Explanatory note: Brickhill Street online bridge engineering feasibility appraisal

In 2019, Milton Keynes Council agreed to undertake a South East MK Transport Study in part[1] to inform the master planning of two strategic allocations (SEMK and South Caldecotte) and the planning of a smaller allocation (Caldecotte Site C) in the area. To inform master planning, the study intended to carry out a high-level analysis of options for improving highway connectivity across the railway line between the A5 and Woburn Sands. This work was intended to be carried out in-house by the Council.

Soon after commencing work on this aspect of the study, the Council were made aware that the East West Rail Company were also commencing studies of rail-related infrastructure along the Marston Vale line in this area, including an assessment of level crossings and what mitigations (e.g. new bridges or underpasses) may be necessary as part of their project taking into account expected levels of rail services once the EWR route to Cambridge was implemented and planned growth in the area. The Council understood that early outputs of this work would be available late summer/early autumn. Considering this, the Council decided in early 2020 to informally work with the East West Rail Company and input into their work rather than duplicating efforts. However, by this stage some draft outputs of the Council's own work had been produced, namely a highway engineering feasibility appraisal of an online bridge along Brickhill Street, bridging the existing level crossing. The piece of work looked discretely at the engineering feasibility of an online bridge option for this location and did not consider engineering feasibility of alternative routes at this location (e.g. via the Caldecotte C site), wider issues or opportunities associated with this option, or indeed whether it is the preferable location for a bridge, or bridges, to improve highway connectivity across the railway to support growth in the area. As such, it was one discrete component of the work that would have informed and been accompanied by a wider assessment in due course.

Considering this, it was thought inappropriate to release the draft highway engineering appraisal of the Brickhill Street online bridge option as it would have been presented in the absence of both a wider appraisal of the online bridge option and a wider holistic assessment of all other options for improving highway connectivity across the railway line between the A5 and Woburn Sands that was expected to be carried out (i.e. how different options compared across a range of criteria or objectives). However, the Council understand that as local communities are aware of this draft work it is right and proper to share it, accompanied by an explanation of its status and purpose. To be clear, it does not represent any project or proposal and forms only a small element of wider work that is still being carried out. The Council will continue to engage with local stakeholders and others on these matters and the work of both the Council and the East West Rail Company.

[1] The study also intended to carry out fresh transport modelling for the area, and to assess a range of local highway management issues in the area. The transport modelling aspect of the work had to be paused due to the closure of Cranfield Road (related to the M1 Smart Motorway project) which affected travel patterns, and has been kept on pause more recently due to Covid-19 related social restrictions also affecting travel patterns. The assessment of local highway management issues has been shared with stakeholders for feedback and the Council is considering how best to take the conclusions and recommendations forward.

BOW BRICKHILL STATION - POTENTIAL PROVISION OF NEW HIGHWAY OVERBRIDGE

INTRODUCTION

Milton Keynes Council Highways Section have been asked to consider the potential provision of a new highway overbridge at Bow Brickhill Station to maintain access in the event that the existing level crossing is closed at some time in the future.

Note: There are currently no plans to close the level crossing or to construct a new highway overbridge so this document is provided for information only.

SPEED RELATED HIGHWAY DESIGN PARAMETERS

The Design Manual for Roads and Bridges (DMRB) - TD9 Highway Link Design - associates geometric standards with specified Design Speeds. This Design Speed is determined by set speed limits and/or observed vehicle speeds at the particular location.

In the vicinity of Bow Brickhill Station a speed limit of 40mph is in operation but the national speed limit applies to the north (beyond Tilbrook roundabout) and to the south (beyond Station Road mini-roundabout).

NOTE: Mini-roundabouts should only be provided where vehicle speeds are below 35mph so they are generally only provided within 30mph speed limits or where vehicle speeds are limited by additional speed control measures. Station Road mini-roundabout is within a 40mph speed limit and has no speed control so does not appear to comply with current requirements.

HIGHWAY CROSS SECTION AT OVERBRIDGE

Transportation have requested that initially a 7.3m carriageway be provided at the highway overbridge with an additional 3.5m traffic lane northwards for possible future Mass Rapid Transit (MRT) requirements. In addition 3m Redways are also requested in both directions.

For this exercise the highway cross section will therefore be 1m verge - 3m Redway - 1m verge - 3.5m MRT lane - 3.65m northbound carriageway - 3.65m southbound carriageway - 1m verge - 3m Redway - 1m verge. Where the bridge occurs a 0.65m parapet will be assumed.

RAILWAY CLEARANCE REQUIREMENTS

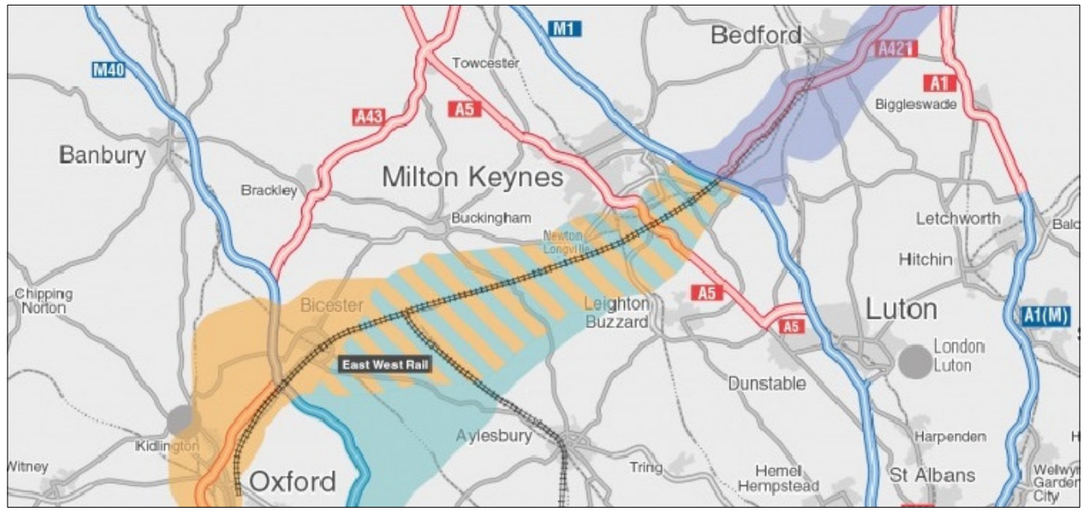
Intended electrification of the railway line has been put on hold but sufficient clearance will still need to be provided to allow for future implementation. Similar clearances to those used by Parsons Brinkerhoff in initial electrification proposals (5.1m clearance 1.5m structure) will therefore be adopted here.

Prepared by: Des Stimpson (Senior Engineer) Date Finalised: 17/03/20

Approved: Luciana Smart (Development & Network Manager) Date Issued: 17/03/20

OXFORD-CAMBRIDGE EXPRESSWAY

The route of the proposed Oxford-Cambridge Expressway is due to be announced in the summer and it will have a marked influence on the highway network in the vicinity of Bow Brickhill. This could result in the V10 Brickhill Street being upgraded to Primary Distributor standard or being downgraded to District or Local Distributor status. Either alternative will influence the Design Speed adopted.



SOUTH CALDECOTTE DEVELOPMENT

Submissions have been received by MKC Planning for the development of the South Caldecotte site and their proposals have been noted.

HIGHWAY OVERBRIDGE OPTIONS

As highway design is dependent on Design Speed it is important that an appropriate Design Speed is selected to accommodate future needs. As future needs are uncertain however the options presented here will include different Design Speeds to cover each eventuality.

Option 1:
Removes the existing 40mph speed limit close to Bow Brickhill Station so that the V10 Brickhill Street becomes a continuous 60mph grid road between Walton Park roundabout to the north and the A5 Kelly's Kitchen roundabout to the south [national speed limit applies - 60mph (100kph) Design Speed 100A].

Option 2:
An initiative to reduce grid road speed limits to a maximum of 50mph throughout Milton Keynes would provide benefit at the railway crossing by reducing geometric requirements [50mph speed limit - 50mph (80kph) Design Speed 85A].

Option 3:
Adjacent development may warrant retention of the existing speed limit of 40mph [40mph speed limit - 40mph (64kph) Design Speed 70A].

Option 4:
Adjacent development may warrant a reduction in the adjacent speed limit to 30mph [30mph speed limit - 30mph (48kph) Design Speed 60B].

Notes:

In the first instance each of the options includes earthwork embankments to illustrate the landtake that would be necessary without the use of retaining structures. To reduce landtake requirements retaining structures may be considered and introduced during detailed design.

The presence of junctions - within 1.5 times the Stopping Site Distance (SSD) of the highway overbridge - means that relaxations or departures to standards in accordance with the DMRD are not permitted.

The height of the new carriageway above the surrounding ground on the overbridge approaches means that Tilbrook roundabout and Station Road roundabout cannot be accommodated so alternative means of access are required.

ACCESS REQUIREMENTS

Access Plan:
During and following construction of a new highway overbridge access will still be required to Caldecotte Lake, Red Bull Racing, Station Road, Bow Brickhill Station north (eastbound trains) and south (westbound trains) platforms, and to adjacent Network Rail and privately owned land.

Mass Rapid Transit (MRT):
A MRT route with buses is being considered and may run between the A5 Kelly's Kitchen roundabout and Milton Keynes to the north.

To enable railway passenger access to MRT in or off carriageway stops could be provided on the overbridge approaches with stairs and/or ramps connecting them to adjacent railway platforms.

Rail Passengers:
Passengers arriving or departing from Bow Brickhill Station may wish to use MRT or be picked up or set down by taxi or lift. Appropriate pick up or set down points would be beneficial.

Vehicle Access:
It is assumed that taxis will be accessing Bow Brickhill Station to and from Milton Keynes. An easy south-in north-out route for each platform will therefore assist with that manouvre.

It is anticipated that most drop-offs and pick-ups will be by family members or friends 'on their way past' so they could utilise the MRT Bus Stops for convenience.

Vehicles accessing Bow Brickhill Station from the south would benefit from an easy north-in south-out route being available to either platform.

Note: if a railway footbridge and/or lifts were to be provided at Bow Brickhill Station some of the pedestrian and/or vehicular access requirements may alter.

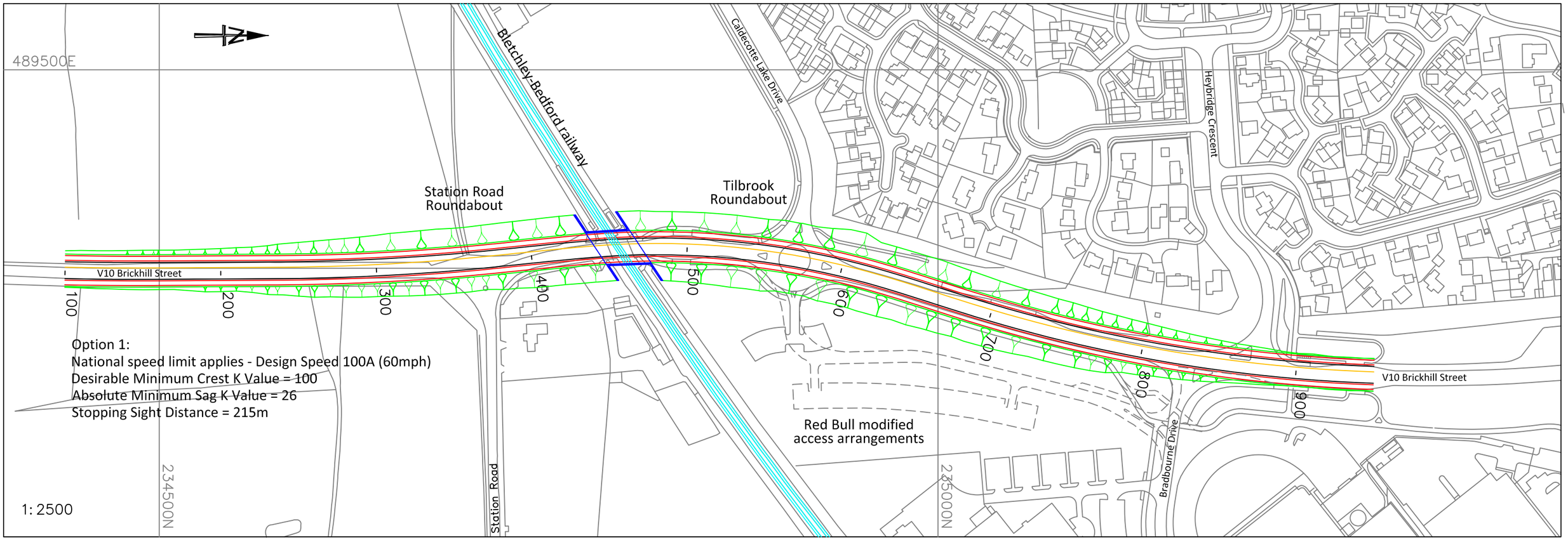
REMAINING ISSUES

Options 1 to 4 provide optimum alignments for the through routes. However, they have not yet been optimised to provide full access to Caldecotte Lake, Red Bull Racing, Station Road, Bow Brickhill Station north (eastbound trains) and south (westbound trains) platforms, and to adjacent Network Rail and privately owned land.

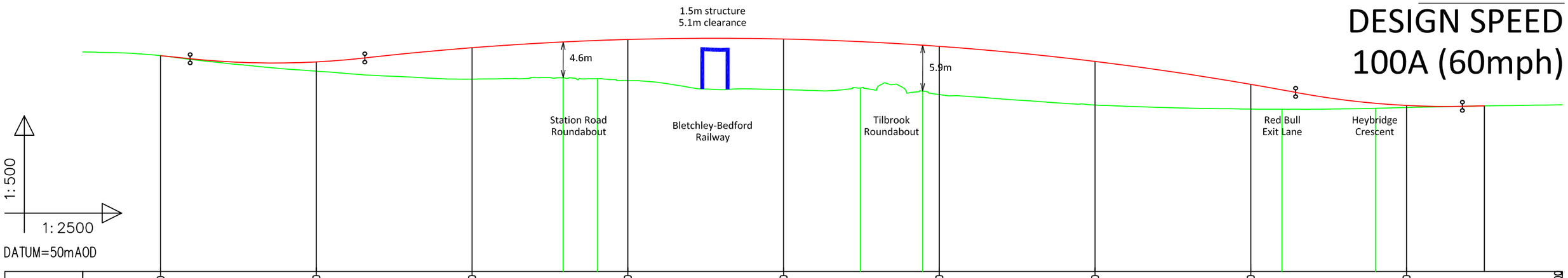
Access Plan:
The Access Plan shows various possibilities that could be pursued during detailed design to help in providing access for local users. However, many of them will be dependent on the future needs of the highway network following the announcement of the Oxford-Cambridge Expressway route and on future plans for Bow Brickhill Station itself once upgrade of the Bletchley to Bedford railway has been completed.

An element of detailed design work on the vertical alignments - notably by the pivotting of the vertical alignment for Option 1 above the bridge structure to minimise the through carriageway height in the vicinity of Bradbourne Drive/Heybridge Crescent - may allow reconfiguration of the Heybridge Crescent junction to permit vehicular access to and from Caldecotte Lake .

In addition horizontal clearance could be provided below the proposed highway overbridge to allow vehicles to execute U-turns without crossing main road traffic. This would aid taxis and with passenger drop offs and pick ups at the station.

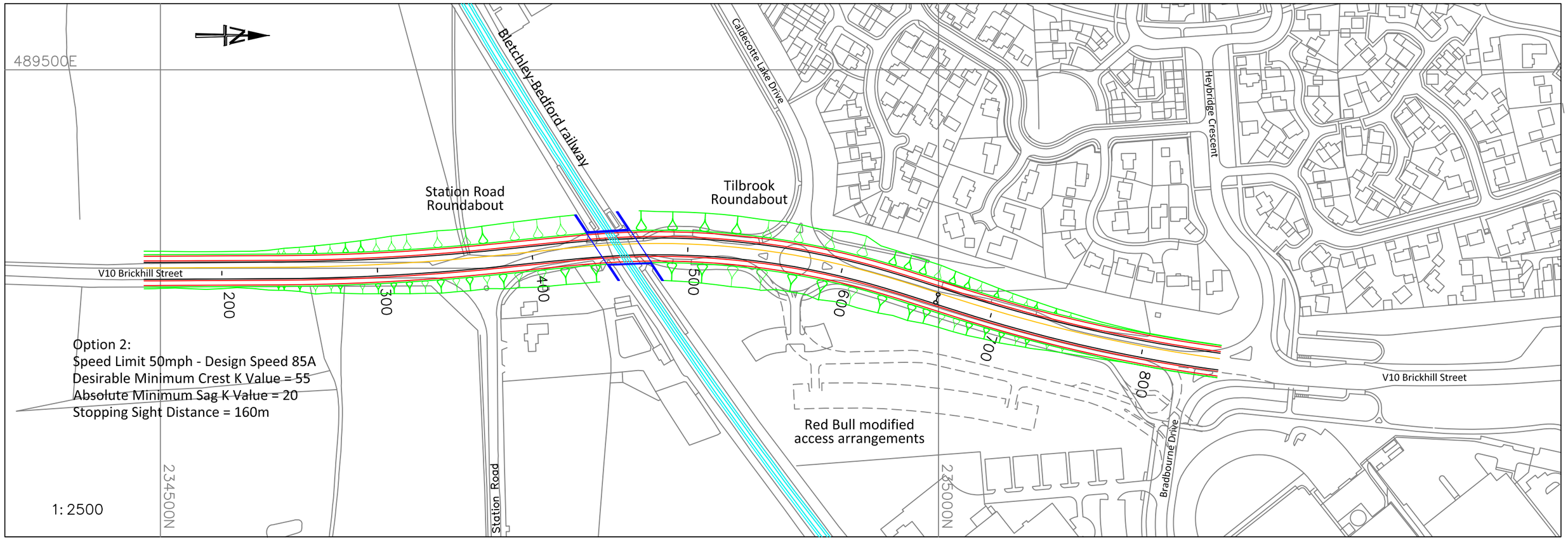


OPTION 1
DESIGN SPEED 100A (60mph)

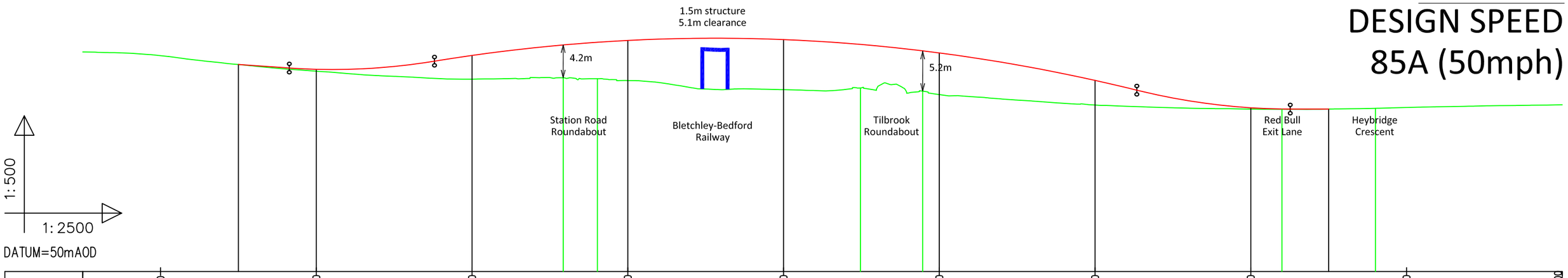


CH	50.000	100.000	200.000	300.000	400.000	500.000	600.000	700.000	800.000	900.000	1000.000
PROP		77.721	76.918	78.742	79.802	79.861	78.921	76.980	74.040	71.328	
EXIST	78.194	77.721	75.725	74.707	74.530	73.356	72.724	71.380	70.860	71.069	71.417
HORIZ	R=−2200.000		R=∞	R=−1440.000	D	RL	R=510.000	RL	RL	R=−990.000	
VERT		P	R=2600.000 L=112.139			R=−10000.000 L=597.657				R=2600.000 L=107.059	P

BOW BRIDGE STATION - POTENTIAL PROVISION OF NEW HIGHWAY OVERBRIDGE

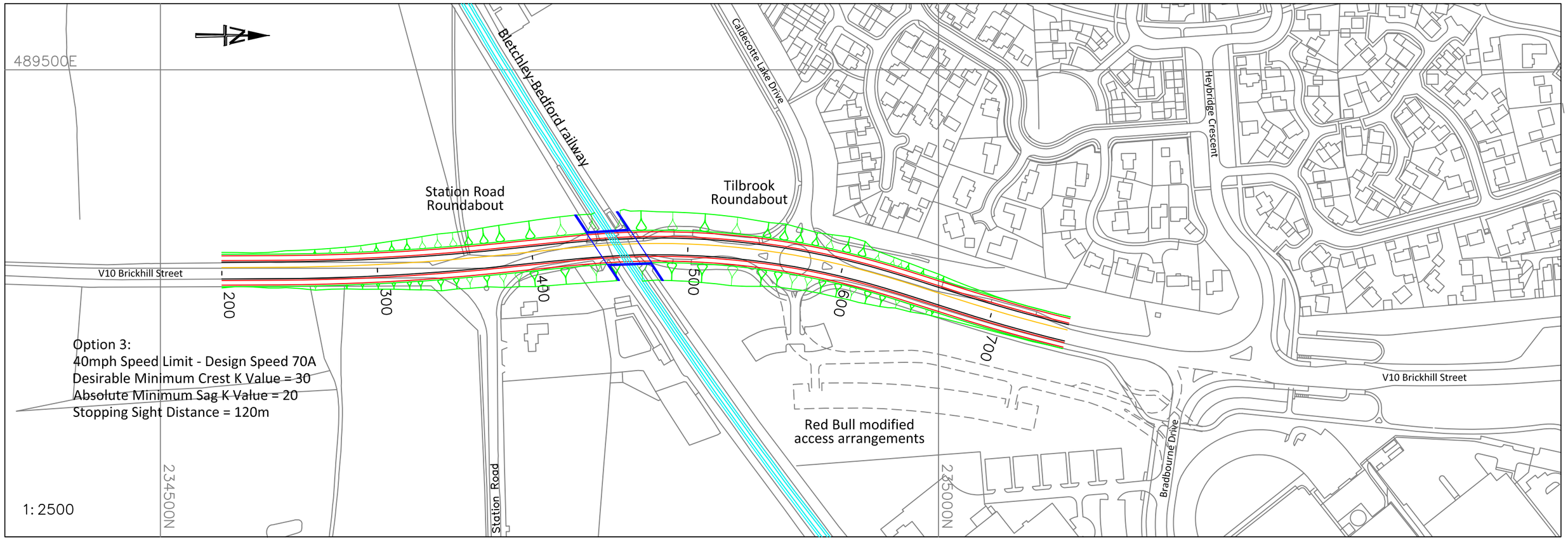


OPTION 2
DESIGN SPEED 85A (50mph)

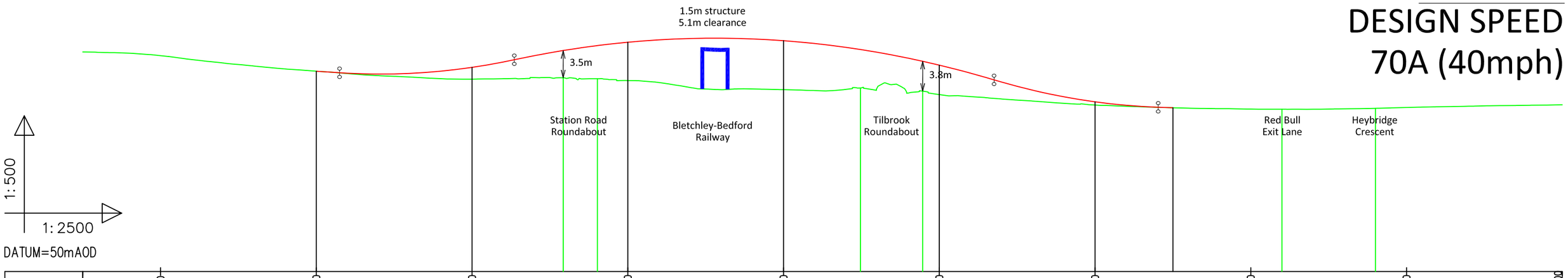


CH	50.000	100.000	200.000	300.000	400.000	500.000	600.000	700.000	800.000	900.000	1000.000
PROP			75.968	77.750	79.676	79.785	78.074	74.546	71.025		
EXIST	78.194	77.721	75.725	74.707	74.530	73.356	72.724	71.380	70.860	71.069	71.417
HORIZ	R=−2200.000		R=∞	R=−1440.000	D	RL	R=510.000	RL	RL	R=−990.000	
VERT		P	R=2000.000 L=93.237			R=−5500.000 L=450.945		R=2000.000 L=98.501	P		

BOW BRIDGE STATION - POTENTIAL PROVISION OF NEW HIGHWAY OVERBRIDGE

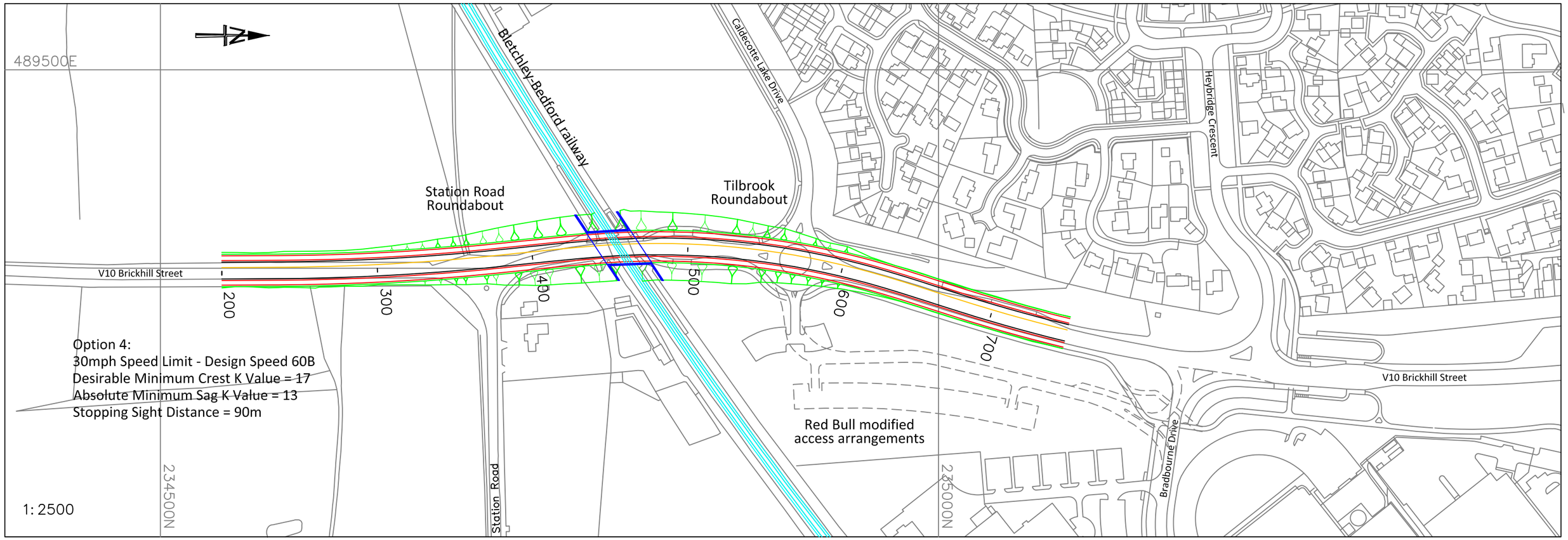


OPTION 3
DESIGN SPEED 70A (40mph)

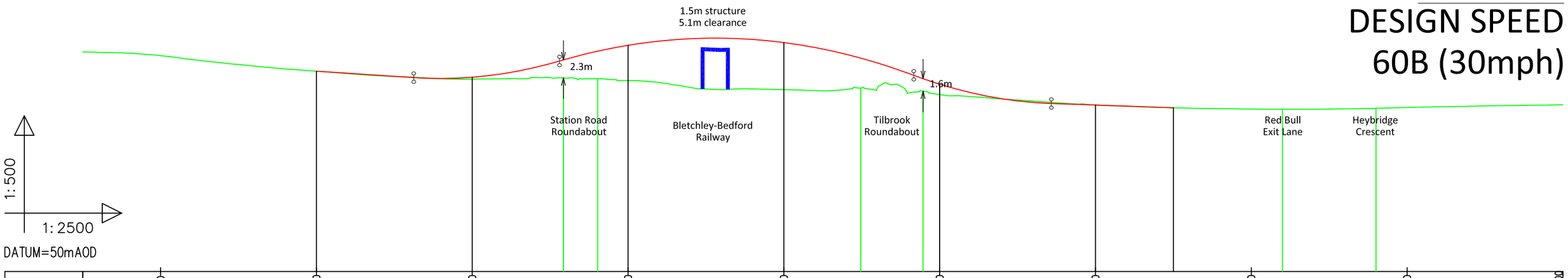


CH	50.000	100.000	200.000	300.000	400.000	500.000	600.000	700.000	800.000	900.000	1000.000
PROP			75.725	76.219	79.444	79.642	76.507	71.791			
EXIST	78.194	77.721	75.725	74.707	74.530	73.356	72.724	71.380	70.860	71.069	71.417
HORIZ	R=−2200.000		R=∞	R=−1440.000	D	RL R=510.000	RL	RL	R=−990.000		
VERT			P R=2000.000 L=112.207		R=−3000.000 L=308.038		R=2000.000 L=105.392	P			

BOW BRIDGE STATION - POTENTIAL PROVISION OF NEW HIGHWAY OVERBRIDGE

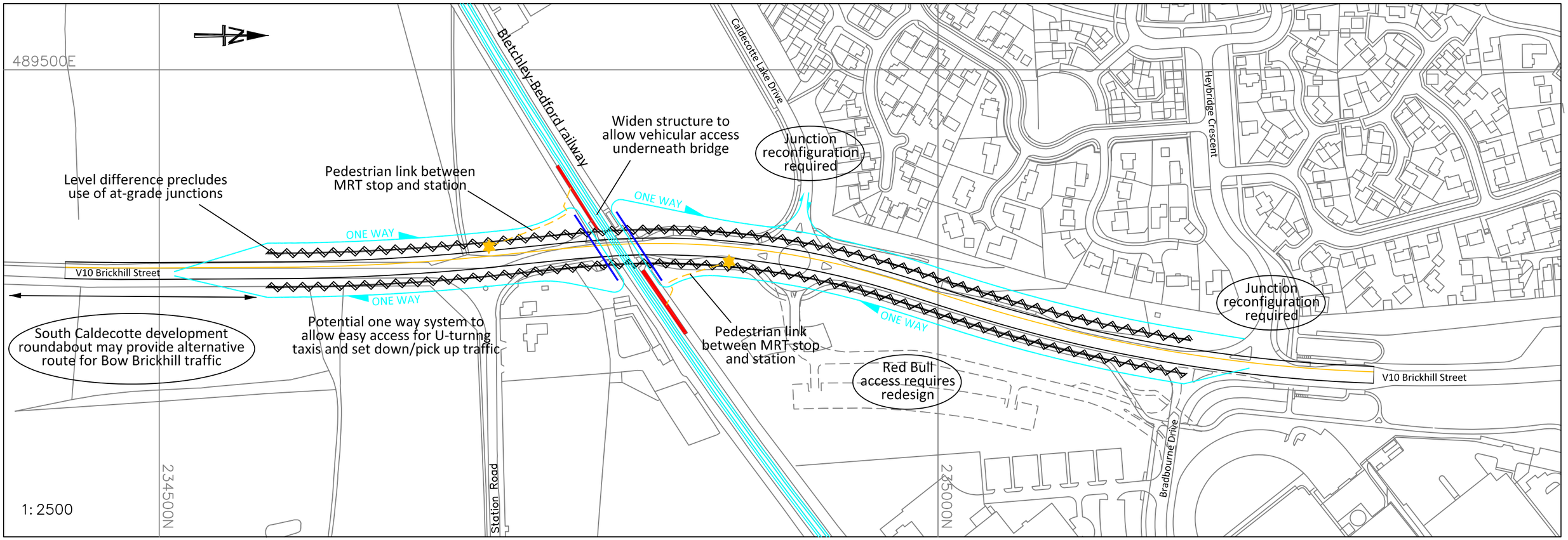


OPTION 4
DESIGN SPEED 60B (30mph)

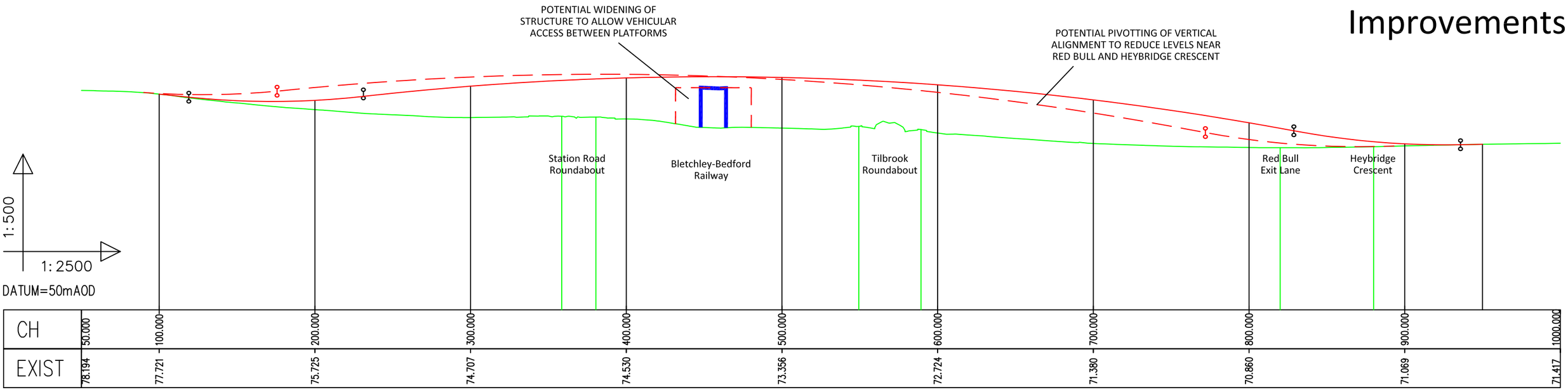


CH	50.000	100.000	200.000	300.000	400.000	500.000	600.000	700.000	800.000	900.000	1000.000
PROP			75.725	74.951	79.054	79.404	74.059	71.380			
EXIST	78.194	77.721	75.725	74.707	74.530	73.356	72.724	71.380	70.860	71.069	71.417
HORIZ	R=−2200.000		R=∞	R=−1440.000	D	RL	R=510.000	RL	RL	R=−990.000	
VERT			L=62.473 P=−1.316%	R=1300.000 L=93.532		R=−1700.000 L=227.360	R=1300.000 L=88.287	L=78.347 P=−0.704%			

BOW BRIDGE STATION - POTENTIAL PROVISION OF NEW HIGHWAY OVERBRIDGE



ACCESS PLAN
Potential Improvements



BOW BRIDGE STATION - POTENTIAL PROVISION OF NEW HIGHWAY OVERBRIDGE

489600E

489700E

600

500

400

300

234900N

234800N

234700N

489500E

CALDECOTTE LAKE DRIVE

Tilbrook Roundabout

Red Bull modified access arrangements

Bletchley-Bedford railway

BRICKHILL STREET

Bow Brickhill Crossing

Bow Brickhill Station

MP 2

Land offered up for new highway bridge

Station Road Roundabout

Station Road

Land being offered up to allow future Grid Road improvement

Earthworks footprint for 60mph (100A) alignment

Dense vegetation

Overgrown

Small trees

Palisade fence

Post & rail fence

Post & wire fence

Public footpath

Rev	Rev. Date	Purpose of revision	Drawn	Rev'd	Apprv'd
0	29/03/20	ORIGINAL DRAWING	DES	LS	LS

Stuart Proffitt - Service Director
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Bleak Hall MILTON KEYNES MK6 1LY Tel: (01908) 691691

Project
BOW BRICKHILL STATION
NEW HIGHWAY BRIDGE

Drawing title
EARTHWORKS FOR OPTION 1:
60MPH (100A) DESIGN SPEED

Drawing status
PRELIMINARY WORK

Scale	1:1000 @ A3	DO NOT SCALE

Drawing number
BB/LAND/01

Rev
0