SEMMMS A6 to Ringway Road West

B012 – Yew Tree Footbridge
Preliminary Design Report
Report No. 1007/704/092

September 2013

STOCKPORT METROPOLITAN BOROUGH COUNCIL

MANCHESTER CITY COUNCIL

Cheshire East Council

PRELIMINARY DESIGN REPORT

Structure Name : Yew Tree Footbridge

Structure Number : B012

Report No. 1007/704/092

Report Control Sheet

Version	Date	Status	Prepared By	Checked By	Approved By
P1	08/01/2012	Draft	N Afshar	N Sheena/ T Kshirsagar	N Sheena
2	10/05/2012	Final	N Afshar	T Kshirsagar	N Sheena
3	24/01/2013	Draft	M Mfandarahwa	N Sheena	N Sheena
4	28/08/2013	Draft	L Fields	N Sheena	N Sheena
5	13/09/2013	Final	L Fields	N Sheena	N Sheena

Table of Contents

1. Description of Site

Yew Tree Footbridge is part of the South East Manchester Multi Modal Strategy (SEMMMS) A6 to Manchester Airport Relief Road (A6MARR) and is proposed to cross the scheme giving to allow the diversion of footpath FP11

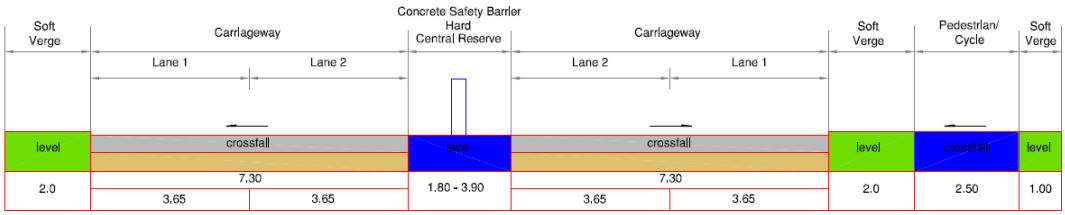
The bridge is situated north of Styal Golf Course and south of Yew Tree Farm at the Chainage 1300m.

Location plans at 1:1250 scale is included in Appendix A.

2. Highway Details

Over Structure: Yew Tree Footbridge; 3.0m width footpath/bridleway.(3.0 Carriageway + 2 x 0.5m string courses).

Under Structure: Under Structure – A6MARR as shown in the following cross section (Total width 26m, central reserve width 3.9m).



3. Proposed structure

The proposed structure will be a single span bridge of fully integral construction. The superstructure will be in the form of precast prestressed concrete U beams and reinforced concrete slab deck.

The bridge superstructure will be supported on full height R.C abutments which will be founded on bored piles. The square deck width including parapet up stands will be 4.0m.

Reinforced concrete wing walls with a return of approximately 45 degrees to the bridge span are proposed and will be constructed on piled foundations.

4. Span arrangements

The single span structure crosses the A6MARR square to the carriageway. A span of approximately 29m is measured between bearing centrelines,

5. Headroom and Clearances

The provided headroom over the A6MARR is greater than 5.3m. Over a highway, the vertical clearance under a new bridge is required to be at least 5.3m (TD27/96). Therefore, with this clearance the superstructure need not be designed for impact loads.

The abutment walls are positioned at a minimum of 4.5m from the carriageway in order to mitigate the risk of vehicular impact.

6. Road Restraint system (Bridge Parapets)

Type P4 steel parapets conforming to the requirements of TD19/06 with a height of 1800mm above finished surfacing level are required for equestrian usage. A 600mm high solid infill panel will be provided in order to obstruct an animal's view of the road below. Mesh infill will be provided for remaining height of the parapet.

Timber post and three rail fencing with a pvc coated mesh infill are to be provided at the bridge approaches.

Steel tubular hand rails are to be provided at the tops of the wingwalls.

7. Preferred Structural Options

7.1 Superstructure Option

Following highway Design Freeze 7, the preferred structural option for this bridge superstructure has been changed from a semi-integral composite steel beam and concrete slab.

It is proposed that the bridge will be a single span, fully integral pre-cast pre-stressed concrete U-beams supporting an in-situ reinforced concrete slab deck. Refer to drawing 1007/3D/DF7/A6-MA/B012/712 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
- Good aesthetics due to symmetrical structure
- 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 Option

Considering the topography of the site, existing ground level and the feasibility of the work, full height a cast insitu reinforced concrete abutment is the best possible option.

Taking the geotechnical information into account, piled foundation would be a suitable foundation method in order to reduce settlements from the embankment and bridge loading, which could affect the track and track bed. Further discussion regarding the geotechnical assessment is addressed in section 9 of this report.

8. Geotechnical Information

The ground conditions for the Yew Tree Footbridge have been assessed using relevant geological maps (Stockport Sheet 98, Solid and Drift Scale 1:50,000) only as no ground investigation has been carried at or within the vicinity of the proposed structure.

8.1 Ground Condition and Groundwater

The ground conditions indicated on the geological maps identify drift deposits of Boulder CLAY of Recent and Pleistocene age overlying Upper Mottled SANDSTONE of Permian and Triassic age which is part of the Sherwood Sandstone Group. Without ground investigation information it is not possible to know the thickness of the drift deposits but from investigations undertaken to the east and west along the route indicate the Boulder Clay/Glacial Till deposits to have thicknesses of between 5 and 10m.

There is no known groundwater information for the site.

8.2 Preliminary Geotechnical Assessment

Without any detailed information known about ground conditions within this area it is anticipated that piled foundations would be an appropriate foundation method. The length of the piles would need to be confirmed after detailed ground investigations have been carried out and the design undertaken by the pile designer.

The potential for chemical attack on buried concrete within the ground has not been assessed. This will be the responsibility of the foundation designer, following a supplementary ground investigation.

Detailed ground investigation is required to confirm the ground conditions identified on the geological maps.

Investigation into the groundwater levels and changes with seasons, along with flow rates is recommended for the design and drainages methods, along with any required temporary mitigation measures during construction.

9. Environmental Impact Considerations

Refer to Volume 1 (Main Text) of the Environmental Statement.

10. Appearance

The superstructure on elevation comprises of approximately 1.4m concrete beams steel beams and 0.6m string course spanning across the A6MARR.

In addition, P4 steel parapets (post with 4 rails) will be mounted on the string courses either sides of the bridge (please refer to the 3D view of the bridge in Appendix B).

The appearance of the exposed faces of the abutment walls and wing walls will be determined based upon SMBC planning requirements.

Appendix A: Location plans

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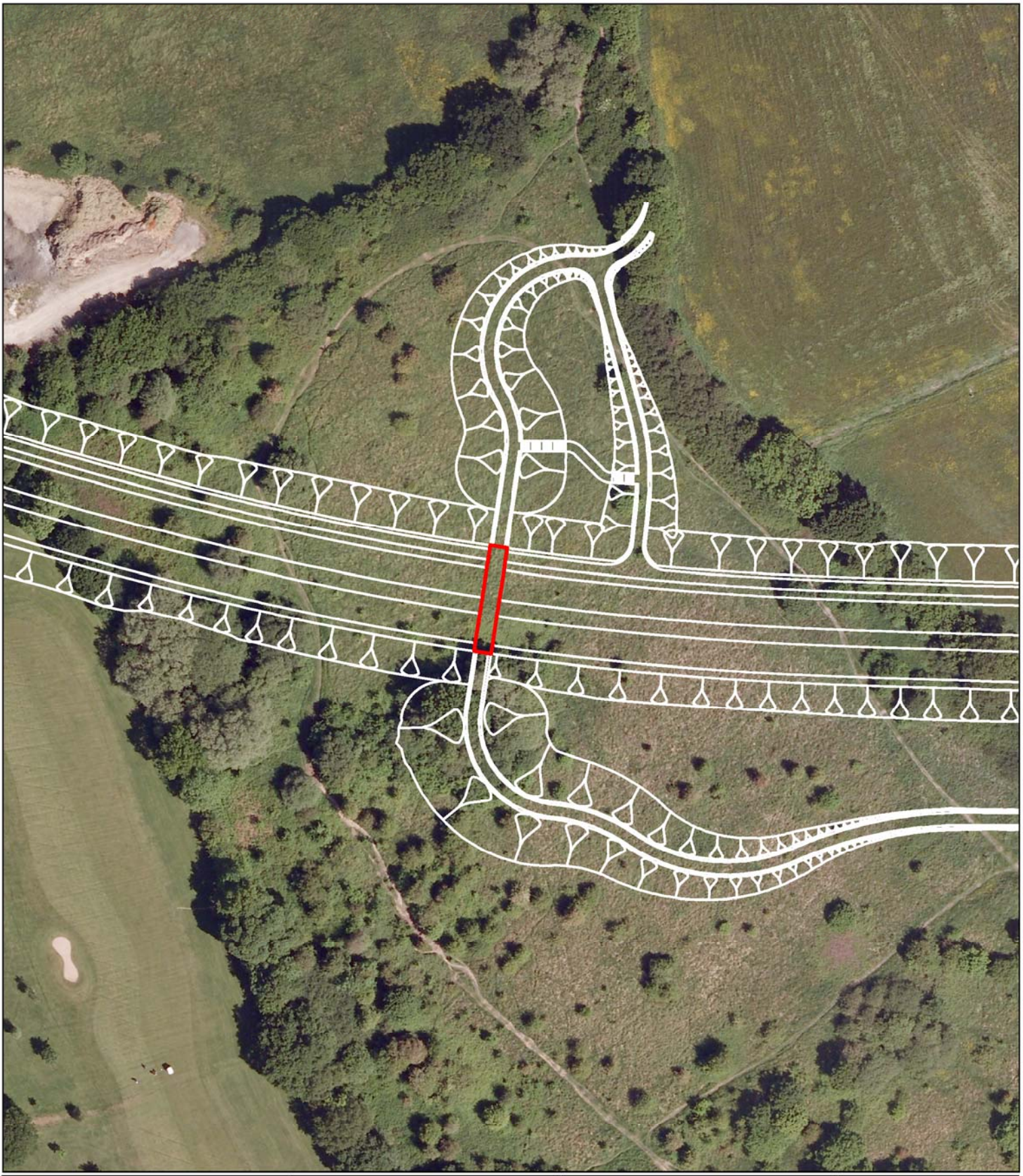
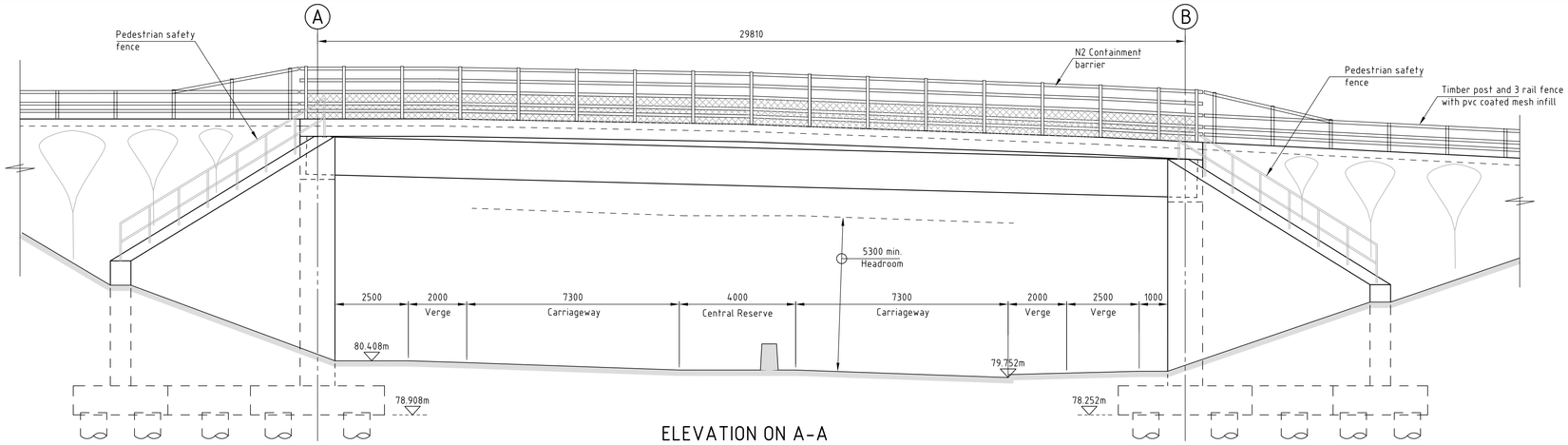


Drawn	CL	Checked	SC	Approved	NH
Date	12/08/2013	Date	12/08/2013	Date	12/08/2013
Size	A4	Scale	1 : 1,250		
GIS Task	4268	Filename			
Drawing No.	1007-3D-DF7-A6-MA-B012-ALP			Revision	

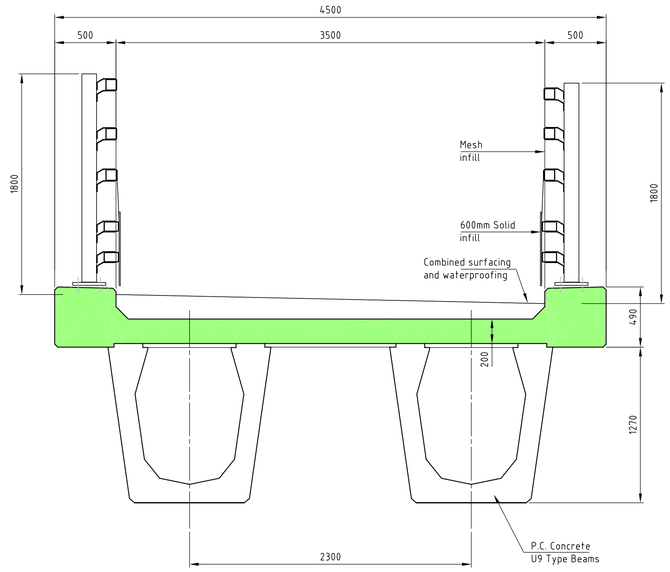
NORTH

Appendix B: Proposed General Arrangement drawing
3D Model



ELEVATION ON A-A

(1:100)



SECTION 1-1

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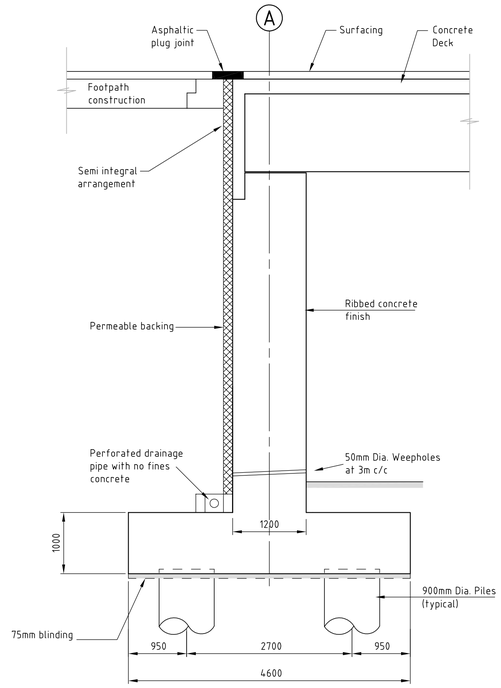
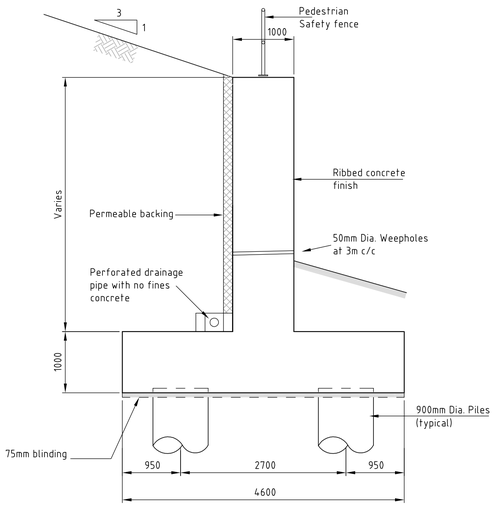


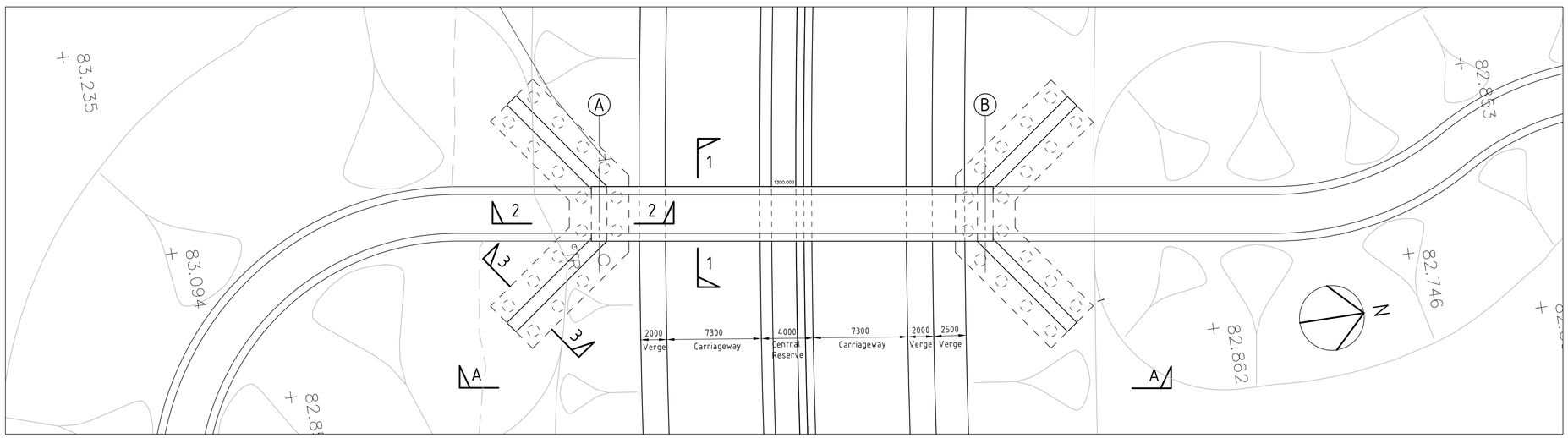
SECTION 2-2

(1:50)



SECTION 3-3

(1:50)



PLAN

(1:200)

NOTES

1. This drawing has been produced based on the latest MX highway model - Draft Design Freeze DF7, as provided by the client (July 2013).
2. This drawing has been produced mainly for the purpose of preliminary design.
3. Levels are in metres and above Ordnance Datum.
4. All dimensions are in millimetres.
5. The option shown in this drawing is not for construction
6. The foundation type shown on the drawing is based on the latest available geotechnical information.
7. Basic preliminary design has been undertaken to determine the geometry of the section sizes as per client's instruction.
8. The footbridge has a combined use of pedestrian, cyclist and equestrian. The width is 3.0m and a departure from standard is required
9. Concrete strengths:-

Precast panel	C32/ 40
Abutment	C40/ 50
Deck slab	C40/ 50
Parapet edge beams	C40/ 50
Precast beams	C50/ 60

10. Permanent formwork is required.
11. Concrete finishes to be as per MCHW specification series 1700 U.N.O. :-

Burried foundations :	F1, U1.
Abutment :	F1.
Buried face of abutment :	F1.
Waterproofing :	F4.
Precast beams :	F5.
Precast concrete panel	F4.
Parapet edge beam :	F3, U3.
Deck slab top surface :	U4.

Rev.	Drawn	Checked	Date	Revision Details
D	SPH	MM	12.09.13	ISSUED FOR PLANNING
C	SPH	MM	29/08/13	ROAD ALIGNMENT & BRIDGE REVISED
B	SPH	N.A.	18/03/13	REVISED INCORPORATING CLIENTS COMMENTS
A	SPH	NS	25/5/12	Equestrian parapet & abutment brickwork added
-	LF	NS	25/1/12	Changed to pile foundations, Section 3-3 added

south east manchester multi modal strategy

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Job Title

A6 TO MANCHESTER AIRPORT RELIEF ROAD

Drawing Title

B012
YEW TREE FOOTBRIDGE
GENERAL ARRANGEMENT

Drawn	Engineer	Checked	Approved
JMcC	LF	NS/LF	NS
Date	Date	Date	Date
DEC '11	DEC '11	DEC '11	DEC '11

Size	Scale
A1	AS SHOWN

SCG No. | Filename

Drawing No. 1007/3D/DF7/A6-MA/B012/712 | Revision D

B012 – Yew Tree Footbridge

View of West Elevation

Appendix C: Reviewed Ground Investigation Information

Note: Specific geotechnical information is not available for this location. Therefore relevant geological maps have been used to assess the ground