A6 to Manchester Airport Relief Road

B004 – Mill Lane Footbridge
Preliminary Design Report
Report No. 1007/704/152

August 2013

STOCKPORT METROPOLITAN BOROUGH COUNCIL

MANCHESTER CITY COUNCIL

Cheshire East Council

PRELIMINARY DESIGN REPORT

Structure Name : Mill Lane Footbridge

Structure Number : B004

Report No. 1007/704/152

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

The Mill Lane Footbridge is part of the A6 to Manchester Airport Relief Road (A6MARR) and is proposed to give pedestrians, cyclists and equestrian access across Norbury Brook. The bridge is to be located approximately 240m and 280m south-west of Buxton railway and Buxton Road respectively at route chainage 8820m approximately

There are a number of residential premises on Old Mill Lane and Mill Lane which are approximately 100m and 200m away from the site respectively however the immediate vicinity of the proposed crossing is open farm land. An aerial location plan at 1:1250 scale is included in Appendix A.

2. Highway Details

Over Structure – Mill Lane Footbridge – 3.5m wide footway and string courses in accordance with BD 29/04. (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 precast pre-stressed concrete TY-beams supporting an in-situ reinforced concrete (R.C.) slab deck. The bridge superstructure will be supported on in-situ R.C. concrete bank seats. A proposed General Arrangement drawing is included in Appendix B.

4. Span Arrangements

The bridge will be a zero skew single span of 21.65m, measured between the faces 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 600mm 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

Single span, fully integral pre-cast pre-stressed concrete TY-beams supporting an in-situ reinforced concrete slab deck. Refer to Drawing 1007/3D/DF7/A6-MA/B004/701 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 reinforced concrete bank seat abutments. They are regarded as the most suitable solution considering the topography of the site, geotechnical information and the feasibility of the work. Further geotechnical information is addressed in Section 8 of this report.

8. Geotechnical Information

There are two boreholes (Norwest Holst Soil Engineering, 1984) near the proposed location of B004, one either side of the brook: NWH MAIN GI 230 on the southwest side of the brook and NWH MAIN GI 247 on the north east side.

These boreholes revealed ground conditions comprising:

- A thin layer of TOPSOIL / MADE GROUND <0.3m thick, overlying;
- Overlying firm CLAY to 1.00m bgl in BH 230 and very dense SAND to 2.10m bgl in BH 247;
- Both boreholes then encountered interbedded MUDSTONE and SILTSTONE bedrock recorded as very weak to weak moderately to highly weathered to a depth of 20.00m bgl. COAL was encountered in BH 247 at a depth of 16.10 to 17.80m bgl. No voids were noted associated with the Coal, but the strata immediately above were noted as highly fractured and weathered, which is commonly observed above worked coal seams.

Groundwater was encountered in BH 247 at a depth of 8.50m bgl. It was described as a moderate flow although after 20minutes it had not been observed to rise.

The Coal Authority report has not been obtained for this exact area but one has been for the proposed Hazel Grove Bridge just to the north. This report states that the Hazel Grove area is within the zone of likely influence from past coal workings in the area but that these workings were last active in 1930 and therefore any movement associated with them should have stopped by now. The report adds that in addition the Coal Authority believes the site is in an area where there is coal at or close to the surface and that these seams may have been worked at some time in the past. As there is coal in BH 247 it is recommended that further investigation comprising two rotary open hole boreholes to a depth of 25.00m bgl is undertaken under the footprint of the abutments of B004 to ensure that there are no voids associated with possible past workings of the coal seam encountered.

A review of the abandonment plans for the Poynton and Norbury collieries shows that the location for B004 is not underlain by any historical workings and no movement is therefore expected from historic mine workings.

It is considered that the bridge supports can be founded on shallow pad foundations, such as bank seat abutments, resting on weathered bedrock 1m below ground level southwest of the brook and on very dense sand 1m below ground level at the northeast of the brook. Because the bedrock on the southwest of the brook is described as very weak to weak and completely weathered, and there is no rock testing, it is considered that the unconfined compressive strength of the rock material should be assumed to be no greater than 1MN/m^2 and a rock mass factor of 0.2 applied, giving an allowable bearing capacity of 200kN/m^2. It may be possible to use higher bearing pressures, but it would be necessary to carry out a plate bearing test of the rock mass at foundation level to determine the maximum allowable bearing capacity.

9. Appearance

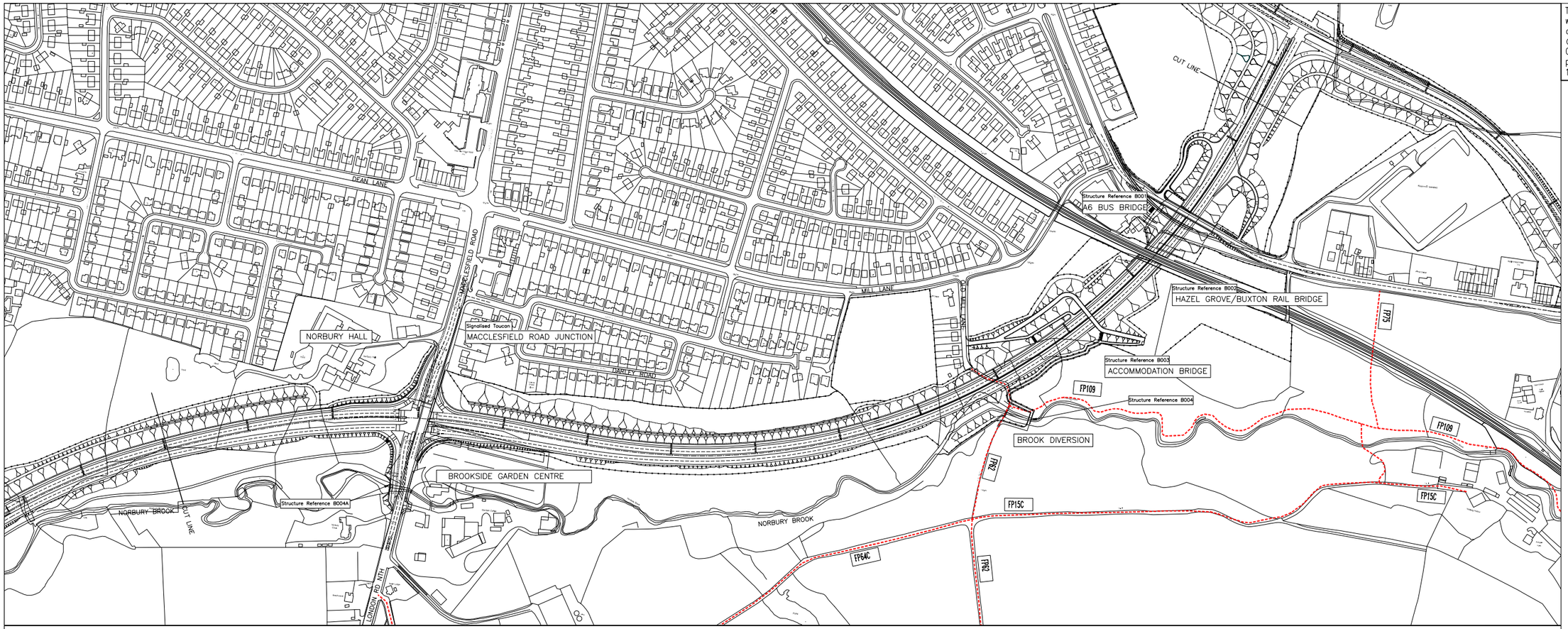
The proposed superstructure will be visible which on elevation comprises 0.7m deep pre-cast beams and 0.5m deep string courses spanning across Norbury Brook. In addition, steel parapets (post with 4 rails) with galvanised mesh infill and 600mm solid infill panels at the base will be mounted on the string courses either side of the bridge, in accordance with TD19/06. All the beams and any exposed faces of the concrete abutments are to be plain concrete. The bridge deck should have a bushed concrete finish suitable for equestrian usage. (Please refer to the 3D view of the bridge included in Appendix B).

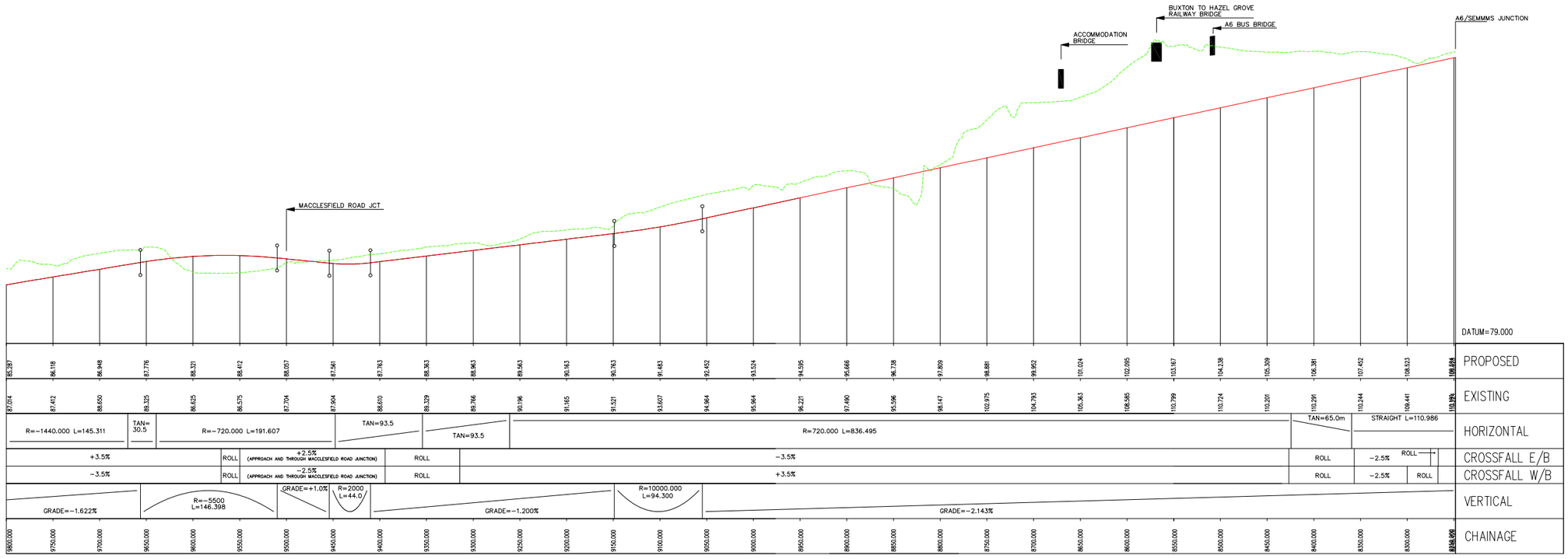
Appendix A: Location Plans

www.semmms.info

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-B004-ALP			Revision	

NORTH





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

KEY

- EXISTING DEFINITIVE PROW
- EXISTING BRIDLEWAY
- PROPOSED FENCELINE

Rev.	Drawn	Checked	Date	Revision Details

www.semmms.info

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Job Title

A6 to MANCHESTER AIRPORT RELIEF ROAD

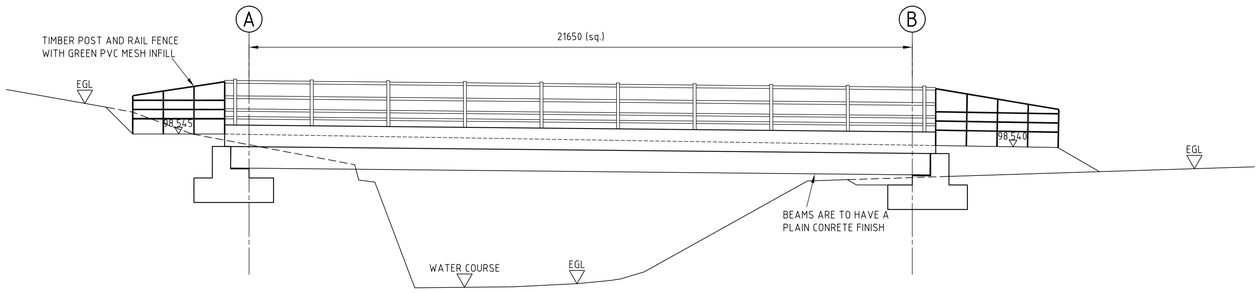
Drawing Title

DESIGN FREEZE 7 GENERAL ARRANGEMENT SHEET 2 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.			Revision
1007/3D/DF7/A6-MA/GA/202			

Appendix B: Proposed General Arrangement Drawing

3D Model



ELEVATION A-A
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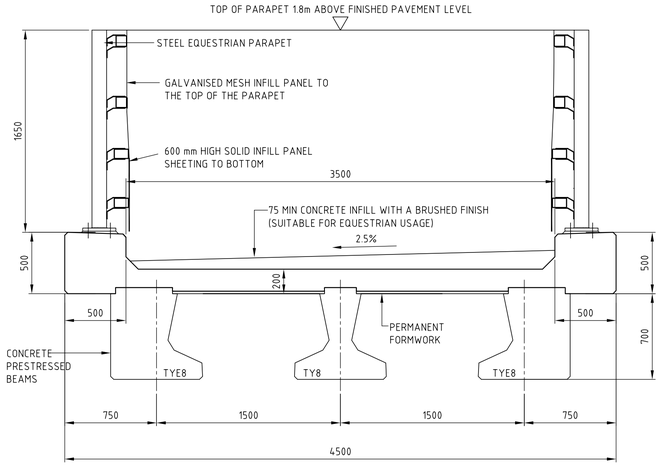

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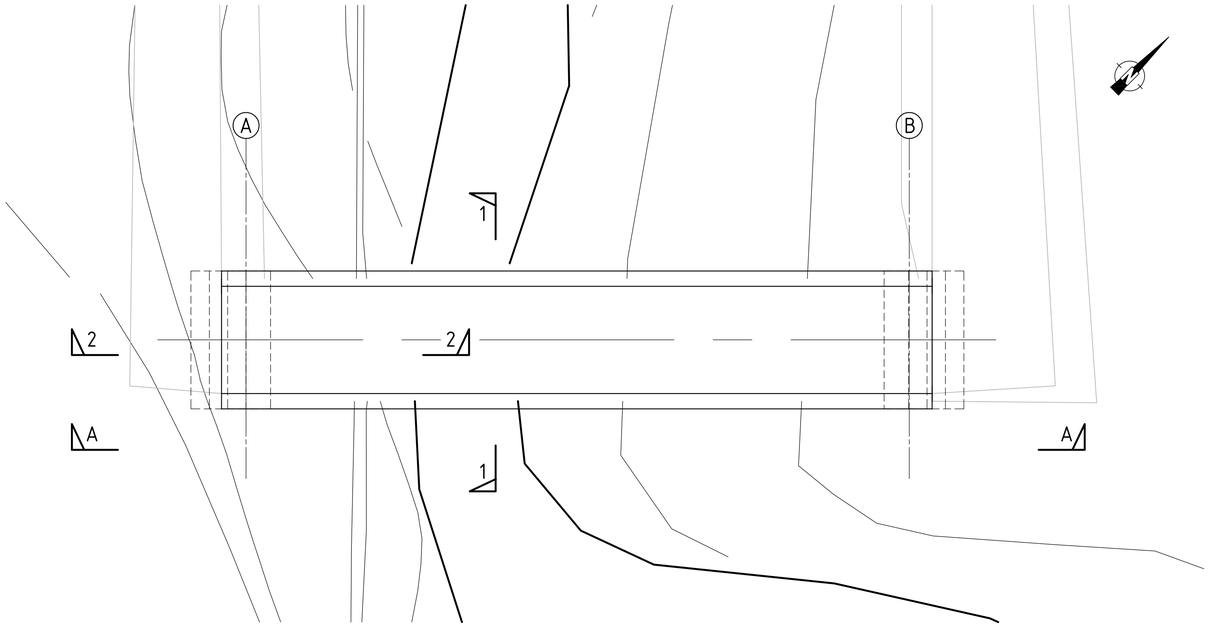
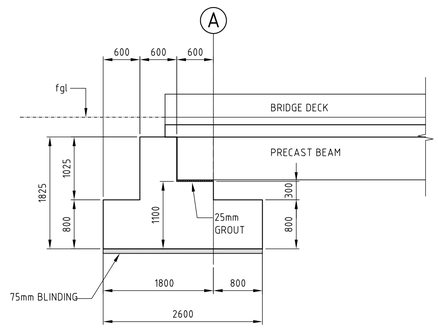
(1:25)



PLAN
(1:100)



SECTION 2-2
(1:50)

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.O. :-

BURIED FOUNDATIONS :	F1, U1.
ABUTMENT COLUMNS :	F1.
BURIED FACE OF ABUTMENT :	F1.
WATERPROOFING :	F4.
PARAPET EDGE BEAM :	F3, U3.
DECK SLAB TOP SURFACE :	U4.

Rev.	Drawn	Checked	Date	Revision Details
A	CT	JW	13.09.13	ISSUED FOR PLANNING
-	CT	JW	28.08.13	FIRST ISSUE (FOR CLIENT COMMENT)

south east manchester multi modal strategy

STOCKPORT METROPOLITAN BOROUGH COUNCIL · Cheshire East Council · MANCHESTER CITY COUNCIL

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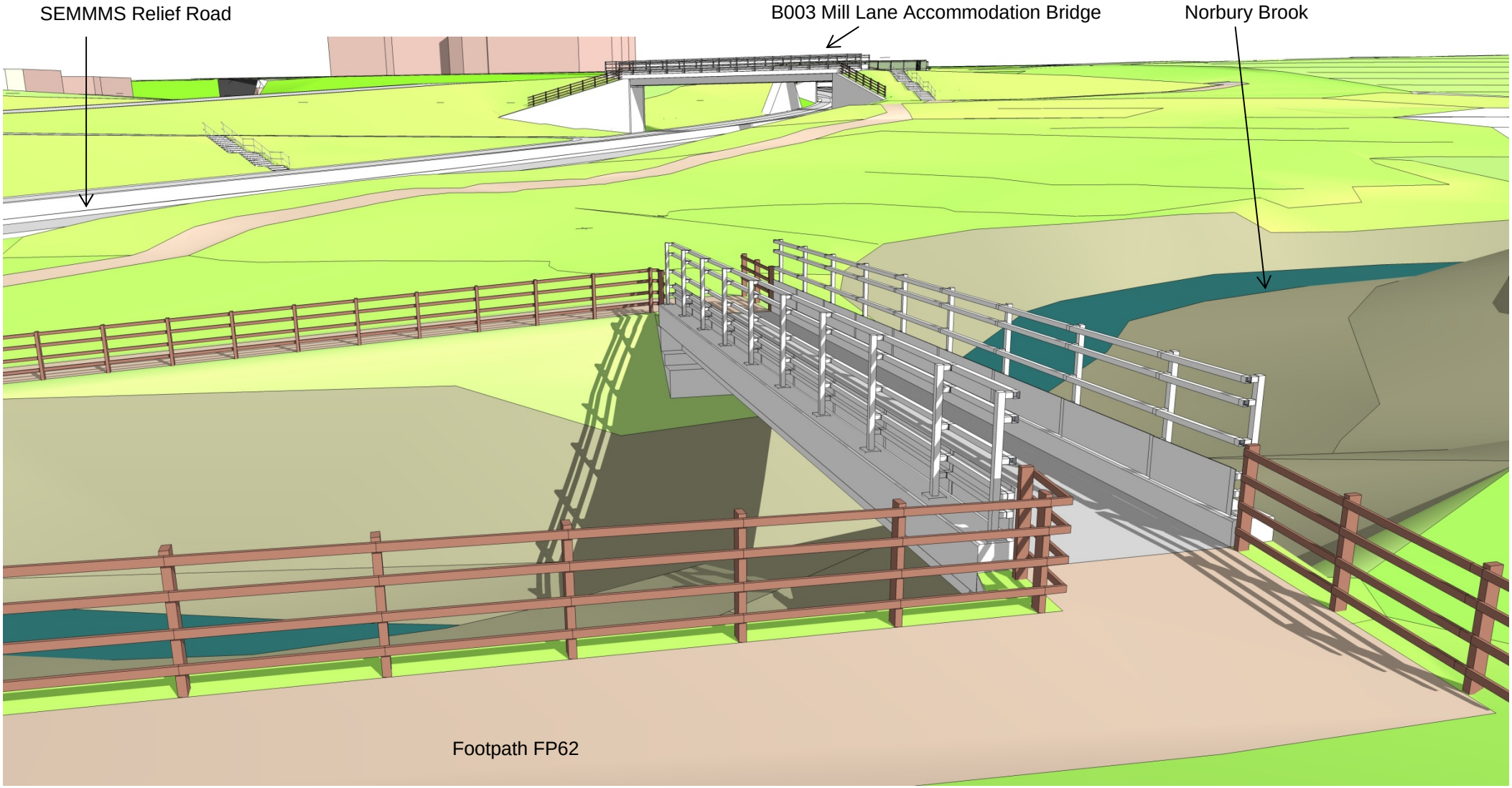
Job Title

A6 TO MANCHESTER AIRPORT RELIEF ROAD

Drawing Title

B004
MILL LANE
FOOTBRIDGE
GENERAL ARRANGEMENT

Drawn	Engineer	Checked	Approved
CT	JW	ME	NS
Date 28.08.13	Date 28.08.13	Date	Date
Size A1	Scale AS SHOWN		
SCG No.	Filename		
Drawing No. 1007/3D/DF7/A6-MA/B004/701			Revision A



B004 – Mill Lane Pedestrian/Cycle bridge over Norbury Brook

View Looking North East

Appendix C: Ground Investigation Information

Norwest Holst Soil Engineering Ltd.

Borehole No. 247

BOREHOLE LOG

Contract No. F5847
Location A6(M) Stockport N-S By-pass
Client L.G. Mouchel & Partners.
Method of Boring Percussion to 2.30m then Rotary (air flush)
Diameter of Borehole 150mm to 2.30m, then 125mm

Sheet 1 of 2
Chainage
Ground Level 97.31 m.A.O.D.
Date 12/3 - 21/3/84

Description of Strata	Legend	Depth Below G.L.(m)	O.D. Level (m)	Casing Depth at Sampling	Sampling and Coring	"N"/ R.Q.D.%	Daily Progress
MADE GROUND: Brick and topsoil		(0.20) 0.20	97.11		0.20-1.00		
Firm light brown, clayey, fine, medium and coarse SAND with some fine, medium sub-rounded gravel, and occasional cobbles.		(0.90) 1.10	96.21		1.00 4,8,21,29, 1.35 50.	100 for 225mm	
Very dense, brown, silty, fine with some medium, coarse SAND, with some fine, medium, sub-rounded gravel, and occasional cobbles.		(1.00) 2.10	95.21	150mm 12/3	1.70 2.00 9,17,9 2.20 2.20 open-hole 2.2-2.5 2.50	50 for 75mm TCR%	12/3 20/3
Dark grey, slightly carbonaceous, shaley silty, moderately weathered MUDSTONE. Weak to moderately weak. Highly fractured with occasional iron staining.		(0.90) 3.00	94.31		80 3.30	0	
Light grey, silty, completely weathered MUDSTONE. Very weak. Poorly, thinly laminated from 3.00m to 3.20m. Highly fractured from 3.30m to 3.50m.		(0.50) 3.50	93.81		100 3.60	0	
Light grey, muddy, moderately weathered SILTSTONE. Weak with occasional plant traces. Thinly laminated from 3.80m to 3.90m.		(0.50) 4.00	93.31		86	0	
Dark grey, silty, moderately weathered MUDSTONE. Weak with occasional poor, thin laminations and plant traces. Highly fractured.		(0.30) 4.30	93.01		4.40 80 4.80	0	
Light grey, silty, completely weathered MUDSTONE. Very weak with occasional highly weathered fragments. Completely to highly weathered from 4.60 to 4.80m.		(0.50) 4.80	92.51		92 6.00	25	
Light grey, slightly muddy, moderately weathered SILTSTONE. Weak, occasionally moderately weak with many plant traces above 6.00m. Thinly laminated from 6.70 to 6.85m and 7.40 to 7.90m. Highly weathered bands from 5.60m to 5.70m, and 6.00 to 6.40m. Moderately open, smooth, clean joint 80° at 7.70 to 7.85m		(3.20) 8.00	89.31		99 8.00	0	
Dark grey to black, carbonaceous, completely weathered MUDSTONE. Very weak with occasional pyritic traces.		(0.50) 8.50	88.81		100	14	
Light grey, poorly thinly laminated, muddy, moderately weathered SILTSTONE. Moderately weak with occasional moderately tight smooth, clean vertical joints		(0.70) 9.20	88.11		9.00		20/3 21/3
Light grey, poorly, thinly laminated below 9.50m, muddy, highly weathered SILTSTONE. Weak with occasional very weak bands. Highly fractured with coal flakes at 9.25m.		(0.80) 10.00	87.31		93	0	

Type of Sample

Is	S.P.T.	■	Undisturbed
Ic	C.P.T.	×	Vane
O	Jar	Δ	Water
●	Bulk		Piezometer

Remarks (Observations of Ground Water etc.) ( )U100 blows

12/3/84 - Borehole dry during boring.
chicelling from 2.20m to 2.30m - ½ hour
Inspection pits for services. 2 hours, no services encountered.

20/3/84 - Water standing at 2.20m at start of days' shift.
Moderate water inflow at 8.50m, casing to 2.30m.

Water levels are subject to seasonal or tidal variations and should not be taken as constant

Norwest Holst Soil Engineering Ltd.

Borehole No. **247**

BOREHOLE LOG

Contract No. F5847
Location A6(M) Stockport N-S By-pass
Client L.G. Mouchel & Partners.
Method of Boring Percussion to 2.30m then Rotary (air flush)
Diameter of Borehole 150mm to 2.30m, then 125mm.

Sheet 2 of 2
Chainage
Ground Level 97.31 m.A.O.D.
Date 12/3 - 21/3/84

Description of Strata	Legend	Depth Below G.L.(m)	O.D. Level (m)	Casing Depth at Sampling	Sampling and Coring	TCR%	"N"/ R.Q.D.%	Daily Progress
Light grey, muddy, moderately weathered SILTSTONE. Moderately weak. Moderately tight, clean joint 10.00-10.25m, 75°.		(0.25) 10.25	87.06		10.40	93	0	
					10.90	92	0	
Grey, silty, highly to completely weathered MUDSTONE. Very weak. Highly fractured from 11.50m to 12.00m, and 13.40m to 13.80m.								
... 12.15m to 12.25m highly weathered, weak.		(3.95)				95	0	
... 13.10m to 13.25m moderately weathered, moderately weak.					13.00			
					13.50	96	24	
Dark grey, silty, completely weathered with highly weathered fragments MUDSTONE. Very weak with much clay.		14.20	83.11					
		(0.80)				99	0	
Dark grey, silty, highly weathered MUDSTONE. Weak to very weak, highly fractured below 15.10m.		15.00	82.31					
		(0.90)			15.30			
Grey, silty, completely weathered MUDSTONE. Very weak with much clay.		15.90	81.41					
		(0.20)						
Black, muddy, impure COAL becomes very muddy below 17.25m. Pyrites at 16.40m. Lustrous above 16.40m.		16.10	81.21			98	0	
		(1.70)						
					17.50			
Grey-brown, silty, completely weathered MUDSTONE. Very weak. (Seat Earth)		17.80	79.51					
		(1.20)						
Purple brown and grey, silty, highly weathered MUDSTONE. Weak. Poorly laminated below 19.40m.						99	0	
...completely weathered band from 19.25m to 19.30m.		19.00	78.31					
...moderately tight, clay smeared, vertical joint from 19.00m to 19.20m		(1.00)						
BOREHOLE COMPLETE		20.00	77.31		20.00			21/3

Type of Sample

- S.P.T. — Undisturbed
- C.P.T. — Vane
- Jar — Water
- Bulk — Piezometer

Remarks (Observations of Ground Water etc.)

21/3/84 - Final water standing level at 7.30m.
Borehole geologged.
Borehole backfilled with hole arisings on completion.

Water levels are subject to seasonal or tidal variations and should not be taken as constant

Norwest Holst Soil Engineering Ltd.

Borehole No. **230**

BOREHOLE LOG

Contract No. F5847
Location A6 (M) Stockport N/S By-Pass
Client L. G. Mouchel & Partners
Method of Boring Percussion to 2.70m, then Rotary (air flush)
Diameter of Borehole 150mm to 2.70m, then 125mm

Sheet 1 of 1
Chainage
Ground Level 100.79 m.A.O.D.
Date 13.3.84 - 21.3.84

Description of Strata	Legend	Depth Below G.L.(m)	O.D. Level (m)	Casing Depth at Sampling	Sampling and Coring	"N"/ R.Q.D.%	Daily Progress
TOPSOIL		(0.30)			0.00-0.30		
		0.30	100.49		0.30-0.60		
Firm, light grey, brown mottled, very sandy CLAY with occasional fine sub-rounded gravel.		(0.70)			0.60 to 1.05	(69)	
		1.00	99.79		1.10		
Dark grey, completely weathered MUDSTONE, weak to very weak.		(1.70)			1.30 1.50 to 1.95	(110)	
					2.00		
Grey, silty, moderately to highly weathered MUDSTONE. Weak, moderately to highly fractured.		2.70	98.09		2.50 D 2.70 S	11,34,55 55for 75mm	13/3
Grey, muddy, moderately to highly weathered SILTSTONE. Weak, highly fractured from 3.40m to 3.70m, moderately fractured from 3.70m to 4.05m.		(0.70)				TCR% 76 0	21/3
		3.40	97.39		3.40		
		(0.65)					
		4.05	96.74				
Grey, slightly muddy, highly to completely weathered, SILTSTONE. Weak to very weak. Highly to very highly fractured.		(0.45)				100 0	
		4.50	96.29				
		(0.50)					
		5.00	95.79		5.00		
Dark grey, silty, highly weathered MUDSTONE. Weak, highly fractured with occasional thin bands of impure coal.		(1.70)				82 0	
Grey, moderately to highly weathered SILTSTONE. Weak, moderately to highly fractured.		6.70	94.09		6.30		
Grey, muddy, highly to completely weathered SILTSTONE. Weak to very weak, very highly fractured with occasional clay bands.		(1.30)				60 0	
		8.00	92.79				21/3
BOREHOLE COMPLETE					8.00		

Type of Sample

- Is S.P.T.
- Ic. C.P.T.
- O Jar
- ● Bulk
- ■ Undisturbed
- × Vane
- Δ Water
- Piezometer

Remarks (Observations of Ground Water etc.) () U100 blows

13.3.84 - Borehole dry during boring chiselling from 2.30 - 2.50, 0.5 hours.

21.3.84 - Standing water level at start of days shift, dry. Borehole backfilled with hole arisings and gravel on completion.

Borehole dry during drilling.

Water levels are subject to seasonal or tidal variations and should not be taken as constant