



A6 to Manchester Airport Relief Road

B005A – Mill Hill Hollow Footbridge
Preliminary Design Report
Report No. 1007/704/154

August 2013

PRELIMINARY DESIGN REPORT

Structure Name : Mill Hill Hollow Footbridge

Structure Number : B005A

Report No. 1007/704/154

Report Control Sheet

Version	Date	Status	Prepared By	Checked By	Approved By
P1	29/08/2013	Draft	J Watton	M Ellis	N Sheena
P2	13/09/2013	Final	J Watton	M Ellis	N Sheena

Table of Contents:

1. Description of Site	4
2. Highway Details	4
3. Proposed Structure	4
4. Span Arrangements	4
5. Headroom and Clearances	4
6. Road Restraint System (Bridge Parapets)	4
7. Preferred Structural Options	4
7.1 Superstructure Options	4
7.2 Substructure Options	5
8. Geotechnical Information	5
9. Appearance.....	6

Appendix A: Location Plans

Appendix B: Proposed General Arrangement Drawing
3D Model

Appendix C: Ground Investigation Information

1. Description of Site

The Mill Hill Hollow Footbridge is part of the A6 to Manchester Airport Relief Road (A6MARR) and is proposed to give pedestrian, cyclist and equestrian access across Norbury Brook approximately 600m North of Poynton Lake at chainage 10300m approximately.

There are a few residential properties on Mill Hill Hollow to the North of the proposed bridge crossing. However the immediate surrounding area is open farm land to the north and south. An aerial location plan at 1:1250 scale is included in Appendix A.

2. Highway Details

Over Structure – Mill Hill Hollow Footbridge – 3.5m wide footway and string courses in accordance with BD29/04. (3.5m footway + 2 x 0.5m string courses)

Under Structure – Norbury Brook

3. Proposed Structure

The proposed structure will be a single span fully integral bridge. The superstructure will be in the form of pre-stressed concrete TY-beams supporting an in-situ reinforced concrete (R.C.) slab deck. The bridge superstructure will be supported on a capping beam founded on a contiguous piled retaining wall. A proposed General Arrangement drawing is included in Appendix B.

4. Span Arrangements

The bridge will be a single span of 8.05m, measured between the centres of each abutment, running approximately parallel to the relief road.

5. Headroom and Clearances

Norbury Brook is a non-navigable watercourse and therefore minimum headroom limits do not apply. The bridge will be a minimum of 0.6m above the anticipated high water table.

6. Road Restraint System (Bridge Parapets)

It is proposed to use steel equestrian parapets that shall be 1.8m above the finished pavement level of the bridge in accordance with TD 19/06.

7. Preferred Structural Options

7.1 Superstructure Options

It is proposed that the bridge will be a single span, fully integral pre-stressed concrete TY-beams supporting an in-situ reinforced concrete slab deck. Refer to Drawing 1007/3D/DF7/A6-MA/B005A/701 and the 3D Model in Appendix B for further details.

For a span range up to 30m, fully integral construction is normally considered a cost effective option. Elimination of movement joints removes a major cause

of maintenance problems from penetration of dirt, water and de-icing salts, which corrode substructures and bearings.

The advantages for using pre-cast concrete beam construction are as follows:

- Low capital & whole-life cost
- Fast and efficient build
- Factory quality with engineered tolerances
- Low maintenance
- The beams can be lifted individually
- Permanent formwork provides self-supporting system during construction and eliminates falsework
- Reduces site works which are weather dependent

Disadvantages:

- Precast concrete beams are usually heavier than comparable steel beams. As a result larger cranes might be required to lift the precast concrete beams
- Heavier superstructure mentioned above might lead to larger foundation sizes
- Delivery times are dependent on a specialist supplier

7.2 Substructure Options

It is proposed that the bridge will be supported on a contiguous piled wall. It is the most feasible option taking consideration of the topography of the site and existing geotechnical. The close proximity of the proposed footpaths to the edge of the slope means that the use of bank seat abutments could destabilise the steep slopes adjacent to the brook. Further geotechnical information is addressed in section 8 of this report.

8. Geotechnical Information

The boreholes most relevant to the new location are EA POYNTON 98_4 and EA POYNTON 99_1 and 99_1R (Exploration Associates, April 1992). The bridge deck is to be above Norbury brook at this location. The span is to be approximately 8m.

BH98_4 encountered Very loose and loose SAND and GRAVEL to 2.30m overlying;

Highly weathered to completely weathered SANDSTONE with rare "pebbles" to 10.70m, recorded as very weak.

BH 99_ 1 together with rotary follow on BH99_1R encountered loose clayey SAND to 1.10m bgl overlying;

Dense becoming very dense gravelly SAND and GRAVEL, becoming slightly cemented from 4.60m to 6.90m overlying;
Highly weathered poorly cemented SANDSTONE to 14.9m bgl. This was recorded as very weak. The bedrock in this area is described as pebble beds of the Sherwood sandstone group of Permian to Triassic age. There are no faults recorded in this area.

Groundwater was not encountered in any of the above boreholes but was encountered nearby in BH 97_3 at a depth of 1.50m bgl. It was described as a slight seepage and was not observed to rise after 20 minutes.

A review of the abandonment plans for the Poynton and Norbury collieries shows that the location for B005A is not underlain by any historical workings and no movement is therefore expected from historic mine workings. Furthermore the published geological information for the area indicates that the site underlain by Sherwood Sandstone and is separated by faulting from the area in which the Poynton and Norbury collieries operated.

It is proposed that the bridge abutments are founded on a contiguous pile wall taken down into weathered sandstone bedrock using 1050mm diameter piles. The contiguous piled wall is to be taken up to deck level at which there will be a pile cap incorporated within the deck construction. It may be possible to achieve the necessary bearing capacity and resistance to overturning by using wide strip foundations resting on the dense and very dense sand and weathered bedrock. It is assessed that a safe bearing capacity of at least 200kN/m² could be achieved in the dense sand, which is the weakest material at founding level. However, this would require large excavations to below stream bed level in the sand and sandstone and it is probable that there would be large inflows of water through the permeable sand and sandstone into the excavations. The resulting settlement may also exceed tolerable limits. It is therefore recommended that piled foundations are adopted at this location.

9. Appearance

The proposed superstructure will be clearly visible which on elevation comprises approximately 0.45m deep pre-cast beams and 0.5m string course spanning across Norbury Brook. In addition, steel parapets (post with 4 rails-open structure) with a galvanised mesh infill and a 600mm high solid infill panel at the base will be mounted on the string courses either side of the bridge. The exposed concrete beams are to be plain concrete and the faces of the contiguous piled wall to be masonry cladded.

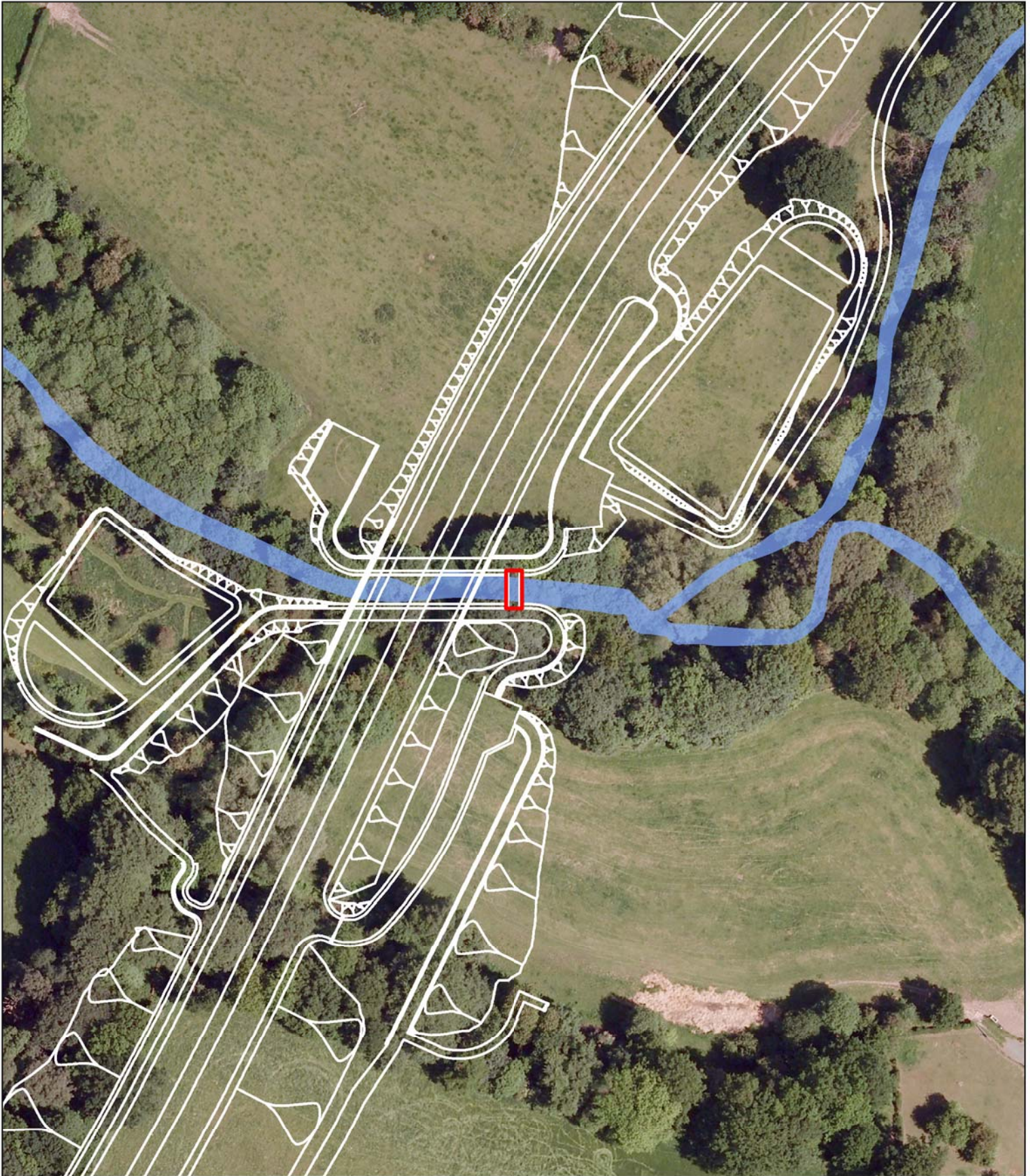
Appendix A: Location Plans



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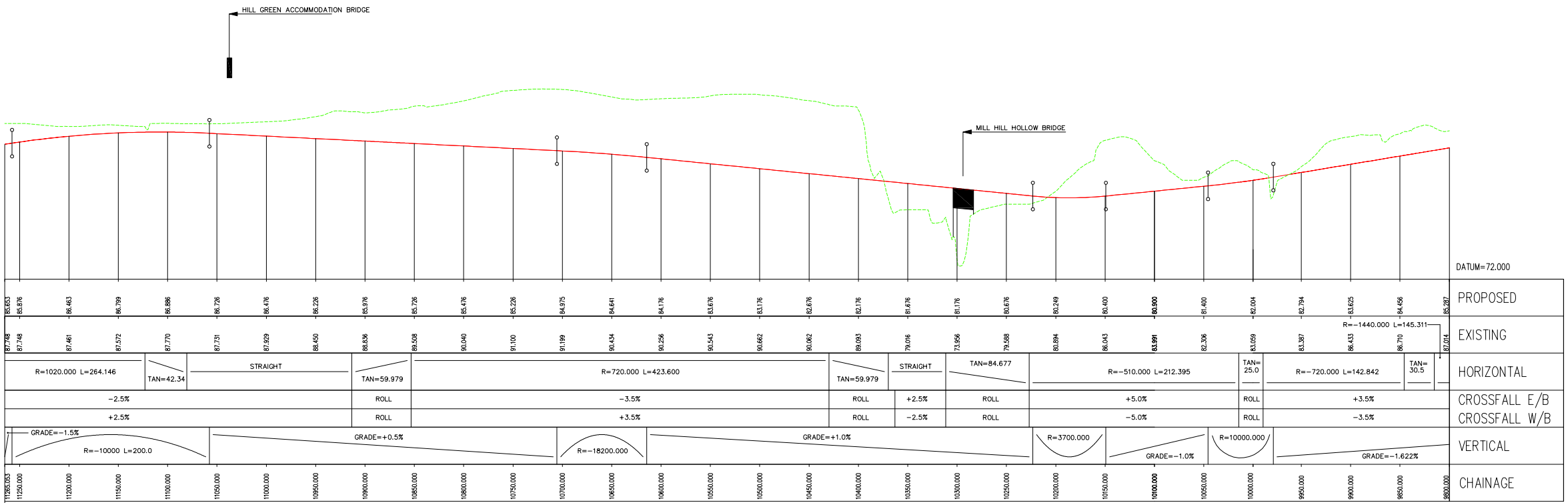
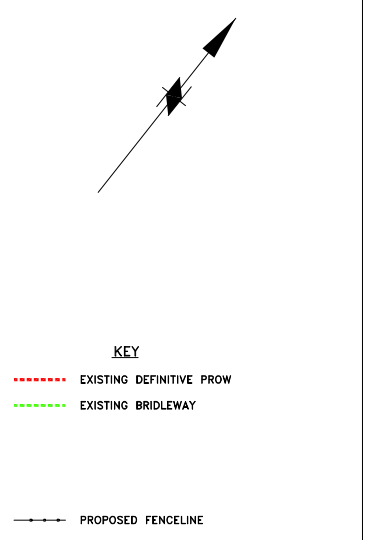
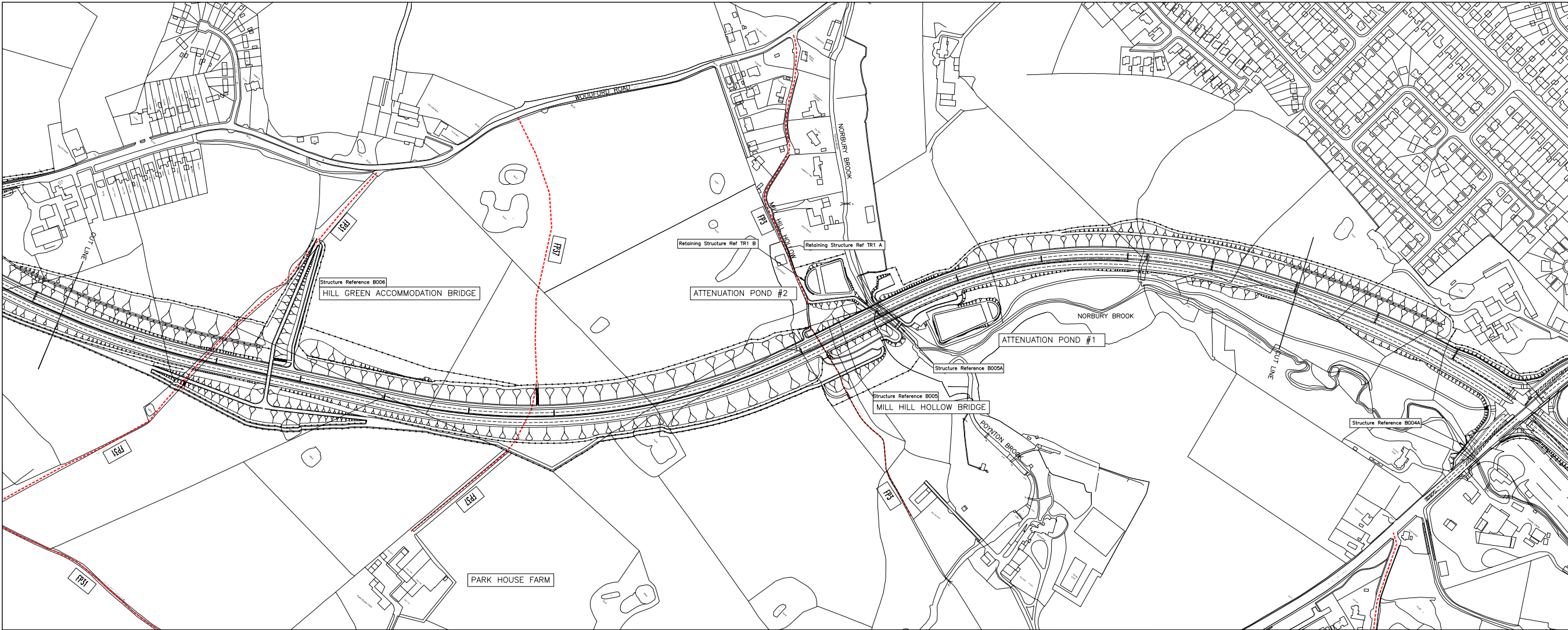


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Drawn	CL	Checked	SC	Approved	NH	
Date	12/08/2013	Date	12/08/2013	Date	12/08/2013	
Size	A4	Scale	1 : 1,250			
GIS Task	4268	Filename				
Drawing No. 1007-3D-DF7-A6-MA-B005A-ALP				Revision		

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SECTION ALONG CENTRELINE OF SEMMMS RELIEF ROAD (SPEED LIMIT 50MPH)

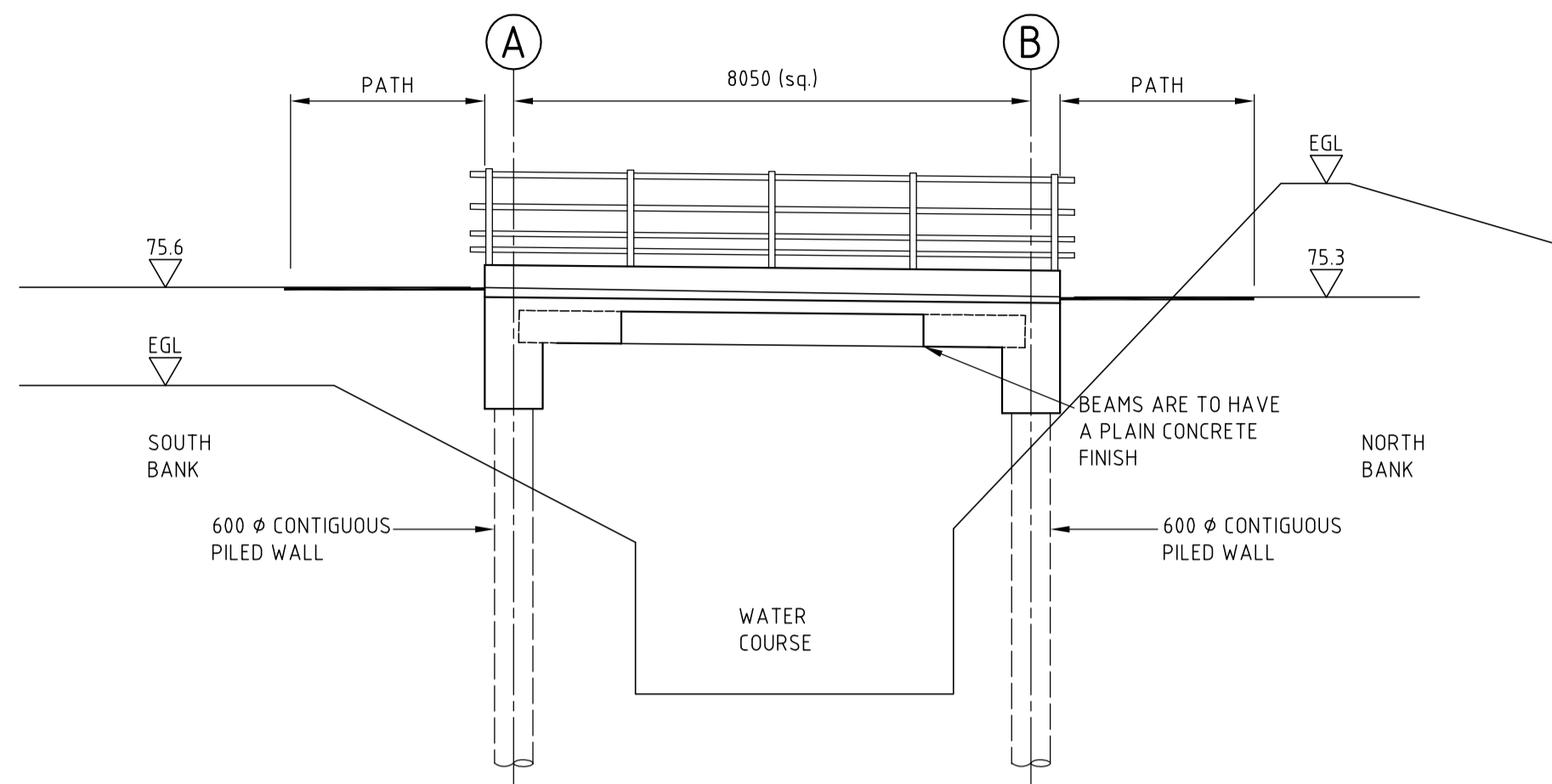
Rev.	Drawn	Checked	Date	Revision Details
Jim McMahon BSc. C.Eng. MICE SERVICE DIRECTOR, MAJOR PROJECTS				
STOPFORD HOUSE STOCKPORT ST1 5JZ TEL : 0161 474 4333 FAX : 0161 474 4833				
Job Title A6 to MANCHESTER AIRPORT RELIEF ROAD				
Drawing Title DESIGN FREEZE 7 GENERAL ARRANGEMENT SHEET 3 of 9				
Drawn	Engineer	Checked	Approved	
SP	SP	NH		
Date	Date	Date	Date	
18.07.13	18.07.13	18.07.13		
Size	Scale			
A1	Hz 1:2500, Vt 1:250			
SCG No.	Filename			
Drawing No. 1007/3D/DF7/A6-MA/GA/203				
				Revision

CHAINAGE SLIPPAGE DUE TO FRAGMENTATION OF SCHEME DEVELOPMENT

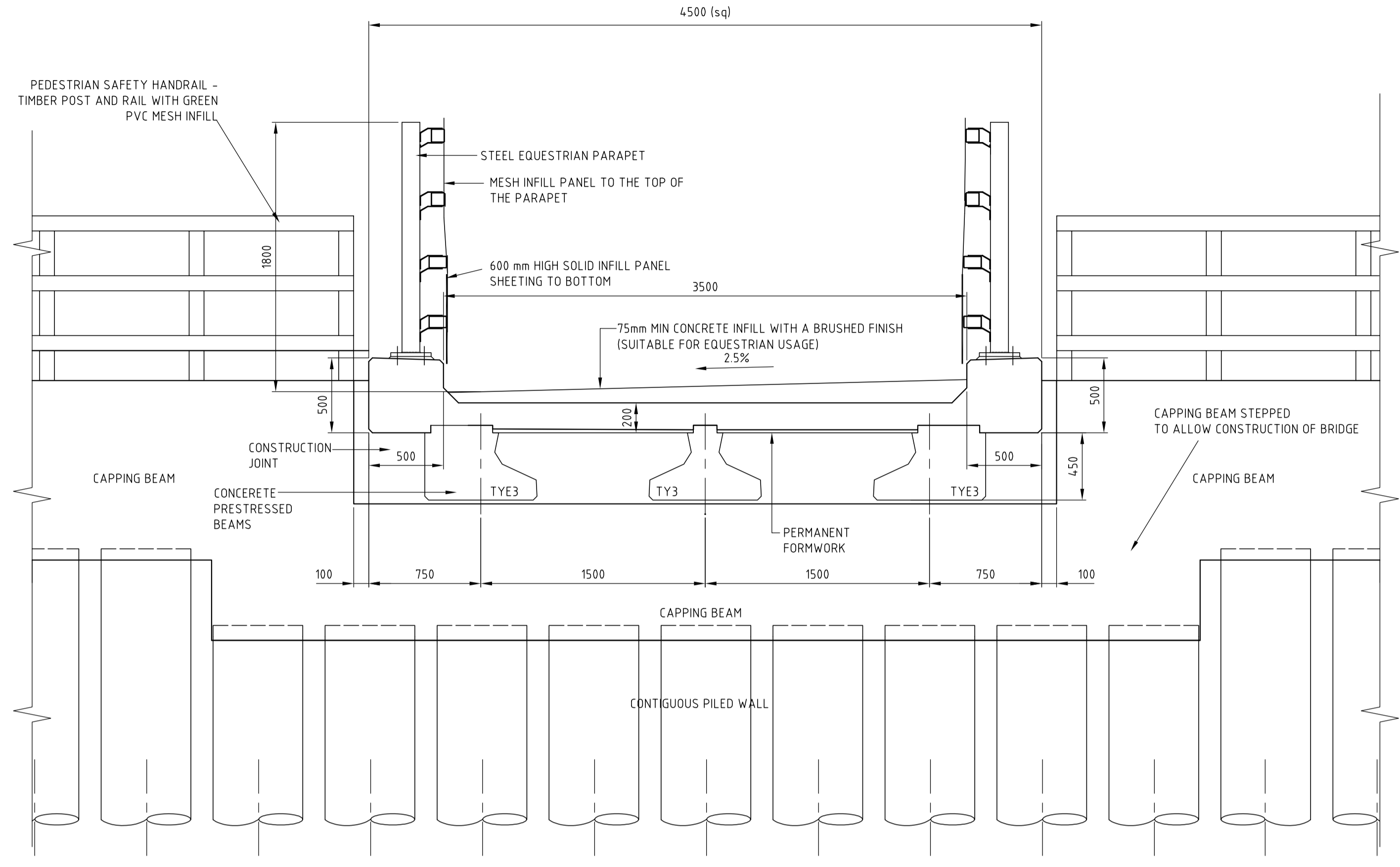
Appendix B: Proposed General Arrangement Drawing
3D Model

NOTES

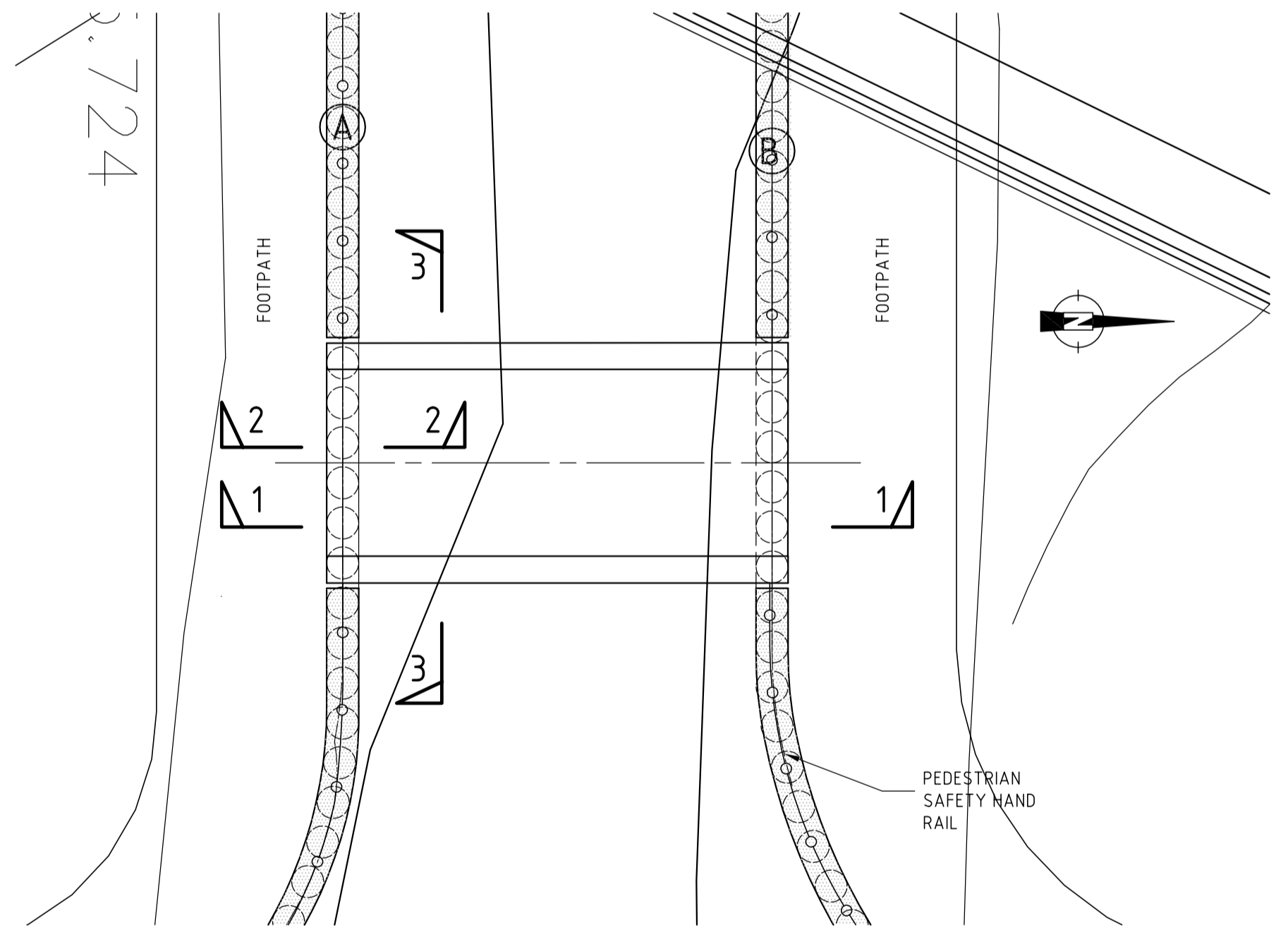
1. THIS DRAWING HAS BEEN PRODUCED MAINLY FOR THE PURPOSE OF PRELIMINARY DESIGN.
2. LEVELS ARE IN METRES AND ABOVE ORDNANCE DATUM.
3. ALL DIMENSIONS ARE IN MILLIMETRES.
4. THE OPTION SHOWN IN THIS DRAWING IS NOT FOR CONSTRUCTION.
5. THE FOUNDATION TYPE SHOWN ON THE DRAWING IS BASED ON THE LATEST AVAILABLE GEOTECHNICAL INFORMATION.
6. BASIC PRELIMINARY DESIGN HAS BEEN UNDERTAKEN TO DETERMINE THE GEOMETRY OF THE SECTION SIZES AS PER CLIENT'S INSTRUCTION.
7. THE BRIDGE HAS A COMBINED USE OF PEDESTRIAN, CYCLIST AND EQUESTRIAN. THE WIDTH IS 3.5M IN ACCORDANCE WITH BD 29/04.
8. CONCRETE STRENGTHS:- DECK SLAB C32/ 40 10.
9. PERMANENT FORMWORK IS REQUIRED.
10. THIS DRAWING HAS BEEN PRODUCED BASED ON THE LATEST MX HIGHWAY MODEL - DRAFT DESIGN FREEZE 7, AS PROVIDED BY THE CLIENT
11. CONCRETE FINISHES TO BE AS PER MCHW SPECIFICATION SERIES 1700 11. U.N.D. :-
 BURIED FOUNDATIONS : F1, U1.
 ABUTMENT COLUMNS : F1.
 BURIED FACE OF ABUTMENT : F1.
 WATERPROOFING : F4.
 PARAPET EDGE BEAM : F3, U3.
 DECK SLAB TOP SURFACE : U4.



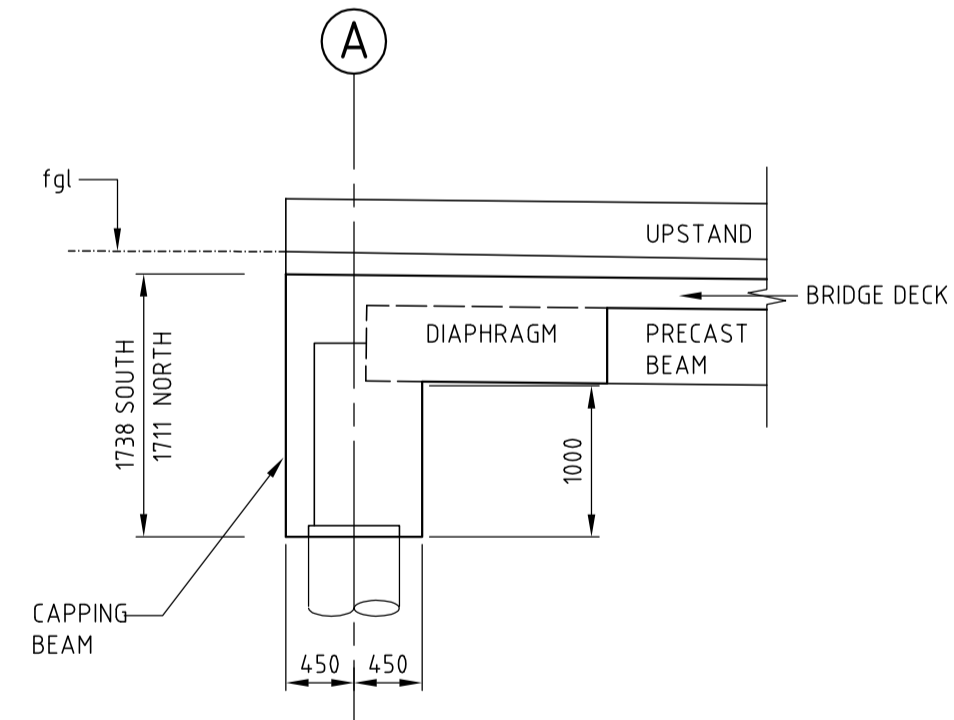
SECTION 1-1
(1:100)



SECTION 3-3
(1:25)



PLAN
(1:100)



SECTION 2-2
(1:50)

A	CT	JW	13.09.13	ISSUED FOR PLANNING
-	CT	JW	28.03.13	FIRST ISSUE (FOR CLIENT COMMENTS)
Rev.	Drawn	Checked	Date	Revision Details

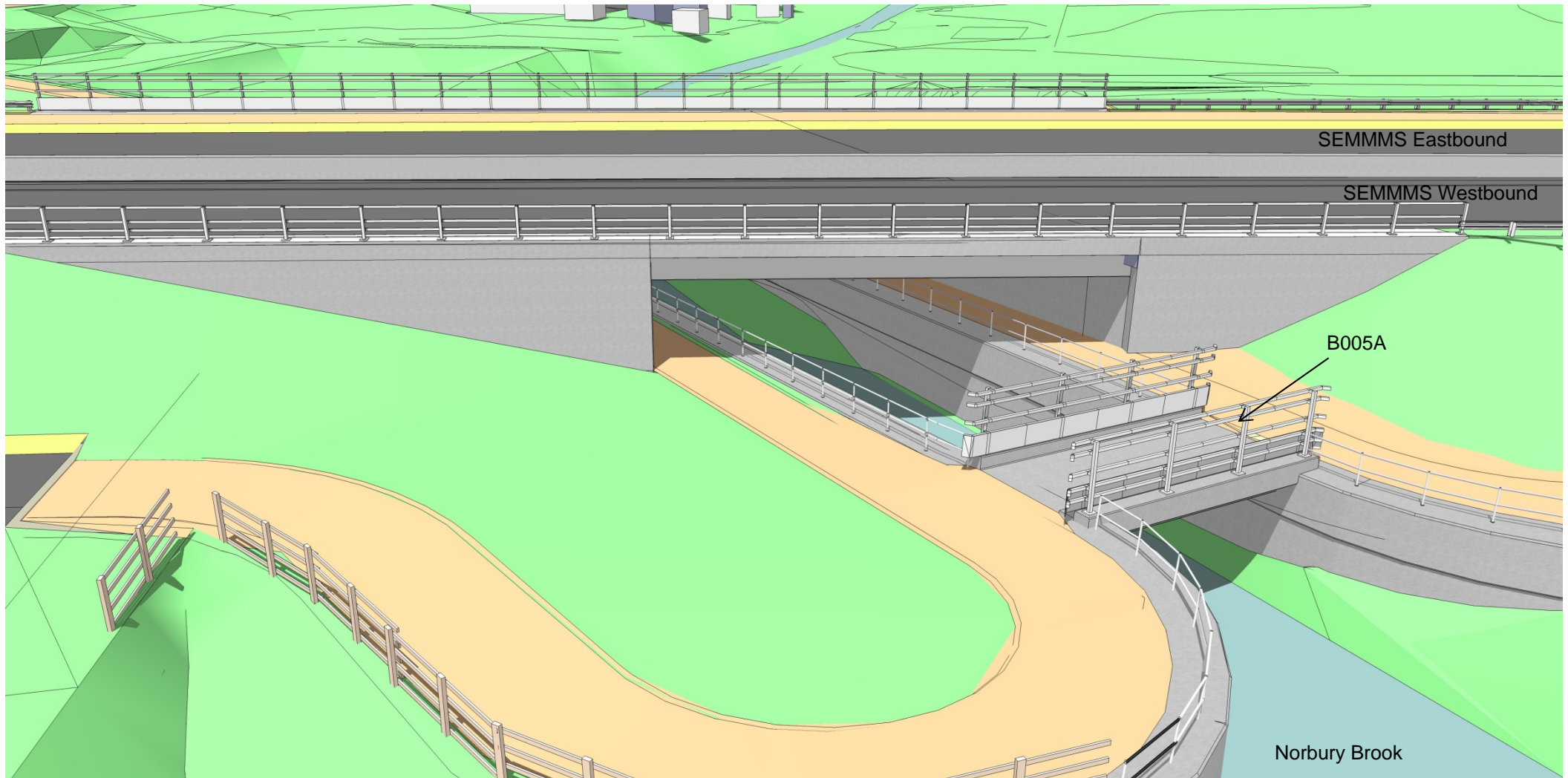


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Job Title
A6 TO MANCHESTER AIRPORT RELIEF ROAD

Drawing Title
MILL HILL HOLLOW FOOTBRIDGE GENERAL ARRANGEMENT

Drawn	Engineer	Checked	Approved
CT	JW	ME	NS
Date	Date	Date	Date
28.08.13	28.08.13		
Size	Scale		
A1	AS SHOWN		
SCG No.	Filename		
Drawing No.	Revision No.		Revision
1007/3D/DF7/A6-MA/B005A/701			A



B005 – Mill Hill Hollow Bridge
B005A – Pedestrian Bridge over Norbury Brook

View Looking East

Appendix C: Ground Investigation Information

BOREHOLE LOG

Project: SEMMS		Job No: 377321SG		Borehole No.	
Date: 08-05-1992/11-05-1992		Co-ordinates: E 391829.2 N 385001.9		Ground Level: 77.35 (m) EA POYNTON 98_4	
Contractor: GEOTECHNICAL ENGINEERING LIMITED			Engineer: Faber Maunsell Ltd		Sheet: 1 of 2

Samples & Tests					Strata				Backfill/ Instrument	
Depth	Type No	Test Results	TCR SCR RQD	if (mm)	Water/ (Flush Return)	O.D. Level	Depth (Thickness)	Description		Legend
0.50	0.50	D 5831 C	N = 4(450mm) 1 1/1 1 1 1			77.05	0.30	TOPSOIL: Dark brown peaty sandy with rootlets.		
							(1.20)	Very loose brown grey fine, medium and coarse gravelly SAND with bands of firm brown mottled grey slightly sandy clay with much gravel.		
1.70	1.70	B 565 SPT D 5832	N = 9(450mm) 1 1/2 2 2 3			75.85	1.50	Loose orange-brown medium and coarse SAND and fine and medium sub-angular and subrounded GRAVEL.		
2.20	2.40	D 5833 SPT	N = 50(225mm) 10 26/50 0 0 0			75.05	2.30	Red-brown highly to completely weathered fine and medium SANDSTONE. Very weak, poorly cemented with rare subrounded pebble inclusions. Below 3.00m: medium and coarse. 6.20m: coarse subrounded gravel sized pebbles recovered.		
3.00		C	N = 0(600mm) 31 50/0 0 0 0							
3.60		C	N = 0(525mm) 50 0/0 0 0 0							
4.20		C	N = 0(600mm) 21 50/0 0 0 0							
4.70		C	N = 0(525mm) 50 0/0 0 0 0							
6.20		C	N = 0(600mm) 27 50/0 0 0 0				(8.40)			
7.70		C	N = 0(525mm) 50 0/0 0 0 0							
9.20		C	N = 0(600mm) 31 50/0 0 0 0							

Water Strikes					Method, Equipment and Remarks	
Strike Depth	Casing Depth	Post Mins	Post Depth	Flow Remarks	Method:	Remarks
					CP	

AG53_NEW/ELB | SW BH LOG (CP/RC) | K:\47660785 - SEMMS\05.0 PROJECT INFORMATION\GINT\47660785-SEMMS.DP | AG53_NEW/GDT | 23/11/2011 | 10:26:16

BOREHOLE LOG

Project: SEMMS		Job No: 37732ISG		Borehole No.	
Date: 08-05-1992/11-05-1992		Co-ordinates: E 391829.2 N 385001.9		Ground Level: 77.35 (m)	
Contractor: GEOTECHNICAL ENGINEERING LIMITED				Engineer: Faber Maunsell Ltd	
				EA POYNTON 98_4	
				Sheet: 2 of 2	

Samples & Tests					Strata				Backfill/ Instrument	
Depth	Type No	Test Results	TCR SCR Rqd	if (mm)	Water/ (Flush Return)	O.D. Level	Depth (Thickness)	Description		Legend
						66.65	10.70	Red-brown highly to completely weathered fine and medium SANDSTONE. Very weak, poorly cemented with rare subrounded pebble inclusions. Below 3.00m: medium and coarse. 6.20m: coarse subrounded gravel sized pebbles recovered. (continued)		
								End of Borehole		

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Water Strikes					Method, Equipment and Remarks	
Strike Depth	Casing Depth	Post Mins	Post Depth	Flow Remarks	Method: CP	

BOREHOLE LOG

Project: SEMMS		Job No: 377321SG		Borehole No.	
Date: 23-04-1992/24-02-1992		Co-ordinates: E 391844.6 N 385025.5		Ground Level: 78.28 (m) EA POYNTON 99_1	
Contractor: GEOTECHNICAL ENGINEERING LIMITED			Engineer: Faber Maunsell Ltd		Sheet: 1 of 2

Samples & Tests					Water/ (Flush Return)	Strata			Backfill/ Instrument
Depth	Type No	Test Results	TCR SCR Rqd	If (mm)		O.D. Level	Depth (Thickness)	Description	
						77.98	0.30	TOPSOIL: (turfed)	
0.45	0.45	B 571 SPT D 5859					(0.80)	Loose brown fine and medium slightly clayey SAND.	
0.90		D 5860							
1.20		B 572				77.18	1.10	Dense yellow-brown fine, medium and coarse silty very gravelly SAND with occasional cobbles.	
1.65		SPT					(1.70)		
2.25		C							
2.80	2.80	B 573 C				75.48	2.80	Very dense brown subrounded medium and coarse GRAVEL, occasional cobbles.	
3.40	3.40	U 599 C					(1.20)		
4.00	4.00	B 574 SPT				74.28	4.00	Very dense orange-brown fine, medium and coarse gravelly SAND.	
4.45		D 5861							
4.60		SPT							
5.05		D 5862							
5.20	5.20	B 575 SPT					(3.00)		
5.65		D 5863							
5.80		SPT							
6.25		D 5864							
6.40		SPT							
6.85		D 5865							
7.00		C				71.28	7.00	Weak red-brown SANDSTONE.	
							(5.30)		

Water Strikes					Method, Equipment and Remarks
Strike Depth	Casing Depth	Post Mins	Post Depth	Flow Remarks	
					Method: CP

AG53_NEW_GLB | SW_BH_LOG | CP | RC | K | 47060785 - SEMMS 05.0 PROJECT INFORMATION | GINT | 47060785 - SEMMS.GPJ | AG53_NEW_GDT | 23/11/2011 | 10:26:20

BOREHOLE LOG

Project: SEMMS		Job No: 377321SG		Borehole No.	
Date: 23-04-1992/24-02-1992		Co-ordinates: E 391844.6 N 385025.5		Ground Level: 78.28 (m)	
Contractor: GEOTECHNICAL ENGINEERING LIMITED			Engineer: Faber Maunsell Ltd		EA POYNTON 99_1
Sheet: 2 of 2					

Samples & Tests					Strata				Backfill/ Instrument	
Depth	Type No	Test Results	TCR SCR RQD	if (mm)	Water/ (Flush Return)	O.D. Level	Depth (Thickness)	Description		Legend
								Weak red-brown SANDSTONE. <i>(continued)</i>		
						65.98	12.30	End of Borehole		

Water Strikes					Method, Equipment and Remarks	
Strike Depth	Casing Depth	Post Mins	Post Depth	Flow Remarks	Method: CP	

AG53 NEW GLB | SW BH LOG (IP/RE) | K:\47060785 - SEMMS\05.0 PROJECT INFORMATION\GINT\47060785-SEMMS.GPJ | AG53_NEW.GDT | 23/11/2011 | 10:26:20



BOREHOLE LOG

Project: SEMMS		Job No: 37732ISG		Borehole No.	
Date: 06-05-1992/06-05-1992		Co-ordinates: E 391844.2 N 385028.8		Ground Level: 78.51 (m) EA POYNTON 99 1R	
Contractor: GEOTECHNICAL ENGINEERING LIMITED			Engineer: Faber Maunsell Ltd		Sheet: 1 of 2

Samples & Tests					Water/ (Flush Return)	Strata			Backfill/ Instrument
Depth	Type No	Test Results	TCR SCR RGD	If (mm)		O.D. Level	Depth (Thickness)	Description	
						78.11	(0.40) 0.40	TOPSOIL	
							(2.10)	Dense brown slightly clayey medium SAND and GRAVEL.	
						76.01	2.50	Red-brown medium coarse SAND. Sparse gravel.	
							(2.10)		
						73.91	4.60	Red-brown weakly cemented SANDSTONE with sparse gravel.	
							(2.30)		
						71.61	6.90	Red-brown highly weathered poorly cemented medium and coarse SANDSTONE. Very weak with very closely spaced sub-horizontal sandy discontinuities. Rare subrounded pebble inclusions, moderately weathered, wea. 8.80m to 9.00m. 9.60m to 10.60m. 9.50m. Pebbly bed. Below 10.60m: highly to completely weathered. Very weak. 13.10m to 14.50m: occasional pebbles. Very weak mudstone inclusion.	
7.50		C	N = 0(525mm) 50 0/0 0 0 0						
9.00		C	N = 0(525mm) 50 0/0 0 0 0						

Water Strikes					Method, Equipment and Remarks	
Strike Depth	Casing Depth	Post Mins	Post Depth	Flow Remarks	Method: RO	

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BOREHOLE LOG

Project: SEMMS		Job No: 37732ISG		Borehole No.
Date: 06-05-1992/06-05-1992		Co-ordinates: E 391844.2 N 385028.8		Ground Level: 78.51 (m) EA POYNTON 99 1R
Contractor: GEOTECHNICAL ENGINEERING LIMITED			Engineer: Faber Maunsell Ltd	Sheet: 2 of 2

Samples & Tests					Strata				Backfill/ Instrument	
Depth	Type No	Test Results	TCR SCR RQD	If (mm)	Water/ (Flush Return)	O.D. Level	Depth (Thickness)	Description		Legend
13.00		C N = 0(600mm) 27 50/0 0 0 0					(8.00)	Red-brown highly weathered poorly cemented medium and coarse SANDSTONE. Very weak with very closely spaced sub-horizontal sandy discontinuities. Rare subrounded pebble inclusions, moderately weathered, wea. 8.80m to 9.00m, 9.60m to 10.60m. 9.50m. Pebbly bed. Below 10.60m: highly to completely weathered. Very weak. 13.10m to 14.50m: occasional pebbles. Very weak mudstone inclusion. (continued)		
						63.61	14.90	End of Borehole		

AGS3_NEW_GLB | SW_BH_LOG | P | RC | K | 47060785 - SEMMS\05.0 PROJECT INFORMATION\GINT\47060785-SEMMS.GPJ | AGS3_NEW_GDT | 23/11/2011 | 10:26:21

Water Strikes					Method, Equipment and Remarks
Strike Depth	Casing Depth	Post Mins	Post Depth	Flow Remarks	
					Method: RO