Id 1560353 Date 14-NOV-2020 Film / Exposure Number Sketch No Sketch 1-5			

Loval 2 Increation Panart Bhotos & Skatabas	Pagard	P2/6	Sheet
Level 2 Inspection Report - Photos & Sketches	Record	B2/6	10 Of 39
Structure Id7799NameInspection Date19-NOV-2020Inspection Level 2[X] Level	3 [] (Inderwater []
Pictures ** Not all images printed. Total siz	e of images allo	wed for this	report has been exceeded.
Id 1560354 Date 14-NOV-2020			
Film / Exposure Number Sketch No Sketch 6-10		~	
Description P4 J2 Finger Joint			
Mod Category Number Comp Code Comp No O P 4 J2	<	$\langle \rangle$	\geq
Id 1560355 Date 14-NOV-2020 Film / Exposure Number Sketch No Sketch 11-17		7	
Description Rocker Bearing Measurements			
Mod Category Number Comp Code Comp No	25		
Id 1565723 Date 14-NOV-2020	AL PROPERTY OF		
Film / Exposure Number Sketch No 009 009			
Description Showing P1 J1 - typical of fixed joints			a contraction
Mod Category Number Comp Code Comp No O P 1 J1			

Level 2 Increation Depart - Distance & Skatcher	Decerd	Dave	Sheet
Level 2 Inspection Report - Photos & Sketches	notos & Sketches Record	B2/6	11 Of 39
Structure Id7799NameInspection Date19-NOV-2020Inspection Level 2	X Level	3 [] (Inderwater []
Pictures ** Not all images printed. Total siz Id 1565725 Date 14-NOV-2020 Film / Exposure Number Sketch No 010 Description Description Image: Showing P1 J2 Mod Category Number Comp Code Comp No O P 1 J2 Image: Showing P1 J2	e of images allow	ved for this	report has been exceeded.
Id 1565727 Date 14-NOV-2020 Film / Exposure Number Sketch No 01		433	

Level 2 Inspection	on Report - Ph	otos & Sketches	Record	B2/6	Sheet 12 Of 39
Structure Id Inspection Date	7799 19-NOV-2020	Name Inspection Level 2	x Level	3[] U	nderwater []
		all images printed. Total siz			
Pictures Id 1565730					
Film / Exposure Number 012				-	
Description Showing A2 joint			0		
	er Comp Code Comp	No			
Id 1565733 Film / Exposure Number		2020			
013			PK		
Description Spall in side 2 end post	AP2				1 Para
Mod Category Number O S 6	er Comp Code Comp	No			
	S				
<					
	B C				
	7				

Level 2 Inspection Report - Photos & Sketche	es Record	B2/6	Sheet
			13 Of 39
Structure Id7799NameInspection Date19-NOV-2020Inspection Level 2		[] U	nderwater []
Pictures ** Not all images printed. Total Id 1565739 Date 14-NOV-2020 Image: Comparison of the second s	size of images allowe	ed for this r	eport has been exceeded.
Film / Exposure Number Sketch No 014			
Description A1 B4	5-N/ 0	K	
Mod Category Number Comp Code Comp No O A 1 B 4			
Id 1565740 Date 14-NOV-2020 Film / Exposure Number Sketch No 015			
Id 1565741 Date 14-NOV-2020 Film / Exposure Number Sketch No 016			

Loval 2 Inspection Report - Photos & Skatches Record	Bale	Sheet
Level 2 Inspection Report - Photos & Sketches Record	B2/6	14 Of 39
Structure Id7799NameInspection Date19-NOV-2020Inspection Level 2[X]Level 3		nderwater []
** Not all images printed. Total size of images allow	ved for this i	report has been exceeded.
Id 1565742 Date 14-NOV-2020		
Film / Exposure Number Sketch No 017	45	
Description	X	
Showing minor cracking in A1		
Mod Category Number Comp Code Comp No O A 1 A		
Id 1565743 Date 14-NOV-2020		
Film / Exposure Number Sketch No 018	1)	
Description Example of spall in S1 deck	Ci da	7
Mod Category Number Comp Code Comp No O S 1 D		
Id 1565744 Date 14-NOV-2020	Hereita an	
Film / Exposure Number Sketch Ne 019	-	
	THE N	THE

Level 2 Inspection Report - Photos & Sketches Record	B2/6	Sheet 15 Of 39
Structure Id 7799 Name Inspection Date 19-NOV-2020 Inspection Level 2[X] Level 3) [] U	nderwater []
Pictures ** Not all images printed. Total size of images allow Id 1565745 Date 14-NOV-2020 Film / Exposure Number Sketch No Image: Sketch No 020 Image: Sketch No Image: Sketch No	ed for this r	report has been exceeded.
Description S1 G3 splice 3 Mod Category Number Comp Code Comp No O S 1 G 3		
Id 1565746 Date 14-NOV-2020 Film / Exposure Number Sketch No 021 Description S1 G4 splice 3 Mod Category Number Comp Code Comp No O S 1 G 4		
Id 1565747 Date 14-NOV-2020		

Level 2 Inspection Report - Photos & Sketc	hes Record	B2/6	Sheet
Structure Id 7799 Na			16 Of 39
Pictures ** Not all images printed. Tot Id 1565748 Date 14-NOV-2020 Film / Exposure Number Sketch No O O23	al size of images allow	red for this r	eport has been exceeded.
Id 1565749 Date 14-NOV-2020 Film / Exposure Number Sketch No 024			
Film / Exposure Number Sketch No 025			

Loval 2 Inspection Penart Photos 9 Skatches Pesard	P2/6	Sheet
Level 2 Inspection Report - Photos & Sketches Record	B2/6	17 Of 39
Structure Id 7799 Name Inspection Date 19-NOV-2020 Inspection Level 2[X] Level 3		nderwater []
** Not all images printed. Total size of images allow	ed for this r	report has been exceeded.
Id 1565752 Date 14-NOV-2020	-e 19 110	
Film / Exposure Number Sketch No 026 026	M	
Description Fixed halving joint S2 E1	1	
Mod Category Number Comp Code Comp No		
	\bigcirc	and a start
		No.
	1	
Id 1565754 Date 14-NOV-2020		
Film / Exposure Number Sketch No 027 027	K	
Description	hand	
Fixed rocker B1 at halving joint 1	P. Contraction	and the second s
Mod Category Number Comp Code Comp No	2	in the second
	A C LO .	and the second
		ture of the second s
Id 1565756 Date 14-NOV-2020		
Film / Exposure Number Sketch No	2.	
	All	
Description Fixed rocker B4 at halving joint 1	to the	
Mod Category Number Comp Code Comp No	1 Ng	Contraction of the local division of the loc
$\begin{array}{ c c c c c }\hline O & P & 1 & B & 4 \\\hline \end{array}$	all	
	- The	- Martin

Level 2 Inspection Report - Photos & Sketches Record	B2/6	Sheet 18 Of 39
Structure Id 7799 Name Inspection Date 19-NOV-2020 Inspection Level 2[X] Level 3		nderwater []
Pictures ** Not all images printed. Total size of images allow Id 1565758 Date 14-NOV-2020 Film / Exposure Number Sketch No Image: Sketch No Image: Sketch No 029 Image: Sketch No Image: Sketch No Image: Sketch No	ed for this r	report has been exceeded.
Description Minor spall in P1 H Mod Category O P 1 H		
Id 1565760 Date 14-NOV-2020 Film / Exposure Number Sketch No Image: Composition of the second	b	
Id 1565761 Date 14-NOV-2020 Film / Exposure Number Sketch Ns 01 Description Mod Category Number Comp Code 0 P 2 H		

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Level 2 Inspection Report - Photos & Sketches Record	82/0	19 Of 39
Structure Id7799NameInspection Date19-NOV-2020Inspection Level 2 XLevel 3	3 [] U	nderwater []
Pictures ** Not all images printed. Total size of images allow	ed for this r	eport has been exceeded.
Id 1565763 Date 14-NOV-2020		
Film / Exposure Number Sketch No 032		
Description Expansion halving joint S2 E2	R	
Mod Category Number Comp Code Comp No O P 2 B		
Id 1565764 Date 14-NOV-2020 Film / Exposure Number Sketch No Image: Comparison of the state of		
Description P2 B1 at expansion HJ2		
Mod Category Number Comp Code Comp No O P 2 B 1		

Level 2 Increation Depart - Distance & Skatches Depart	DO/C	Sheet
Level 2 Inspection Report - Photos & Sketches Record	B2/6	20 Of 39
Structure Id 7799 Name Inspection Date 19-NOV-2020 Inspection Level 2[X] Level 3) [] U	nderwater []
Pictures ** Not all images printed. Total size of images allow Id 1565765 Date 14-NOV-2020 Film / Exposure Number Sketch No Sketch No 034	ed for this r	report has been exceeded.
Id 1565766 Date 14-NOV-2020		

Level 2 Inspection Report - Photos & Sketch	nes Record	B2/6	Sheet 21 Of 39
Structure Id 7799 Nat Inspection Date 19-NOV-2020 Inspection Leve	ne 1 2 [<u>x</u>] Level 3	3 [] U	
Pictures ** Not all images printed. Total Id 1565767 Date 14-NOV-2020 Film / Exposure Number Sketch No 036 036	al size of images allow	red for this r	report has been exceeded.
Id 1565768 Date 14-NOV-2020			
Id 1565769 Date 14-NOV-2020 Film / Exposure Number Sketch No 038	P2	84	

aval 2 Increation Penert Photos & Skatabas Penerd	B2/6	Sheet
Level 2 Inspection Report - Photos & Sketches Record		22 Of 39
Structure Id7799NameInspection Date19-NOV-2020Inspection Level 2[X]Level 3	3 [] U	nderwater []
** Not all images printed. Total size of images allov	/ed for this r	eport has been exceeded.
Id 1565770 Date 14-NOV-2020		
Film / Exposure Number Sketch No 039		
Description		
Example of spalls in S3 deck		
Mod Category Number Comp Code Comp No O S 3 D		
Id 1565771 Date 14-NOV-2020		
Film / Exposure Number Sketch No 040		
Description Example of surface discontinuities in S3 girders		
Mod Category Number Comp Code Comp No S 3 G 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	593	
Id 1565772 Date 14-NOV-2020		
Film / Exposure Number Sketch No 041		
Description Example of corrosion at S3 splice welds		Al Contraction
Mod Category Number Comp Code Comp No O S 3 G	500	1
	A CARE	

oval 2 Inspection Benert Bhotos & Skatahas Beserd	B2/6	Sheet
evel 2 Inspection Report - Photos & Sketches Record		23 Of 39
Structure Id 7799 Name Inspection Date 19-NOV-2020 Inspection Level 2[X] Level 3	3 [<u>]</u> U	nderwater []
** Not all images printed. Total size of images allow	ed for this i	report has been exceeded.
Id 1565773 Date 14-NOV-2020		
Film / Exposure Number Sketch No 042 042	Rior	
Description Example of corrosion in S3 girders	R	
Mod Category Number Comp Code Comp No O S 3 G		
Id 1565774 Date 14-NOV-2020		
Film / Exposure Number Sketch No 043		
Id 1565775 Date 14-NOV-2020 Film / Exposure Number Sketch No 044		

Level 2 Inspection Report - Photos & Sketches Record	B2/6	Sheet 24 Of 39
Structure Id 7799 Name Inspection Date 19-NOV-2020 Inspection Level 2 Level	3 [] U	
Pictures ** Not all images printed. Total size of images allo Id 1565776 Date 14-NOV-2020 Film / Exposure Number Sketch No 045 045	wed for this	report has been exceeded.
Description Coating failure in stressing bar ends Mod Category Number ST S 3 G		
Id 1565781 Date 14-NOV-2020 Film / Exposure Number Sketch No Image: Comparison of the state of the		
Mod Category Number Comp Code Comp No O P 3 H Image: Comp Code Image: Comp Code Image: Comp Code P 3 H Image: Comp Code Image: Comp Code Image: Comp Code P 3 H Image: Comp Code Image: Comp		
Id 1565782 Date 14-NOV-2020 Film / Exposure Number Sketch No 047		

loval 2 Inspection Penert - Photos & Skatabas Penerd	D2/6	Sheet
Level 2 Inspection Report - Photos & Sketches Record	B2/6	25 Of 39
Structure Id7799NameInspection Date19-NOV-2020Inspection Level 2[X]Level	3 [<u>]</u> U	nderwater []
** Not all images printed. Total size of images allow	/ed for this I	report has been exceeded.
Id 1565783 Date 14-NOV-2020		
Film / Exposure Number Sketch No 048 048	P3 B3	ALS .
Description P3 B3 Mod Category Number Comp Code Comp No	12	
O P 3 B 3		
Id 1565784 Date 14-NOV-2020	•	
Film / Exposure Number Sketch No Description D3. P4	P3 64	
P3 B4 Mod Category Number Comp Code Comp No O P 3 B 4		
Id 1565785 Date 14-NOV-2020		
Film / Exposure Number 050 Description P3 B4 Mod Category Number Comp Code Comp Code Comp No P 3 B 4		

l aval 2 Increation Penart - Photos & Skatabas Penard	D0/6	Sheet
Level 2 Inspection Report - Photos & Sketches Record	B2/6	26 Of 39
Structure Id7799NameInspection Date19-NOV-2020Inspection Level 2[X]Level 3	3 [] U	nderwater []
** Not all images printed. Total size of images allow	ed for this i	report has been exceeded.
Id 1565786 Date 14-NOV-2020		
Film / Exposure Number Sketch No 051 Image: Constraint of the second se		ANS I
Description		
Example of spalling in S4 deck	15	
Mod Category Number Comp Code Comp No O S 4 D		
Id 1565787 Date 14-NOV-2020	The second second	91.2.18
Film / Exposure Number Sketch No 052		
Mod Category Number Comp Code Comp No O S 4 G		
Id 1565788 Date 14-NOV-2020		
Film / Exposure Number Sketch No 053		
Mod Category Number Comp Code Comp No O S 4 G 1	North Contraction	

Level 2 Inspection Report - Photos & Sketches Record	B2/6	Sheet 27 Of 39
Structure Id 7799 Name Inspection Date 19-NOV-2020 Inspection Level 2[X] Level 3	s [] U	
** Not all images printed. Total size of images allow Id 1565789 Date 14 -NOV-2020 Film / Exposure Number Sketch No 054 054 Description Example of cracks in welds at S4 splice 2 in girders Images printed. Total size of images allow Mod Category Number Comp Code Comp No 0 3 4 G 2	ed for this r	report has been exceeded.
Id 1565790 Date 14-NOV-2020 Film / Exposure Number Sketch No Sketch No 055		
Id 1565791 Date 14-NOV-2020		

Level 2 Inspection Report - Photos & Sketches	Record	B2/6	Sheet 28 Of 39
Structure Id 7799 Name Inspection Date 19-NOV-2020 Inspection Level 2	C Level 3		
** Not all images printed. Total size Id 1565792 Date 14-NOV-2020 Film / Exposure Number Sketch No 057	of images allow	ved for this in	report has been exceeded.
Id 1565793 Date 14-NOV-2020 Film / Exposure Number Sketch No 058			
Id 1565796 Date 14-NOV-2020 Film / Exposure Number Sketch No 059	P4-B		

Level 2 Inspection Report - Photos & Sketches Record		B2/6	Sheet 29 Of 39
Structure Id 7799 Nation Date 19-NOV-2020 Inspection Level	me 1 2 [X] Level 3	3 [] U	nderwater []
Pictures ** Not all images printed. Tot Id 1565797 Date 14-NOV-2020 Film / Exposure Number Sketch No 060 060	al size of images allow	red for this i	report has been exceeded.
Id 1565798 Date 14-NOV-2020	P4 1	52	
Id 1565799 Date 14-NOV-2020 Film / Exposure Number Sketch No 062		PH+ FA3	

Level 2 Inspection Report - Photos & Sketches Record	B2/6	Sheet 30 Of 39		
Structure Id 7799 Name Inspection Date 19-NOV-2020 Inspection Level 2[X] Level 3 [_] Underwater [_]				
Pictures ** Not all images printed. Total size of images allow Id 1565800 Date 14-NOV-2020	ed for this r	report has been exceeded.		
Film / Exposure Number Sketch No 063				
Id 1565803 Date 14-NOV-2020 Film / Exposure Number Sketch No Image: Comparison of the state of				
Description P4 B5 downstream side Mod Category Number O P 4 B 5				
Id 1565806 Date 14-NOV-2020 Film / Exposure Number Sketch No 065 065				
Description P4 B5 upstream side	3			
Mod Category O P 4 B				

Level 2 Inspection Report - Photos & Sketches	Pacard	B2/6	Sheet
Level 2 Inspection Report - Photos & Sketches	Inspection Report - Photos & Sketches Record		31 Of 39
Structure Id7799NameInspection Date19-NOV-2020Inspection Level 2	X Level 3	3 [<u>]</u> U	nderwater []
Pictures ** Not all images printed. Total size Id 1565808 Date 14-NOV-2020 Film / Exposure Number Sketch No 066 Description P4 B6 0 0 Mod Category Number Comp Code Comp No O P 4 B 6			
Id 1565810 Date 14-NOV-2020 Film / Exposure Number Sketch No D67	P487		

Loval 2 Inspection Penart Photos & Skatches Pesard	D2/6	Sheet
Level 2 Inspection Report - Photos & Sketches Record	B2/6	32 Of 39
Structure Id7799NameInspection Date19-NOV-2020Inspection Level 2[X]Level 3	[] U	nderwater []
Pictures ** Not all images printed. Total size of images allows Id 1565813 Date 14-NOV-2020 Film / Exposure Number Sketch No Images printed. Images printed. Description P B B Images printed. Images printed. Mod Category Number Comp Code Comp No Images printed. Images printed. Images printed. Images	ed for this r	report has been exceeded.
Id 1565816 Date 14-NOV-2020		

loval 2 Increation Penart Photos 9 Skatabas Penard	P0/6	Sheet
Level 2 Inspection Report - Photos & Sketches Record	B2/6	33 Of 39
Structure Id 7799 Name Inspection Date 19-NOV-2020 Inspection Level 2[X] Level 3	3 [] U	nderwater []
Pictures ** Not all images printed. Total size of images allow Id 1565818 Date 14-NOV-2020	ed for this i	report has been exceeded.
Film / Exposure Number Sketch No		
Description Example of spalling in S5 deck at finger joint Mod Category O S 5 D		
Id 1565820 Date 14-NOV-2020 Film / Exposure Number Sketch No 071		
	LA.	
Id 1565821 Date 14-NOV-2020 Film / Exposure Number Sketch No 072	State	in the second

Lovel 2 Increation Penert - Photos 9 Skatabas Pener		Sheet
Level 2 Inspection Report - Photos & Sketches Record	d B2/6	34 Of 39
Structure Id 7799 Name Inspection Date 19-NOV-2020 Inspection Level 2[X] Level	evel 3 [] U	nderwater []
Pictures ** Not all images printed. Total size of images Id 1565822 Date 14-NOV-2020 Film / Exposure Number Sketch No 073 O73	allowed for this re	eport has been exceeded.
Id 1565823 Date 14-NOV-2020		

Level 2 Inspection Report - Photos & Sketches Record	B2/6	Sheet 35 Of 39
Structure Id 7799 Name Inspection Date 19-NOV-2020 Inspection Level 2 Level 3	s [] U	nderwater []
** Not all images printed. Total size of images allow Id 1565824 Date $14 - NOV - 2020$ Film / Exposure Number Sketch No 075 Image: Sketch No Description Image: Sketch No Example of P5 bearing condition Image: Sketch No O P 5 B Image: Sketch No	ed for this i	report has been exceeded.
Id 1565825 Date 14-NOV-2020 Film / Exposure Number Sketch No 076 Description Showing P5 bearings on P5 Mod Category Number Comp Code Comp Code Comp Code Comp No P 5 B		
Id 1565826 Date 14-NOV-2020 Film / Exposure Number Sketch No 077		
Id 1565827 Date 14-NOV-2020 Film / Exposure Number Sketch No 078	luch	

Level 2 inspection report - Finotos c solutiles record B2/0 36 or 39 Structure Id 7799 Name Inspection Date 19-NOV-2020 Inspection Level 2[X] Level 3	Level 2 Inspection Report - Photos & Sketches Record	B2/6	Sheet
Inspection Date 19-NOV-2020 Inspection Date 19-NOV-2020 Inspection Level 2 X Level 3 Underwater Pictures ** Not all images printed. Total size of images allowed for this report has been exceeded. Id 1555828 Date 14-NOV-2020 Film / Exposure Number Sketch No 0 A 2 A Id 1555829 Date 14-NOV-2020 Id 1555829 Date 14-NOV-2020 Id 1555829 Date 14-NOV-2020 Id 1555829 Date 14-NOV-2020 Film / Exposure Number Sketch No 080 Date Description Not all images printed. Total size of images allowed for this report has been exceeded. Id 1555829 Date 14-NOV-2020 Film / Exposure Number Sketch No 080 Description Pescription Sketch No 080 Description A2 B3 Mod Mod Category Number Comp Code Comp No Mod Category Number Comp Code Comp No	Lever 2 inspection Report - Photos & Sketches Record	82/0	36 Of 39
Id 1565828 Date [4-NOV-2020] Film / Exposure Number Sketch No 079 Description Wew of A2 Mod Category Number Comp Code 0 A 2 1 1565829 Date 14 1565829 Date 14 1565829 Date 14 1565829 Date 16 1565829 Date 16 1565829 Date 17 Sketch No Date Description Description Description A2 B3 Date 14-NOV-2020 Mod Category Number Comp Code Comp No Description Mod Category Number Comp Code Comp No Description Mod Category Number Comp Code Comp No Description		3 [] U	nderwater []
Film / Exposure Number Sketch No Description View of A2 Mod Category Number O A 2 A Id 1565829 Date 14-NOV-2020 Film / Exposure Number Sketch No 080 Description A2 B3 Mod Category Number Comp Code Comp No	Pictures ** Not all images printed. Total size of images allow	ed for this r	eport has been exceeded.
079 Description View of A2 Mod Category Number O A 2 A Id 1565829 Date 14-NOV-2020 Film / Exposure Number Description A2 B3 Mod Category Number Comp Code Comp No	Id 1565828 Date 14-NOV-2020		
View of A2 Mod Category Number O A 2 A Id 1565829 Date 14-NOV-2020 Film / Exposure Number Sketch No Description A2 B3 Mod Category Number Comp Code Comp No			
Film / Exposure Number Sketch No 080	View of A2 Mod Category Number Comp Code Comp No		
080 Description A2 B3 Mod Category Number Comp Code Comp No	Id 1565829 Date 14-NOV-2020		the state of the s
A2 B3 Mod Category Number Comp Code Comp No			
	A2 B3 Mod Category Number Comp Code Comp No	0	
		A283	

Level 2 Inspection Report - Photos & Sketch	es Record	B2/6	Sheet 37 Of 39
Structure Id 7799 Nam Inspection Date 19-NOV-2020 Inspection Level		3 [] U	
Pictures ** Not all images printed. Total Id 1565830 Date 14-NOV-2020 Film / Exposure Number Sketch No 081	size of images allow	ved for this r	eport has been exceeded.
Id 1565831 Date 14-NOV-2020 Film / Exposure Number Sketch No D82			

Level 2 Inspection Report - Photos & Sketches Record	B2/6	Sheet 38 Of 39
Structure Id 7799 Name Inspection Date 19-NOV-2020 Inspection Level 2[X] Level 3	3 [<u>]</u>] U	nderwater []
Pictures ** Not all images printed. Total size of images allow	ed for this r	eport has been exceeded.
Id 1565833 Date 14-NOV-2020		
Film / Exposure Number Sketch No 084	~	
Description Example of loss of bolts in stressing bar attachments		
Mod Category Number Comp Code Comp No ST S 6 G 1 Id 1565834 Date 14-NOV-2020	\bigcirc	\supset
Film / Exposure Number Sketch No 085	\rightarrow	
Description Crack removal S1 G3 splice 3		
Mod Category Number Comp Code Comp No O S 1 G 3		
Id 1565835 Date 14-NOV-2020		
Film / Exposure Number Sketch No 086		
Description Crack removal S5 G1 splice 2		
Mod Category Number Comp Code Comp No O S 5 G 1 Id 1565836 Date 14-NCV-2020		
Film / Exposure Number Sketch No		
Description Crack removal S6 G1 splice 3		
Mod Category Number Comp Code O S 6 G 1		
Id 1565844 Date 14-NOV-2020		
Film / Exposure Number Sketch No Sketch 24		
Description Barron Kuranda NDT and cack removal		
Mod Category Number Comp Code Comp No		

_evel 2 Inspection Report - F	hotos & Sketches Re	cord	B2/6	Sheet
Structure Id 7799 Inspection Date 19-NOV-2020	Name Inspection Level 2[X]			39 Of 39
		nages allow	ed for this	report has been exceeded.

St	andard	Proce	dure E	хс	ept	ion	s Re	epo	rt	B2/4	Sheet 1 Of 1
					•			•			
	Stru	ucture Id	Rerron	/99 Di	vor				Name		
	Crossi	ng Name uro Type	Bridge		IVEI			A	lt. Name Owner MR D District 403 Fa	EPARTMEN	T OF MAIN R
	Siruci Construct	ion Type	Girder	/Be	am				District 403 F	ar North	
Con	struction	Materia	Steel						District 403 Fi LGA Id 277 M	IAREEBA S	HIRE COUNCI
	Isti uction	Inspector		N	R				Date 19-NOV-2	2020	
Iт	nspection										\leq
		Level 3					-			U	nderwater []
	Roa	d Sectio	n					Sta	rt End		TDist
Id	l Descri	ption		S	Cwa	y S	RPC	!	Dist RPC	Dist	Start End
32.	A CAIR	NS - MA	REEBA	С	1	С	5		0.000 5	0.257 1	2.535 12.792
	Compon	ent Locatio	n						Exception (X)		
Modification	Group	Component	Standard Number	Exposure Class	Undefined Component	Component Not Inspected	Less than 25% Comp Inspected	Other	Comments * Description of undefi * Photogy ayh/sketch re * Reasons component r * Any other exceptions	eferences not inspected	
0	A1	F	59 C	3		x			Buried and unseen (016).		
0	P1	F	59 C	3		x			Euried and unseen (022).		
0	P2	F	59 C	3		x	\langle		Buried and unseen (031).		
0	P3	F	59 C	3		x		O)	Buried and unseen (036).		
0	P4	F	59 C	3		x <	\bigcirc	\geq	Buried and unseen (056).		
0	P5	F	59 C	3	4	×			Buried and unseen (073).		
0	A2	F	59 C	3		x			Buried and unseen (079).		
	O A2 F 59 C 3 X Buried and unseen (079).										

	foctivo	Comp	ononte	. 6		oort B2/3	Sh	eet		
De	efective	Comp	onents		el		1 (Df 7		
	Stru	icture Id	7799			Name				
Structure Id 7/99 Name Crossing Name Barron River Alt. Name										
	Structu	are Tvpe	Bridge			Owner <u>MR</u> <u>DEPARTMENT</u>	OF N	IAI	NR	
	Constructi	ion Type	Girder/	Be	am	District 403 Far North)			
						LGA Id 277 MAREEBA SHE			ICI	
001	I	nspector	•	NR		Date 19-NOV-2020	$\overline{}$			
In	spection I						r			
111	-	Level 3 [Programmed [X] Exceptional []] Under	muate	r-		
						· · · · · · · · · · · · · · · · · · ·			<u> </u>	
		d Sectio		~	~		Dist		-	
Id						ay S RPC Tdist RPC Tdist Stat			nd	
32	A CAIR	NS - MA	REEBA	C	I 	C 5 0.000 5 0.257 12.53	C	12.7	192	
	C					Description of Defect	R	equire	ed	
	Сотроне	ent Location	n 1	s	fe	* Detailed Description * Estimated Quantity		Action	ı	
ion		Ŧ		Exposure Class	Condition State	* "Other" action required		(X)	-	
ficat	<u> </u>	one	lard ber	sure	ition	* Urgency of action (what, who, whea, how) * Recommended Testing	tor	3 ction		
Modification	Group	Component	Standard Number	odx	ond	* Reference of Sketches and Photos (Roll/Exposure Nos)	Monitor	Level 3 Inspection	Other	
~	-	•			_		~		•	
0	AP1	GR1	72 S	3	3	23			X	
Single	bolt connection	on to end po	osts in both (GR (002	- typical). Requires provision of connections to current standards.				
0	S1	BR1	2 S	3	4		Τ	X		
All BR	posts have in	sufficient th	read at anch	lor b	olts	l and lack weshers (004 - typical). Base plates are recessed into kerbs. M	ortar ar	oplied u	up to	
						away in many cases. Minor surface corrosion at lower portion of base pla R posts. Requires engineering input.	ites typi	ical.		
0	P1	J2	11 0	3	3				Х	
Refers	s to compressi	ion seal joint	t with steel n	iosin	gs a	I tEi of span 2. Compression seal is highly weathered and perishing (010)). Spoi	ls in joi	int.	
Nosing	s appear fair S2	- gaps betw BR 1	een nosings 2 S	bc(h sid	les 47mm (Temp. 27). Recommend replacement of compression seal.	—	X	<u> </u>	
					Ċ					
						and lack washers (004 - typical). Base plates are recessed into kerbs. M away in many cases. Minor surface corrosion at lower portion of base pla			ip to	
Deline	ation provided S3	by retrorefl BR 1	lective sticks		1	R posts. Requires engineering input.	—	X	T	
				V						
						and lack washers (004, 005 - typical). Base plates are recessed into kert alled away in many cases. Minor surface corrosion at lower portion of ba				
Deline	ation provided	d by retrorefi	lective sticke	ers o	n Bl	R posts. Requires engineering input.	· · ·		1	
0	S4	BR1	25	3	4			X		
						and lack washers (004, 005 - typical). Base plates are recessed into kert alled away in many cases. Minor surface corrosion at lower portion of ba				
Deline	ation provided	d by retrorefl	lective sticke	ers o	n Bl	R posts. Requires engineering input.		T		
0	P4	33	11 0	3	3				X	
						span 5. Rubber gland is perishing with the gland breaking away in section ing moisture ingress. Seal is also lifting at side 2 at the pedestrian footw				
kerb jo	oints fair. Requ	uires replace	ement of con	npre	ssio		ay. Side		3 ai	
0	S5	BR1	2 S	3	4		1	X		
						and lack washers (004, 005 - typical). Base plates are recessed into kert				
	ation provided		lective sticke			alled away in many cases. Minor surface corrosion at lower portion of ba R posts. Requires engineering input.	se plate	s typic	,dl.	
0	S6	BR1	2 S	2	4			Х		

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De	fective	Comp	onents	s R	lep	oort	B2/3		She		
	Struc Inspectio	ture Id on Date	77 19-NOV	99 -20	020	Name Inspection Level 2 X Level 3	3 [] U 1	nder	wate	r [_	
	Compone	nt Locatio	n			Description of Defect * Detailed Description		\bigcirc		equire Action	
ion		It		Class	State	* Estimated Quantity * "Other" action required		\leq		(X)	
Modification	Group	Component	Standard Number	Exposure Class	Condition State	 * Urgency of action (what, who, when, how) * Recommended Testing * Reference of Sketches and Photos (Roll/Exposed) 	ure Nos)		Monitor	Level 3 Inspection	Other
up to le	All BR posts have insufficient thread at anchor bolts and lack washers (004, 005 - typical). Base plates are recessed into kerbs. Mortar applied up to level with top of base plate - mortar missing/spalled away in many cases. Minor surface corrosion at lower portion of base plates typical. Delineation provided by retroreflective stickers on BR posts. Requires engineering input.										
0	A2	J1	14 S	3	3	\sim					X
	l plate anchors blishment of a		side 2 lane	- rou	ighly	at wheel paths (012). Steel plate slapping noisily und	er traffic. Red	comme	nd		
0	A1	B4	43 S	3	3						X
front fa	ace also.					ck face with flaking and loss of section up to 6mm (01 NB - steel components in structure typically have red			der co	ating o	n
0	S1	G3	22 S	3	4	HD - Steel components in surcess typically have rea	icad couling	5.		Х	
	Structure undergoing investigations due to brittle failure/fatigue concerns. Several sites have undergone testing, specifically welds at splice										
Minor Post in MPI ar 4.6mm Girden S1 G3 crackir	 joins, cross girder-girder interfaces and at stiffeners. Initial visual inspection indicated cracking at welds in G2 splice 1 (019) and G3 splice 3 (020). Minor surface discontinuities noted in G3 splice 1, G4 splice 1, G2 splice 2, G2 splice 3 and G4 splice 3 (021 - typical). Refer to Sketch 18 - Post inspection Tech note and Sketch 19 - Summary Plans. MPI and ultrasonic testing post removal of lead coatings later showed cracking in S1 G3 splice 3 (lower) of up to 22mm in length and up to 4.6mm in depth. Minor cracking up to 2mm also found in S1 G4 splice 3 (lower) (refer to Sketch 25). Girders appear otherwise fair (016, 022) Refer to Sketch 18 for coating levels across structure. S1 G3 splice 3 (lower) identified as a "priority 1" crack. Post inspection weld was ground back at S1 G3 Splice 3. No apparent propogation of cracking into parent material was found (085, Sketch 21). Refer also to Sketch 24 - Barron Kuranda NDT and crack removal. 										
0	S1	G4	22 S	â	3					Х	
joins, o Initial v Minor :	Structure undergoing investigations due to britile failure/fatigue concerns. Several sites have undergone testing, specifically welds at splice joins, cross girder-girder interfaces and at stiffeners. Initial visual inspection indicated cracking at welds in G2 splice 1 (019) and G3 splice 3 (020). Minor surface discontinuities noted in G3 splice 1, G4 splice 1, G2 splice 2, G2 splice 3 and G4 splice 3 (021 - typical). Refer to Sketch 18 - Post inspection Tech note and Sketch 19 - Summary Plans.										
4.6mm	n in depth. Min	or cracking	up to 2mm a	also	foun	ngs later showed cracking in S1 G3 splice 3 (lower) of d in S1 G4 splice 3 (lower) (refer to Sketch 25).	up to 22mm	in leng	th and	up to	
	\frown					Sketch 18 for coating levels across structure.					
S1 G3 splice 3 (lower) identified as a "priority 1" crack. Post inspection weld was ground back at S1 G3 Splice 3. No apparent propogation of cracking into parent material was found (085, Sketch 21). Refer also to Sketch 24 - Barron Kuranda NDT and crack removal.											
0	P1	> ^{B1}	43 S	3	3					Х	
B1 and eviden Recom B2 and	d B4 have bee t under coatin mendations to d B3 are in fair	n coated sir g on unders o replace ar condition.	ides of both ichor nuts in	rocl rocl	oecti kers viou	(026 - typical). on however moderate-severe loss of section remains and in sole plates. s L3 report (17/12/2015) has yet to be carried out. xers-sole plates.	in anchor nut	ts (027,	028).	Corro:	sion

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De	fective	Comp	onents	s R	lep	oort	B2/3		eet Of 7	
	Struc Inspectio	ture Id on Date	77 19-NOV	99 -20	020	Name Inspection Level 2 X Level 3	3 []]] U 1	nderwate	er []	<u> </u>
	Compone	nt Locatio	n			Description of Defect * Detailed Description			lequire Action	
Modification	Group	Component	Standard Number	Exposure Class	Condition State	 * Estimated Quantity * "Other" action required * Urgency of action (what, who, when, how) * Recommended Testing * Reference of Sketches and Photos (Roll/Expose) 	v.re Nos)	Monitor	Level 3 (Inspection (
B1 and eviden Recom B2 and	Fixed rocker bearings at halving joint 1, E1 of span 2 (026 - typical). B1 and B4 have been coated since previous inspection however moderate-severe loss of section remains in anchor nuts (027, 028). Corrosion evident under coating on undersides of both rockers and in sole plates. Recommendations to replace anchor nuts in previous L3 report (17/12/2015) has yet to be carried out. B2 and B3 are in fair condition. Refer to Sketch 12 for measurements of gaps at rockers-sole plates.									
	S2	D1	20 C	3	3					X
	spails with	G4				offit under finger joint in D2 and D4 (030 - typical). Rec	uires treatme	ent of reinfor		I T
0			22 S	3	3	ure/fatigue concerns. Several sites have undergone te			Х	
splice MPI ar - S2 G	Initial visual inspection detected minor surface discontinuities in G1 splice 1, G4 splice 1, G1 splice 2, G2 at XG2 interface, G3 splice 3, and G4 splice 4 (refer to Sketch 19). MPI and ultrasonic testing post removal of lead coatings later showed cracking in: - S2 G4 splice 2 (lower) up to 3mm in length. Refer to Sketch 25. Girders appear otherwise fair (031). Possible breakdown of coating. Refer to Sketch 18 for coating levels across structure.									
0	P2	B1	43 S	3	4				Х	
B1 - C determ	S4. Lower atta ine extent of I	achment on oss of secti	downstream on.	n sid	e ha	s completely corroded away (033). Corrosion evident	in hinge pin (034) - unable	e to	
0	P2	B4	43 S	3<	Å				Х	
	S4. Lower atta rs severe.	achment on	downstream	n sid	e ha	completely corroded away (036). Corrosion evident	in hinge pin.	Corrosion in	hinge p	oin
O	S2	W	71 C	3	3			Х		
Signific	cant localised Refer to scou	build up S2	E2 on the d	ovyn	strea	am side relative to original readings (024, 031). Locali	sed scours a	nd build up i	n other	
0	P2	B1	40 0	3	3				Х	
Fixed I	bearings locat	ed on pier 2							<u> </u>	<u> </u>
	S3. Outside an acement of an					tion (037). Minor corrosion evident under coating. Pre	vious L3 insp	ection recon	nmenda	ation
B4 also has corrosion and minor loss of section in outside anchor nut (038).										
Bearin O	gs have been S3	coated sinc	e previous L 20 C	2 in 3	spec 3	tion.				X
						I reinforcement in D1 at MS, D5 at E1 and in D4 at E1	likely due to	poor cover.	Requir	es
squarii ST	ng to behind re S3	eo, treatmer G1	nt of reo and 22 S	cov 3	erino 3	g with a reinstatement mortar.			Х	
			sing bars ter	nding	, to v	vorsen towards E2 (044 - typical). Protective coating f	ailing at stres	sing bar end	ls at gir	ders
2, 3 an	id 4 (045 - typi	ical).	-						-	
Stress	ing bars requi	re cleaning	and painting	. NB	: bar	rs likely coated with lead based paint.				

Page Number: 3 of 7

De	fective	Comp	onents	s R	e	port	B2/3	Sheet 4 Of 7	
	Struc Inspectio	ture Id on Date	77 19-NOV	99 -20	20	Name Inspection Level 2 X Level 3	3 [] U i	nderwater []	
	Compone	nt Location	n			Description of Defect * Detailed Description		Required	
Modification	Group	Component	Standard Number	Exposure Class	Condition State	 * Estimated Quantity * "Other" action required * Urgency of action (what, who, when, how) * Recommended Testing * Reference of Sketches and Photos (Roll/Exposed) 	v.re Nos)	Action Level 3 Other Other	
0	P3	B1	40 O	3	4		$\overline{}$	X	
B1 - C	S4. Lower atta	achment nut	has nearly	com	plete	aly corroded away (047) with moderate corrosion in ນຳເ	e hinge pin a	nd upper attachments.	
0	P3	B4	40 O	3	4		~	x	
from hi	inge pin under	r coating. Up	oper attachn	nents	s are	 Minor corrosion evident forming under recent spot tra e untreated and have corrosion with moderate loss of s of girder (050). 	eatment coati section in nut	ng (049). Rust staining s. Severe loss of section	
0	S4	G1	22 S	3	3			х	
						ure/fatigue concerns. Several sites have undergone te Refer to Sketch 18 - Post inspection Tech note and Si			
						elds of the lower lap of splice 2 of all girders (053, 054		-	
Minor s	surface discor	ntinuities als	o noted in a	ll gir	ders	at Splice 3. Spot corresion at many splice welds (055	- typical). Re	fer to Sketch 19.	
- S4 G - S4 G - S4 G - S4 G Refer t	MPI and ultrasonic testing post removal of lead coatings later showed cracking in: - S4 G1 splice 2 (lower) up to 5mm. - S4 G2 splice 2 (lower) with a depth of 0.9mm. - S4 G3 splice 2 (lower) of up to 5mm in length. - S4 G4 splice 3 (lower) up to 3mm. Refer to Sketch 25 for testing results. Girders show a breakdown of coating with spot corrosion in several areas particularly in girders 2, 3 and 4 on the downstream faces (052, 057 - typical). Recommend cleaning and recoating as soon as teasible.								
0	S4	G2	22 S	3	3			Х	
joins, c Initial v Minor s - S4 G - S4 G - S4 G - S4 G - S4 G Refer t Girders	Structure undergoing investigations due to brittle failure/fatigue concerns. Several sites have undergone testing, specifically welds at splice joins, cross girder-girder interfaces and at sufferences. Refer to Sketch 18 - Post inspection Tech note and Sketch 19 - Summary Plans. Initial visual inspections showed fine cracks in the welds of the lower lap of splice 2 of all girders (053, 054 - typical). Refer to Sketch 19. Minor surface discontinuities also noted in all girders at Splice 3. Spot corrosion at many splice welds (055 - typical). Refer to Sketch 19. MPI and ultrasonic testing post removal of lead coatings later showed cracking in: - S4 G1 splice 2 (lower) up to Smm. - S4 G2 splice 2 (lower) with a depth of 0.9mm. - S4 G3 splice 2 (lower) of up to Smm in length. - S4 G4 splice 3 (lower) up to Smm. Refer to Sketch 25 for testing results. Girders show a breakdown of coating with spot corrosion in several areas particularly in girders 2, 3 and 4 on the downstream faces (052, 057 - typical). Recommend cleaning and recoating as soon as feasible.								
0	S4	G3	22 S	3	3			x	
						ure/fatigue concerns. Several sites have undergone te Refer to Sketch 18 - Post inspection Tech note and Si			
Initial v	visual inspection	ons showed	fine cracks	in th	e w	elds of the lower lap of splice 2 of all girders (053, 054	- <mark>typical)</mark> . Re	fer to Sketch 19.	
Minors	surface discor	ntinuities als	o noted in a	ll gir	ders	at Splice 3. Spot corrosion at many splice welds (055	- typical). Re	fer to Sketch 19.	
MPI an	nd ultrasonic te	esting post r	emoval of le	ead o	oat	ings later showed cracking in:			

Page Number: 4 of 7
Defective Components Report		B2/3	She 5 O		
Structure Id 7799	Name		50	,	
Structure Id 7799 Inspection Date 19-NOV-2020 Ir	spection Level 2 X Level 3	U	nderwate	r [_]
Component Location * Deta	ption of Defect niled Description	2		equire Action	
iffication bolds and a second and a second and a second and a second a se	mated Quantity her" action required ency of action (what, who, when, how) ommended Testing erence of Sketches and Photos (Roll/Exposi	rre Nos)	Monitor	Level 3 <	Other
 S4 G1 splice 2 (lower) up to 5mm. S4 G2 splice 2 (lower) with a depth of 0.9mm. S4 G3 splice 2 (lower) of up to 5mm in length. S4 G4 splice 3 (lower) up to 3mm. Refer to Sketch 25 for testing results. Girders show a breakdown of coating with spot corrosion in stypical). Recommend cleaning and recoating as soon as feas NB: Steel components throughout structure have lead based 	sible.	on the downs	stream faces ((052, 0)57 -
O S4 G4 22 S 3 3				Х	
Structure undergoing investigations due to brittle failure/fatigi- joins, cross girder-girder interfaces and at stiffeners. Refer to Initial visual inspections showed fine cracks in the welds of th Minor surface discontinuities also noted in all girders at Splic MPI and ultrasonic testing post removal of lead coatings late - S4 G1 splice 2 (lower) up to 5mm. - S4 G2 splice 2 (lower) with a depth of 0.9mm. - S4 G3 splice 2 (lower) of up to 5mm in length. - S4 G4 splice 3 (lower) up to 3mm. Refer to Sketch 25 for testing results. Girders show a breakdown of coating with spot corrosion in s typical). Recommend cleaning and recoating as soon as feas NB: Steel components throughout structure have lead based	Sketch 18 - Post inspection Tech note and Sk te lower lap of splice 2 of all girders (053, 054 e 3. Spot corresion at many splice welds (055 r showed cracking in:	xetch 19 - Su - typical). Re - typical). Re	immary Plans ifer to Sketch	19. 19.	
ST S4 G4 22 S 3 3				Х	
Longitudinal stressing bars retro-fitted to either side of all gird Spot corrosion throughout stressing bars (044 - typical). Pro Stressing bars require cleaning and painting. NB: bars likely	tective coating failing at stressing bar ends par	ticularly at g	irders 4 (045	- typica	al).
O P4 B1 435 3 4	·			Х	
Bearings 1-4 appear to have related to their tolerance limits. B1 - CS4. Severe loss of section in anchor attachment on do corrosion with severe loss of section in sole plate-girder attac bolt (064). Anchor bolts through rocker-bed plate have comp	wnstream side with active corrosion apparent chment (060). Rust staining at rocker-bed plate	under recent	recoating (05	n hing	
O P4 B2 43 S 3 3				X	
Bearings 1-4 appear to have rotated to their tolerance limits. B2 - CS3. Moderate loss of section in hinge pin nut with acti (061)				rosion	
O P4 B3 43 S 3 3				Х	
Bearings 1-4 appear to have rotated to their tolerance limits. B3 - CS3. Generally fine. Minor amounts of corrosion under r		er-bed plates			

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De	fective	Comp	onents	s F	Rep	bort B2/3		heet Of 7	7
	Struc Inspectio	ture Id on Date	77 19-NOV	99 -2(020	Name			
						Description of Defect		Requi	
	Compone	ent Location	n	SS	lte	* Detailed Description * Estimated Quantity		7 Acti	on
Modification	Group	Component	Standard Number	Exposure Class	Condition State	 * "Other" action required * Urgency of action (what, who, when, how) * Recommended Testing * Reference of Sketches and Photos (Roll/Exposure Nos) 	Monitor	Level 3 ×	Inspection (
0	P4	B4	43 S	3	3			x	
Bearin	gs 1-4 appear	to have rot	ated to their	tole	ranc	e limits. Refer to Sketch 14 for measurements at rocker-bed plates.			
B4 - C O	S3. Generally P4	fine. Minor B5	spot corrosio 43 S	on. 3	4	//		X	
						rings 1-4. Refer to Sketch 15 for measurements at rocker-bed plates	Ĺ	^	
(Rema B5 - C	ining) anchor S4. Active cor	bolts throug	h rocker-be	d pla of se	ate p ectio	oss bly bent. Build up of dirt at rocker-bed plate interface requires cl n in hinge nut with moderate-severe loss of section in hinge bolt (064 away on both faces (065).	eaning.	bolts	
0	P4	B6	43 S	3	3			Х	
(Rema	ining) anchor	bolts throug	h rocker-be	d pla	ate p	rings 1-4. Refer to Sketch 15 for measurements at rocker-bed plates oss bly bent. Build up of dirt at rocker-bed plate interface requires cl nut top face, Little active corosion otherwise (066).			
0	P4	B7	43 S	3	3	\bigcirc		Х	
(Rema	ining) anchor	bolts throug	h rocker-be	d pla	ate p le pla	rings 1-4. Refer to Sketch 15 for measurements at rocker-bed plates oss bly bent. Build up of dirt at rocker-bed plate interface requires cl ate-girder nut top face, Little active corosion otherwise (067).		X	
						initia 4.4. Defer to Skatch 4E for measurements at reaker had platested	Ĺ	^	
(Rema B8 - C	ining) anchor S4. Active cor	bolts throug	h rocker-be	d pia	ste p i sec	rings 1-4. Refer to Sketch 15 for measurements at rocker-bed plates ess bly bent. Build up of dirt at rocker-bed plate interface requires cl tion in hinge bolt. Anchor bolts through rocker-bed plate have compl	eaning.	oded a	way
O	S5	D1	20 C		3	sole plate-girder nut top face.			X
Spallin	g in all decks	at E1 under	finger joint	í with	exp	osed and corroding reinforcement (070). Requires treating.	L		
0	S5	G1	22 S	3	4			Т	X
						I ure/fatigue concerns. Several sites have undergone testing, specifica Refer to Sketch 18 - Post inspection Tech note and Sketch 19 - Sur			се
	visual inspectiv to Sketch 19.	on found cra	acks in the w	elds/	s of t	he lower lap of splice 1 of G1. Vertical crack also found in weld at X	G3-G1 in	terface	(072).
Minor	surface discor	tinuities als	o noted in G	64 sp	olice	1, and all girders at splice 2 (071 - typical) Refer also to Sketch 19.			
- S5 G - S5 G	1 at XG3 inter	face on ups	tream and d	lown	istre	ngs later showed cracking in: am faces up to 35mm in length and up to 3.3mm in depth. depth up to 3.9mm.			
Girder: feasibl		kdown of co	ating with s	pot (COFFC	osion in several areas (052, 057 - typical). Recommend cleaning and	recoating) as so	on as
NB: St	eel componer	nts througho	ut structure	have	e lea	d based coatings.			

De	efective	Comp	onente	s P	201	nort	B2/3		She		
		Jounh	onents	יו כ			02/3		7 0)f 7	
	Struc	ture Id	77	99		Name					
	Struc Inspectio	on Date	19-NOV	-20)20	Inspection Level 2 X Level 3	3[] U	nderv	wate	r []	
	Compone	ent Locatio	n			Description of Defect * Detailed Description				equire Action	
Modification	Group	Component	Standard Number	Exposure Class	Condition State	 * Estimated Quantity * "Other" action required * Urgency of action (what, who, when, how) * Recommended Testing * Reference of Sketches and Photos (Roll/Expos 	v.re Nos)		Monitor	Level 3 \times Local 3 \times 1 \times 1	
S5 G1	splice 2 (upp	er) identified	d as a "priori	ty 1"	cra	ck. Post inspection weld was ground back at S5 G1 Sc	plice 2. No ap	parent	propo	gation	of
O	S6	G1	22 S	3 3	4	h 22). Refer also to Sketch 24 - Barron Kuranda ND F a		iovai.		Х	
Structu joins, o	ure undergoing cross girder-gi	g investigati rder interfac	ions due to b ces and at st	orittle iffen	e fail ers.	■ lure/fatigue concerns. Several sites have undergone te . Refer to Sketch 18 - Post inspection Tech note and Si	sting, specifi ketch 19 - Su	cally we immary	elds at Plans	splice	l.
- ·						d of the lower lap of splice 3 of G1 (078). Refer to Sketo		_			
						der 1 at G2 interface (077).					
	nd ultrasonic to 1 splice 3 (low				coat	tings later showed cracking in:					
			C C			potential brittle failure in 2019.					
crackir	ng into parent	material wa	is found (087	Ž, Sk	etch	ck. Post inspection weld was ground back at S6 G1 Sp h 23). Refer also to Sketch 24 - Barron Kuranda NDT a	lice 3. No ap ind crack rem	parent noval.	propo	gation	_
ST	S6	G1	22 S	3				l			X
Stress		ved and rep	placed in 201	19 as	s pa	rt of investigations into fatigue (083).					
						in attachments at stiffeners 7 and 8 (084 - typical). Rec earings and Macalloy bars.	quires proper	attachi	ment.		
O	S6	W	71 0	3					X		
Signifi	cant localised	build up at	E1 of downs	trea	n si	de (024, 073). Refer to scour soundings report. Monito	D r .	Ľ			<u> </u>
					3)						

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Structure Condit	ion	Inc	nec	tion		nort				B2/'	1	Sheet	
Structure Contain		1113	her		1110	pon				82/	•	1 Of 13	
Structure Id		77	99				Name	e					
Crossing Name	Bar	ron]	River	:			t. Name						
Structure Type	Brid	lge					Owner					MAIN R(
Construction Type	Gire	der/I	Beam	l 						r North			
Construction Material	Stee	l				I	LGA Id	277	MA	AREEBA	SHIRE (COUNCII	
Inspector							Date	e 19-NO	DV-2	020		\sum	
Inspection Level 2			Pro	ograi	nme	d [<u>X</u>]			τ	Undersize	Compet	ients []	
Level 3	L)	Ex	cepti	ional						Underw	vater []	
Road Section	n					Star	rt]	End	/	TDi	st	
Id Description			S Cw	•				RPC		Dist 🗸	Start	End	
32A CAIRNS - MA	REE	BA (C 1	C	5		0.000	5		0.257	12.535	12.792	
Overall Ratings	1	2	3	4	5	Comme	nts						
Original Structure (O)	-	-		X	U	Comme	iit.5						
Structure is in poor condition.						l				$\langle \rangle$			
Remedial actions recommended Compression seals at P1 J2 and						\sim	~		ement.				
All BR posts have insufficient the plates. Minor surface corrosion a Strengthening (St)							se plates ar	re recesse	d into k	erbs with mor	tar applied u	p to level with top of base	
Longitudinal stressing bars retro	fitted	to eith	er side	ofall	jirders.								
Coating and attachments appea	r gene	rally fa	ir. Spo	t corro	sion th	rough I ke	ly breakdo	wn of coat	ing part	icularly in spa	ans 3 and 4.		
Stressing bars at S6 G1 were re	moved	l for te	sting a	nd rep	aced.	2 attachm	ents on the	e upstream	n side of	f G1 (side 2) a	are missing a	nchor bolts.	
Widening (WLn, WRn), Leng	theni	ng (1.1	, L2),	Raise	l (Ra)	Redecke	ed (Re), Sh	ortening	(S1, S2	e), Strengther	ning (St)		
<		Ż	9										

S	tructu	ire	Cond	litio	on Ins	spect	tion I	Repo	ort				B2/2	Sheet
			ture Id n Date		77 <u>:</u> -NOV		 In	specti		ame wel 2	<u>[x</u>] Level 3	[] Un	2 Of 13
С	omponen	t Loca	ation					Qu	antity		þb	Commen	ts	
Modification	Group	Component	Standard	Exposure Class	Quantity	it			Per ndition State		Maintenance Reqd	* Descrij magnit	tude,extent	ndition ets by location type, thes and photos
Mo	Gre	COI	Sta	Exp	Qui	Unit	1	2	3	4	Mai		Exposure Nos	
0	AP1	AP	70 O	3	1.0	EACH		1.0			Х		12	
(003	considere) potential	y allo	w moisture	e per	netration t	o superst	tructure.		sues ap	parent ((001).	Minor sections	of the WS pu	ing away from the abutment nosing
0	AP1	GR	72 S	3	2.0	EACH			2.0				\bigtriangledown	
GR1	ict damage height at uires provi	600mi	m at lowes	st poi	int. Single	bolt con	nection t	-		oth GR (I	002 -	typica!).		
0	AP1	FY	40	3	20.0	LINM		20.0				Footway in fair next service.	condition. Le	af litter should be cleared away at
0	AP1	PRO	53 O	3	180.0	M2		180.0				20m considere	ed. No scours	visible.
0	A1	J1	14 S	3	8.5	LINM		8.5			\square	Sliding plate ap bolts appear el		vorking as designed (003). Retaining pitting in plate.
0	S1	BR	25	3	86.0	LINM				86.0		~		
top o Mino	f base pla	te - m corros	ortar miss ion at low	sing/s er po	palled aw	ay in ma	ny cases	i.	tion prov	(VS)		ase plates are reflective sticke		kerbs. Mortar applied up to level with
Mino	r transver	se shr	inkage cra	acks	ranging fr	om hairlir	ne-0.3mi	n. No sp	alls/exp	osed reo	in to	p and side face	es. Minor loss	of fines throughout.
Surv	ey marker	at sid	e 2 kerb (007)			~	\bigcirc	\mathbf{r}					
Scup O	pers clear S1	red du WS	ring inspe 1 C	ction 3	. Scuppe 310.0	rs have b M2	een trea	ted since 310.0		is inspec	tion X	- no active corre	osion.	
Con	crete WS s	shows	loss of fin	nes w	ith minor	transvers	se cracks	6 (006, O	08 - typic	cal). Wea		surface all spa	ns treated wit	n an epoxy resin in 2009 - little
All b Duri	ng time of	oedest inspec	trian walky ction all m	way a otor t	across all traffic hes	been rec	fuced to	single la	ine and o				-	trian traffic under normal operation. to load concerns.
Pede	estrian cor A1	J2	should be 15 O	e con 3		efore reo LiNM	pening t	o two lar 8.5						
Refe	rs to fixed	joint a	at E2 of sp	L_ Dan 1	(008).)								
Joint	sealant h	ighly v	veathered	with	minor los	s of seal								
Con: O	ider repla	cemer J1	nt of seale		next serv 8.5			8.5			Х			
_	rs to fixed							0.0			^			
	ant highly	-	\sim			seal in a f	few insta	nces (OC)9 - typic	al).				
Con	sider repla	cemer	nt of seala	ant at	next serv	ice.			-					

St	ructu	ire	Cond	itio	on Ins	spect	tion	Repo	ort				B2/2	Sheet 3 Of 13
	St	ruct	ure Id		77	99			N	ame		•		
			n Date	19	-NOV		 T	(m. c. c. t.						derwater []
	Inshe	cuo	II Date				11	specti	on Le	evel 2		j Level 5		
Co	mponen	t Loca	ation					Qı	antity		ld	Commen	ts	
		<u> </u>		Class				Co	Per ndition		Maintenance Reqd	* Locati	on of item/co	ndition
Modification		lent	p	e Cl	y				State		ance			cts by location type,
dific	Group	Component	Standard	Exposure	Quantity	t		-			inten		tude,extent	ches and photos
Mo	Gre	Col	Sta	Exp	Qui	Unit	1	2	3	4	Mai		Exposure Nos	
0	P1	J2	110	3	8.5	LINM			8.5					
Refers	s to comp	ressio	on seal joi	nt wi	th steel n	osings at	E1 of sp	an 2.						
Comp	ression s	eal is	highly we	athe	red and p	erishing	(010). Sp	ooils in jo	int.					\rightarrow
Nosin	gs appea	r fair -	gaps bet	weer	n nosings	both side	es 47mm	(Temp.	27).				$\langle \langle \rangle \rangle$	
Recor	nmend re	eplace	ment of c	ompi	ression se	eal.								
0	P1	J3	14 S	3	8.5			8.5					\land	
Steel	finger joir	nt at E	2 of span	2.									\sim	
Measu	urements	taken	at finger	joint	gaps - re	fer to Ske	etches 1-	5. No in	dication	of exces	sive	differentials.	>	
Spoils	in joint r	equirir	ng clearing	g out	at next s	ervice.								
									ings at I	nalving jo	in b	eneatin, potentia	ally exacerbat	ing existing corrosion issues.
Redes	sign or pr P1	ovisio J4	n of a spla 15 O	ash s 3	hield sho 8.5		nsidered	8.5			T	5		
	joint at E			Ĩ	0.0			0.0		L <u>A</u>	^	\sim		
	-		ered with	min	vr loce of	cool in a	fow incto	ncoc (0()0 tuni		\geq			
								inces (or)			
O	S2	BR	nt of seala 2 S	nt al		LINM			TĈ.	91.2				
All BR	posts ha	ave ins	sufficient t	hrea	d at anch	or bolts a	Ind lack	washers	(904, 00	<u> </u>)5 - typic	al). B	ase plates are	recessed into	kerbs. Mortar applied up to level with
top of	base pla	te - m	ortar miss	ing/s	spalled av	ay in ma	ny cases	5.	\leq					
Minor	surface (corrosi	ion at low	er po	ortion of b	ase plate	s typical	. Delinea	tion pro	vided by	retro	reflective sticke	ers on BR pos	ts.
	res engin			2	01.0)	r	_			
0	S2	ĸ	3 C	3	91.2			91.2	L	L_	Ļ			
							\sim) .						of fines throughout.
Scupp O	ers clear S2	ed du WS	ring inspe 1 C	ction 3	. Scuppe 388.0	rs have b M2	een trea	ted since 388.0	e previo	us inspe	ction X	- no active corr	osion.	
Concr						transvere	se cracks		08 <u>-</u> tvni	cal) We		surface all spa	ns treated wit	h an epoxy resin in 2009 - little
			it visible ir				of cruck.	, (000, 0	00 - typi		uning	Surface an Spa		
All bo	lards at p	oedest	rian walk	way a	across all	spans ar	e now m	issing (O	06), offe	ering no	prote	ction or delinea	tion for pedes	trian traffic under normal operation.
During	g time of	inspec	tion all m	otor	traffic has	been ree	duced to	single la	ine and	directed	dowr	the centre of t	he bridge due	to load concerns.
Pedes		cerns	should be		sidered b	efore rec	pening t	o two lar	nes.					
0	P2	J1	15 O	3	8.5	LINM		8.5			Х			
Fixed	joint at E	1 of s	pari 3.		9									
Seala	nt highly	weath	ered with	mino	or loss of	seal in a	few insta	inces (OC)9 - typio	cal).				
-			nt of seala				-	0.5		r				
0	P2	J2	150	3	8.5	LINM		8.5						
	joint at E													
Seala	nt highly	weath	ered with	mino	or loss of	seal in a	few insta	inces (OC)9 - typio	cal).				
Consi	der repla	cemer	nt of seala	nt at	next serv	/ice.								

St	tructu	ıre	Cond	itio	on Ins	spect	tion I	Repo	ort				B2/2	Sheet 4 Of 13
			ture Id n Date	19	77 <u>9</u> -NOV		 In	snecti		ame] Level 3	[] Un	derwater []
							10							
	omponen	t Loc:	ation	ass				-	ıantity Per ndition		Reqd	Commen	ts on of item/co	n distan
Modification	Group	Component	Standard	Exposure Class	Quantity	Unit	1		State 3	4	Maintenance Reqd	* Descrij magnit * Refere	ption of defe tude,extent	cts by location type, ches and photos
0	S3	BR	28	3	91.2	LINM				91.2			17	
top of Minor	f base pla	ite - m corros	ortar miss ion at low	ing/s	spalled aw	ay in ma	ny cases	5 .				ase plates are reflective sticke		kerbs. Mortar applied up to level with ts.
0	S3	K	3 C	3		LINM		91.2					\land	
			-											of fines throughout.
Scup O	pers clea S3	red du WS	ring inspe 1 C	ction 3	1. Scuppe 388.0	s have b M2	een trea	ted since 388.0	e previou	us inspe	ction X	- no active com	osion.	
Conc	rete WS :	shows	loss of fin	es w	ith minor	transvers	se cracks	s (006, 0	08 - typi	cal). We	aring	surface all spa	ns treated wit	h an epoxy resin in 2009 - little
Durin Pede	g time of strian cor	inspeo ncerns	ction all m	otor e cor	traffic has nsidered b	been rec efore rec	duced to	single la o two lar	ine and			\searrow	-	trian traffic under normal operation. to load concerns.
0	P3	J1	150	3	8.5	LINM		8.5	\square	$(\sqrt{3})$	х			
Seala		weath	pan 4. ered with nt of seala				few insta	inces (OC)9 - typic	al).				
0	P3	J2	150		8.5	LINM		8.5	\bigcirc		Х			
Seala		weath	ered with				few insta	inces (00)9 - typic	cal).				
Cons O	ider repla	BR	nt of seala 2 S	nt at 3		ICE.	\mathbb{R}	7		91.2				
top of	f base pla	ite - m	ortar miss	ing/s	spalled aw	ay in ma	ny cases	5.						kerbs. Mortar applied up to level with
				er po	ortion of ba	ise plate	s typical.	. Delinea	tion prov	vided by	retro	reflective sticke	ers on BR pos	ts.
O	ires engii S4	K	3 C	3	91.2	LINM		91.2						
Mino	transver	se shr	inkage cra	icks	ranging fr	om hairli	ne-0.3mi	m. No sp	alls/exp	osed rec) in to	p and side face	es. Minor loss	of fines throughout.
_							een trea			us inspe	ction	- no active corr	osion.	
0	S4	ws	\square		388.0	M2		388.0			Ļ	·		
			loss of fin t visible ir			transvers	se cracks	s (006, O	u8 - typi	cal). We	aring	surface all spa	ns treated wit	h an epoxy resin in 2009 - little
All bo	llards at	pedes	trian walik	way a	across all	spans ar	e now m	issing (O	06), offe	ering no	prote	ction or delinea	tion for pedes	trian traffic under normal operation.
Durin	g time of	inspe	ction all m	otor	traffic has	been rec	duced to	single la	ne and	directed	dowr	n the centre of t	he bridge due	to load concerns.
Pede	strian cor	ncerns	should be	e con	nsidered b	efore reo	pening t	o two lar	nes.					

St	tructu	ire	Cond	liti	on Ins	spect	tion I	Repo	ort				B2/2	Sheet 5 Of 13
	St	ruct	ture Id		779	99			N	ame				
	Inspe	ectio	n Date	19	-NOV	-2020	In	specti			X] Level 3	[] Un	derwater []
Со	omponen	t Loca	ation					Qu	ıantity Per		Reqd	Commen	ıts	
Modification	Group	Component	Standard	Exposure Class	Quantity	it			ondition State		Maintenance R	* Descri magni	tude,extent	ndition cts by location type, ches and photos
		-			-	Unit	1	2	3	4			Exposure Nos	
0	P4	J1	150	3	8.5	LINM		8.5			Х		$\overline{\lambda}$	
Seala		weath	ered with		or loss of s		few insta	inces (OC	09 - typic	:al).				\gg
0	P4	J2	14 S	3	8.5			8.5						
Steel	finger joi	nt at E	1 of span	5.								l ,	\square	
Spoil: bene	s in joint a ath, poter	at E2 c ntially (only requir exacerbat	ring c ing e	learing ou xisting co	it at next rrosion is	service. sues.	Moisture				differentials. ected onto outs	de expansion	rocker bearings at halving joint
Rede O	sign or pr P4	ovisio J3	n of a spla 11 O	_	hield sho 8.5	uld be co LINM	nsidered		8.5		6			
_					el nosing a		non F		0.0		N.	\leq		
Seal Steel	is also lift plates at	ing at kerb j	side 2 at f	the p	edestrian	aking awa footway.	ay in sec	tions (01	11). Glan	nd has so	epara	ited from nosing	g at side 2 pot	entially allowing moisture ingress.
0	P4	J4	150	3	8.5	LINM		8.5		P	Х			
Seala		weath	ered with		or loss of s		few insta	inces (Ol	59 - typic	cal).	•			
0	S5	BR	25	3	91.2	LINM	\sum			91.2				
					d at anch palled aw				(004, 00)5 - typic	al). B	ase plates are	recessed into	kerbs. Mortar applied up to level with
Mino	r surface (corros	ion at low	er po	ortion of ba	ase plate	s typical	. Delinea	ation prov	vided by	retro	reflective sticke	ers on BR pos	ts.
-	ires engir					$(\underline{\mathcal{G}})$)				_			
O Minoi	S5 r transver	K se shr	3 C inkage cra	3 acks	(_(LINM cm hairli	ne-0.3mi	91.2 m. No sp		osed rec) in to	p and side face	es. Minor loss	of fines throughout.
Scup O	pers clea S5	red du WS	ring inspe 1 C	ection 3	. <u>Scupper</u> 388.0	s have b M2	een trea	ted since 388.0		us inspe	ction	- no active com	osion.	
			loss of fir t visible i			transvers	se cracks	s (006, 0	08 - typi	cal). We	aring	surface all spa	ns treated wit	h an epoxy resin in 2009 - little
All bo	ollards at p	pedes	trian walk	way	across all	spans ar	e now m	issing (O)06), offe	ering no	prote	ction or delinea	tion for pedes	trian traffic under normal operation.
			\sim		traffic has isidered b			-		directed	dowr	n the centre of t	he bridge due	to load concerns.
O	P5	J1	150	3		LINM	pering t	8.5			Х			
Fixed	l joint at E	1 of s	pan 6.									l		
Seala	ant highly	weath	ered with	mino	or loss of s	seal in a t	few insta	inces (OC	09 - typic	al). Con	sider	replacement o	f sealant at ne	ext service.

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St	tructu	ıre	Cond	litio	on Ins	spect	ion I	Repo	ort				B2/2	Sheet 6 Of 13
			ture Id n Date		77 2-NOV		 In	specti		ame evel 2	[<u>x</u>] Level 3	[] Un	derwater []
С	omponen	t Loca	ation					Qı	lantity		þþ	Commen	ts	
Modification	Group	Component	Standard	Exposure Class	Quantity	it			Per ondition State		Maintenance Reqd	* Descrij magnit	tude,extent	ndition ets by location type, ches and photos
Mc	Gr	C	Str	Ex	Qu	Unit	1	2	3	4	Ma		Exposure Nos	
0	S6	BR	28	2	74.0	LINM				74.0			17	
			sufficient t ortar miss						(004, 00)5 - typic	al). B	ase plates are	recessed into	kerbs. Mortar applied up to level with
Mino	r surface	corros	ion at low	er po	ortion of b	ase plates	s typical.	Delinea	ition prov	vided by	retro	reflective sticke	ers on BR pos	ts.
Requ	iires engir	neering	g input.										\bigcirc	
0	S6	к	3 C	3	74.0	LINM		74.0					\land	
Mino	r transver	se shr	inkage cra	acks	ranging fr	om hairlir	ne-0.3mr	n. No sp	alls/exp	osed rec	in to	p and side face	s. Minor loss	of fines throughout.
Scup O	pers clea S6	red du WS	ring inspe 1 C		1. Scuppe 310.0		een trea	ted since 310.0		us inspec	tion	- no active corre	osion.	
							o cracks			cal) Wo	aring	surface all coa	ns troated wit	h an epoxy resin in 2009 - little
			nt visible ir			uansvers		6 (UUU, U	uo - typi				ns treated with	n an epoxy resim in 2009 - litue
All bo	ollards at p	pedest	trian walk	waya	across all	spans are	e now m	issing (O	106), offe	ering no p	orote	ction or delinea	tion for pedes	trian traffic under normal operation.
Durin	g time of	inspec	ction all m	otor	traffic has	been red	luced to	single la	ane and (directeo	dowr	n the centre of t	he bridge due	to load concerns.
Pede			should be				pening t				\sum			
0	A2	J1	14 S			LINM		5.0		$\underline{\langle 0 \rangle}$				
2 ste	el plate ar	nchors	missing a	at sid	le 2 lane -	roughly a	at wheel	paths (0)12) Ste	ei plate :	slapp	ing noisily unde	er traffic.	
	mmend re	eestab AP	lishment 70 O			EACH		1.0				20m considere	d Approach i	s in fair condition.
							0.0		\sum					
0	AP2	GR	725			EACH	2.0	$ \geq $						
		-	n replace				ardrail is	in goed	conditio	n.				
Spall O		ost at s PRO	ide 2 - co 53 O	_	d in S6 Bl 120.0	R. М2		120.0				20m considere	ed.	
0	A1	PED	44 0	3		EACH	\rightarrow	4.0						
							<u>(B)</u>							
0	A1	В	43 S			EACH		3.0						
			fer to Ske		((7	-		nents.					
			n fair cond			9								
				\sim		n the bac	k face w	ith flakin	g and lo	ss of sec	tion	up to 6mm (014	l, 015). Stainii	ng under coating on front face also.
	_	-	ly accepti		\sim									
Reco	mmend tr	reatme	ent of trea	trnen	t of B4 be	ed plate. N	IB - stee	l compo	nents in	structure	e typi	cally have red l	ead coatings.	
Refe	also to S A1	ketch A	20 2019 50 C		_	s into Bea	rings an	d Macal 1.0						
_			\sum	_			tical ebri			airline 0.1	mm	(017) Water et	aining on abu	tment front face.
Abuu	A1	F	59 C	3		EACH	ucai sili	y Nage C		v mile-U.		Buried and uns	_	
		'	550	Ŭ,	1.0	LAON	^	^	^	^			oon (010).	

St	ructu	ire	Cond	iti	on Ins	spect	ion I	Repo	ort				B2/2	Sheet
						•		•						7 Of 13
			ure Id		77				N	ame				
	Inspe	ectio	n Date	19)-NOV	-2020	In	specti	on Le	evel 2	<u> </u>] Level 3	[] Un	derwater []
Co	mponen	t Loca	ition	S				Qu	iantity Per		teqd	Commen	ts	
Modification	Group	Component	Standard	Exposure Class	Quantity	it			ndition State		Maintenance Reqd	* Descrij magnit	tude,extent	ndition cts by location type, ches and photos
Me	Gr	Co	Sti	Ex	ŋ	Unit	1	2	3	4	Ma	(Roll/E	Exposure Nos	3)
0	S1	D	20 C	3	354.0	M2		354.0			Х			
Very	little cracl	king ge	enerally.									•		
	ne-0.1mm reat at ne			at E	1 and MS	shows n	o change	e since 2	2001 ins	pection.	Mino	r spalls with exp	posed reo in E	05 at MS (018 - typical) and at D1
				_	previous i		n and sh				_			
0	S1	G	22 S			EACH		2.0					\wedge	ally welds at splice joins, cross girder-
Initial Minor Tech MPI a Minor Girde S1 G	visual ins surface on note and and ultras cracking rs appear 3 splice 3	spectio discon Sketcl onic te up to r other (lowe	tinuities n h 19 - Sur sting pos 2mm also wise fair (r) identifie	ed cra oted mma t rem o four 016, 016,	ry Plans. noval of le nd in S1 (022) R a "priority etch 21).	ice 1, G4 ad coatin 64 splice 3 efer to Sk y 1" crack Refer also	splice 1, gs later ; 3 (lower) xetch 18	, G2 spli showed) (refer to for coati spection	ce 2, G2 cracking o Sketch ng level: weld w	e splice : in S1 C 25). s across	3 and 63 sp strue	G4 splice 3 (02 lice 3 (lower) of cture.	up to 22mm i ice 3. No app	tefer to Sketch 18 - Post inspection n length and up to 4.6mm in depth. arent propogation of cracking into
ST	S1	G	22 S	3		EACH		4.0		\bigtriangledown			ressing bars r	retro-fitted to either side of all girders. opear fair.
0	S1	XG	31 C	3	1.0	EACH		1.0		P	Х	Very minor spa from poor cove	alls with expos er. Treat at ne	sed reo in underside of XG1 in bay 4 xt convenience.
0	S1	XG	31 S	3	4.0	EACH		4.0	\sum					
paint.					ondition - interface			\sim)~	tive coa	ting d	lue to the age of	f the structure	e. NB: coating includes a lead based
0	S1	W	710	3		EACH	\geq	1.0				Localised scou 024). Refer to		original readings on both sides (022, nas report.
0	P1	В	40 O	3	4.0	EACH	\sim	4.0			İ			5
Fixed	bearings	locate	ed on Pier	1.			75)					1		
No si	gnificant o	defects	s in bearin	ngs -	protective	e coating a	appears	sound (025 - typ	oical).				
Refer	also to S	ketch	20 - 2019	Inve	estigations	s into Bea	/ Irings an	d Macall	oy bars.					
о	P1	PED	44 O	3	4,0	EACH		4.0						
0	P1	н	54 C	3	(1.0	EACH		1.0			х			
Head	stock is ir	n fair c	ondition (022)	No crack	king at car	ntilever a	arms.			1	1		
<u>1 min</u> 0	or spall o P1	n face C	1 near E		9) - treat 1.0	EACH	r at next	conveni 1.0	ence.		Г	No significant of	defects (022).	
0	P1	F	59 C	3	1.0	EACH	Х	х	Х	×		Buried and uns	seen (022).	
-			<u> </u>				~	~	~				\ - /·	

St	ructu	ıre	Cond	liti	on Ins	spect	tion	Repo	ort				B2/2	Sheet 8 Of 13	
			ture Id n Date		779 9-NOV		 In	ispecti	_	ame vel 2	[<u>x</u>	Level 3	[] Un	derwater []	-
Co	mponen	t Loca	ation					Qu	antity		pb	Commen	its		
Modification	Group	Component	Standard	Exposure Class	Quantity	Unit	1		Per ndition State 3	4	Maintenance Reqd	* Descrij magni * Refere	tude,extent	cts by location type, ches and photos	
0	P1	в	43 S	3	4.0	EACH		2.0	2.0					$\langle \langle \rangle$	٦
Fixed	rocker b	earing	s at halvir	ng joi	int 1, E1 o	f span 2	(026 - ty	pical).							
coatir Reco B2 ar	ng on und mmendat nd B3 are	lerside tions to in fair	es of both	rock anch	ers and in or nuts in	bed plat	es. 5 L3 repo	ort <mark>(</mark> 17/12				ction remains i carried out.	in anchor nuts	(027, 028). Corrosion evident under	г
Refer	also to S	ketch D	20 - 2019 20 C	Inve 3	estigations 442.0	s into Bea M2	arings ar	d Macal 440.0					>		\neg
_							ffit under				(/130	typical) Per	uiros troatmo	nt of reinforcement.	
Deck	otherwise	e in fai	ir condition	n wit	h no signi	ficant cra	icking or	spalling.		4				it of reinforcement.	
0	S2	G	22 S	3	4.0	EACH		3.0	1.0						
girder Initial to Sk MPI a - S2 (r interface visual ins etch 19). and ultras 34 splice	es and spectio conic te 2 (low	at stiffend on detecte esting pos ver) up to 3	ers. F ed mi t ren 3mm	Refer to S nor surfac noval of le in length.	ketch 18 ce discon ad coatir Refer to	- Post in tinuities ngs later Sketch	in G1 spl showed 25.	Tech no lice 1, G cracking	te and ! 4 splice in:	sketch 1, G1	n 19 - Summar splice 2, G2 a	y Plans. t XG2 interfac	ally welds at splice joins, cross girden re, G3 splice 3, and G4 splice 4 (refe	
Girde ST	rs appea S2	r other G	wise fair (22 S	(031) 3		e breakdo EACH	own of co	ating. R	<u>.</u>	ketch 18	for co	pating levels a	cross structur	е.	-
Long	itudinal st	ressin	g bars ret	ro-fit	ted to eith	er side o	f all girde	ers. Attac	chments	appear	fair. S	pot corrosion i	n stressing ba	Irs.	
Refer	also to S	ketch XG	20 - 2019 31 S			s into Bea		d Macal			гг	-			_
			r generally			((7/4_								
Minor	surface	discon	tinuities n	oted	in G2 at)	XG2 inter		fer to Sk	etch 19.		r				
0	P2	В	43 S	3		EACH	/	2.0		2.0					
			expansion or measur			01			rings sho	ow rotati	on.				
loss (B2 - (B3 - (of section CS2. App CS2. App	ears fa ears fa	air (035). air. No ap	vio a parei	pparent controsic	orrosion i on issues	ssues.	2					0	34) - unable to determine extent of corrosion in hinge pin appears severe	9.
Reme	edial actio	ons rec	commende	ed in	previous	L3 report	t ((17/12	/2015) ha	ave yet t	o be car	ried o	ut.			
Beari	ngs have	been	coated si	nce p	previous L	2 inspect	tion.								
			20 - 2019								ator	nto boaringe			
O NB: E	S1 and B4	w are p	710			EACH	i joint ca	ilich afain	Which d			nto bearings.			-
			build up S ort. Monite		on the do	ownstrea	m side r	elative to	original	reading	s (024	4, 031). Localis	sed scours an	d build up in other areas. Refer to	
Lacon	Soundini	yarep	on, monili	<i>.</i>											٦

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S	tructu	ıre	Cond	liti	on Ins	spect	ion I	Repo	ort				B2/2	Sheet
														9 Of 13
			ture Id	_	77					ame				
	Inspe	ectio	n Date	-	-NOV	-2020	In	specti	on Le	vel 2	<u> </u>] Level 3	[] Un	derwater []
С	omponen	t Loca	ation						ıantity Per		Reqd	Commen	ts	
Modification	dı	Component	Standard	Exposure Class	ntity			Co	ndition State		Maintenance R	* Descrij magnit	tude,extent	cts by location type,
Mod	Group	Com	Stan	Expo	Quantity	Unit	1	2	3	4	Mair		ences of sketo Exposure Nos	ches and photos ;)
0	P2	в	40 O	3	4.0	EACH		3.0	1.0					
Fixe	d bearings	locat	ed on pier	· 2 .								,		
	CS3. Outs						ion (037)	. Minor d	corrosion	evident	und	er coating. Prev	vious L3 inspe	ction recommendation of
	lso has co						side anc	hor nut (038)				$\langle \rangle \rangle$	
	ings have								050).					
0	_	PED	440	3		EACH		4.0					7	
0	P2	н	54 C	3	1.0	EACH		1.0				Fair condition	(031). No sign	s of cracking at cantilever arms.
0	P2	С	56 C	3	1.0	EACH		1.0				Fair condition	(031)	
0	P2	F	59 C	3	1.0	EACH	Х	Х	Х	X	17	Buried and uns	seen (031).	
0	S3	D	20 C	3	442.0	M2		440.5	1.5			$\langle \rangle$		
	Il sections nd reo, tre								D1 at M	S, D5 at	E1 a	I and in D4 at E1	likely due to p	boor cover. Requires squaring to
Scup O	pers have S3	been G	treated s	ince 3		inspectior EACH	n and she	ow no ac 4.0	ctive corr	osion.	Х			
							re/fatique			val sites		e undergone tes	sting specifics	ally welds at splice joins, cross girder-
Mino to Sk Girde flang	er surface (ketch 19). ers show a	discon Spot o a breal and G	tinuities n corrosion a kdown of 3 at E2 (0	ioted at ma coati 42, 0	in G1 spl any splice ng with sp 143 - typic	ice 1, G4 welds (04 pot corros al) with ne	splice 1, 41 - typic ion in se	, G1 split al). veral are	ce 2, G2 eas espe	at XG2	inter ward	s E2 and in par	2, G3 splice 3 ticular girders	8 (040 - typical) and G4 splice 4 (refer 2 and 3. Minor corrosion in bottom elect areas appear to be failing.
	Steel com			_				·	2.0					
ST	S3	G	22 S	3		EACH	(1.0				J		
Spot (045	 typical). 	throu	ghout stre	essin	g bars ten	ding to w	orsen to	wards E2	2 (044 - 1	typical).	Prot	ective coating fa	ailing at stress	ing bar ends at girders 2, 3 and 4
O	ssing bars	XG	re cleaning 31 S	g and 3		EACH	s likely co	bated wit		ased pa	Int. X			
Spot	corrosion	formi	ng on cros	ss gir	ders typic	ally wors	ening to	wards E2	2 of spar	n (044) re		ing spot treatme	ent.	
Mino	r surface (discon	itinuity rep	orte	d în XG2 i	at G2 inte	erface (re	fer to Sk	(etch 19					
	s girder at		ents appe			EACH		1.0						
0	S3	W	$\overline{\}$			EACH		1.0		uo to ori	airc	readings (00.4		
LOCa	ilisea scou	iis on	upstream	side	and local	isea Duilo	up on d	ownstre	am relati	ve to or	gina	i readings (024,	040). Refer to	o scour soundings report.

St	Structure Condition Inspection Report													Sheet 10 Of 13
	St	ruct	ure Id		77	99			N	ame				
			n Date				 In	Name Inspection Level 2 [X] Level 3						nderwater
	Insp							speen		VCI 2			<u> </u>	
Co	omponen	t Loca	ation					-	antity		рb	Commen	ts	
E				lass					Per ndition		e Reqd	* Locati	on of item/	condition
catio		nent	rd	Exposure Class	ity			5	State		nanc		-	fects by location type,
Modification	Group	Component	Standard	tposu	Quantity	Unit			- T - T		Maintenance		tude,extent ences of sk	etches and photos
Μ	Ū	Ŭ	St	Ex	õ	Ū	1	2	3	4	M	(Roll/E	Exposure N	os)
0	P3	В	40 O	3	4.0	EACH		2.0		2.0				
Fixed	bearings	on to	p of pier 3	(04	6). Bearin	gs have l	nad spot	treatmer	nt since	previous	insp	bection.		
B2 - (B3 - (B4 - (under attacl	 B1 - CS4. Lower attachment nut has nearly completely corroded away (047) with moderate corrosion in the hinge pin and upper attachments. B2 - CS2. Fair condition. B3 - CS2. Minor corrosion evident under coating - spot treatment appears to be failing (048). Requires cleaning and retreating. B4 - CS4. Minor loss of section in lower attachments. Minor corrosion evident forming under recent spot treatment coating (049). Rust staining from hinge pin under coating. Upper attachments are untreated and have corrosion with moderate loss of section in nuts. Severe loss of section in sole plate-girder attachment on top of lower flange of girder (050). Refer also to Sketch 20 - 2019 Investigations into Bearings and Stiffeners. 													
Reme	edial actio P3	ns reo H	commende 54 C	ed in 3		L3 report	t <mark>(17 Feb</mark>	2015) h 1.0	ave yet t	to be ca	rried) A fair condit	ion (046). No creating found in
	F۵	П										cantilever arms	S.	ion (046). No cracking found in
0	P3	С	56 C	3	1.0	EACH		1.0			$\langle \langle$	No significant i	issues (046).
0	P3	F	59 C	3	1.0	EACH	Х	Х	Х	Х		Buried and uns	seen (036).	
0	S4	D	20 C	3	442.0	M2		442.0		Ŕ	х	~		
Deck	Deck is generally sound.													
Mino	Minor spalls with exposed and corroded reinforcement in D1 under side 1 kerb (051 - typical). Treat at earliest convenience. Minor cracking ranging from hairline-0.2mm in D2 E1-MS. Scuppers have been treated since previous inspection and show no ective corrosion.													
Struc							re/fatique	e concer	\geq		hav	e undergone tes	stina specit	ically welds at splice joins, cross girder-
												ch 19 - Summar		·····; ····· ··· ··· ··· ····; ····· ··· ···
Initial	visual ins	spectio	ons showe	ed fin	e cracks	in the we	lds of the	e lower la	ip of spli	ce 2 of a	all gir	rders (053, 054	- typical). R	efer to Sketch 19.
Mino	surface (discon	tinuities a	lso r	noted in al	ll girders a	at Splice	3. Spot	corrosio	n at mar	iy sp	lice welds (055	- typical). R	efer to Sketch 19.
MPI and ultrasonic testing post removal of lead coatings later showed cracking in: - S4 G1 splice 2 (lower) up to 5mm. - S4 G2 splice 2 (lower) with a depth of 0.9mm. - S4 G3 splice 2 (lower) of up to 5mm in lengtly. - S4 G4 splice 3 (lower) up to 3mm. Refer to Sketch 25 for testing results.														
	Girders show a breakdown of coating with spet corrosion in several areas particularly in girders 2, 3 and 4 on the downstream faces (052, 057 - typical). Recommend cleaning and recoating as soon as feasible.													
NB: S	Steel com S4	ponen G	ts through 22 S			have lead	based o	coatings. 3.0	1.0		–			
_				\leq			f all aird.			appear	foir	J		
Spot	corrosion	throug		ssing	g bars (04	44 - typic	al). Prote	ective coa	ating fail	ing at st	ressi	ng bar ends par	ticularly at	girders 4 (045 - typical).
Stres O	sing bars S4	requir XG	e cleaning 31 S	g and 3	d painting 6.0	. NB: bar	s likely c	oated wit 6.0	h lead b	ased pa	int. X			
			ng on cros				an (044		Roquin	as spot		ment		
			-			uynout Sp	an (044	- typical)	. Requir	es shor	ueal	ment.		
O	s girder at S4	W	ments are 71 O	3 sou		EACH		1.0						d up both sides relative to original to scour soundings report.

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St	ructu	ıre	Cond	iti	on In	spect	tion I	Repo	ort				B2/2	Sheet	
														11 Of 13	
			ture Id		77					ame					
	Inspe	ectio	n Date	19	9-NOV	-2020	In	specti	on Le	vel 2	X] Level 3	[] Und	lerwater []	
Co	mponen	t Loca	ation	Class			Quantity Per				Reqd	Commen	ts		
Modification	Group Component Standard				Quantity	it	Condition State			Maintenance R	 * Location of item/condition * Description of defects by location type, magnitude,extent * References of sketches and photos 				
Mc	Gr	Co	Sta	Exposure	ŋ	Unit	1	2	3	4	Ma	(Roll/E			
0	P4	В	43 S	3	8.0	EACH			5.0	3.0					
	ngs 1-4 r r-bed pla		rocker be	arin	gs located	on Pier	4. Bearin	igs 1-4 a	ppear to	have ro	tated	d to their toleran	ce limits. Refe	r to Sketch 14 for measurements at	
B3 - (B4 - (Beari Sketc NB: E (Rem B5 - (plate B6 - (B7 - (B2 - CS3. Moderate loss of section in hinge pin nut with active corrosion. Minor loss of section in anchor attachments with active corrosion (061) B3 - CS3. Generally fine. Minor amounts of corrosion under recent recoating (062). B4 - CS3. Generally fine. Minor spot corrosion. Bearings 5-8 refer to rocker bearings at expansion halving joint E1 of span 5 (058). Bearings 5-8 are rotated in opposite direction to bearings 1-4. Refer to Sketch 15 for measurements at rocker-bed plates. NB: B5 and B8 are positioned directly under the finger joint catch drain which directs water onto bearings. (Remaining) anchor bolts through rocker-bed plate poss bly bent. Build up of dirt at rocker-bed plate interface requires cleaning. B5 - CS4. Active corrosion and severe loss of section in hinge nut with moderate-severe loss of section in hinge bolt (064). Anchor bolts through rocker-bed plate plate-girder nut top face, Little active corosion otherwise (066). B7 - CS3. Moderate-severe loss of section in sole plate-girder nut top face, Little active corosion otherwise (067). B8 - CS4. Active corrosion and moderate loss of section in hinge bolt. Anchor bolts through rocker-bed plate have completely corroded away on both faces (065). 														
					L3 inspe				(C						
0	P4	PED	440	3	4.0	EACH		4.0		2					
0	P4	н	54 C	3	1.0	EACH		1.0	\geq			Headstock is in	n fair condition	(056). No cracking at cantilver arms.	
0	P4	С	56 C	3	1.0	EACH		1.0	$\overline{\mathbf{r}}$			No significant i	ssues (056).		
0	P4	F	59 C	3	1.0	EACH	Âx	X	×	Х		Buried and uns	een (056).		
0	S5	D	20 C	3	442.0	M2		438.0	4.0				. ,		
							sed and				(070	- typical). Requ	ires treating		
	of deck a				iger joint			corrodin	gronio	comon	(070	- typical). Noqu	iros trouting.		
				inco	provious)		tivo con	racion					
O	S5	G	22 S	3	previous 4.0	EACH		3.0		1.0					
														lly welds at splice joins, cross girder-	
girder interfaces and at stiffeners. Refer to Sketch 18 - Post inspection Tech note and Sketch 19 - Summary Plans. Initial visual inspection found cracks in the welds of the lower lap of splice 1 of G1. Vertical crack also found in weld at XG3-G1 interface (072). Refer to Sketch 19.															
Minor	surface	discon	tinuities a	lso r	noted in G	4 splice 1	1, and all	girders a	at splice	2 (071 -	typi	cal) Refer also to	o Sketch 19.		
- S5 (- S5 (G1 at XG	3 inter 2 (upp	face on u	ostre	noval of le am and d m in lengt	ownstrea	m faces	up to 35	mm in le		d up	to 3.3mm in dep	oth.		
Girde	rs show a	a breal	kdown of	coati	ing with sp	oot corros	sion in se	everal are	eas (052	, 057 - t	ypica	I). Recommend	cleaning and i	recoating as soon as feasible.	
NB: S	steel com	ponen	ts through	nout	structure	have lead	l based o	coatings.							
												ick at S5 G1 Spl and crack remo		arent propogation of cracking into	

St	Structure Condition Inspection Report													Sheet 12 Of 13		
			ture Id n Date		7799 Name D-NOV-2020 Inspection Level 2 [X] Level								[] Un			
Co	mponen	t Loca	ation				Quantity				pb	Commen	ts			
Modification	Group	Component	Standard	Exposure Class	Quantity	Unit	1	Per Condition State			Maintenance Reqd	* Descrij magnit * Refere	Location of item/condition Description of defects by location type, nagnitude,extent References of sketches and photos Roll/Exposure Nos)			
ST	S5	G	22 S	3	4.0	EACH		4.0				Longitudinal st Attachments a		etro-fitted to either side of all girders.		
0	S5	XG	31 S	3	8.0	EACH		8.0								
Cross	s girders a	are ge	nerally in t	fair c	ondition v	vith attacl	nments o	generally	sound.				\square	\checkmark		
Vertic O	al crack f P5	ound i B	in weld at 43 S	XG 3		face (072 EACH	2). Refer	to Sketc 4.0	h 19. Mo	onitor.						
_							74)	4.0				l	\sim			
Fixed rocker bearings at fixed having joint E2 of S5 (074). Refer to Sketch 16 for measurements at rocker-bed plate. Bearings have been coated since previous inspection (075).																
Minor O	active co S5	orrosio W	n in B1 up 71 O	oper 3		nt on ups EACH	tream si	de and a 1.0	t rocker-	bed plat	e inte	erface in <u>B4 - re</u> Discalised build		ther treatment. tream side relative to first readings		
										4	Q	(024, 073). Ret	fer to scour so	oundings report.		
0	P5	В	40 0	3	4.0	EACH		4.0				\triangleright				
	Fixed bearings on pier 5.															
	pnificant o P5	PED	44 O	3	4.0	EACH		4.0	\sim	(95)	~					
0	P5	н	54 C	3	1.0	EACH		1.0	$\langle \langle \rangle$)}		Headstock is ir arms.	n fair conditior	n (073). No cracking at cantilever		
0	P5	С	56 C	3	1.0	EACH		1.0	\bigcirc							
0	P5	F	59 C	3	1.0	EACH	Х	X	$\supset x$	Х		Buried and uns	seen (073).			
0	S6	D	20 C	3	354.0	M2	~	354.0	<u></u>							
Deck	appears	sound										1				
Scup O	pers have S6	e been G	treated si 22 S	ince 3		EACH	n and sh	ow no ac 3.0	tive corr	rosion. 1.0						
Struct	ture unde interface	rgoing s and	investiga at stiffene	tions ers F	s due to b Refer to S	rittle failu ketch 18	e/fatigu	e concern spection	ns. Seve Tech no	eral sites	have Sketc	e undergone tes h 19 - Summar	sting, specifica v Plans	ally welds at splice joins, cross girder-		
						\mathcal{O}	/					. Refer to Sketc	·	tch 18.		
			gating fro		- ()	107			-	-	,					
MPI a	and ultras	onic te	esting pos er) up to {	tren	oval of le	ad coatin										
	-		61 as part	_	\sim		otential t	orittle fail	ure in 20)19.						
S6 G	1 splice 3	(lowe	r) identifie	d as)) - a "priority	/ 1" crack	. Post in	spection	weld wa	as groun		ck at S6 G1 Spl and crack remo		arent propogation of cracking into		
ST	S6	G	22 \$	3		EACH		3.0	1.0							
Longi	tudinal st	ressin	g bars ret	ro-fit	ted to eith	er side o	f all girde	ers.				I				
			ved and re tream fac									4 - typical). Req	uires proper a	attachment.		
Refer	Refer also to Sketch 20 - 2019 Investigations into Bearings and Macalloy bars.															

St	Structure Condition Inspection Report B2/2 Sheet 13 Of 13															
			ture Id n Date	19	77 -NOV		 T	en e et		ame				derwater		
	Inshe	cuo	II Date	19-NOV-2020 Inspection Level 2						vel 2	<u> </u>	j Level 5				
Co	mponen	t Loca	ation				Quantity Per				Reqd	Comments				
Modification	Group Component Standard		Standard	Exposure Class Quantity			Condition State				Maintenance R	 * Location of item/condition * Description of defects by location type, magnitude,extent * References of sketches and photos 				
Mod	Group	Con	Star	Exp	Qua	Unit	1	2	3	4	Mai		ences of sketches and photos exposure Nos)			
0	S6	XG	31 S	3	3.0	EACH		3.0								
	-		ogating fro			-	r 1 at G2	? interfac	e (077).			•				
	Cross girders otherwise fair with sound attachments.												\sim			
0	S6	XG	31 C	3	1.0	EACH		1.0				Minor vertical c girders up to 0.		ncrete cross girder at A2 between all		
0	S6	W	710	3	1.0	EACH			1.0			Significant local Refer to scour		p at E1 of downstream side (024, 073). port. Monitor.		
0	A2	В	43 S	3	4.0	EACH		4.0			Х	~ <	7			
Rocker bearings on A2. Refer to Sketch 17 for measurements at rocker-bed plate. Bearings are all in fair condition (079) with minor rust staining under recent coating in bed plate of B3 (080) and minor corrosion in underside of rocker and in bed plate of B4 (081).																
Reco	mmend c	leanin	g and rep	aintir	ng.											
0		PED	440	3	0	EACH		4.0		2						
0	A2	Α	50 C	3	1.0	EACH		1.0			\supset	Abutment is in f	fair condition	. No cracking or spalling noted (079).		
0	A2	F	59 C	3	1.0	EACH	Х	Х	X	X	ÿ	Buried and uns	een (079).			