SEMMMS A6 to Ringway Road West

B014 – Styal Road Airport Spur Feasibility Report Study

Report No. 1007/7.04/094

December 2011

STOCKPORT METROPOLITAN BOROUGH COUNCIL

MANCHESTER CITY COUNCIL

Cheshire East Council

Styal Road Airport Spur

Feasibility Study Report

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EXECUTIVE SUMMARY

The feasibility study commenced with a desk study gathering all the relevant available information which might affect the scheme. Previous available drawings produced by Manchester City Council were studied. No previous feasibility study was available on this crossing apart from the drawings mentioned above. Continual consultation with Stockport Metropolitan County Council and Network Rail has enabled a better understanding of the constraints affecting the development of viable and suitable engineering solution.

A number of options have been considered for the proposed extensions on both sides of the existing structure. The principal constraints affecting the solutions are the track possession time available and the proximity to the tracks also. The maximum available possession time (Outside Rules of the Route) is 28 hours.

A number of options have been considered in detail against a number criteria such as how long it takes to construct the relevant option, the risks and any other relevant factors including whether that method of construction has been tried before.

In the absence of detailed geotechnical information about ground conditions within this area it is anticipated that piled foundations would be an appropriate construction method. Regarding the groundwater there is so far no known information for the site.

The preferred option is precast pre-tensioned concrete beams supported on conventional reinforced concrete abutment walls on bored pile foundations with a fully integral connection between the deck and abutments. Bored piles are the most practicable type of abutment for the road/ rail layouts at this location.

1. INTRODUCTION

1.1 South East Manchester Multi Modal Strategy (SEMMMS)

The proposed SEMMMS A6 to Manchester Airport Relief Road will provide a new approximately 10km long dual carriageway, with new sections of road built from the A6 at Hazel Grove to the eastern end of the existing A555 at Woodford Road, Bramhall and from the western end of the existing A555 at Wilmslow Road, Handforth to Manchester Airport and the spur road to the M56.

A pedestrian and cycle route is proposed for the whole length including retrofitting it to the 4km existing section of the A555.

The scheme is located in three local authority boundaries Stockport, Manchester, and East Cheshire with the majority of the scheme being in Stockport.

The scheme is anticipated to require approximately 15 bridge structures (highways bridges, accommodation bridges and footbridges) and 17 retaining walls. Three of the bridges span over the existing railway tracks and one goes under the railway tracks.

1.2 The Need for the Scheme

The aim of the scheme is to reduce levels of traffic in local communities including Stockport, Wythenshawe, Heald Green, Hazel Grove, Poynton and Bramhall, which will bring benefits for everyone in these areas:

- Existing roads will be able to be improved to help create safer, friendlier neighbourhoods.
- Walking and cycling routes are being considered as part of the new road scheme as well as on those existing roads where traffic congestion will have been relieved.
- Access to local shops and work places will be made easier and safer for those without cars, while those who choose to use, or need to use, their car will benefit as congestion will be reduced.
- The space created on existing roads will allow for the development of public transport services as an attractive alternative to using the car.
- Local air quality will be improved as there will be less pollution from traffic.
- Car drivers who presently travel along the existing roads in and around Greater Manchester should have easier journeys.
- Local centres and the services and facilities they provide for residents will be made more accessible for everyone, including those with mobility difficulties.
- Communities and shopping centres will be relieved of the impact of heavy goods vehicles which will transfer to the new road.
- Freight traffic will benefit, both from the reduced congestion on existing roads and the provision of new, less congested routes, helping to promote existing and new business in the area.

1.3 Styal Road Airport Spur

Historically the Wilmslow- Manchester (Via Styal) line was constructed as an alternative to Wilmslow to Manchester (via Stockport) route and is often referred to as 'The Styal Line'. The construction of the line was completed in the early 20th century.
There is also a spur to Manchester Airport. The branch to the airport leaves the Styal Line via a triangular junction between Heald Green and Styal.

The Styal Airport Spur Line runs roughly from North to West providing a commuter route between Manchester and the Airport.

Services are currently operated by Northern Rail (30minutes frequency) and TransPennine Express. The Northern Rail services consist of an hourly Manchester Piccadilly to Crewe service via Manchester Airport and Wilmslow and an hourly Manchester Piccadilly to Manchester Airport service. Evening services on the Crewe to Manchester Line start and terminate at Wilmslow and is extended through Manchester Piccadilly to Manchester Oxford Road railway station.

National Grid reference for the crossing is E383892, N385059. Scheme chainage at Design Freeze 4A is approximately 2420m.

1.4 URS Scott Wilson Commission

URS Scott Wilson was commissioned by Stockport Metropolitan County Council in November 2011 to prepare a report on the feasibility of constructing a bridge at the crossing, with the following being included in the report:

- Introduction
- Need for Scheme
- Scheme Sponsor/ Description of Scheme/ Consultation/ Programme/ Estimated Cost
- Justification for Preferred Option
- Potential affect on NR Assets:
  - NR land easement/ license needs
  - NR Level Crossing usage &/ or changes
  - NR Signalling
  - Street lighting
- Geological Considerations
- Environmental Considerations
- Design Resource Strategy
- Construction Methodology Proposed
- Other Relevant Information
- Project Risks
- Conclusions & Recommendations
- Elevations & Sections Drawings

The following is also required to progress the feasibility study:

- To liaise with Network Rail (NR) to assess the required possessions, and advance notice required, for various bridge options.

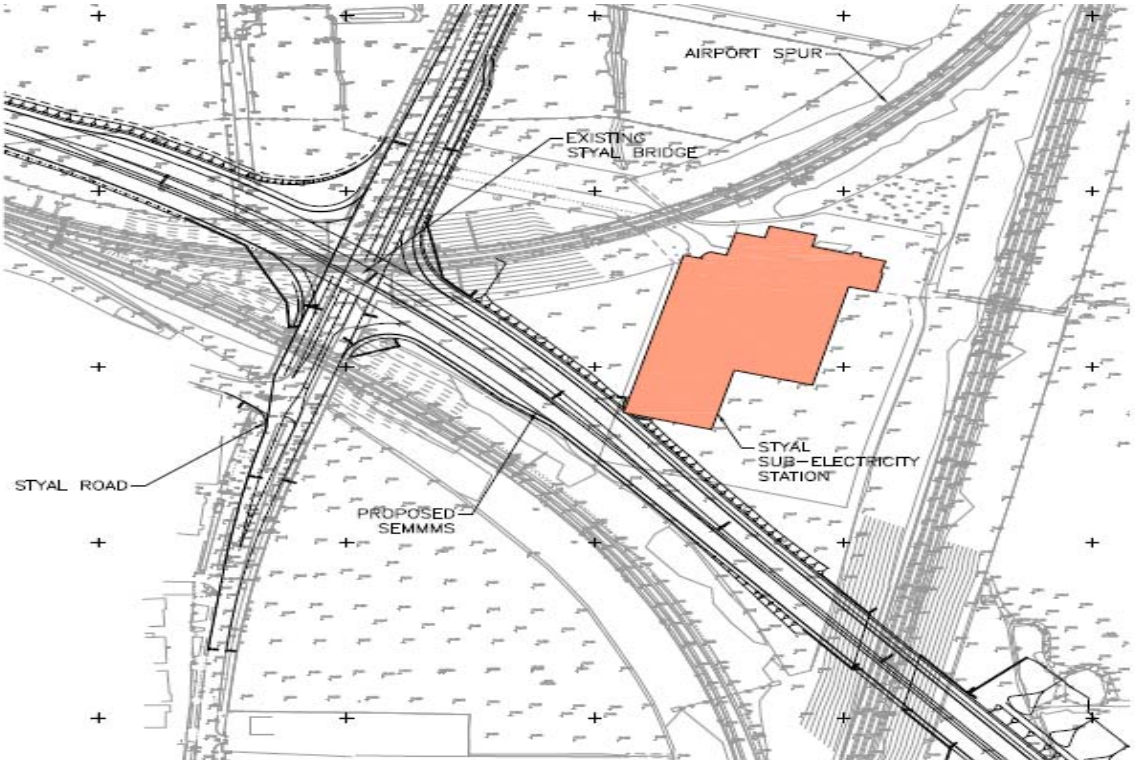
2. SITE DESCRIPTION

2.1 Existing Topography

The Airport Spur line forms the northern arm of a railway triangle which connects the Styal line to the airport. The proposed road runs approximately parallel to the southern arm of the triangle and crosses both the spur and the main Styal line as shown on the figure below. The crossing will be an at grade traffic controlled junction between the proposed road and the existing Styal road at the point where the spur is crossed. The topography of the surrounding ground is relatively in a flat site. The existing topography along the line of the proposed Relief Road is slightly lower than the level of the Styal

Road, so the proposed scheme is carried on small embankments on either side of Styal Road.

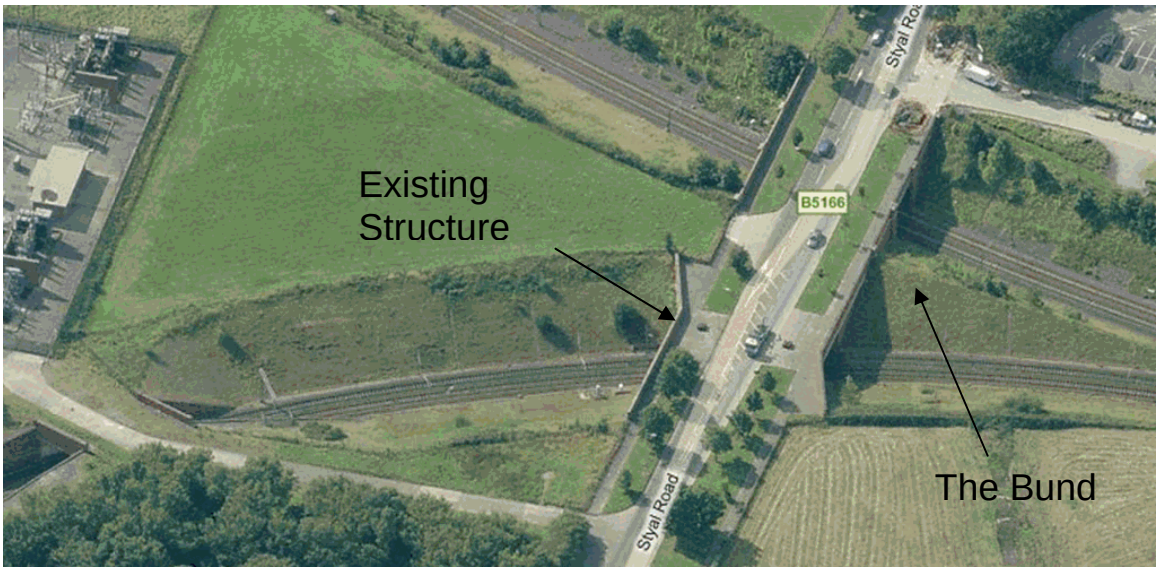
The existing Styal Road dictates the vertical alignment of the scheme. The electricity sub station on the South of the Spur is a pinch point in the horizontal alignment of the scheme as shown below.



Plan view of the scheme at the crossing

2.2 Existing Structure

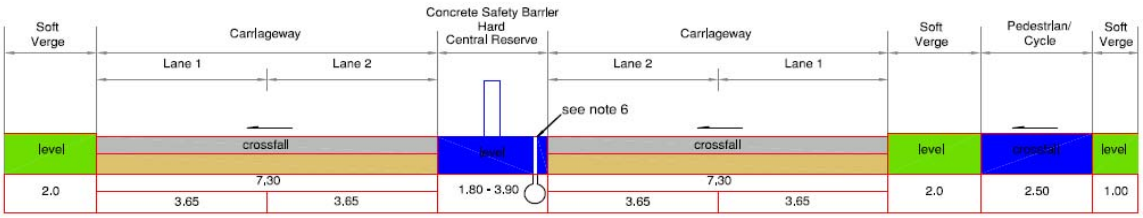
There is an existing bridge carrying Styal Road over the Airport Spur and a similar bridge adjacent to it where the Southern Spur is crossed. The proposed scheme crosses Styal Road at approximately 19 degrees skew. The existing structure needs to be extended on both sides. Information regarding the existing structure is only available on the four drawings produced by Manchester City Council in 2004 to show a number of options for the proposed scheme and on another drawing that was provided by NR. However the information on the NR drawing is suspect. It can be seen from the plan below that the existing structure is splayed on both corners. Obviously this needs to be addressed properly in any of the considered options. It is recommended that a proper survey of the geometry of the structure and railway infrastructure is to be undertaken prior to any detailed design of the proposed extensions on either side of the existing structure. The headroom provided at the existing structure over the tracks is 4640mm minimum.



Plan showing the existing bridge and the bund between the two spurs

2.3 Road Geometry

The proposed road crosses Styal Road at a skew of 19 degrees. The road comprises of dual 7.3m carriageways, 2.0m verges on either side of the carriageways, 2.5m cycleway on one side with another 1.0m soft verge to the cycleway side and a central reserve varying between 1.8-3.9m as shown below. The central reserve at the crossing is 2.5m giving a total crossing width of 24.1m.



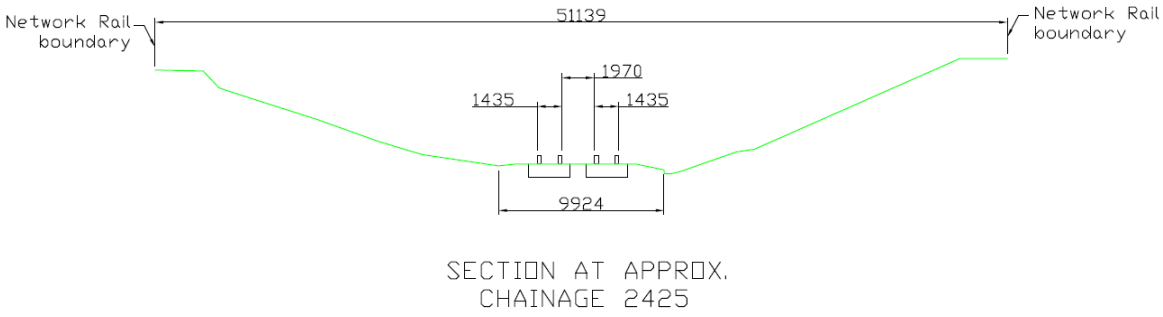
Super Elevated Cross Section for D2UAP Road mainline (Speed Limit 40 mph)

A6- Styal Road (Total Width is 24.6m taking into account the central reserve is 2.5m at the crossing

2.4 Railway- the North Spur

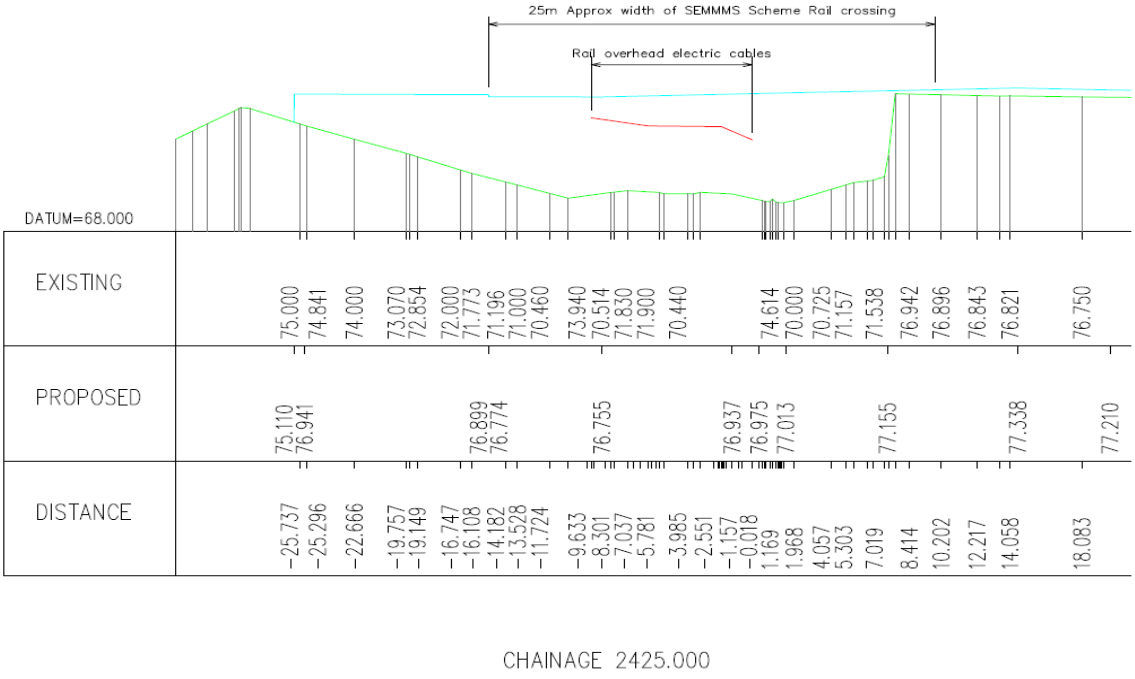
At the crossing the railway is in a cutting as shown on the figure below. The depth of the cutting is approximately 6-7m.

The railway alignment is curved and has a radius of approximately 320.0m. The railway line is electrified and comprises standard gauge double track with concrete sleepers as shown on the figure below. There are also some clearances to either side of the tracks as shown below to either side of the tracks giving a total distance of greater than 45.0m.



Typical Cross Section

The figure below shows some data regarding the existing and the proposed scheme levels.



Section through the track at chainage 2425.0m showing the existing and proposed levels

The railway vertical alignment is on a gradient of 0.5% rising slightly in the Airport direction.

Top view of the bridge crossing

There are 4 overhead cables including the contact wires for each track and the return conductors.

View showing the northern spur and the catenary

Signalling and telecommunication (S&T) cables run alongside the tracks as shown on the figure below.

View on the east side of the existing structure looking north

2.5 Ground Conditions

The ground conditions for the Existing Styal Road Rail Bridge East 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 within at or within the vicinity of the proposed structure.

The ground conditions indicated on the geological maps identify drift deposits of Boulder CLAY of Recent and Pleistocene age overlying Lower 'keuper' Marl over 'Keuper' Waterstones, underlain by 'Keuper' Sandstones, which are all part of the Mercia Mudstone 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.

2.5.1 Groundwater

There is no known groundwater information for the site.

2.5.2 Preliminary Geotechnical Assessment

In the absence of a detailed site geotechnical information piled foundations have been assumed. The length of the piles would need to be confirmed after detailed ground investigations have been carried out and further detailed design is undertaken.

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.
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.

Geotechnical information relevant to the site is included in Appendix A.

2.6 Land Ownership

The Compulsory Purchase Order (CPO) in relation to land ownership will be in place for the entire scheme before any construction work is undertaken.

2.7 Site Access

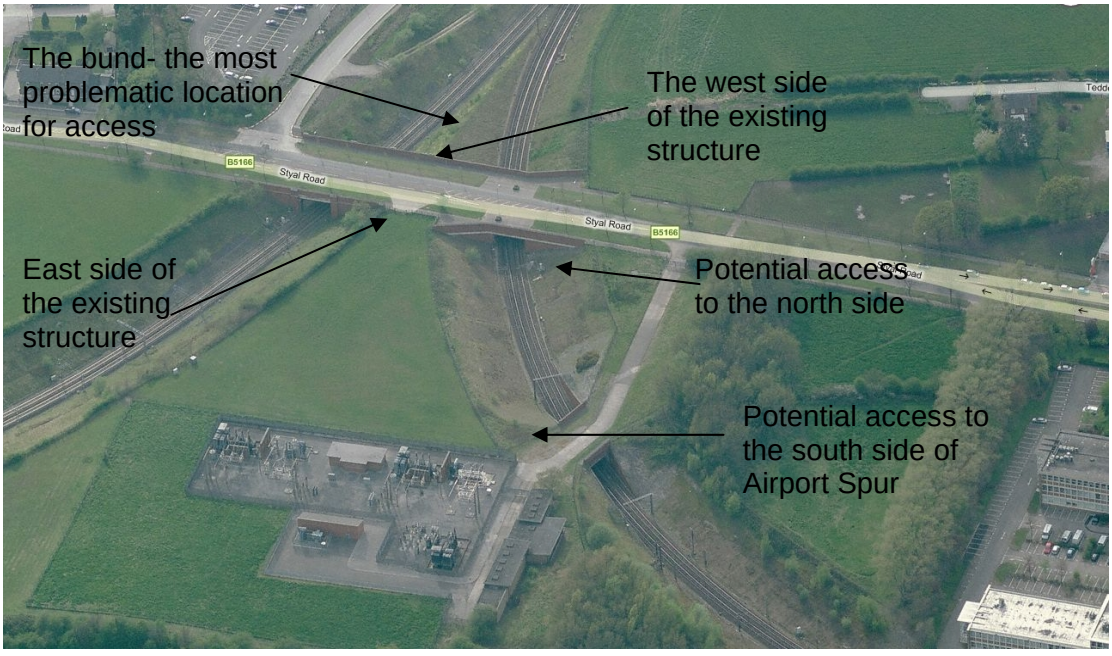
Access to site is not straight forward.

East side of the existing structure- East extension

Access to the north side of the north spur (to construct the north abutment) could be gained via the access road to the Electricity Sub Station as shown on the figure below. While access to the south side of the north spur (to construct the south abutment) could be gained via the same access road adjacent to the Electricity Sub Station. Therefore discussion with the Electricity Sub Station owners will be required in advance.

West side of the existing structure- West extension

Access to the north side of the tracks to construct the north abutment is via Styal Road and across the field. While access to the south side of the north spur to construct the south abutment has to be across the tracks. Proper procedures have to be in place to satisfy Network Rail requirements. It should be noted that the south spur will also be affected.



Plan showing the access to the site to construct the bridge

The bund in the triangulated area between the two spurs will probably have to be flattened (see figure below) to create a platform for the construction of the piles. This needs to be taken into account while considering the construction methodology in this area.

View on the west side of the existing structure showing the bund and the south spur

2.8 Topographical Survey

Topographical survey has been provided by the client (SMBC) and has been used to develop the options.

3. BACKGROUND INFORMATION

No report is currently available on the existing structure or the crossing. A number of drawings are available and they are as follows:

Date	Drawing Number	Drawing Name	By
1987	DMF20072985	Manchester International Airport- Proposed Rail Link- Styal Road Overbridge	British Railway Board
2004	A0/A5/526/01- 1 (P- revision)	General Arrangement – Option 1	Manchester City Council
2004	A0/A5/526/01- 2 (P- revision)	General Arrangement – Option 2	Manchester City Council
2004	A0/A5/526/01- 3 (P- revision)	General Arrangement – Option 3	Manchester City Council
2004	A0/A5/526/01- 4 (P- revision)	General Arrangement – Option 4	Manchester City Council

It should be noted that Drawing DMF-20072985 of the existing structure shows a contiguous piled foundation with a precast prestressed beam deck. While the other 4 drawings produced by Manchester City Council show the existing bridge as a box structure (refer to Appendix D).

4. CONSULTATION

4.1 Stockport Metropolitan Borough Council (SMBC)

4.1.1 Planning

Planning for the scheme has not been granted yet. One of the aims of this study is to apply for planning approval.

4.1.2 Existing Statutory Undertakers Equipment and New Services

Existing Statutory Undertakers Equipment

Information is available re the existing services in Styal Road and they are as follows:

- 6 no. HV & 2 no. LV crossing Styal Road running towards Styal Electricity sub station
- 1 no. 250mm MP gas main & 1 no. 180mm LP gas main running along Styal Road. 2 no. HV cables adjacent to Railway (Airport Spur South) running towards Styal Electricity sub station will need diverting to allow for road construction
- Proposed diversion routes are essential to formulate and understand a sequence of works

These services could be accommodated within the

4.1.3 New Services

Unless stated otherwise, for all bridges provision shall be made for statutory undertaker's equipment within the two outermost verges of the carriageway. These are to be available to carry highway communications and lighting. Services that are installed below or within the deck structure shall not adversely affect the appearance of the structure. Services shall not be installed on the outside face of deck edges. It is worth noting that lighting has only been provided at the junctions and not along the entire scheme.

4.1.4 Environmental

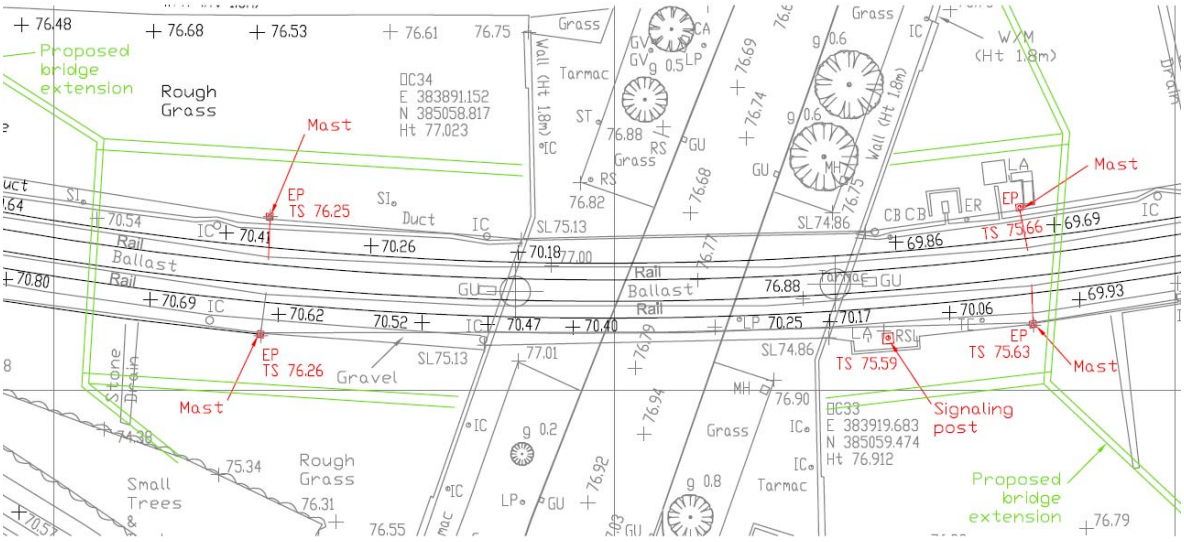
SMBC has advised that all environmental issues will be dealt with by Environmental Consultant, Mouchel.

4.2 Network Rail

Network Rail has appointed Nigel Downes as a project manager and Ian Fairfoot as the Asset Protection Engineer for the scheme and SMBC has liaised with them.

4.2.1 Infrastructure Records

The following information has been abstracted from the NR survey.



From the above figure it is clear that there is a number of NR furniture in the footprint of the proposed extensions. The survey information reveals that the top level of signalling post (Signalling post top level is 75.59; deck soffit level approximately 74.91) is higher than the deck soffit level by approximately 0.68m. Similarly the masts are higher than the deck soffit level by approximately (0.800-1.12m). This equipment needs to be relocated in advance to allow the construction of the deck slab. Therefore discussion has to take place with NR in advance regarding the feasibility of relocating this equipment.

4.2.2 Technical Constraints

SMBC has liaised with NR Civil Engineer for the Scheme to determine any technical constraints for the proposed scheme.

NR's over-riding objective is to minimise the disruption to the operational railway.

The line is electrified and there is already an existing structure. The minimum headroom at the existing structure over the tracks is 4640mm. The headroom over the tracks at the extensions needs to be not less than that provided under the existing structure. However the vertical alignment of the proposed scheme allows the provision of such headroom. In addition the deck soffit levels of the extensions have to be set at 600mm minimum from the overhead cables.

4.2.3 Operations and Possessions

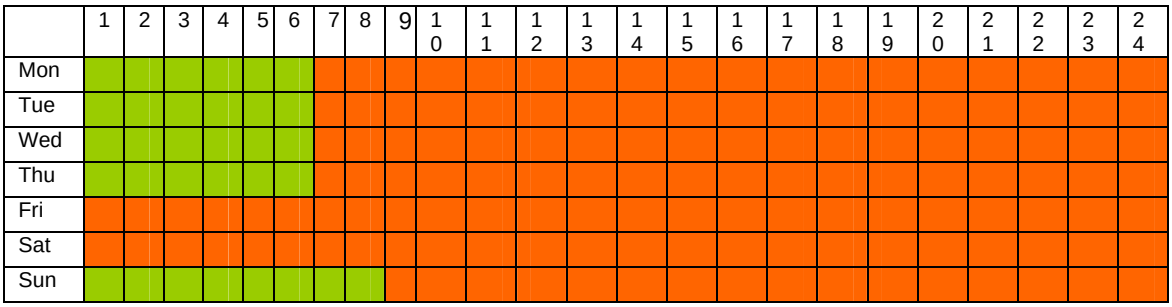
Railway possessions are coordinated by NR's Possession Optimization Manager Dave Murphy. The time available is dependent on the usage of the line.

5. DESIGN CONSTRAINTS

5.1 Railway Possessions

5.1.1 Rules of Route Possessions

Normal Rules of Route possessions: 7.0 hours (22:40- 5:40) night time possessions are available 9 weeks per year. Allowing approximately 1.0 hour for handover by and hand back to NR, this will leave approximately 5.0 hours for productive work-time respectively. This is shown pictorially below.



5.1.2 Longer Possessions (Outside Rules of Route Possessions)

It should be noted that Outside Rules of the Route (ORoR) possession times might be required while constructing the south abutment of the west extension in the triangulated area between the north and south spurs.

The Outside Rules of the Route possessions can be applied for at least one year in advance .It is unlikely that anything beyond 01:00 Sunday to 5:00 Monday (28 hours) would be granted. Allowing approximately 1.0 hour for handover by and hand back to NR, this will leave approximately 26 hours for the productive work-time. Following discussions with Network Rail on 14th of December 2011, it was advised that formal applications should be made in advance regarding the availability of such possession times.

5.2 Highway Alignment

5.2.1 Horizontal Alignment

At the bridge crossing the horizontal alignment of the scheme comprises a 720.0m radius curve. In addition the proposed road crosses Styal Road at 19 degree skew. The horizontal alignment is dictated by the Electricity Sub Station in south of the north spur.

5.2.2 Vertical Alignment

The vertical alignment of the proposed scheme at the bridge is at 0.5% gradient. The vertical alignment for the scheme is dictated by the following factors:

- Styal Road level
- The existing structure soffit level (as the deck soffit levels of the extensions have to be in line with existing soffit level).

5.2.3 Headroom and Construction Depth

The MX model has been progressed by SMBC. The highway alignment work was based on providing the same headroom as that provided over the tracks at the existing bridge. The highway alignment also assumed approximately 1.2m deep construction depth for the new extensions. However on the west side the highway alignment will need to be raised to maintain adequate headroom due to the rising gradient of the railway line.

5.3 Ground Conditions

As discussed before piling is anticipated to be the right solution in this area.

5.4 Ground Water Conditions

From the information available so far there is no record of under ground water and hence it has not been considered as a constraint. The presence of ground water is not likely to be problematic for the piled foundations.

5.5 Other Constraints- Access

Access to this site is difficult at this crossing and heavy equipment such as piling rigs and cranes are needed. The design will therefore have to take account of this by limiting the size of the structural elements where possible. Hence enabling smaller plant to be used.

6. OPTIONS CONSIDERED

The following options have been considered:

6.1 Option 1

Precast pre-tensioned concrete beams supported on reinforced concrete conventional abutment walls on bored piled foundations with a fully integral connection to the deck.

This option is based on what Manchester CC called Option 1. This option considers a wider span than the existing bridge and with proposed span of 22m (as per their drawing) and requires Y4 beams at 1000mm centres; the span is too long for T10s. Y4s would give a deeper construction depth so in order to line up the soffit and thus maintain minimum headroom there would be a step in the top of the deck. However there appears to be sufficient fill on top of the existing deck for this not to be a problem.

The difference in span and beam depth between the existing bridge and extensions would result in complex moment and shear effects. Therefore a structural connection between the two would not be provided. There may be sufficient depth of fill to put a slab over the joint to prevent reflection cracking in the road surface.

6.2 Option 2

This option is as for Option 1 but using high modulus steel sheet piles in the abutments instead of contiguous bored piles.

6.3 Option 3

Steel beams on shallow piled abutments with a composite concrete deck. This option could span more than 22m and reduce the amount of incursion into the cutting but at the cost of additional construction depth.

Interface Issues

The structure will cross a very busy electrified railway line at Styal Road junction, it will carry a highway junction which includes an alignment almost parallel to the track so the extensions and wing walls will require “very high containment” (H4a) parapets.

There are railway signals in very close proximity to the existing bridge which will be significantly affected by the extensions. The extensions will have a larger span than the

existing bridge so the signal sighting may not be impaired. However the signals may have to be re-located outside the structure. Such re-location would be restricted because of the proximity of the junction at the other end of the spur. Some of the OLE masts supporting the catenary may also be affected.

7. CONCLUSIONS

7.1 General

From the information available limited options can be considered.

Span arrangement:

The options available to be considered in this location are either in line with the existing structure abutments or set back further so that the abutments can be constructed easier away from the tracks. The span of the structure should be such that it carries the footprint of the scheme too.

As discussed above the proposed structure will cross a very busy electrified railway line. It should be noted that there are railway signals in close proximity to the existing structure. Therefore a longer span will be advantageous in avoiding these signals.

The clear span of the bridge extensions is anticipated to be in the region of 20.0m

Parapets

The configuration of the highway and the railway at this location is such that in addition to provision of H4a very high containment parapets on the deck edges, H4a parapets will be required on all wing walls as well. The length of these parapets needs to comply with NR and HA standards.

Joint between the existing and the extensions

As mentioned above a structural connection between the existing and the new extensions is not recommended. The joint will be detailed to cater for any anticipated vertical movement under the service loads. As the preferred option is going to be founded on piled foundations the new extensions are not anticipated to undergo significant movement, hence the joint can be detailed to cater only for a small movement.

Deck beam alignment

It is a normal to construct the abutments parallel to the tracks. It is also a normal practice for the deck beams of both extensions to cross the tracks at right angle as much as possible. However the deck slabs for both extensions can not be of rectangular and trapezoidal shapes due to the presence of the corner splay to either side of the existing deck. Therefore the beams close to the existing structure on both sides will be fanned in a manner to suit the available geometry.

Permanent Formwork

Permanent formwork will be provided to enable casting the insitu concrete deck safely

Barriers and transitions

Barriers and transitions are also required. In relation to this Road Restrain Risk Assessment Process (RRRAP) analysis is required as part of the design

7.2 The merits and demerits of potential bridge options have been summarized below:

Ref.	Description	Construction	Possessions	Merits	Risks
	Preferred Options				
1	Over line, prestressed precast beam and RC slab on conventional RC wall integral abutments on bored piled foundations. Refer to Drawing 1007/3D/DF5/A6-MA/B014/714-1 in Appendix B.	Install safety screens. Construct piling platforms. Install the abutment wall along side railway. Lift in precast beams and erect safety screens. Construct deck.	Can be constructed under a series of RoR possessions. Weekend closure may be required for deck installation.	Simple to construct. Access for construction of abutments due to existing cutting slope is restricted. Use of a greater span than the existing bridge would be easier to construct due to the access limitations. Conventional piles can be constructed from above otherwise blockade would be required. Increased span ensures signal sighting is not infringed in the horizontal direction. Brick cladding can be attached to the wingwalls to match the existing wing walls.	Very busy electrified railway line.
2	Over line, steel beams and RC slab on high modulus steel sheet pile integral abutments. Refer to Drawing 1007/3D/DF5/A6-MA/B014/714-2 in Appendix B	Install safety screens. Construct piling platforms. Install sheet pile wall along side railway. Lift in precast beams and erect safety screens. Construct deck.	Can be constructed under a series of RoR possessions or a series of weekend closures. Weekend closure may be required for deck installation.	Simple to construct. Piling operations possibly quicker to install than contiguous bored piles. Access for construction of abutments due to existing cutting slope is restricted. Use of a greater span than the existing bridge would be easier to construct due to the access limitations. Sheet piles can be installed from above otherwise blockade would be required. Increased span ensures signal sighting is not infringed. Longer spans could be achieved but construction depth would be limited by the depth of fill on the existing bridge. Brick cladding can be attached to the sheet piles to match the existing abutment.	Very busy electrified railway line.
3	Over line, steel beams	As above except steel beams.	Can be constructed under a	Simple to construct.	Very busy electrified

	and RC slab on conventional RC wall integral abutments on piled foundations.		series of RoR possessions. Weekend closure may be required for deck installation.	Access for construction of abutments due to existing cutting slope is restricted. Use of a greater span than the existing bridge would be easier to construct due to the access limitations. Bored piles can be constructed from above otherwise a blockade would be required. Increased span ensures signal sighting is not infringed. Longer spans could be achieved but construction depth would be limited by the depth of fill on the existing bridge.	railway line.
4	As for 1 above but with the abutments in line with the existing.	As for 1 above.	As for 1 above except access would be severely restricted due to the need for blockades / possessions and temporary removal of OLE equipment.	Access for construction of the abutments would be severely restricted. **Rejected.**	
5	As for 1 above except using conventional RC cantilever wall on piles.	As for 1 above.	As for 1 above except access would be severely restricted due to the need for blockades / possessions and temporary removal of OLE equipment.	Access for construction of the abutments would be severely restricted. **Rejected.**	

7.3 Preferred Option

7.3.1 Substructure

Taking into account all the factors discussed above the preferred option is conventional reinforced abutment walls on bored piled foundations integral with the deck. The proposed abutments are set further back from the existing structure abutments to facilitate their construction. These abutments could be constructed within RoR possession times. The wingwalls will be brick clad to match the existing. For the preferred option refer to 1007/3D/DF5/A6-MA/B014/714-1 in Appendix B and for further understanding of the proposed preferred scheme refer to the 3D models shown on Figures 1-3 in Appendix C. For an overview of the wingwalls refer to 1007/3D/DF5/A6-MA/B014/714-1

7.3.2 Superstructure

The preferred option for the superstructure is precast prestressed beams and reinforced concrete slab integral with the abutments.

7.3.3 Reasons behind the preferred option

In summary the reasons behind the preferred option are as follows:

- Simple to construct.
- Access for construction of abutments due to existing cutting slope is restricted. Use of a greater span than the existing bridge would be advantageous as it is easier to construct the abutments due to the access limitations.
- Bored piles and abutment walls can be constructed from above without needing RoR possession times provided all the NR requirements are met. However to construct the south abutment of the west extension (location of the bund) ORoR possession times might be required.
- Increased span ensures signal sighting is not infringed and satisfies the clearances required by NR.
- Precast beams can easily be lifted into place in a number of RoR possession times.
- Maintenance for precast beams is minimal
- Brick cladding can be attached to the piles to match the existing abutment

7.3.4 Construction Methodology

The following construction methodology is anticipated

- Install safety screens
- Construct piling platform in four locations to construct 4 abutments.
- Install bored piles and construct walls parallel to the tracks for the four locations (4 abutments).

- Construct the cross beam on top of the piles to create a platform for receiving the deck beams.

- Lift in precast prestressed beams with the permanent formwork and erect safety screens.

- Construct the insitu concrete deck slab and the joint between the deck and the cross beam

- Install high containment parapet (H4a) as shown on the drawing

8. RECOMMENDATIONS

- The most important factor that controls the cost and the risk of constructing a bridge over the railway is the length of time it takes to construct it. It is therefore recommended that, once funding for the scheme is in place, the construction period is determined with **more certainty**.

- As there is currently conflicting information regarding the existing structure in terms of the form of construction and the foundation type, it is important to undertake proper geometrical survey of the existing structure prior to the detailed design of the proposed extensions.

- The 28 hour ORoR possession times are only available on request. Confirmation should be obtained from NR regarding the availability of these ORoR possession times.

- It is also important to obtain information regarding the load carrying capacity of the existing structure. Any work which might be required for the existing structure can be done in parallel with the proposed new work. Previous assessment and inspection reports need to be made available.

- Detailed ground investigations for the relevant sites are recommended to enable undertaking the detailed design of foundations.

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

- In advance all the Network rail assets have to be identified in detail so that they could be taken into account while considering the relevant construction methods. Attempts have to be made to minimise any disruption to these assets.

- Construction programme needs to be developed by the contractor in liaison with the designer, the client and NR.

- More robust construction cost is required to be worked out by the contractor.

- In advance discussions have to take place with NR regarding the feasibility of relocating the affected equipments as mentioned in section 4.2.1. This information will have an effect on the construction methodology and proposed span.

- Optimisation of the span and pile size including the spacing will be finalised at the detailed design stage.

APPENDIX A

Geotechnical Information

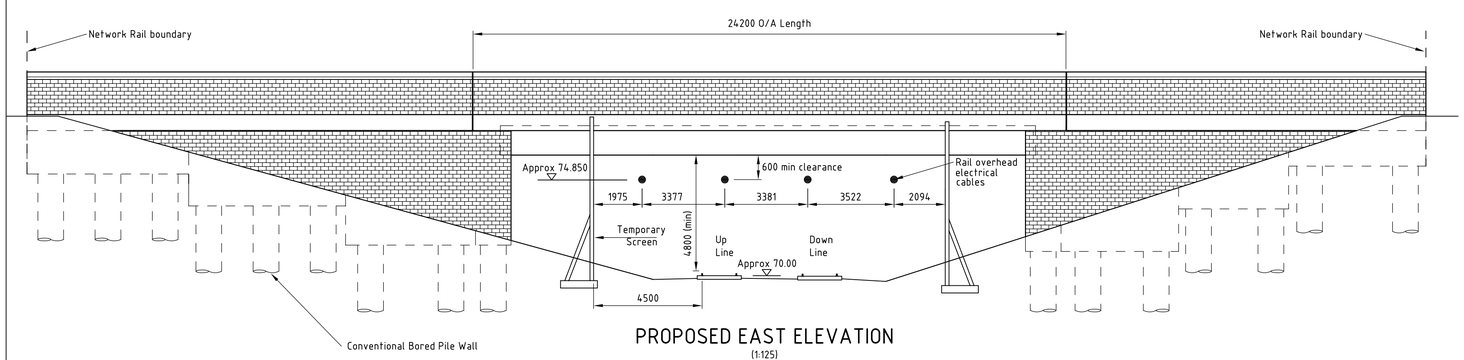
Detailed geotechnical information is not available similar to the main Styal Line bridge. Detailed geotechnical information is recommended to be acquired for the next stage.

APPENDIX B

Option Drawings

NOTES

1. This drawing has been produced based on the latest MX highway model - Draft Design Freeze 5, as provided by the client.
2. This drawing has been produced mainly for the purpose of planning application.
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.



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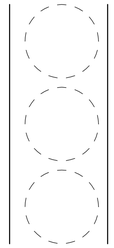
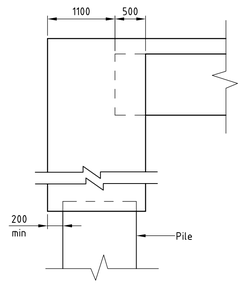


PLAN ON PILED ABUTMENT
(1:50)



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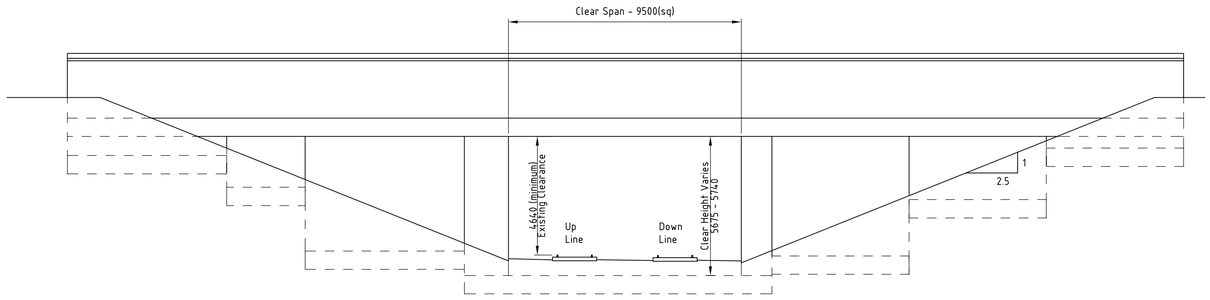
(1:50)



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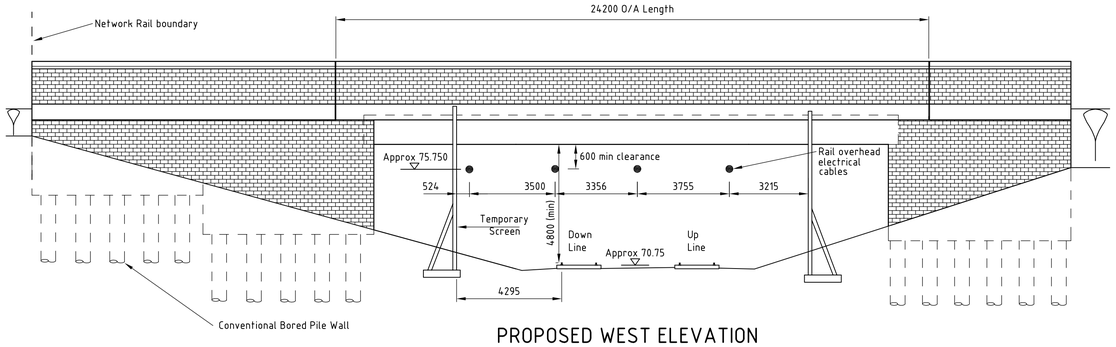
(1:125)



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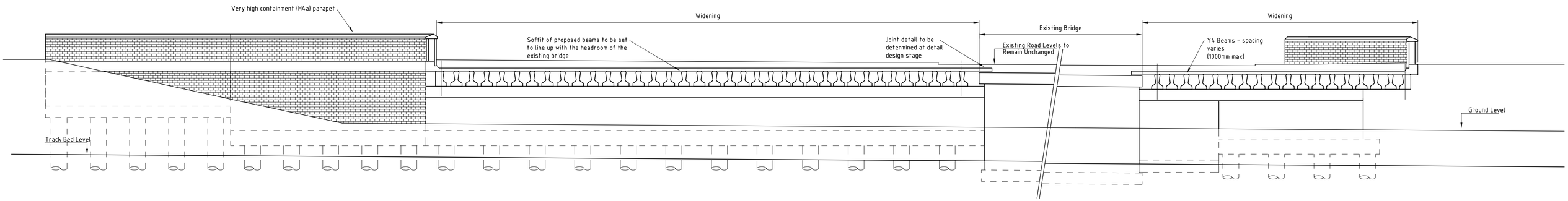
(1:125)



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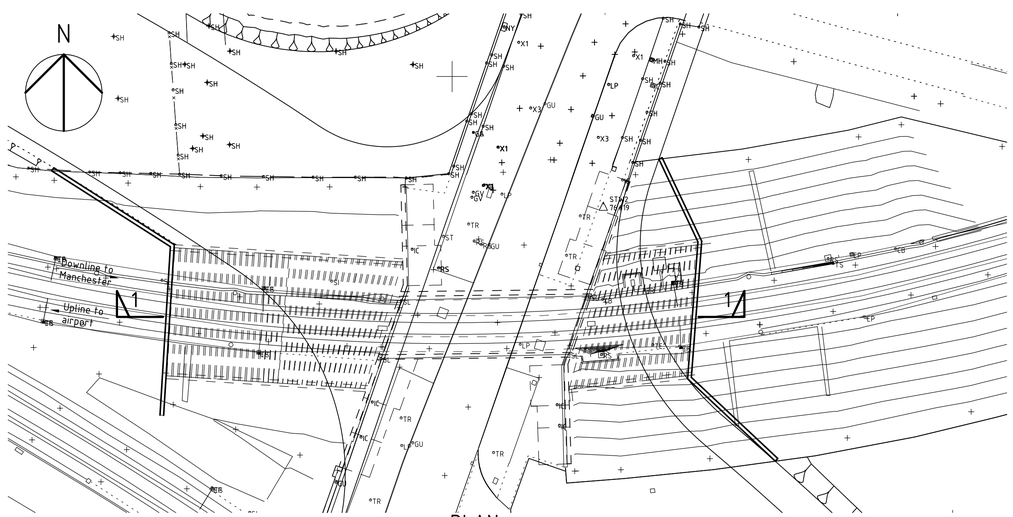

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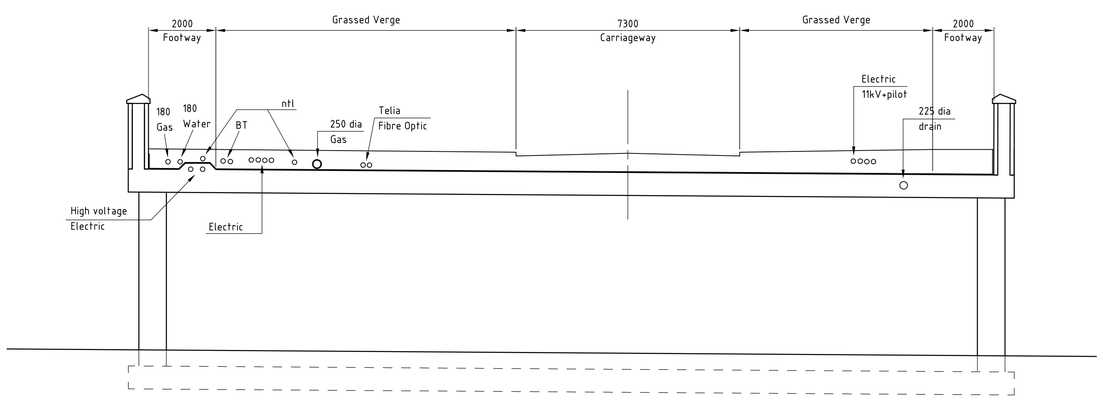

SECTION THROUGH DECK (EXISTING)
(1:100)

Rev.	Drawn	Checked	Date	Revision Details

south east manchester multi modal strategy

semmms

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Job Title

SEMMMS
RELIEF ROAD SCHEME
A6-AIRPORT

Drawing Title

STYAL ROAD
AIRPORT SPUR BRIDGE
GA-OPTION 1

Drawn	Engineer	Checked	Approved
SF	OTP	OTP	NS
Date	Date	Date	Date
11/12/11	11/12/11	11/12/11	11/12/11
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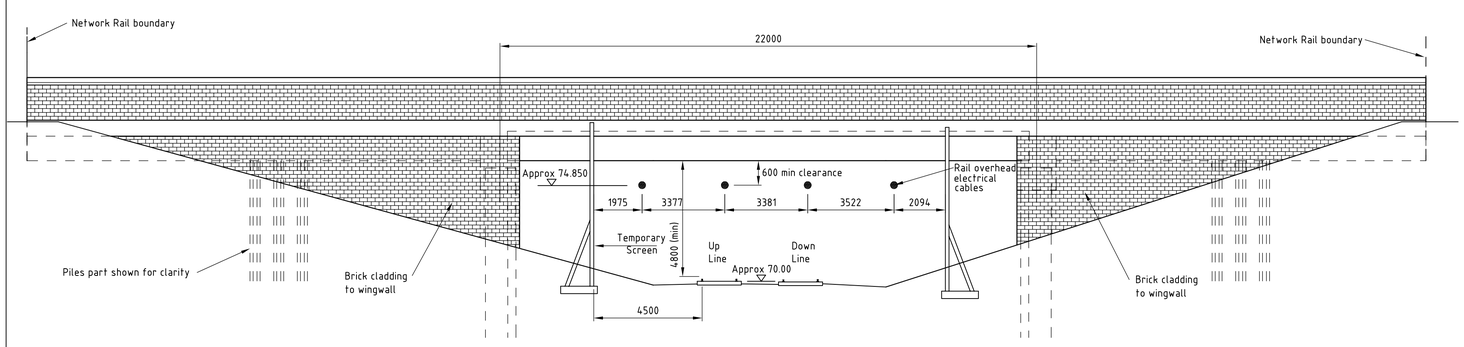
SCG No.	Filename		
Drawing No.			Revision
1007/3D/DF5/A6-MA/B014/714-1			



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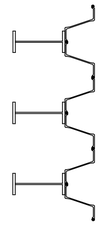

PLAN ON PILED ABUTMENT
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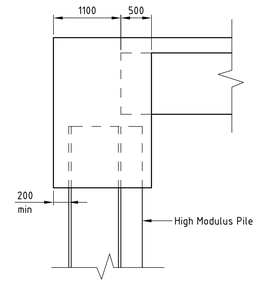

SECTION THROUGH ABUTMENT
(1:50)

NOTES

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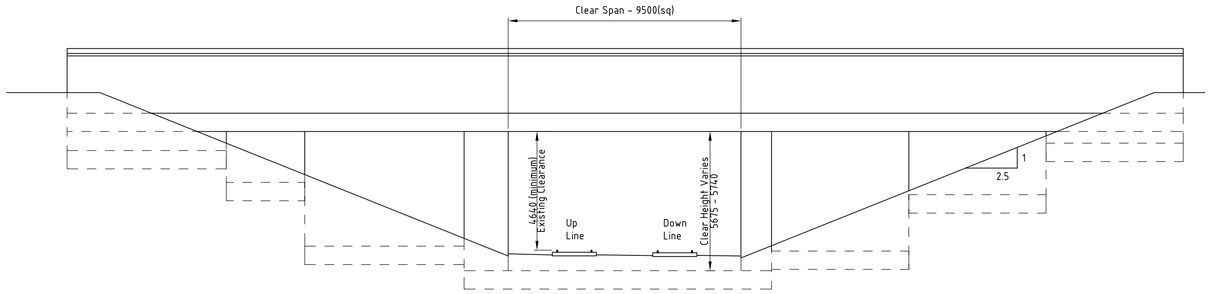
7. Basic preliminary design has been undertaken to determine the geometry of the section sizes as per client's instruction.



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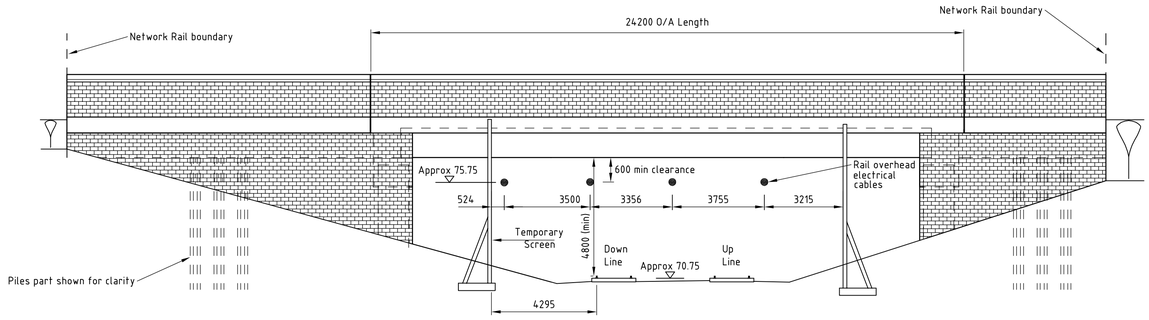

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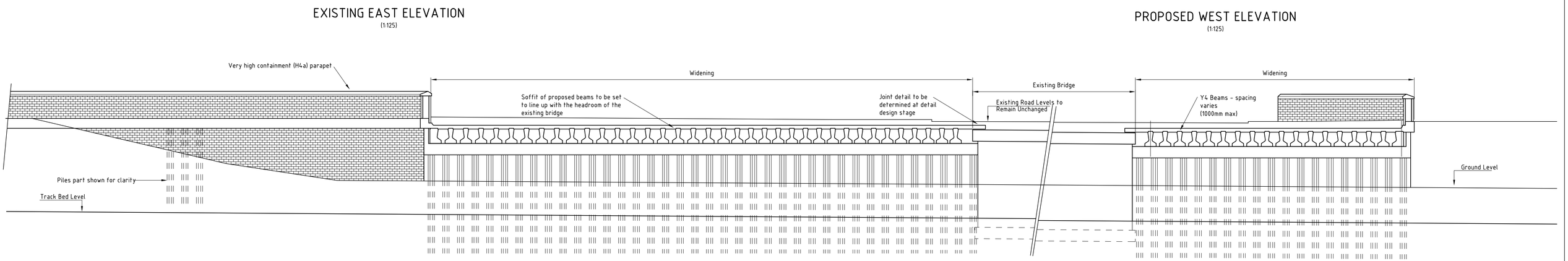
(1:125)



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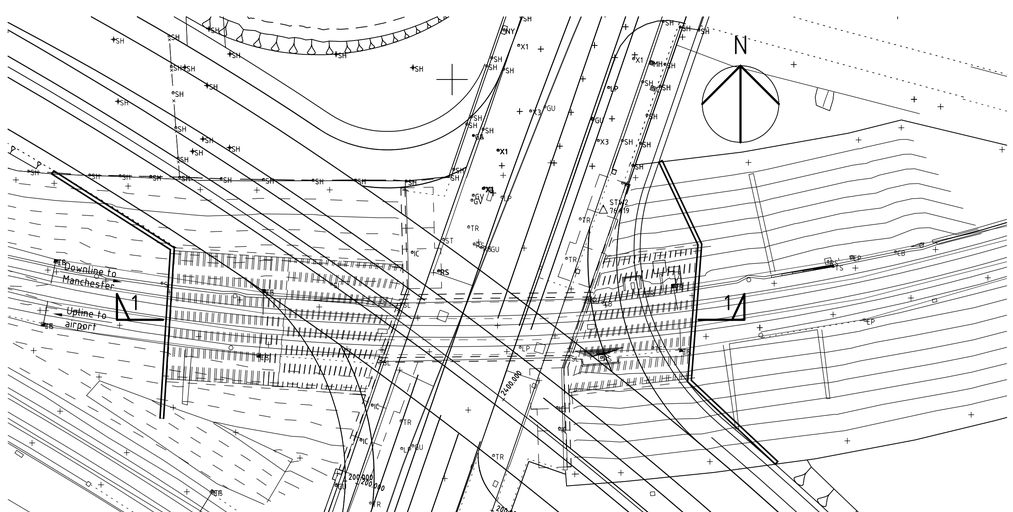

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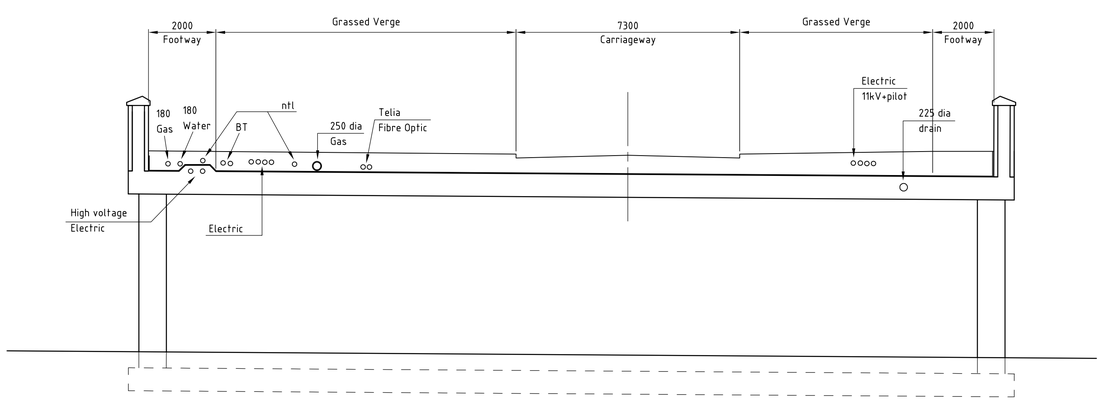

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Rev.	Drawn	Checked	Date	Revision Details

south east manchester multi modal strategy

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

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A6-AIRPORT

Drawing Title

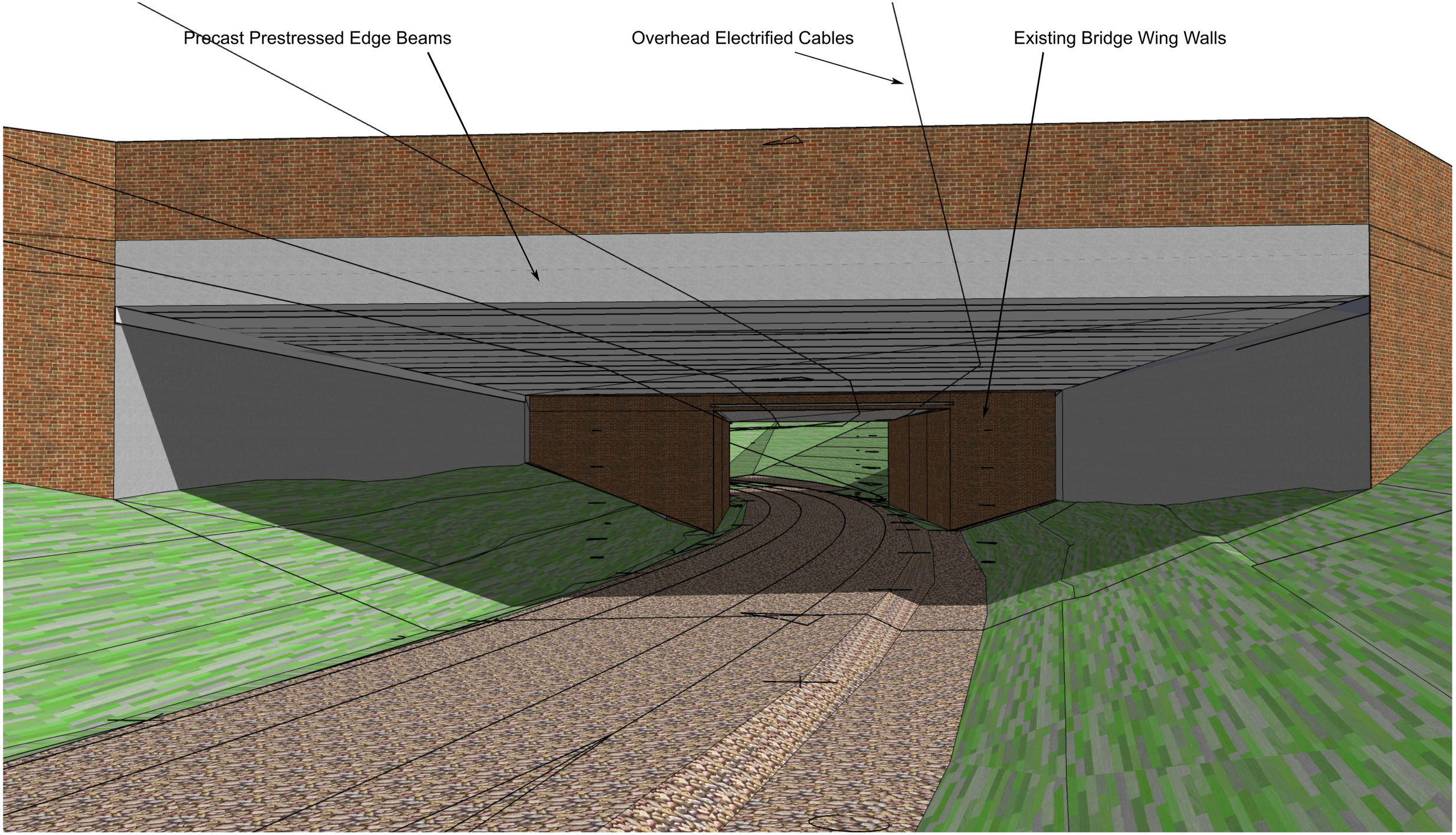
STYAL ROAD
AIRPORT SPUR BRIDGE
GA-OPTION 2

Drawn	Engineer	Checked	Approved
SF	OTP	OTP	NS
Date	Date	Date	Date
11/12/11	11/12/11	11/12/11	11/12/11
Size	Scale		
A1	AS SHOWN		
SCG No.	Filename		

Drawing No. 1007/3D/DF5/A6-MA/B014/714-2 Revision

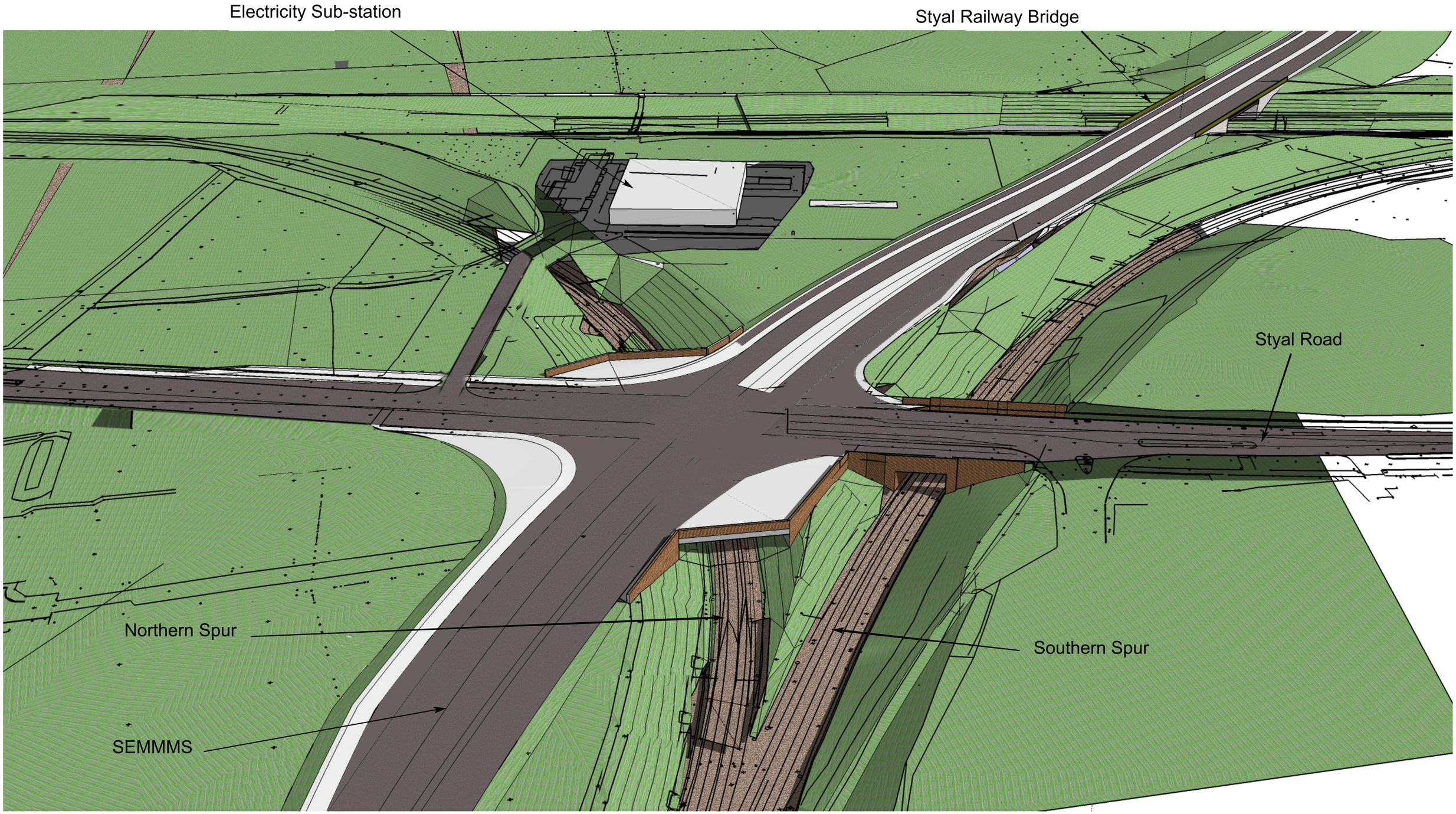
Appendix C

3D Model of the preferred option



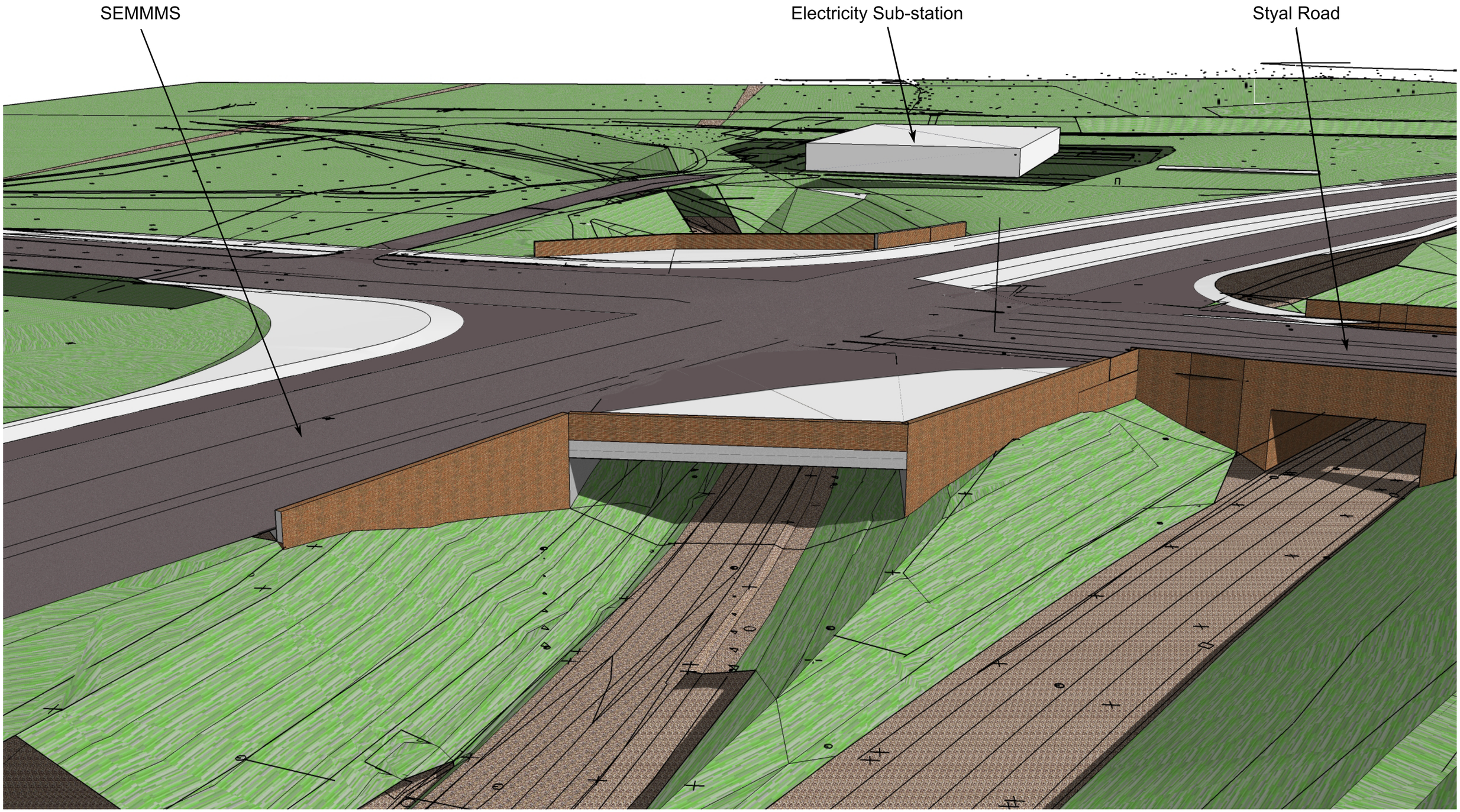
Styal Road Airport Spur Bridge Extensions
View on Extension Elevation

FIGURE 1



Styal Road Airport Spur Bridge Extensions
Aerial View Looking East

FIGURE 2

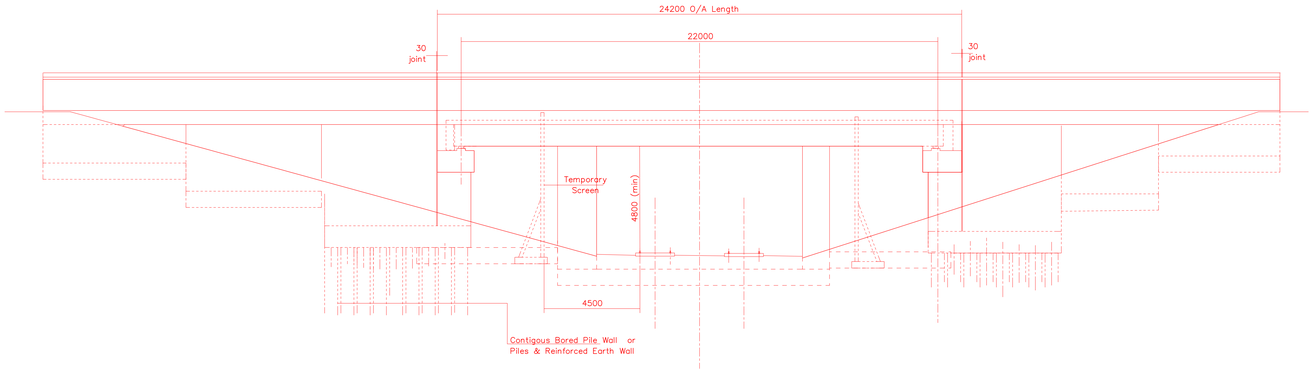


Styal Road Airport Spur Bridge Extensions
View Looking East

FIGURE 3

Appendix D

Option drawings produced by Manchester City Council



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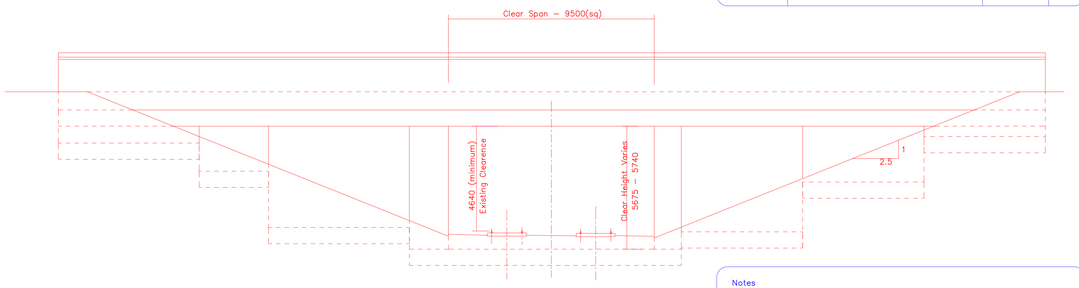

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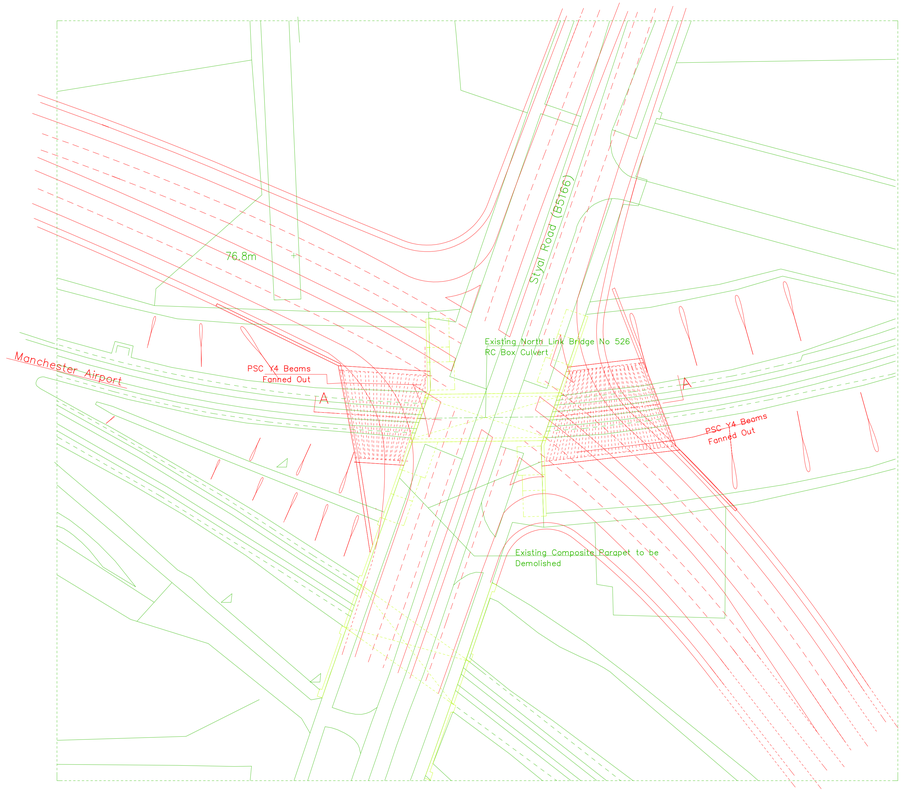
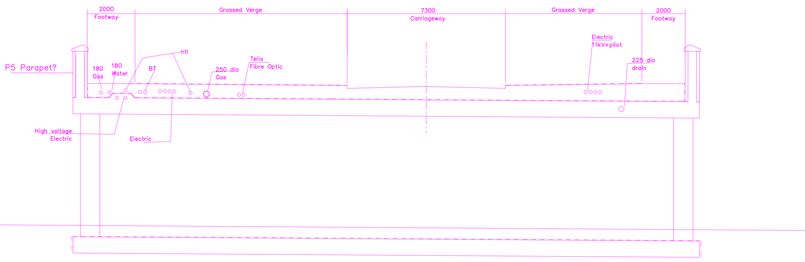


PLAN 1:500



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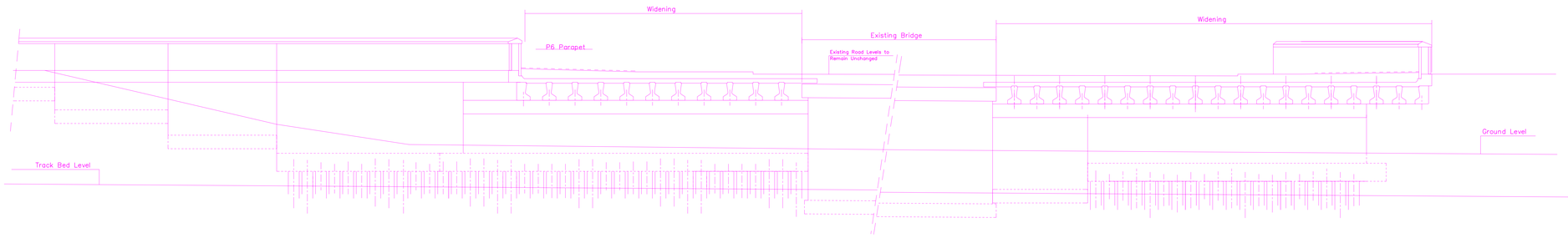

A– A
PROPOSED SECTION 1:100

Notes

1. Details of the Existing Stucture are from British Rail Drg No BRR 363/C/5020C of Jan 91 submitted to Manchester City Council for Technical Approval. Verified only by visual inspection from road level.
2. The proposed widening using precast concrete beams is one of four possible options considered suitable for the scheme. The lateral clearances adopted are assumed to be satisfactory for work behind safety screens. To be agreed with Networkrail and design span to be adjusted accordingly.
3. Geometric road layout used at the Styal Road Junction is based on the Drg No A0/01234/005 of 25/07/03 – Titled Styal Road Junction – Option 1. Details may vary in the final layout.
4. The foundation details presented are schematic only based on design details of existing structures in the vicinity. May vary based on site investigation results (to be carried out)

Revisions

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PROJECT TITLE
SEMMS – NEW RELIEF ROAD SCHEME
MANCHESTER AIRPORT ROAD LINK WEST
STYAL ROAD JUCTION BRIDGE No 526 – WIDENING

DRAWING TITLE
GENERAL ARRANGEMENT – OPTION 1
Widening with Precast Concrete Beams

DATE	DRAWN BY	CHECKED BY	APPROVED BY
Dec 2004	NDP		
SCALE	DATE DRAWN	DATE CHECKED	DATE APPROVED
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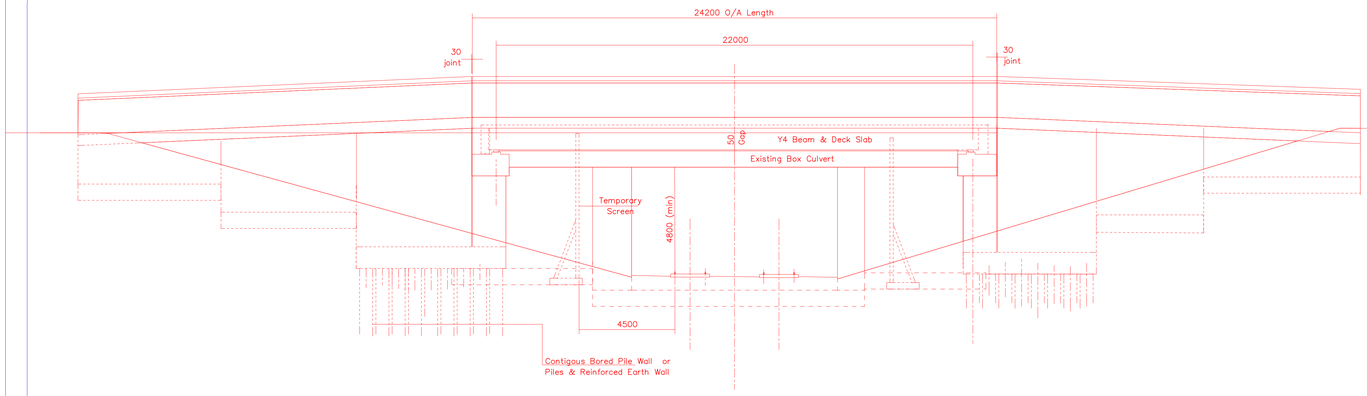
DRAWING No. A0/05/526/01 – 1 REVISION P



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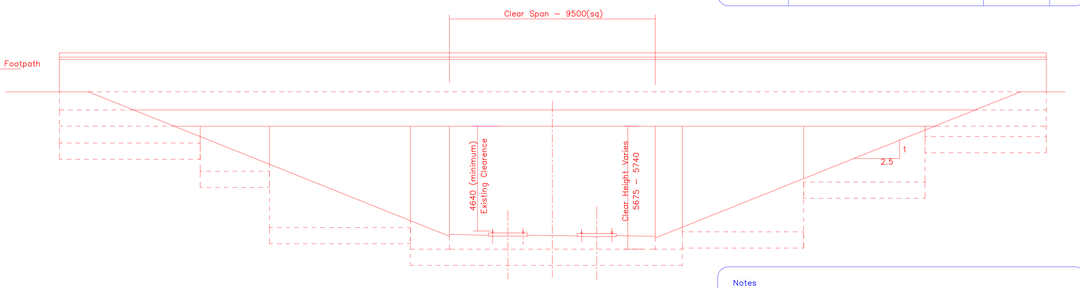

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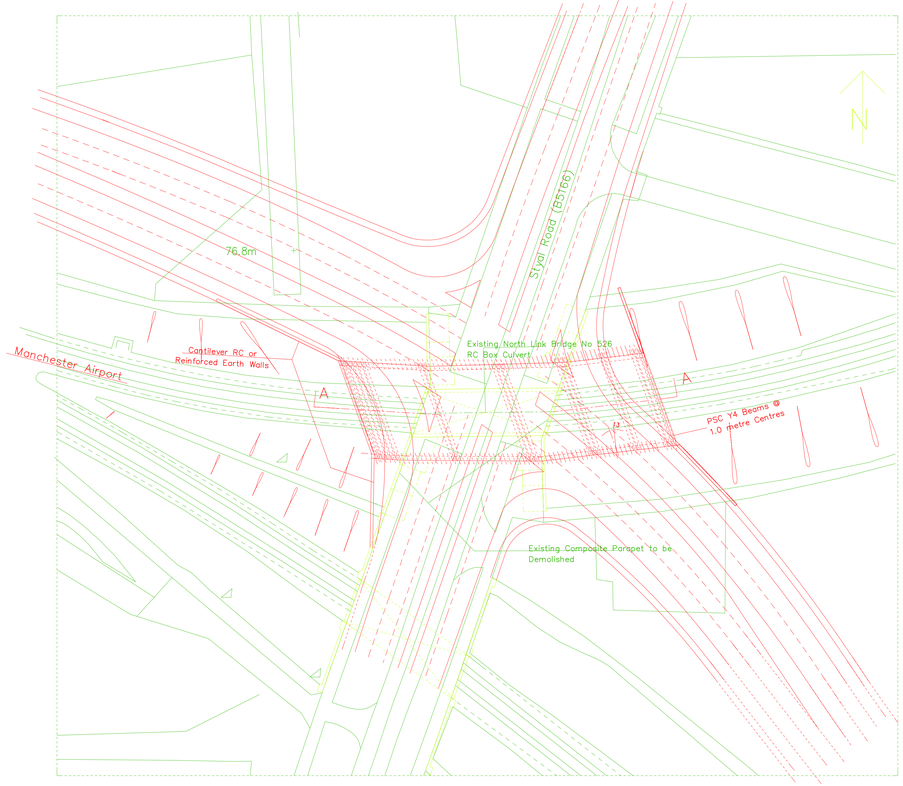

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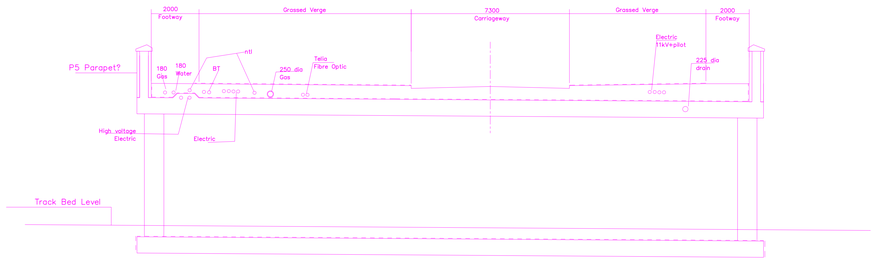

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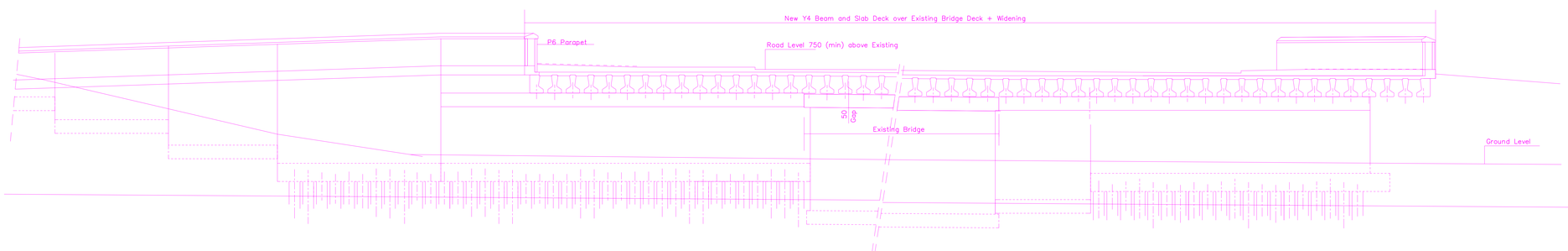

A– A
PROPOSED SECTION 1:100

Notes

1. Details of the Existing Stucture are from British Rail Drg No BRR 363/C/5020C of Jan 91 submitted to Manchester City Council for Technical Approval. Verified only by visual inspection from road level.
2. The proposed Reconstruction using precast concrete beams is one of four possible options considered suitable for the scheme. The lateral clearances adopted on the assumption that work can be carried out behind safety screens. To be agreed with Networkrail and design span to be adjusted accordingly.
3. Geometric road layout used at the Styal Road Junction is based on the Drg No A0/01234/005 of 25/07/03 – Titled Styal Road Junction – Option 1. Details may vary in the final layout.
4. The foundation details presented are schematic only based on design details of existing structures in the vicinity. May vary based on site investigation results (to be carried out)

Revisions

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PROJECT TITLE
SEMMS – NEW RELIEF ROAD SCHEME
MANCHESTER AIRPORT ROAD LINK WEST
STYAL ROAD JUCTION BRIDGE No 526 – WIDENING

DRAWING TITLE
GENERAL ARRANGEMENT – OPTION 2
Widening & Reconstruction – Concrete Y Beam Deck

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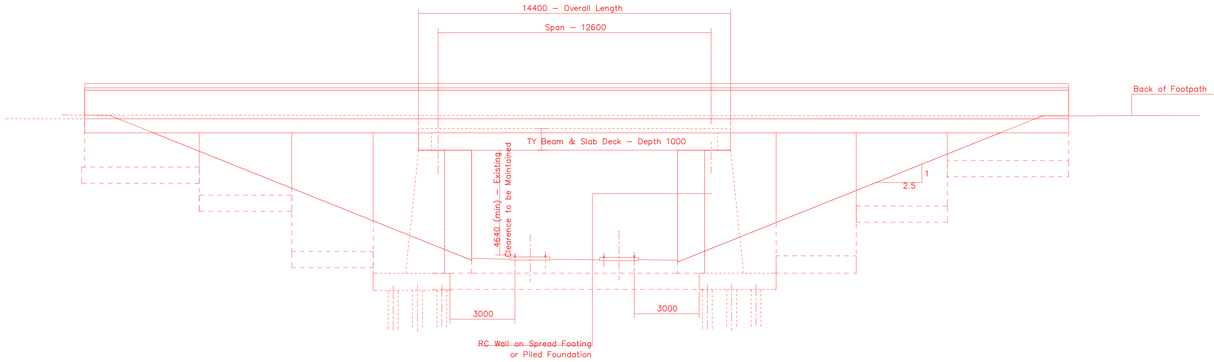

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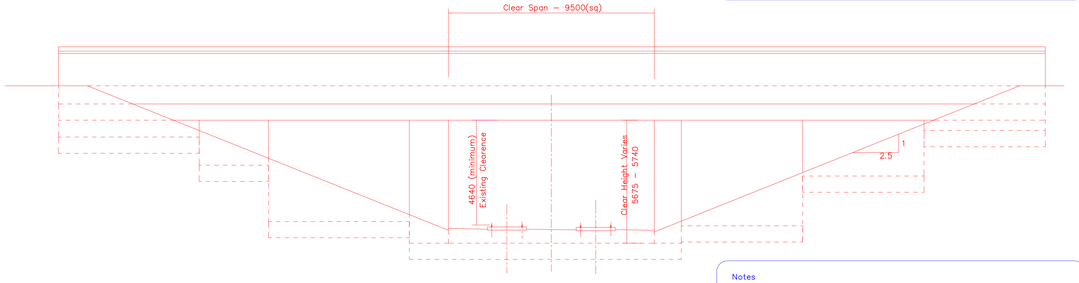

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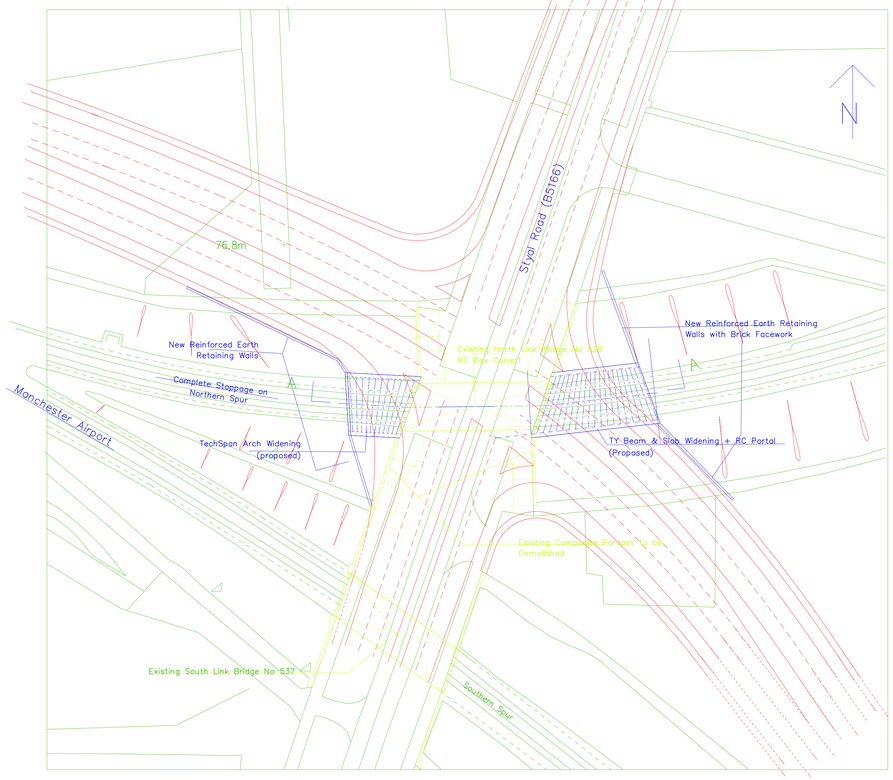

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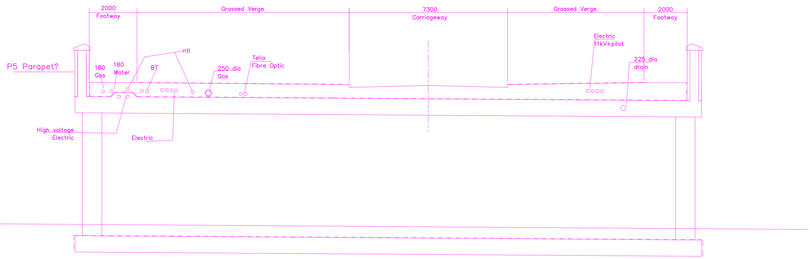

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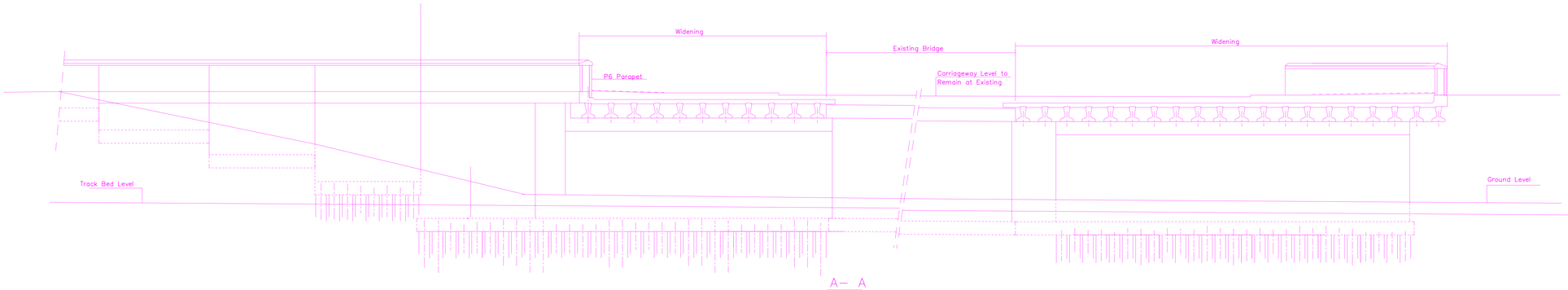

A– A
PROPOSED SECTION 1:100

Notes

1. Details of the Existing Stucture are from British Rail Drg No BRR 363/C/5020C of Jan 91 submitted to Manchester City Council for Technical Approval. Verified only by visual inspection from road level.
2. The proposed widening using Concrete Portal is one of four possible options considered suitable for the scheme Based on the assumption that the Southern Spur operations can be completely stopped. Feasibility to be further investigated and further developed in consultation and agreement with Networkrail and Rail Operatoring Companies.
3. Geometric road layout used at the Styal Road Junction is based on the Drg No A0/01234/005 of 25/07/03 – Titled Styal Road Junction – Option 1. Details may vary in the final layout.
4. The foundation details presented are schematic only based on design details of existing structures in the vicinity. May vary based on site investigation results (to be carried out)
5. The lateral clearences to be agreed with Networkrail and design span to be adjusted accordingly.

Revisions

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ENGINEERING DESIGN CONSULTANCY

PROJECT TITLE
SEMMS – NEW RELIEF ROAD SCHEME
MANCHESTER AIRPORT ROAD LINK WEST
STYAL ROAD JUCTION BRIDGE No 526 – WIDENING

DRAWING TITLE
GENERAL ARRANGEMENT – Option 3
Widening – Concrete Portal

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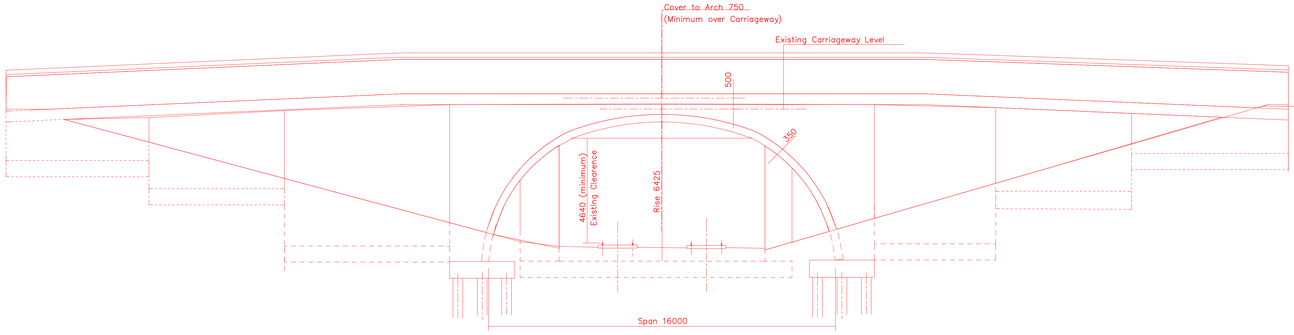
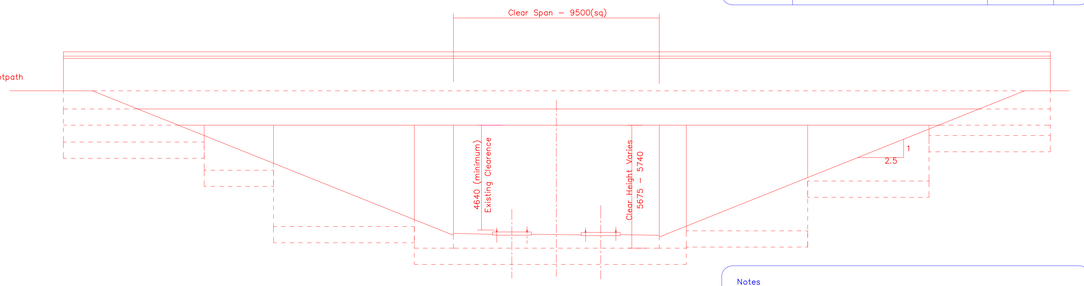
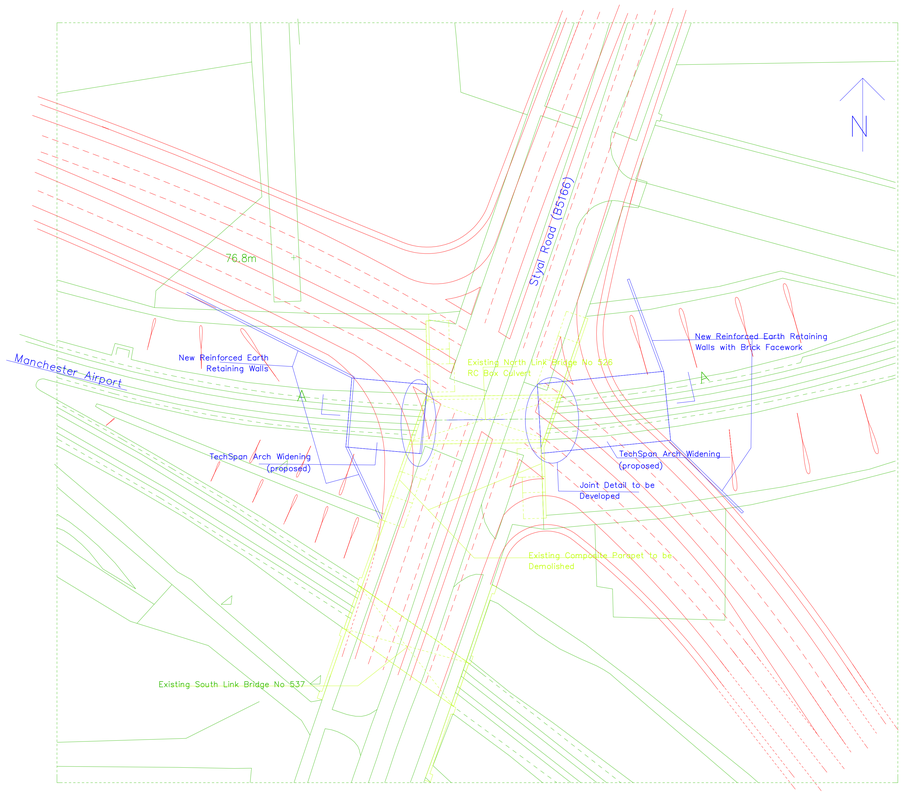


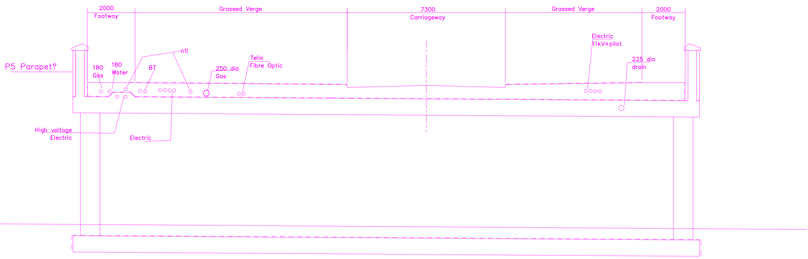
PROPOSED EAST ELEVATION 1:100



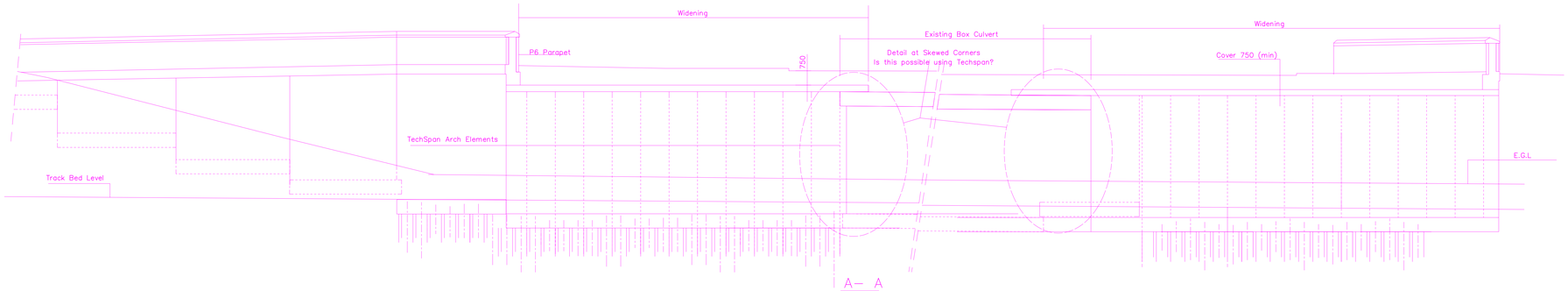
EXISTING EAST ELEVATION 1:100



PLAN 1:500



SECTION THROUGH DECK (EXISTING) 1:100



A– A
PROPOSED SECTION 1:100

Notes

1. Details of the Existing Stucture are from British Rail Drg No BRR 363/C/5020C of Jan 91 submitted to Manchester City Council for Technical Approval. Verified only by visual inspection from road level.
2. The proposed widening using Techspan Arch is one of few possible options considered suitable for the scheme. Feasibility to be further investigated and further developed in consultation with a Proprietory Designer/Installer eg. The Reinforced Earth Company.
3. Geometric road layout used at the Styal Road Junction is based on the Drg No A0/01234/005 of 25/07/03 – Titled Styal Road Junction – Option 1. Details may vary in the final layout.
4. The foundation details presented are schematic only based on design details of existing structures in the vicinty. May vary based on site investigation results (to be carried out)
5. The lateral clearences to be agreed with Networkrail and design span to be adjusted accordingly.

Revisions

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PROJECT TITLE
SEMMS – NEW RELIEF ROAD SCHEME
MANCHESTER AIRPORT ROAD LINK WEST
STYAL ROAD JUCTION BRIDGE No 526 – WIDENING

DRAWING TITLE
GENERAL ARRANGEMENT
Option 4 – Techspan Arch

DATE	DRAWN BY	CHECKED BY	APPROVED BY
Dec 2004	NDP		
SCALE	DATE DRAWN	DATE CHECKED	DATE APPROVED
1:500 1:100	Dec 2004		
	DRAWING ACCOUNT	PROJECT FILE	WINDOW FILE
	N:/nmda_jh/micrords/*	*/scheme.cpj	*/Drawings/good4.man

DRAWING No. A0/05/526/01 – 4 REVISION P

MEDC: FRAME: A0: P