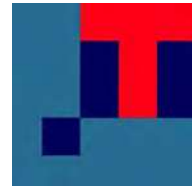




Comhairle Ceantair
Lár Uladh
Mid Ulster
District Council



COTT LANE FOOTBRIDGE
PRINCIPAL INSPECTION REPORT



Project No	Revision	Prepared by	Checked by	Approved by	Status	Date
16/140C	1	PDD	TS	TS	FINAL	24/10/2016



CONTENTS

	Page No.
1.0 INTRODUCTION	2
2.0 LOCATION OF THE STRUCTURE	2
3.0 DESCRIPTION OF THE STRUCTURE	2
4.0 DETAILED CONDITION REPORT	3
5.0 CONCLUSIONS	11
6.0 RECOMMENDATIONS	12

Appendix 1 – Bridge Location Plan and Detailed drawing

Appendix 2 – Photographs



1.0 INTRODUCTION

- 1.1 WDR & RT Taggart were appointed by Mid Ulster District Council to carry out a Principal Inspection of Cott Lane Footbridge, Cott Lane is approximately 2 miles north east of Ballinderry. The inspection was carried out by Philip Duffy and Tommy Stevenson on Thursday 22nd September 2016.
- 1.2 Weather conditions: Weather was dry and bright with a temperature of approx. 17 degrees Celsius.
- 1.3 Inspections since last Principal Inspection: There are no records of previous inspections available for the footbridge. It is therefore not possible to comment on any deterioration or maintenance carried out on the bridge.

2.0 LOCATION OF THE STRUCTURE

- 2.1 Cott Lane footbridge crosses the Ballinderry River approximately 1.0km from where the river enters Lough Neagh. Photograph No. 1 shows the bridge approach from the west and Photograph No. 2 from the east.

3.0 DESCRIPTION OF THE STRUCTURE

- 3.1 The bridge is a five span reinforced concrete structure, Photograph No's 3 & 4 show a view of the south upstream (U/S) elevation and Photograph No's 5 & 6 a view of the north downstream (D/S) elevation. The bridge comprises of 2 No. reinforced concrete edge beams supporting a reinforced concrete deck and supported on concrete abutments and piers. Steel parapet railing is supported by a mixture of concrete pillars and steel posts. There is no detailed information of the bridge construction available and at this stage it is not possible to ascertain the formation level of the concrete piers or abutments.
- 3.2 The structure has 5 No. spans as detailed on drawing No. 16/140C/001 and the total span between abutments is 57.60m. The bridge is approximately 1.80m wide.
- 3.3 There are 4 No. concrete piers, 3 of which consist of 2 No. 300x300mm columns on circular circular columns. There are 2 No. 200mm wide concrete beams between the columns at top of circular column and deck levels. Pier No. 4 is one mass concrete



structure. It is unknown if this may have been formed at a later date around a pier similar to the others.

4.0 DETAILED CONDITION REPORT

4.1 Deck Elements

The bridge deck is approximately 75mm thick and of reinforced concrete construction. The deck spans between two no. 200x275mm deep reinforced concrete edge beams. The 5 spans were inspected and damage recorded as detailed:

4.1.1 Concrete Deck & Edge Beams

4.1.1.1 SPAN 1 (Photograph No. 7)

Deck (Photograph No. 8):

1. Slight water ingress was noted at one location. There are other locations where water staining is visible.
2. 3.2m from Abutment 1 (Photograph No. 9)- Concrete spalling; area approx. 80x80x20mm deep. One reinforcing bar is exposed; corrosion is visible with slight loss of section.
3. 3.9m from abutment 1(Photograph No. 10)- Concrete spalling; area approx. 100x50x20mm deep. One reinforcing bar is exposed; corrosion is visible with minimal loss of section.
4. At Pier No.1- area approx. 200x90x20mm deep (Photograph No. 11). One reinforcing bar is exposed; corrosion is visible with significant loss of section.
5. There is minor concrete damage on the edge of the deck slab at 2 No. locations on the downstream face, see Photograph No's 12 & 13, one reinforcing bar is exposed at each location with minor corrosion visible.

Edge Beams (U/S-Photograph 14, D/S-Photograph 15):

1. Both beams appear to be in good condition with no significant defects identified.



4.1.1.2 **SPAN 2** (Photograph 16)

Deck (Photograph No. 17):

1. 7.3m from Pier 1 (Photograph No. 18)- Concrete spalling; area approx. 120x40x15mm deep. One reinforcing bar is exposed; corrosion is visible with minimal loss of section.
2. 8.3m from Pier 1 (Photograph No. 19)- Concrete spalling; 3 areas approx. 260x80x15mm deep and 2 No. at 50x50x15mm deep. One reinforcing bar is exposed at each location; corrosion is visible with loss of section.
3. 8.6m from Pier 1(Photograph No. 20)- Concrete spalling; area approx. 200x100x15mm deep. One reinforcing bar is exposed; corrosion is visible with loss of section.
4. 9.2m from Pier 1(Photograph No. 21) - Concrete spalling; 3 locations within an area of approx. 400x200mm. One reinforcing bar is exposed at each location; corrosion is visible with loss of section.
5. 10.8m from Pier 1(Photograph No. 22)- Water seepage is evident on deck at this location. Other isolated evidence of water seepage are visible.
6. Seepage appears to follow the line of a hairline crack approx. 0.5m from Pier 2- See Photograph No. 17.

Edge Beams:

- Upstream Beam (Photograph No. 23):
 1. 13.0m from Pier 1(Photograph No. 24) 0112- Minor concrete damage at bottom of beam approx. 200x20x15mm deep.
- Downstream Beam (Photograph No. 25):
 1. Water staining visible at 2 locations on beam.

4.1.1.3 **SPAN 3** (Photograph No. 26)

Deck (Photograph No. 27):

1. 2.9m from Pier 2 (Photograph No. 28)- Concrete spalling; area approx. 70x70x10mm deep. One reinforcing bar is exposed; corrosion is visible with significant loss of section.



2. 4.9m from Pier 2 (Photograph No. 29)- Concrete spalling; 2 areas approx. 200x100x10mm deep and 300x25x10mm deep. One reinforcing bar is exposed; corrosion is visible at each location with minor loss of section.
3. 9.0m from Pier 1(Photograph No. 30)- Concrete spalling; area approx. 200x100x15mm deep. One reinforcing bar is exposed; corrosion is visible with loss of section.
4. (Photograph No. 31)- Concrete spalling; 3 isolated locations at approx. 9.0m, 10.0m and 13.0m from Pier 2. One reinforcing bar is exposed at each location; corrosion is visible.
5. Seepage appears to follow the line of a hairline crack approx. 0.5m from Pier 2- See Photograph No. 27.

Edge Beams:

- Upstream Beam (Photograph No. 32):
 1. No significant damage identified.
- Downstream Beam (Photograph 33):
 1. 5.7m from Pier 2 (Photograph No. 34)- Significant concrete spalling/ damage; area of approx. 600 long x 200x50-70mm deep. Two reinforcing bars are exposed; corrosion is visible with loss of section.
 2. 7.2m from Pier 2 (Photograph No. 35)- Concrete spalling; area of approx. 300mm long x200x50mm deep. One reinforcing bar is exposed; corrosion is visible with loss of section.

4.1.1.4 SPAN 4 (Photograph No. 36)

Deck (Photograph No. 37):

1. 1.2m from Pier 4 (Photograph No. 38)- Concrete spalling; 3 areas approx. 200x40x10mm deep and 2 No. 100x40x10mm deep. One reinforcing bar is exposed; corrosion is visible with loss of section.
2. Isolated area of water seepage/ leakage visible. There are two areas where seepage appears to have occurred along a hairline crack in the deck at approx. 0.5m from Pier 4 and at mid span (see Photograph No. 38).

Edge Beams:

- Upstream Beam (Photograph No. 39):
 1. Vertical hairline cracks are visible along the beam.



- Downstream Beam (Photograph 40):
 1. 4.0m & 7.0m from Pier 4 (Photograph No. 41)- Concrete spalling; 2 isolated areas. One reinforcing bar exposed; corrosion is visible with loss of section.
 2. Vertical hairline cracks are visible along the beam.

4.1.1.5 **SPAN 5** (Photograph 42)

Deck (Photograph No. 43):

1. A hairline crack is visible approx. 0.5m from pier 4 (see Photograph No. 44) with evidence of seepage/ leachate from the crack. This crack continues down into the edge beams.
2. Isolated areas of water seepage/ leakage are visible.

Edge Beams:

- Upstream Beam (Photograph No. 45):
 1. Vertical hairline cracks are visible along the beam.
- Downstream Beam (Photograph No. 46):
 1. Vertical hairline cracks are visible along the beam.

4.2 **Load-bearing Substructure**

4.2.1 **Foundations**

No 'opening up' was carried out at foundation level. The foundations were not visible on site. Records of the bridge construction are not available.

4.2.2 **Abutments**

Bridge abutments are partially visible, however 'opening up' was not carried out to identify the abutment formation level. Abutments appear to consist of an insitu reinforced concrete bank-seat supporting the concrete abutment which has the bridge beams cast in.



4.2.2.1 **Abutment 1** (West) See Photograph No. 47:

The abutment appears to be in relatively good condition, however there is minor concrete damage to the base of the abutment at bank-seat level. Reinforcement is not exposed.

4.2.2.2 **Abutment 2** (East) See Photograph No. 48:

The abutment appears to be in relatively good condition, however there is minor concrete damage to the base of the abutment at bank-seat level. Reinforcement is not exposed.

4.2.3 **Piers**

Piers are partially visible, however 'opening up' was not carried out to identify the pier formation level.

Piers No.1, 2 and 3 are decorative reinforced concrete piers constructed of 2 no. round columns to formation level with 2 no. 300x300mm square columns to underside of deck level. These columns are linked together with 2 No. 200mm wide beam at top of round column and at deck level.

Pier 4 is a mass concrete pier. It may be suggested that Pier 4 was also a decorative pier that may have been surrounded in concrete at a later stage.

4.2.3.1 **Pier 1**

Photograph No. 49 shows the east elevation of Pier 1. Circular columns are not visible, however the decorative coping is.

1. The four corners of the downstream column are damaged as detailed:
 - a. Photograph 50 SE- Damage is approx. 150mm x 500mm x 35mm deep. One reinforcing bar and two small diameter links are exposed; corrosion and section loss visible.
 - b. Photograph 51 NW- Damage is approx. 70mm x 400mm x 40mm deep. One reinforcing bar is exposed; corrosion and section loss visible.



- c. SE and NE corners- Minor concrete damage noted, no steel exposed.

2. The upstream column is damaged as detailed:

- a. Photograph 52- North face- Damage is approx. 200x70x 35mm deep. Three no. reinforcing bar links are exposed; corrosion and significant section loss visible.
- b. Photograph 53- East Face decorative section of beam- Damage is approx. 100x300x 10mm deep. One reinforcing bar is exposed; corrosion and section loss visible. Lack of cover.
- c. Photograph 54- North face- Minor concrete damage noted, 1 reinforcing bar exposed with minor corrosion and section loss visible. There is also evidence of a previous repair to the cross beam.

4.2.3.2 Pier 2

Photograph No. 55 shows the east elevation of Pier 2.

1. The downstream column is damaged as detailed:

- a. Photograph No. 56 shows significant damage to the south face of this column- Damage is the full width of the column over 400mm and 60mm deep at the worst case. Two reinforcing bars and two small diameter links are exposed and corrosion and section loss visible.
- b. Photograph No. 57 shows concrete spalling and one exposed bar on the cross beam on the south face. One reinforcing bar is exposed and corrosion and section loss visible.

2. The upstream column is damaged as detailed:

- a. Photograph 58 shows hairline cracking which continues around the perimeter of the column at approximately mid-height. This is possibly a construction joint, however, minor concrete damage is noted.

4.2.3.3 Pier 3

Photograph No. 59 shows the west elevation of Pier 3. Access was not possible at the time of inspection, however damage was observed from the river bank

- 1. Photograph No. 59 shows damage to both the SW and NW corners of the downstream and upstream columns respectively. There is significant concrete



damage and reinforcement is exposed with corrosion and possible section loss.

2. Photograph No. 60 shows concrete damage on the upper cross beam on the east face of Pier 3.

4.2.3.4 Pier 4

Photograph No. 61 shows the east elevation of Pier 4. As detailed this is a mass concrete pier.

There is scour to the riverbed at the SE corner of the pier, however, it was not possible to ascertain if the pier is being undermined at this stage.

1. Photograph No. 62 shows a crack on the pier face. The crack continues around the perimeter of the pier. The crack is approx. 5mm on the east face and hairline on the west face.

4.3 Durability Elements

4.3.1 Superstructure & Substructure drainage

The bridge is completely surfaced with low permeability bitumen surfacing. Drainage is provided by means of longitudinal slopes on the bridge. There was no standing water on the surface at the time of inspection.

4.4 Safety Elements

4.4.1 Parapets

Parapets consist of metal handrails with alternate concrete and steel pillars/posts. (see Photograph No. 63) The parapet hand rails are generally in good condition. There is however some minor damage:

1. Photograph No. 64 shows concrete damage to the top of a concrete pillar.
2. Photograph No. 65 shows a crack to the top of the concrete pillar corresponding with the top hand rail.



4.4.2 Footbridge surfacing

A bitumen surfacing has been applied to the surface of the footbridge.

There are isolated locations where this surfacing is damaged. Photograph 66 provides an example of this damage.

There is vegetation growth along the edge of surfacing and plinth over the entire length of the footbridge (see Photograph 67).

4.5 Other Bridge Elements

4.5.1 River Bed

The river bed appears to slope gradually from the west bank with a deeper channel between Piers 3 & 4. At the time of inspection water was not flowing between Pier 4 and the east Abutment No. 2.

It was noted that there may be scour to the river bed to the south west of Pier 4. The water appears to be fast flowing as the river meanders towards this pier.

4.5.2 Embankments

Embankments are grassed. Access to the river is at Pier 2 with a localised sloped area. Access to the East embankment is limited and relatively steep.

4.6 Ancillary Elements

4.6.1 Services

There does not appear to be any services nearby or crossing the footbridge.



5.0 **CONCLUSIONS**

- 5.1 Our inspection of Cott Lane Footbridge highlighted various defects in the structure. The footbridge is a slender structure with significant spans of up to approximately 15.2m. There is evidence that there is movement in the bridge and it was observed on site that there is movement across the structure when the bridge is being trafficked.
- 5.2 The bridge deck exhibits signs of generally isolated concrete spalling and subsequent corrosion of reinforcement at these locations. There is evidence of transverse hairline cracking on the deck at either side of the piers, made evident by leaching through these cracks.
- 5.3 The edge beams exhibit signs of generally isolated concrete spalling and subsequent corrosion of reinforcement at these locations. There is however significant damage to the downstream edge beam between Piers 2 and 3. Vertical hairline cracking was also identified on beams between Pier 3 and Abutment 2.
- 5.4 Decorative Piers 1, 2 & 3 all exhibit significant concrete damage around the midpoint on the upper square columns. This may indicate horizontal movement of the bridge structure. The mass concrete Pier No. 4 is cracked around its perimeter on the upper half of the pier.
- 5.5 Formation level of the bridge abutments were not visible at inspection. The visible elements of the abutments were generally in good condition with minor concrete damage.
- 5.6 Foundations are not visible and in the absence of records for the structure are unknown.
- 5.7 The parapet railing and concrete pillars are in relatively good condition, there are areas of minor concrete damage.
- 5.8 The river bed is deepest between Pier 3 and 4 and appears to have partly scoured the river bed along Pier 4.
- 5.9 The embankments are in good condition, with no evidence of slippage.



6.0 RECOMMENDATIONS

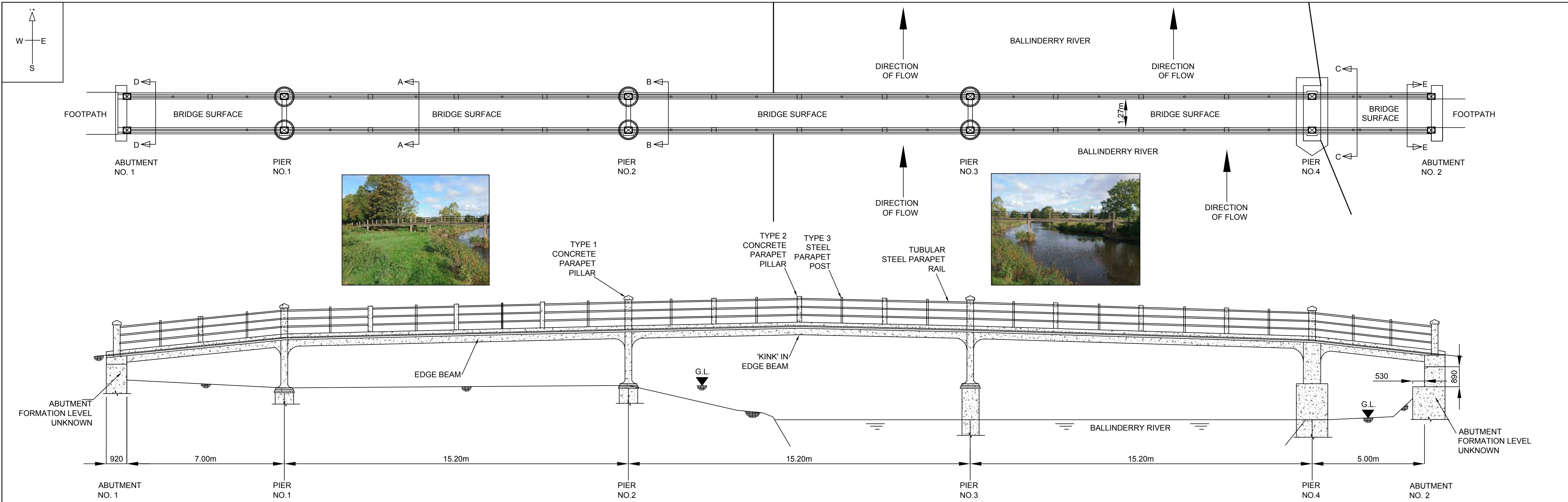
- 6.1 It is recommended that a detailed structural analysis is carried out on the bridge structure.
- 6.2 In the absence of detailed construction drawings, tests will be required to ascertain reinforcement cover levels and reinforcement layout and diameter.
- 6.3 In order to assess the long term durability of the structure and enable an assessment of the lifespan of the structure to be undertaken, testing should be carried out on the structure. Testing may include:
- Cover meter survey to assess cover and layout.
 - Small areas of 'opening up' to confirm the size, location, spacing and condition of the reinforcement.
 - Carbonation Tests
 - Chloride & Cement Content (Dust Sample)
 - "Pull off" concrete strength tests
 - Core removal for analysis
 1. Compressive Strength Testing
 2. Chemical testing to establish cement, chloride and sulphate content.



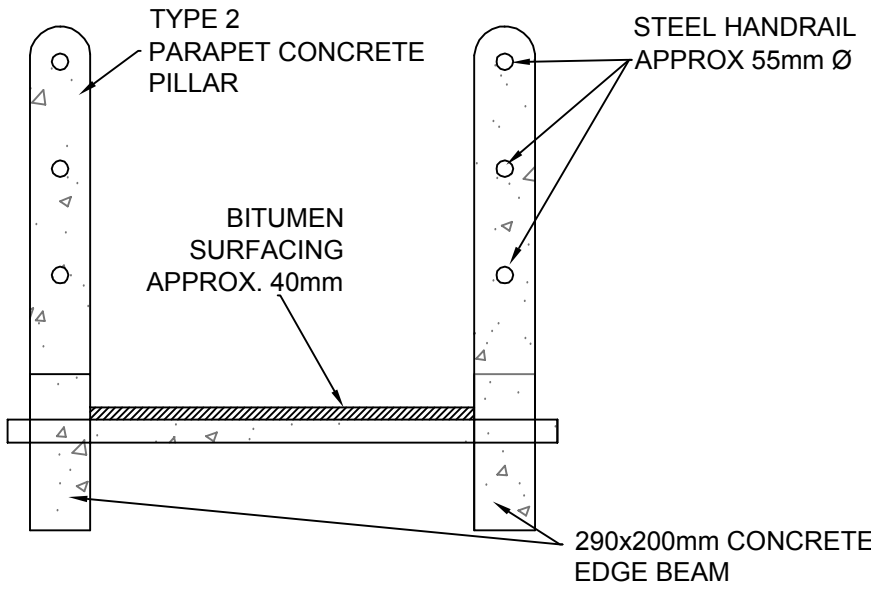
APPENDIX 1 :
BRIDGE LOCATION PLANS & DETAILED DRAWING



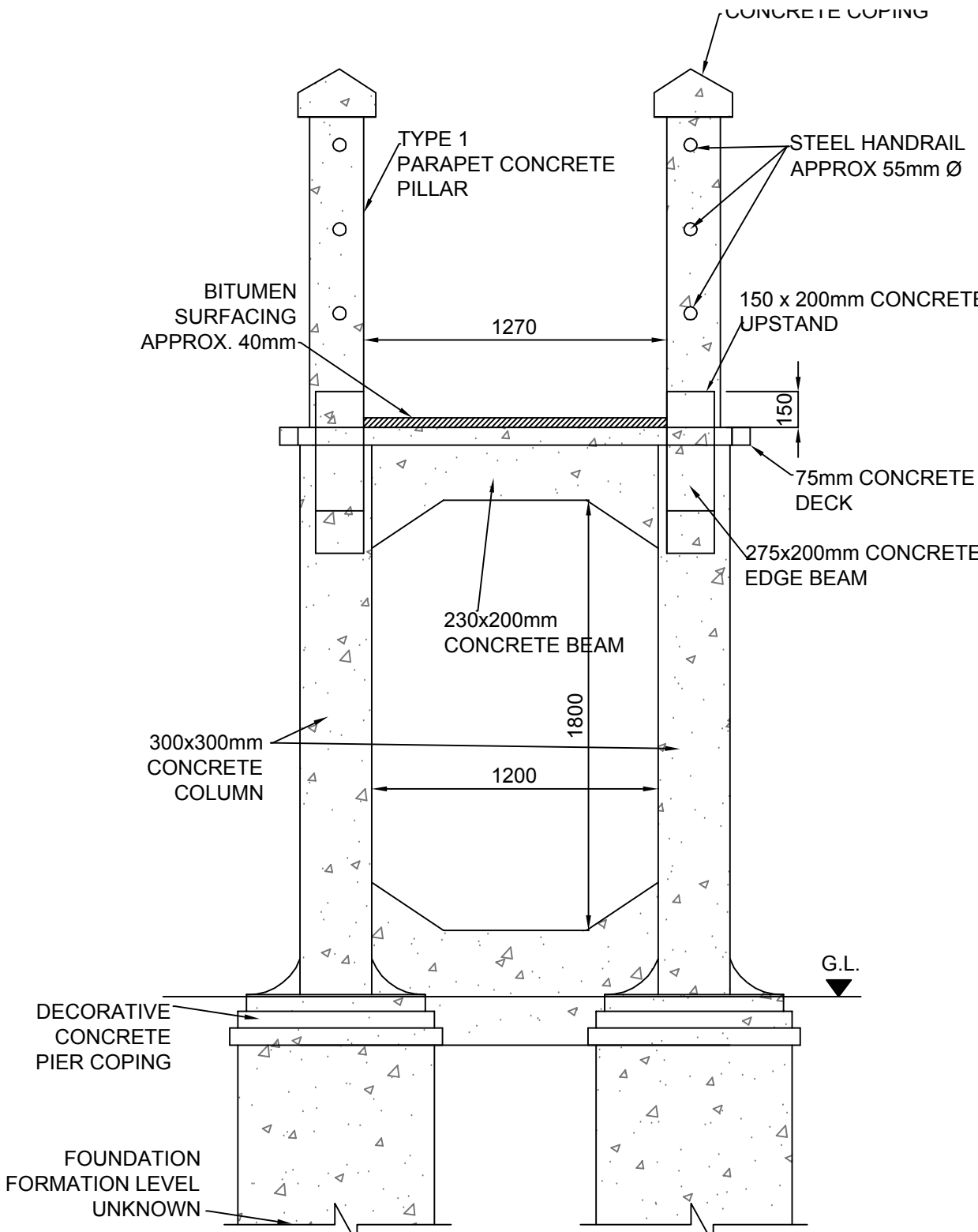
Figure 1 – Site Location Plan



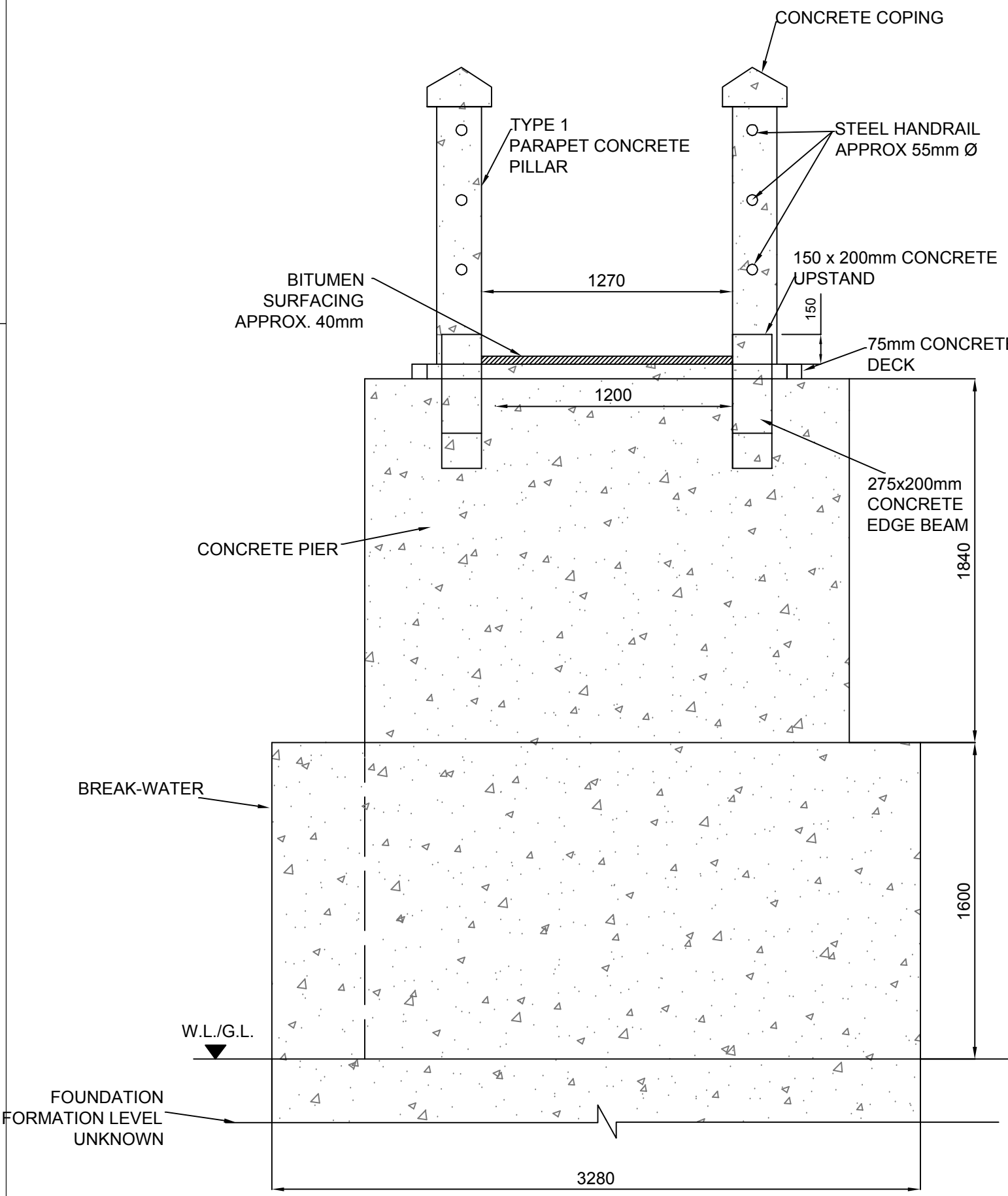
LAYOUT PLAN & SECTION
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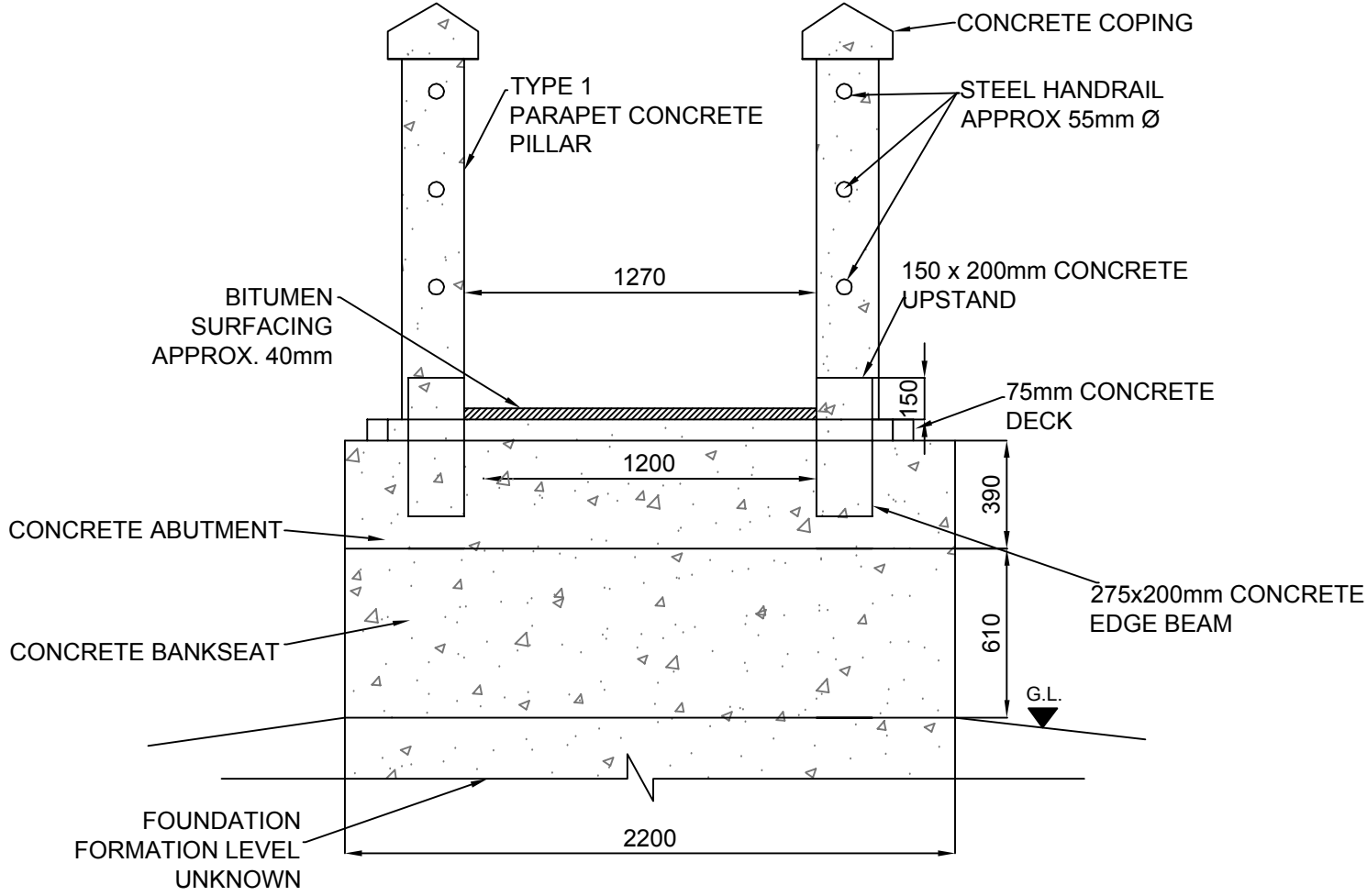
BRIDGE DECK- SECTION A-A
SCALE: 1:20



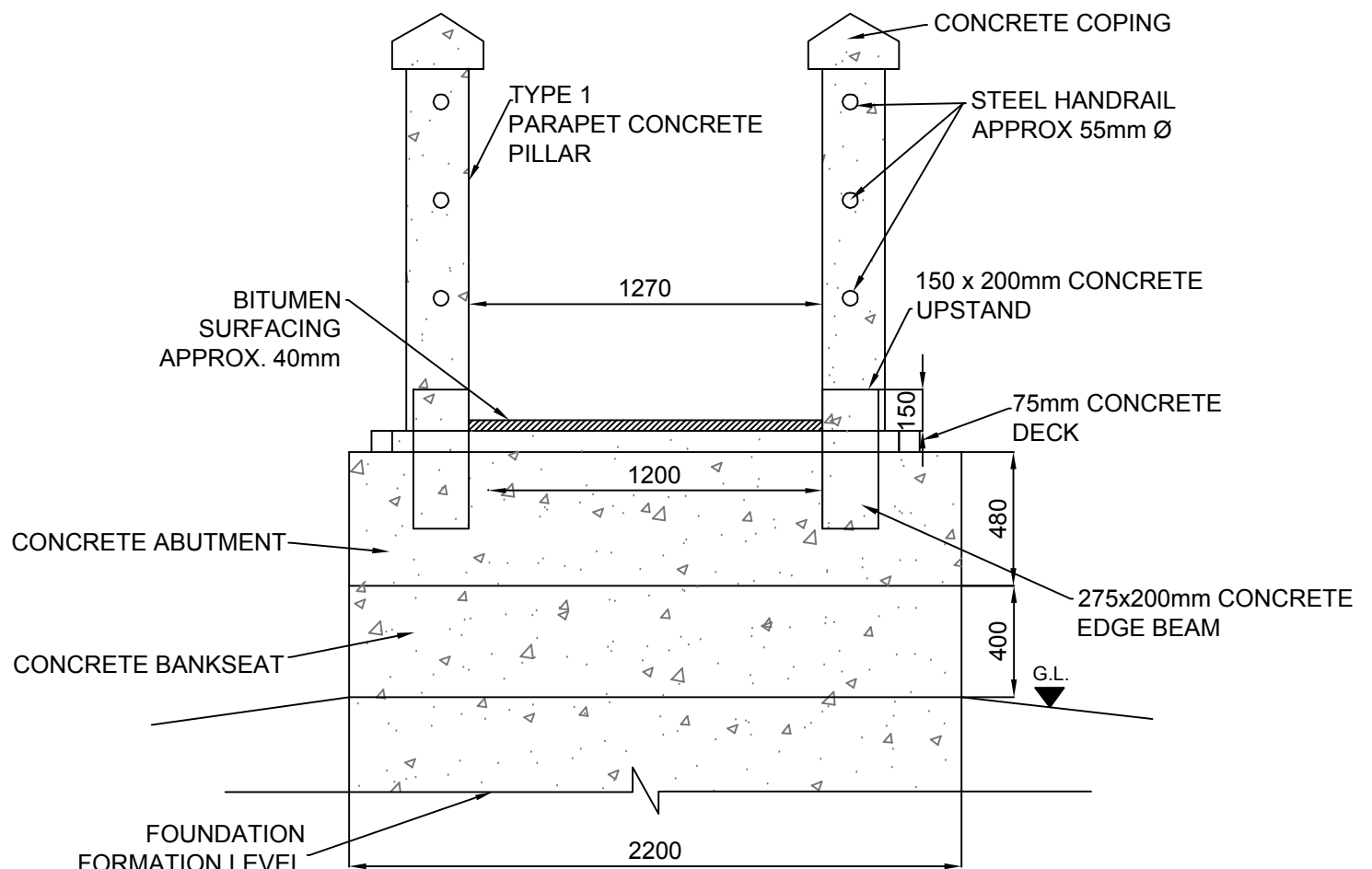
PIER 2- SECTION B-B (PIERS 1 & 3 SIMILAR LAYOUT)
SCALE: 1:20



PIER 4- SECTION C-C
SCALE: 1:20



ABUTMENT 1- SECTION D-D
SCALE: 1:20

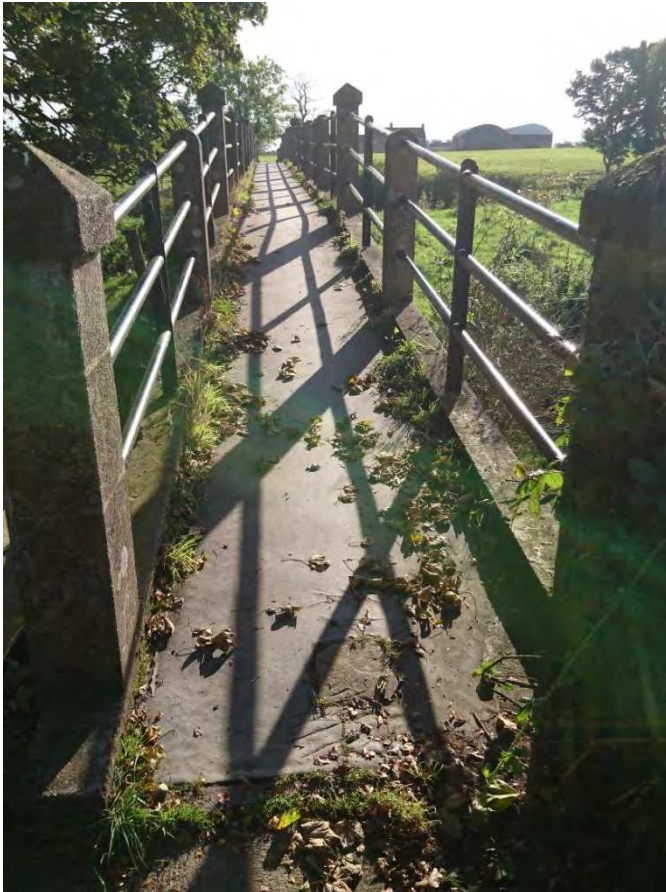


ABUTMENT 2- SECTION E-E
SCALE: 1:20

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AK	BY	18/10/16	18/10/16
SLRPH	CHKD	DATE	DATE
	AMENDMENT DETAILS		
WDR & RT TAGGART			
CLIENT			
MID ULSTER DISTRICT COUNCIL			
CONTRACT			
COTTS LANE BRIDGE INSPECTION			
DRAWING			
BRIDGE LAYOUT PLAN, SECTIONS & DETAILS			
STATUS			
SCALE AS SHOWN AT A1			
DRAWN	PDD	DATE	18/10/16
CHECKED	TS	DATE	18/10/16
DRG No.	16/140C/001	REV.	0
Architects Civil Engineers Structural Engineers Landscape Architects Town Planning Consultants Planning Supervisors Project Managers		Laganwood House Newforge Lane Malone Road Belfast BT9 5NX Tel 028 9066 2121 Fax 028 9066 3162 email mail@wdr-rt-taggart.com	



APPENDIX 2 : PHOTOGRAPHS



Photograph 1: Approach from west



Photograph 2: Approach from east.



Photograph 3: South Elevation (west).



Photograph 4: South Elevation (east).



Photograph 5: North Elevation (east).



Photograph 6: North Elevation (west).



Photograph 7: Span 1- U/S Overview



Photograph 8: Span 1- Deck overview



Photograph 9: Span 1- Item 2.



Photograph 10: Span 1- Item 3.



Photograph 11: Span 1- Item 4.



Photograph 12: Span 1- Item 5/1



Photograph 13: Span 1- Item 5/2



Photograph 14: U/S Edge Beam



Photograph 15: D/S Edge Beam



Photograph 16: Span 2- U/S Overview



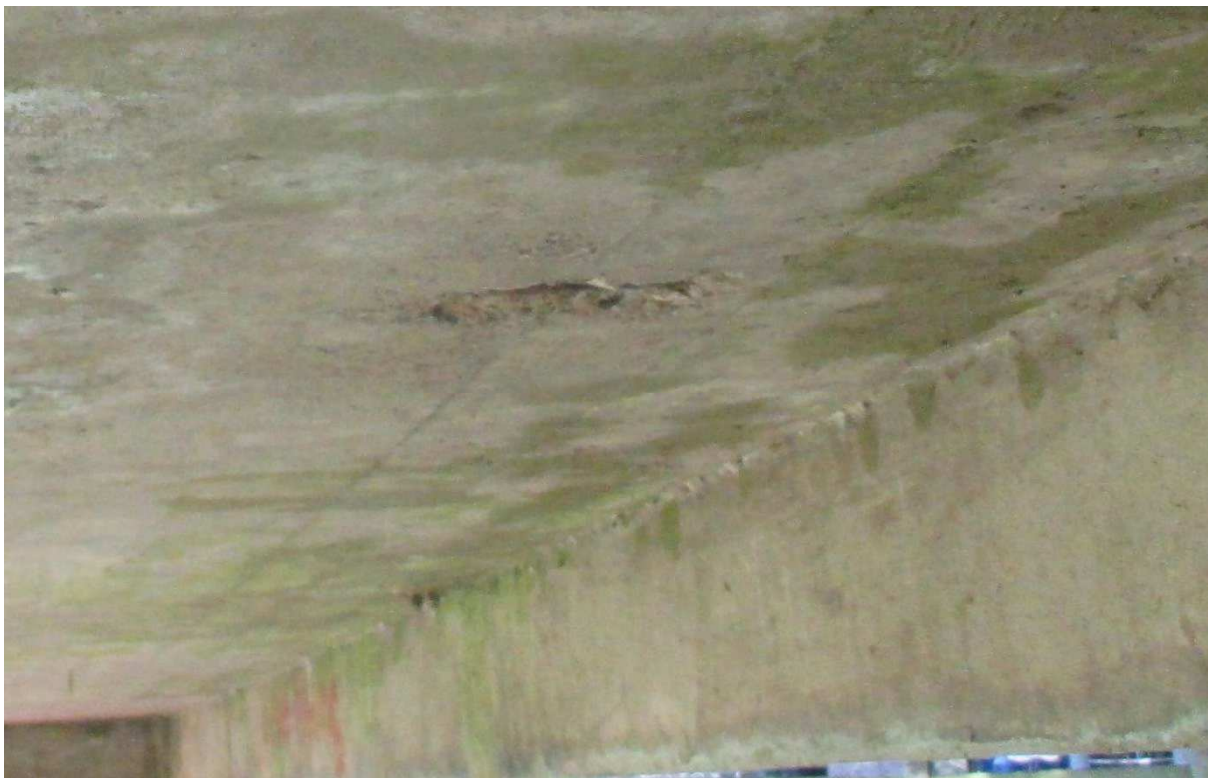
Photograph 17: Span 2- Deck overview



Photograph 18: Span 2- Item 1



Photograph 19: Span 2- Item 2



Photograph 20: Span 2- Item 3.



Photograph 21: Span 2- Item 4.



Photograph 22: Span 2- Item 5.



Photograph 23: Span 2- U/S Edge Beam



Photograph 24: Span 2- U/S Edge Beam- Item 1.



Photograph 25: Span 2- D/S Edge Beam.



Photograph 26: Span 3- U/S Overview



Photograph 27: Span 3- Deck overview



Photograph 28: Span 3- Item 1.



Photograph 29: Span 3- Item 2



Photograph 30: Span 3- Item 3.



Photograph 31: Span 3- Item 4.



Photograph 32: Span 3- U/S Edge Beam Overview.



Photograph 33: Span 3- D/S Edge Beam Overview.



Photograph 34: Span 3- D/S Edge Beam- Item 1.



Photograph 35: Span 3- D/S Edge Beam- Item 2.



Photograph 36: Span 4- U/S Overview.



Photograph 37: Span 4- Deck Overview.



Photograph 38: Span 4- Item 1.



Photograph 39: Span 4- U/S Edge Beam.



Photograph 40: Span 4- D/S Edge Beam.



Photograph 41: Span 4- D/S Edge Beam- Item 1.



Photograph 42: Span 5- U/S Overview.



Photograph 43: Span 5- Deck Overview.



Photograph 44: Span 5- Item 1.



Photograph 45: Span 5- U/S Edge Beam.



Photograph 46: Span 5- D/S Edge Beam.



Photograph 47: Abutment 1 (West) Overview.



Photograph 48: Abutment 2 (East) Overview.



Photograph 49: Pier 1- Overview.



Photograph 50: Pier 1- Item 1a.



Photograph 51: Pier 1- Item 1b.



Photograph 52: Pier 1- Item 2a.



Photograph 53: Pier 1- Item 2b.



Photograph 54: Pier 1- Item 2c.



Photograph 55: Pier 2- Overview



Photograph 56: Pier 2- Item 1a.



Photograph 57: Pier 2- Item 1b.



Photograph 58: Pier 2- Item 2a.



Photograph 59: Pier 3- Overview



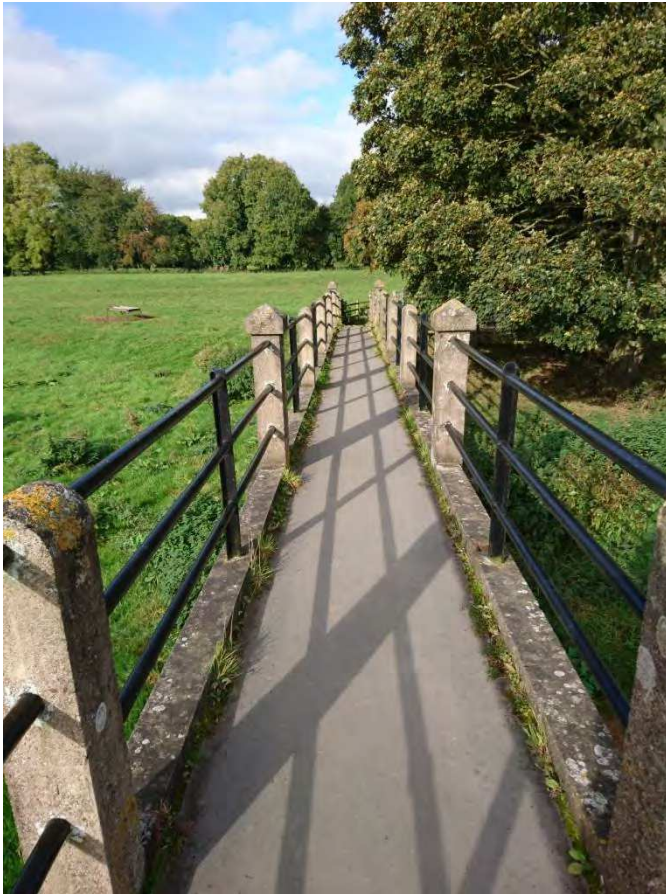
Photograph 60: Pier 3- Item 2.



Photograph 61: Pier 4- Overview.



Photograph 62: Pier 4- Item 1.



Photograph 63: Parapet- Overview.



Photograph 64: Parapet- Item 1.



Photograph 65: Parapet- Item 2.



Photograph 66: Surfacing Damage.



Photograph 67: Vegetation Growth.