A.D TN004 THATCHAM BRIDGE REVIEW

TECHNICAL NOTE

Job Name:	Rainsford Farm Review
Job No:	332110569
Note No:	TN004
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Prepared By:	Stephen Wren
Subject:	Rail Overbridge, Colthrop Village, Thatcham

1. Introduction

1.1. Stantec have been requested to review drawing 5010.600 Rev A by Stuart Michael Associates, depicting a multiple span highway bridge over the railway and canal. This technical note has been prepared by Stantec's Bridge and Rail team and covers the finding of that review.

2. Highway Related Comments

2.1. Comments below are based on the bridge team's experience of interfacing with highway designs, rather than a specialist highway engineer.

Bridge Width

2.2. For this type of project the bridge would typically be wider to ensure a certain amount of future proofing. For example

- 7.3m rather than 6.0m carriageway, or at minimum 6.5m in order to accommodate buses; and
- 2.0m wide footway rather than 1.0m wide verge on the western side to provide suitable pedestrian amenity.

Highway Impact

2.3. The design appears to be based on the permanent closing of the one-way section of Piper Lane covering the majority of the existing public highway denoted as Pipers Lane (private industrial estate roads unaffected). The proposed permanent closure extends from south of the existing junction with a private industrial estate to the west and the Kuehne and Nagel property to the east. It is assumed that the section of Piper's Lane west of the electricity sub-station will remain open and be changed into two way traffic to maintain access to the station and the SSE substation. This has the following impacts/potential impacts:

- The unit currently occupied by Thatcham Motor Company will no longer have direct access to public highway; whilst a fence line is adjacent to a private estate road – it is unknown what rights they may have to use it.
- Existing utilities in Pipers Lane are unknown.

2.4. It is assumed that there would be highway improvement works north of the tie-in to the existing Pipers Lane, as at high level this does not appear suitable for the proposed change of use of Pipers Lane.

Gradients

2.5. The change in levels on both the north and south approaches to the bridge imply **vertical gradients up to approximately 1 in 11.5**. This is **not accessible for pedestrians and cyclists and may therefore be unacceptable under the Equality Act**. A maximum approach gradient of 1 in 20 is the preferred gradient to provide an accessible route. A slacker gradient can be achieved through a tighter crest curve and tying-in the ends of the approach embankments further to the north and south – it would therefore appear be possible to provide a gentler gradient than that proposed.

2.6. Whilst reference may be made to Newbury Racecourse overbridge which has steep approach gradients, that scheme was originally developed prior to current standards and legislation. That scheme is more constrained at the ends of the embankments, nevertheless significant effort was expended to mitigate the gradients as far as reasonably possible including:

- Raising ground levels at the tie-ins, by approximately 1m on the junction with Hambridge Road – which for this scheme is equivalent to extending the embankment north to Pipers Way and raising that highway by 1m; and
- Within the adjacent constraints achieving gradients 1 in 13 on the north side and 1 in 17.5 on the south side

Horizontal Alignment

2.7. Horizontal alignment is straight over the majority of the bridge but curves at the ends. This would likely result in widening the entire bridge to create a bridge of constant width to avoid unnecessary design and construction difficulties. It is recommended that the horizontal alignment is kept straight over the entire bridge length.

Carriageway Thickness

2.8. Minimum carriageway thickness should be 120mm at the channel line, rather than the 100mm quoted.

3. Rail Related Issues

3.1. Effects on the Overhead Line Equipment (OLE) could have significant cost and programme implications. The bridge design should be developed on the basis on minimising these, although some aspects such as earthing and bonding will be unavoidable.

3.2. Neither OLE records nor discussion with Network Rail have been provided. The existing OLE conductor wire height will be at a high level to give safe clearance to vehicles using the nearby existing level crossing. The OLE itself has a system depth that is live and on top of that there is a need for electrical clearance to the 25,000V potential. In the absence of OLE information, the proposed clearance of 7.0m sounds reasonable.

- Clearance above track level needs to be agreed with NR, there is a risk that this may be required to be greater than 7.0m
- Source of track level on SMA drawing unknown, risk of actual track level being higher than this.

3.3. **The proposed bridge alignment appears to clash or be close to an existing OLE mast** visible on publicly available satellite imagery (such as Google Maps). **This is a significant issue with the proposed design.**

- Modifications to the OLE to enable the bridge may affect numerous OLE masts and require noisy night-time working to install new OLE foundations and affect train services during construction.

- Trackside topographical survey of the track, OLE wires and masts, OLE records from Network Rail, together with OLE engineer design input is required. This would enable to review the interface of the existing OLE and/or an outline design of modifications to the OLE systems.

3.4. The existing level crossing will not be able to be fully closed following the bridge construction as:

- The level crossing provides step-free access for passengers between the platforms at Thatcham Station (installation of lifts to the existing station footbridge if there is passive provision within the existing structure would cost around £1m)

- The level crossing provides a crossing for pedestrians at a gradient compliant with the Equality Act.

- The level crossing provides a crossing for cyclists at a gradient compliant with cycleway design standards.

- It is unknown if there is a need to provide for any abnormal vehicular load movements that nearby organisations may require that might not be accommodated over the proposed proposed bridge due to horizontal alignment issues.

4. Structural Issues

4.1. The proposed abutments and piers have been set at different orientations, it is strongly recommended that these are placed parallel to one another at the same orientation to avoid unnecessary design and construction difficulties with the bridge.

4.2. The SMA drawing appears to be a highway drawing rather than a bridge drawing, as such structural details such as structural continuity over the piers and abutments, and the piled foundations do not represent likely bridge engineering details. Detailed comments the bridge details are therefore not offered.

4.3. Adequacy of the existing culvert to support the proposed temporary road is unknown.

4.4. Interface of northern abutment foundations with the existing culvert is unknown, with a consequent risk of a clash or damage to the culvert.

5. Approximate Costing

5.1. Highway over rail bridges construction costs include a lot of abnormal costs, as a result significant costs can be omitted when using a bottom-up costing methodology. Therefore, the cost estimate in this note is based on a top-down costing methodology, by comparison with similar highway over rail bridges installed to support housing developments.

5.2. Two schemes with comparable scope and quoted construction costs in the technical press are Newbury Racecourse overbridge (single 25m span over the railway) £6.7m in 2015; Borehamwood interchange (multiple spans over an electrified railway and a parallel highway) in Essex £11.8m in 2019. Based on this and other experience, at current prices we would estimate the construction cost to be around £12m.

5.3. Project cost items that can be estimated are listed below.

Item	Estimate Basis	Cost
Construction cost	Top-down estimate	£12m
Professional fees	15% of construction cost	£1.8m
Highway authority inspection fees	8% of construction cost	£1.0m
Highway authority commuted sum	35% of construction cost	£4.2m
Network Rail incurred costs (staff costs, approvals, site attendance to ensure rail safety)	Allowance (excluding OLE changes)	£1m
Sub-total		**£20m**

5.4. There are other project costs and potential project costs including:

- OLE changes to accommodate bridge alignment – unknown
- Network Rail Property shared value for agreeing land access over the railway – their starting point it typically 50% of the uplift value to the land resulting from NR granting a right to bridge their railway
- Utility diversions due to stopping up – unknown
- Other land costs – unknown
- Costs associated with floodplain compensation – the southern embankment has a significant footprint within the floodplain. Consideration may be required for an additional southern span on the viaduct to avoid this.
- Costs associated with providing a bridge that has a more accessible approach gradients than the proposed 1 in 11.5.

6. Conclusion

6.1. Stantec has undertaken a review of a bridge concept drawing for the Rainsford Farm proposed development. A number of potential issues have been identified with the proposal including carriageway widths, lack of suitable gradients for Equality Act compliance, substantial clashes with Rail OLE.

6.2. Estimated costs are in the order of £20m excluding a number of factors. Moreover, the new bridge would also necessitate the provision of lifts at the railway station as closure of the adjacent level crossing would remove the current level access between platforms. This would also increase costs.

DOCUMENT ISSUE RECORD

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