MORAY COUNCIL
DEPARTMENT OF ENVIRONMENTAL SERVICES
DIRECT SERVICES

Principal Inspection

ARTHURS BRIDGE

Principal Inspection Report

B234M205-J-ART-STR-REP-PIR-0001

Arthurs Bridge St/PI/2025

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Executive Summary

Structure Name:	Arthurs Bridge		
Location:	Lossiemouth		
Inspection Date:	11th February 2025		
Bridge Condition Indicators	**Individual Span Scores**		**Full Structure Score**
BCI Average:	West Span	83.95	**72.25**
	Central Span	48.84	
	East Span	83.95	
BCI Critical:	West Span	81.00	**9.72**
	Central Span	9.72	
	East Span	81.00	

Arthur's Bridge is a 36.58m three span reinforced concrete half-joint structure. The bridge is located near Lossiemouth and carries the B9103 over the River Lossie. The outer spans and cantilever spans of the structure are cast in-situ, supported by the reinforced concrete abutments and piers. The 13.72m post-tensioned concrete suspended span, is supported on half joints. The structure has deteriorated significantly throughout its life, this deterioration is particularly prevalent in the areas around the half-joints. Subsequently, the structure has a 7.5 tonne weight limit imposed and is under signal controlled single lane running.

A Principal Inspection of Arthur's Bridge was undertaken by Jacobs on the 11th February 2025. Access to the half joints, suspended and cantilever spans were obtained through the use of an underbridge unit. All elements of the structure were inspected apart from the buried foundations and waterproofing system.

The east and west spans of the structure were found to be in fair condition, however the central span was in poor condition. The half-joints, cantilever beams and crossbeams are significantly deteriorated and there were extensive defects noted in these areas. Large joined up spalls were observed with significant amounts of reinforcement exposed which was severely corroded. The expansion joints have failed, and substantial water ingress was observed at the half joint locations.

The condition of the bridge has deteriorated since the last Principal Inspection in 2020. When compared to photographs and descriptions provided in the 2020 PI, existing spalled concrete has extended and deepened, and new spalling has formed where previous surface cracks were recorded.

It is understood that the structure is currently being managed until end of life, with replacement planned within the next five years. Therefore, it is recommended that three monthly monitoring is continued but no structural concrete repairs have been proposed. It is recommended that up to date concrete testing is undertaken on the structure and a new assessment completed. This assessment should consider the increased corrosion to the reinforcement that has occurred since the 2020 assessment and ensure the structure can still accommodate 7.5 tonnes ALL.

Contents

Executive Summary ii
1. Introduction 1
1.1. Inspection Procedures 1
1.2. Inspection Information 1
2. Description of Structure 3
3. History of Structure 5
3.1. Inspection History 5
3.2. Assessment History 5
3.3. Maintenance History 6
4. Inspection Findings 7
4.1. Deck Elements 8
4.1.1. Primary Deck Element 8
4.1.2. Transverse Beams 8
4.1.3. Slab 9
4.1.4. Half Joints 10
4.2. Load-Bearing Sub-Structure 12
4.2.1. Foundations 12
4.2.2. Abutments 12
4.2.3. Piers 13
4.2.4. Bearings 13
4.3. Durability Elements 15
4.3.1. Superstructure Drainage 15
4.3.2. Substructure Drainage 16
4.3.3. Waterproofing 17
4.3.4. Expansion joints 17
4.3.5. Finishes: parapets/safety/fences 18
4.4. Safety Elements 20
4.4.1. Guardrails 20
4.4.2. Carriageway surfacing 20
4.4.3. Footway and verge surfacing 22
4.5. Other Bridge Elements 24
4.5.1. Wing Walls 24
4.5.2. Embankments 25
4.6. Ancillary Elements 26
4.6.1. Signs 26
4.6.2. Services 27
5. Conclusions and Recommendations 28

5.1. Works Requiredwe 28
5.2. Monitoring 29
6. References 30

Appendix A: BCI Scoring Sheet

Appendix B: Annotated PI General Arrangement Drawings

Appendix C: Photographs from Principal Inspection

1. Introduction

This report presents the findings of the Principal Inspection (PI) which has been completed for Arthurs Bridge located on the B9103 over the Rive Lossie in Moray.

A description of the structure is provided under Section 2 of this report, with Section 3 outlining the available data which informed the history of the inspected asset. The inspection findings are detailed within Section 4, with Section 5 presenting conclusions and recommendations. The BCI scoring sheet may be reviewed under Appendix A, annotated PI General Arrangement drawings are provided in Appendix B and photographs can be found in Appendix C.

1.1. Inspection Procedures

The PI has been undertaken in accordance with CS 450 [1] and the guidance presented in the 'Inspection Manual for Highway Structures' Volume 1 [2] and Volume 2 [3]. The County Surveyors' Society (CSS) Inspection Process and Retaining Wall Inspection Pro-Forma is utilised for all General and Principal Inspections. The BCI scores provide a consistent measure of individual structure conditions and the overall stock condition [4].

1.2. Inspection Information

Table 1-1 presents the general details of the inspection.

Table 1-1: Inspection Information

Inspecting Engineer:	Cameron Coupar (Jacobs)
Assistant(s):	Lucy Ring (Jacobs)
Date(s) of Inspection:	11/02/2025 and 13/02/2025 (majority of inspection completed on 11th, return to inspect west outer beams, pier and abutment on 13th)
Weather Conditions:	11/02/25: Overcast, light drizzle in morning, light wind, 5 degrees Celsius 13/02/25: Light cloud and sun, 2 degrees
Method of Inspection:	Inspection of suspended span and half joints was completed using an underbridge unit. The outer spans, piers and abutments were inspected on foot with a ladder.
Areas Not Inspected:	The buried foundations and deck waterproofing were not accessible and therefore not inspected.
Site location:	Arthur's Bridge is located in Moray Council area on the B9103 over the River Lossie. The location is indicated on the maps in Figure 1.

Figure 1: Arthur's Bridge Location

2. Description of Structure

Arthurs Bridge carries the B9103 over the river Lossie near Lossiemouth. The structure is a three-span half-joint beam bridge. It comprises two reinforced concrete cantilever side spans and a suspended post-tensioned concrete span supported on the half joints within the cantilever span. Table 2-1 provides a general description of the structure and Figure 2 provides a sketch of the structure identifying each span.

Table 2-1: Structure Description

Grid Reference:	NJ 25335 67206
Number of Spans:	Three spans
Span Lengths:	7.62m – 21.34m – 7.62m
Skew:	N/A
Overall Width of Deck:	6.70m between kerbs (reduced to ~4.35m)
Minimum headroom:	N/A
Restrictions:	7.5 tonne weight limit, reduced to single lane running with traffic light signalling
Highway Carried:	B9103
Obstacle Crossed:	River Lossie
Approx. Date of Construction:	1964
Deck Elements:	Primary elements: Side spans are 7.62m long and comprise 6No reinforcement concrete beams, these beams cantilever 3.81m into the central span. Central suspended span is 13.72m and consists of 6No pre-cast post-tensioned concrete beams. Transverse beams (secondary deck element): 7No reinforced concrete transverse beams. Slab (secondary deck element): Reinforced concrete construction in all three spans. Half joints: Suspended central span is supported by half-joints at the end of the cantilevered beams.
Load-Bearing Sub-Structure:	Foundations: Record information suggests that the abutments are supported on spread foundations and the pier foundation are bored concrete piles. Abutments: In-situ reinforced concrete Piers: In-situ reinforced concrete Bearings: Elastomeric bearing pads Culvert: Masonry and concrete arched culvert to the west of the structure

Durability Elements:	Superstructure drainage: Drainage pipes located at east half-joint Substructure drainage: 3No weep holes in each abutment. 1No weep hole in southeast wing wall, no drainage identified in other wing walls. Waterproofing: Deck waterproofing system details unknown. Expansion joints: Elastomeric deck joint located at each of the half joints. Finishes: guardrail: Protected by a paint system.
Safety Elements:	Parapets: Steel post and rails Carriageway surfacing: Bituminous material Footway and verge surfacing: Bituminous material
Other Elements:	Wingwalls: In-situ reinforced concrete Embankments: There are sloped embankments down to the river between the piers.
Ancillary Elements:	Signs: Various steel signs on approach to structure. Services: A cable connecting the traffic lights runs alongside the carriageway on the verge.
Additional Notes:	None.

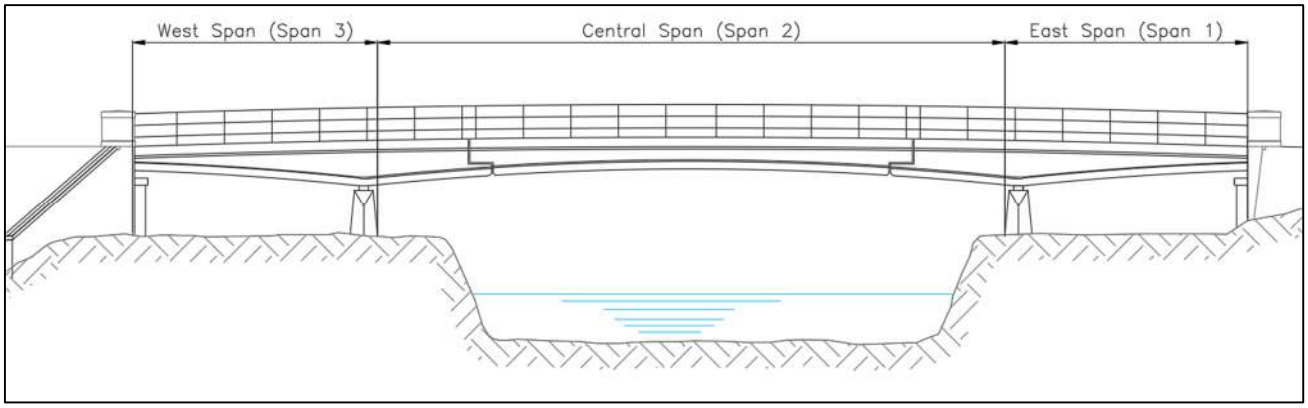


Figure 2 : Elevation of the structure looking downstream (north)

3. History of Structure

The Moray Council Structures Management System (SMS) has been reviewed to determine the inspection, assessment and maintenance history of the structure.

3.1. Inspection History

Table 3-1 presents the inspection history and corresponding BCI. Minor variations in the BCI scores can be expected due to different inspectors and varying weather conditions when conducting the inspections, impacting the calculated score.

Table 3-1: Inspection History

Inspection	Date	Inspector	Bridge Condition Indicators	
			BCI Average	BCI Critical
General Inspection	21/06/2023	Chris Waterstreet	76.38	9.72
General Inspection	22/06/2021	Derek Reid	77.57	9.72
Principal Inspection	10-11/02/2020	Fairhurst	Unknown	Unknown
Special Inspection	10-11/02/2020	CONCORR	NA	NA
General Inspection	27/06/2019	Derek Reid	83.27	47.33*
General Inspection	11/07/2017	Derek Reid	81.51	9.72
General Inspection	08/04/2015	J.A.M	88.53	47.52
General Inspection	29/04/2013	-	88.53	47.52
General Inspection	03/06/2011	-	88.31	47.52
General Inspection	13/05/2009	-	90.55	50.84

*Increase in BCI Critical score is assumed to be due to concrete patch reinstatement works following the 2017 inspection. There is no available record of specific concrete repairs being undertaken.

3.2. Assessment History

An assessment was carried out in 2017 following an intrusive investigation to determine the corrosion of reinforcement at the half-joints. The assessment recommended that a 26 tonne weight restriction was applied to the bridge and that the traffic was reduced to single lane running.

Another assessment was carried out in 2020 after further deterioration was noted during the 2020 Principal Inspection. This assessment recommended that a weight restriction of 7.5 tonnes be applied to the bridge. This weight restriction is still in operation with single lane running in place.

3.3. Maintenance History

The structure was annually monitored and inspected by Fairhurst between 2009 and 2016. This included half-cell potential and concrete testing at the half-joints and a tactile survey of all structural elements.

During the 2020 Principal Inspection an additional Special Inspection was also carried out which included hammer testing, covermeter survey, carbonation depth testing, dust samples for analysis, half-cell surveys and endoscopic survey.

The reports from these inspections are available on the Council's Structures Management System.

No known large maintenance projects have been carried out on the bridge.

The bridge is deemed substandard, and is currently being managed to the end of its life. It is anticipated to be replaced within the next five years.

4. Inspection Findings

The following section details the inspection findings and has been set out to correspond with the County Surveyors' Society Inspection Process and Bridge Inspection Pro-Forma which is presented in Appendix A.

For each structural element, where defects have been identified, remedial works have been recommended. The works required have been prioritised as follows:

1. Urgent – Imminent risk to safety or structure serviceability.
2. Recommended before next General Inspection (GI) (2 years)
3. Recommended before next Principal Inspection (PI) (6 years)
4. Monitor – Active monitoring and recording of defect.
5. No action – GI and PI programme is adequate for monitoring condition.
6. Further investigation – Further investigation is required to confirm the cause and severity of the defect.

The list of works required is considered to supersede all previous tasks identified in Moray Council asset management system. The works required are summarised and grouped under Section 5, in the Conclusions and Recommendations chapter of this report.

4.1. Deck Elements

4.1.1. Primary Deck Element

Inspection Findings:	The main post-tensioned beams in the suspended section of the central span are in generally good condition. However, there is localised spalling, exposed reinforcement and corrosion at the half-joint locations. This has generally occurred on the end face of the beams. The cantilever beams in the central span are in poor condition. With regular corrosion and spalling along their length between the half joint and pier. In some cases, spalls have joined up to leave up to 2m of exposed longitudinal reinforcement. The outer span is in generally good condition with only minor defects noted. Some small spalling was noted on Beam 1 west and Beam 6 east. Individual defect descriptions and details are tabulated and presented with the locations on the PI General Arrangement Drawing in Appendix B.		
Supporting Evidence:	Refer to Appendix B: Annotated PI General Arrangement Drawings and Appendix C: Photographs from Principal Inspection.		
West span **BCI: Central span** **East span**	2 **Severity:** 4 2	B **Extent** B B	**Defect** 2.2
Defect Description:	Reinforced Concrete: Joined up, deep spalls exposing shear links and main bars with general and pitting corrosion		
Work Required:	Regular monitoring of concrete deterioration (3 monthly)		
Works Priority:	4. Monitor – Active monitoring and recording of defect.		

4.1.2. Transverse Beams

Inspection Findings:	The cross beams were in poor condition, particularly at the half joint locations. The transverse beams on the cantilever spans had significant large spalls across the soffit of the beams, exposing corroded shear links and longitudinal reinforcement. The cross beam at central span was in good condition, the only defect noted was a hairline crack between Beams 2 and 3. This was present on both faces of the beam, originating at the soffit of the deck and propagating diagonally to the mid-depth of the beam before dissipating. The cross beams at the pier locations were observed to be in fair condition. There is some minor spalling present on both cross beams, with some corrosion staining where reinforcement has been exposed.

Supporting Evidence:	Refer to Appendix B: Annotated PI General Arrangement Drawings and Appendix C: Photographs from Principal Inspection.				
West span **BCI: Central span** **East span**	2 **Severity** 4 2		B **Extent** C B		2.2 **Defect** 2.2 2.2
Defect Description:	Reinforced Concrete: Joined up, deep spalls exposing shear links and main bars with general and pitting corrosion				
Work Required:	Regular monitoring of concrete deterioration (3 monthly)				
Works Priority:	4. Monitor – Active monitoring and recording of defect.				

4.1.3. Slab

Inspection Findings:	The soffit of the bridge deck was in good condition. Localised spots of corrosion, likely from tying wire were observed, however these were rare across the whole area of the soffit. Additionally, some bird's nests were also noted on the structure.
Supporting Evidence:	 Fig 3. Localised spots of tying wire observed in soffit of deck

	 Fig 4. View of soffit with bird's nest visible at crossbeam

West span		1		A	2.2
BCI: Central span	**Severity**	1	**Extent**	A	**Defect** 2.2
East span		1		A	2.2

Defect Description:	Reinforced concrete: No spalls
Work Required:	Remove bird's nests.
Works Priority:	2. Recommended before next General Inspection (GI) (2 years)

4.1.4. Half Joints

Inspection Findings:	The half joints are in very poor condition. There is significant water ingress at the half joint, particularly at the edges of the deck. This has led to deterioration and spalling of the concrete, with major corrosion of the exposed reinforcement. There are defects present on all faces of the half joints, with common defects being seen across multiple joint locations. Progressive deterioration can be observed in common locations with cracking and delamination indicating where future spalls will occur. The corners of the half joints are generally worst effected with many corners having spalled off entirely. It is suggested this is due to a lack of suitable

	cover during the original construction, making the links more susceptible to water ingress and corrosion. There was a noticeable increase in deterioration and extent of spalls when compared with photos from the previous PI undertaken in 2020. Individual defect descriptions and details are tabulated and presented with the locations on the PI General Arrangement Drawing in Appendix B.		
Supporting Evidence:	Refer to Appendix B: Annotated PI General Arrangement Drawings and Appendix C: Photographs from Principal Inspection.		
BCI	**Severity** 4	**Extent** E	**Defect** 2.2
Defect Description:	Reinforced Concrete: Joined up, deep spalls exposing shear links and main bars with general and pitting corrosion		
Work Required:	Regular monitoring of concrete deterioration (3 monthly)		
Works Priority:	4. Monitor – Active monitoring and recording of defect.		

4.2. Load-Bearing Sub-Structure

4.2.1. Foundations

Inspection Findings:	It was not possible to visually inspect the foundations as they are buried. There are no signs of settlement or rotation of the wall, so they are assumed to be in good condition.

4.2.2. Abutments

Inspection Findings:	The abutments are in fair condition. There is water staining, sediment build up and dampness at the corners of each abutment. This is due to surface runoff from the road above. There is also some staining on the face of the west abutment. The west abutment shelf had delaminating concrete on the top surface. Additionally, the back wall had small areas of spalling, with corrosion staining visible at these locations.				
Supporting Evidence:	 Fig 5. Staining on the west abutment For further photographs of this element refer to Appendix B: Annotated PI General Arrangement Drawings and Appendix C: Photographs from Principal Inspection.				
BCI:	**Severity**	2 3	**Extent**	B B	**Defect** 2.5 14.2
Defect Description:	Reinforced Concrete: Early signs of delamination Waterproofing: Wet surface, drops of water falling and significant staining				
Work Required:	Regular monitoring of concrete deterioration (3 monthly)				
Works Priority:	4. Monitor – Active monitoring and recording of defect.				

4.2.3. Piers

Inspection Findings:	The piers were observed to be in fair condition. Both piers have graffiti on their faces.					
Supporting Evidence:	 Fig 6. Example of graffiti on west pier. For further photographs of this element refer to Appendix B: Annotated PI General Arrangement Drawings and Appendix C: Photographs from Principal Inspection.					
BCI:	**West span** **East span**	**Severity**	1 1	**Extent**	A A	**Defect**	2.2 2.2
Defect Description:	Reinforced Concrete: No spalls					
Work Required:	Clean to remove the graffiti.					
Works Priority:	2. Recommended before next General Inspection (GI) (2 years)					

4.2.4. Bearings

Inspection Findings:	There are three different types of bearings present across the structure. The large elastomeric bearings at the piers are in generally good condition with some minor cracks. The bearings at the east half joint are elastomeric pads, these are in good condition, with no defects observed. The bearings at the west half joint are formed of a concrete block with a thin (10mm) elastomeric pad on top. These pads are crushed and deteriorated, with splitting and cracks easily visible. No information is available to indicate why different bearing types have been used at the west and east half joints.

<table>
<tr><td>Supporting Evidence:</td><td colspan="3"> 
Fig 7. Deteriorated thin bearing pad at west half joint, crushed with cracking</td></tr>
<tr><td>West span
BCI: Central span
East span</td><td>1
Severity 4
1</td><td>A
Extent D
A</td><td>12.4
Defect 12.4
12.4</td></tr>
<tr><td>Defect Description:</td><td colspan="3">Bearing: Major breakdown</td></tr>
<tr><td>Work Required:</td><td colspan="3">Regular monitoring of bearing defects at the west half joint and impact on bridge articulation (6 monthly)</td></tr>
<tr><td>Works Priority:</td><td colspan="3">4. Monitor – Active monitoring and recording of defect.</td></tr>
</table>

4.3. Durability Elements

4.3.1. Superstructure Drainage

<table>
<tr><td>Inspection Findings:</td><td colspan="3">There are two drainage pipes at the east expansion joint, these outlet at the external faces of the structure. Algae staining was noted at both outlet points. The south drainage pipe is completely blocked by calcified sediment.</td></tr>
<tr><td>Supporting Evidence:</td><td colspan="3"> 
Fig 8. Algae and staining at the north east drainage pipe

 
Fig 9. Sediment blocking drainage pipe at south side of east expansion joint</td></tr>
<tr><td>BCI</td><td>Severity 5</td><td>Extent D</td><td>Defect 8.1</td></tr>
</table>

Defect Description:	Drainage: Totally blocked
Work Required:	Remove sediment from drainage pipe and unblock.
Works Priority:	2. Recommended before next General Inspection (GI) (2 years)

4.3.2. Substructure Drainage

Inspection Findings:	There are three weepholes in each abutment and one in the southeast wing wall. No further substructure drainage was identified. The weep holes were found to be in good condition with no evidence of blockages noted. Staining was observed on the face of the abutments below the weephole outlets.		
Supporting Evidence:	 Fig 10. Common defect of staining below outlet of weep holes		
BCI	**Severity** 2	**Extent** D	**Defect** 8.2
Defect Description:	Drainage: Causing minor staining		
Work Required:	None.		
Works Priority:	5. No action – GI and PI programme is adequate for monitoring condition.		

4.3.3. Waterproofing

Inspection Findings:	No evidence of waterproof failure was observed.		
Supporting Evidence:	NA.		
BCI	**Severity** 1	**Extent** A	**Defect** 14.1
Defect Description:	Waterproofing: No visible sign of seepage		
Work Required:	None.		
Works Priority:	5. No action – GI and PI programme is adequate for monitoring condition.		

4.3.4. Expansion joints

Inspection Findings:	The expansion joints have failed, causing major leakage through the structure at the half joint locations. In some places constant dripping water was observed from the joint location. This has resulted in stalactites forming in some locations and the spalling of concrete at the joint. From above the expansion joints are filled with silt and debris. The sill on each side of the joint is minorly corroded.
Supporting Evidence:	 Fig 11. Stalactites on soffit of deck at east expansion joint location

	 Fig 12. Silt build up in the joint and minor corrosion of sills

BCI	**Severity**	4	**Extent**	E	**Defect** 10.12
Defect Description:	Expansion Joints: Major leakage through joint causing structural damage				
Work Required:	Regular monitoring of concrete deterioration (3 monthly)				
Works Priority:	4. Monitor – Active monitoring and recording of defect.				

4.3.5. Finishes: parapets/safety/fences

Inspection Findings:	Complete failure of the paint system was observed at the joint locations on the guardrail. This had resulted in corrosion and section loss of the guardrail section. Paint failure was also consistently noted on the parapet base plates, with corrosion of the plate and bolts. Aside from these localised areas the paint system was in fair condition.

<table>
<tr><td rowspan="5">Supporting Evidence:</td><td colspan="3"> 
Fig 13. Localised paint failure at baseplates and guardrail join location

 
Fig 14. General view of north guardrail looking west</td></tr>
<tr><td>BCI</td><td>Severity 5</td><td>Extent B</td><td>Defect 4.1</td></tr>
<tr><td>Defect Description:</td><td colspan="3">Paintwork and protective coating: All coats failed</td></tr>
<tr><td>Work Required:</td><td colspan="3">Grit blast and repaint the corroded guardrail and baseplates.</td></tr>
<tr><td>Works Priority:</td><td colspan="3">2. Recommended before next General Inspection (GI) (2 years)</td></tr>
</table>

4.4. Safety Elements

4.4.1. Guardrails

Inspection Findings:	The guardrails were generally in a fair condition. Localised corrosion and section loss were observed at joint locations and baseplates. This was where the localised paint failure identified in 4.3.5 has occurred.		
Supporting Evidence:	 Fig 15. Section loss of guardrail base plates		
BCI	**Severity** 3	**Extent** B	**Defect** 1.2
Defect Description:	Metalwork: Moderate section loss causing some reduction in functionality		
Work Required:	Grit blast and repaint the corroded guardrail and baseplates		
Works Priority:	2. Recommended before next General Inspection (GI) (2 years)		

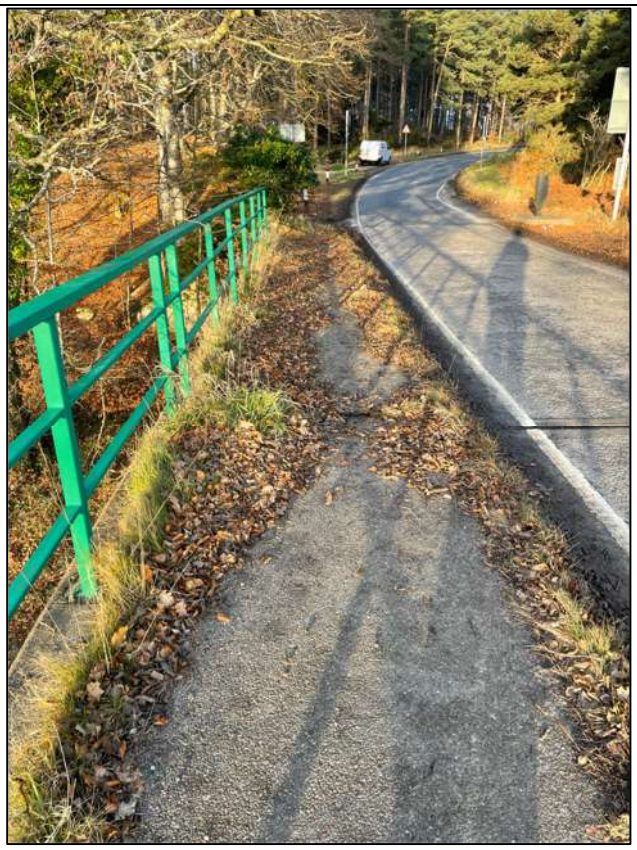
4.4.2. Carriageway surfacing

Inspection Findings:	The carriage surfacing was in good condition. There was some vegetation growth and leaf debris build up along the kerbs at either side of the carriageway.

Supporting Evidence:	 Fig 16. Road surface in good condition  Fig 17. Vegetation along the south kerb				
BCI	**Severity**	2 1	**Extent**	B A	**Defect**	5.1 9.1
Defect Description:	Vegetation: Minor vegetation causing no structural damage Surfacing: Little to no wear/weathering				
Work Required:	Remove vegetation and debris build up.				
Works Priority:	2. Recommended before next General Inspection (GI) (2 years)				

4.4.3. Footway and verge surfacing

Inspection Findings:	There is a single footway running along the southern side of the structure, the surfacing of the footpath was observed to be in good condition. The footway and verge on the north side of the structure had a build up of leaves and debris.
Supporting Evidence:	 Fig 18. Build up of leaves and debris on north verge

<table>
<tr><td></td><td colspan="6"> 
Fig 19. Build up of leaves and vegetation growth at western end of footway</td></tr>
<tr><td>BCI</td><td>Severity</td><td>2
1</td><td>Extent</td><td>B
A</td><td>Defect</td><td>5.1
9.1</td></tr>
<tr><td>Defect Description:</td><td colspan="6">Vegetation: Minor vegetation causing no structural damage
Surfacing: Little to no wear/weathering</td></tr>
<tr><td>Work Required:</td><td colspan="6">Remove vegetation and debris build up.</td></tr>
<tr><td>Works Priority:</td><td colspan="6">2. Recommended before next General Inspection (GI) (2 years)</td></tr>
</table>

4.5. Other Bridge Elements

4.5.1. Wing Walls

<table>
<tr><td>Inspection Findings:</td><td colspan="6">The wing walls were in fair condition, no structural defects were noted. However, there was a large amount of vegetation on the southwest wall. There was minor vegetation growth and staining observed on the other walls.</td></tr>
<tr><td>Supporting Evidence:</td><td colspan="6"> 
Fig 20. Significant vegetation growth on the southwest wing wall

 
Fig 21. Minor vegetation and staining observed on the southeast wall</td></tr>
<tr><td>BCI</td><td>Severity</td><td>3
1</td><td>Extent</td><td>C
A</td><td>Defect</td><td>5.2
2.2</td></tr>
</table>

Defect Description:	Vegetation: Significant depth/density of vegetation obscuring inspection Reinforced concrete: No spalls
Work Required:	Remove vegetation and debris build up.
Works Priority:	2. Recommended before next General Inspection (GI) (2 years)

4.5.2. Embankments

Inspection Findings:	The embankments were in good condition with no defects noted.		
Supporting Evidence:	 Fig 22. West embankment in good condition		
BCI	**Severity** 1	**Extent** A	**Defect** 11.1
Defect Description:	Embankments: Sound, no deformation		
Work Required:	None.		
Works Priority:	5. No action – GI and PI programme is adequate for monitoring condition.		

4.6. Ancillary Elements

4.6.1. Signs

Inspection Findings:	The signage and traffic lights were generally in good condition. The traffic lights were observed to be functioning correctly during the inspection. The southeast pilaster end warning sign was obscured by vegetation.
Supporting Evidence:	 Fig 23. Southeast pilaster end warning sign obscured by vegetation  Fig 24. Traffic lights and approach signage in good condition

BCI:	**West Span** **East Span**	**Severity**	1 2	**Extent**	A B	**Defect**	5.2 5.2
Defect Description:	Vegetation: low depth/density of vegetation cover, easily removed					
Work Required:	Remove vegetation and debris build up.					
Works Priority:	2. Recommended before next General Inspection (GI) (2 years)					

4.6.2. Services

Inspection Findings:	The ducting carrying traffic light cabling was observed to be in good condition.				
Supporting Evidence:	 Fig 25. Ducting carrying traffic light cabling in good condition				
BCI	**Severity**	1	**Extent**	A	**Defect** NA
Defect Description:	NA				
Work Required:	None.				
Works Priority:	5. No action – GI and PI programme is adequate for monitoring condition.				

5. Conclusions and Recommendations

The structure is in an overall fair condition. However, there is significant deterioration around the half-joints and associated elements, this area of the structure is in very poor condition having further deteriorated since the last Principal Inspection in 2020.

The outer spans were in fair condition with only minor defects noted.

The suspended span beams were generally in a good condition, however significant defects were noted to the span ends at the half-joint locations.

The cantilever spans were observed to be in poor condition with multiple large concrete areas having spalled, exposing lengths of significantly corroded longitudinal reinforcement and shear links. The reinforced concrete deterioration is concentrated around the half-joints with defects noted on all surfaces of the joints, on both the upper and lower nib. Additionally, full width concrete spalling was observed on many of the cantilever span crossbeams, exposing significantly corroded reinforcement. Water ingress was evident on both half joints, with some areas observed to be actively dripping.

From comparison with the 2020 Principal Inspection and Special Inspection, there has been a continued deterioration of the structure. Further spalling can be observed, with areas of previous spalled concrete having notably become enlarged with new additional areas present. Furthermore, the exposed reinforcement is visibly more corroded. It is recommended that active monitoring of the structure be continued at intervals of three months.

It was noted that an assumption was made, for the corroded diameter of the reinforcement in the previous assessment completed in 2020. Following the observations detailed throughout this report and continued deterioration of the structure observed, it is anticipated that this corroded diameter value will have reduced. Therefore, it is recommended that another assessment be undertaken as a high priority to ensure that the structures capacity of 7.5 tonne ALL remains valid. In conjunction with the assessment, it is recommended that further concrete testing is undertaken to establish the current extent of corrosion propagation for comparison with the 2020 results.

It is understood from Moray Council that the structure is to be managed until the end of life. The deterioration of the structure is a concern and following the results of the assessment the timeline for replacement should be reviewed.

5.1. Works Required

The following table lists the works which have been identified as being required. The following list of works required supersedes all previous works required identified on the Councils Structures Management System. Tasks have been grouped where they are the result of a single fault.

Table 5-1: Works Required

Task No.	Element	Works Required	Priority
001	21	Grit blast and repaint corroded elements of guardrail and baseplates.	2
	23		
002	15	Unblock south drainage pipe from structure.	2
003	03	Remove vegetation, debris and bird's nests from structure.	2
	24		
	25		
	31		
	36		
004	11	Remove the graffiti on the piers	2

5.2. Monitoring

The following table lists all items which are to be actively monitored more regularly than GIs. The defects condition shall be reported to the Engineer following the three monthly inspections, to determine whether deterioration is now critical.

Table 5-2: Monitoring Required

Task No.	Element	Works Required	Priority
100	1	Three monthly monitoring of concrete deterioration, with a focus on half-joints, crossbeams and surrounding areas.	4
	2		
	4		
	13		
200	18	Six monthly monitoring of half joint bearings and bridge articulation.	4

6. References

[1] Design Manual for Roads and Bridges, CS 450 - Inspection of highway structures, March 2020, Revision 0.

[2] Inspection Manual for Highway Structures, Volume 1: Reference Manual, May 2007.

[3] Inspection Manual for Highway Structures, Volume 2: Inspectors Handbook, May 2007.

[4] CSS Bridges Group, “Bridge Condition Indicators - Volume 2, Bridge Inspection Reporting,” CSS, Epsom, 2002.

Appendix A BCI Score Sheet

BRIDGE INSPECTION PRO FORMA

Jacobs

☐ Superficial	☐ General	☑ Principal	☐ Special	Form		of		for this bridge
Inspector	Cameron Coupar & Lucy Ring	Date	11/02/2025	Next Inspection Type/Date	General	Feb-2027		
Bridge Name	Arthurs Bridge	Bridge Ref/No.		Road Ref/No.				
OS Easting	325335	OS Northing	867208					
Span	1	of	3	Span Width (m)	8.2	Span Length (m)	7.62	
All above ground elements inspected	Yes	Photographs						
Number of construction forms in bridge	3							

Bridge Code	
Primary Deck Form	04
Primary Deck Material	C
Secondary Deck Form	24
Secondary deck material	A

Set	No	Element Description	S	Ex	Def	W	P	Cost	Comments/Remarks
Deck Elements	1	Primary deck element	2	B	2.2	Y	4	*	Minor spalling to beams.
	2	Transverse beams	2	B	2.2	Y	4	*	Minor spalling, some corrosion staining at pier crossbeam
	3	Secondary deck element (see Table 8)	1	A	2.2	N			
	4	Half joints							
	5	Tie beam/rod							
	6	Parapet beam or cantilever							
	7	Deck bracing / Diaphragm							
Load-bearing Substructure	8	Foundations	1	A	6.1	N			
	9	Abutments (incl. Arch springing)	3	B	14.2	Y	4	*	Staining and deposit build up at abutment corners.
	10	Spandrel wall/head wall							
	11	Pier/column	1	A	2.2	N			
	12	Cross head/capping beam							
	13	Bearings	1	A	12.4	N			
	14	Bearing plinth/shelf							
Durability Elements	15	Superstructure drainage							
	16	Substructure drainage	2	D	8.2	N			
	17	Waterproofing	1	A	14.1	N			
	18	Movement/expansion joints							
	19	Finishes: deck elements							
	20	Finishes: substructure elements							
	21	Finishes: parapets/safety fencing	5	B	4.1	Y	2	*	Paint system completely failed locally.
Safety Elements	22	Access/walkways/gantries							
	23	Handrail/parapet/safety fencing	3	B	1.2	Y	2	*	Corrosion and section loss in localised areas.
	24	Carriageway surfacing	2	B	M	Y	2	*	Remove vegetation and debris.
	25	Footway/verge/footbridge surfacing	2	B	M	Y	2	*	Remove vegetation and debris.
Other Bridge Elements	26	Invert/river bed							
	27	Aprons							
	28	Fenders/cutwaters/collision prot.							
	29	River training works							
	30	Revetment/batter paving							
	31	Wing walls	3	C	M	Y	2	*	Remove vegetation.
	32	Retaining walls							
	33	Embankments	1	A	11.1				
	34	Machinery							
Ancillary Elements	35	Approach rails/barrier walls							
	36	Signs	2	B	5.2	Y	2	*	One end barrier sign obscured by vegetation
	37	Lighting							
	38	Services	1	A	NA	N			Ducting in good condition.
Other	39								
	40								
	41								
	42								

S - severity, **Ex** - extent, **Def** - defect, **W** - work required, **P** - work priority, **Cost** - Cost of Work

MULTIPLE DEFECTS

Element No.	Defect 1						Defect 2						Comments
	S	Ex	Def	W	P	Cost	S	Ex	Def	W	P	Cost	
24	2	B	5.1	Y	2	*	1	A	9.1	N			1) Vegetation and debris on carriageway 2) Surfacing in good condition
25	2	B	5.1	Y	2	*	1	A	9.1	N			1) Vegetation and debris on footway 2) Surfacing in good condition
31	3	C	5.2	Y	2	*	1	A	2.2	N			1) Remove vegetation from wingwalls 2) Concrete wall in good condition

INSPECTOR'S COMMENTS

	Refer to Pricipal Inspection report: B234M205-J-ART-STR-REP-PIR-0001 and accompanying Appendices.				
Name:		Signed		Date	

ENGINEER'S COMMENTS

Name:		Signed		Date	

WORK REQUIRED

Reference No.	Suggested Remedial Works	Priority	Est. Cost (£)	Action / Work Ordered
1	Three monthly monitoring of concrete deterioration	4	*	
2	Three monthly monitoring of concrete deterioration	4	*	
9	Three monthly monitoring of concrete deterioration	4	*	
21	Grit blast and repaint corroded sections of guardrail.	2	*	
23	Grit blast and repaint corroded sections of guardrail.	2	*	
24	Remove vegetation and debris from carriageway and footpath.	2	*	
25	Remove vegetation and debris from carriageway and footpath.	2	*	
31	Remove vegetation from wingwall.	2	*	
36	Remove vegetation from in front of signage.	2	*	
Name:		Signed	Date	

BRIDGE INSPECTION PRO FORMA

Jacobs

☐ Superficial	☐ General	☑ Principal	☐ Special	Form		of		for this bridge
Inspector	Cameron Coupar & Lucy Ring	Date	11/02/2025	Next Inspection Type/Date	General	Feb-2027		
Bridge Name	Arthurs Bridge	Bridge Ref/No.		Road Ref/No.				
OS Easting	325335	OS Northing	867208					
Span	2	of	3	Span Width (m)	8.2	Span Length (m)	21.34	
All above ground elements inspected	Yes	Photographs						
Number of construction forms in bridge	3							

Bridge Code	
Primary Deck Form	04
Primary Deck Material	C
Secondary Deck Form	24
Secondary deck material	A

Set	No	Element Description	S	Ex	Def	W	P	Cost	Comments/Remarks
Deck Elements	1	Primary deck element	4	B	2.2	Y	4	*	Significant spalling, reinforcement exposed and corroded.
	2	Transverse beams	4	C	2.2	Y	4	*	Significant spalling, reinforcement exposed and corroded.
	3	Secondary deck element (see Table 8)	1	A	2.2	N			
	4	Half joints	4	E	2.2	Y	4	*	Significant spalling, reinforcement exposed and corroded.
	5	Tie beam/rod							
	6	Parapet beam or cantilever							
	7	Deck bracing / Diaphragm							
Load-bearing Substructure	8	Foundations							
	9	Abutments (incl. Arch springing)							
	10	Spandrel wall/head wall							
	11	Pier/column							
	12	Cross head/capping beam							
	13	Bearings	4	D	12.4	Y	4	*	Thin elastomeric bearing pads at west half joint are crushe
	14	Bearing plinth/shelf							
Durability Elements	15	Superstructure drainage	5	D	8.1	Y	2	*	One drainage pipe on south side of structure blocked.
	16	Substructure drainage							
	17	Waterproofing	1	A	14.2	N			
	18	Movement/expansion joints	4	E	10.12	Y	4	*	Failing, significant water ingress to structure below.
	19	Finishes: deck elements							
	20	Finishes: substructure elements							
	21	Finishes: parapets/safety fencing	5	B	4.1	Y	2	*	Paint system completely failed locally.
Safety Elements	22	Access/walkways/gantries							
	23	Handrail/parapet/safety fencing	3	B	1.2	Y	2	*	Corrosion and section loss in localised areas.
	24	Carriageway surfacing	2	B	M	Y	2	*	Remove vegetation and debris.
	25	Footway/verge/footbridge surfacing	2	B	M	Y	2	*	Remove vegetation and debris.
Other Bridge Elements	26	Invert/river bed							
	27	Aprons							
	28	Fenders/cutwaters/collision prot.							
	29	River training works							
	30	Revetment/batter paving							
	31	Wing walls							
	32	Retaining walls							
	33	Embankments							
	34	Machinery							
Ancillary Elements	35	Approach rails/barrier walls							
	36	Signs							
	37	Lighting							
	38	Services	1	A	NA	N			Ducting in good condition.
Other	39								
	40								
	41								
	42								

S - severity, **Ex** - extent, **Def** - defect, **W** - work required, **P** - work priority, **Cost** - Cost of Work

MULTIPLE DEFECTS

Element No.	Defect 1						Defect 2						Comments
	S	Ex	Def	W	P	Cost	S	Ex	Def	W	P	Cost	
24	2	B	5.1	Y	2	*	1	A	9.1	N			1) Vegetation and debris on carriageway 2) Surfacing in good condition
25	2	B	5.1	Y	2	*	1	A	9.1	N			1) Vegetation and debris on footway 2) Surfacing in good condition

INSPECTOR'S COMMENTS

	Refer to Pricipal Inspection report: B234M205-J-ART-STR-REP-PIR-0001 and accompanying Appendices.				
Name:		Signed		Date	

ENGINEER'S COMMENTS

Name:		Signed		Date	

WORK REQUIRED

Reference No.	Suggested Remedial Works	Priority	Est. Cost (£)	Action / Work Ordered
1	Three monthly monitoring of concrete deterioration	4	*	
2	Three monthly monitoring of concrete deterioration	4	*	
4	Three monthly monitoring of concrete deterioration	4	*	
13	Six monthly monitoring of bearings and bridge articulation.	4	*	
15	Unblock drainage pipe	2	*	
18	Three monthly monitoring of concrete deterioration	4	*	
21	Grit blast and repaint corroded sections of guardrail.	2	*	
23	Grit blast and repaint corroded sections of guardrail.	2	*	
24	Remove vegetation and debris from carriageway and footpath.	2	*	
25	Remove vegetation and debris from carriageway and footpath.	2	*	
Name:		Signed	Date	

BRIDGE INSPECTION PRO FORMA

Jacobs

☐ Superficial	☐ General	☑ Principal	☐ Special	Form		of		for this bridge
Inspector	Cameron Coupar & Lucy Ring	Date	11/02/2025	Next Inspection Type/Date	General	Feb-2027		
Bridge Name	Arthurs Bridge	Bridge Ref/No.		Road Ref/No.				
OS Easting	325335	OS Northing	867208					
Span	3	of	3	Span Width (m)	8.2	Span Length (m)	7.62	
All above ground elements inspected	Yes	Photographs						
Number of construction forms in bridge	3							

Bridge Code	
Primary Deck Form	04
Primary Deck Material	C
Secondary Deck Form	24
Secondary deck material	A

Set	No	Element Description	S	Ex	Def	W	P	Cost	Comments/Remarks
Deck Elements	1	Primary deck element	2	B	2.2	Y	4	*	Minor spalling to beams.
	2	Transverse beams	2	B	2.2	Y	4	*	Minor spalling, some corrosion staining at pier crossbeam
	3	Secondary deck element (see Table 8)	1	A	2.2	N			
	4	Half joints							
	5	Tie beam/rod							
	6	Parapet beam or cantilever							
	7	Deck bracing / Diaphragm							
Load-bearing Substructure	8	Foundations	1	A	6.1	N			
	9	Abutments (incl. Arch springing)	3	B	M	Y	4	*	Delamination of top shelf and staining of abutment.
	10	Spandrel wall/head wall							
	11	Pier/column	1	A	2.2	N			
	12	Cross head/capping beam							
	13	Bearings	1	A	12.4	N			Good condition.
	14	Bearing plinth/shelf							
Durability Elements	15	Superstructure drainage							
	16	Substructure drainage	2	D	8.2	N			Minor staining from drainage holes.
	17	Waterproofing	1	A	14.1	N			
	18	Movement/expansion joints							
	19	Finishes: deck elements							
	20	Finishes: substructure elements							
	21	Finishes: parapets/safety fencing	5	B	4.1	Y	2	*	Paint system completely failed locally.
Safety Elements	22	Access/walkways/gantries							
	23	Handrail/parapet/safety fencing	3	B	1.2	Y	2	*	Corrosion and section loss in localised areas.
	24	Carriageway surfacing	2	B	M	Y	2	*	Remove vegetation and debris.
	25	Footway/verge/footbridge surfacing	2	B	M	Y	2	*	Remove vegetation and debris.
Other Bridge Elements	26	Invert/river bed							
	27	Aprons							
	28	Fenders/cutwaters/collision prot.							
	29	River training works							
	30	Revetment/batter paving							
	31	Wing walls	3	C	,M	Y	2	*	Remove vegetation.
	32	Retaining walls							
	33	Embankments	1	A	11.1	N			
	34	Machinery							
Ancillary Elements	35	Approach rails/barrier walls							
	36	Signs	1	A	5.2	N			Signage in good condition.
	37	Lighting							
	38	Services	1	A	NA	N			Ducting in good condition.
Other	39								
	40								
	41								
	42								

S - severity, **Ex** - extent, **Def** - defect, **W** - work required, **P** - work priority, **Cost** - Cost of Work

MULTIPLE DEFECTS

Element No.	Defect 1						Defect 2						Comments
	S	Ex	Def	W	P	Cost	S	Ex	Def	W	P	Cost	
9	2	B	2.5	Y	4	*	3	B	14.2	Y	4	*	1)Corroded spotting on abutment shelf 2) Staining and seepage at edges of abutment, sediment build up
24	2	B	5.1	Y	2	*	1	A	9.1	N			1) Vegetation and debris on carriageway 2) Surfacing in good condition
25	2	B	5.1	Y	2	*	1	A	9.1	N			1) Vegetation and debris on footway 2) Surfacing in good condition
31	3	C	5.2	Y	2	*	1	A	2.2	N			1) Remove vegetation from wingwalls 2) Concrete wall in good condition

INSPECTOR'S COMMENTS

Refer to Pricipal Inspection report: B234M205-J-ART-STR-REP-PIR-0001 and accompanying Appendices.

Name:		Signed		Date	

ENGINEER'S COMMENTS

Name:		Signed		Date	

WORK REQUIRED

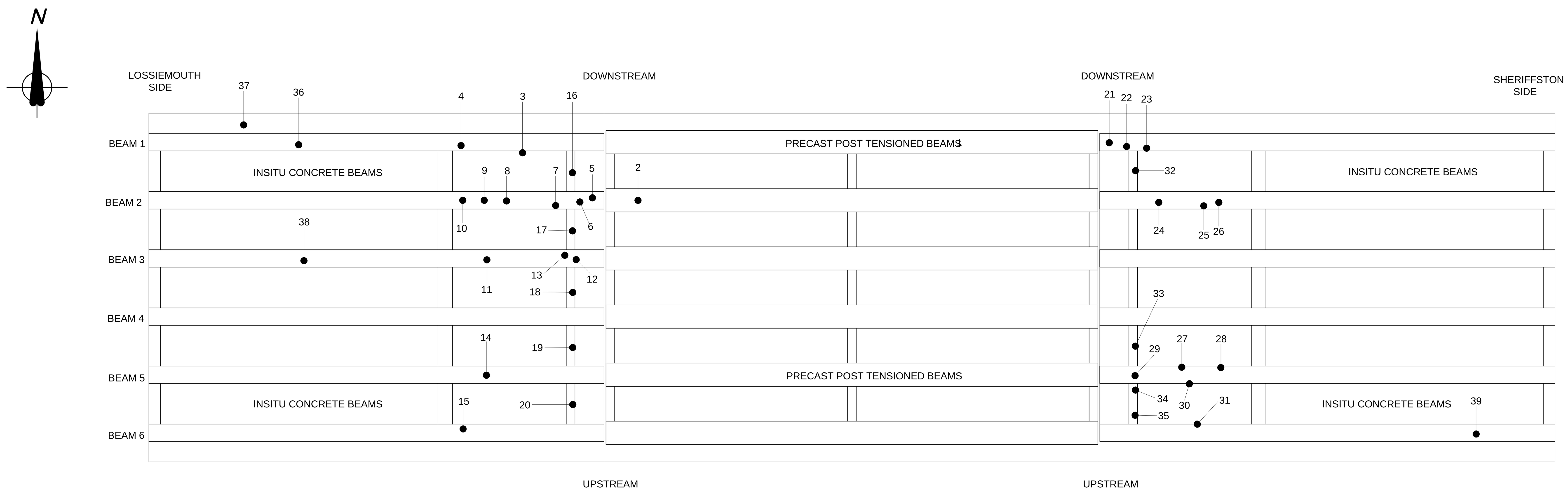
Reference No.	Suggested Remedial Works	Priority	Est. Cost (£)	Action / Work Ordered
1	Three monthly monitoring of concrete deterioration	4	*	
2	Three monthly monitoring of concrete deterioration	4	*	
9	Three monthly monitoring of concrete deterioration	4	*	
21	Grit blast and repaint corroded sections of guardrail.	2	*	
23	Grit blast and repaint corroded sections of guardrail.	2	*	
24	Remove vegetation and debris from carriageway and footpath.	2	*	
25	Remove vegetation and debris from carriageway and footpath.	2	*	
31	Remove vegetation from wingwall.	2	*	

Name:		Signed		Date	

Appendix B Annotated PI General Arrangement Drawings

NOTES:

1. All dimensions in millimetres unless otherwise noted.
2. All levels in metres unless otherwise noted.
3. This drawing is to be read in conjunction with B234M205-J-ART-STR-REP-PIR-0001 and accompanying Appendix C: Photographs from Principal Inspection
4. The photograph number references the Appendix C: Photographs from Principal Inspection



PLAN

SCALE 1:75

Defect Number	Span	Beam Number	Size	Description	Photograph Number
1	Suspended span	Beam 1 soffit	NA	Small corrosion spots	1
2	Suspended span	Beam 2 soffit	NA	Rebar staining along soffit of beam, clear lines where shear links are sitting	2
3	Cantilever span west	Beam 1	2370 x 200 x 100 mm	Large spall, inside corner of beam	3
4	Cantilever span west	Beam 1	400 x 70 x 60 mm	Delamination close to bearing, severe staining	4
5	Cantilever span west	Beam 2	450x180x30mm	Defect on bottom face of cantilever span at half-joint (A)	5
6	Cantilever span west	Beam 2	100x100mm	Defect on bottom face of cantilever span at half-joint (B)	6
7	Cantilever span west	Beam 2	470mm long, 1.1mm thick	Longitudinal crack (D)	7
8	Cantilever span west	Beam 2	800 x 400 x 100mm	Exposed and corroded reinforcement and spalled concrete (E)	8
9	Cantilever span west	Beam 2	500 x 340 x 40 mm	Exposed and corroded reinforcement and spalled concrete (F)	9
10	Cantilever span west	Beam 2	400 x 290 x 40 mm	Spalling and exposed reinforcement close to beam end	10
11	Cantilever span west	Beam 3	NA	Staining along length of span soffit	11
12	Cantilever span west	Beam 3	200 x 120 x 20 mm	Three small spalls on soffit, reinforcement exposed (C)	12
13	Cantilever span west	Beam 3	500 x 110 x 100 mm	Spalled concrete, reinforcement exposed (D)	13
14	Cantilever span west	Beam 5	NA	Spotted corrosion marks on beam soffit	14
15	Cantilever span west	Beam 6	1050 x 200 x 100 mm	Large spall close to pier, significant staining	15
16	Cantilever span west - crossbeam	Beam 1 – Beam 2	880 x 250 x 90 mm	Full width spall with exposed reinforcement	16
17	Cantilever span west - crossbeam	Beam 2 – Beam 3	1080 x 250 x 70 mm	Total spall of soffit of crossbeam, exposed and corroded reinforcement	17
18	Cantilever span west - crossbeam	Beam 3 – Beam 4	570 x 250 x 70 mm	Full width spall with exposed reinforcement	18
19	Cantilever span west - crossbeam	Beam 4 – Beam 5	200 x 250 x 40 mm	Full width spall with exposed reinforcement	19

Defect Number	Span	Beam Number	Size	Description	Photograph Number
20	Cantilever span west - crossbeam	Beam 5 – Beam 6	1000 x 250 x 100 mm	Full width spall with exposed reinforcement	20
21	Cantilever span east	Beam 1	550 x 280 x 50mm	Spalling on soffit of half joint, reinforcement exposed and corroded (A)	21
22	Cantilever span east	Beam 1	200 x 160 x 20mm	Spalling and delamination of concrete (B)	22
23	Cantilever span east	Beam 1	1100 x 230 x 90 mm	Large and deep spall close to cross beam, reinforcement exposed and corroded (C)	23
24	Cantilever span east	Beam 2	Range, 80 x 80 x 20 to 200 x 200 x 50	Areas of small spalls and corrosion (C)	24
25	Cantilever span east	Beam 2	920 x 100 x 100mm	Long spall, corner of beam is missing	25
26	Cantilever span east	Beam 2	600 x 100 x 40 mm	Spalling concrete and staining	26
27	Cantilever span east	Beam 5	950 x 135 x 120 mm	Spall along north bottom edge of beam, reinforcement exposed and corroded €	27
28	Cantilever span east	Beam 5	740 x 110 x 150 mm	Spall along north bottom edge of beam, reinforcement exposed and corroded (F)	28
29	Cantilever span east	Beam 5	450 x 550 x 60mm	Large spall between crossbeams, full width of beam (G)	29
30	Cantilever span east	Beam 5	3000 x 140 x 100 mm	Spall along south bottom corner of beam, longitudinal reinforcement exposed full length of spall (H)	30
31	Cantilever span east	Beam 6	2065 x 220 x 90 mm	Spall along north bottom corner of beam, reinforcement revealed and corroded	31
32	Cantilever span east - crossbeam	Beam 1 – Beam 2	1080 x 250 x 160 mm	Deep spall across the whole soffit of the cross beam, significant reinforcement corrosion	32
33	Cantilever span east - crossbeam	Beam 4 – Beam 5	750 x 250 x 80 mm	Spalling and exposed reinforcement, full length crack through spall in longitudinal direction	33
34	Cantilever span east - crossbeam	Beam 5 – Beam 6	530 x 100 x 100 mm	Spall on soffit of crossbeam, linked to second spall with significant cracking	34
35	Cantilever span east - crossbeam	Beam 5 – Beam 6	540 x 250 x 100 mm	Spall on soffit of crossbeam, linked to second spall with significant cracking	35
36	Outer span west	Beam 1	180 x 80 mm	Small areas of spalling on underside of beam	36
37	Outer span west	Beam 1	2300 mm long	Spalling of external face of beam, along the chamfer of the cantilever beam	37
38	Outer span west	Beam 3	700 x 300 mm	Honeycombing on side face of beam close to midspan	38
39	Outer span east	Beam 6	50 x 50 mm	Small spalls on soffit of beam	39

Rev	By	Chkd	Apprvd	Date	Description
P01	LR	CC	PMcK	21/03/2025	ISSUED FOR INFORMATION

Client

Jacobs

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Consultant

Arthur's Bridge Principal Inspection

Project

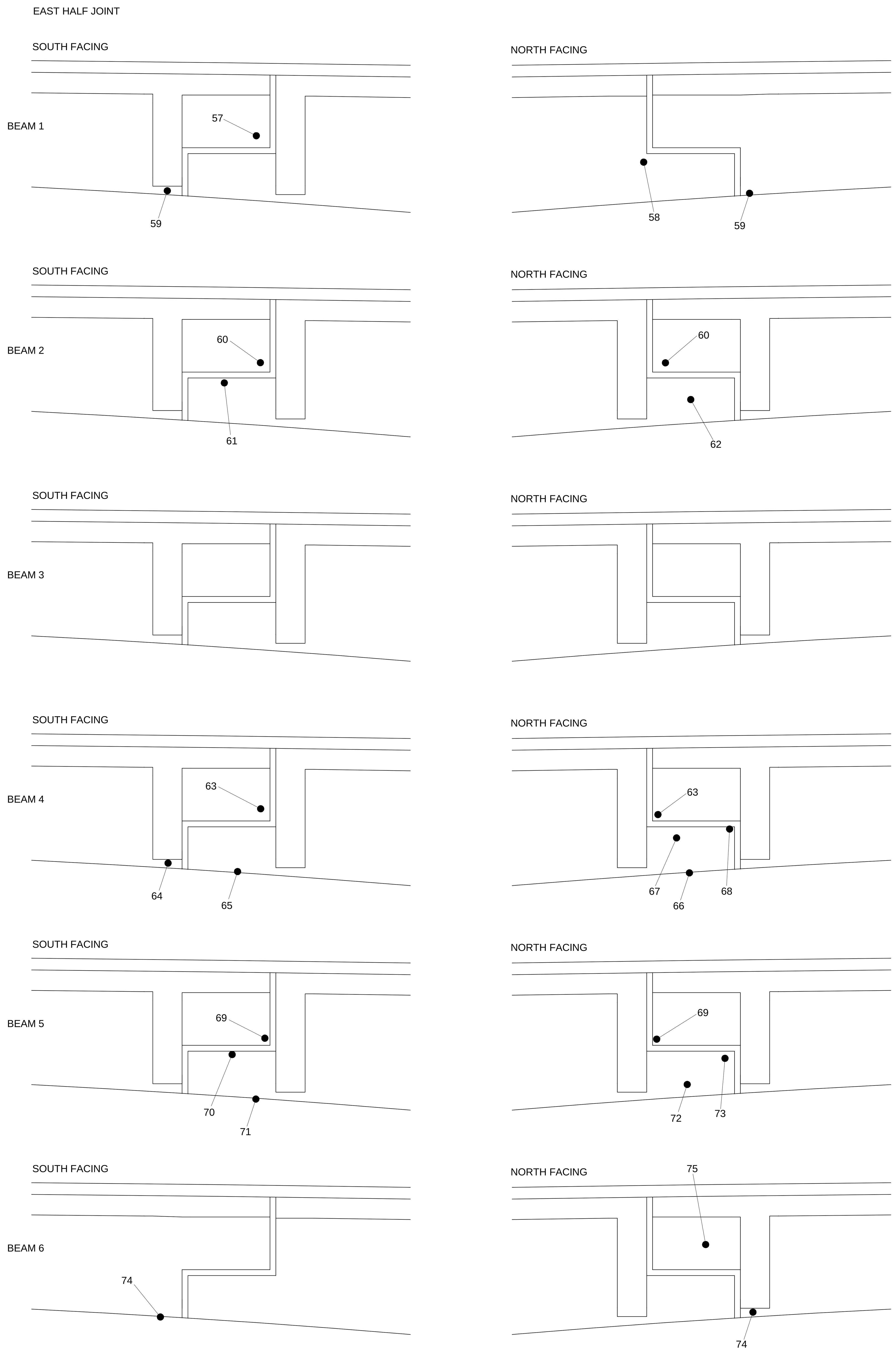
Drawing

Appendix B
Marked Up General Arrangement
Plan View

Drawn by: LR Date: 21/03/2025
Checked by: CC Date: 21/03/2025
Approved by: PMcK Date: 21/03/2025

Drawing No. B234M205-J-ART-STR-DWG-PIR-0001 Revision P01

Drawing Scale: AS NOTED AT A1



Defect Number	Span	Beam Number	Size	Description	Photograph Number
57	Half joint east	Beam 1 (south facing)	550 x 400 x 60 mm	Spalling on face and corner with exposed and corroded reinforcement	57
58	Half joint east	Beam 1 (north facing)	NA	Water ingress, active water dripping and green mould on outside face	58
59	Half joint east	Beam 1 (north and south facing)	600 x 100 x 110 mm	Spalling of soffit end of suspended span, end links exposed, one completely protruding and sheared, badly corroded	59
60	Half joint east	Beam 2 (south and north facing)	340 x 450 x 140 mm	End face link exposed, whole face is cracked with corner spalled on both sides of beam	60
61	Half joint east	Beam 2 (south facing)	750 x 220 mm	Spalling concrete indicated by cracking, bursting off corner	61
62	Half joint east	Beam 2 (north facing)	350 x 490 x 40 mm	Spalled concrete on side face of beam, exposed and severely corroded reinforcement	62
63	Half joint east	Beam 4 (south and north facing)	600 x 460 x 160 mm	End face corner cracked and spalling, full width of beam	63
64	Half joint east	Beam 4 (south facing)	600 x 70 x 80	Spalling and cracking of soffit end of suspended span, end links exposed (B)	64
65	Half joint east	Beam 4 (south facing)	1800 x 180 x 80 mm	Spalling of bottom corner of beam, reinforcement exposed and corroded (D)	65
66	Half joint east	Beam 4 (north facing)	1000 x 100 x 100 mm	Bottom corner spalling off, cracking	66
67	Half joint east	Beam 4 (north facing)	NA	Delaminated face of beam	67
68	Half joint east	Beam 4 (north facing)	150 x 90 x 150 mm	Top corner wedge cracked and beginning to spall	68
69	Half joint east	Beam 5 (south and north facing)	600 x 150 x 60 mm	Spalling of corner of end suspended span, saturated and dripping	69
70	Half joint east	Beam 5 (south facing)	600 mm long	Crack 100 mm below top edge of beam, bursting off corner	70
71	Half joint east	Beam 5 (south facing)	450 x 180 mm	Spalling with cracking present	71
72	Half joint east	Beam 5 (north facing)	400 x 450 x 45 mm	Significant spalling, with exposed and corroded reinforcement, bottom corner also coming off, joined up spall	72
73	Half joint east	Beam 5 (north facing)	240 mm long, 1.6 mm wide crack	Crack running from spalled area to top corner	73
74	Half joint east	Beam 6 (south and north facing)	600 x 10 x 60 mm	Spalling of soffit end of suspended span, end links exposed and corroded	74
75	Half joint east	Beam 6 (north facing)	130 x 100 x 50 mm	Isolated deep spall on face of concrete	75

NOTES:

1. All dimensions in millimetres unless otherwise noted.
2. All levels in metres unless otherwise noted.
3. This drawing is to be read in conjunction with B234M205-J-ART-STR-REP-PIR-0001 and accompanying Appendix C: Photographs from Principal Inspection
4. The photograph number references the Appendix C: Photographs from Principal Inspection

Rev	By	Chkd	Apprvd	Date	Description
P01	LR	CC	PMcK	21/03/2025	ISSUED FOR INFORMATION

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Project

Arthur's Bridge Principal Inspection

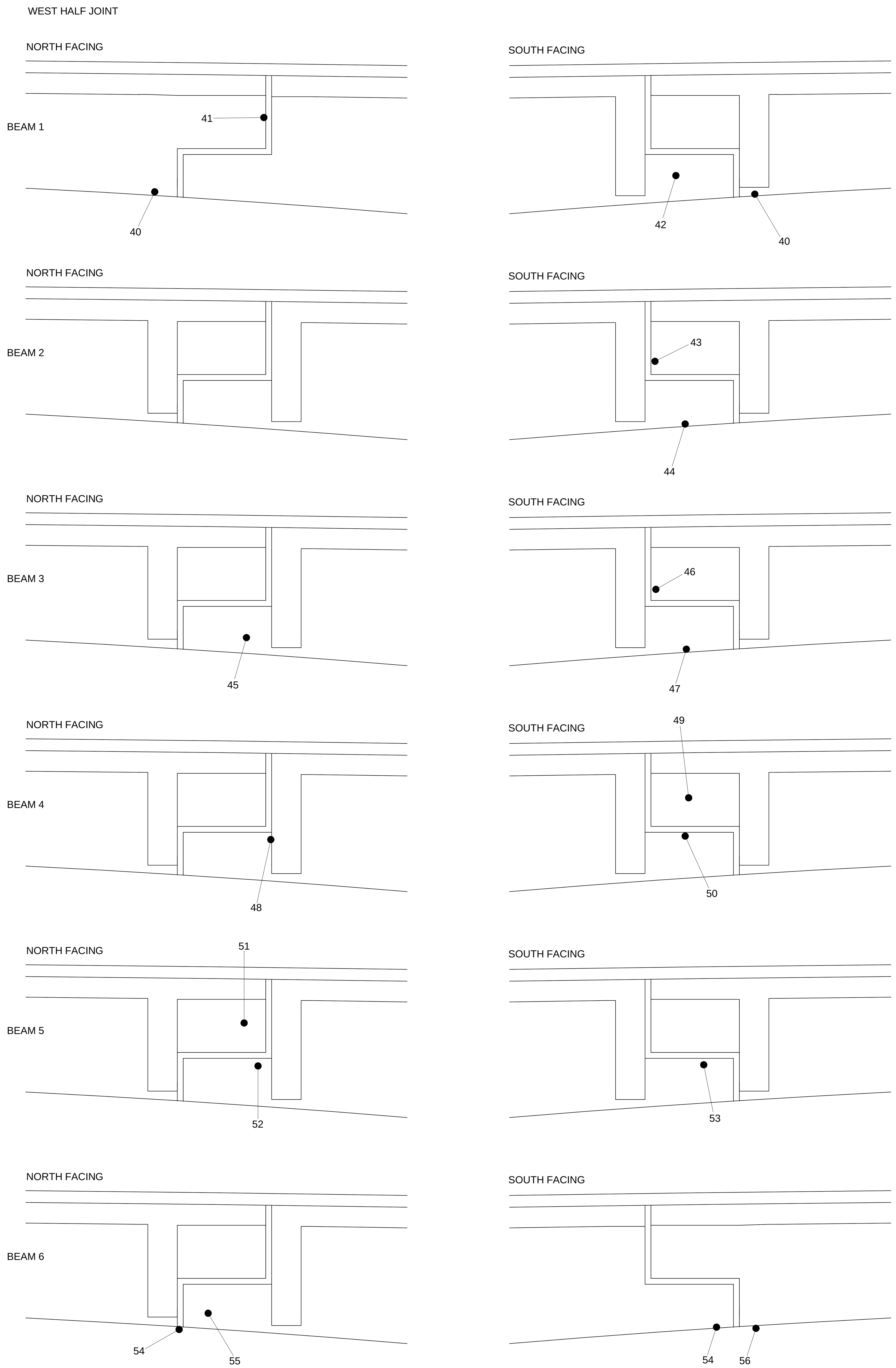
Drawing

Appendix B
Marked Up General Arrangement
East Half Joints

Drawn by: LR Date: 21/03/2025
Checked by: CC Date: 21/03/2025
Approved by: PMcK Date: 21/03/2025

Drawing No.: B234M205-J-ART-STR-DWG-PIR-0002
Revision: P01

Drawing Scale: AS NOTED AT A1



Defect Number	Span	Beam Number	Size	Description	Photograph Number
40	Half joint west	Beam 1 (north and south facing)	400 x 300 x 100 mm	Severely corroded and exposed links, spall at end of beam	40
41	Half joint west	Beam 1 (north facing)	NA	Water ingress, damp and green mould on outside face	41
42	Half joint west	Beam 1 (south facing)	650 x 400 x 80 mm	Delaminated face, beginning to spall, hollow sounding with large crack in bottom face (A)	42
43	Half joint west	Beam 2 (south facing)	50 mm depth	Crack and spalling of corner of suspended span	43
44	Half joint west	Beam 2 (south facing)	950 x 250 x 150 mm	Loss of corner of the bottom section, 60mm deep	44
45	Half joint west	Beam 3 (north facing)	300 mm long, 1 mm max width	One main crack, with further hairline cracks visible in same area	45
46	Half joint west	Beam 3 (south facing)	380 x 340 x 90 mm	Suspended span, corner missing, with exposed reinforcement	46
47	Half joint west	Beam 3 (south facing)	700x200x140mm 60mm	Spalled bottom corner, exposed reinforcement	47
48	Half joint west	Beam 4 (north facing)	NA	Hollow sounding in top corner, concrete starting to delaminate	48
49	Half joint west	Beam 4 (south facing)	100 x 100 mm	Patch repair	49
50	Half joint west	Beam 4 (south facing)	680 mm long, 1.6 mm width	Crack, indicating future spalling at top corner, depth of 150 mm from top face	50
51	Half joint west	Beam 5 (north facing)	320 x 300 x 30 mm	Spalling on face with exposed rebar	51
52	Half joint west	Beam 5 (north facing)	280 x 200 x 100 mm	Area of missing concrete in joint corner, previously repaired	52
53	Half joint west	Beam 5 (south facing)	400x 280 mm repair, 50 mm long crack	Previous repair, with new hairline crack going into the repair patch	53
54	Half joint west	Beam 6 (north and south facing)	550 x 660 x 150 mm	Large spall of bottom of cantilever beam end, previously repaired, corroded reinforcement exposed	54
55	Half joint west	Beam 6 (north facing)	500 mm long, 1.5 mm wide crack	Crack along the north face, joins into spall (Defect 54)	55
56	Half joint west	Beam 6 (south facing)	130 x 150 x 50 mm	Spalling of soffit end of suspended span, end links exposed	56

NOTES:

1. All dimensions in millimetres unless otherwise noted.
2. All levels in metres unless otherwise noted.
3. This drawing is to be read in conjunction with B234M205-J-ART-STR-REP-PIR-0001 and accompanying Appendix C: Photographs from Principal Inspection
4. The photograph number references the Appendix C: Photographs from Principal Inspection

Rev	By	Chkd	Apprvd	Date	Description
P01	LR	CC	PMcK	21/03/2025	ISSUED FOR INFORMATION

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Project

Arthur's Bridge Principal Inspection

Drawing

Appendix D
Marked Up General Arrangement
West Half Joints

Drawn by: LR Date: 21/03/2025
Checked by: CC Date: 21/03/2025
Approved by: PMcK Date: 21/03/2025

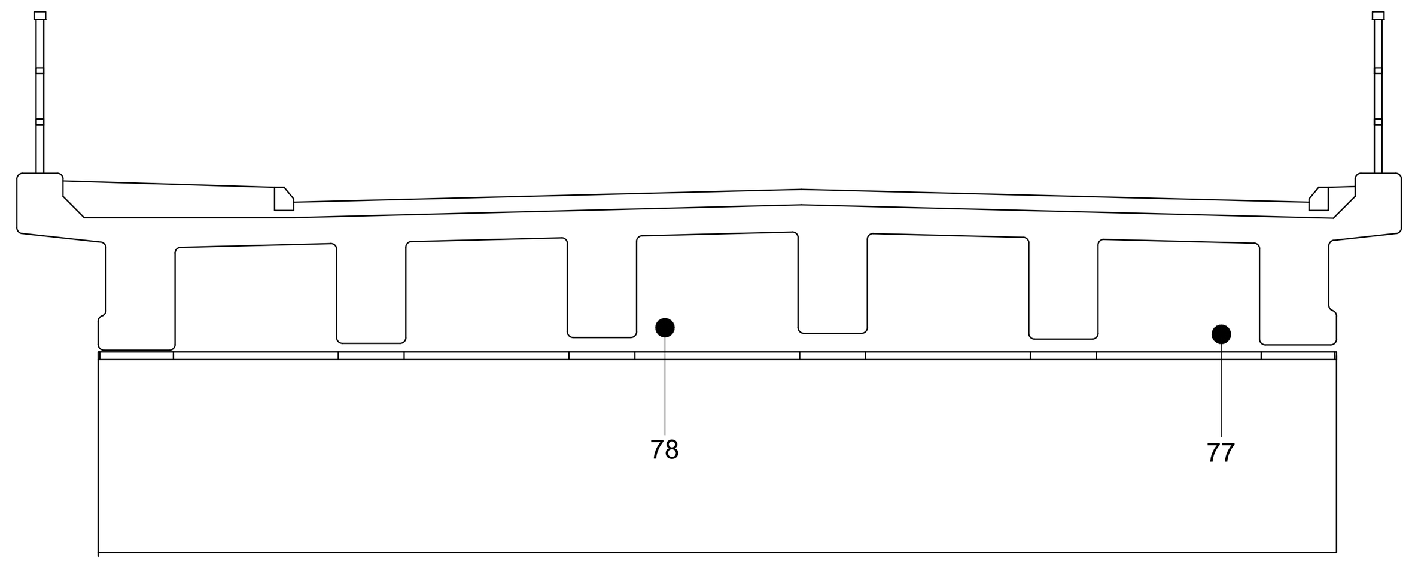
Drawing No. B234M205-J-ART-STR-DWG-PIR-0003 Revision P01

Drawing Scale: AS NOTED AT A1

NOTES:

1. All dimensions in millimetres unless otherwise noted.
2. All levels in metres unless otherwise noted.
3. This drawing is to be read in conjunction with B234M205-J-ART-STR-REP-PIR-0001 and accompanying Appendix C: Photographs from Principal Inspection
4. The photograph number references the Appendix C: Photographs from Principal Inspection

WEST PIER - EAST FACING



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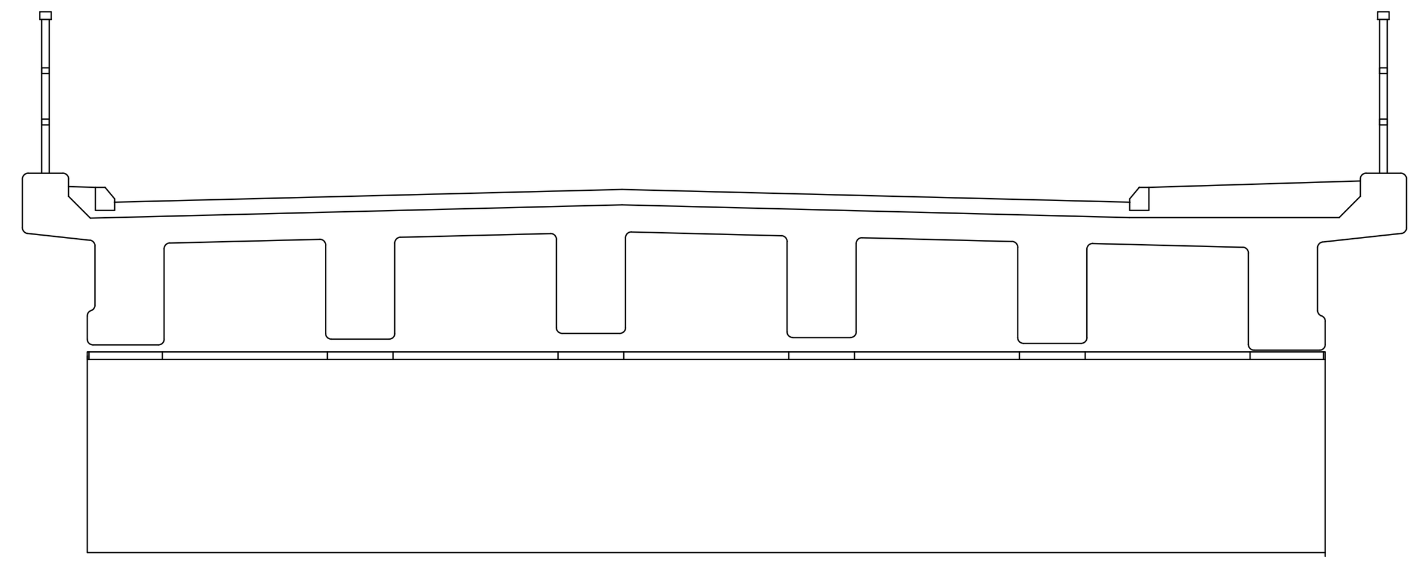
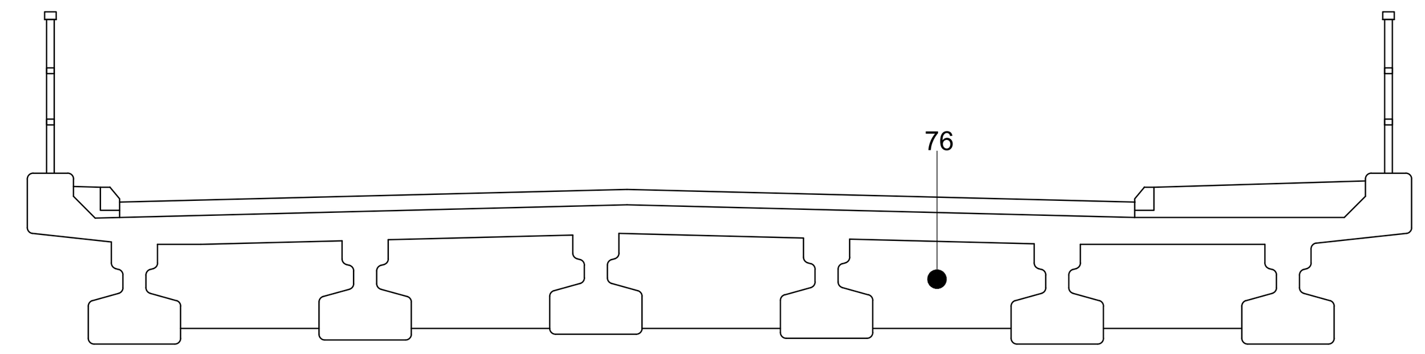


CENTRAL CROSSBEAM - FACING EAST



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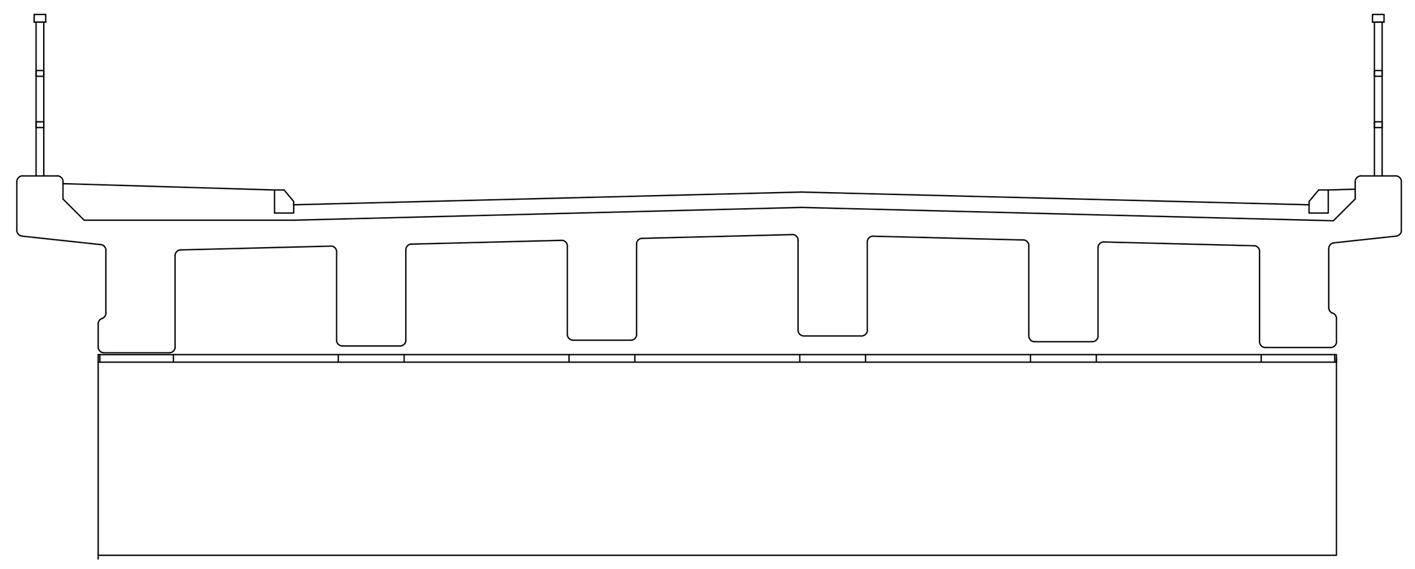

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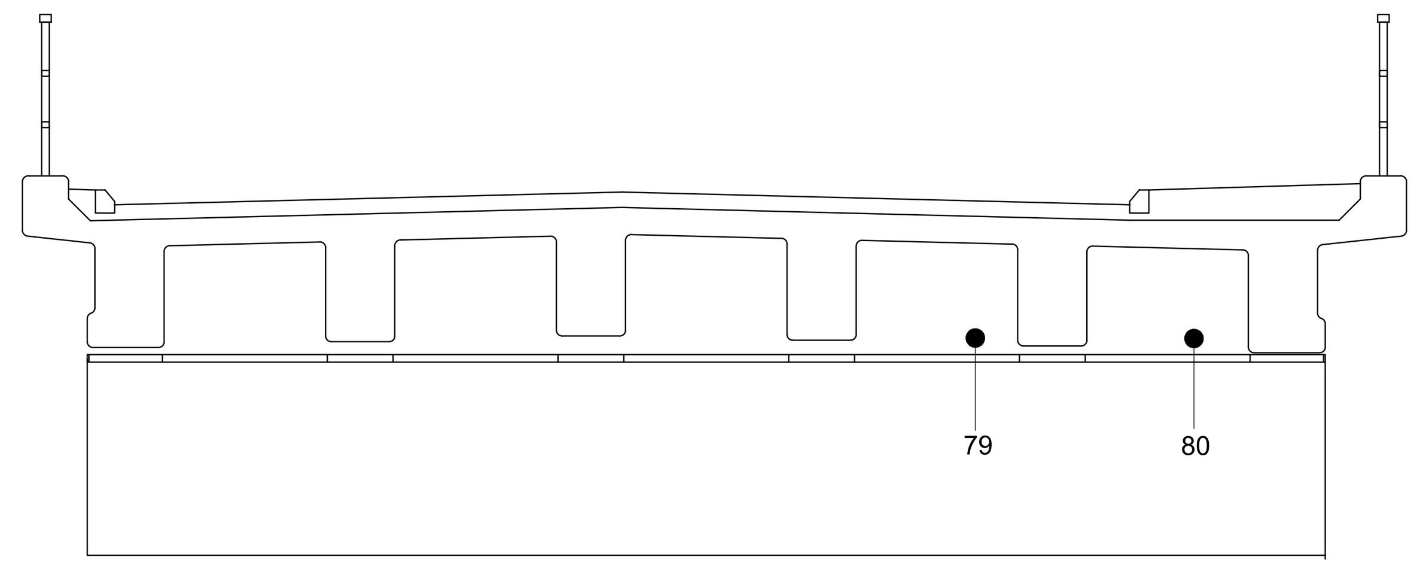
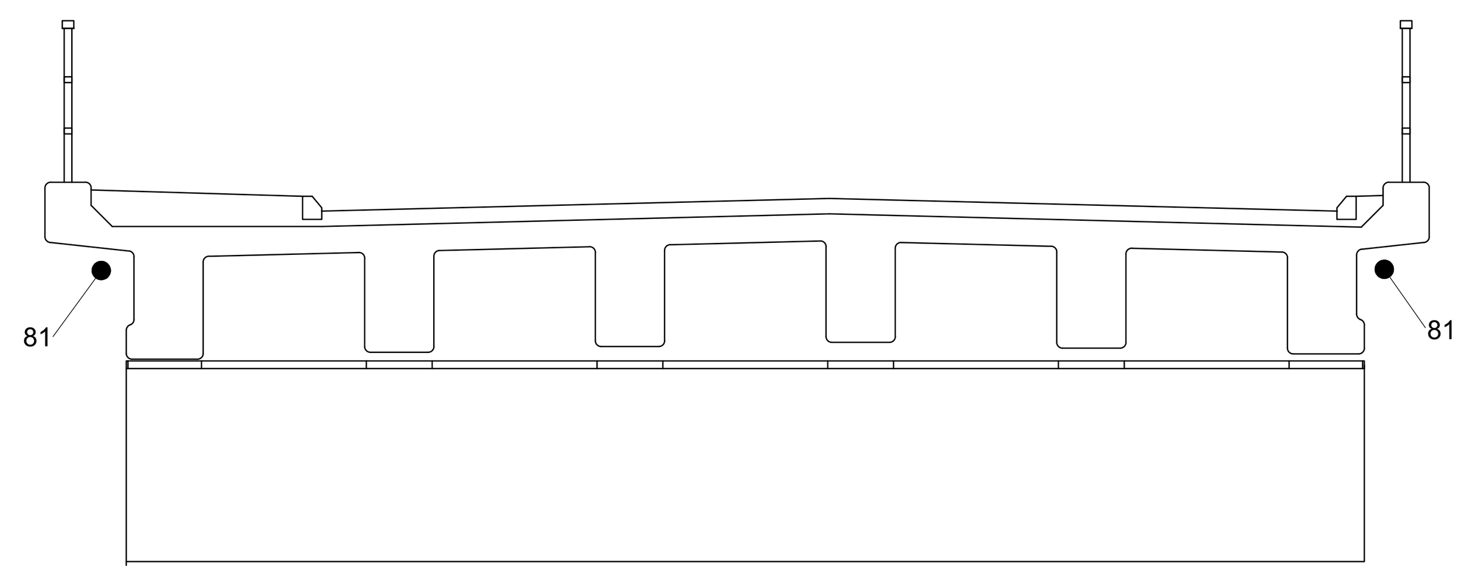
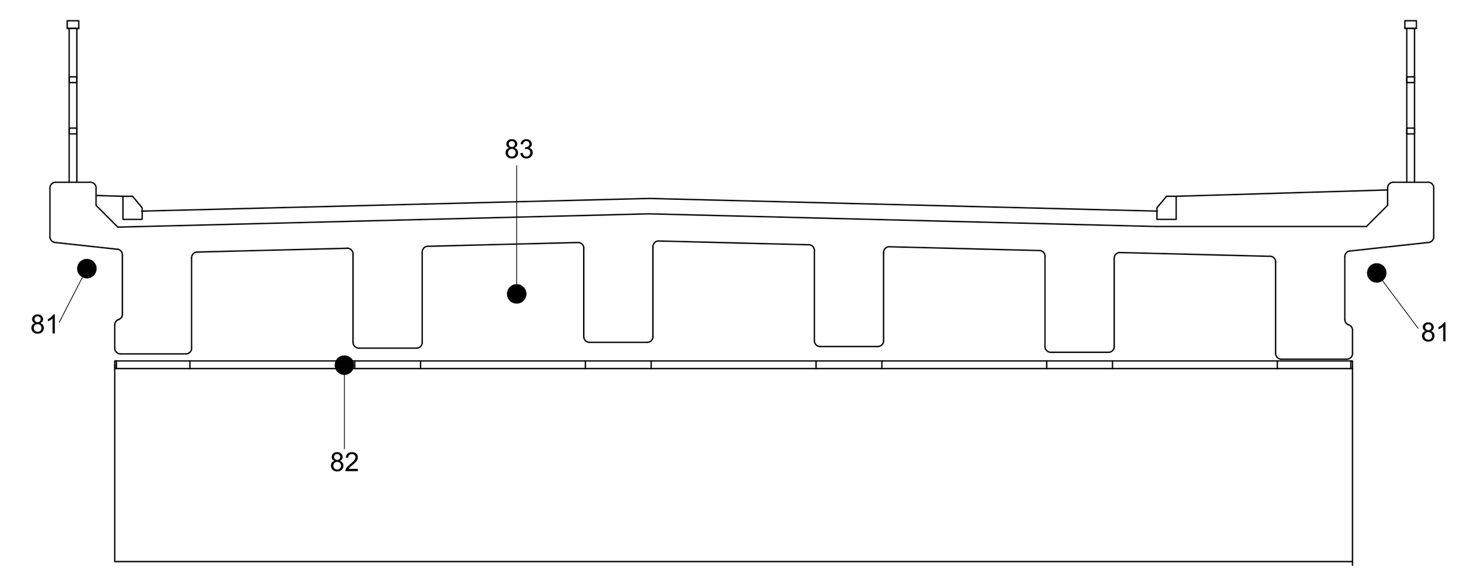


Defect Number	Span	Beam Number	Size	Description	Photograph Number
76	Central cross beam	Beam 2 – Beam 3 (both faces)	400 mm long, 0.45 mm thick crack	Hairline crack, starting from soffit of deck and is on a diagonal, visible on both sides of cross beam	76
77	West pier, east face	Beam 1 – Beam 2	220 x 220 x 40 mm	Spalling in area of large aggregate, some corrosion staining	77
78	West pier, east face	Beam 3 – Beam 4	250 x 230 x 60 mm	Spalled concrete with cracks extending from spall	78
79	East pier, west face	Beam 4 – Beam 5	NA	Hairline crack with corrosion staining	79
80	East pier, west face	Beam 5 – Beam 6	440 x 180 x 40 mm	Concrete spalling, some corrosion staining	80
81	East and west abutment	Abutment corners	NA	Staining and seepage at all corners, residue build up	81
82	West abutment	Top of abutment	NA	Delamination of top of abutment	82
83	West abutment	Back face of abutment between beams	300 x 140 mm	Delamination and general corrosion stains between beams, multiple spots	83

EAST ABUTMENT



WEST ABUTMENT



Rev	By	Chkd	Apprvd	Date	Description
P01	LR	CC	PMcK	21/03/2025	ISSUED FOR INFORMATION

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Project

Arthur's Bridge Principal Inspection

Drawing

Appendix B
Marked Up General Arrangement Cross Sections

Drawn by: LR Date: 21/03/2025

Checked by: CC Date: 21/03/2025

Approved by: PMcK Date: 21/03/2025

Drawing No. B234M205-J-ART-STR-DWG-PIR-0004

Revision P01

Drawing Scale: AS NOTED AT A1

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User and Plot Date : couparc : 18:4:2025 - 11:4 am

Appendix C Photographs from Principal Inspection

Appendix A – Photographs from Principal Inspection

Photograph 1: Beam 1 soffit, suspended span, small corrosion spots

Photograph 2: Beam 2 soffit, suspended span, rebar staining

Photograph 3: Beam 1, cantilever span west, large spall

Photograph 4: Beam 1, cantilever span west, delamination and severe staining

Photograph 5: Beam 2, cantilever span west, cracking and staining on bottom face

Photograph 6: Beam 2, cantilever span west, defect on bottom face of cantilever

Photograph 7: Beam 2, cantilever span west, longitudinal crack

Photograph 8: Beam 2, cantilever span west, exposed and corroded reinforcement

Photograph 9: Beam 2, cantilever span west, exposed and corroded reinforcement

Photograph 10: Beam 2, cantilever span west, exposed and corroded reinforcement

Photograph 11: Beam 3, cantilever span west, staining

Photograph 12: Beam 3, cantilever span west, small spalls and reinforcement exposed

Photograph 13: Beam 3, cantilever span west, spalled concrete and reinforcement exposed

Photograph 14: Beam 5 , cantilever span west, spotted corrosion marks

Photograph 15: Beam 6, cantilever span west, large spall

Photograph 16: Beam 1 – Beam 2, cantilever span west, cross beam, full width spall with exposed reinforcement

Photograph 17: Beam 2 – Beam 3, cantilever span west, cross beam, full width spall with exposed reinforcement

Photograph 18: Beam 3 – Beam 4, cantilever span west, cross beam, full width spall with exposed reinforcement

Photograph 19: Beam 4 – Beam 5, cantilever span west, cross beam, full width spall with exposed reinforcement

Photograph 20: Beam 5 – Beam 6, cantilever span west, cross beam, full width spall with exposed reinforcement

Photograph 21: Beam 1, cantilever span east, spalling on soffit of half joint

Photograph 22: Beam 1, cantilever span east, spalling and delaminating concrete

Photograph 23: Beam 1, cantilever span east. Large and deep spall, reinforcement exposed and corroded

Photograph 24: Beam 2, cantilever span east, areas of small spalls and corrosion

Photograph 25: Beam 2, cantilever span east, long spall, corner of beam is missing

Photograph 26: Beam 2, cantilever span east, spalling concrete and staining

Photograph 27: Beam 5, cantilever span east, large spall reinforcement exposed and corroded

Photograph 28: Beam 5, cantilever span east, spall reinforcement exposed and corroded

Photograph 29: Beam 5, cantilever span east, spall between crossbeams

Photograph 30: Beam 5, cantilever span east, spall along bottom corner of beam, longitudinal reinforcement and links exposed

Photograph 31: Beam 6, cantilever span east, spall along bottom corner of beam, longitudinal reinforcement and links exposed

Photograph 32: Beam 1 – Beam 2, cantilever span east, crossbeam, full width spall with exposed reinforcement

Photograph 33: Beam 4 – Beam 5, cantilever span east, crossbeam, full width spall with exposed reinforcement, full length crack through spall

Photograph 34: Beam 5 – Beam 6, cantilever span east, crossbeam, spall with exposed reinforcement linked to defect 35

Photograph 35: Beam 5 – Beam 6, cantilever span east, crossbeam, full width spall with exposed reinforcement linked to defect 34

Photograph 36: Beam 1, outer span west, small areas of spalling

Photograph 37: Beam 1, outer span west, spalling along chamfer of the cantilever beam

Photograph 38: Beam 3, outer span west, honeycombing on side face

Photograph 39: Beam 6, outer span east, small spalls

Photograph 40: Beam 1 (north and south facing), half joint west, severely corroded and exposed links, spall at end of beam

Photograph 41: Beam 1 (north facing), half joint west, Water ingress, damp and green mould on outside face

Photograph 42: Beam 1 (south facing), half joint west, delaminated face, beginning to spall, hollow sounding with large crack in bottom face

Photograph 43: Beam 2 (south facing), half joint west, crack and spalling

Photograph 44: Beam 2 (south facing), half joint west, loss of bottom corner section

Photograph 45: Beam 3 (north facing), half joint west, crack with hairline cracks in same area

Photograph 46: Beam 3 (south facing), half joint west, spalled corner with exposed reinforcement

Photograph 47: Beam 3 (south facing), half joint west, spalling and exposed reinforcement, evidence of previous repair

Photograph 48: Beam 4 (north facing), half joint west, hollow sounding and delamination

Photograph 49: Beam 4 (south facing), half joint west, patch repair

Photograph 50: Beam 4 (south facing), half joint west, crack below top face

Photograph 51: Beam 5 (north facing), half joint west, spalling with exposed rebar

Photograph 52: Beam 5 (north facing), half joint west, area of missing concrete previous repair patch

Photograph 53: Beam 5 (south facing), half joint west, previous repair with new hairline crack going into patch

Photograph 54: Beam 6 (north and south facing), half joint west, large spall, previously repaired and corroded reinforcement exposed

Photograph 55: Beam 6 (north facing), half joint west, crack, joins into Defect 54

Photograph 56: Beam 6 (north facing), half joint west, spalling of soffit of end of suspended span, end links exposed

Photograph 57: Beam 1 (south facing), half joint east, spalling with exposed and corroded reinforcement

Photograph 58: Beam 1 (north facing), half joint east, water ingress with active water dripping and green mould on outside face

Photograph 59: Beam 1 (north and south facing), half joint east, end links exposed, one completely protruding and sheared

Photograph 60: Beam 2 (north and south facing), half joint east, end face link exposed, whole face is cracked with corner spalled

Photograph 61: Beam 2 (south facing), half joint east, spalling concrete indicated by cracking, bursting off corner

Photograph 62: Beam 2 (north facing), half joint east, exposed and severely corroded reinforcement

Photograph 63: Beam 4 (south and north facing), half joint east, end face corner cracker and spalling

Photograph 64: Beam 4 (south facing), half joint east, spalling and cracking of soffit end of suspended span

Photograph 65: Beam 4 (south facing), half joint east, spalling of bottom corner of beam, reinforcement exposed and corroded

Photograph 66: Beam 4 (north facing), half joint east, spalling and cracking

Photograph 67: Beam 4 (north facing), half joint east, delaminated face of beam

Photograph 68: Beam 4 (north facing), half joint east, cracking and spalling

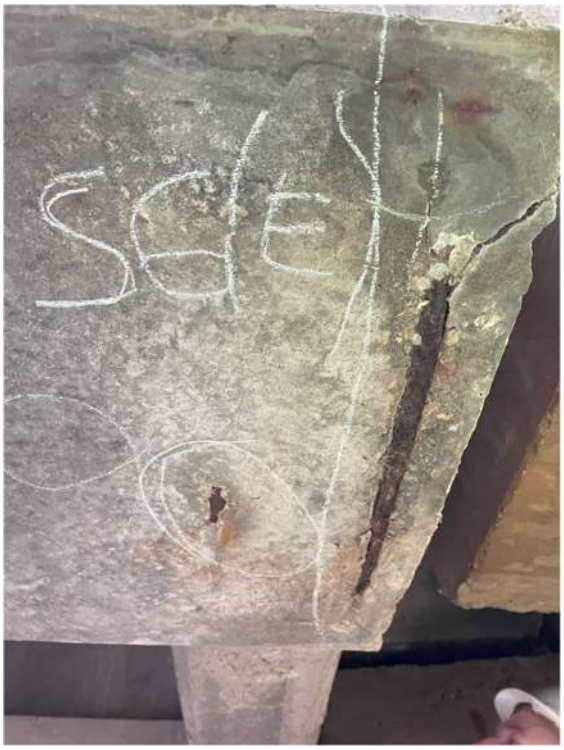
Photograph 69: Beam 5 (south and north facing), half joint east, spalling of corner, saturated and dripping

Photograph 70: Beam 5 (south facing), half joint east, crack below top edge, bursting

Photograph 71: Beam 5 (south facing), half joint east, spalling with cracking present

Photograph 72: Beam 5 (north facing), half joint east, significant spalling with exposed and corroded reinforcement

Photograph 73: Beam 5 (north facing), half joint east, crack running form spalled area to top corner



Photograph 74: Beam 6 (south and north facing), half joint east, spalling of soffit, end links exposed and corroded

Photograph 75: Beam 6 (north facing), half joint east, isolated deep spall

Photograph 76: Beam 2 – Beam 3 (both faces), central cross beam, hairline crack on diagonal from soffit of deck

Photograph 77: Beam 1 – Beam 2, west pier, east face, spalling in area of large aggregate

Photograph 78: Beam 3 – Beam 4, west pier, east face, spalled concrete with cracks extending from spall

Photograph 79: Beam 4 – Beam 5, east pier, west face, hairline crack with corrosion staining

Photograph 80: Beam 5 – Beam 6, east pier, west face, concrete spalling with staining

Photograph 81: Abutment corners, east an west abutment, staining and seepage, residue build up

Photograph 82: Top of abutment, west abutment, delamination of top of abutment

Photograph 83: Back face of abutment between beams, west abutment, delamination and general corrosion stains between beams, multiple spots