TRANSPORT AND WORKS ACT 1992

TRANSPORT AND WORKS (INQUIRIES PROCEDURES) RULES 2004

NETWORK RAIL (LEEDS TO MICKLEFIELD ENHANCEMENTS) ORDER

HIGHWAY AND DESIGN PROOF OF EVIDENCE

OF

GED STAMPER

Document Reference	CD 7.08
Author	Ged Stamper
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1. INTRODUCTION

1.1 Qualifications and experience

1.1.1 My name is Ged Stamper, and am a Principal Engineer (Highways) at SYSTRA. I have a BSc (Hons) in Civil Engineering from University of Newcastle upon Tyne (1984). I have been a Member of the Institution of Civil Engineers (C Eng, MICE) since 2000 and have been involved in the design and construction of highways, bridges and port schemes in UK and Middle East for 38 years. I lead a team at SYSTRA for the design of highways schemes. I am the SYSTRA Professional Head in Highways and am involved in the development and career progression of graduate engineers.

1.1.2 I have been appointed as Contractors Responsible Engineer (CRE) for Highways on the Scheme from 2023 and have been CRE on other rail related highways schemes at Gatwick Station and Burton on Trent Station. I have also been involved in the design of the highways related elements for HS2.

1.1.3 My evidence is concerned with the highways interface with The Network Rail (Leeds to Micklefield Enhancements) Order which seeks to close one footbridge at Austhorpe Lane and two road over rail bridges at Austhorpe Lane and Ridge Road and replace them with two new bridges in approximately the same location.

1.1.4 The two new bridges to replace the existing take the form of:

- Austhorpe Lane – new 2 lane overbridge with integral footpath tying into Austhorpe Road to the north and Austhorpe Lane to the south but widened from 1 lane to 2. The new alignment over the bridge will be different from existing due to the widened carriageway and the deck elevation will be higher than the existing.
- Ridge Road – new 2 lane overbridge with integral footpath replacing the same, in approximately the same location but wider than existing and raised by approximately 200mm.

1.1.5 I also address the proposed new access road at Neville Hill and its interface with the existing non definitive bridleway and the closure of the Peckfield Level Crossing and associated diversion of the bridleway at Peckfield Lane / Pit Lane in Micklefield. Note that some aspects of the closure of the Peckfield Level Crossing closure are also covered in the Proof of Evidence of Michael Westwood.

1.1.6 I have not included an overall summary of the Order within this Proof of Evidence although most aspects are naturally discussed where relevant. This Proof of Evidence documents the Scheme from a highway engineering and construction perspective.

1.2 Statement of Matters

1.2.1 The Statement of Matters has been received from the Transport Infrastructure Planning Unit. The following matters will be dealt with by this document read in conjunction with Michael Westwood's Proof of Evidence (**CD 7.26**) and Paul Harrison's Proof of Evidence (**CD 7.05**).

- Item 3 – The main alternative options considered by NR and the reasons for choosing the options set out in the Order.
- Item 4a – The impact of the closure of Peckfield Level Crossing on users
- Items 4c and 4d – The approach used for the safety audit and user survey and the impacts on highway safety.
- 5d – Highways – Impact on cycleway at Neville Hill.

2. SCOPE OF EVIDENCE

2.1 Introduction

2.1.1 My evidence will be structured in two parts:

- Engineering & Design Response to the Statement of Matters
- Engineering & Design response to submitted Objections

2.1.2 Within my evidence I have not described the generalities of the Scheme Development, Option Selection, or the full detail of the proposed works. These items are extensively documented in the Network Rail Statement of Case (**CD 5.01**). Specifically, the reader is referred to the following sections of the Statement of Case (SoC):

- SoC Section 8 – Scheme Development
- SoC Section 9 – Scheme Description and Construction

2.1.3 The application is based on the emerging design maturity available at the time of initial submission i.e. Approval in Principle (AIP) level of detail. It should be noted that a number of outstanding design decisions and details will only be known when the next stage, Detailed Design, concludes around April 2024.

2.2 Response to Statement of Matters

2.2.1 My evidence, given in Section 3, is primarily in response to Matters 3, 4a, 4c, 4d and 5d of the Statement of Matters as described above.

2.3 Response to Objections and Representations

2.3.1 My evidence given in Section 5 is in response to the submitted Objections and Representations as listed below.

3. ENGINEERING AND DESIGN RESPONSE TO STATEMENT OF MATTERS

3.1 Design Standards

3.1.1 For Austhorpe Lane, applicable standards are a combination of Leeds City Council Transport Supplementary Planning Document (SPD) and Design Manual for Roads and Bridges (DMRB).

3.1.2 For Ridge Road, only DMRB has been considered due to the high speed of the route, and as agreed with LCC. The SPD document is not applicable as this is intended for low speed roads only.

3.1.3 Other standards listed below do not form part of DMRB but are recognised national standards for items such as road signs.

3.1.4 The main design documents are listed below but are limited to the highways works so do not include the bridges or utilities standards.

Document	Purpose
Leeds City Council Transport SPD	Design and specification roads, footpaths, including carriageway materials and geometry.
Leeds City Council Highways And Transportation Standard Details	Standard Details
Manual of Contract Documents for Highway Works (MCHW)	Volume 1 Specification for Highway Works Volume 2 Notes for Guidance on the Specification for Highway Works Volume 3 Highway Construction Details
Design Manual for Roads and Bridges (DMRB) CD 109 Revision 1, Highway Link Design	Highway alignment

DMRB CD 127 Version 1.0.1, Cross-sections and headrooms	Highway cross sections
DMRB CD 224 Revision 0, Traffic Assessment	Traffic loading
DMRB CD 225 Revision 1, Design for new pavement foundations	Road pavement design
DMRB CD 226 Version 0.1.0, Design for new pavement construction	Road pavement design
DMRB CD 236 Version 4.0.1, Surface course materials for construction	Road pavement design
DMRB CD 377 Requirements for road restraint systems Revision 4	Safety barrier design
DMRB GG 119 Version 2, Road Safety Audit	Road Safety Audit
Traffic Signs Regulations and General Directions 2016	Traffic signs and road markings layout.
Traffic Signs Manual – Chapter 3	Regulatory signs
Traffic Signs Manual – Chapter 4	Warning signs
Traffic Signs Manual – Chapter 5	Road markings
Department for Transport Inclusive Mobility A Guide to Best Practice on Access to Pedestrian and Transport Infrastructure, December 2021	Consulted for accessibility issues.
Local Transport Note 1/20 Cycle Infrastructure Design	Reviewed for design considerations

Sustrans Design Manual Chapter 7 Junctions and crossings: cycle friendly design (draft) February 2015	Consulted for the provision of cycling/equestrian measures along the cycleway in advance of road crossing.
DETR Guidance on the use of Tactile Paving Surfaces	Consideration on the requirement for tactile surfaces.
Department for Transport Manual for Streets	Highway alignment
Chartered Institution of Highways & Transportation Manual for Streets 2	Highway alignment

3.1.5 These design standards have been submitted to Leeds City Council as part of the Civils Form F - *Roads/Highway Authority agreement to bridge works documents (Form 006)*, which are in turn based on the Network Rail Standard NR/L2/CIV/003/Form F Issue 5, *Engineering and Architectural Assurance of Building and Civile Engineering Works*. These standards provide a brief description of existing conditions, a brief description of proposed Works and the proposed design criteria; design loading, design speed of road traffic, standard of parapet containment, road/footpath layout, K values and the stopping sight distances, road profile and specification for road surfacing. A copy of *NR/L2/CIV/003/F006: ROAD/HIGHWAY AUTHORITY AGREEMENT TO BRIDGEWORKS* is included in **Appendix D.**

3.1.6 The design standards have been selected according to the category of the road. For Neville Hill Access Road and Austhorpe Lane overbridge, LCC design standards have been selected due to the low speed nature of the road and the urban setting. The design has also been checked against national standards (DMRB) for certain items such as forward visibility and safety barriers, where included. For Ridge Road Overbridge, DMRB standards have been used as these are more applicable to high speed rural roads.

3.2 Road Safety Audit – all locations

3.2.1 As of the normal design process, a series of Road Safety Audits (RSA's) are carried out over the course of the design process at identifiable points;

- Stage 1 - Completion of preliminary design.

- Stage 2 - Completion of detailed design.
- Stage 3 - Completion of construction.
- Stage 4 - Post opening monitoring

These are carried out in accordance with DMRB standard GG 119 Version 2, Road Safety Audit, most recently updated in January 2020. The RSA is carried out by a team of at least two members that works together on all aspects of the road safety audit, independent of the highway scheme conception, design, construction and operation. The road safety audit team comprises a road safety audit team leader and at least one road safety audit team member and may include one or more road safety audit team observers who are not part of the road safety audit team.

3.2.2 The individuals within the road safety audit team can be drawn from different organisations including the Overseeing Organisation (in this case LCC) and the design organisation (TRUe Alliance) or can be from an external organisation independent of both.

3.2.3 The road safety audit team leader is a person with the appropriate training, skills and experience who is approved for a particular highway scheme and road safety audit stage by the Overseeing Organisation. The road safety audit team leader is responsible for leading the road safety audit team through the process and managing the production of the road safety audit report. The team leader must have;

- at least 10 days of formal collision data analysis or road safety engineering/road design training,
- A minimum of 2 days continuing professional development (CPD) in the field of ,RSA, collision data analysis or road safety engineering in the last 12 months
- 4 years of collision data analysis or road safety engineering/road design experience
- 5 RSAs completed within the last 12 months as team leader or member.

The road safety audit team member is a person with the appropriate training, skills and experience necessary for a particular highway scheme and road safety audit stage, working with the road safety audit team leader. The team member must have;

- 10 days of formal collision data analysis or road safety engineering/road design training
- a minimum of 2 days CPD in the field of RSA, collision data analysis or road safety engineering in the last 12 months
- 2 years of collision data analysis or road safety engineering/road design experience
- 5 RSAs completed within the last 24 months as team leader, member or observer.

3.2.4 The CV and CPD record of the RSA team are submitted to the Overseeing Organisation for approval prior to the audit together with the RSA brief, prepared by the design organisation. The brief follows the format in GG 119 Revision 2 and includes information relating to the proposed design and the potential effect on road safety such as site location plans, scale layout plans, departures and relaxations from standards, construction/ typical details, previous RSA reports, previous RSA response reports and evidence of agreed actions, collision data and collision data analysis road traffic collision plot, traffic signal staging traffic counts, speed surveys pedestrian, cyclist and horse riding desire lines and volumes, walking, cycling and horse riding assessment and reviews, items outside the scope of the RSA/ strategic decisions, other factors that may impact on road safety, design speeds/ speed limits, design standards used, adjacent land uses. Not all audits require all the information listed, but the audit brief identifies what information has been supplied and what has been omitted from the brief.

3.2.5 The RSA site visit is carried out by the RSA team and up to 4 invitees who might be any additional specialist advisors, police and maintaining agent representatives.

3.2.6 The audit report is then prepared by the RSA team, independently of the design organisation, the overseeing organisation or any of the invitees, and contains any matters that the RSA team considers will have an effect on the overall road safety of the scheme and its' effect on the existing road network. The RSA report identifies any problems and provides recommendations.

3.2.7 The audit report is submitted to the overseeing organisation and the design organisation prepares a response report, where it can accept the RSA problem and recommendation made by the RSA team, accept the RSA problem raised, but suggest

an alternative solution, giving appropriate reasoning or disagree with the RSA problem and recommendation raised, giving appropriate reasoning for rejecting both.

3.2.8 The response report tis then submitted to the overseeing organisation who then add in their responses to the audit and the design organisations responses.

3.2.9 The overseeing organisation and design organisation then meet to agree the RSA actions and produce a list of agreed actions to take forward to the next design stage or remedial actions in the case of the Stage 3 audit.

3.2.10 Stage 1 RSA's with designers responses have been prepared for Austhorpe Lane (reference 151666-TRA-E3-HUL4-REP-W-HW-800342) and Ridge Road (reference 151666-TRA-E3-HUL4-REP-W-HW-800340). The meeting to discuss the RSA's and agree on the actions are still to be arranged.

3.3 Austhorpe Lane – Current layout

3.3.1 Austhorpe Lane Bridge (also referred to by Network Rail as HUL4/21) is a single span overbridge carrying a single carriageway public road, Austhorpe Lane, approximate width 4.4m. There is no footpath over the railway forming part of this bridge although there is a separate footbridge alongside.

3.3.2 The road narrows from 2 lanes to the north of the bridge to one lane over the bridge and widens out to 2 lanes to the south of the bridge. The total deck width is 5.2m and the total span length is approximately 16.3m.

3.3.3 The bridge spans over 2 No. non-electrified tracks and consists of a single masonry arch span with masonry parapets. The existing parapet height is 1.2m. The substructure consists of stone abutments and wingwalls.

3.3.4 Lineside infrastructure includes concrete access steps on the north side of the bridge with an access point with palisade gate. To the east of the existing bridge there is a 475mm diameter gas pipe structure (Network Rail reference HUL4/20B) which crosses over the railway lines.

3.3.5 The area is constrained by the adjacent footbridge to the west of the road bridge (Network Rail reference HUL4/21A) and adjacent properties. HUL4/21A footbridge is a three-span reinforced concrete deck with half joints over the middle span and reinforced concrete piers. The structure crosses 2 No. non-electrified lines and is

adjacent to HUL4/21. The structure is owned and maintained by Leeds City Council. HUL4/21A footbridge has open railing parapets, height 1.1m and has a clear span between pier faces is approximately 16.9m.

3.3.6 At the north of the bridge over the railway line Austhorpe Road changes designation to Austhorpe Lane. Approximately 75m from the centre of the bridge to the north west Austhorpe Road is joined by Railway Road and by Croftdale Grove at approximately 105m to the north east. The nearest junction to the south of the railway bridge is Kingswear Crescent, 200m to the south west. Approximately 25m from the northern end of the railway is a public footpath / cycleway linking Austhorpe Road to Amelia Stewart Lane. A zebra crossing is located on Austhorpe Road approximately 30m to the north of the end of the bridge, with the corresponding zig-zag road markings extending onto the bridge.

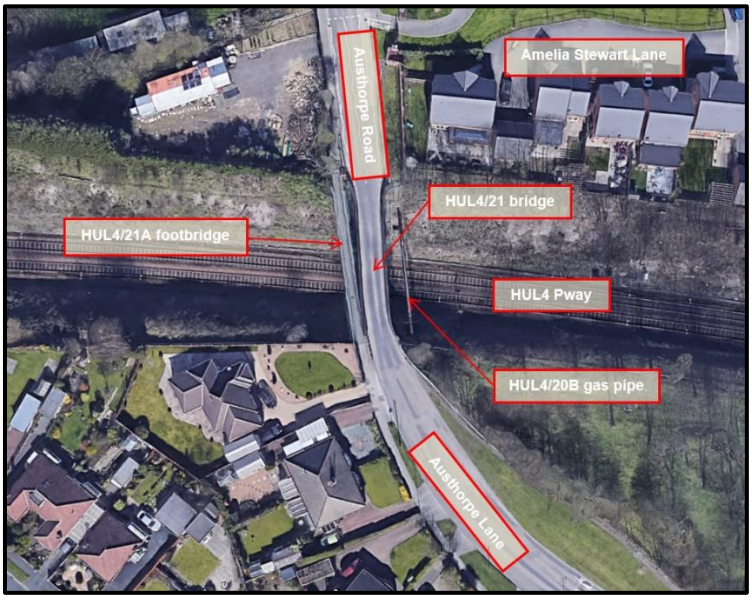

Figure 1 – Austhorpe Lane Existing Location

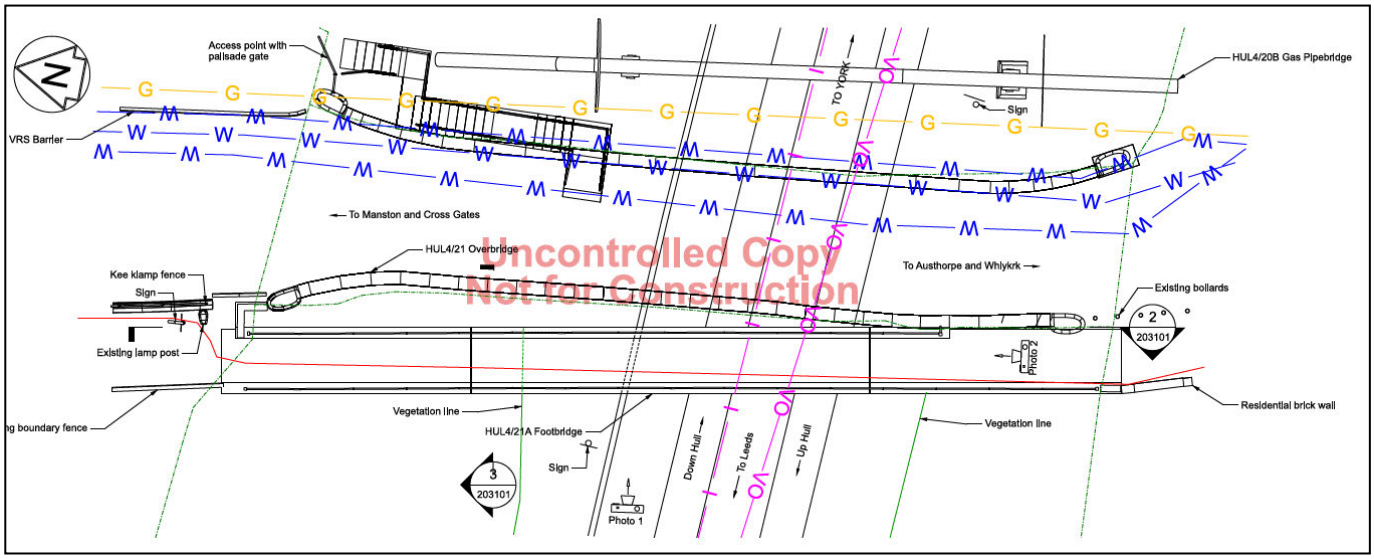

Figure 2 – Austhorpe Lane Existing General Arrangement

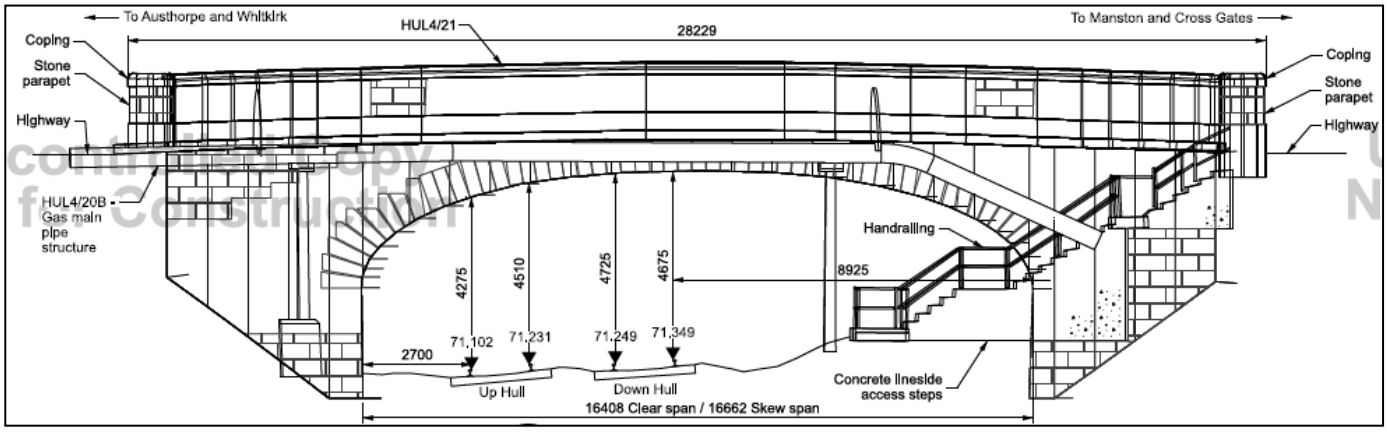

Figure 3 – Austhorpe Lane Low Mileage Elevation

3.3.7 3 small diameter watermains and 1 small diameter gas main cross the bridge within the deck structure. This gas main is independent of the larger gas main in HUL4/21B. A telecommunications cable and a street lighting cable are carried within the adjacent footbridge (HUL4/21A). The utilities are shown in figure 2 above.

3.3.8 A 12m length of double row open box beam vehicle safety barrier is provided on the south east corner of the bridge, followed by another 12m of single row open box beam.

3.3.9 6 bollards / delineators are provided on the south west corner of the bridge leading into the abutment and there is a short length of handrailing on the north east corner of the bridge.

3.3.10 The bridge lies within a 20mph posted speed limit zone.

3.3.11 The bridge is subject to a 7.5 tonne weight limit restriction and is signposted immediately to the north of the overbridge and approximately 20m to the south.

3.3.12 Austhorpe Road and Austhorpe Lane are illuminated by street lighting. The 7.5 tonne weight limit signs on the north and south sides of the bridge are also illuminated.

Figure 4 - Austhorpe Lane looking south

Figure 5 - Austhorpe Lane looking north

3.4 Austhorpe Lane – Reasons for replacement

3.4.1 The current bridge needs to be replaced as the headroom over the railway is insufficient for the electrification works of TRU. Early alternative design options included lowering the rail lines through the area but this was found to be neither technically possible nor economical due to the long lengths that would be affected. The increase in required headroom will raise the level between the existing and proposed bridge decks in excess of 200mm. This is explained in more detail by the PoE of Paul Harrison

3.4.2 The current bridge parapet height does not comply with current standards and its ability to resist impact is unknown. The height of the handrailing at the adjacent HUL4/21A footbridge is similarly below current design standards.

3.4.3 The existing bridge is 1 lane with shuttle operation for the 2 opposing traffic flows. Austhorpe Road / Austhorpe Lane is on a bus route so although flows are generally low, should 2 vehicles enter the bridge at the same time, one will be required to reverse to clear the overbridge.

3.4.4 The existing forward visibility for traffic passing north to south is notably substandard as the parapet blocks the sightline towards oncoming traffic.

3.4.5 These factors indicate that localised modifications to the existing bridge are not practical and replacement is the only valid solution.

3.5 Austhorpe Lane – Proposed layout

3.5.1 The new structure will incorporate the existing separate footpath bridge (HUL4/21A) into a single structure. The highway alignment will replace the single lane over the bridge with 2 narrow lanes, each 2.75m wide, for a carriageway width of 5.50m. HUL4/21A footbridge will be replaced with a 2.0m wide footpath adjacent to the new carriageway on the west, and a 0.5m hardened verge will be incorporated on the east. The overall width between abutment faces will therefore be 8.0m.

3.5.2 The alignment of the bridge will be revised so that the skew of the bridge is increased with the new centreline of the bridge at the south abutment at the approximate location of the east parapet of the old alignment. The road alignment has been revised to improve the forward visibility for road users by removing the existing reverse curve over the bridge, providing 2 lanes over the bridge in place of the current single lane whilst minimising the effect on the adjacent residential properties. See figures 6 & 7 below – the proposed bridge is shown in red and the existing structure is shown in green.

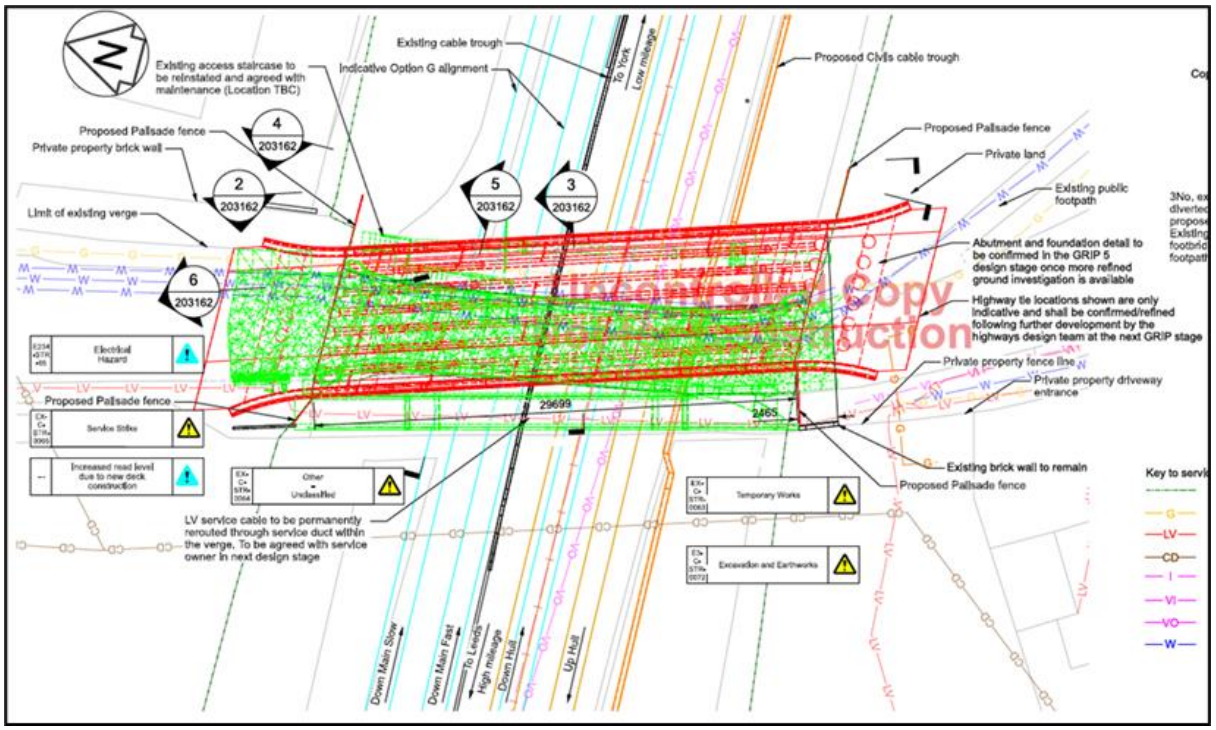

Figure 6 – Austhorpe Lane Proposed general arrangement

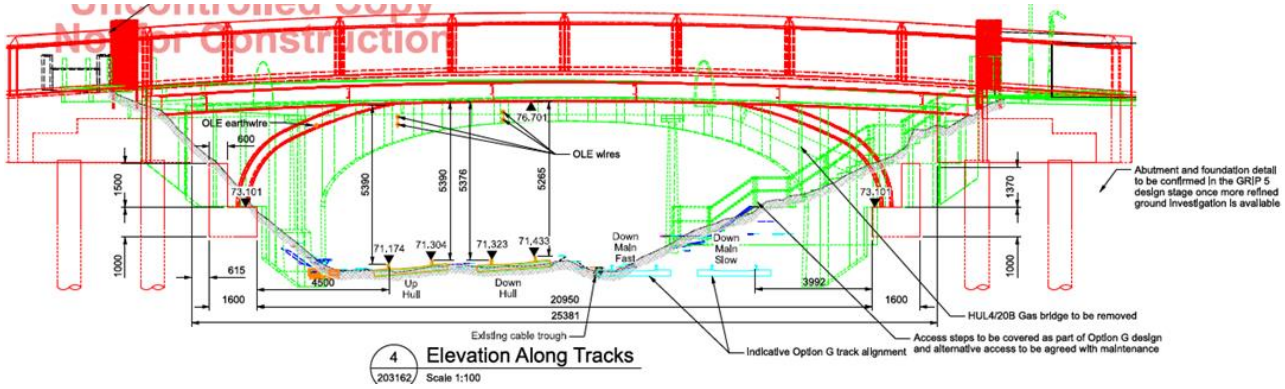

Figure 7 – Austhorpe Lane proposed low mileage elevation

3.5.3 The revised alignment provides a distance of 3.2m from the face of kerb to the boundary wall of the adjacent property in the northeast corner of the bridge (25 Amelia Stewart Lane), and increases the distance to the boundary wall in the southwest corner (193 Austhorpe Lane).

3.5.4 The replacement parapets will be minimum 1.8m high in accordance with current design standards and will achieve H4a containment level in accordance with DMRB CD 377 (Requirements for road restraint systems).

3.5.5 The posted speed limit (20mph) will remain unchanged on completion of the scheme, subject to change by Leeds City Council as the Highway Authority.

3.5.6 The 7.5 tonne weight limit will be retained for environmental reasons and to reduce the risks of large vehicles using the new route through the residential area. However, the bridge structure will be designed in accordance with current design standards and current maximum vehicle sizes for comparable road bridges – normal vehicle loading of a multi-axle heavy goods vehicles up to 44 tonnes and abnormal load type SV80, (6 axle vehicle, 13 tonnes per axle).

3.5.7 A pair of speed cushions (road humps) will be constructed just to the south of the bridge. These will be designed and constructed in accordance with LCC standard details.

3.6 Austhorpe Lane – Design and compliance with standards

3.6.1 Austhorpe Lane has been designed to comply predominantly with a Type 1 connector street (LCC SPD), which is the highest category within this design guide. The design has been checked against DMRB CD 109 (Highway Link Design) and this standard has been used where it is more appropriate. The design speed for a Type 1 connector street is 20mph, but the lowest design speed in DMRB CD 109 (Highway Link Design) is 50kph (approximately 31mph).

3.6.2 The carriageway width over the bridge will be 5.5m as discussed earlier and as agreed with LCC. This is a departure from standards for both LCC SPD (cl. 230) and DMRB CD 127 (Cross sections and headrooms).

3.6.3 The highway design loading of the bridge is determined by DMRB CD 224 (Traffic Assessment) as it is not covered within LCC SPD This calculates the total number of design standard axles over the 40 year design life of the carriageway and is expressed in millions of standard axles (msa). The total traffic loading has been calculated at less than 2 msa, so the design standards default to the minimum value (2 msa). The design life for the carriageway (40 years) is less than the design life of the structure (120 years). The existing weight limit on the bridge (7.5 tonnes) will be maintained after opening for environmental purposes but the bridge will be designed to accommodate normal 44 tonne articulated heavy goods vehicles.

3.6.4 Safety barriers will be provided in accordance with DMRB CD 377 (Requirements for road restraint systems) with containment class H4a over the railway bridge and N2 elsewhere.

3.7 Austhorpe Lane – Horizontal alignment

3.7.1 A LCC SPD Type 1 connector street specifies a minimum centreline radius of 35m whereas DMRB CD 109 (Highway Link Design) table 2.10 (Figure 8 below) requires a minimum horizontal radius of 520m when used with zero superelevation, or 90m for 2 steps below desirable minimum radius with superelevation of 7%. 2 steps below desirable minimum is a relaxation from standards, anything greater is classed as a departure from standards.

Table 2.10 Design speed related parameters

Design speed kph	120	100	85	70	60	50	V2/R
Stopping sight distance (metres)							
Desirable minimum	295	215	160	120	90	70	-
One step below desirable minimum	215	160	120	90	70	50	-
Horizontal curvature (metres)							
Minimum R* with adverse camber and without transitions	2880	2040	1440	1020	720	520	5
Minimum R* with superelevation of 2.5%	2040	1440	1020	720	510	360	7.07
Minimum R* with superelevation of 3.5%	1440	1020	720	510	360	255	10
Desirable minimum R (superelevation 5%)	1020	720	510	360	255	180	14.14
One step below desirable Minimum R (superelevation 7%)	720	510	360	255	180	127	20
Two steps below desirable minimum radius (superelevation 7%)	510	360	255	180	127	90	28.28
Vertical curvature							
Desirable minimum* crest K value	182	100	55	30	17	10	-
One step below desirable min crest K value	100	55	30	17	10	6.5	-
Desirable minimum sag K value	37	26	20	20	13	9	-
Overtaking sight distances							
Full overtaking sight distance FOSD (metres)	-	580	490	410	345	290	-
FOSD overtaking crest K value	-	400	285	200	142	100	-
* Not recommended for use in the design of single carriageways (see Section 9)							
The V^2/R values shown above simply represent a convenient means of identifying the relative levels of design parameters, irrespective of design speed.							

Figure 8 - DMRB CD 109 table 2.10

3.7.2 The majority of the length of the existing alignment is on a horizontal radius of less than 90m with short lengths of straights. The minimum estimated radius is 70m. The proposed alignment has a minimum horizontal radius of 60m at the tie in between the new and old alignment at the southern end of the new works but for the section over the new bridge, the new alignment is on either a straight or radius of 400m. The proposed design is therefore compliant with the requirements for a LCC SPD Type 1 connector street but is a departure from standards for DMRB CD 109 (Highway Link Design). The horizontal alignment is constrained by the presence of adjacent properties and cannot be improved without additional land purchase.

3.7.3 The comparison between the existing and proposed horizontal alignment is shown in a tabular format in Appendix A.

3.8 Austhorpe Lane – Vertical alignment

3.8.1 A LCC SPD Type 1 connector street specifies a desirable minimum longfall of 5% and DMRB CD 109 (Highway Link Design) has a maximum gradient of 6% for all purpose single carriageway roads. The existing vertical alignment does not exceed 5% and the maximum gradient on the proposed alignment is 4%. Therefore both existing and proposed alignments meet design standards for gradient.

3.8.2 A Type 1 connector street has a minimum K value [1]for the radius of the vertical curve of 6.5 and DMRB CD 109 (Highway Link Design) has a desirable minimum K value of 10 for a crest curve and 9 for a sag curve. CD 109 has a permitted relaxation for crest curves of 1 step below desirable minimum to K value 6.5, but there is no corresponding relaxation for sag curves. See Figure 8 for details. Crest curves with K values close to or at the desirable minimum are not recommended for single carriageway roads as they can encourage unsafe overtaking, so crests with K values of 1 step below desirable minimum are preferred where tight vertical curves are unavoidable.

3.8.3 Over the existing bridge, the carriageway has a crest curve of value 2.63 with zero superelevation so is a departure from standards. The new carriageway has been raised due to the rail alignment changes and the provision of overhead power and is approximately 200mm higher than the existing layout at the crest of the bridge. To tie back into the existing carriageway within the works area, the crest K value has been reduced to 2 over the new bridge which is also a departure from standards. The comparison between the existing and proposed vertical alignment is shown in a tabular format in Appendix A

3.8.4 Different options have been considered with increased K values for the crest curve but have all resulted in increased road elevations off the bridge and corresponding needs for retaining walls to the north of the bridge, increased land take on the southeast side of the bridge due to longer embankments and would possibly lead to some of the properties on the southwest side of the bridge being inaccessible to cars.

The K value is s the horizontal distance required to achieve a 1% change in the slope of the vertical curve. It is calculated from the formula K=L/A where L = length of curve and A = absolute value of difference in grades. A small K value vertical curve produces a pronounced change in level over a relatively short distance, whereas a large K value curve produces a smoother profile [1]

3.9 Austhorpe Lane – Forward visibility

3.9.1 Forward visibility for a LCC SPD Type 1 connector street is 25m for light vehicles at 20mph design speed and 33m for 25mph. For HGV's and buses, this forward visibility increases to 27m at 20mph design speed and 36m at 25mph.

3.9.2 For DMRB CD 109 (Highway Link Design) and a 50kph design speed, the forward visibility is 70m, and 50m for the permitted relaxation of one step below desirable minimum.

3.9.3 The existing bridge is constrained by the parapet and has a length of 20m where the forward visibility is between less than 50m on the northbound carriageway and 40m where the forward visibility is less than 50m on the southbound carriageway. The minimum existing forward visibility is 17.7m over a short length on the southbound carriageway. The existing layout is therefore compliant with LCC SPD for the northbound carriageway but is not compliant for the southbound direction. The existing carriageway is not compliant with DMRB CD 109 (Highway Link Design) in either northbound or southbound.

3.9.4 The proposed northbound carriageway has a 20m length where the forward visibility is less than 50m and 2 lengths of 20m where the forward visibility is less than 50m on the southbound carriageway. The minimum proposed forward visibility is 37.2m over a short length on the northbound carriageway. The proposed layout is therefore complaint with LCC SPD for both northbound and southbound carriageways. The proposed layout is not compliant with DMRB CD 109 (Highway Link Design) for forward visibility but provides improvement over the existing layout throughout.

3.9.5 The forward visibilities when measured according to with DMRB CD 109 (Highway Link Design) have been calculated for the existing and proposed conditions and are shown below. The imaginary eye line is that of the driver of a low vehicle, so has an eye height of 1.05m above the road surface and is positioned 1.5m into the carriageway. The same 1.5m offset for the object is used, but the object height is reduced to 0.26m to represent debris or an animal in the road.

3.9.6 The forward visibilities are included in tabular format in Appendix A.

3.10 Austhorpe Lane – Drainage

3.10.1 The proposed drainage will follow the existing arrangement – over the bridge, no gullies will be provided but rainfall will run down the channels to gullies situated to the north and south of the structure.

3.11 Austhorpe Lane – Utilities

3.11.1 The existing large gas main carried in HUL4/21B will be diverted below the tracks using micro-tunnelling so has no effect on the overbridge or new carriageway. The minor utilities currently within the deck of the road bridge and adjacent footbridge will be diverted into a utilities gallery running below the deck. There will be further local diversions of utilities for street lighting and serving the domestic customers on both sides of the bridge.

3.12 Austhorpe Lane – Heritage

3.12.1 The heritage aspects of Austhorpe Lane bridge are covered in the Proof of Evidence submission from Amy Jones.

3.13 Austhorpe Lane – Summary and Departures from Standard

3.13.1 I consider that the final design is the best that can be achieved within the constraints of the changes to the railway and the constrained nature of the site. The track changes and the inclusion of the overhead power systems require the clearance above to be lines to be increased, thus raising the minimum finished road level of the overbridge. The aim has been to improve road safety by adding an extra lane to the overbridge and reduce the risks of head on collisions but within the constraints of the available land and not requiring the acquisition of any additional properties to provide an alignment that meets all design standards.

3.13.2 The aim has been to provide a design that is compliant with the design standards and to reduce the number of departures from standards to a minimum. The departures from standard for forward visibility and K value of the vertical curve over the bridge are mitigated by the low speed nature of the road, warning signs and traffic calming measures (road humps) to discourage excessive speed and retention of the weight limit to remove large and heavy vehicles from the bridge.

3.14 Ridge Road – Current layout

3.14.1 A656 Ridge Road is a single carriageway road between M1 Motorway junction 47 to the north and Peckfield Roundabout / A63 Selby Road to the south. Over the section of road in the vicinity of the overbridge it is subject to National Speed Limit. The road runs in a straight line north / south for approximately 1700 metres with HUL4/14 overbridge located approximately 1150 metres from Peckfield Roundabout.

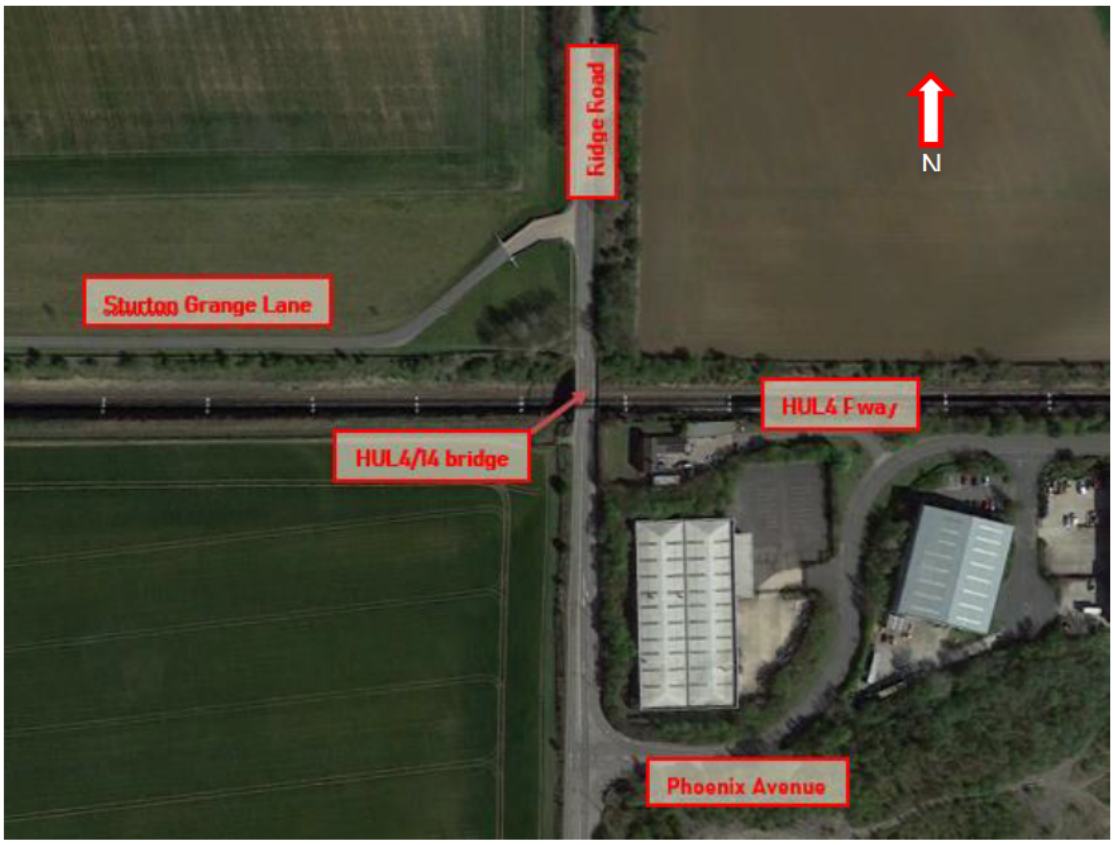

Figure 9 - Ridge Road location

3.14.2 HUL4/14 is a single span overbridge carrying the A656 single carriageway public road. North of the bridge the existing carriageway is approximately 6.0m wide. Over the bridge the width of the carriageway is approximately 5.9m, with a narrow footpath / hardened verge of approximate width 1.38m to the west and a footpath of approximate width 2.00m to the east. The total deck width is 10.24m between the outsides of the parapets and 9.42m between the faces of the parapets. Immediately to the south of the bridge the carriageway widens to form an exit taper for entry into Phoenix Avenue for vehicles travelling from the north and to provide a dedicated right turn lane into Phoenix Avenue for vehicles travelling from the south. The two through lanes are each approximately 3.0m wide.

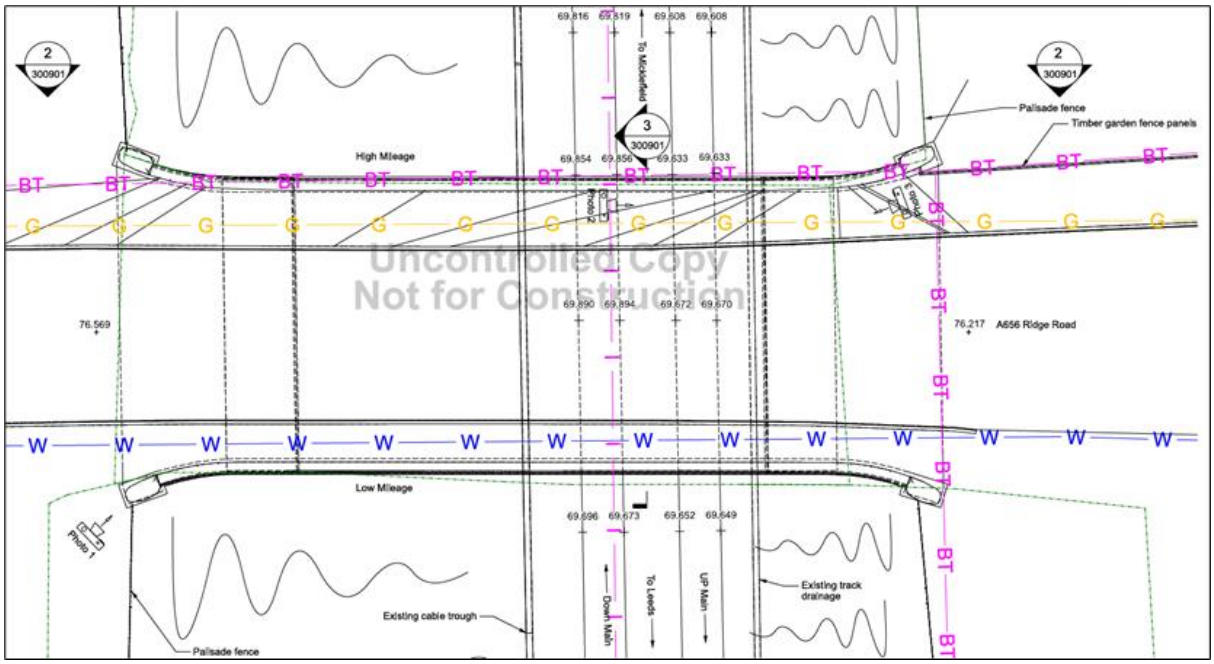

Figure 10 - Ridge Road existing general arrangement

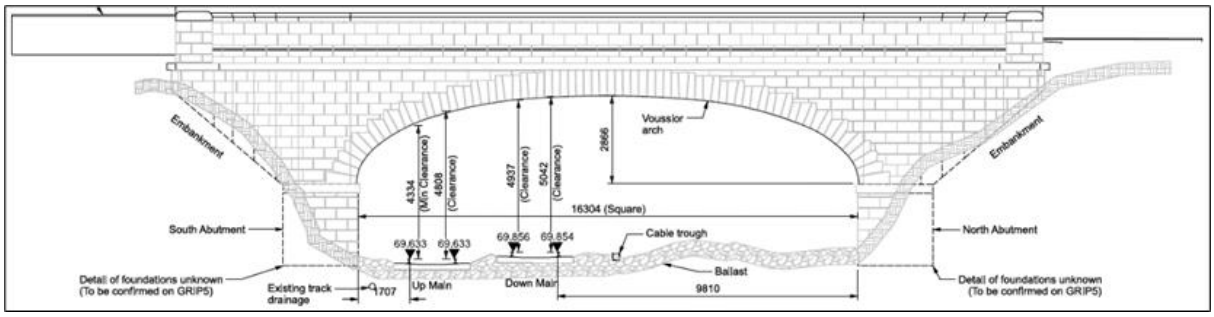

Figure 11 - Ridge Road existing elevation

3.14.3 Approximately 70 metres to the north of the centre point of the bridge, a farm access track, Sturton Grange Lane, joins Ridge Road from the west. Approximately 150 metres to the south of the centre point of the bridge, Phoenix Avenue joins Ridge Road from the east and provides access to the Peckfield Business Park. Both of these roads are unclassified single carriageway minor roads.

3.14.4 A Public Footpath joins Ridge Road from the west to north of the overbridge.

3.14.5 A pedestrian footpath with kerbed upstand is provided on the eastern side of Ridge Road from Phoenix Avenue and stops at the northern end of the bridge where it is replaced by a highway verge (unkerbed). A kerbed hard strip / narrow pedestrian footpath is provided on the western side of Ridge Road over the bridge only. North and south of the bridge, the footpath is replaced with an unkerbed highway verge.

3.14.6 No properties directly access Ridge Road in the vicinity of the bridge.

3.14.7 Buried services and Statutory Undertakers information indicate that a gas main and a telecoms cable pass up the eastern footpath / verge, with the gas main towards the carriageway edge and the telecoms cable towards the back of footpath / verge. To the south of the bridge, the gas main passes under the kerbline and is located in the carriageway.

3.14.8 Immediately south of the abutment, an additional telecoms cable crosses the road and runs east – west along the top of the railway embankment.

3.14.9 A water main passes up the western verge / footpath.

Figure 12 - Ridge Road looking north

3.15 Ridge Road – Reasons for replacement

3.15.1 The reasons for replacement for Ridge Road Bridge are similar to those for Austhorpe Lane Bridge and discussed in section 3.3 above.

3.15.2 The current bridge needs to be replaced as the headroom over the railway is insufficient for the electrification works of TRU. Early alternative design options included lowering the rail lines through the area but this was found to be neither technically possible nor economical due to the long lengths that would be affected. The increase in required headroom will raise the level between the existing and proposed bridge decks in excess of 200mm.

3.15.3 The current bridge parapet height does not comply with current standards and its ability to resist impact is unknown.

3.15.4 These factors indicate that localised modifications to the existing bridge are not practical and replacement is the only valid solution.

3.16 Ridge Road – Proposed layout

3.16.1 In keeping with the existing arrangement, the new carriageway will be a like-for-like replacement with some structural changes to the bridge parapets and provision for some future widening of the carriageway.

3.16.2 The carriageway throughout will be 7.07m width between kerb faces, comprising of 2 lanes, balanced with 2.5% (1:40) crossfall from the centreline of the road towards the channels. The road over the bridge will be bounded by a footpath on the eastern side, width 1.80m, which continues over the bridge and connects into the existing footpath leading towards Phoenix Avenue. The raised hard strip on the western side is narrower at 986mm wide, and extends only over the length of the bridge, similar to the existing condition. The overall width between the faces of the parapets will be 9.86m. The carriageway will be widened equally about the existing centreline over the bridge and will be marked as 2 x 3.00m lanes in keeping with the existing arrangement. The carriageway will continue outside the edge of lane line to provide a total asphalt with of 3.54m between centreline and face of kerb and provide some room for future widening of the lanes. Outside the limits of the bridge, the new carriageway will be tapered to meet the existing carriageway on a 1:50 taper.

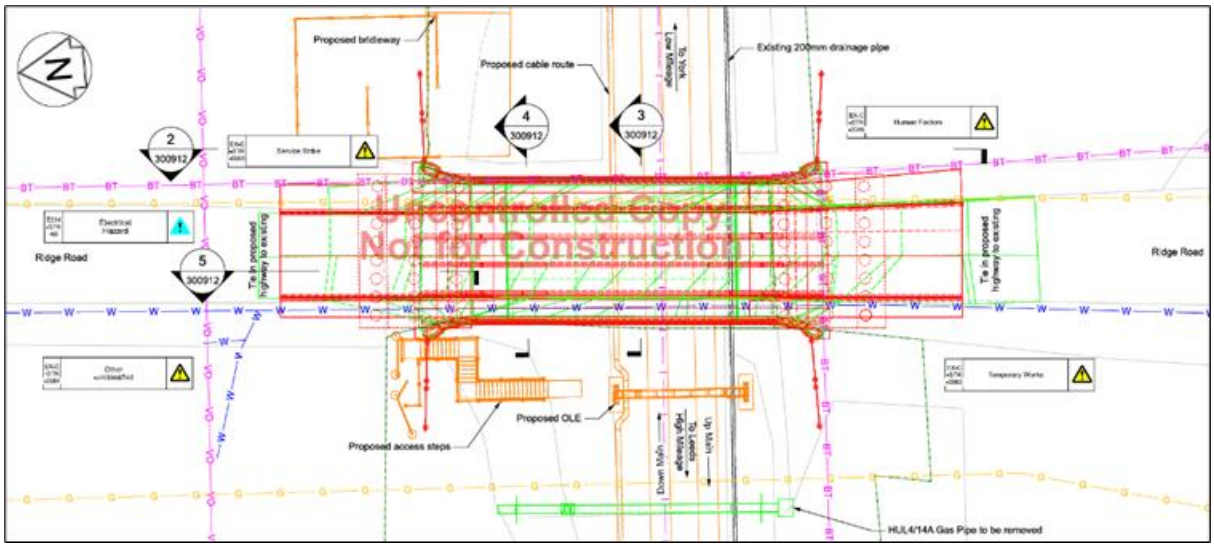

Figure 13 - Ridge Road proposed general arrangement

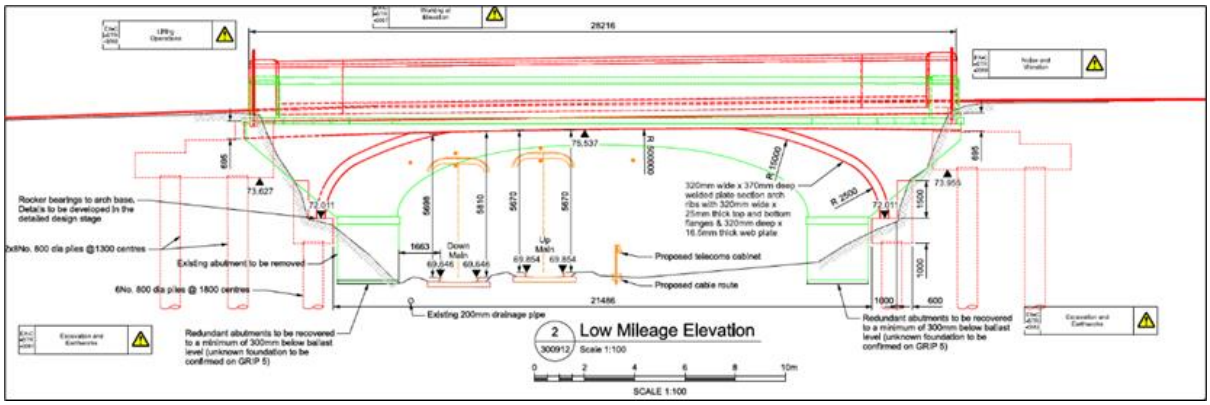

Figure 14 - Ridge Road proposed elevation

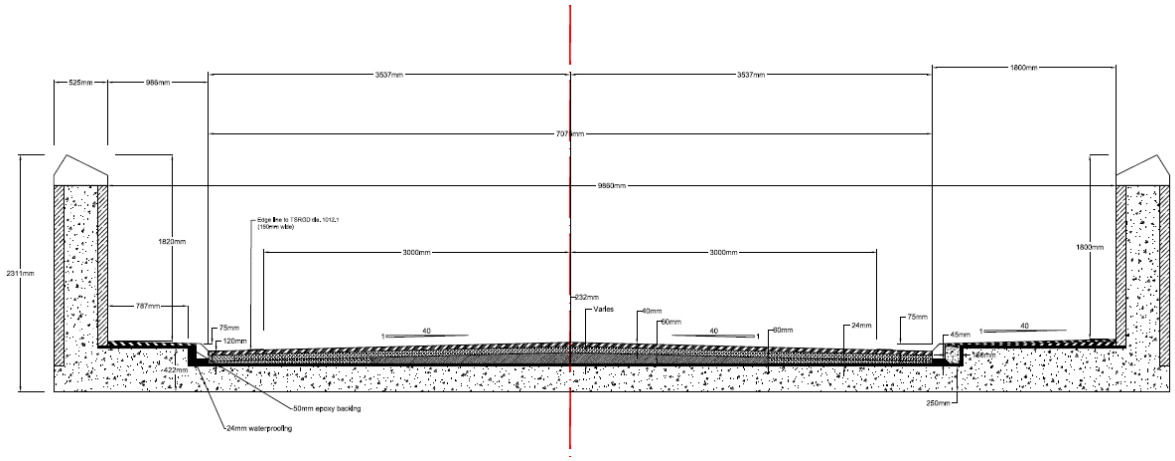

Figure 15 - Ridge Road bridge cross section

3.16.3 The centreline of the new and existing carriageway will remain the same which will result in the structure shifting 132mm towards the east to account for the change in cross sectional layout.

3.16.4 The replacement parapets will be minimum 1.8m high and achieve H4a containment level. A Road Restraints Risk Assessment Process (RRRAP) has been carried out to determine the need for additional safety barrier off the bridge and the extent of these barriers and we have found that additional high containment barriers (H4a) will be needed on all 4 corners of the bridge. These will be shown on ther final detail design drawings.

3.17 Ridge Road – Design and compliance with standards

3.17.1 Ridge Road has been designed in accordance with DMRB CD 109 (Highway Link Design) with a design speed of 100kph as national speed limits apply on this section of road.

3.17.2 The carriageway width over the bridge will be 7.07m as discussed earlier and as agreed with LCC. This is a departure from standards for both LCC SPD (cl. 230) and DMRB CD 127 (Cross sections and headrooms). The width is constrained by the available land for construction and permanent use. Wider overall road widths were considered but were discounted as the existing carriageway width is approximately 6.0m and extra widening to the standard of 7.3m would result in an extra shift to the east of the bridge structure which would conflict with the property to the south east of the bridge.

3.17.3 The highway design loading of the bridge will be in accordance with DMRB CD 224 (Traffic Assessment). The standard design period of 40 years results in a loading of 17 msa for the northbound carriageway and 12 msa for the southbound. As this is a single carriageway road the higher of the 2 values is used throughout to calculate the thickness of the road pavement.

3.17.4 Safety barrier will be provided in accordance with DMRB CD 377 (Requirements for road restraint systems) with containment class H4a over the railway bridge and N2 elsewhere.

3.18 Ridge Road – Horizontal alignment

3.18.1 The horizontal alignment will follow the existing Ridge Road which is approximately straight through the works. This is therefore in compliance with DMRB CD 109 (Highway Link Design)

3.19 Ridge Road – Vertical alignment

3.19.1 The vertical alignment will tie into the existing surface on either side of the bridge using vertical curves in excess of the desirable minimum crest and sag curves for a 100kph speed road. This will produce a smooth alignment that meets the design standards for a high speed road. Over the bridge, the road profile will be on a constant grade of approximately 1% for ease of construction and to keep the deadload on the bridge to a minimum and will be approximately 150mm higher than existing due to the change in clearance to the railway below.

3.20 Ridge Road – Forward visibility

3.20.1 Due to the straight horizontal alignment and the large radius vertical curves of the vertical alignment, the forward visibility over the bridge for road users is in excess of the 215m minimum required in the DMRB CD 109 (Highway Link Design) design standard.

3.20.2 Visibility for road users joining the main road from Phoenix Avenue and the farm access road are in excess of 215m and are in compliance with standards.

3.21 Ridge Road – Drainage

3.21.1 The vertical alignment of the revised bridge follows the existing, passing north to south in a series of shallow curves and grades. The new drainage arrangement will follow the existing – rainfall to the north of the bridge will flow into the verges on either side of the carriageway. Over the bridge, rainfall will run down the channels and into the verge on the south west side of the road, and into the existing gullies on the south east side of the road

3.22 Ridge Road – Utilities

3.22.1 The existing high pressure gas main running alongside the bridge to the east will be diverted on the same alignment but will be laid under the new railway lines. There is

an existing medium pressure gas main and a telecommunications cable in the existing eastern footpath which will be diverted into a service bay running beneath the deck of the new overbridge in the eastern footpath. There is also a watermain running up the western verge of the existing bridge which will be replaced by 2 new watermains diverted into another service bay running beneath the deck of the new overbridge in the western hard strip.

3.23 Ridge Road Bridge – Heritage

3.23.1 Similar to section 3.11 above, the heritage aspects of Ridge Road bridge are covered in the Proof of Evidence submission from Amy Jones.

3.24 Neville Hill Access Road – Current layout

3.24.1 The proposed Neville Hill Access Road is located at the end of Newmarket Approach which in turn connects to A63, Pontefract Lane.

3.24.2 The area of the proposed road is bounded on the west and east by light industrial units and a footpath on the east which connects Newmarket Approach to the footpath / bridleway. There is a stub end road immediately at the end of Newmarket Approach indicating that a connecting road was likely considered during the design and construction of the original road. This stub end is 7.3m wide.

Figure 16 - Neville Hill Access Road, existing conditions

3.24.3 The definitive Leeds City Council Public Rights of Way map defines this as a non-definitive bridleway linking Halton Moor Road and New Market Lane. The bridleway varies in width but is approximately 2.2m wide and runs east-west for approximately 850m. The new road crosses the bridleway approximately 380m from the end at Halton Moor Road.

Figure 17 - Neville Hill Access Road - bridleway looking east, depot to left

3.24.4 The boundary of Network Rail Neville Hill Depot is approximately 20m to the north of the bridleway at the proposed road. The boundary fence runs approximately parallel to the bridgeway for most of its length although the offset varies between 20m and 50m.

3.24.5 The general topography is relatively flat from Newmarket Approach to the bridgeway and along the bridleway, but the deport is sited approximately 3m higher than the bridleway. The ground rises steeply from the boundary fence to the general level of the depot and marshalling yard.

3.24.6 Newmarket Approach and the bridleway are lit but the footpath linking the two is unlit.

3.24.7 There is an existing A-frame barrier at the start of the footpath at Newmarket Approach (see figure 18) and the grass area immediately to the north of Newmarket Approach is blocked off with 3 large stone blocks.

3.24.8 There are existing utilities passing through and near to the works;

- A drainage culvert – this is sufficiently deep that it is unaffected by the works and does not interfere with the proposals.
- A street lighting cable running along the southern edge of the bridleway.
- 2 district heating pipes running parallel to and just to the north of the bridleway.
- A low voltage cable, running from Neville Hill Deport, across the bridleway, along the existing footpath and into Newmarket Approach.

3.24.9 A telecommunications cable, passing along the footpath at Newmarket Approach but appears to stop at the boundary of the new road.

3.25 Neville Hill Access Road – Proposed layout

3.25.1 The proposed carriageway is 7.3m wide from the junction with Newmarket Approach to the existing track within the depot.

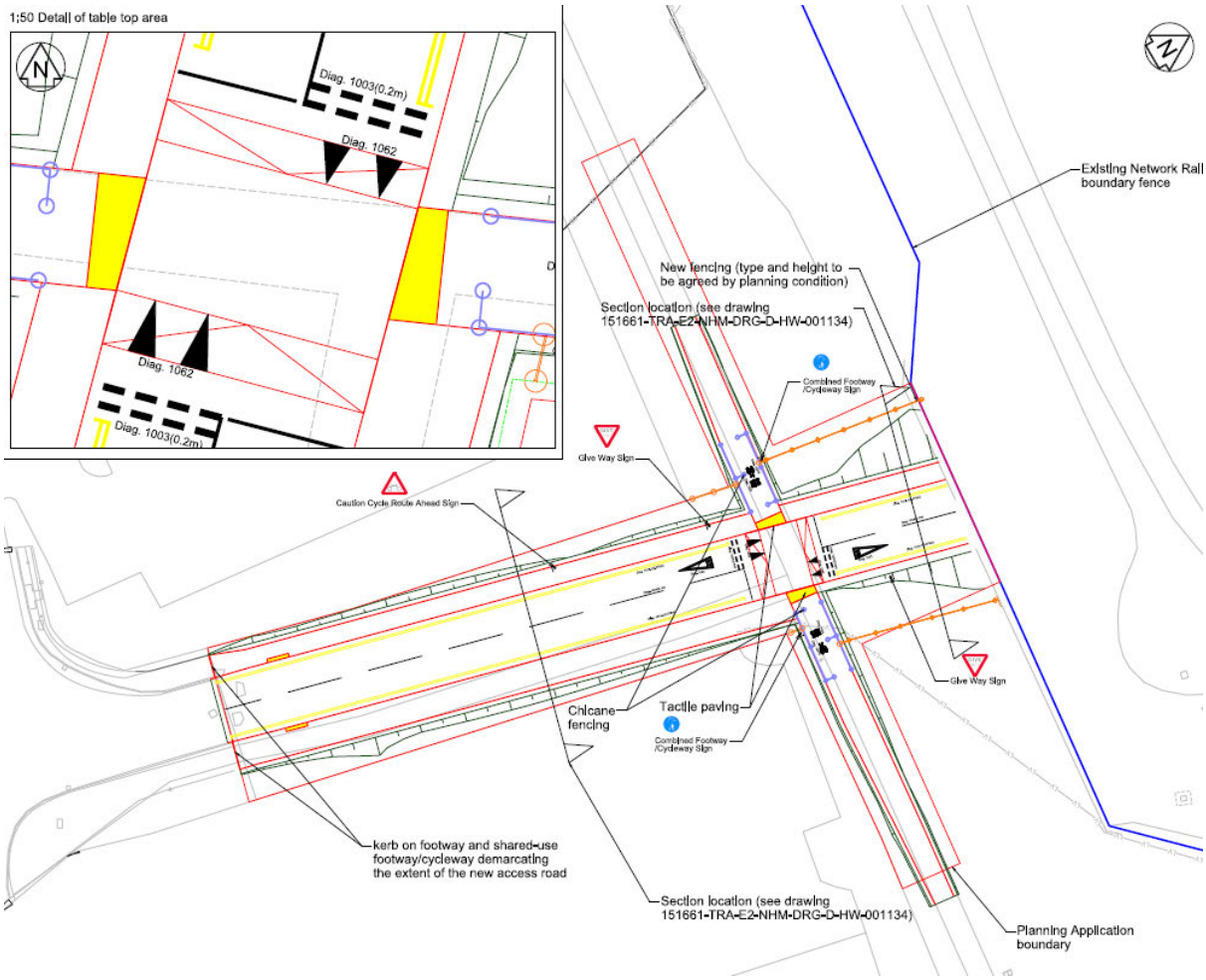

Figure 18 - Proposed Layout Neville Hill Access Road

3.25.2 A 2.0m wide footpath is provided on the western side of the road, from the existing footpath at Newmarket Approach up to and across the bridleway and onwards to the depot boundary fence.

3.25.3 A 3.0m wide shared use cycleway / footpath is provided on the eastern side of the road from Newmarket Approach to the bridleway. This bridleway crosses the new access road on a 15º skew.

3.25.4 The bridleway is widened from the existing 2.2m wide to 3.0m wide through the proposed works to be compliant with cycleway design standards. This widening is provided over a length of 34m. The northern edge of the bridleway remains the same and the widening is to the south only. Chicane guard rail barriers are provided on both approaches of the bridleway to the new road and are intended to warn and slow cyclists as they near the junction.

3.25.5 A table-top speed reduction road hump is provided where the new road crosses the bridleway. The road surface rises to the same level of the bridleway from both sides and extends across the full width of the road. The level of the table top is the same as the bridleway, so is intended to not impede cyclists, equestrians, pedestrians and persons with reduced mobility but will provide a physical deterrent to road vehicles. Due to the skew of the bridleway relative to the proposed road, the table top is 4.4m wide to permit the 3.0m wide bridleway crossing to be placed entirely within the raised flat section.

3.25.6 Give Way road markings and road signage is provided on both approaches to the bridleway to emphasise the need for low speeds at the crossing point. Pedestrians, cyclists and equestrians will have priority over the road users at the crossing.

3.25.7 Tactile paving is provided at an uncontrolled crossing shortly after the start of the works and at the table top crossing to identify the crossing points for persons with visual impairment (see figure 18).

3.25.8 LCC have indicated that they will not be adopting the highway with the exception of the revised bridleway only. The new access road will therefore remain in the ownership of Network Rail who will be responsible for any ongoing maintenance.

3.26 Neville Hill Access Road – Design and compliance with standards

3.26.1 Although the road will remain in Network Rail ownership, the road and the details have been designed in accordance with LCC standards and details, with the exception of the vertical profile of the road to the north of the bridleway. Network Rail has applied to Leeds City Council for planning permission to construct the new road and the proposed changes to the existing bridleway (ref: 23/03522/FU). I append a copy of the Transport Assessment submitted with that application which includes the Stage 1 RSA as Appendix E.

3.27 Neville Hill Access Road – Horizontal alignment

3.27.1 The horizontal alignment is straight throughout the works. Within the depot area the alignment will tie into the existing access tracks. The bridleway is straight, although there is the widening to the south.

3.28 Neville Hill Access Road – Vertical alignment

3.28.1 The highway vertical profile up to the bridleway is compliant with standards, with a tie-in sag curve K value 3 at Neville Hill leading into a crest curve (K value 4.5) up to the bridleway. The section of the carriageway to the north of the bridleway does not comply with LCC standards and comprises a back to back sag curve (K value 1.3) to crest curve (K value 1.0). The level difference between the bridleway and the depot area is approximately 3 metres over a horizontal distance of 30 metres so the peak gradient will be 15%. This short section of road cannot be designed to LCC standards due to the large level difference and the short horizontal distance between the bridleway and the finished ground level inside the compound. Compliance with standards would require a combination of retaining walls and earthworks cuttings within the depot and retaining walls at the bridleway. This section of road is part of the works that will not be adopted by LCC and will only ever be used by Network Rail, their contractors and authorised users.

3.28.2 The bridleway is on a constant grade of approximately 1.5%, falling from east to west. This is in compliance with LCC standards.

3.29 Neville Hill Access Road – Forward visibility

3.29.1 The visibility through the works for road and bridleway users is unobstructed.

3.29.2 The visibility at the junction for the bridleway users requires 43m to right and left, from a point 2.5m from the edge of the road. The full visibility is provided to the south for both eastbound and westbound travel. Visibility to the north is limited by the position of the gates into the depot. These gates are located 20.4m to the north for the eastbound bridleway and 19.2m for the westbound bridleway. In practice, the gates will be open when the road is in use so actual visibility will be higher.

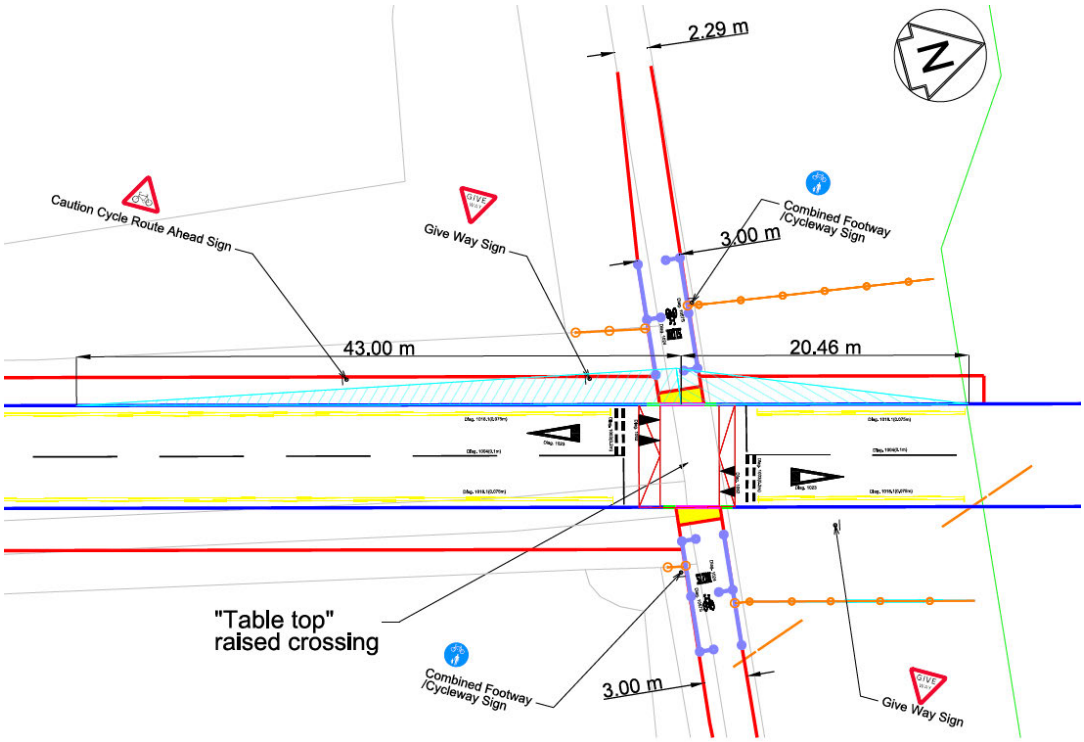

Figure 19 - Visibility for bridleway users, eastbound

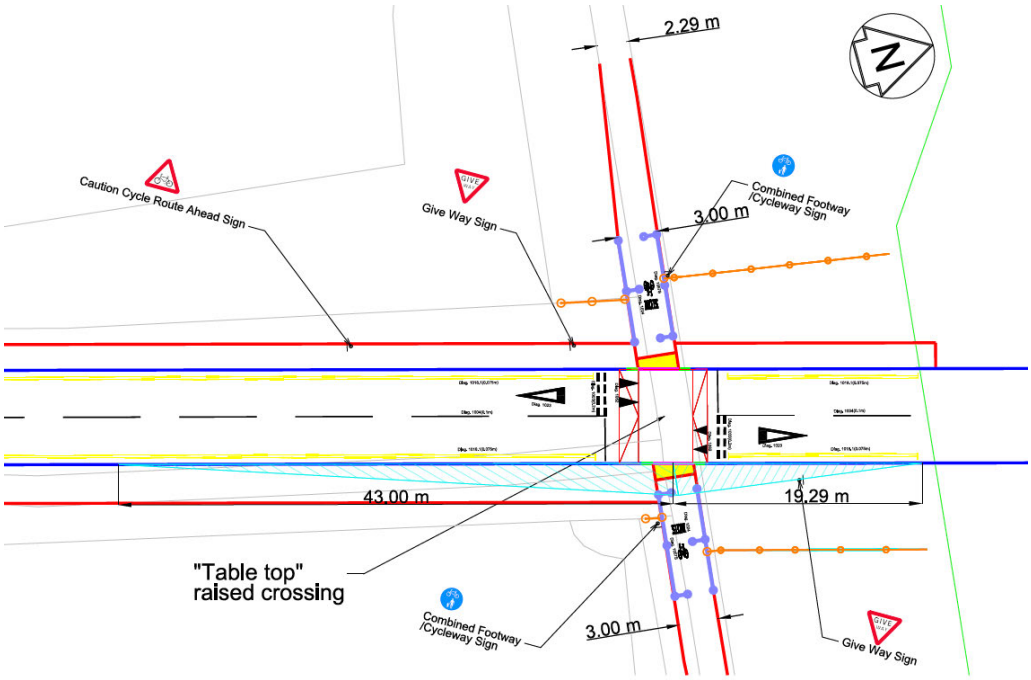

Figure 20 - Visibility for bridleway users, westbound

3.29.3 Full 43m visibility to the east and west is provided for road users exiting the depot.

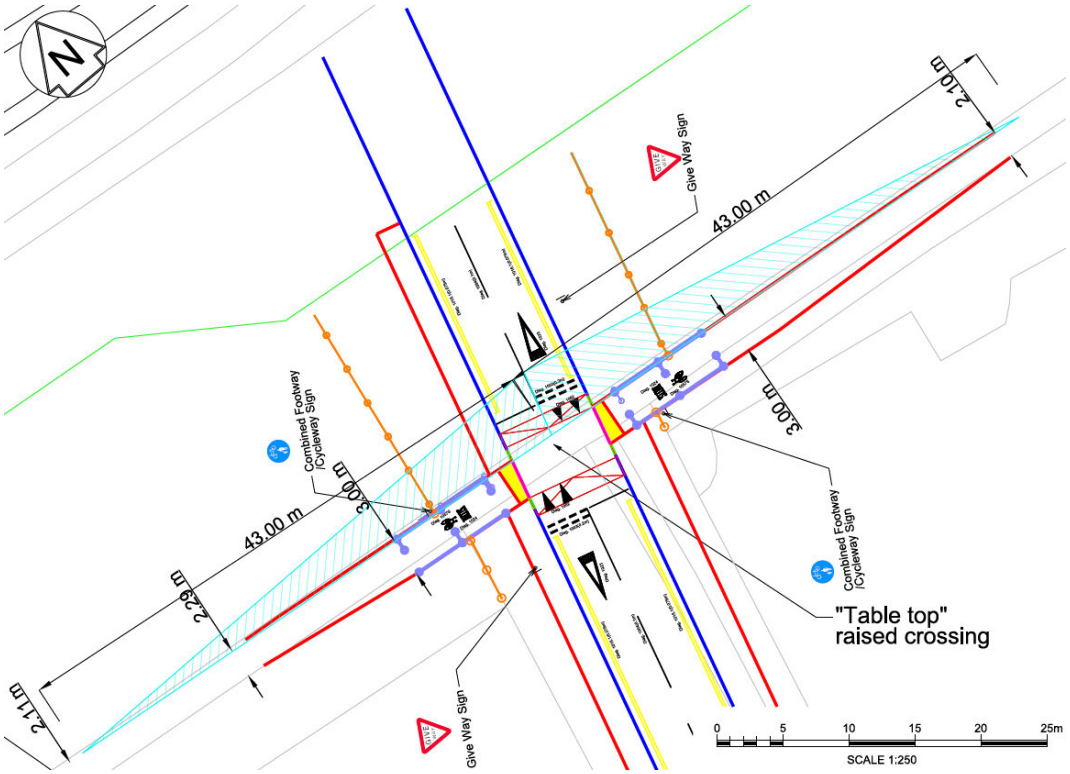

Figure 21 - Visibility for road users, southbound

3.29.4 For road users approaching from the south, full visibility to the west is provided. Visibility to the east is limited to 9.23m by the presence of the boundary fence to the industrial unit. The mitigation provided for the sub-standard visibility is the raised table top hump, Give Ways and chicane barriers which in combination will require all users of road and bridleway to reduce their speed.

3.29.5 Improvement of the visibility to the east would require the purchase of the small area of private land and realignment of the boundary fence.

3.29.6

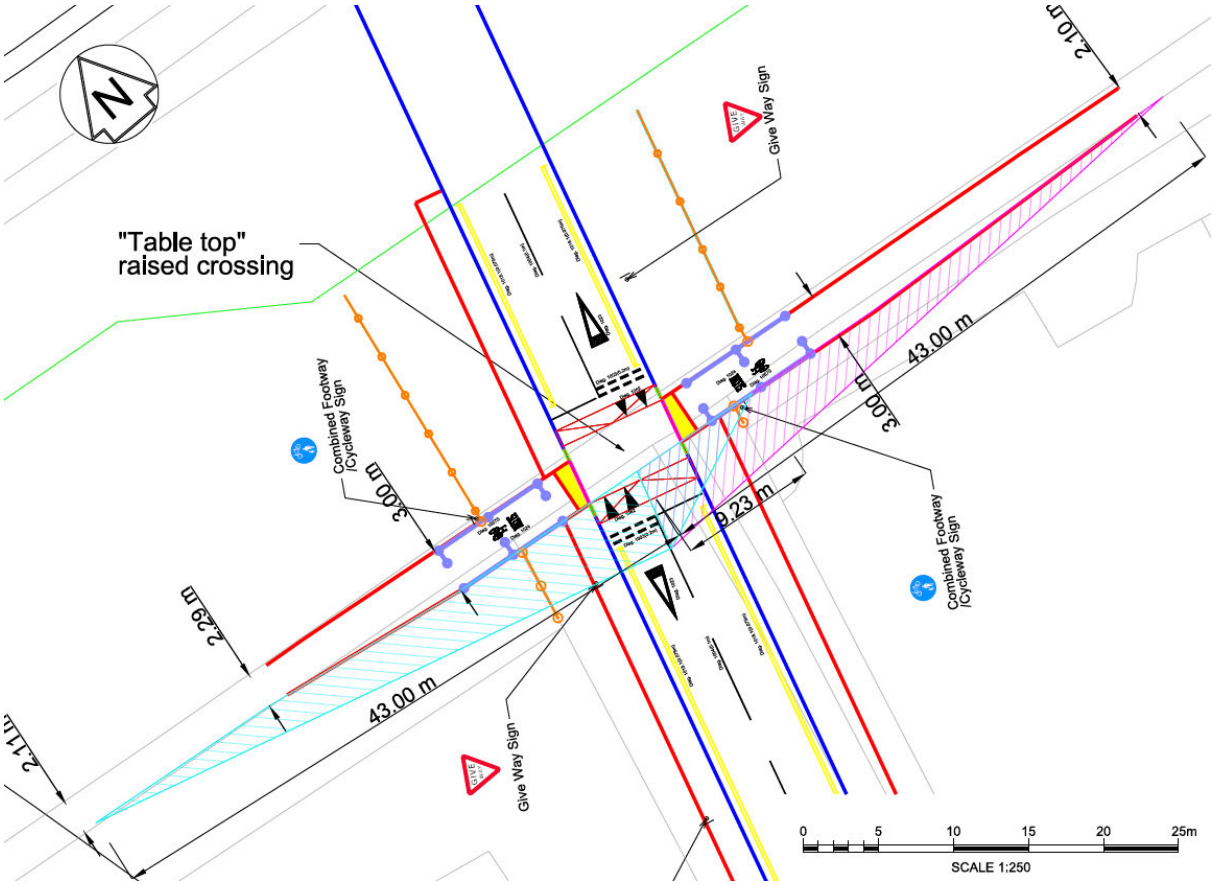

Figure 22 - Visibility for road users, northbound

3.30 Neville Hill Access Road – Drainage

3.30.1 Normal kerb and gully drainage will be provided on the new carriageway, with the flows attenuated before discharge into the highway drainage system in Newmarket Approach.

3.31 Neville Hill Access Road – Utilities

3.31.1 District heating pipes run parallel to the bridleway and will be protected under the new carriageway by a reinforced concrete slab.

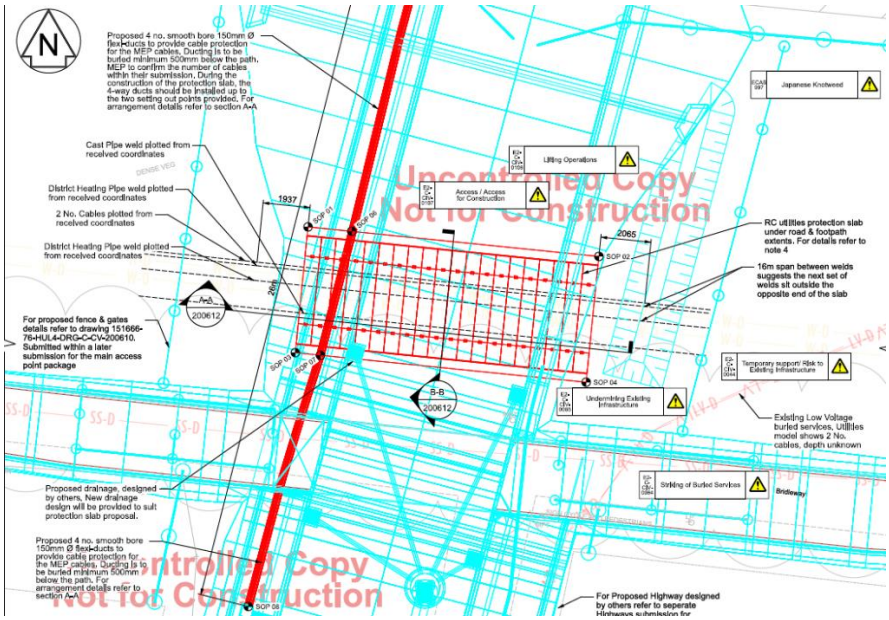

Figure 23 - District heating pipe protection, plan

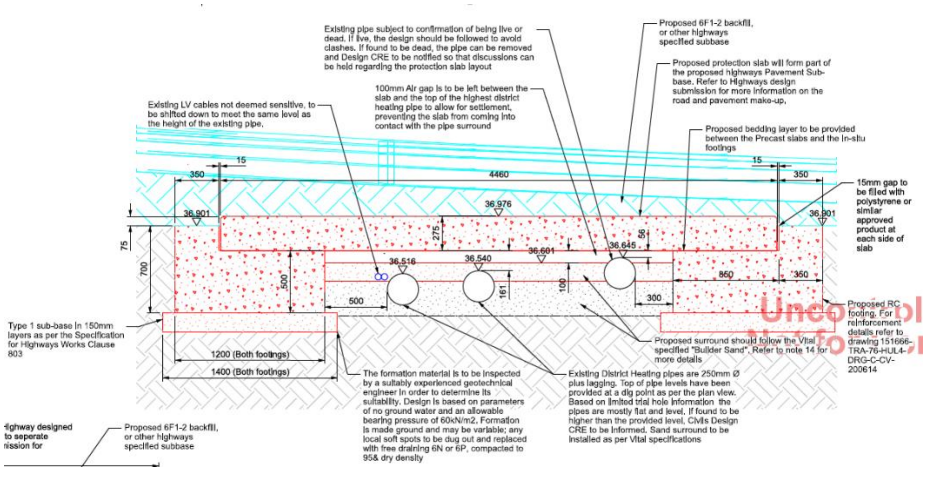

Figure 24 - District heating pipe protection, section

3.31.2 The existing street lighting on the bridleway will be relocated where it conflicts with the new works. No new street lighting will be provided, but lighting column foundations and ductwork to probable new column locations will be included. If street lighting is to be added to the scheme at a later date, the amendments can be made without extensive excavation to provide power.

3.32 Peckfield Bridleway Diversion - overview

3.32.1 The diversion for the bridleway at Peckfield Lane / Pit Lane in Micklefield is covered in detail by the Proof of Evidence of Michael Westwood. The figure below is reproduced from his Proof of Evidence, with the new bridleway shown in green. The existing bridleway is shown as the magenta line and passes up Pit Lane to the existing Peckfield Level Crossing. The bridleway then continues to the north along Pit Lane (also known as Peckfield Lane).

3.32.2 The proposed diversion starts at the north of the existing level crossing and goes east, through the Micklefield Recreation Ground, (MRG) to Great North Road, then turns south under the existing rail overbridge and turns west, along Pit Lane to the south side of the level crossing. Several matters have been raised by LCC regarding the proposals.

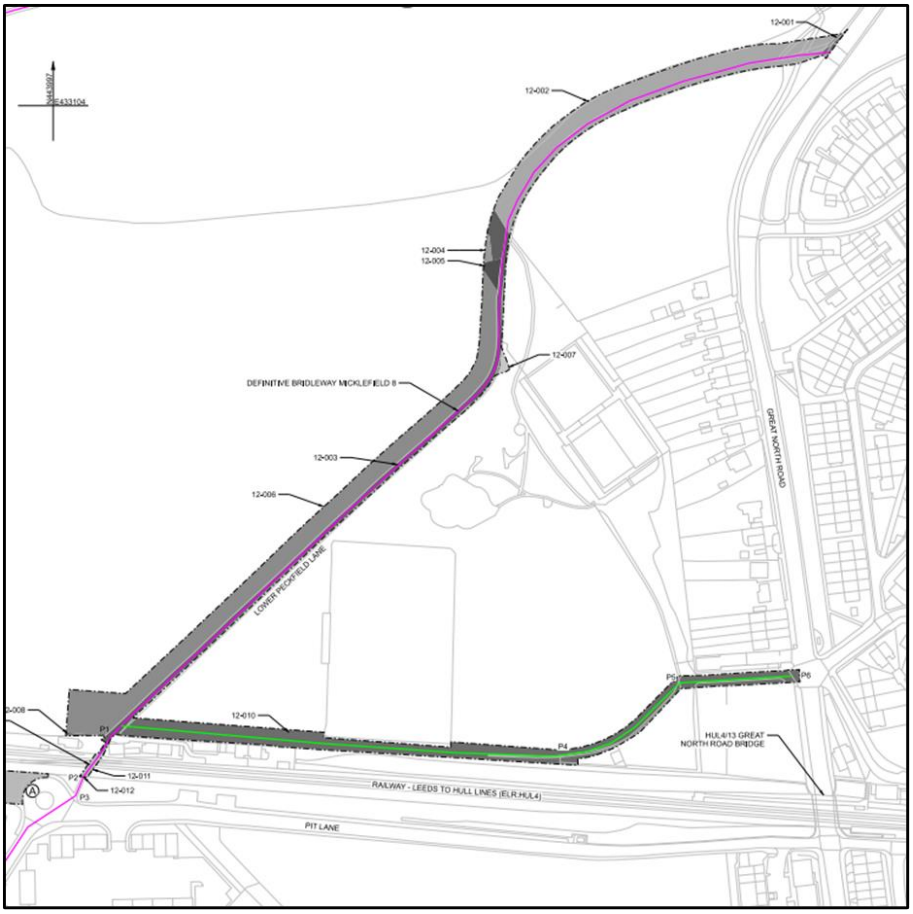

Figure 25 - Peckfield Bridleway Diversion

3.32.3 A Route Safety Assessment has been carried out to consider the safety implications to non-motorised users (NMU's) from the proposals at the request of LCC.

3.32.4 The assessment was carried out using the guidance provided in National Highways Design Manual for Roads and Bridges document GG119 'Road Safety Audit' and GG142 'Walking, cycling and horse-riding assessment and review' as well as the guidance on best practice given in the CIHT's document 'Road Safety Audit Guidelines'. The assessment considered the safety implications of NMU's being diverted from the current route to the proposed route.

3.32.5 This assessment is included in reference CD3.10

3.33 Peckfield Bridleway Diversion – entrance to MRG

3.33.1 LCC were concerned that "*the route that is being proposed for diversion of the bridleway PROW will put pedestrians, horse riders and other bridleway users in direct conflict with vehicles that also use the access track to the MRG and the residential cottages nearby*."

3.33.2 It is noted that the access into the recreation ground is too narrow to permit two-way traffic, but the width is in excess of a standard single lane. The surface appears to be in good condition and has good visibility end-to-end.

3.33.3 The track to the car park is bounded by mature trees on the north and south sides, therefore widening of the track is not considered an appropriate option.

3.33.4 The track, which is about 55m long will only be used by cars travelling at low speed under normal conditions. There is a height restriction barrier indicating a maximum height of 2.1m (7'0") which would bar most vans and some taller cars.

3.33.5 The same height restriction barrier would also affect horse riders, who would have to dismount to pass under the barrier, and is lower than the required headroom for cyclists (2.3m) who may also need to dismount. All users of the track will therefore be moving at very low speeds and are unlikely to come into conflict. Therefore, the shared use of this track by self-propelled vehicles, horse riders, cyclists and walkers is not considered to be a safety problem.

3.33.6 Additionally, records of pedestrian flows at Micklefield level crossing have found no instances of use by horses and riders, so the chances of conflict between car users and equestrians at the access track off Great North Road are very low.

3.34 Peckfield Bridleway Diversion – existing road network including under Network Rail bridge

3.34.1 LCC were also concerned that "*the proposals include a route under the railway line on Great North Road, under an existing tunnel. The tunnel itself is narrow, unlit and would not leave sufficient room for both horses and cars to safely use the highway in accordance with Rule 215*."

3.34.2 The road under the tunnel is not narrow, as it is in excess of 6.0m between kerbs. Recent works by LCC have narrowed the road under the bridge from approximately 7.5m wide and has provided a wider footpath on the west side of the road.

3.34.3 The section of the road immediately under the bridge is unlit, but there are street lights approximately 9m north of the bridge and 19m south of the bridge. Although the lighting levels have not been checked as part of the scheme, such an arrangement will provide normal levels of illumination during the hours of darkness. Equestrians would also be expected to follow the Highway Code Rule 51 which states;

> ***At night****. It is safer not to ride on the road at night or in poor visibility, but if you do, make sure you wear reflective clothing and your horse has reflective bands above the fetlock joints. A light which shows white to the front and red to the rear should be fitted, with a band, to the rider's right arm and/or leg/riding boot. If you are leading a horse at night, carry a light in your right hand, showing white to the front and red to the rear, and wear reflective clothing on both you and your horse. It is strongly recommended that a fluorescent/reflective tail guard is also worn by your horse.*

3.34.4 I do not agree that motorised vehicles cannot pass horses on Great North Road. Highway Code Rule 215 states;

> ***Horse riders and horse-drawn vehicles****. Be particularly careful of horse riders and horse-drawn vehicles especially when approaching, overtaking, passing or moving away. Always pass wide and slowly. When you see a horse on a road, you should slow down to a maximum of 10 mph. Be patient, do not sound your horn or rev your engine. When safe to do so, pass wide and slow, allowing at least 2 metres of space.*

Great North Road is approximately 7.5m wide through Micklefield and in excess of 6.0m wide under the bridge. A large SUV (2.2m wide) passing a horse and rider (75cm wide) with a clear gap of 2.0m needs 4.95m to safely pass. A refrigerated HGV is the widest vehicle normally encountered on the roads and has a width of 2.58m. (Source: The Road Vehicles (Construction and Use) Regulations 1986). Based on the same considerations, a refrigerated HGV would need 5.33m to safely pass a horse and rider.

3.34.5 All motorised vehicles would need to slow to a walking pace, wait for a suitable gap in oncoming traffic and swing across to the right hand side of the road to pass. This is in keeping with the British Hose Society "Dead Slow" messaging, where drivers are expected to slow down to a maximum of 10mph, be patient (not sound the horn or rev the engine), pass the horse wide and slow, (if safe to do so) at least a car's width if possible, drive slowly away.

3.34.6 Pit Lane to the south of the railway runs from Great North Road near to the railway overbridge to the roundabout near to the Enterprise Court Business Centre. This section near to Great North Road is in excess of 6m wide and there is therefore sufficient width for any normal road vehicle to pass a horse and rider, following the precautions listed above.

3.35 Peckfield Bridleway Diversion – provision for cyclists

3.35.1 LCC also commented "*Also It is stated in the attached the data shows average speeds can be higher than 30mph on Great North Road which means more protected space is preferred for cyclists at per LTN 1/20 guidance if this diversion is to be deemed acceptable".*

3.35.2 As discussed above, Great North Road has a width of between 7m to 8m, is lit, has a 30mph speed limit over the diverted length of bridleway, and has speed humps/raised table in the section of road that passes through the railway underbridge.

3.35.3 When a vehicle encounters a horse or cyclist in the highway, the driver will need to wait for a suitable gap in the opposing traffic flow and then overtake. There is no lack of width on Great North Road to undertake such a manoeuvre.

3.35.4 The Automatic Traffic Count (ATC) recorded a two-way flow on the Great North Road of approximately 2,400 vehicles per day. In the busiest hour, the opposing flow was approximately 120 vehicles per hour (i.e. two vehicles per minute). This low level of

opposing flow would not represent a material constraint to a driver overtaking a horse and rider.

3.35.5 The ATC recorded a total of 37 cycles northbound and 39 cycles southbound over a 7 day period, an average of just over 5 cycles per day in each direction. LTN 1/20 discusses the need and design requirements for protected space for cycling (including light segregation, stepped cycle track, kerbed cycle track) but the design standards start with up to 200 cycles per hour in a 1-way direction and 300 cycles per hour for 2-way direction. A protected space for cycling is not a requirement in this situation due to the very low cycle flows.

4. OPTION SELECTION/ALTERNATIVES CONSIDERED

4.1.1 The Network Rail (Leeds to Micklefield Enhancements) Order Statement of Case NR19 Section 8.5 discusses the option selection and alternatives considered. These alternatives are discussed in greater detail below.

4.1.2 During GRIP3 and into the start of GRIP4, options as described in section 4.2 to 4.9 were considered for HUL4/21 Austhorpe Lane Bridge.

4.1.3 The current design proposals have been developed from Option 2E, (section 4.8), but modified as described in sections 3.4 to 3.11, above.

4.1.4 The variation in options for HUL4/14 Ridge Road Bridge were not as extensive as there was less scope to amend the alignment and concentrated more on the provision of space for the utilities within the bridge. See Section 4.10 to 4.19

4.2 Austhorpe Lane Option 1 – 2 way carriageway, footway on west side

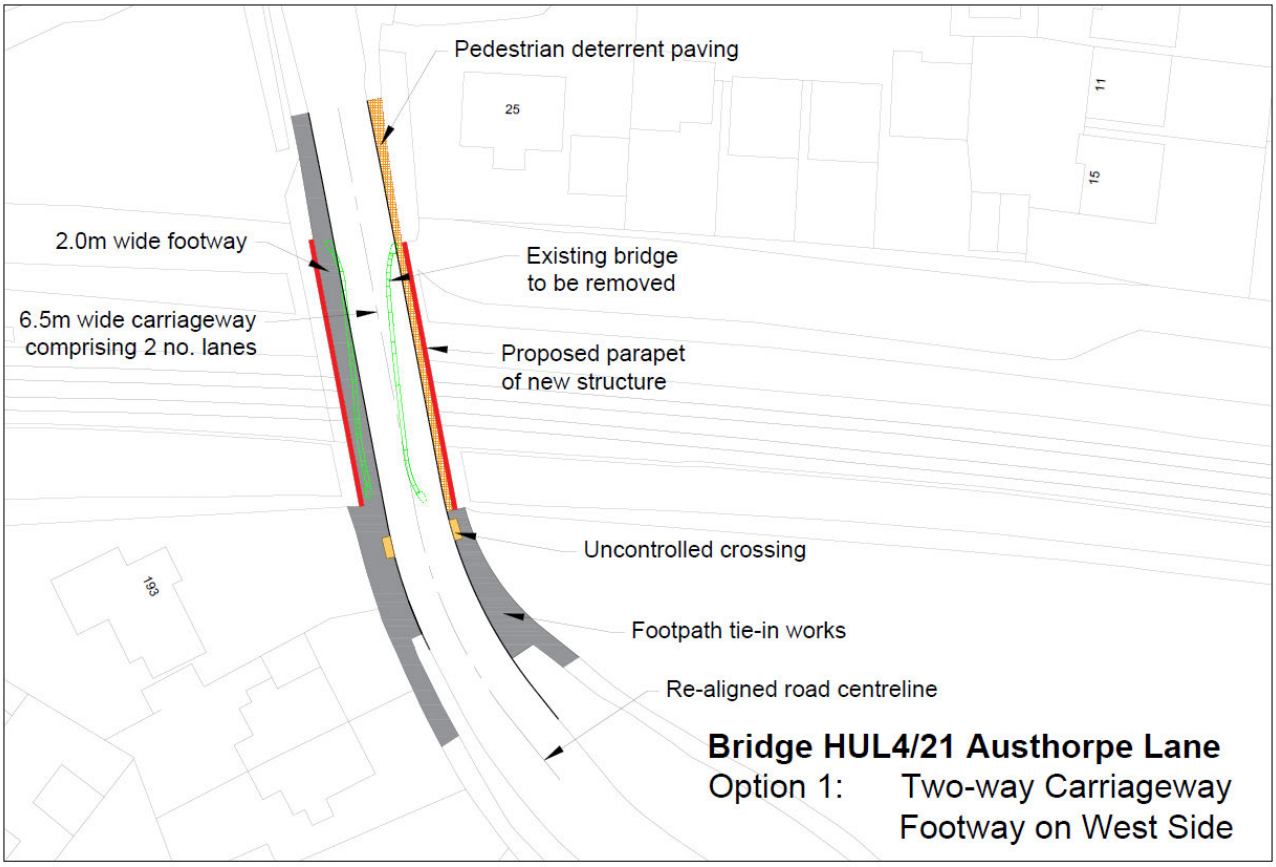

Figure 26 - Austhorpe Lane Option 1

4.2.1 Impact to adjacent land/properties – significant land-take required on the northeast and southeast approaches to accommodate additional lane.

4.2.2 Buildability – the demolition of existing footbridge will provide a safe access for the construction of the new road bridge

4.2.3 Health and safety during maintenance – 2m wide footway provides sufficient room to install 3 no. existing water mains service pipes within deck after application of suitable waterproofing. Access for inspection and maintenance can be gained from on top of the deck removing the need to work from height in a rail environment below deck.

4.2.4 Traffic disruption – there will be less disruption to the railway and the road to undertake any future emergency works on the watermain. Works could be undertaken without closing the railway and with minimal impact to the highway.

4.2.5 Departure from standards – two lane carriageway complies with current/LCC standards which will facilitate the planning approval process with LCC. Forward visibility for southbound traffic would be significantly reduced due to the proximity of the east parapet.

4.2.6 Construction Cost – wider deck and foundations require more land-take and hence less economical to build and maintain

4.2.7 Sustainability – wider deck requires larger amount of concrete and steel, which will increase carbon footprint.

4.3 Austhorpe Lane Option 2 – 2 way carriageway, footway on both sides

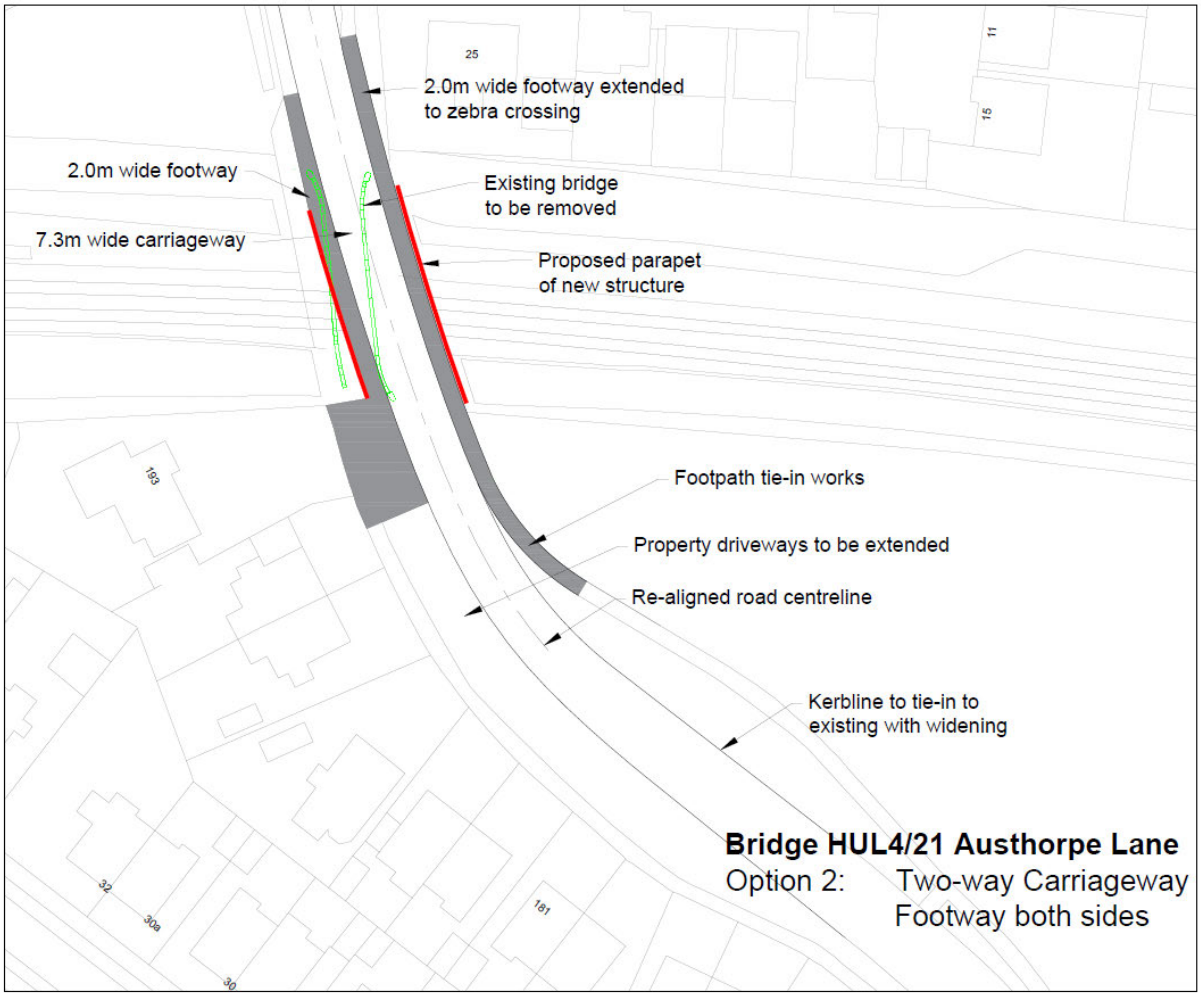

Figure 27 - Austhorpe Lane Option 2

4.3.1 Impact to adjacent land/properties – significant land-take required on the Northeast and Southeast approaches to accommodate additional lane.

4.3.2 Buildability – the demolition of existing footbridge will provide a safe access for the construction of the new road bridge

4.3.3 Health and safety during maintenance – 2m wide footway provides sufficient room to install 3 no. existing water mains service pipes within deck after application of suitable waterproofing. Access for inspection and maintenance can be gained from on top of the deck removing the need to work from height in a rail environment below deck.

4.3.4 Traffic disruption – there will be less disruption to the railway and the road to undertake any future emergency works on the watermain. Works could be undertaken without closing the railway and with minimal impact to the highway.

4.3.5 Departure from standards – two lane carriageway complies with current/LCC standards which will facilitate the planning approval process with LCC. Wide footpaths on both sides of the road will assist in providing good forward visibility.

4.3.6 Construction Cost – wider deck and foundations require more land-take and hence less economical to build and maintain

4.3.7 Sustainability – wider deck requires larger amount of concrete and steel, which will increase carbon footprint.

4.4 Austhorpe Lane Option 2A – 1 way carriageway, footway on east side

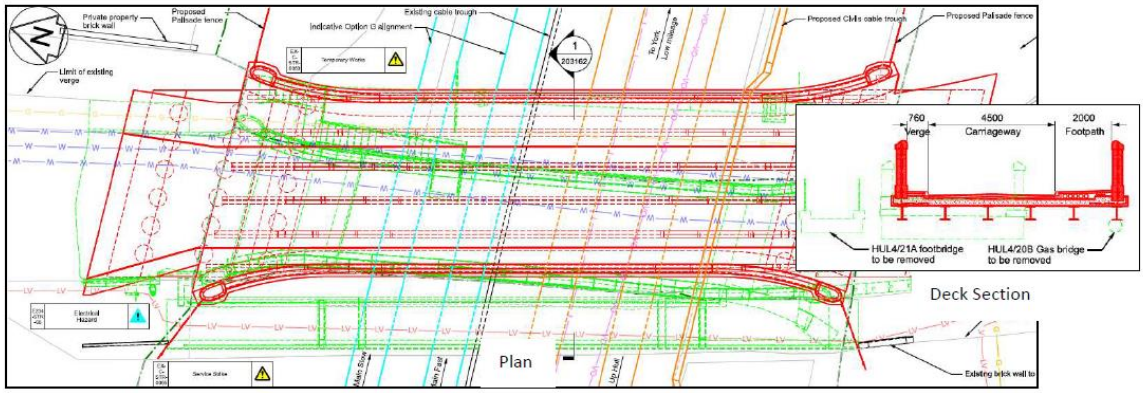

Figure 28 - Austhorpe Lane Option 2A

4.4.1 Impact to adjacent land/properties – minimal land-take required on the Northeast and Southeast approaches to accommodate footway within new deck

4.4.2 Buildability – the demolition of existing footbridge will provide a safe access for the construction of the new road bridge

4.4.3 Health and safety during maintenance – 2m wide footway provides sufficient room to install 3 no. existing water mains service pipes within deck after application of suitable waterproofing. Access for inspection and maintenance can be gained from on top of the deck removing the need to work from height in a rail environment below deck.

4.4.4 Traffic disruption – there will be less disruption to the railway and the road to undertake any future emergency works on the watermain. Works could be undertaken without closing the railway and with minimal impact to the highway.

4.4.5 Departure from standards – single lane carriageway does not comply with current standards and could slow the planning approval process with LCC. Footpath on the east side of the bridge will assist in providing good forward visibility for drivers.

4.4.6 Pedestrian effects – pedestrians would be required to cross from west to east and back again which would be increased risk compared to the existing arrangement.

4.4.7 Construction cost – smaller deck width will lead to reduced foundation size and a smaller amount of land take making and hence more economical to build and maintain.

4.4.8 Sustainability – due to the small size of the carriageway, smaller amount of concrete and steel will be required for construction, hence a lower carbon footprint.

4.5 Austhorpe Lane Option 2B – 2 way carriageway, footway on east side

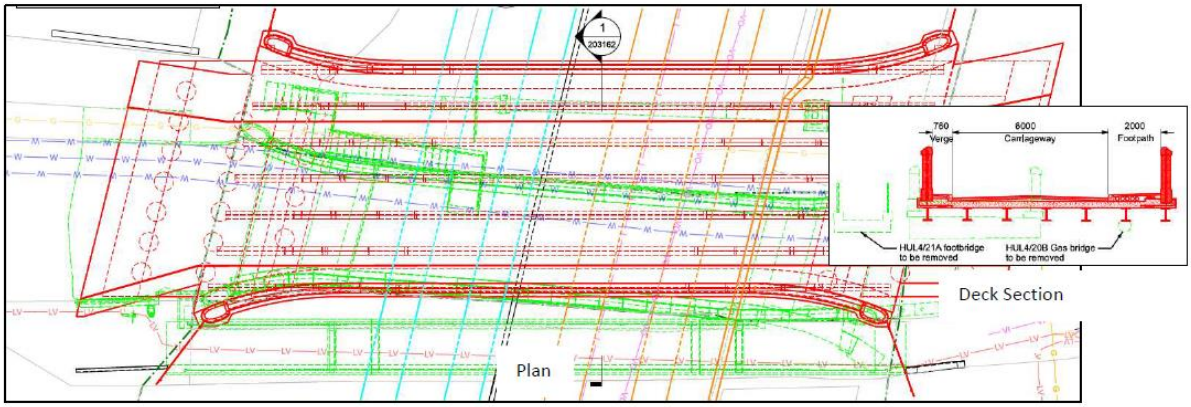

Figure 29 - Austhorpe Lane Option 2B

4.5.1 Impact to adjacent land/properties – significant land-take required on the Northeast and Southeast approaches to accommodate additional lane.

4.5.2 Buildability – the demolition of existing footbridge will provide a safe access for the construction of the new road bridge

4.5.3 Health and safety during maintenance – 2m wide footway provides sufficient room to install 3 no. existing water mains service pipes within deck after application of suitable

waterproofing. Access for inspection and maintenance can be gained from on top of the deck removing the need to work from height in a rail environment below deck.

4.5.4 Traffic disruption – there will be less disruption to the railway and the road to undertake any future emergency works on the watermain. Works could be undertaken without closing the railway and with minimal impact to the highway.

4.5.5 Departure from standards – two lane carriageway complies with current/LCC standards which will facilitate the planning approval process with LCC. Footpath on the east side of the bridge will assist in providing good forward visibility for drivers.

4.5.6 Pedestrian effects – pedestrians would be required to cross from west to east and back again which would be increased risk compared to the existing arrangement.

4.5.7 Construction Cost – wider deck and foundations require more land-take and hence less economical to build and maintain

4.5.8 Sustainability – wider deck requires larger amount of concrete and steel, which will increase carbon footprint.

4.6 Austhorpe Lane Option 2C – 2 way carriageway, retain existing footbridge

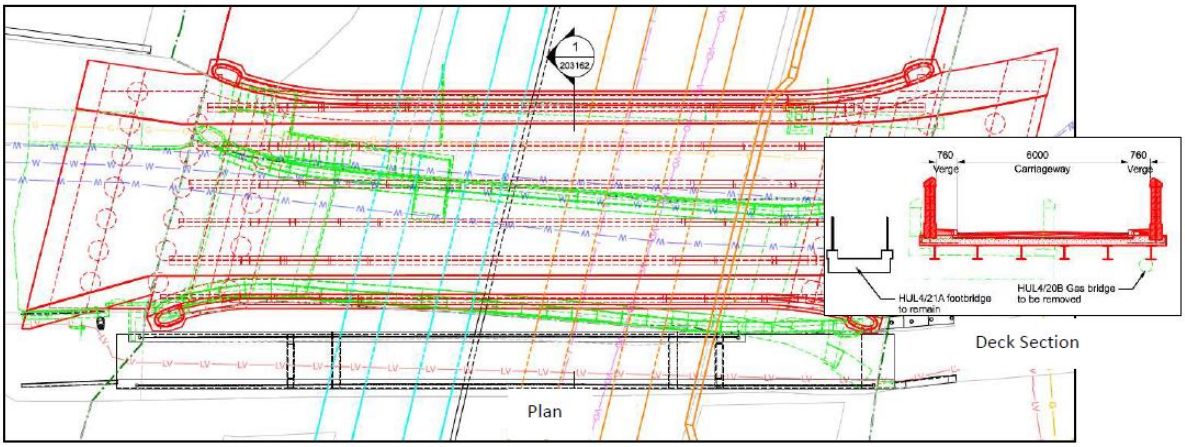

Figure 30 - Austhorpe Lane Option 2C

4.6.1 Impact to adjacent land/properties – significant land-take required on the Northeast and Southeast approaches to accommodate additional lane.

4.6.2 Buildability – given the proximity of existing footbridge and road bridge, there is restricted access to safely construct the new road bridge with the existing footbridge in place.

4.6.3 Health and safety during maintenance – 0.76m wide verges are too narrow to accommodate water mains and service pipes. Pipes will have to be attached between composite beams below deck. This will require construction and maintenance staff to work at height in a rail environment during construction and future maintenance.

4.6.4 Traffic disruption – the railway will need to be closed to allow any emergency works to the water main service, resulting to significant disruption.

4.6.5 Departure from standards – two lane carriageway complies with current/LCC standards which will facilitate the planning approval process with LCC. Close proximity of the abutments would significantly affect the forward visibility for drivers.

4.6.6 Construction Cost – a wider bridge deck coupled with additional works to upgrade existing footbridge parapets to meet electrification requirement and works to protect existing footbridge supports from derailment impact makes it even less economical

4.6.7 Sustainability – wider deck requires larger amount of concrete and steel, which will increase carbon footprint.

4.7 Austhorpe Lane Option 2D – 2 way carriageway, footway east and west

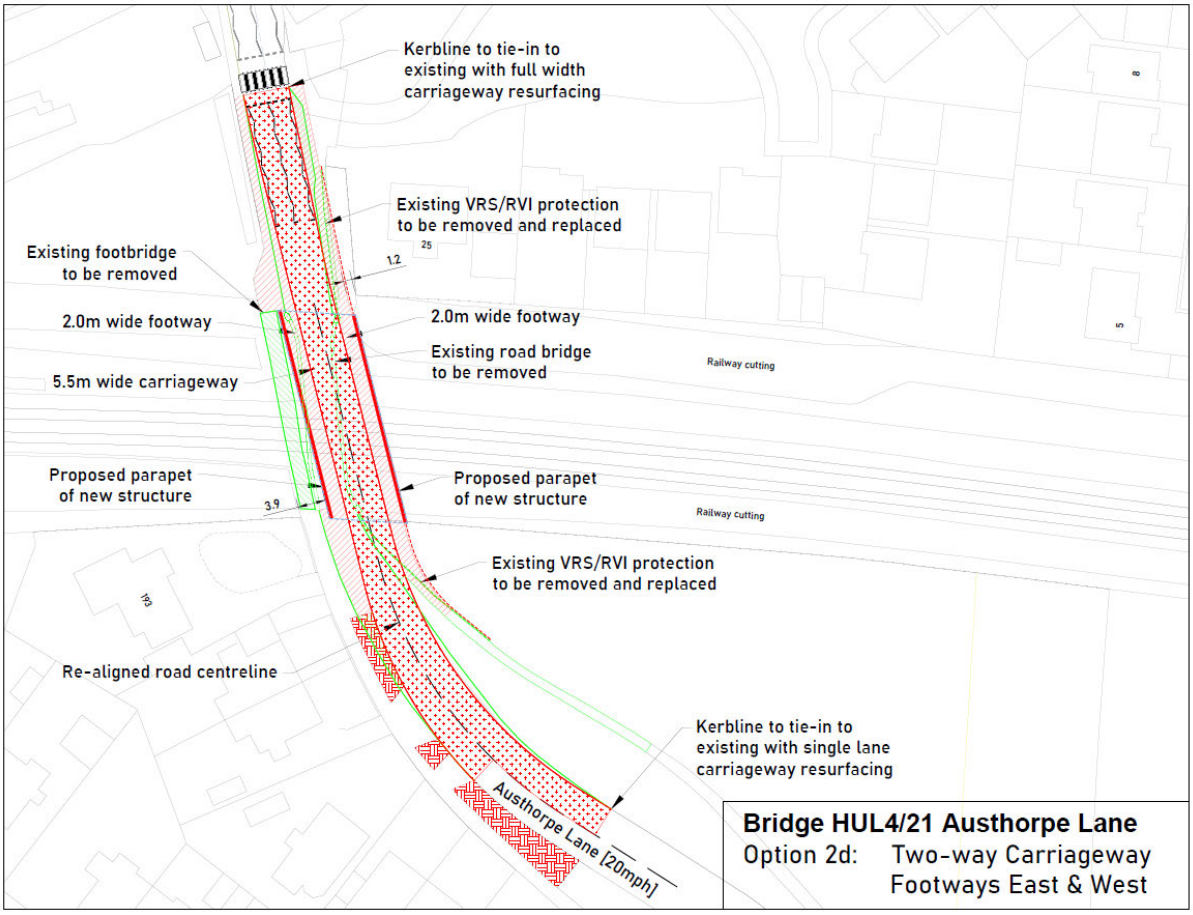

Figure 31 - Austhorpe Lane Option 2D

4.7.1 Impact to adjacent land/properties – significant land-take required on the Northeast and Southeast approaches to accommodate additional lane.

4.7.2 Buildability – the demolition of existing footbridge will provide a safe access for the construction of the new road bridge

4.7.3 Health and safety during maintenance – 2m wide footway provides sufficient room to install 3 no. existing water mains service pipes within deck after application of suitable waterproofing. Access for inspection and maintenance can be gained from on top of the deck removing the need to work from height in a rail environment below deck.

4.7.4 Traffic disruption – there will be less disruption to the railway and the road to undertake any future emergency works on the watermain. Works could be undertaken without closing the railway and with minimal impact to the highway.

4.7.5 Departure from standards – two lane carriageway complies with current/LCC standards which will facilitate the planning approval process with LCC. Footpath on the east side of the bridge will assist in providing good forward visibility for drivers.

4.7.6 Construction Cost – wider deck and foundations require more land-take and hence less economical to build and maintain.

4.7.7 Sustainability – wider deck requires larger amount of concrete and steel, which will increase carbon footprint.

4.8 Austhorpe Lane Option 2E – 2 way carriageway, footway on west

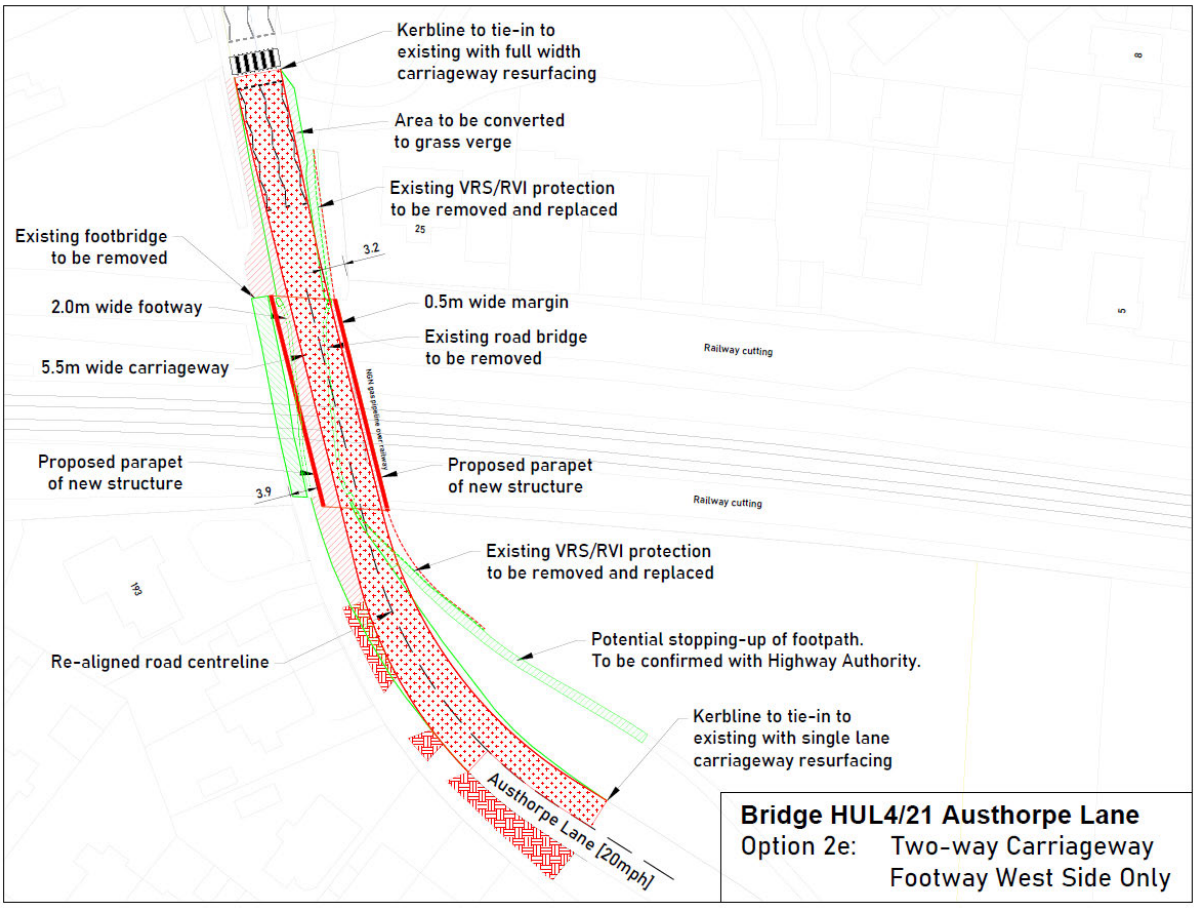

Figure 32 - Austhorpe Lane Option 2E

4.8.1 Impact to adjacent land/properties – significant land-take required on the Northeast and Southeast approaches to accommodate additional lane.

4.8.2 Buildability – the demolition of existing footbridge will provide a safe access for the construction of the new road bridge

4.8.3 Health and safety during maintenance – 2m wide footway provides sufficient room to install 3 no. existing water mains service pipes within deck after application of suitable waterproofing. Access for inspection and maintenance can be gained from on top of the deck removing the need to work from height in a rail environment below deck.

4.8.4 Traffic disruption – there will be less disruption to the railway and the road to undertake any future emergency works on the watermain. Works could be undertaken without closing the railway and with minimal impact to the highway.

4.8.5 Departure from standards – two lane carriageway complies with current/LCC standards which will facilitate the planning approval process with LCC. Lack of footpath on the east side of the bridge will affect forward visibility for drivers.

4.8.6 Construction Cost – wider deck and foundations require more land-take and hence less economical to build and maintain

4.8.7 Sustainability – wider deck requires larger amount of concrete and steel, which will increase carbon footprint.

4.9 Austhorpe Lane Option 3 – 1 way carriageway, footway on east side

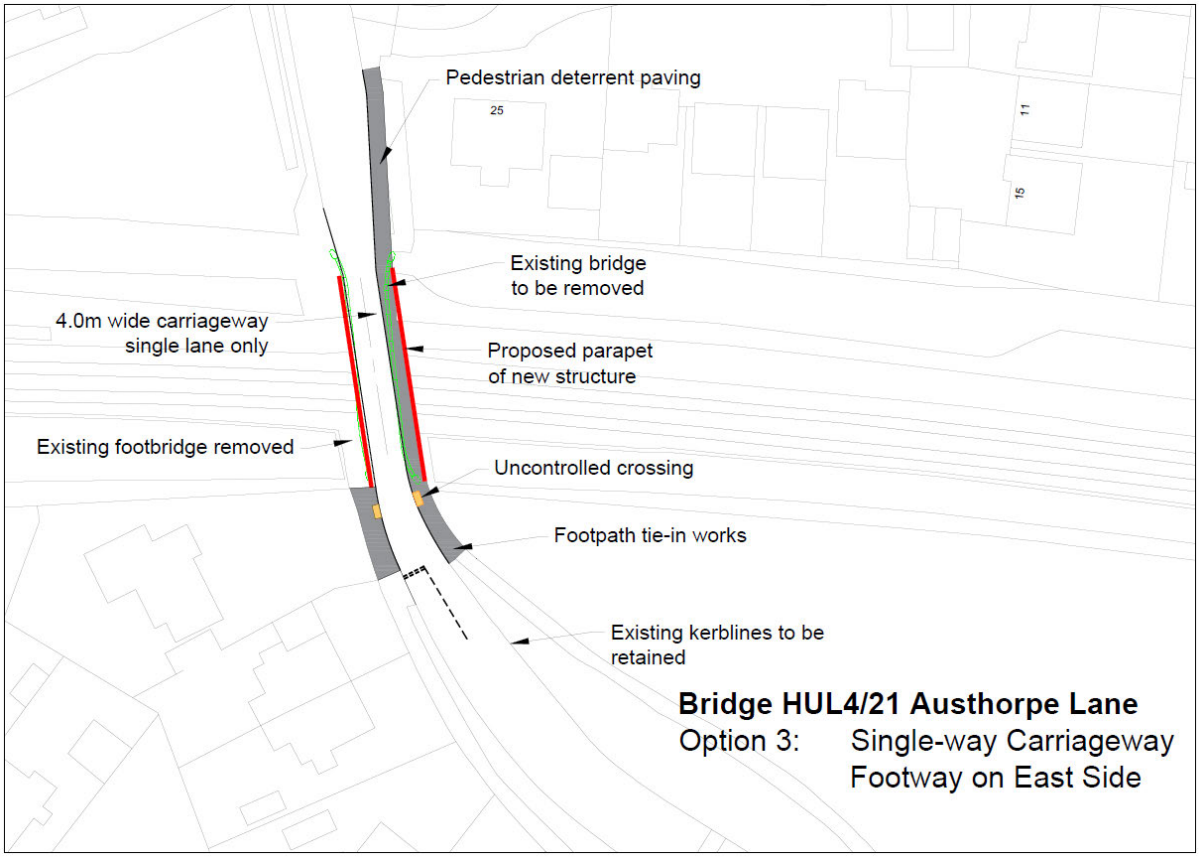

Figure 33 - Austhorpe Lane Option 3

4.9.1 Impact to adjacent land/properties – minimal land-take required on the Northeast and Southeast approaches to accommodate footway within new deck

4.9.2 Buildability – the demolition of existing footbridge will provide a safe access for the construction of the new road bridge

4.9.3 Health and safety during maintenance – 2m wide footway provides sufficient room to install 3 no. existing water mains service pipes within deck after application of suitable waterproofing. Access for inspection and maintenance can be gained from on top of the deck removing the need to work from height in a rail environment below deck.

4.9.4 Traffic disruption – there will be less disruption to the railway and the road to undertake any future emergency works on the watermain. Works could be undertaken without closing the railway and with minimal impact to the highway.

4.9.5 Departure from standards – single lane carriageway does not comply with current standards and could slow the planning approval process with LCC. Footpath on the east side of the bridge will assist in providing good forward visibility for drivers.

4.9.6 Pedestrian effects – pedestrians would be required to cross from west to east and back again which would be increased risk compared to the existing arrangement.

4.9.7 Construction cost – smaller deck width will lead to reduced foundation size and a smaller amount of land take making and hence more economical to build and maintain.

4.9.8 Sustainability – due to the small size of the carriageway, smaller amount of concrete and steel will be required for construction, hence a lower carbon footprint.

4.10 Austhorpe Lane – Summary of Options

4.10.1 Based on the evidence detailed above, I consider the best solution is Option 2E in that it meets as many of the constraints as possible whilst still providing a solution that can be constructed within the available land.

4.11 Ridge Road Option 1 (GRIP4 design)

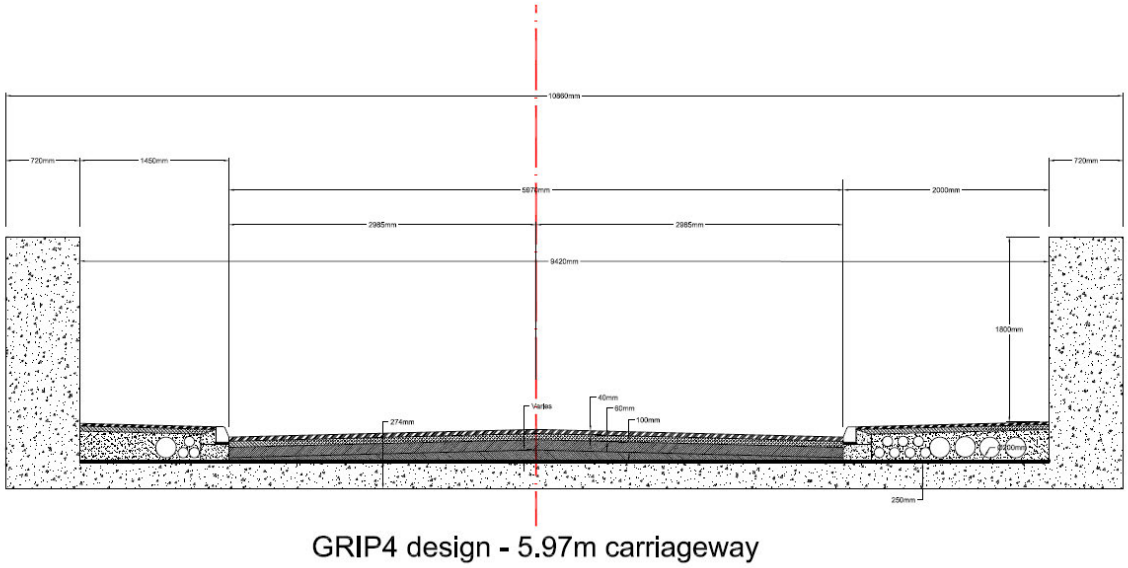

Figure 34 - Ridge Road Option 1 (GRIP4)

4.11.1 The GRIP4 design followed the existing bridge cross section where possible, with a 5.97m carriageway.

4.11.2 The utilities which are currently buried within the footpath and hard strip have been raised so they now run above the deck slab. This has the effect of increasing the deadload on the bridge due to the increased depth of asphalt.

4.12 Ridge Road Option 2, 7.3m carriageway

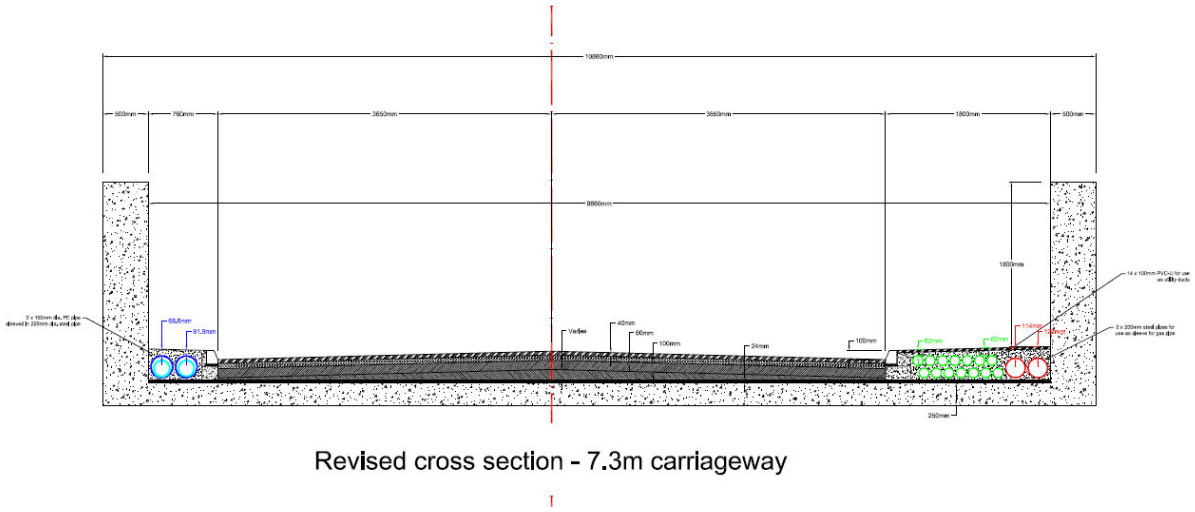

Figure 35 - Ridge Road Option 2

4.12.1 Similar to Option 1, but the parapets have been slimmed down to 500mm from 720mm and the carriageway widened to 7.3m from 5.97m.

4.12.2 The utilities, shown in blue, green and red above, have been updated following discussions with the utility providers with 2 x 160mm water mains in the hard strip and 2 x 200mm sleeves for the low pressure gas main and 14x 100mm diameter ducts for all other utilities.

4.13 Ridge Road Option 3, 3 x water mains

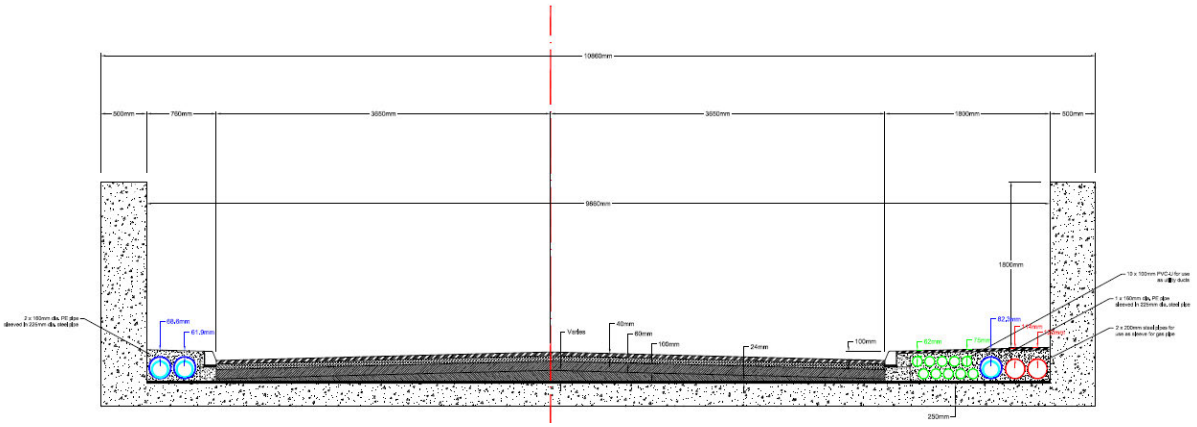

Figure 36 - Ridge Road Option 3

4.13.1 Similar to Option 2 but one additional water main in the footpath and 10x 100mm diameter ducts. Later discounted as the design developed into Option 4 and above.

4.14 Ridge Road Option 4, reversed gas and water mains

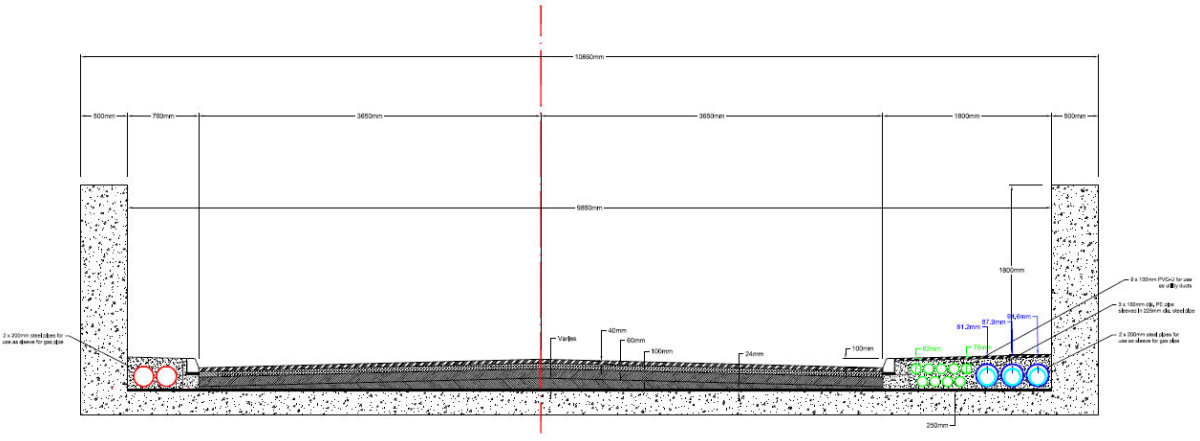

Figure 37 - Ridge Road Option 4

4.14.1 Similar to Option 3 but the positions of the gas mains and water mains have been switched to keep the water mains within the same side of the bridge for ease of construction and maintenance. Later discounted with the development of Option 5.

4.15 Ridge Road Option 5, larger water mains and reduced carriageway width

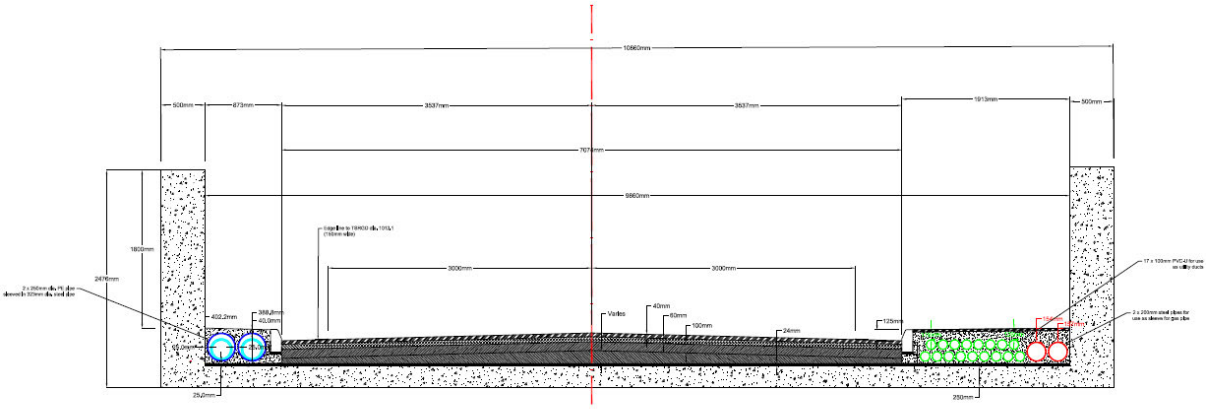

Figure 38 - Ridge Road Option 5

4.15.1 Similar to Option 2, but the water mains were increased to 250mm diameter which had the effect of reducing the width of the carriageway to 7.07m. This removed the need for the third water main

4.16 Ridge Road Option 6, reduced footpath width

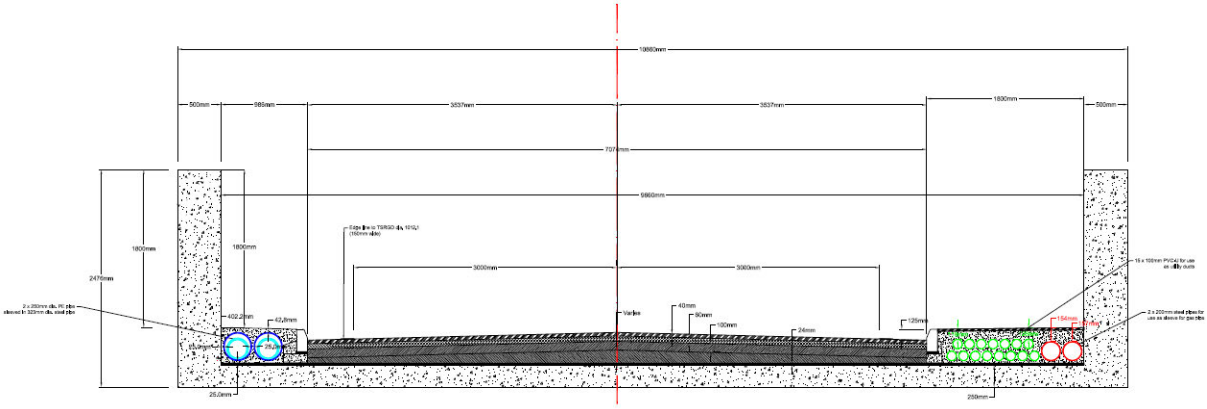

Figure 39 - Ridge Road Option 6

4.16.1 Similar to Option 5, but the kerb on the hard strip was moved to allow the larger watermains to be constructed easier and to provide greater offset to the water main from the back of kerb in accordance with design standard details.

4.17 Ridge Road Option 7, increased kerb height

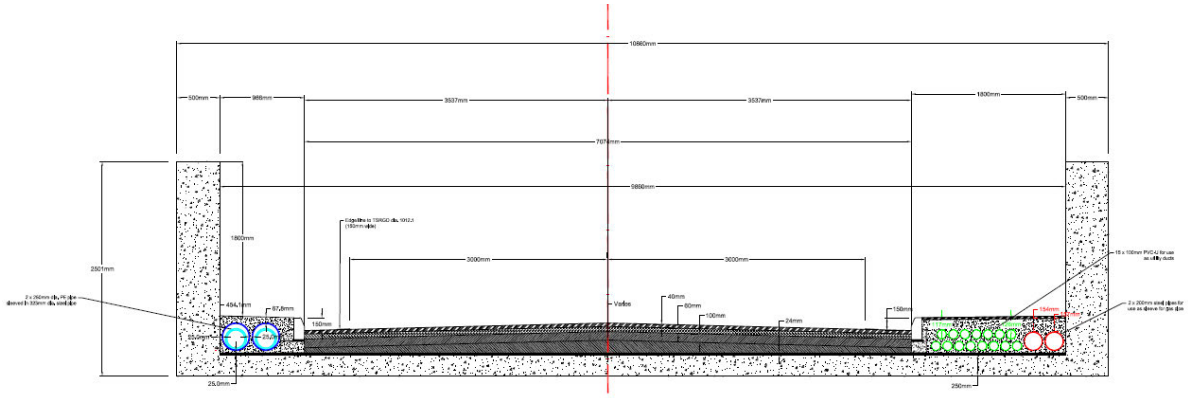

Figure 40 - Ridge Road Option 7

4.17.1 Similar to Option 6, but the kerb upstand was increased to 150mm to allow greater cover to the watermains and greater protection in case the hard strip was overrun by large vehicles. This kerb height would be a Departure from Standards and the increased kerb height adds additional deadload onto the bridge deck.

4.18 Ridge Road Option 8, additional services in footpath

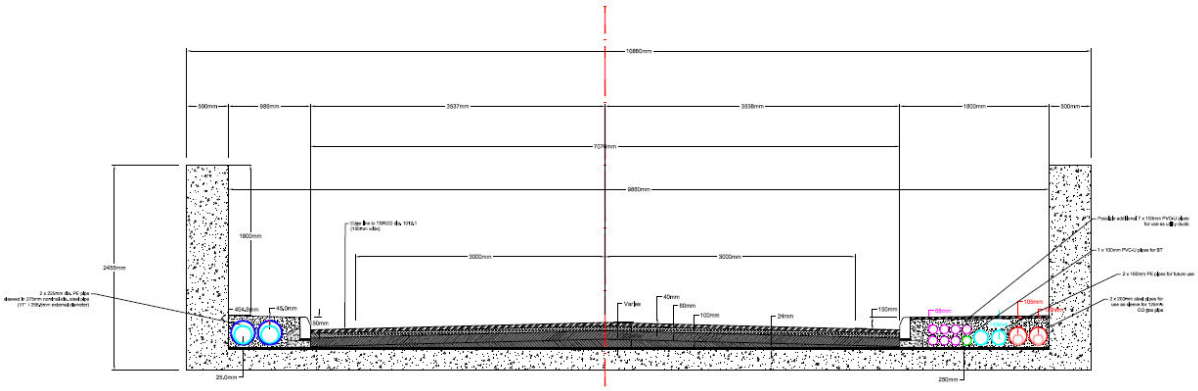

Figure 41 - Ridge Road Option 8

4.18.1 Similar to Option 7, but the 100mm ducts were reduced to 8 and 2 x 160mm ducts were added to the footpath for future use by any utilities that would not fit within the 100mm duct.

4.19 Ridge Road Option 9, reduced kerb height

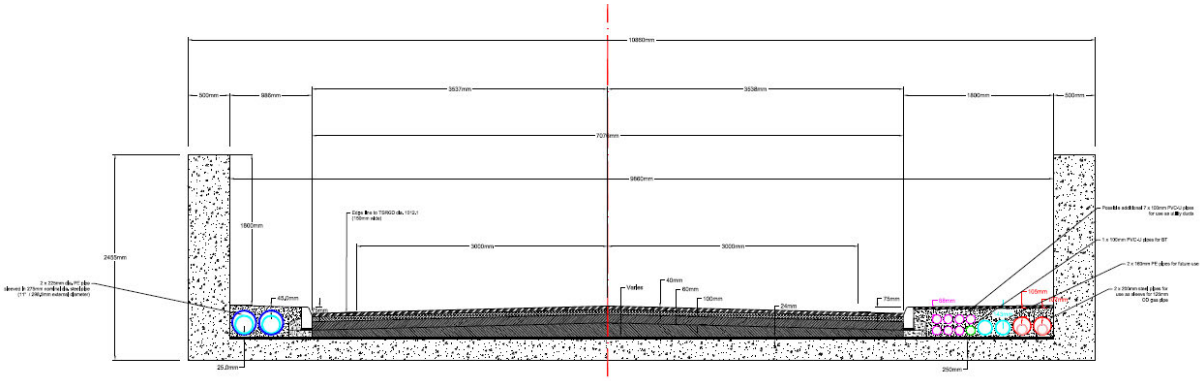

Figure 42 - Ridge Road Option 9

4.19.1 Similar to Option 8, but the kerb height was reduced to 75mm in accordance with the DMRB design standards and thus removing the Departure. This change had the effect of increasing the deadload on the bridge again, with a maximum asphalt thickness of 395mm.

4.20 Ridge Road Option 10, removal of utilities

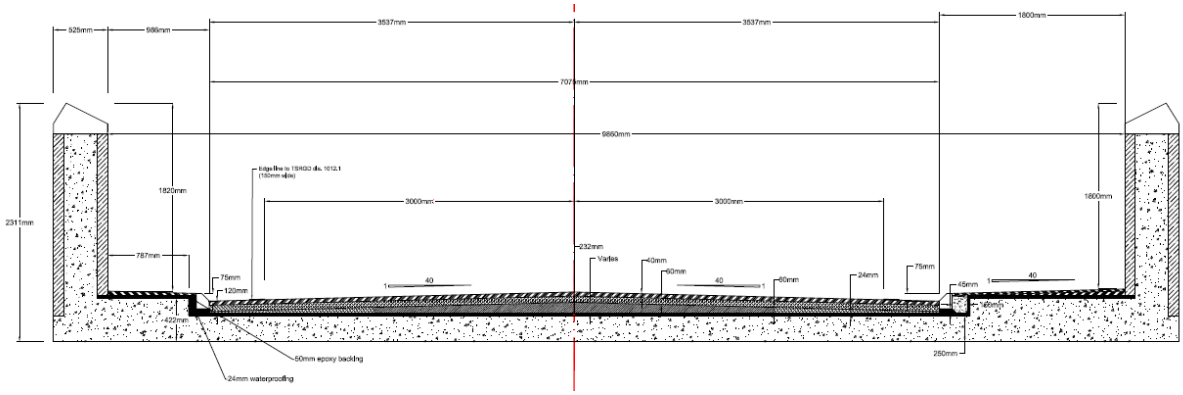

Figure 43 - Ridge Road Option 10

4.20.1 This option was developed after discussions with the utilities and Bridges to run the utilities below the deck slab and within a utilities gallery. This allowed the kerb heights to be reduced to the design standard height of 75mm and reduce the asphalt thickness to the design standard minimum of 120mm. The reduced thickness of asphalt is a 46% reduction and significantly reduces the deadload on the bridge.

4.20.2 This option was then developed into the final design as described in Section 3.14 to 3.20.

5. ENGINEERING AND DESIGN RESPONSE TO OBJECTIONS

5.1 Austhorpe Lane Bridge

5.1.1 Objections and representations (whole or part) addressed within this section include:

5.1.2 OBJ 01 – Email from Mr Brian Hall

Mr Hall had several objections to the proposed works at Austhorpe Lane. A response from NR has been sent and is summarised below.

Comment	Response
I object to the demolition in principle of the grade 2 listed bridge on Austhorpe Lane Leeds as part of the trans Pennines rail upgrade.	The response to this objection is covered in the Proof of Evidence from Paul Harrison
I also object to the new road bridge been 2 track as opposed to the current single track which will lead to potential RTAs and pedestrian fatalities.	Network Rail has engaged extensively with LCC on the design for the replacement bridge. Following this engagement, proposals for single lane options are not being progressed and instead a replacement structure with two lanes is proposed
On one side of the road bridge is a zebra crossing and the road speed limit is 20 mph which is never adhered to as vehicles regularly travel at speeds around 40 mph.	A speed limit of 20mph is clearly posted on Austhorpe Road / Austhorpe Lane and enforcement of the legal limit is outside of the scope of this Order.
The current single track bridge means that vehicles have to reduce speed and potentially give way to oncoming vehicles to navigate the bridge. The proposals for a two track bridge will mean that vehicles will not now need to reduce speed or give way. Two track will also increase traffic use of the road bridge and road in a residential area on a residential road with a speed limit of 20 mph. The residential cohort is mainly elderly and there is a school on Austhorpe Lane.	The proposed alignment provides two lanes across the bridge and design details have been included to improve road safety and to reduce the risks of head-on collisions. The lanes are slightly narrower than standard to encourage lower speeds across the bridge. As part of the works, two new road cushions (speed humps) will also be constructed to the south of the new bridge to discourage speeding vehicles. These will be constructed in accordance with LCC guidance and will deter speeding vehicles but provide a smooth route for cyclists.
The plans also mean the road bridge footpath will now be on the opposite side of the road bridge meaning pedestrian	The existing western footpath continues over the separate footbridge and onwards down Austhorpe Lane. The proposed new

residents will have to cross Austhorpe Lane road walking from the estate (which the bridge serves) to cross the road bridge , an unbelievable decision to locate the footpath on that side. The whole proposal will lead to fatalities .	footpath follows a similar arrangement, but with the western footpath continuing over the bridge alongside the carriageway, instead of over a separate footbridge.

5.1.3 OBJ 21 – email from Mr Peter Freeman

Mr Freeman had several objections to the proposed works at Austhorpe Lane, some of which were related to highways matters. A response from NR has been sent and is summarised below.

Comment	Response
The proposed replacement Railway bridge here is a similar width to the existing narrow hump bridge, I believe a 5.5m carriageway with a 0.5m buffer to one side and a 2m footway at the other is dangerous as hostile/errant vehicles can mount the pavement, hit pedestrians or the bridge parapet. The kerbs should be a minimum of 300mm high to prevent this.	High containment kerbs were considered for the section over the bridge, but these do not comply with current design standards and as a result have been discounted. Standard kerb heights, together with the low speed limit, do not raise the risks to pedestrians using the bridge.
On the Crossgates side, the existing ~1m high pedestrian guardrail allows an unobstructed view of the railway and approaching trains for all people, Replacing this with 1.8m wall may lead to people attempting to climb over/onto it to view trains, last time we were there on the evening of the 9th July to see the flying Scotsman they were approximately 30 other people including children.	The heights of the parapets are subject to stringent design standards and cannot be reduced. Pedestrians climbing the parapet walls to view the trains is not considered a significant risk.
Drawing 151666-TRA-00-HUL4-DRG-R-SG-110004 states the road from P1 (south of Wetherby bridge deck)-P2(173 Austhorpe Lane) will be permanently stopped-up, this means the new road and bridge will be a privately owned public road maintainable at Network Rail (or other) expense, as their maintenance budget and safety-critical staff resource is being reduced I imagine they would want to enter	Austhorpe Road and Austhorpe Lane will be temporarily stopped up for the duration of the works, but will be reopened on the new alignment once the works are complete. Network Rail are currently discussing the alignment and details of the bridge with LCC. The new highway will be adopted by LCC but the bridge will remain in ownership

a section 38 agreement to transfer ownership (and maintenance) to Leeds City Council, however, this can not happen as this does not meet any adoptable standard (one is a minimum of 3m shared-use foot & cycle path throughout the new development, in this case connecting the new path out of the Limes, over the railway). Crossgates station used to have a footbridge, but this was left to rot into a dangerous condition and then demolished by the railway authority I fear the same fate for this bridge. The existing footbridge was added as the footpath across the existing road bridge was not considered safe for pedestrians, to reinstate this footpath considering the increased number of vehicles using the bridge would be a foolhardy and unnecessary risk to pedestrians.	of Network Rail for operations and maintenance. A 3m wide shared use cycleway/ footpath is not required on the replacement bridge; it is not in place on the existing bridge and the proposed bridge will not be wide enough to accommodate one.
The existing Narrow/Weak bridge has a 7.5t weight ban this acts as traffic-claiming and prevents large vehicles rat running through the Deven estate any improvement to this road would induce more demand and increase trips in the residential area. I would like proper community engagement to consider and poll multiple options including traffic lights, one-way street, buses and emergency access only, and pedestrianisation	The 7.5t weight limit will be maintained after the works to deter large vehicles using this route. However, in accordance with current design standards, the bridge will have the capacity to carry all standard road traffic up to and including heavy goods vehicles. Additional traffic calming measures such as road humps are being considered as part of the works and will be installed in accordance with LCC highway standards.

5.1.4 OBJ 21 – email from Ms Joanna Kilburn and Mr Bob Elliott

Ms Kilburn and Mr Elliott had several objections and queries to the proposed works at Austhorpe Lane, some of which were related to highways matters. A response from NR has been sent and is summarised below.

Comment	Response
In the documentation, there is reference to closing roads Railway Rd/ Austhorpe Road - is this just temporary?	Austhorpe Lane and Austhorpe Road will be closed for the duration of the demolition and reconstruction of the railway bridge. Vehicular and pedestrian access to the

	properties to the north and south of the bridge will be maintained at all times, though vehicles will not be able to pass over the bridge itself. The footbridge shall remain in use as long as possible until the reinstatement of the new bridge. Once the new bridge has been constructed, Austhorpe Lane will reopen.
Can you please advise whether access to Back Marshall Lane will be maintained from Railway Rd. This is the only way the waste collection vehicles can access our rubbish bins etc, plus emergency vehicles.	Railway Road will not be directly affected by the road and bridge reconstruction works, but temporary road closures may be necessary for short periods of time during the gas main diversion and for compound works on the south side of the road. We will coordinate these road closures with refuse collection and will provide access for emergency services at all times.
How will the flats at 168 and 170 Austhorpe Road access their parking and flats?	The works to the road will not impact Back Marshall Lane or Railway Road, and access to the parking at 168 and 170 Austhorpe Road will not be affected by the Leeds to Micklefield scheme ("the Scheme"). However, as noted above, road closures may be necessary for short periods of time during the gas main diversion and for compound works on the south side of the road.

5.2 Ridge Road Bridge

5.2.1 No objections relating to highways matters have been received although several cover topics such as heritage, traffic diversions during construction and disruption. These have been addressed by other members of the design team.

5.3 Bridleway at Neville Hill

5.3.1 To date no objections relating to highways matters have been received apart from the comments from LCC.

5.4 Peckfield Level Crossing

5.4.1 A number of the issues raised in objections relating to the closure of Peckfield Level Crossing have been addressed in the Proofs of Michael Westwood (**CD 7.26**), Andrew Cunningham (**CD 7.23**) and Suzanne Bedford (CD 7.29). I have addressed issues relating to highway safety in Section 3.33 above.

6. WITNESS DECLARATION

6.1 Statement of declaration

6.1.1 I hereby declare as follows:

(i) This Proof of Evidence includes the facts which I regard as being relevant to the opinions which I have expressed, and the Inquiry's attention has been drawn to any matter which would affect the validity of that opinion.

(ii) I believe the facts which I have stated in this PoE are true and that the opinions expressed are correct, and,

(iii) I understand my duty to the Inquiry to help it with the matters within my expertise and I believe I have complied with that duty.

Signed [redacted]

Ged Stamper **Dated: 6 February 2024**
Principal Engineer, SYSTRA