- Option 10 - Subway with approach ramps.

Alterative to the above options, equestrian will be directed to use the by-pass route option (Route C).

4 Development Requirements for the Existing Equipment

4.1 Survey & Mapping

Refer to 'Topographic Survey Specification Report' in Appendix 'N'

4.2 Electrification and Plant

Drawing MMD-318484-C-DR-HW-07

- The road lighting will be designed in accordance with BS5489-1; 2013;
- The design will take into account the surrounding area and any environmental issues;
- Where necessary the lighting will be integrated with the existing road lighting;
- All lighting will conform to the Local Authority's standards;
- Lighting adjacent to the railway will be provided by full cut-off flat glass lanterns, taking in to account Network Rail standards and requirements.

Drawing MMD-318484-C-DR-BR-101 & 102

- Lighting adjacent to the railway will be provided by full cut-off flat glass lanterns, taking into account Network Rail standards and requirements;
- Lighting to the footbridge across the tracks will be provided by low level lighting contained within the bridge structure;
- All lighting levels provided for accessible routes will be in accordance with the Equalities Act 2010.

Subway

- Lighting adjacent to the railway will be provided by full cut-off flat glass lanterns, taking into account Network Rail standards and requirements;
- All lighting levels provided for accessible routes will be in accordance with the Equalities Act 2010;
- Lighting to the subway will include emergency coverage.

4.3 Signalling

It is understood that this line is currently scheduled for resignalling, with Foxton LC being renewed as MCB-OD. The following assessment assumes that the crossing is closed prior to this signalling scheme taking place. It should be noted that closure prior to resignalling will entail a cost benefit of approximately £1M."

The assets requiring alteration are as follows:

- Foxton Gate Box;
- Foxton Interlocking;
- Cambridge PSB relay room;
- Cambridge PSB control panel;
- Interlocking interface.

This assessment has been undertaken as a desktop study using information provided by Network Rail in the form of Signalling Infrastructure Condition Assessment (SICA) reports. The findings are as follows:

Foxton Gate Box. This was the subject of a secondary SICA inspection on 13th December 2012 (Report ref. NR/AN/SIG/ACR/12-13/40). Foxton Gate Box will be made fully redundant by these works and will therefore be decommissioned. There is no listed structure in close proximity which could affect the proposed scheme. The level crossing was completely renewed in 1998, with further minor renewals and additions in 2012. The wiring is classified as Normal and all equipment is in a generally good condition.

Foxton Interlocking. This was the subject of a secondary SICA inspection on 16th January 2013 (Report ref. NR/AN/SIG/ACR/12-13/53). Foxton interlocking will require alteration to remove the slotting controls on signals 113 and 114. The interlocking dates from 1983 and the overall category of the wiring is poor due to significant dry degradation. The risk of disruption due to wire damage is significant. Alterations to this interlocking will therefore require special measures to ensure that unaffected circuits are not damaged. The technician's

indication panel will also require updating to remove the level crossing. This consists of a single-piece fascia which is in good condition.

Cambridge PSB relay room. This was the subject of a secondary SICA inspection on 25th February 2010 (Report ref. NR/AN/SIG/ACR/10/09). Alterations will be required to recover the slot indications associated with the level crossing. The interlocking dates from 1983, with wiring of the geographical sets classified as Fair but other wiring classified as Poor due to dry degradation. The limited nature of the alterations suggests that the risk of disruption due to wire damage is low.

Cambridge PSB control panel. This is assessed in the same report as the relay room and its overall condition is considered to be good. The panel is an Entrance-Exit (NX) type panel of domino tile construction. Alterations to remove the level crossing and slot indications will be required.

Interlocking interface. This is provided via a GETS Delphin 1024 TDM provided in 2010. This equipment will be suitable for alteration.

Signal Sighting Issues

The road bridge is currently planned to be positioned above 1038B and 1039A points. Whilst the OLE design would normally prohibit points under bridges, the crossover (1039) and siding connection (1038) are not electrified. The closest signal on the Up Royston line is CA114, located on Foxton station platform. Sighting of this signal will not be affected by the road bridge. The signal ahead, CA110, is located at Shepreth station, 1990 yards beyond CA114. This signal will not be affected by the road bridge. The Down Royston signal closest to the road bridge is CA113, located 808 yards on the approach to the level crossing, placing the bridge between the signal and the crossing. The signal ahead of the bridge, CA115, is not visible from Foxton station. As a result of the above, the current planned road bridge has no impact on signal sighting.

The current design of the footbridge, as depicted on drawing MMD-318484-C-DR-BR-01, shows the bridge deck approximately above CA114 signal with the DDA-compliant ramps on the outside of the platform. This signal is approached along a gradual right-hand curve

with the last 200 yards or so being straight. This information has been deduced from Google Earth and Google Street view. This arrangement means that the current bridge design should not adversely impact the sighting of CA114, although this will be subject to a formal signal sighting committee at a later development stage. This may be undertaken using the Bentley signal sighting tool applied to a Building Information Management (BIM) model of the bridge design prior to construction. No other signals are affected.

4.4 Telecoms

4.4.1 Operational

The proposed works will have no effect on the existing Track/P' way alignment and signal sighting.

At the existing level crossing point it is proposed to provide a palisade fence gate controlled by Network Rail which will be used as a railway access point (RAP) for future Track/ P'way maintenance

It is understood that the existing gate box is to be made fully redundant and decommissioned. Any associated telephones and fax machines contained therein will be recovered and handed back to the maintainer as maintenance spares if required.

Once the level crossing has been decommissioned any existing emergency telephones will also be recovered and handed back to the maintainer as maintenance spares if required.

Any GSM-R coverage issues (e.g., the provision of lifts and/or footbridge) will be investigated at the GRIP 4 stage of the project and the requirements of Project Advice Notes PAN/E/TE/FT/0060 and PAN/E/TE/FT/0061 will be required to be adhered to.

4.4.2 SISS

<u>Telecommunications – SISS</u>

Site visits were carried out by others and the following conclusions reached:

Closed Circuit Television (CCTV)

There is currently no CCTV coverage of the station, although there is coverage of the level crossing. It is understood that at present the CCTV is provided by Cambridge County Council or the police to monitor movements at existing level crossing and is not part of the NR infrastructure.

Customer Information System (CIS)

There are currently two existing CIS Information Boards at the station. One Next Train Indicator (NTI) is located on the shelter of Platform 1 and a Next Train Indicator is located on a gallows post on Platform 2. The indicator displays appear to be new but at the time of a site visit did not appear to be working correctly.

The customer information systems appeared to be in good condition but their life expectancy and the condition of the associated cabling cannot be confirmed.

Public Address (PA)

There are a number of PA speakers on both Platforms 1 & 2 and as the station is unmanned these are thought to be Long Line Public Address (LLPA), but it has not been confirmed from where the announcements are made.

The public address (PA) appears to be in good condition, but will require maintaining. The life expectancy and the condition of the associated cabling cannot be confirmed.

Passenger Help Point (PHP)

There is an existing help point at the station on Platform 1, only sited on the wall of the shelter.

The PHP appears to be in good condition, but is understood not to be working and will require maintaining. The life expectancy and the condition of the associated cabling cannot be confirmed.

Proposed Telecoms Options

As there is currently no CCTV coverage at the station, it is assumed that the addition to any existing CCTV system or the provision of any new CCTV system will be the responsibility of the TOC.

New Subway

CCTV

CCTV coverage will be required in order to view the top and bottom of the ramps leading to and from Platforms 1 and 2 and at each end of the underpass covering its length.

It is proposed that CCTV coverage will consist of a camera looking at the ramps leading to and from Platforms 1 and 2 and two cameras at each end of the underpass covering its length.

Customer Information Systems

There is an option to provide new NTI screens at the top of each ramp leading to and from to Platforms 1 and 2 in order to inform passengers as to which platform their train is arriving/departing from and the time of the next train from that platform.

It is proposed that one new CIS screen will be provided at the top of each of the ramps leading to and from Platforms 1 and 2 and will be of the same type as the existing.

Public Address

New PA speakers will be required within the new underpass in order to inform passengers as to which platform their train is arriving/departing from and of any delays/disruptions to services.

It is proposed that a new PA speaker will be provided within the underpass.

PHP

There will no requirement for PHP units within the new underpass.

New footbridge and Ramps

CCTV

CCTV coverage will be required in order to view the stairs leading to and from Platforms 1 and 2, covering the footbridge itself.

It is proposed that the CCTV coverage will consist of two cameras looking at the stairs leading to and from Platform 2, one camera looking at the stairs leading to and from Platform1, and two cameras at each end of the footbridge covering its length.

Customer Information Systems

There is an option to provide new NTI screens at the top of each ramp leading to and from Platforms 1 and 2 in order to inform passengers as to which platform their train is arriving/departing from, and the time of the next train from that platform.

Public Address

There will not be a requirement for PA speakers on the footbridge or the ramps.

PHP

There will not be a requirement for PHP units on the footbridge or the ramps.

New footbridge with lifts

CCTV

CCTV coverage will be required in order to view the stairs leading to and from Platforms 1 and 2, the lifts and the footbridge.

CCTV coverage will also be required within each lift.

It is proposed that CCTV coverage will consist of a camera at ground level looking at the stairs leading to and from Platforms 1 and 2, a camera at ground level looking at the lifts leading to and from Platforms

1 and 2, two cameras on the footbridge covering the lifts and top of the stairs, and two cameras at each end of the footbridge covering its length.

A new camera will be provided within each lift as part of the lift build.

Customer Information Systems

There is an option to provide new NTI screens at the bottom of the stairs and the bottom of the ramps, in order to inform passengers as to which platform their train is arriving/departing from, and the time of the next train from that platform.

Public Address

There will not be a requirement for PHP units on the footbridge or the ramps or within the lifts.

PHP

A new assistance unit will be required within each lift as part of the lift build.

4.5 Track

Due to the existing condition of the track over the crossing, it is proposed to replace 18m (60 feet) length of track over the level crossing.

4.6 Vehicle Incursion Measures

This study considers the following measures to improve road safety and mitigate risk of vehicle incursion:

1. Appropriate road signage will be provided on both sides of the existing level crossing, at the proposed A10 tie-in as well as at the blocked off location to confirm new layout.
2. Vehicle access to the existing level crossing will be made impossible with permanent kerbs and protection bollards (if deemed necessary).

3. When the new alternative for pedestrian crossing is constructed, the existing level crossing route will be permanently blocked for pedestrians by installing 1.8m high steel palisade fence.
4. Driver's visibility at night will be improved by illuminating the area with an appropriate lighting system.
5. The new A10 by-pass route will be protected by the appropriate class of safety barriers on either side to prevent errant vehicles falling from the embankment or encroach into cutting.
6. Road gradients and bend radii are designed to improve visibility, thus reducing probability of accidents.
7. Wider footways on the bridge will be proposed to reduce risk and give drivers extra width to avoid accidents.
8. For an overbridge option, a high containment parapet (1.8m high) is proposed at each side of the structure continuing past the abutment and connecting with the highway safety fence by means of transition.

4.7 Platform Gauging Compliance

Based on the platform gauging information provided by Network Rail, the existing platforms at Foxton Station are non-compliant. These should be brought up to current standard when the proposed platform extension improvement works are planned.

Refer to Appendix 'Q' for platform gauging data.

Since the work proposed in this work scope is outside the boundary of platforms, there is no effect on existing platform gauging.

4.8 Drainage

There are open watercourses on 3 sides of the site (north, east and west) within a distance of 1km from the current crossing point. Based on the available sewer records, there appears to be no public surface water drains in the vicinity of the site. There may be some local streams or tributaries that drain the surface water of the area to these watercourses. These will need to be confirmed at the next stage of the project via consultation with the Local Authorities and site visits. The flooding potential of these local streams, if present, and their impacts to the proposal will need to be assessed.

The available sewer records show only foul drains present in the vicinity of the current crossing point. They are generally of 150mm diameter. There appears to be a pumping station located next to the existing crossing point. The local foul sewers are draining to this pumping station and a 250mm dia. rising main is also connecting to it from the east. From the pumping station, twin rising mains take the flow to the west. No information on the depths of the foul sewers and rising mains is available at present.

Potential Flood and Drainage Impacts of the Proposed Options

Overbridge Option

The approximately 0.5km long embankment will alter the current surface water overland flow paths. The impacts of this are not known at this stage and will need to be assessed at the next stage of the project. There may be requirements to provide culvert crossings underneath the embankment to maintain the current flow conditions. Similarly, if there are existing local watercourses draining the area which are disturbed by the embankment proposal, they will also need to be diverted. This will need confirmation at the next stage of the project.

Part of the embankment will be constructed on top of the existing foul sewers and rising mains. Anglian Water will need to be consulted on the proposals and they may require diversion of these services for the construction of the proposed works. Similarly, the proposed embankment may also affect other services serving the existing pumping station such as signalling and power cables. These services will also need to be positioned if affected.

For the new road itself, the new paved area will generate additional surface water runoff and it should not be discharged to the foul system unless Anglian Water agrees to it. Consultation with Anglian Water will need to be made at the next stage of the project on this matter. If it is confirmed not acceptable to drain to the foul system, alternative options including a soak away, draining to the local, or other nearby, watercourses will need to be considered.

Underpass Option

Most of the impact of the overbridge option, including its impact on existing overland flow paths, and additional surface water generated by the new paved surface also applies to the underpass option. However, the underpass option will very likely require diversions of the existing sewers and rising mains where the new cutting intercepts with these services. The scale of the diversion works required are also expected to be more significant than that required for the overbridge option, as the new sewer alignments will need to clear the cutting area.

For draining the new underpass, pumping facilities will probably be required. As with the overbridge option, the outfall for the additional runoff will need to be investigated.

5 Environment and Ecological Study

5.1 Environmental appraisal

Refer to Appendix 'R' for 'Environmental Appraisal and Action Plan'.

5.2 Ecological Constraints Study

Refer to Appendix 'S' for 'Ecological Constraints Study'.

6 Programme and Construction Methodology

6.1 Disruption to Rail Operations

None

6.1.1 Existing possession opportunities

The underpass structure option will be constructed adjacent to the rail embankment. The bridge will be installed using a box jacking technique, and will approximately require 65 hour blockade of the line during Easter or Christmas period. This possession duration is too long for operational requirement and against the Network Rail's policy of possessions. For this reason, the underpass solution is not considered as a viable option and is not considered for further development.

The substructure of the overbridge can be constructed in a separated green zone working, but the installation of the superstructure will require approximately a 24 hour possession plus other ROR possessions which can be achieved during the weekend blockade.

Recent possession planning meeting held at the end of April 2013 identified the following possessions are available on this line:

- 4no 27hours weekend possession in October 2017;
- 2no 27 hours weekend possessions in December 2017.

The following is the extract from the Network Rail Engineering Access statement for 2013 version 4.2 and 2014 version 2 that shows possession opportunities for the route between Royston to Shepreth Branch Junction.

EA1230 ROYSTON TO SHEPRETH BRANCH JN

SECTION		PERIOD A & B 09.12.2012 – 10.02.2013	PERIOD C 11.02.2013 – 24.03.2013	PERIOD D 25.03.2013 – 18.05.2013	PERIOD E TO G 19.05.2013 – 08.09.2013	PERIOD H & J 09.09.2013 – 07.12.2013	REMARKS
Royston (exclusive) and Shepreth Branch Jn 1230.1	WEEK END	0140 Sun to 0730 Sun Down BLOCKED 2335 Sat to 0615 Sun Up BLOCKED	0140 Sun to 0730 Sun Down BLOCKED 2335 Sat to 0630 Sun Up BLOCKED	0140 Sun to 0730 Sun Down BLOCKED 2335 Sat to 0630 Sun Up BLOCKED	0140 Sun to 0730 Sun Down BLOCKED 2335 Sat to 0630 Sun Up BLOCKED	0140 Sun to 0730 Sun Down BLOCKED 2335 Sat to 0630 Sun Up BLOCKED	If any isolation takes out power to Letchworth CSD the possession must be applied for pre CPPP publication. If post CPPP then late notice process to be adhered to. (Isolation finish time of 0540 Sun.)
	SUN/ MON	0135 Mon to 0625 Mon Down BLOCKED 2335 Sun to 0500 Mon Up BLOCKED **until 31.12.2012 and from 06.01.2013** 0135 Mon to 0625 Mon Down BLOCKED 0055 Mon to 0500 Mon Up BLOCKED	0135 Mon to 0625 Mon Down BLOCKED 2355 Sun to 0500 Mon Up BLOCKED	0135 Mon to 0625 Mon Down BLOCKED 2335 Sun to 0500 Mon Up BLOCKED	0135 Mon to 0625 Mon Down BLOCKED 2335 Sun to 0500 Mon Up BLOCKED	0135 Mon to 0625 Mon Down BLOCKED 2355 Sun to 0500 Mon Up BLOCKED **until 21.10.2013 and from 27.10.2013** 0135 Mon to 0625 Mon Down BLOCKED 2335 Sun to 0500 Mon Up BLOCKED	Part sections 83ABC, 84CDEFG only to be taken –standard possession opportunities not available west of Royston except for weeknight cyclics,
	MID WEEK	0005 T-F to 0430 T-F Down and Up Cambridge/ Chord/ Branch / Single BLOCKED 4 w.p.a (WA Cyclic Type 2a,2c) 2345 M-Th to 0430 T-F Down and Up Cambridge/ Chord / Branch / Single BLOCKED 3 w.p.a (WA Cyclic Type 2b) ① 0135 T-S to 0625 T-S Down BLOCKED 2345 M-F to 0500 T-S Up BLOCKED					

NOTES

① Divert and/or re-time via STP. See Section 5. These cyclics must align with LNE cyclical maintenance possessions between Hitchin (Cambridge Jn) & Meldreth. Hitchin & Tottenham Hale depots to liaise on possession limits at Royston.

EA1230 ROYSTON TO SHEPRETH BRANCH JN

SECTION		PERIOD A & B 08.12.2013 – 09.02.2014	PERIOD C 10.02.2014 – 23.03.2014	PERIOD D 24.03.2014 – 17.05.2014	PERIOD E TO G 18.05.2014 – 07.09.2014	PERIOD H & J 08.09.2014 – 13.12.2014	REMARKS
Royston (exclusive) and Shepreth Branch Jn 1230.1	WEEK END	0140 Sun to 0730 Sun Down BLOCKED 2335 Sat to 0615 Sun Up BLOCKED	0140 Sun to 0730 Sun Down BLOCKED 2335 Sat to 0630 Sun Up BLOCKED	0140 Sun to 0730 Sun Down BLOCKED 2335 Sat to 0630 Sun Up BLOCKED	0140 Sun to 0730 Sun Down BLOCKED 2335 Sat to 0630 Sun Up BLOCKED	0140 Sun to 0730 Sun Down BLOCKED 2335 Sat to 0630 Sun Up BLOCKED	If any isolation takes out power to Letchworth CSD the possession must be applied for pre CPPP publication. If post CPPP then late notice process to be adhered to. (Isolation finish time of 0540 Sun.)
	SUN/ MON	0135 Mon to 0625 Mon Down BLOCKED 2335 Sun to 0500 Mon Up BLOCKED	0135 Mon to 0625 Mon Down BLOCKED ~~2355 Sun~~ 0005 to 0500 Mon Up BLOCKED	0135 Mon to 0625 Mon Down BLOCKED 2335 Sun to 0500 Mon Up BLOCKED	0135 Mon to 0625 Mon Down BLOCKED 2335 Sun to 0500 Mon Up BLOCKED	0135 Mon to 0625 Mon Down BLOCKED ~~2355 Sun~~ 0005 to 0500 Mon Up BLOCKED	Part sections 83ABC, 84CDEFG only to be taken –standard possession opportunities not available west of Royston except for weeknight cyclics,
	MID WEEK	0005 T-F to 0430 T-F Down and Up Cambridge/ Chord / Branch / Single BLOCKED 4 w.p.a (WA Cyclic Type J) ① 0135 T-S to 0625 T-S Down BLOCKED 2345 M-F to 0500 T-S Up BLOCKED					

NOTES

① Divert and/or re-time via STP. See Section 5. These cyclics must align with LNE cyclical maintenance possessions between Hitchin (Cambridge Jn) & Meldreth. Hitchin & Tottenham Hale depots to liaise on possession limits at Royston.

6.2 Indicative construction programme

The route options considered will have a similar construction programme. The construction programme is prepared based on the options of approach embankments or cutting.

Refer to 'Appendix I' for indicative construction programme.

6.2.1 Construction Sequence

Once the construction site is mobilized:

- Remove site constraints and divert required services.
- Construct new bypass route;
- Divert A10 traffic to new route;
- Close A10 road for traffic at existing level crossing by installing proposed incursion protection;
- Construct footbridge foundations and supports with associated ramps or lift shafts;
- Block existing level crossing with palisade fence;
- During a night possession, remove OLE and install footbridge;
- Reinstate OLE to reduce height below the bridge.

6.3 Reliability and maintainability

Removal of the crossing asset reduces the scope for problems occurring and on-going maintenance of the asset.

7 Cost Estimates

7.1 Option cost estimates

Estimates have been developed for the options identified, based on assumptions and exclusions mention in section 7.2.

Contingencies of 30% and 40% are considered for the main bridge options and pedestrian access options respectively. Estimates are detailed in Appendix 'E' and are summarised below, (*Estimated cost not calculated as the options are unfeasible).

Route Options	Estimated Cost
Route C1 based on Overbridge Option	£ 13,200,000
Route C1 based on Underpass Option	£ 21,150,000
*Route C2 based on Overbridge Option	-
*Route C2 based on Underpass Option	-
*Route C3 based on Overbridge Option	-
*Route C3 based on Underpass Option	-
Route C4 based on Overbridge Option	£ 11,650,000
Route C4 based on Underpass Option	£ 19,170,000
Structure Options - Pedestrian/Cycleway Crossing	
Footbridge with Ramps	£ 3,000,000
Footbridge & Lift shafts - straight stairs	£ 2,300,000
Footbridge & Lift shafts - Compact stairs	£ 2,400,000
Footbridge with Ramps for Equestrians	£ 4,500,000
Subway/Bridleway with Ramps	£ 3,100,000

7.2 Assumptions and exclusions

The assumptions and exclusions are included within the cost estimates detailed in Appendix 'E'.

7.3 Risk

Main risks applicable to all options are as follows:

1. Land acquisition;
2. Existing buried services;
3. Exceptional inclement weather during construction;
4. Estimate variance.

Refer to Appendix 'F' for detailed description.

8 Consultation

8.1 Stakeholders

The primary groups of stakeholders identified so far for this scheme include full Network Rail list are:

a. Internal:

- Sponsors
- Network Operations
- RAM Team
- Foxton Maintenance Depot
- Maintenance
- Operations Manager
- ORA Team and Level Crossing Manager
- Liabilities Manager
- Network Strategy and Planning
- IP Anglia

b. External:

- ORR
- DfT
- FCC
- FOCs
- Barrington Cement Works
- Local Authority (CCC)
- Highways Agency
- Local Residents
- Road Users
- Rail Users
- Adjoining Landowners
- Utilities
- Environment Agency
- Natural England
- Protection for Rural England
- Cycle User Groups
- Equine User Groups (British Horse Society)
- Pedestrians/Ramblers

c. CDM Stakeholders:

- Client
- Clients Representative
- CDM Coordinator
- Designer
- Principal Contractor

9 Discussion Summary

Options Comparison Summary

Route	Advantages	Disadvantages
Route A	1. Relatively short span bridge 2. No additional structure required for pedestrians and equestrians at the level crossing. 3. Minimises the requirement of land acquisition. 4. No significant cost compared to bypass options.	1. Disruption to the A10 traffic. The A10 will have to be closed for a significant period (over 18 months), with traffic being diverted via A1198 and B603 to the north or via A505 to the south for the duration of the construction period. 2. Diversion of existing services is unavoidable and expensive for both the flyover and underbridge options. 3. Frontage access to existing dwelling adjacent to the A10 will be severely restricted, due to the embankment or retaining structure required to support/retain the adjacent ground from the road. 4. In order to accommodate this option, two properties (No.2 Barrington Road and No.4 Royston Road) adjacent to the level crossing will need to be acquired and demolished. 5. Noise and dust emissions due to demolition and construction. 6. The overbridge flyover headroom will be higher due to higher OLE at the existing level crossing location. 7. Station Road will be permanently closed. 8. There will be considerable disruption to rail services during construction. 9. Future extension of platforms will be affected.

Route	Advantages	Disadvantages
Route B	None	1. Clash with existing residential properties (approx. 10. No. properties will be affected). 2. Noise and dust emission levels during construction would be high. 3. Diversion of existing services is unavoidable and will have significant cost implication. 4. Existing of station would require long span crossing over the existing platforms. 5. Station Road is a main route to Foxton Village Centre, this route option will require alternate route to Station Road.

Route C Sub-Routes			
Options	**Estimated Cost**	**Advantages**	**Disadvantages**
Sub-Route C1	£13,200,000 (overpass) £21,150,000 (Underpass)	1. Designed to maintain existing design speed. 2. Cheaper than route C3. 3. No interface with Network Rail Depot.	1. Relatively bigger structural span (32.6m). 2. Significant land acquisition (approximately 45,000 m^2). 3. Interfaces with private property located on Barrington Road. 4. Requires a short retaining structure at Barrington road.
Sub-Route C2	*	1. Slightly shorter route compared than C1. 2. Cheaper than route C1 and C3. 3. No interface with Network Rail Depot.	1. Interfaces with private property located on Barrington road. 2. One step down from current design speed but within limit TD 9/93. 3. Requires a retaining structure at Barrington road.

Route C Sub-Routes			
Options	**Estimated Cost**	**Advantages**	**Disadvantages**
Sub-Route C3	*	1. Least impact on properties. 2. No requirement of retaining structure. 3. No impact on Network Rail Depot.	1. Required most land takes (approximately 45,000 m^2). 2. Largest structural span (54 m). 3. Most expensive of all routes. 4. Longest construction timescale. 5. One step down from current design speed but within limit TD 9/93.
Sub-Route C4	£ 11,650,000 (Overpass) £ 19,170,000 (Underpass)	1. Cheapest of all options 2. Minimum land take 3. Smallest structural span 4. Shortest of all routes	1. Interfaces with network rail depot which would require relocation/demolition. 2. Noise and dust emissions due to demolition. 3. One step down from current design speed but within limit TD 9/93.

Bridge Alternatives			
Options	**Estimated Cost**	**Advantages**	**Disadvantages**
Overbridge Option	£ 2,200,000	1. Minimises disruption to rail movements during construction. 2. No risk of flooding during construction. 3. Minimises the construction programme. 4. Cheaper than the underpass option. 5. Less chances to interface with buried services.	1. High headroom requirement due to existing OLE. 2. High headroom requires high abutments and approach embankments which extensively increase the construction cost. 3. High containment parapet is required over the bridge. 4. Possible clash with existing overhead power lines.

Bridge Alternatives			
Options	**Estimated Cost**	**Advantages**	**Disadvantages**
Underpass Option	£ 2,450,000	1. Lower headroom requirement. 2. Using box jacking method, rapid construction can be done without any disruption to train movements.	1. Box jacking technique requires high level of precession and accuracy. 2. Constant monitoring of track levels is required during construction. 3. Risk of flooding during excavation due to high water table. 4. Risk of flooding will enhance the construction timescale. 5. De-watering required during construction due to low water table i.e. 2m from ground level. 6. High water table will require permanent pumping station which enhances the cost of this option. 7. Diversion of unknown buried services or obstructions would significantly increase the cost and timescale of construction. 8. Would require extensive site work due to insitu concrete.

Pedestrian, Cycle & Bridleway Crossing Alternatives			
Options	**Estimated Cost**	**Advantages**	**Disadvantages**
Pedestrian Footbridge with Equality Act 2010 Ramps	£ 3,000,000	1. Easy and cheaper to construct compared to the subway option. 2. Prefabricated steel footbridge minimises disruption to train movements. 3. Does not require any casting of concrete over the track and is a quick and clean solution.	1. Ramps would require bigger land acquisition. 2. Longer ramps will cause significant problems for people with walking difficulties and wheelchair users. 3. Capital cost of ramps will be higher than lift shafts. 4. Ramp will require departure from standard. 5. Cannot accommodate a bridleway. 6. Footbridge would require regular inspections and maintenance of bearings.

Pedestrian, Cycle & Bridleway Crossing Alternatives			
Options	**Estimated Cost**	**Advantages**	**Disadvantages**
Footbridge with Equality Act 2010 Ramps for Pedestrians & Equestrians	£ 4,500,000	1. Shorter route for the riders. 2. Existing route, familiar to riders and horses. 3. Non-traffic route, much safer for the riders.	1. Horses likely to get frightened while crossing the bridge. 2. Riders would prefer to choose longer route over small metal bridge. 3. Will require wooden decking over the bridge to deaden the noise. 4. Inconvenient for pedestrians & cyclists. 5. Regular cleaning of ramps & surface.
Footbridge with Equality Act 2010 Lift shafts	£ 2,400,000	1. Cheapest of all options 2. Easy and quick to install. 3. Minimum land acquisition. 4. Convenient for wheel chairs and people with walking difficulties. 5. Minimum disturbance to neighbourhood communities.	1. Lift shafts will require constant maintenance to keep it in operation. 2. Steel footbridge requires regular painting which will require possession thus increases the whole life costs of the structure. 3. Cannot accommodate a bridle way. 4. The new steel structure will require earth bonding.

Pedestrian, Cycle & Bridleway Crossing Alternatives			
Options	**Estimated Cost**	**Advantages**	**Disadvantages**
Equality Act 2010 Compliance Subway	£ 3,100,000	1. Subway can a accommodate bridleway route. 2. Low maintenance cost. 3. Lower headroom requirement would minimise ramps length in compliance DDA standard.	1. Most expensive of all options. 2. Risk of flooding during excavation due to high water table which is approximately 2m below existing ground level. 3. Bigger land acquisition and higher maintenance cost. 4. Subway construction will require longer possession compared to other options. 5. This will undermine the foundations of existing platform. The option would be unfeasible if platforms are founded on piles. 6. Unknown buried services will have an impact on the cost and construction timescale. 7. Longer ramps will cause significant problems for people with walking difficulties and wheelchair

9.1 Preferred Options

Based on SIFT study, following options to be considered in GRIP 3 stage. Underpass options have not been forwarded due to the high risks involved during the construction. The matrix produced is attached in Appendix 'B' of the report.

9.1.1 Routes

Based on the significant direct effect on the number of residential properties, the Route A and B is considered to be inappropriate, particular with other Route options available for consideration. Therefore, Route B is not considered for further development.

Following a sift exercise, it is concluded that route option C1 and C4 has been put forward for further development. The route option C3 has not been put forward due to its complex construction and high cost.

9.1.2 Overbridge Options

- Precast Prestressed Concrete (PPC) Beams on Cantilever abutments (Option 1)
- Integral Bridge on bankseat abutments (Option 2)
- Integral Bridge on bankseat abutments (Option 3)

9.1.3 Underbridge Options

None

9.1.4 Pedestrian Access Options

- Footbridge with approach ramps and stairs (Option 7).
- Footbridge with lift shafts and stairs (Option 8).
- Footbridge with approach for pedestrian and equestrians (Option 9).

10 Conclusion and Recommendations for Further Work

The feasibility study of existing level crossing closure identified three main routes A-C. Route C is divided into four sub-route options, and each route discusses the opportunity of underpass or overpass, across the railway lines. All routes have been evaluated and their strength, weaknesses, opportunities and threats are highlighted in Appendix ‘A’. Risks and opportunities that have arised from the study are detailed in Appendix 'F' of this report.

Route A (online) & Route B (bypass south side) has been discounted at early stage because these present the least attractive solutions in terms of disruption to vehicular users along the A10, and potential demolition of up to 10 residential properties along the proposed line of the by-pass respectively. The remaining Route C, was further developed and an outline estimated cost (Refer to Section 7) was produced to compare the cost of sub-options C1 & C4 which were deemed the most favourable sub-options. Sub-option C3 was determined to be the most expensive solution due to its larger curve radius which in turn extended the limit of the works and increased the difficulties due to the larger bridge span. This route avoids the interface with existing Network Rail Depot but the benefits achieved versus cost comparison is not significant therefore this route is not taken forward to the next GRIP stage. Further consideration was given to develop routes with an approach cutting or embankment. The study concluded that an approach cutting with an underpass option is more problematic to construct due to the presence of high water table and will require a permanent pumping system within the cutting area, with considerable long term financial maintenance impact.

During the bridge option development an RC box insitu construction was considered at early stage but was discounted due to the extensive concreting and possession requirements. The bridge feasibility considers a solution which involves as much prefabrication as possible to minimise disruption to rail movements. The overbridge options are economical and simple to construct and will require less possession time when compared to an underpass solution. The estimated cost of the overbridge is 18.5% less than underpass for the same route. The estimated cost of an overbridge and underbridge proposal is given as below:

Overbridge Option	Underpass Option
£2,000,000	£2,450,000

The increased cost of an underpass option is mainly due to the significant excavation and it is anticipated that the construction work programme for the underpass structure will be longer than overbridge solution (refer to Appendix 'E' for estimated construction work programmes). It is concluded that an underpass solution is an undesirable option due to its complex construction and increased capital and maintenance cost.

Different overbridge options were discussed in the report (refer to section 2.4.1), but it is not intended to draw specific conclusion or make recommendations on the choice of bridge type at this stage. This study will allow the next GRIP stage to develop these options further and conclude the optimum solution.

The report has also identifies a preferred location for the construction of a new footbridge or subway at existing level crossing. Provision of providing a combine footbridge for bridleway and pedestrian has been anticipated over the existing level crossing but this would significantly increases the capital cost of the structure and is a serious safety risk. The option of 'Footbridge with ramp approaches and stairways' is considered as an unfeasible alternative due to the requirement for excessive ramp lengths adding to the construction cost. Moreover, this option does not compliance fully with Equality Act 2010 requirements and will require departure for acceptance. A tunnel/subway option may incur excessive costs due to unforeseen site constraints and unfavourable ground conditions. The works programme to construct the subway will be considerably longer and will require a longer possession of the track when compared to alternatives. A footbridge with lift shafts is considered to be a preferred alternative as it provides simple and cost effective solution, so this option is sifted for further development.

The recommendation of the above options is based on a number of considerations that have been taken into account to achieve the most suitable form of structure for the client, road users, construction issues

and the surrounding environment. The options recommended for further development are summarised in the SIFT sheet (refer Appendix 'B').

In order to progress the work we recommend the review of the following key issues in the next GRIP stage,

- Undertake detail ground investigation and prepare a factual report based on the investigation.
- Carry out a topographic survey of areas where the proposed intervention impacts on existing infrastructure or external land owners.
- Investigate the existing buried services and negotiate with the land owners.
- Carry out an outline design of the structure, to facilitate early acceptance from key stakeholders.
- Consult with the local community.

11 Appendices

Appendix A. Strengths Weaknesses Opportunities and Threats (SWOT) Analysis

Options	Description	Strengths and Opportunities	Weaknesses and Threats
Do Nothing	**No change from the existing**	▪ No infrastructure works required. ▪ No blockade or possession requirements. ▪ No requirement of land acquisition.	▪ Does not meet the basic objectives of the study. ▪ Safety risk to the public. ▪ Disruption to A10 traffic. ▪ Weakness to the operation of Train Operating Companies.
Route A	**On-line Grade Separation**	▪ No additional structure requirement for pedestrians, cyclist and bridleways. ▪ Can achieve the requirement with minimal investment compared to other options. ▪ Minimum land acquisition. ▪ Relatively smaller bridge span.	▪ Disruption to the A10 traffic. The A10 will have to be closed for a significant period (over 18 months), with traffic being diverted via A1198 and B603 to the north or via A505 to the south for the during the construction period. ▪ Presence of existing services makes this expensive for both over and underbridge options. ▪ Demolition of existing houses adjacent to the level crossing. ▪ Noise and dust emission due to demolition. ▪ Would have an effect on future extension of platforms. ▪ Station Road will be permanently closed. ▪ 췅얺얻siderable disruption to rail services during construction.
Route B	**Bypass-South Side**	▪ Bridge would span over two track lines resulting in shorter span of the structure.	▪ Interface with existing residential dwellings requiring demolition. ▪ Noise and dust emission due to demolition. ▪ Diversions of existing services are unavoidable and possibly would increase the cost of the scheme. ▪ May result in longer route in order to avoid existing station.
Sub-Route C1	**Bypass-North Side**	▪ Designed to maintain existing design speed. ▪ Shorter Route than Sub-Route C3. ▪ Minimal effect on Network Rail Depot.	▪ Relatively bigger structure span than c2 and C4. ▪ Large land acquisition compared to C4. ▪ Interfaces with private property located on the Barrington Road. ▪ Requires a short retaining structure at Barrington road. ▪ Will be cheaper than C3 but expensive than C2 and C4.
Sub-Route C2	**Bypass-North Side**	▪ Slightly shorter route compared to C1. ▪ Cheaper than route C1 and C3. ▪ Minimal effect on Network Rail Depot.	▪ Interfaces with private property located on Barrington road. ▪ One step down from current design speed but within limit TD 9/93. ▪ Requires a retaining structure at Barrington road
Sub-Route C3	**Bypass-North Side**	▪ Least impact on properties. ▪ No requirement of retaining structures. ▪ No impact on Network Rail Depot.	▪ Required maximum land take. ▪ Would require large span structure. ▪ Most expensive of all routes. ▪ Enhance construction timescale. ▪ One step down from current design speed but within limit TD 9/93.

Options	Description	Strengths and Opportunities	Weaknesses and Threats
Sub-Route C4	**Bypass-North Side**	▪ Cheapest of all options. ▪ Minimum land take. ▪ Small structure span. ▪ Shortest of all routes.	▪ Interfaces with network rail depot which would require demolition. ▪ Noise and dust emissions due to demolition. ▪ One step down from current design speed but within limit TD 9/93.
Bridge Alternatives			
Option 1	**Simply supported deck - Prestress beams**	▪ Low maintenance cost compared to steel construction but higher than integral form of construction. ▪ Horizontal thrust will be lowered on substructure and foundations compared to integral options.	▪ Large amount of crane lifts during erection. ▪ High volume of insitu concrete. ▪ Maintenance cost due to bearings and movement joints. ▪ Prestress beams are heavier than steel beams. ▪ Higher construction depth compared to Integral/semi-integral options. ▪ Would require longer construction time scale compared to integral for of construction.
Option 2	**Fully Integral bridge on bank seats**	▪ Minimum maintenance cost. ▪ Minimises insitu concreting for the substructure. ▪ Relatively less vertical load on the foundations. ▪ Minimal construction depth of the structure. ▪ Easy to demolish due to less smaller substructure.	▪ This form would significantly increase the structural span. ▪ Longer span is likely to increase the cost of the structure compared to other options.
Option 3	**Semi -integral bridge on bank seats**	▪ Can be constructed on soft ground. ▪ Low construction depth. ▪ Low maintenance cost ▪ Easy to demolish ▪ Simple rapid & safe construction. ▪ Reduce need for piles or foundation improvement. ▪ Less volume of concrete compared to alternatives. ▪ Panels can be modified on site to suit geometric constraints. ▪ No requirement for scaffolding & formwork during installation.	▪ Drainage outlets are required to prevent settlement. ▪ No cracks or warning of settlement is apparent on the structure.
Option 4	**Steel Composite Deck.**	▪ Easy to pre-camber during fabrication. ▪ Due to its lighter weight, smaller crane may be use during erection. ▪ Easy transportation and rapid erection. ▪ Shallow construction depth compared to prestress beams.	▪ Bracing between beams is required for their stability during erection. ▪ Higher long term maintenance cost.

Options	Description	Strengths and Opportunities	Weaknesses and Threats
Option 5 & 6	**Underpass Options**	▪ Lower headroom requirement compared to overbridge. ▪ Using box jacking method, rapid construction can be done without any disruption to train movements.	▪ Box jacking technique requires high level of precession and accuracy. ▪ Constant monitoring of track levels is required during construction. ▪ Diversion of unknown buried services or obstructions would significantly increase the cost and timescale of construction. ▪ Risk of flooding during excavation would require de-watering works which will enhance the construction time scale. ▪ High water table will require permanent pumping station which enhances the cost of this option. ▪ Would require extensive site work due to insitu concrete.
Pedestrian/Cyclists/Equestrian Crossing Alternatives			
Option 7	**Footbridge with Equality Act 2010 Ramps**	▪ Easy and cheaper to construct compared to the subway option. ▪ Prefabricated steel footbridge minimises disruption to train movements. ▪ Does not require any casting of concrete over the track and is a quick and clean solution.	▪ Ramps would require bigger land acquisition. ▪ Longer ramps will cause significant problems for people with walking difficulties and wheelchair users. ▪ Capital cost of ramps will be higher than lift shafts. ▪ Ramp may require departure from standard. ▪ Cannot accommodate a bridleway. ▪ Footbridge would require regular inspections and maintenance of bearings.
Option 8	**Footbridge with Equality Act 2010 lift shaft**	▪ Cheapest of all options ▪ Easy and quick to install. ▪ Minimum land acquisition. ▪ Convenient for wheel chairs and people with walking difficulties. ▪ Minimum disturbance to neighbourhood communities.	▪ Lift shafts would require constant monitoring/maintenance to keep it in operation. ▪ Steel footbridge requires regular painting which will require possession thus increases the whole life costs of the structure. ▪ Cannot accommodate a bridle way. ▪ The new steel structure will require earth bonding.

Option 9	**Footbridge with ramps for Pedestrians/Cyclists/Equestrians**	▪ Allow equestrians to cross the railway at or close to existing bridleway route. ▪ Prefabricated steel footbridge minimises disruption to train movements. ▪ Does not require any casting of concrete over the track and is a quick and clean solution.	▪ Ramps would require bigger land acquisition. ▪ Longer ramps will cause significant problems for people with walking difficulties and wheelchair users. ▪ Wider footbridge and ramps to accommodate equestrians as well as pedestrians, hence capital cost will be higher. ▪ Ramp may require departure from standard. ▪ Risk of horses being frightened by passing train, while they are crossing the bridge. ▪ Potential higher daily maintenance required to remove horse excrement. ▪ Potential requirement for additional wooden decking to reduce noise from horse crossing the steel deck. ▪ Footbridge would require regular inspections and maintenance of bearings.
Option 10	**Subway with Equality Act 2010 Ramps**	▪ Subway can a accommodate bridleway route. ▪ Low maintenance cost. ▪ Lower headroom requirement would minimise ramps length in compliance DDA standard.	▪ Most expensive of all options. ▪ Risk of flooding during excavation due to high water table which is approximately 2m below existing ground level. ▪ Bigger land acquisition and higher maintenance cost. ▪ Subway construction will require longer possession compared to other options. ▪ This will undermine the foundations of existing platform. The option would be unfeasible if platforms are founded on piles. ▪ Unknown buried services will have an impact on the cost and construction timescale. ▪ Longer ramps will cause significant problems for people with walking difficulties and wheelchair users.

Appendix B. SIFT Determination

Project	**318484**
Intervention	**Foxton**
Grip Stage	**2**

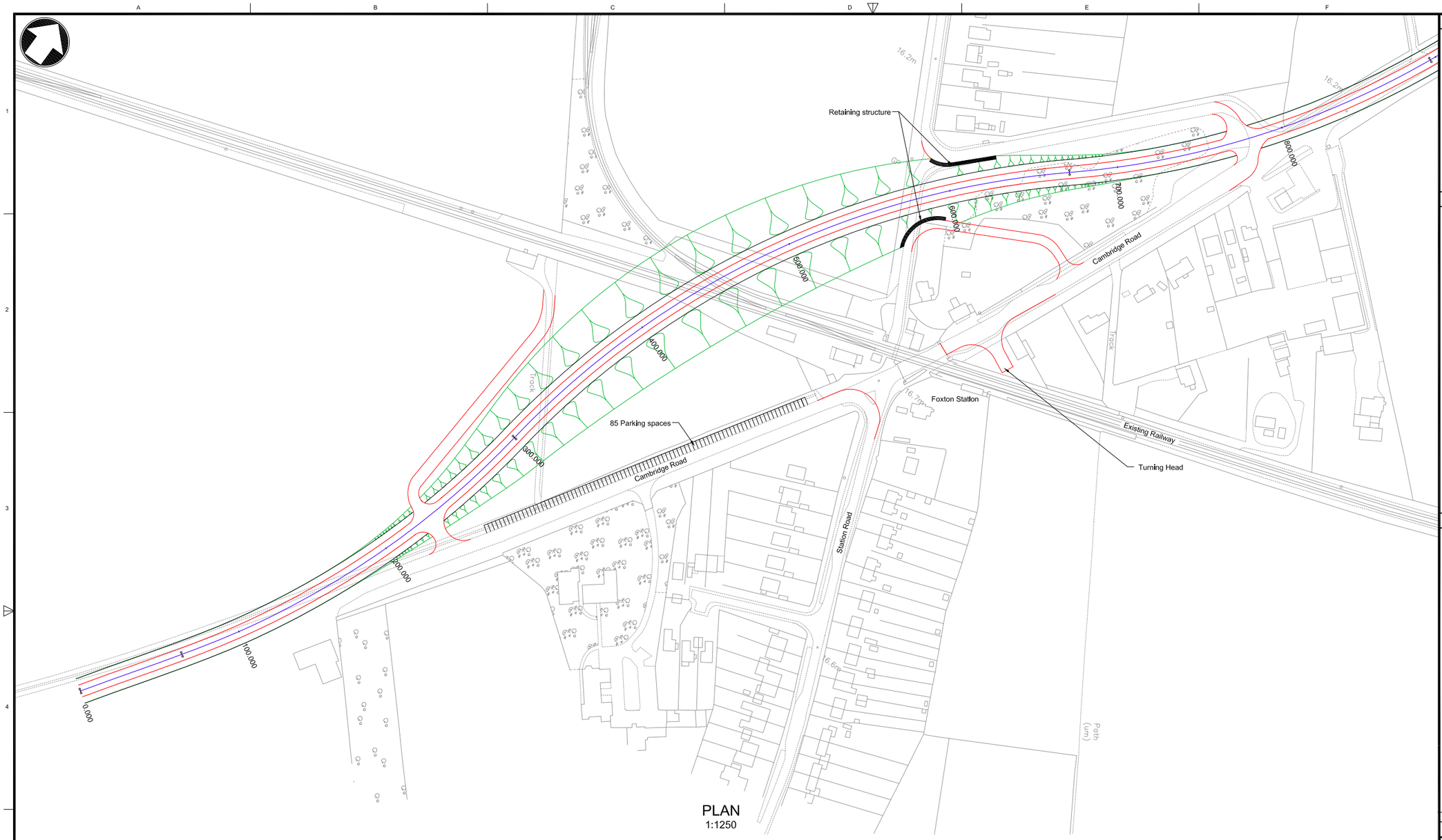
Key

- High Impact, not beneficial or does not meet basic requirement
- Neutral;no significant effect;middle cost effect (relative to options considered)
- Meets requirement;beneficial;low capital cost (relative to options considered)

- Carry forward to Next GRIP Stage
- Option dismissed - due to the clear fact the option is not practical.
- Option dismissed with stakeholders' agreement

Option	Option Type	Operational Flexibility	Capital Cost	Construction Methodology	Construction Access	Disruption to Rail Operations	Impact on third Parties	Benefit Realisation	Environmental Constraints	Land Intake	System Safety	Stakeholder Issues	Consents Required	Performance	Operational Saving	Provision for future Proofing	Take Option Forward	Commentary
Route Options																		
Do Nothing Option	No Infrastructure works																NO	Does not meet the objective
Route A	Online route																NO	Disruption to A10 traffic, Interface with existing houses & services.
Route B	Bypass south side																NO	Interface with existing houses
Route C1	Bypass north isde																YES	Interfaces with private property located on Barrington road.
Route C2	Bypass north side																YES	Not designed to current design speed but within the desirable limit of
Route C3	Bypass north side																NO	Longer route, capital cost not feasible
Route C4	Bypass north side																YES	Shortest of all route, minimum land intake, shorter structure span.
Structural Options at new level crossing																		
Option 1	Simply supported, overbridge																YES	High volume of insitu concrete.
Option 2	Integral, overbridge																YES	Longer bridge span, minimum maintainance cost
Option 3	Semi-Integral, overbridge																YES	Less concrete, no excavation, easy to demolish, low maintainance
Option 4	Steel composite overbridge deck																NO	High maintenance and capital cost
Option 5	Box Jacking technique, Underpass																NO	Requires high level of precession and accuracy
Option 6	Cut & Cover, Underpass																NO	Risk of flooding during excavation due to high water table
Structural Option - Pedestrains, Cyclist and Equestrians																		
Option 7	Footbridge with ramps for Pedestrain																YES	Long ramp lengths, unsuitable for disable people.
Option 8	Footbridge with stairs and lift shaft																YES	Cost effective, minimum land acquisition.
Option 9	Footbridge with ramps for Pedestrains, Cyclist and Equestrains																YES	Non traffic route but could friegthen horses during train movement.
Option 10	Subway with ramps																NO	Expensive, possible flooding during construction & max land intake

Appendix C. Layout Option Sketches



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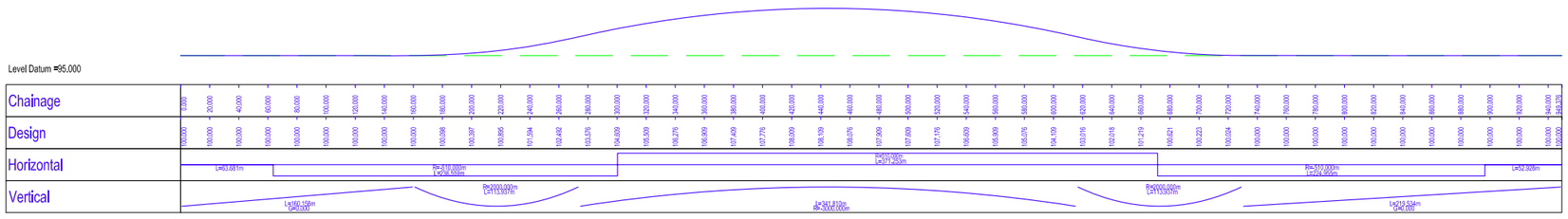

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Notes

1. All dimensions are in millimetres unless otherwise stated.
2. Do not scale any items or information from this drawing.
3. Ground Level assumed to be 100maOD.
4. Horizontal alignment based on 50mph road (Design Manual for Roads and Bridges) Vertical alignment based on 50mph road. (Design Manual for Roads and Bridges).

Key to symbols

Proposed Road Centerline
Proposed Channel Lines
Proposed Earthworks

Reference drawings

Rev	Date	Drawn	Description	Ch'k'd	App'd
AG	20.02.13		Preliminary Issue		

Mott MacDonald
Canterbury House
85 Newhall Street
Birmingham, B3 1LZ
United Kingdom
T +44 (0)121 2374000
F +44 (0)121 2374001
W www.mottmac.com

Client
Network Rail

Title
NR - Foxton Level Crossing Closure
ELR: SBR Milage 50 (Crossing No 104)
Highway Layout - Option 1
Overbridge Option.

Designed	A.Griffiths		Eng check	C.Searson	
Drawn	A.Griffiths		Coordination	F.C.W Yeung	
Dwg check	C.Searson		Approved	M.A.Alton	

Scale at A1	Status	Rev
As Shown	APR	P1

Drawing Number
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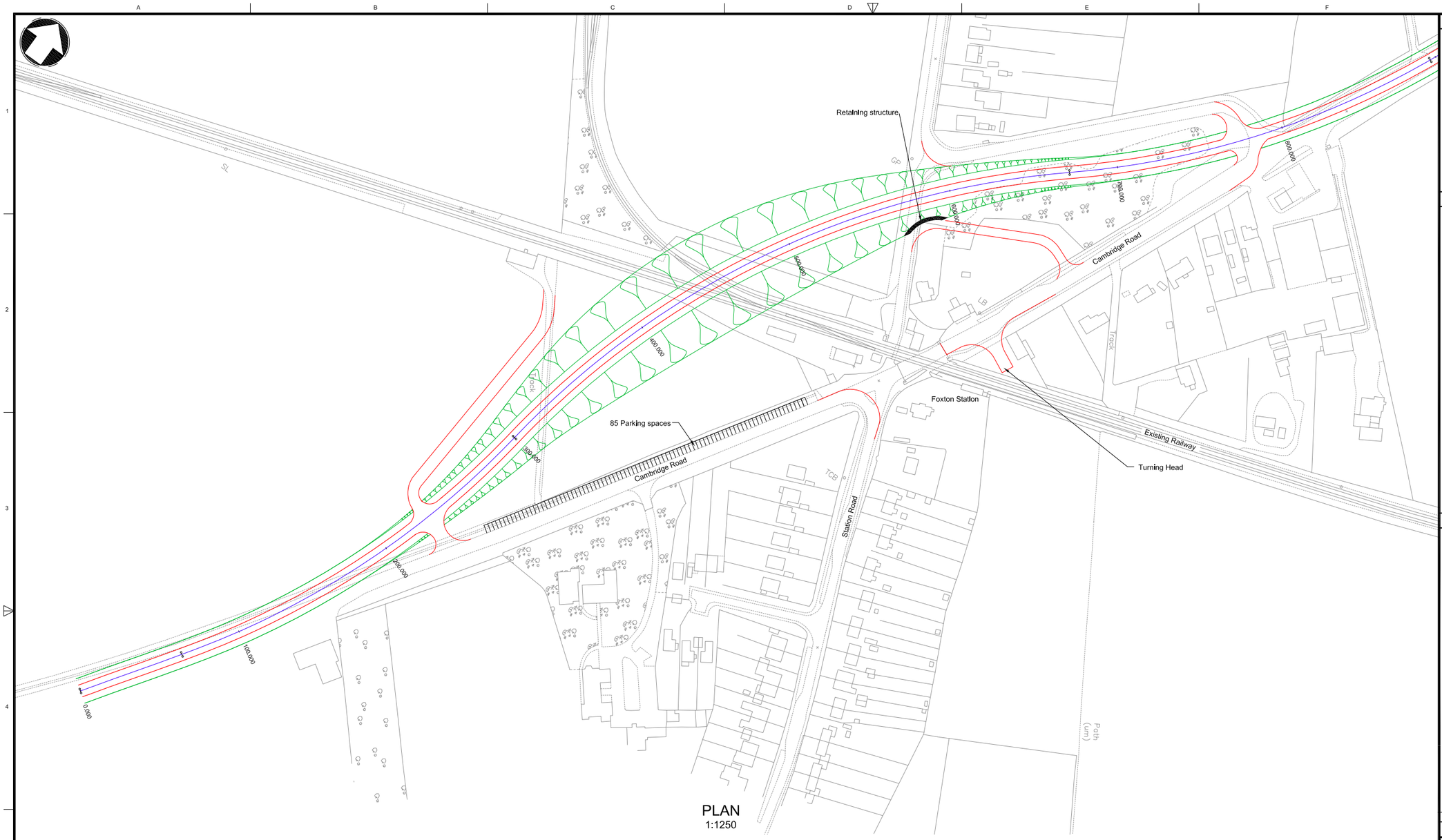

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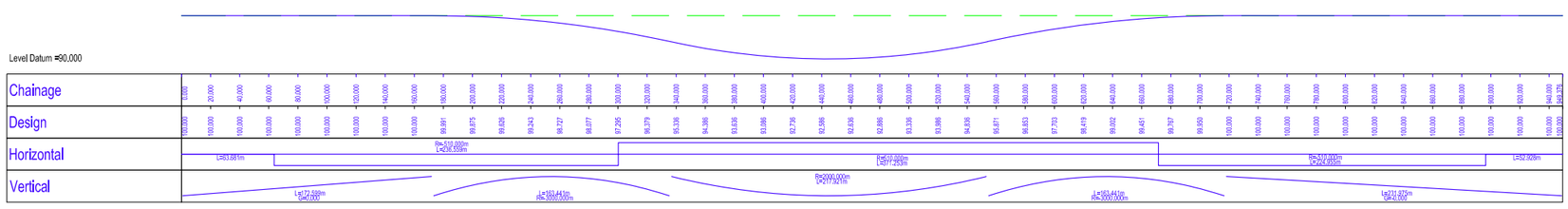

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Notes

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4. Horizontal alignment based on 50mph road (Design Manual for Roads and Bridges) Vertical alignment based on 50mph road. (Design Manual for Roads and Bridges).

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Mott MacDonald
Canterbury House
85 Newhall Street
Birmingham, B3 1LZ
United Kingdom
T +44 (0)121 2374000
F +44 (0)121 2374001
W www.mottmac.com

Client
Network Rail

Title
NR - Foxton Level Crossing Closure
ELR: SBR Milage 50 (Crossing No 104)
Highway Layout - Option 1
Underpass Option.

Designed	A.Griffiths	Eng check	C.Searson	
Drawn	A.Griffiths	Coordination	F C W Yeung	
Dwg check	C.Searson	Approved	M.A.Alton	

Scale at A1	Status	Rev
As Shown	APR	P1

Drawing Number
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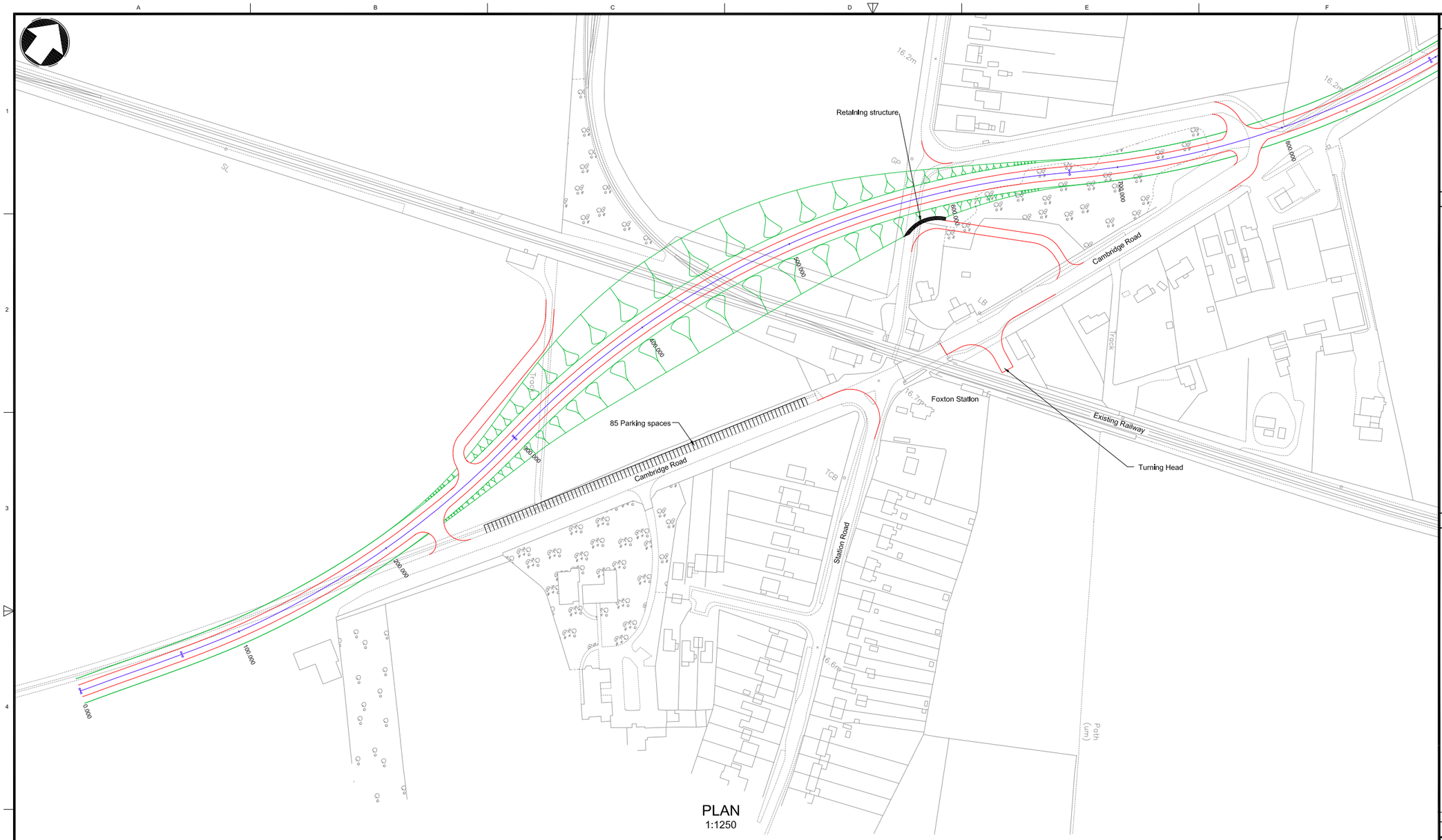

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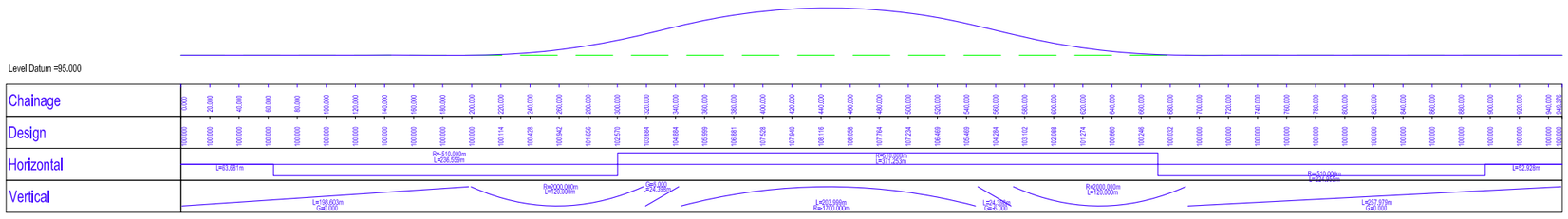

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Notes

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2. Do not scale any items or information from this drawing.
3. Ground Level assumed to be 100m aOD.
4. Horizontal alignment based on 50mph road (Design Manual for Roads and Bridges) Vertical alignment based on 40mph road. (Design Manual for Roads and Bridges).

Key to symbols

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- Proposed Earthworks

Reference drawings

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Mott MacDonald
Canterbury House
85 Newhall Street
Birmingham, B3 1LZ
United Kingdom
T +44 (0)121 2374000
F +44 (0)121 2374001
W www.mottmac.com

Client
Network Rail

Title
NR - Foxton Level Crossing Closure
ELR: SBR Milage 50 (Crossing No 104)
Highway Layout - Option 2
Overbridge Option.

Designed	A.Griffiths	Eng check	C.Searson	
Drawn	A.Griffiths	Coordination	F C W Yeung	
Dwg check	C.Searson	Approved	M.A.Alton	

Scale at A1	Status	Rev
As Shown	APR	P1

Drawing Number
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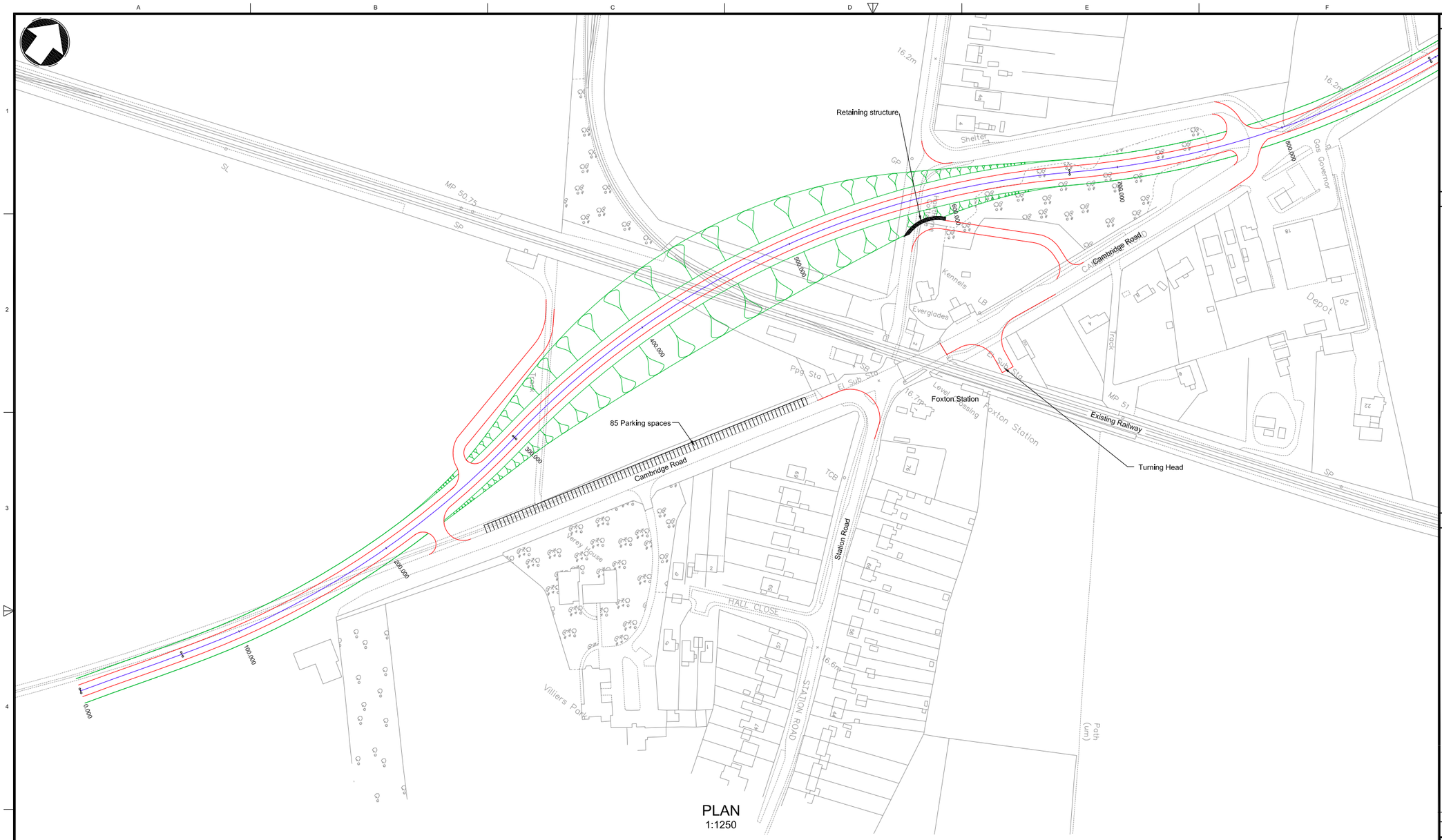

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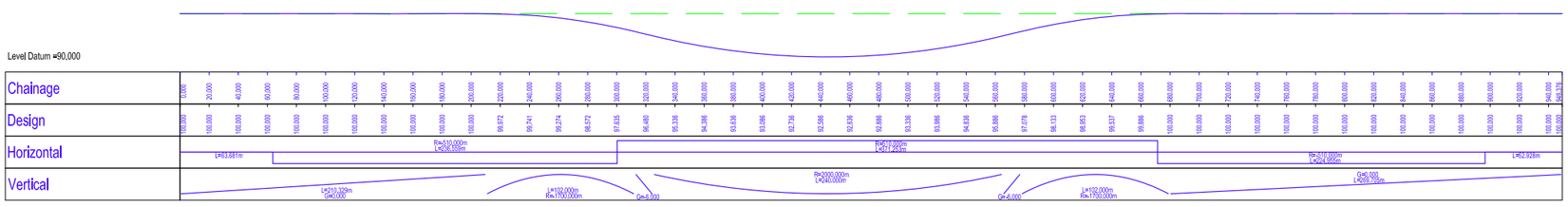

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3. Ground Level assumed to be 100m aOD.
4. Horizontal alignment based on 50mph road (Design Manual for Roads and Bridges) Vertical alignment based on 40mph road. (Design Manual for Roads and Bridges).

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Mott MacDonald
Canterbury House
85 Newhall Street
Birmingham, B3 1LZ
United Kingdom
T +44 (0)121 2374000
F +44 (0)121 2374001
W www.mottmac.com

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ELR: SBR Milage 50 (Crossing No 104)
Highway Layout - Option 2
Underpass Option.

Designed	A.Griffiths		Eng check	C.Searson
Drawn	A.Griffiths		Coordination	F C W Yeung
Dwg check	C.Searson		Approved	M.A.Alton

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As Shown	APR	P1

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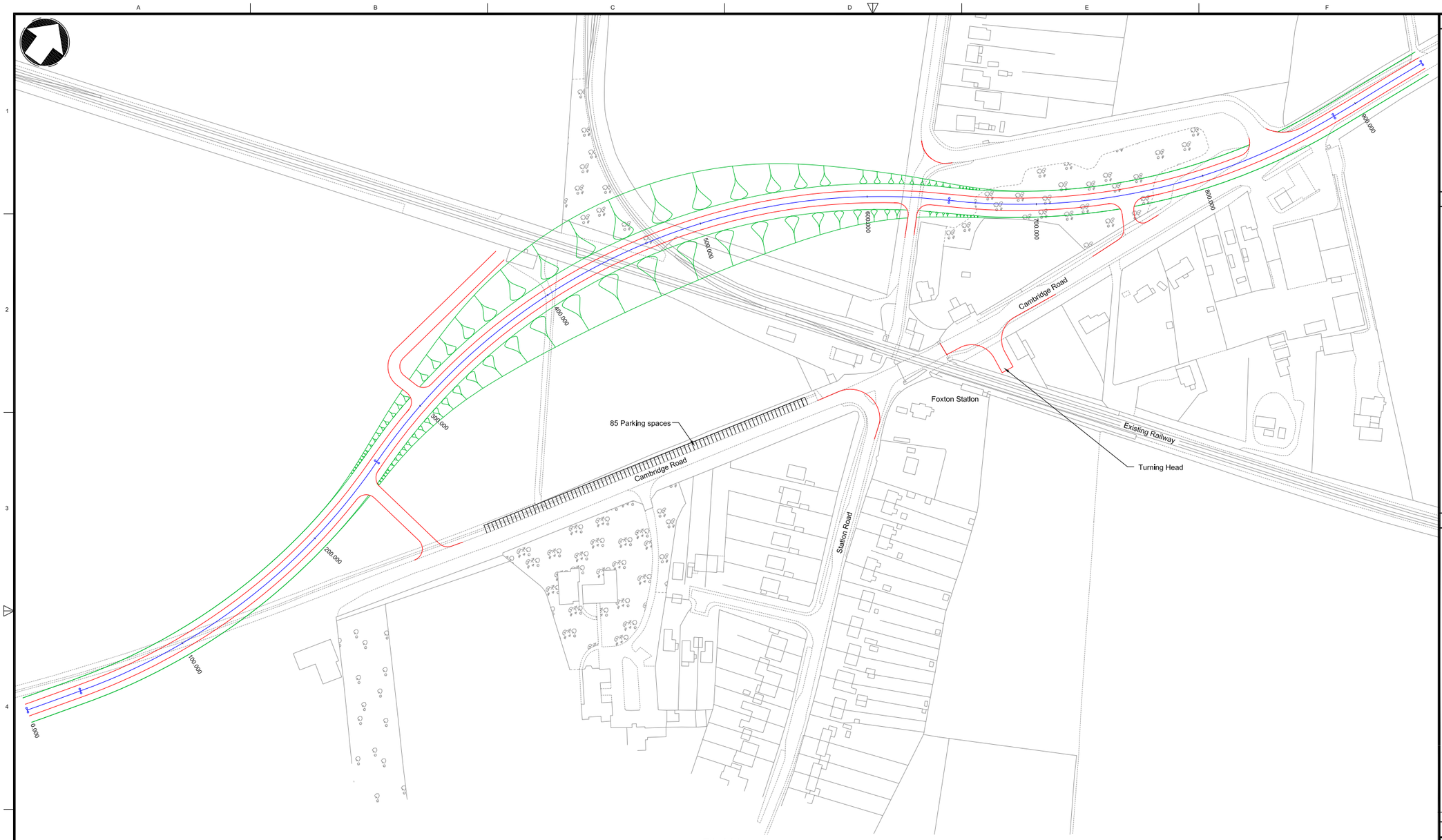

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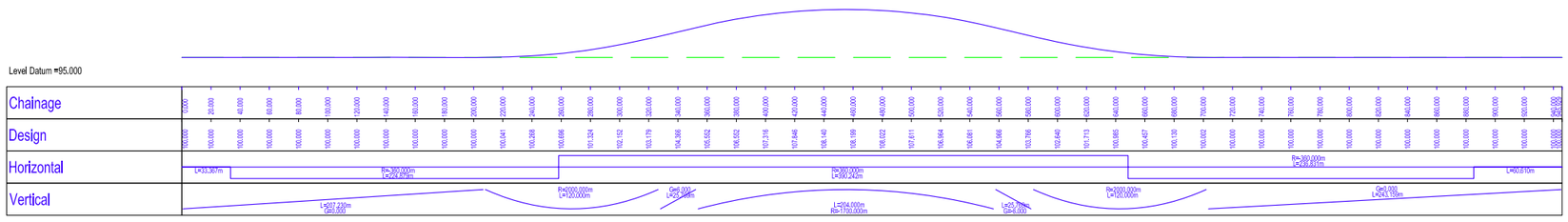

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Notes

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2. Do not scale any items or information from this drawing.
3. Ground Level assumed to be 100maOD.
4. Horizontal alignment based on 40mph road (Design Manual for Roads and Bridges) Vertical alignment based on 40mph road. (Design Manual for Roads and Bridges).

Key to symbols

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- Proposed Channel Lines
- Proposed Earthworks

Reference drawings

Rev	Date	Drawn	Description	Ch'k'd	App'd
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Mott MacDonald
Canterbury House
85 Newhall Street
Birmingham, B3 1LZ
United Kingdom
T +44 (0)121 2374000
F +44 (0)121 2374001
W www.mottmac.com

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Title
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ELR: SBR Milage 50 (Crossing No 104)
Highway Layout - Option 3
Overbridge Option.

Designed	A.Griffiths	Eng check	C.Searson	
Drawn	A.Griffiths	Coordination	F C W Yeung	
Dwg check	C.Searson	Approved	M.A.Alton	

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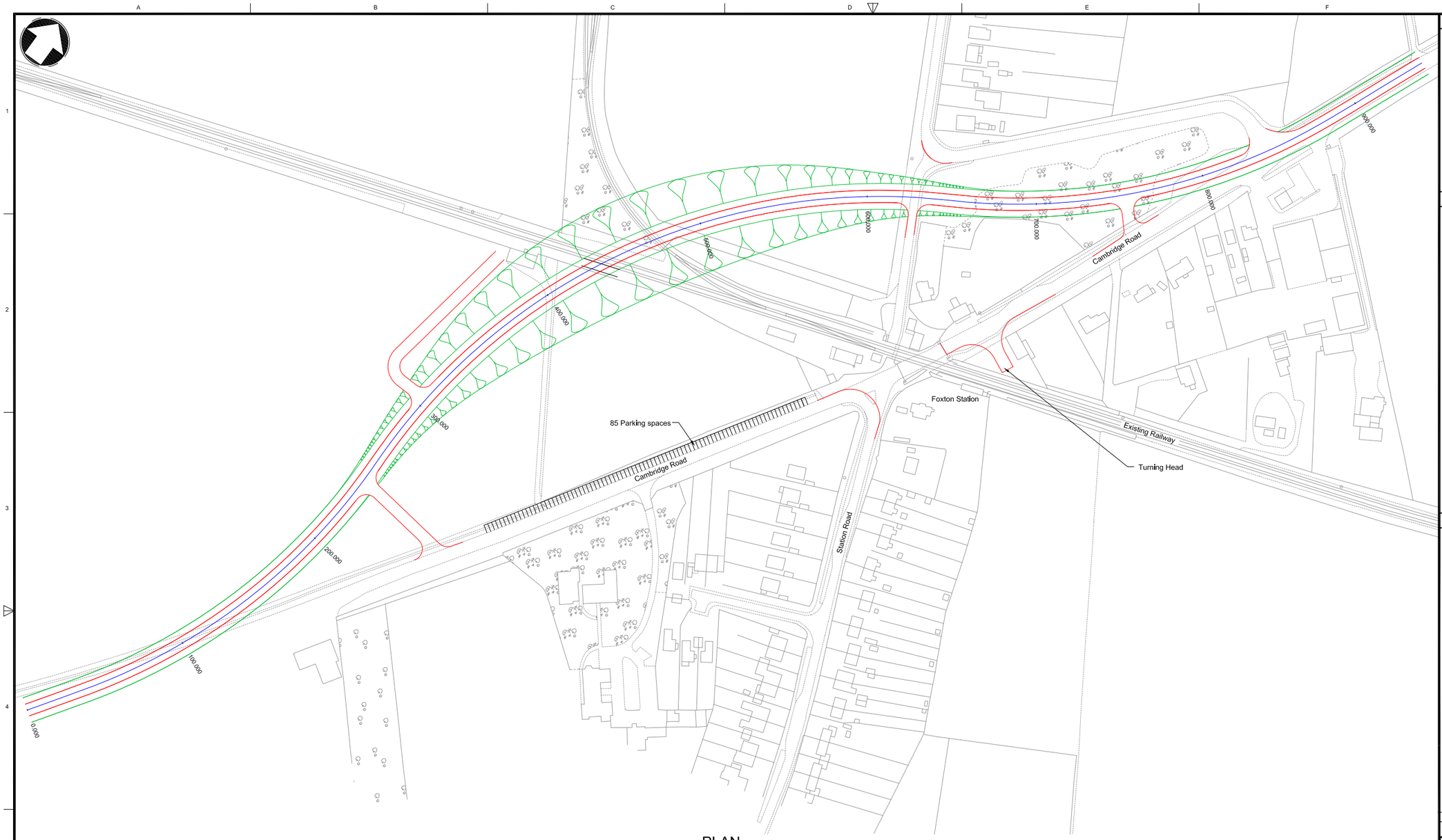

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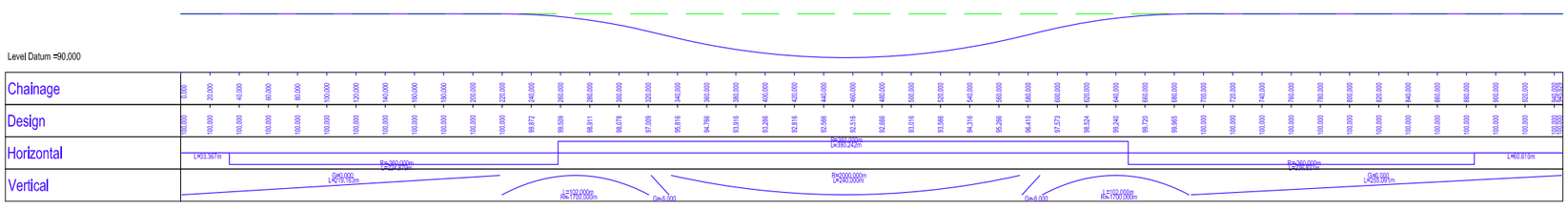

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Key to symbols

Proposed Road Centerline
Proposed Channel Lines
Proposed Earthworks

Reference drawings

Rev	Date	Drawn	Description	Ch'k'd	App'd
AG	20.02.13		Preliminary Issue		

Mott MacDonald
Canterbury House
85 Newhall Street
Birmingham, B3 1LZ
United Kingdom
T +44 (0)121 2374000
F +44 (0)121 2374001
W www.mottmac.com

Client
Network Rail

Title
NR - Foxton Level Crossing Closure
ELR: SBR Milage 50 (Crossing No 104)
Highway Layout - Option 3
Underpass Option.

Designed	A.Griffiths		Eng check	C.Searson	
Drawn	A.Griffiths		Coordination	F C W Yeung	
Dwg check	C.Searson		Approved	M.A.Alton	

Scale at A1	Status	Rev
As Shown	APR	P1

Drawing Number
MMD-318484-C-DR-HW- 06

P:\Birmingham\BNI\318484 Foxton Level Crossing Elimination\Drawings\Highways\MMD-318484-C-DR-HW-06.dwg Mar 1, 2013 - 4:50PM grl49221

PLAN
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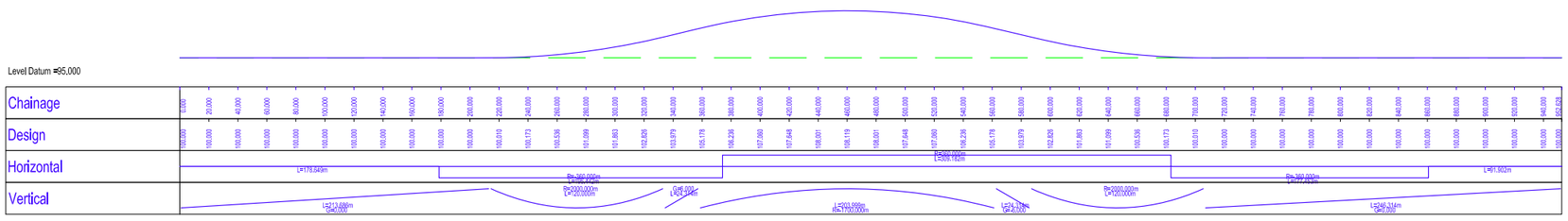

LONG SECTION
H= 1:2000 V= 1:400

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We accept no responsibility for the consequences of this document being relied upon by any other party, or being used for any other purpose, or containing any error or omission which is due to an error or omission in data supplied to us by other parties.

P:\Birmingham\BNI\318484 Foxton Level Crossing Elimination\Drawings\Highways\MMD-318484-C-DR-HW-07.dwg Mar 1, 2013 - 4:51PM gri49221

Notes

1. All dimensions are in millimetres unless otherwise stated.
2. Do not scale any items or information from this drawing.
3. Ground Level assumed to be 100maOD.
4. Horizontal alignment based on 40mph road (Design Manual for Roads and Bridges) Vertical alignment based on 40mph road. (Design Manual for Roads and Bridges).

Key to symbols

- Proposed Road Centerline
- Proposed Channel Lines
- Proposed Earthworks

Reference drawings

Rev	Date	Drawn	Description	Ch'k'd	App'd
AG	20.02.13		Preliminary Issue		

Mott MacDonald
Canterbury House
85 Newhall Street
Birmingham, B3 1LZ
United Kingdom
T +44 (0)121 2374000
F +44 (0)121 2374001
W www.mottmac.com

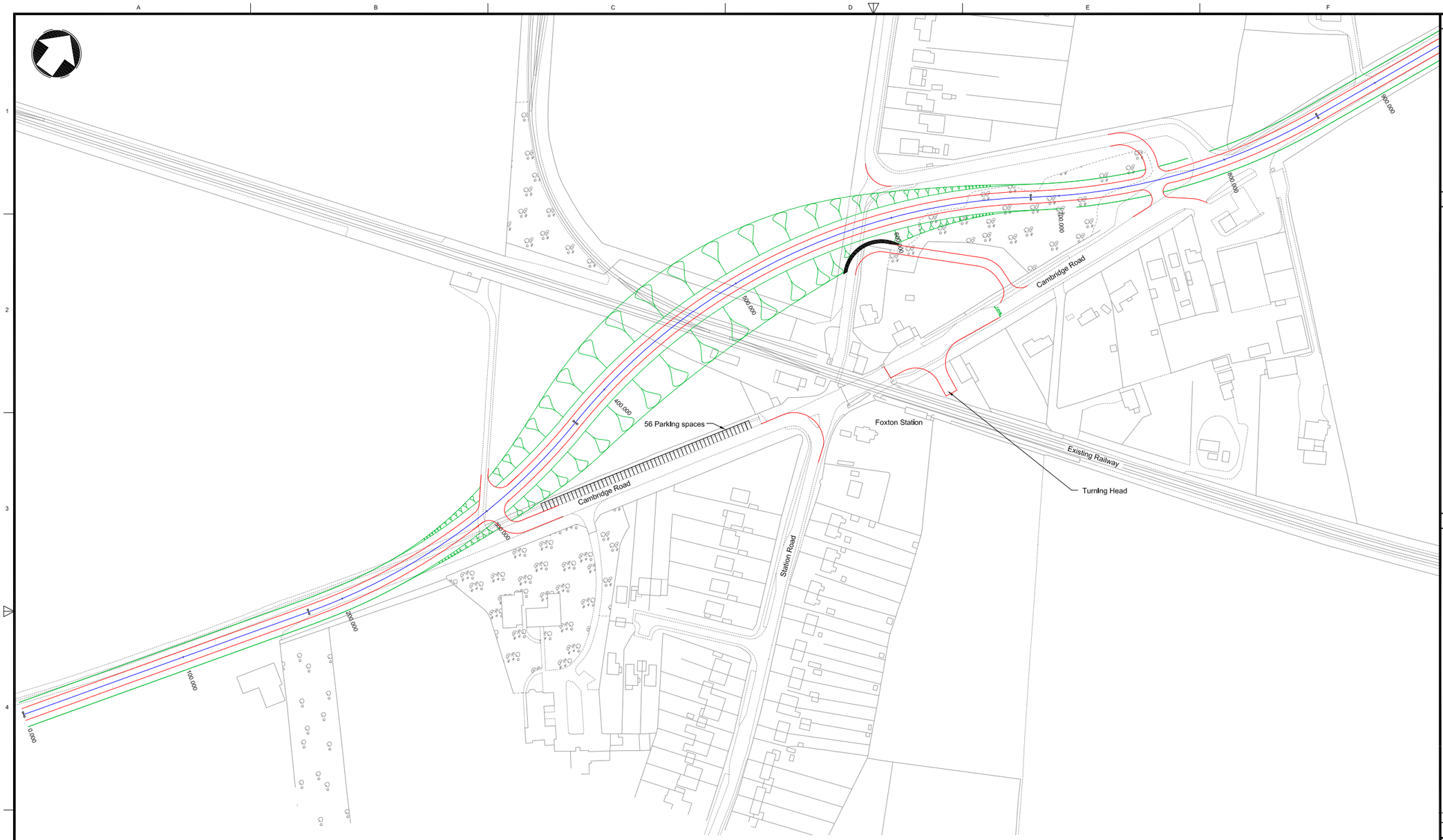
Client
Network Rail

Title
NR - Foxton Level Crossing Closure
ELR: SBR Milage 50 (Crossing No 104)
Highway Layout - Option 4
Overbridge Option.

Designed	A.Griffiths	Eng check	C.Searson	
Drawn	A.Griffiths	Coordination	F C W Yeung	
Dwg check	C.Searson	Approved	M.A.Alton	

Scale at A1	Status	Rev
As Shown	APR	P1

Drawing Number
MMD-318484-C-DR-HW- 07



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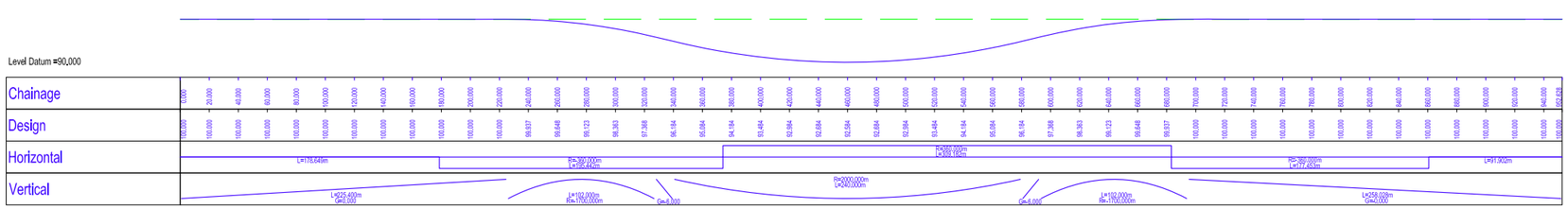

LONG SECTION
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Notes

1. All dimensions are in millimetres unless otherwise stated.
2. Do not scale any items or information from this drawing.
3. Ground Level assumed to be 100maOD.
4. Horizontal alignment based on 40mph road (Design Manual for Roads and Bridges) Vertical alignment based on 40mph road. (Design Manual for Roads and Bridges).

Key to symbols

- Proposed Road Centerline
- Proposed Channel Lines
- Proposed Earthworks

Reference drawings

Rev	Date	Drawn	Description	Ch'k'd	App'd
A/G	20.02.13	*	Preliminary Issue	*	*

Mott MacDonald

Canterbury House
85 Newhall Street
Birmingham, B3 1LZ
United Kingdom
T +44 (0)121 2374000
F +44 (0)121 2374001
W www.mottmac.com

Client

Network Rail

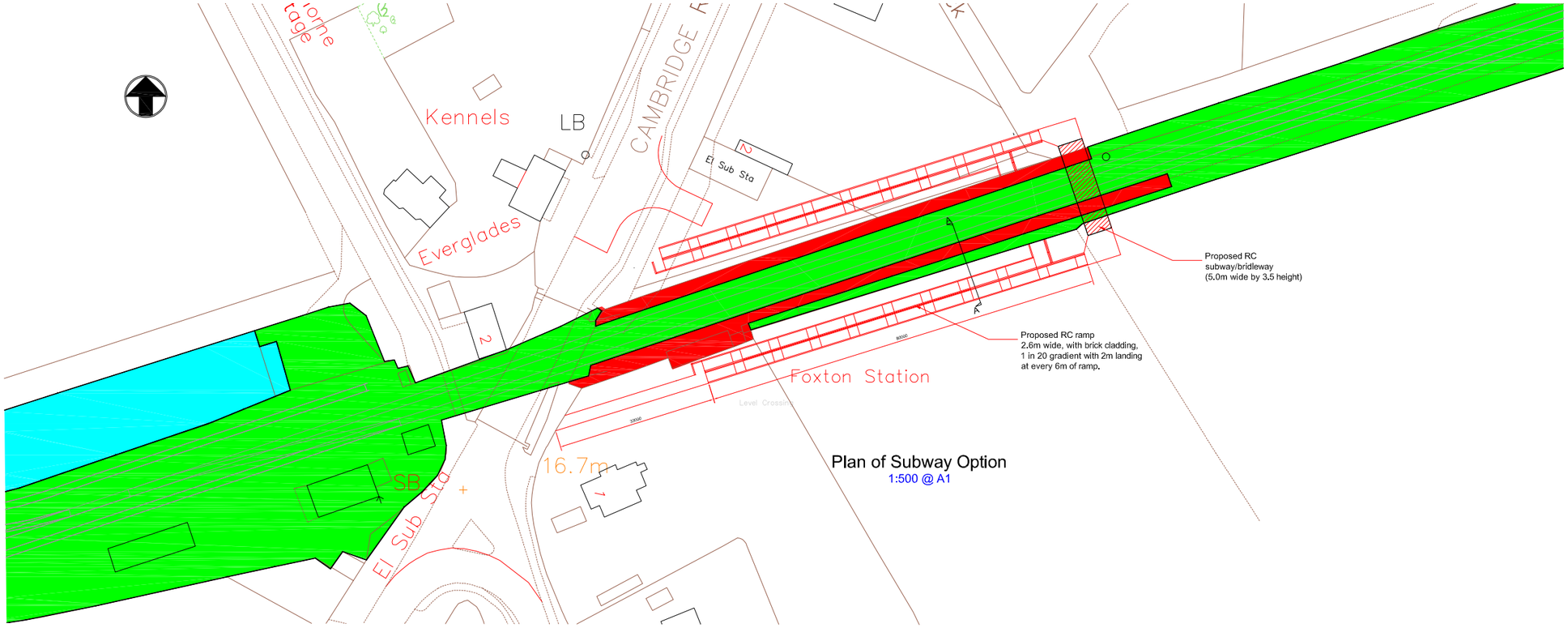
Title

NR - Foxton Level Crossing Closure
ELR: SBR Milage 50 (Crossing No 104)
Highway Layout - Option 4
Underpass Option.

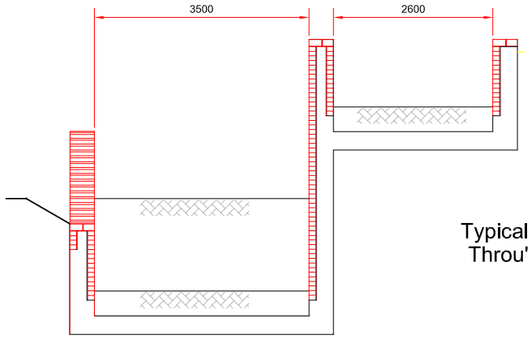
Designed	A.Griffiths	Eng check	C.Searson	
Drawn	A.Griffiths	Coordination	F C W Yeung	
Dwg check	C.Searson	Approved	F C W Yeung	

Scale at A1	Status	Rev
As Shown	APR	P1

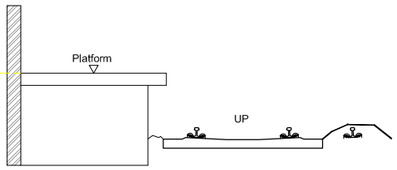
Drawing Number
MMD-318484-C-DR-HW- 08

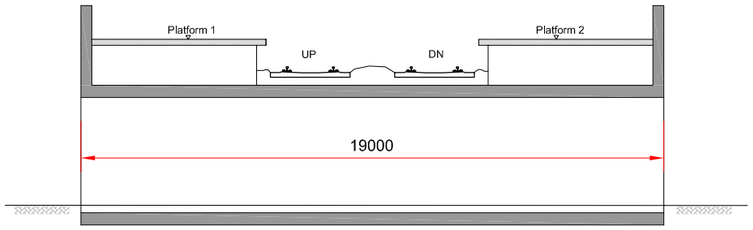


Plan of Subway Option
1:500 @ A1



Typical Cross Section
Throu' Ramp (A - A)
1:50 @ A1





Typical Cross Section
Throu' Subway (B - B)
1:100 @ A1

Typical Elevation
1:150 @ A1

Notes

1. All dimensions are in millimeters unless otherwise stated.
2. All levels are in metres unless otherwise stated.
3. Do not scale any items or information from this drawing.
4. The arrangement shown in this drawing is based on approximate dimension measured off the OS maps, and the topography in the area has been assumed to be flat.
5. All proposed pedestrian right of way, including footbridge, subway, ramps, stairs, and lifts shall be designed to compliant with Equality Act 2010.
6. As part of the footbridge construction, lowering of the existing OLE is envisaged to minimum the length of ramps and steps required. However, consideration must be given to ensure excessive cost does not incur, in providing supporting structure to accommodate this lowering.

Key to symbols

- Station Lease
- Network Rail Ownership
- Maintenance Depot

Reference drawings

Rev	Date	Drawn	Description	Ch'k'd	App'd
P2	April 2013	MS	Amend. following NR & CCC comments	FCWY	MAA
P1	Mar 2013	MS	Draft issue	FCWY	MAA

Mott MacDonald
Canterbury House
85 Newhall Street
Birmingham, B3 1LZ
United Kingdom
T +44 (0)121 2374000
F +44 (0)121 2374001
W www.mottmac.com

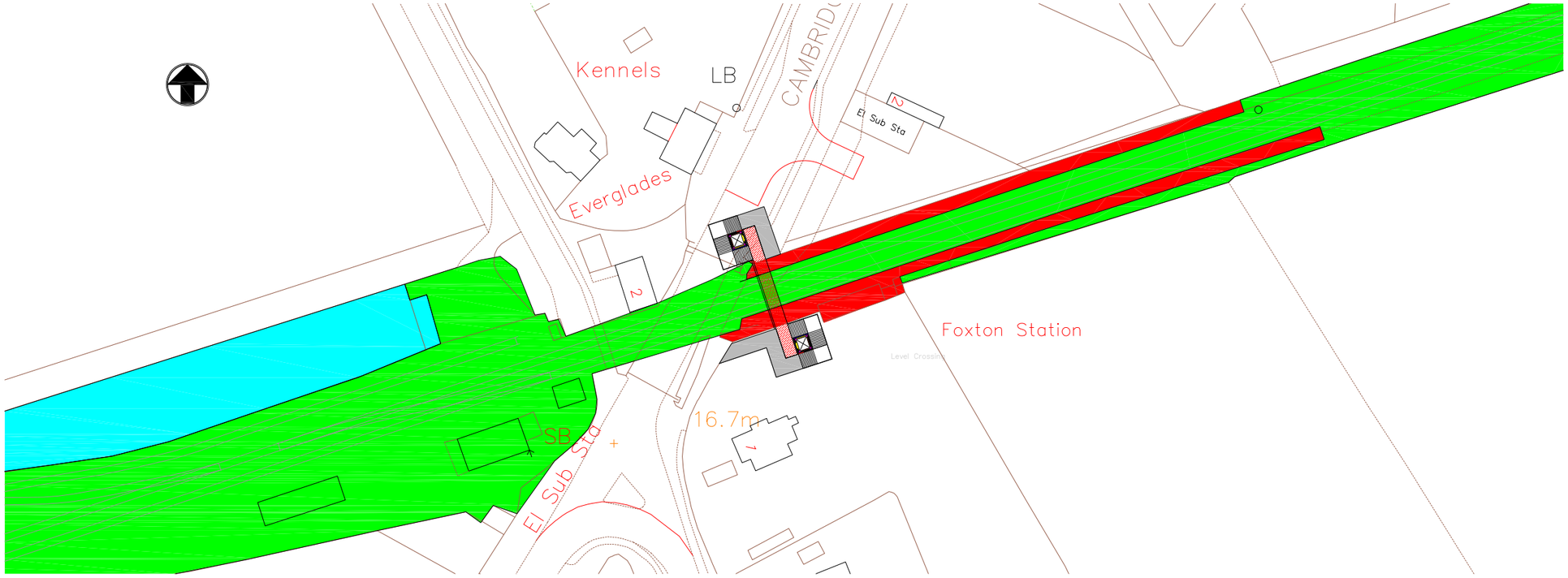
Client
Network Rail

Title
NR - Foxton Level Crossing Elimination
ELR: SBR Milage 50 (Crossing No 104)
Typical General Arrangement
Subway/Bridleway Option

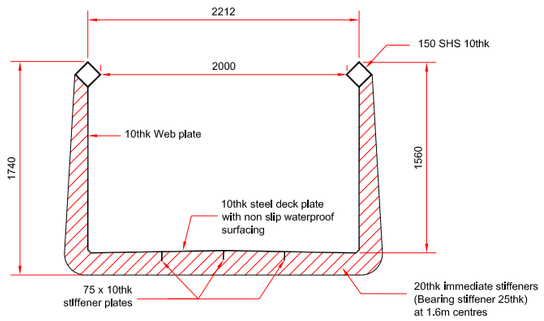
Designed	F Ul-Haq	FUH	Eng check	F C W Yeung	FCWY
Drawn	M Southall	MS	Coordination	F C W Yeung	FCWY
Dwg check	F Ul-Haq	FUH	Approved	M A Alton	MAA

Scale at A1	Status	Rev
As Shown	APR	P2

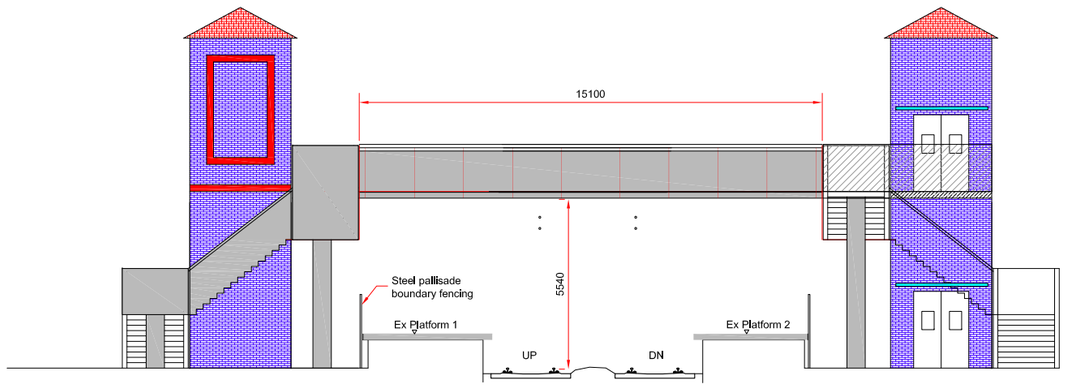
Drawing Number
MMD-318484-C-DR-BR-101



Footbridge & Lifts
Scheme Plan
1:500 @ A1



Typical Footbridge Cross Section
1:25 @ A1



Typical Footbridge Elevation
1 : 100 @ A1

Notes

1. All dimensions are in millimeters unless otherwise stated.
2. All levels are in metres unless otherwise stated.
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5. All proposed pedestrian right of way, including footbridge, subway, ramps, stairs, and lifts shall be designed to compliant with Equality Act 2010.
6. As part of the footbridge construction, lowering of the existing OLE is envisaged to minimum the length of ramps and steps required. However, consideration must be given to ensure excessive cost does not incur, in providing supporting structure to accommodate this lowering.

Key to symbols

- Station Lease
- Network Rail Ownership
- Maintenance Depot

Reference drawings

Rev	Date	Drawn	Description	Ch'k'd	App'd
P2	April 2013	MS	Amend, following NR & CCC comments	FCWY	MAA
P1	Mar 2013	MS	Draft issue	FCWY	MAA

Mott MacDonald
Canterbury House
85 Newhall Street
Birmingham, B3 1LZ
United Kingdom
T +44 (0)121 2374000
F +44 (0)121 2374001
W www.mottmac.com

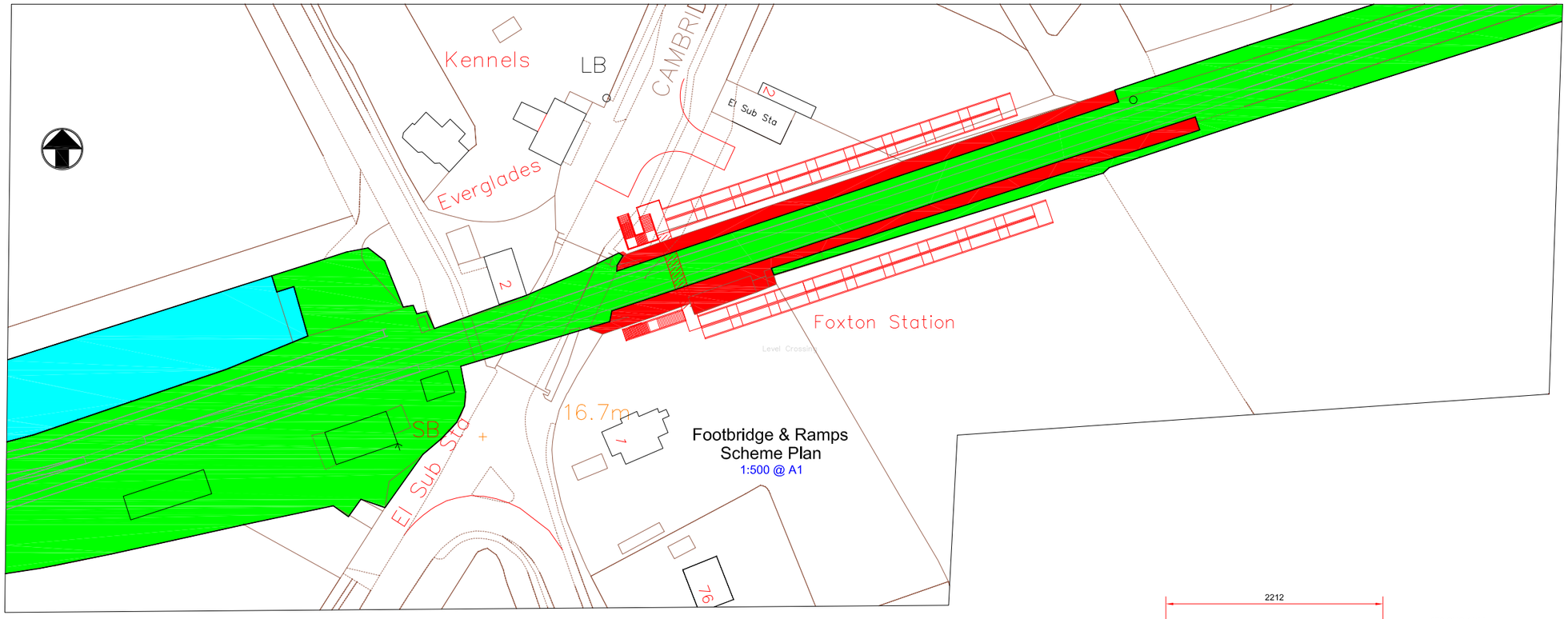
Client
Network Rail

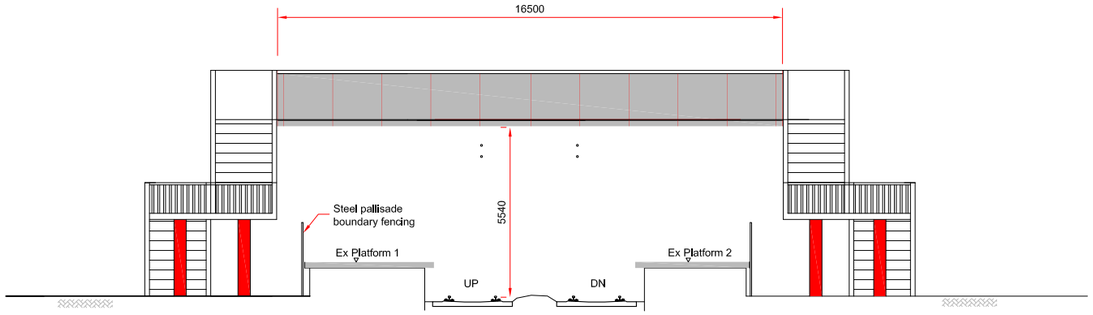
Title
NR - Foxton Level Crossing Elimination
ELR: SBR Milage 50 (Crossing No 104)
Typical General Arrangement
Footbridge, Lift & Wrap Stair Option

Designed	F Ul-Haq	FUH	Eng check	F C W Yeung	FCWY
Drawn	M Southall	MS	Coordination	F C W Yeung	FCWY
Dwg check	F Ul-Haq	FUH	Approved	M A Alton	MAA

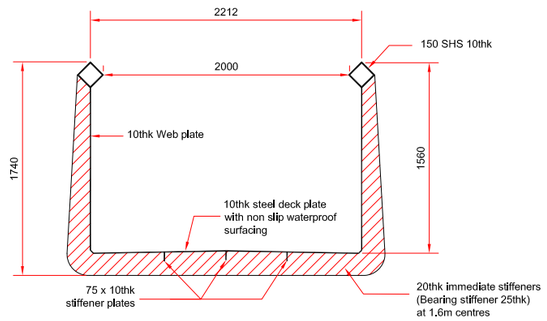
Scale at A1	Status	Rev
As Shown	APR	P2

Drawing Number
MMD-318484-C-DR-BR-102

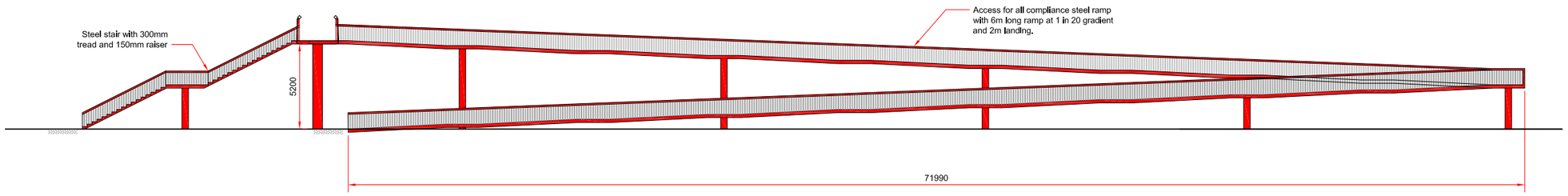




East Elevation
1:100 @ A1



Typical Footbridge Cross Section
1:25 @ A1



Typical Footbridge South Elevation
1 : 150 @ A1

Notes

1. All dimensions are in millimeters unless otherwise stated.
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5. All proposed pedestrian right of way, including footbridge, subway, ramps, stairs, and lifts shall be designed to compliant with Equality Act 2010.
6. As part of the footbridge construction, lowering of the existing OLE is envisaged to minimum the length of ramps and steps required. However, consideration must be given to ensure excessive cost does not incur, in providing supporting structure to accommodate this lowering.

Key to symbols

- Station Lease
- Network Rail Ownership
- Maintenance Depot

Reference drawings

Rev	Date	Drawn	Description	Ch'k'd	App'd
P2	April 2013	MS	Amend, following NR & CCC comments	FCWY	MAA
P1	Mar 2013	MS	Draft issue	FCWY	MAA

Mott MacDonald

Canterbury House
85 Newhall Street
Birmingham, B3 1LZ
United Kingdom
T +44 (0)121 2374000
F +44 (0)121 2374001
W www.mottmac.com

Client

Network Rail

Title

NR - Foxton Level Crossing Elimination
ELR: SBR Milage 50 (Crossing No 104)
Typical General Arrangement
Footbridge & Ramp Option

Designed	F Ul-Haq	FUH	Eng check	F C W Yeung	FCWY
Drawn	M Southall	MS	Coordination	F C W Yeung	FCWY
Dwg check	F Ul-Haq	FUH	Approved	M A Alton	MAA

Scale at A1	Status	Rev
As Shown	APR	P2

Drawing Number
MMD-318484-C-DR-BR-103