

Level 2 Structure Condition Report (Suggested Form)	Form L2-1
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Location Details	
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Structure ID	BR001	Road Name	Twentyfirst Street
Bridge Name	Twentyfirst Street Bridge	Road Number	-
Crossing (road or stream)	Stream	Road Class	Local
Structure Type	Road Bridge	Locality/Suburb	Renmark, SA 5341
Construction Type	Abutment, piers, support beams and concrete deck	Map Number	-
		Ref #	-
Construction Material	Concrete	Latitude	-34.173949
Date of Construction	1960	Longitude	140.728693
Date of Inspection	18/05/2023	Local Authority	Renmark Paringa Council

Inventory Items	
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Length (abutment - abutment)	15.5 m	Last Level 2 Inspection	-
Width (Outside kerb - Outside kerb)	10 m	Next Level 2 Inspection	05/2026
Height (water or road to underside of deck)	2.4 m	Inspected By	Tonkin - Patrick Callaghan and Hamid Baseer
Number of Spans	1	Received By	Shannon Baxter
		Date	
Number of Traffic Lanes	2	Checked By	James Farrall
		Date	19/05/2023

Location Conditions & Information	
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Time of Day	Daytime	Access Equipment Required	No	Info	
Temperature	19 c	Structure Plans Available	Yes	#	
Waters Tidal	- was -	Inspection Level Type	2		
Chainage	(km) on the/from				Rd
Programmed	Yes	Exceptional		Underwater	



Inspection Comments	
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Overall, bridge structure is deemed to be in a "very poor" condition with several components needing immediate maintenance actions as identified in this report. Bridge capacity can potentially increase from 10T limit as per TMK's report given that the actual yield strength of the steel beams has been identified upon inspection. Complete rebuilding of the bridge allowing light vehicles (4.5T) and pedestrian crossing is recommended in terms of cost-benefit analysis as opposed to excessive repairing of the existing bridge structure.

Overall Structure Condition Rating	Good	Fair	Poor	Very Poor	Close	
Original Structure (O)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Modification ()	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Modification ()	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Modification ()	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	



Approach 2



Twentyfirst St Bridge, Renmark

Approach 1



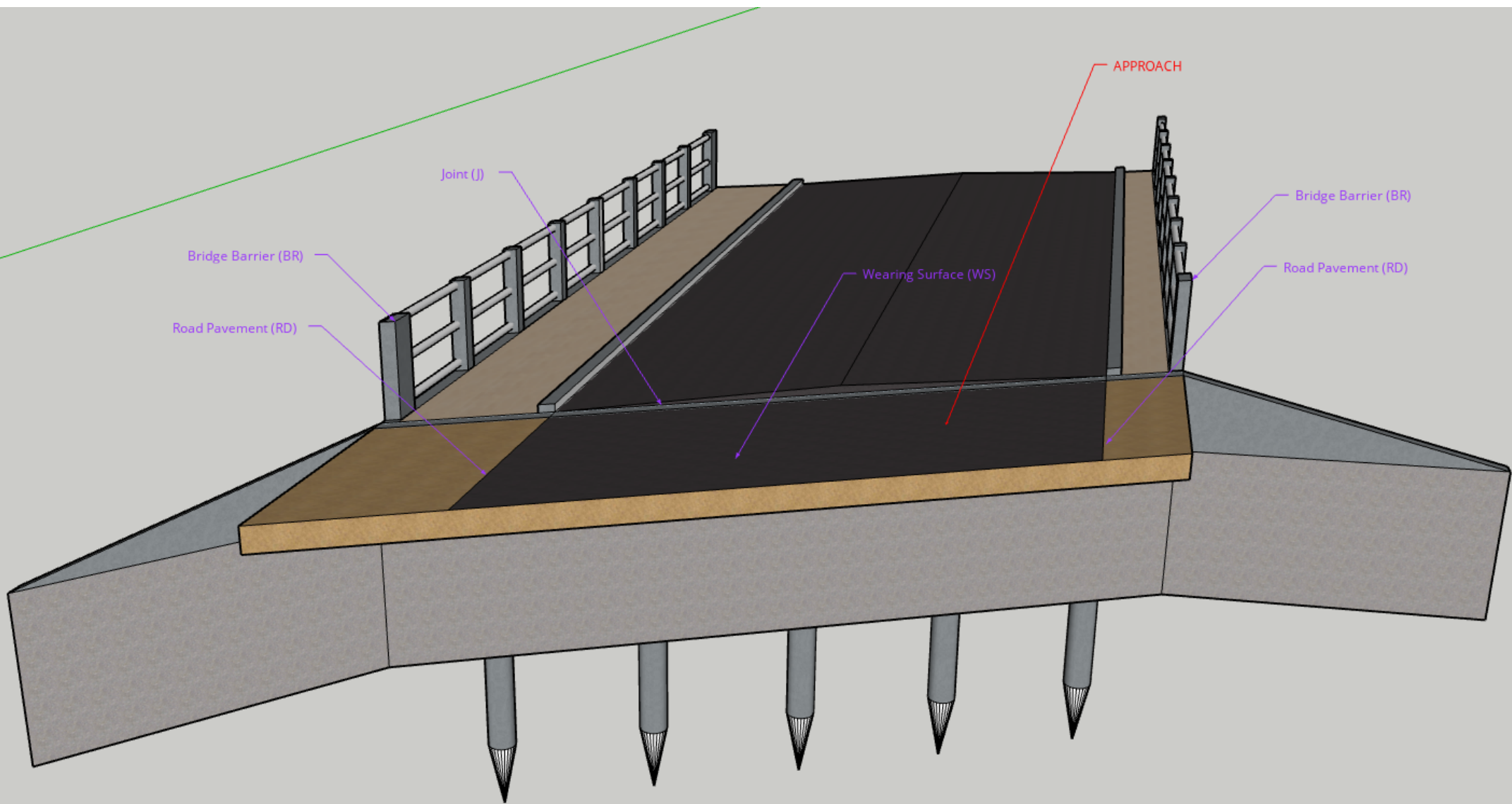
APPROACH 1

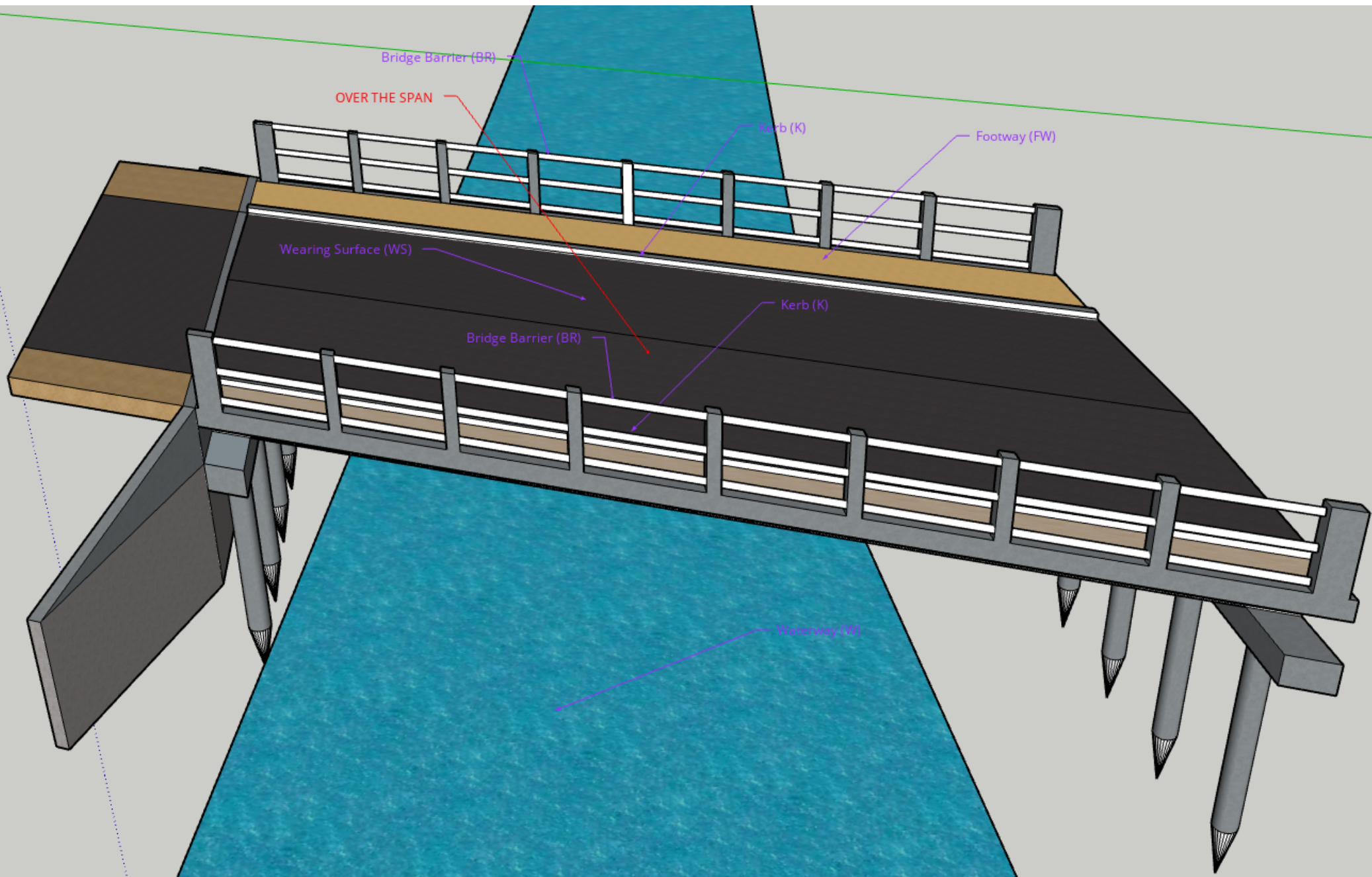
OVER THE SPAN

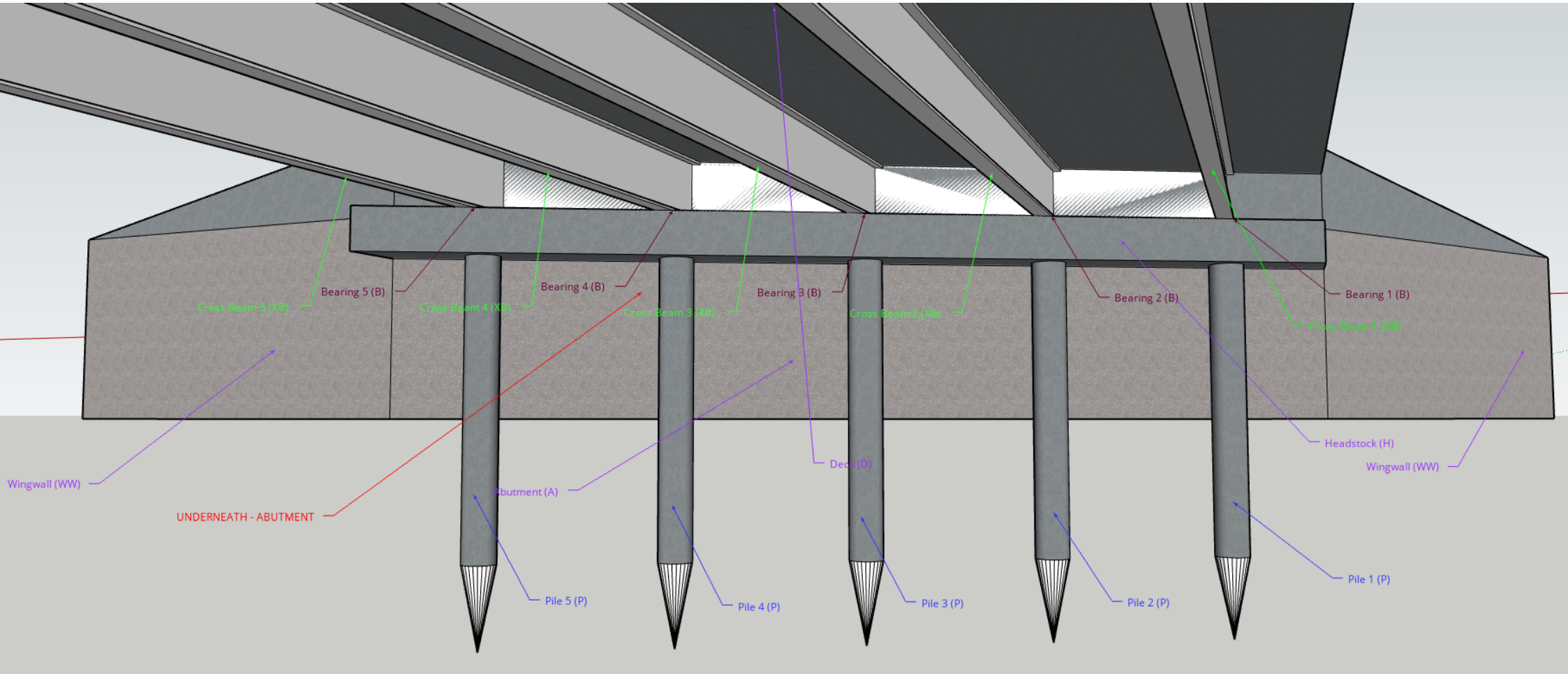
APPROACH 2

ABUTMENT 1

ABUTMENT 2







Component Inventory and Condition Assessment Form

Structure ID BR001 Inspection Date 18/05/2023
 Bridge Name Twentyfirst St Bridge Type of Inspection Level 2
 Inspected By Tonkin - PSC and HB Programmed Yes Exceptional Underwater

Component Location											Quantity Per Condition State				Comments - type of defect - location of defect - size and severity - photo number
Modification	Section	Group	Group Number	Component	Component Number	Component Material (P, C, S, T, O)	Unit (Lm, m ² , each)	Quantity	Exposure Class	Maintenance Required	1	2	3	4	
O	Approach 1	AP	1	BR	1	S	Lm	1	2	<input checked="" type="checkbox"/>				1	
O		AP	1	WS	1	O	m ²	7.3	2	<input checked="" type="checkbox"/>	3	4.3			TMK (Post-Flood) - The road surfaces to each of the bridge approaches had suffered minor subsidence which was evident due to parallel cracks in the asphalt road surfaces and level difference in the road surface immediately prior to the bridge. Tonkin - Cracking across the width of the road approaches close to the joint. Slight level changes in the pavement surface layer.
O		AP	1	J	1	O	Lm	1	2	<input type="checkbox"/>			1		Tonkin - Joint not sealed. No approach slab. Pavement cracking at the edge.
O		AP	1	RD	1	O	Each	1	2	<input checked="" type="checkbox"/>				1	TMK (Post-Flood) - Floodwaters had caused erosion to base course and subgrade layers beneath the road surface at the abutments – causing loss of portions of the road surface. Tonkin - Road scour and more severe closer to the joint/abutment. Pavement base course and subgrade layers eroded at the road shoulders. Need reinstating.
O		AP	1	BR	2	S	Lm	1	2	<input checked="" type="checkbox"/>				1	TMK (Pre-Flood) - Hand rails on both external perimeters of the bridge were observed during TMK's onsite investigation to have visually evident deterioration and cracking, due to the expansion caused by corrosion of the internal reinforcement of the concrete post. It was observed that the hand rail system was not structurally adequate to serve as a vehicular impact barrier, rather just a pedestrian access perimeter barrier. Tonkin - Signs of severe concrete cracking and deterioration. Steel sections not held together very effectively. Barrier deemed inadequate to absorb significant vehicle impact. Corrosion of the internal reinforcement in the concrete posts have caused cracking at the edge of the deck. A steel section is missing between the first two concrete posts.

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Modification	Section	Group	Group Number	Component	Component Number	Component Material (P, C, S, T, O)					1	2	3	4	
O	Over The Span	S	1	BR	1	S	Lm	15	2	<input checked="" type="checkbox"/>				15	TMK (Pre-Flood) - Hand rails on both external perimeters of the bridge were observed during TMK's onsite investigation to have visually evident deterioration and cracking, due to the expansion caused by corrosion of the internal reinforcement of the concrete post. It was observed that the hand rail system was not structurally adequate to serve as a vehicular impact barrier, rather just a pedestrian access perimeter barrier. Tonkin - Signs of severe concrete cracking and deterioration. Steel sections not held together very effectively. Barrier deemed inadequate to absorb significant vehicle impact. Corrosion of the internal reinforcement in the concrete posts have caused cracking at the edge of the deck. Concrete posts are smaller in size compared to the end posts on both sides.
O		S	1	WS	1	O	m ²	113	2	<input type="checkbox"/>	96	17		TMK (Post-Flood) - The roadway was visually less affected but possible delamination of the road surface cannot be excluded. Tonkin - Generally in good condition with no severe cracking at the surface of the pavement layer.	
O		S	1	K	1	C	Lm	15	2	<input type="checkbox"/>	15			Tonkin - New kerb installed with the level raised compared to the original drawing. The kerb is in relatively good condition with no cracking or spalling.	
O		S	1	W	1	O	Each	1	2	<input type="checkbox"/>	1			Tonkin - Waterway is clear with no significant obstructions that would impede the water flow.	
O		S	1	FY	1	C	Lm	15	2	<input checked="" type="checkbox"/>				15	TMK (Post-Flood) - The asphalted pedestrian walkway on the north-western side of the bridge had been severely eroded and delaminated from the bridge deck due to floodwater activity. Tonkin - Resurfacing of the pathway. Significant cracking and deterioration of the asphalt layer and gravel underneath.
O		S	1	BR	2	S	Lm	15	2	<input checked="" type="checkbox"/>				15	TMK (Pre-Flood) - Hand rails on both external perimeters of the bridge were observed during TMK's onsite investigation to have visually evident deterioration and cracking, due to the expansion caused by corrosion of the internal reinforcement of the concrete post. It was observed that the hand rail system was not structurally adequate to serve as a vehicular impact barrier, rather just a pedestrian access perimeter barrier. Tonkin - Signs of severe concrete cracking and deterioration. Steel sections not held together very effectively. Barrier deemed inadequate to absorb significant vehicle impact. Corrosion of the internal reinforcement in the concrete posts have caused cracking at the edge of the deck. Concrete posts are smaller in size compared to the end posts on both sides.

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Modification	Section	Group	Group Number	Component	Component Number	Component Material (P, C, S, T, O)	Unit (Lm, m ² , each)	Quantity	Exposure Class	Maintenance Required	1	2	3	4	
O	Approach 2	AP	2	BR	1	S	Each	1	2	<input checked="" type="checkbox"/>				1	
O		AP	2	WS	1	O	m ²	7.3	2	<input checked="" type="checkbox"/>		3	4.3		TMK (Post-Flood) - The road surfaces to each of the bridge approaches had suffered minor subsidence which was evident due to parallel cracks in the asphalt road surfaces and level difference in the road surface immediately prior to the bridge. Tonkin - Cracking across the width of the road approaches close to the joint. Slight level changes in the pavement surface layer.
O		AP	2	J	1	O	Lm	1	2	<input type="checkbox"/>			1		Tonkin - Joint not sealed. No approach slab. Pavement cracking at the edge.
O		AP	2	RD	1	O	Each	1	2	<input checked="" type="checkbox"/>				1	TMK (Post-Flood) - Floodwaters had caused erosion to base course and subgrade layers beneath the road surface at the abutments – causing loss of portions of the road surface. Tonkin - Road scour and more severe closer to the joint/abutment. Pavement base course and subgrade layers eroded at the road shoulders. Need reinstating.
O		AP	2	BR	2	S	Each	1	2	<input checked="" type="checkbox"/>				1	TMK (Pre-Flood) - Hand rails on both external perimeters of the bridge were observed during TMK's onsite investigation to have visually evident deterioration and cracking, due to the expansion caused by corrosion of the internal reinforcement of the concrete post. It was observed that the hand rail system was not structurally adequate to serve as a vehicular impact barrier, rather just a pedestrian access perimeter barrier. Tonkin - Signs of severe concrete cracking and deterioration. Steel sections not held together very effectively. Barrier deemed inadequate to absorb significant vehicle impact. Corrosion of the internal reinforcement in the concrete posts have caused cracking at the edge of the deck.

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Modification	Section	Group	Group Number	Component	Component Number	Component Material (P, C, S, T, O)					1	2	3	4	
O	Underneath - Abutment 1	S	1	XB	1	S	Each	5	2	<input checked="" type="checkbox"/>			3	2	TMK (Post-Flood) - Lateral forces imposed by the flow of floodwater likely had contributed to further warping / rotation of the steel support beams due to lack of bridging / cross bracing – an item which was discussed within the initial report. Tonkin - Beams are not composite, sagging in the mid span. Bottom flange has been plated at the middle section. No plating only underneath the central beam. Beams 4 and 5 in the Northern side of the bridge are showing lateral movement. Steel corrosion evident in all beams. The make of the steel section were identified that could allow increasing yielding strength for structural analysis.
O		S	1	D	1	C	Each	1	2	<input checked="" type="checkbox"/>			1		TMK (Post-Flood) - Minor additional spalling of concrete was noted – likely loose concrete fragments being removed by floodwater activity. Around 150mm rubble on top of the deck as part of resurfacing which is adding extra dead load. Minimal cover underneath the bridge deck causing concrete delamination and exposing of the bottom steel reinforcement. Concrete patch repair works have been done but in isolated section only. Honeycombing possibly due to inadequate compacting.
O		A	1	B	1	O	Each	5	2	<input checked="" type="checkbox"/>			3	2	TMK (Post-Flood) - Grouted end bearings of the steel beams had been eroded due to historic cracking and floodwater activity. Tonkin - Bearing showing typical signs of fatigue and distortion due to flooding. Steel plate and bolts have corroded.
O		A	1	WW	1	C	Each	2	2	<input checked="" type="checkbox"/>			2		Tonkin - Newer concrete. Pre-cast section installed post initial construction.
O		A	1	P	1	C	Each	5	2	<input type="checkbox"/>			5		TMK (Post-Flood) - No signs of significant differential movement were observed during the non-destructive investigation, to the concrete piers. Tonkin - concrete piles are relatively more intact and no sign of differential movement observed.
O		A	1	H	1	C	Each	1	2	<input checked="" type="checkbox"/>			1		TMK (Pre-Flood) - Concrete degradation and spalling occurring to both ends of the concrete support beam to east embankment, exposing internal steel reinforcement. Tonkin - As per the tap test, the concrete deemed gummy or corroded. No longer fulfilling structural purpose.
O		A	1	A	1	C	m ²	18	2	<input checked="" type="checkbox"/>			18		TMK (Post-Flood) - The bridge abutments had suffered erosion effects from the floodwater. Tonkin - Isolated cracks observed that go across the abutment. There appears to be multiple stages of reconstruction/repair over the life-span of the bridge with pre-cast concrete wall installation and pouring concrete.

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Component Location											Quantity Per Condition State				Comments - type of defect - location of defect - size and severity - photo number
Modification	Section	Group	Group Number	Component	Component Number	Component Material (P, C, S, T, O)	Unit (Lm, m ² , each)	Quantity	Exposure Class	Maintenance Required					
O	Underneath - Abutment 2	A	2	B	1	O	Each	5	2	<input checked="" type="checkbox"/>			3	2	TMK (Post-Flood) - Grouted end bearings of the steel beams had been eroded due to historic cracking and floodwater activity. Tonkin - Bearing showing typical signs of fatigue and distortion due to flooding. Steel plate and bolts have corroded.
O		A	2	WW	1	C	Each	2	2	<input checked="" type="checkbox"/>			2	Tonkin - Newer concrete. Pre-cast section installed post initial construction.	
O		A	2	P	1	C	Each	5	2	<input type="checkbox"/>		4	1	TMK (Post-Flood) - No signs of significant differential movement were observed during the non-destructive investigation, to the concrete piers. Tonkin - concrete piles are relatively more intact and no sign of differential movement observed. The concrete pile in the North-Western corner could not be investigated due to the lack of access and it has been assumed that the pile exists as per the original drawings provided and the pile arrangement of the abutment on the opposite side.	
O		A	2	H	1	C	Each	1	2	<input checked="" type="checkbox"/>			1	TMK (Pre-Flood) - Concrete degradation and spalling occurring to both ends of the concrete support beam to east embankment, exposing internal steel reinforcement. Tonkin - As per the tap test, the concrete deemed gummy or corroded. No longer fulfilling structural purpose.	
O		A	2	A	1	C	m ²	17.5	2	<input checked="" type="checkbox"/>			18	TMK (Post-Flood) - The bridge abutments had suffered erosion effects from the floodwater. Tonkin - Isolated cracks observed that go across the abutment. There appears to be multiple stages of reconstruction/repair over the life-span of the bridge with pre-cast concrete wall installation and pouring concrete.	

Photos and Sketches Report

Structure ID BR001 Inspection Date 18/05/2023
 Bridge Name Twentyfirst St Bridge Type of Inspection - Level 2
 Inspected By Tonkin - PSC and HB

Report Image No. Date
 Original Image No.

Mod	Group	Component	Condition State
<input type="text" value="O"/>	<input type="text" value="AP1"/>	<input type="text" value="BR1"/>	<input type="text" value="4"/>



Report Image No. Date
 Original Image No.

Mod	Group	Component	Condition State
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Report Image No. Date
 Original Image No.

Mod	Group	Component	Condition State
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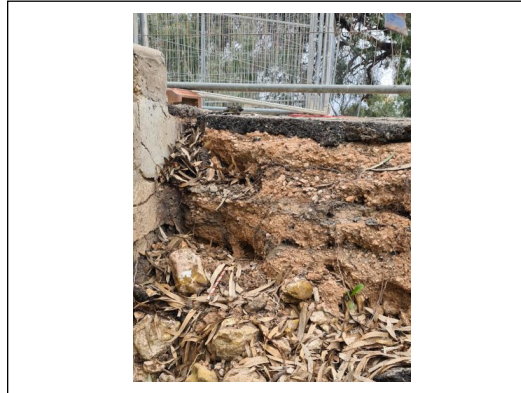


Photos and Sketches Report

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 Inspected By Tonkin - PSC and HB

Report Image No. Date
 Original Image No.

Mod	Group	Component	Condition State
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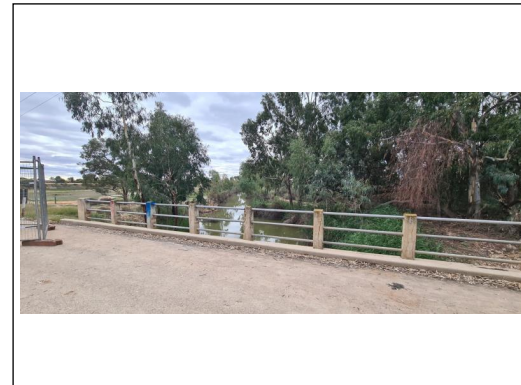
Report Image No. Date
 Original Image No.

Mod	Group	Component	Condition State
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Report Image No. Date
 Original Image No.

Mod	Group	Component	Condition State
<input type="text" value="O"/>	<input type="text" value="S"/>	<input type="text" value="BR1"/>	<input type="text" value="4"/>



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Report Image No. Date
 Original Image No.

Mod	Group	Component	Condition State
<input type="text" value="O"/>	<input type="text" value="S"/>	<input type="text" value="WS"/>	<input type="text" value="2"/>



Report Image No. Date
 Original Image No.

Mod	Group	Component	Condition State
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Report Image No. Date
 Original Image No.

Mod	Group	Component	Condition State
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Photos and Sketches Report

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Report Image No. 10 Date 18/05/2023

Original Image No. Twentyfirst St Bridge (10) .jpg

Mod	Group	Component	Condition State
O	S	FY	4



Report Image No. 11 Date 18/05/2023

Original Image No. Twentyfirst St Bridge (11) .jpg

Mod	Group	Component	Condition State
O	S	BR2	4



Report Image No. 12 Date 18/05/2023

Original Image No. Twentyfirst St Bridge (12) .jpg

Mod	Group	Component	Condition State
O	AP2	WS	2



Photos and Sketches Report

Structure ID BR001 Inspection Date 18/05/2023
 Bridge Name Twentyfirst St Bridge Type of Inspection - Level 2
 Inspected By Tonkin - PSC and HB

Report Image No. 13 Date 18/05/2023

Original Image No. Twentyfirst St Bridge (13).jpg

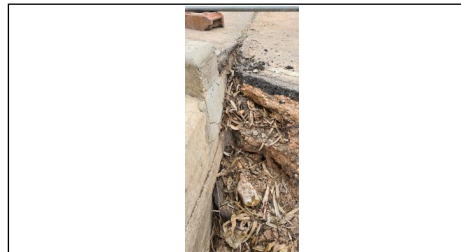
Mod	Group	Component	Condition State
O	AP2	J	4



Report Image No. 14 Date 18/05/2023

Original Image No. Twentyfirst St Bridge (14).jpg

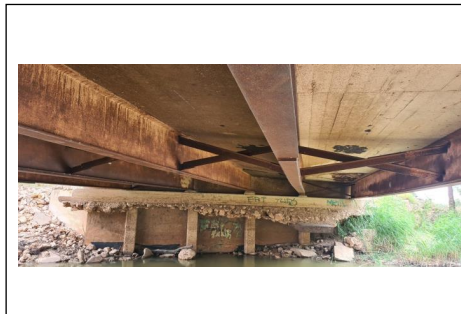
Mod	Group	Component	Condition State
O	AP2	RD	3



Report Image No. 15 Date 18/05/2023

Original Image No. Twentyfirst St Bridge (15).jpg

Mod	Group	Component	Condition State
O	S	XB	4



Photos and Sketches Report

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Report Image No. 16 Date 18/05/2023
 Original Image No. Twentyfirst St Bridge (16).jpg
 Mod O Group S Component D Condition State 3



Report Image No. 17 Date 18/05/2023
 Original Image No. Twentyfirst St Bridge (17).jpg
 Mod O Group A1 Component B Condition State 3



Report Image No. 18 Date 18/05/2023
 Original Image No. Twentyfirst St Bridge (18).jpg
 Mod O Group A1 Component WW Condition State 3



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Report Image No. 19 Date 18/05/2023
 Original Image No. Twentyfirst St Bridge (19) .jpg

Mod	Group	Component	Condition State
O	A1	H	3



Report Image No. 20 Date 18/05/2023
 Original Image No. Twentyfirst St Bridge (20) .jpg

Mod	Group	Component	Condition State
O	A1	P	2



Report Image No. 21 Date 18/05/2023
 Original Image No. Twentyfirst St Bridge (21) .jpg

Mod	Group	Component	Condition State
O	A1	A	3



Report Image No. 22 Date 18/05/2023
 Original Image No. Twentyfirst St Bridge (12) .jpg

Mod	Group	Component	Condition State
O	A2	A	3

