INFRASTRUCTURE PLANNING

THE INFRASTRUCTURE PLANNING (APPLICATIONS: PRESCRIBED FORMS AND PROCEDURE) REGULATIONS 2009

NETWORK RAIL (IPSWICH CHORD) ORDER

Sproughton Road Bridge (BFC/1) Architectural Design Statement

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1.0 INTRODUCTION

1.1 This Sproughton Road Bridge (BFC/1) Architectural Design Statement (this Statement) relates to an application (the Application) by Network Rail Infrastructure Limited (Network Rail) to the Infrastructure Planning Commission (IPC) under the Planning Act 2008 for the Network Rail (Ipswich Chord) Order (the DCO) which would grant powers to construct and maintain a new railway chord (the Ipswich Chord Development).

1.2 This Statement has been prepared as additional material supporting the Application as provided for by Regulation 5(2)(q) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 and in accordance with the Department for Communities and Local Government guidance, “Planning Act 2008: Guidance” as an Application Document.

1.3 The purpose of this Statement is to explain the context, objectives and considerations taken into account in developing the design of the new Sproughton Road Bridge.

1.4 This Statement forms part of a suite of Application documents and should be read alongside and is informed by those documents.

1.5 Network Rail intends to construct the Ipswich Chord Development, a 1.415 km chord to link the Great Eastern Main Line with the East Suffolk Line to the north of Ipswich, Suffolk.

1.6 The proposed development is the construction of the railway (Work No. 1) and the other works detailed below, as set out in Part 1 of Schedule A to the DCO.

   In the county of Suffolk, districts of Ipswich and Babergh

1.6.1. Work No. 1 – A railway 1,415 metres in length, commencing at a point on the existing Great Eastern Main Line railway 650 metres north-west of the bridge carrying that railway over Sproughton Road, passing south-eastwards on existing embankment then passing south-eastwards over the River Gipping, curving eastwards and then north-eastwards on the south-eastern side of the River Gipping then joining the existing East Suffolk Line railway passing back over the River Gipping and terminating at a point on the East Suffolk Line railway 70 metres north-east of the bridge carrying that railway over the river.

1.6.2. Work No. 1 includes widening of the existing embankment carrying the Great Eastern Main Line railway on its north-eastern side supported by a retaining wall; a new bridge adjacent to the existing bridge carrying the Great Eastern Main Line railway
over Sproughton Road; a bridge over the River Gipping; an embankment carrying the proposed railway on the south-eastern side of the River Gipping; and the reconstruction of bridge 404 carrying the East Suffolk Line railway over the River Gipping.

Associated development comprising:

1.6.3.  **Work No. 2** – Diversion of a surface water sewer commencing at a point 75 metres south of the junction of Sproughton Road and Boss Hall Road, passing south-eastwards and terminating by means of an outfall into the River Gipping at a point 55 metres north-east of the bridge carrying the Great Eastern Main Line railway over the river;

1.6.4.  **Work No. 3** – Extension of the training wall on the southern side of the River Gipping between points R1 and R2 on the works plans;

1.6.5.  **Work No. 4** – An access road commencing at a point 205 metres south of the bridge carrying the East Suffolk Line railway over the River Gipping passing north-eastwards through the proposed embankment (Work No. 1) by means of an underpass, then passing south-westwards by means of a ramp and terminating at a point on the said embankment 110 metres south-west of the point of commencement;

1.7  In connection with these works the DCO would authorise further associated development within Order limits consisting of:

1.7.1. demolition of the former cold store building at the Harris Factory site;

1.7.2. electrical equipment and signalling works;

1.7.3. ramps, means of access and footpaths;

1.7.4. embankments, aprons, abutments, retaining walls, wing walls and culverts;

1.7.5. works to alter the position of apparatus, including mains, sewers, drains and cables; and

1.7.6. works to alter the course of, or otherwise interfere with, a watercourse other than a navigable watercourse;

1.7.7. landscaping and other works to mitigate any adverse effects of the construction, maintenance or operation of the authorised project;
1.7.8. works for the benefit or protection of land affected by the authorised project;

1.7.9. working sites in connection with the construction of the authorised project; and

1.7.10. such other works as may be necessary or expedient for the purposes of or in connection with the construction of the authorised project provided that they are within the scope of the Environmental Statement.

1.8 The development described above would be subject to specific requirements regarding the approved plans, landscaping, highway accesses, archaeology, construction methodology and other matters set out in Part 2 of Schedule A to the DCO.
2.0 SUMMARY

2.1 This Statement relates to the Application (the Application) by Network Rail Infrastructure Limited (Network Rail) to the Infrastructure Planning Commission (IPC) under the Planning Act 2008 for the Network Rail (Ipswich Chord) Order (the DCO) which would grant powers to construct and maintain a new railway chord (the Ipswich Chord Development).

2.2 Work No. 1 for which development consent is sought includes the construction of a new bridge adjacent to the existing bridge carrying the Great Eastern Main Line railway over Sproughton Road.

2.3 The existing bridge over Sproughton Road is described in section 3 of this Statement and the new bridge will be built to stand as an independent structure.

2.4 The north east approach to the bridge has been made as wide as possible (16.00m), which has the effect of increasing the visual openness, daylight penetration and improved safety for vehicles, cyclists and pedestrian users.

2.5 Both the new and existing bridge abutments are in blue engineering brick which provides for visual consistency and colour and enhances the impact of the new structure on the existing street scene.
3.0 EXISTING SPRoughton ROAD BRIDGE

3.1 The existing rail corridor runs in a north easterly direction and is immediately to the west of the City of Ipswich. Sproughton Road runs in an east to west direction and provides an important route between the A14 trunk road, Sproughton and the city. It also provides access to industrial, retail and residential properties adjacent to and accessed from Sproughton Road.

3.2 The railway is elevated on an embankment where it crosses over Sproughton Road on an existing bridge, under which the highway locally dips to provide the signed 4.4m vehicle clearance height. The existing Sproughton Road Bridge actually has a headroom of 4.6m above the road centre line, which is less than the preferred headroom of 5.7 m.

3.3 An embankment supports the track to the north and south of Sproughton Road, and interfaces with the brick abutments adjacent to the footpaths. The railway bridge spans these abutments. The combination of adjacent embankments, brick abutments and the relatively low vehicle clearance under the bridge means the bridge represents a significant feature along Sproughton Road and a visual barrier or “gateway” to the general area. The clear span of the bridge (8.950m) is only just sufficient for the highway and footpaths and this limited width adds to the visual restriction caused by the bridge.

3.4 The construction date of the existing Sproughton Road Bridge is unknown. The bridge deck is thought to be circa 1930 while the brick piers are probably Victorian in origin. The bridge deck consists of riveted plate steel girders, a design common across the UK rail network. The brick abutments and wingwalls are in blue engineering brick, with brick coping and padstones from natural stone. This design was widely used and is a functional and utilitarian structure. Due to the low clearance under the bridge, both approaches have adjacent collision protection beams. These beams, by necessity, are separate and parallel to the bridge span in order to allow for them to receive direct impact without damage to the main span. The beams are clearly signed to identify the limited headroom clearance beneath the bridge structure.

3.5 The wingwalls on the east side of the existing bridge retain the embankment fill and the railway boundary is secured by a palisade fence running along the base of the railway embankment.
4.0 DESIGN OF THE NEW BRIDGE STRUCTURE (BFC/1)

4.1 There were a number of spatial and engineering challenges that had to be addressed as part of the design of the new bridge structure next to the existing structure. It was important that the new chord lines were constructed as close to the existing tracks as possible to minimise the land take either side of the bridge. However, sufficient space had to be provided between the two bridges to allow for future maintenance and inspection purposes. A 600mm gap was therefore provided between the two structures.

4.2 The primary purpose of this Underbridge is to support the two railway tracks that form the new Chord over Sproughton Road. This structure is to be constructed to the east of and adjacent to the existing bridge (LTN/254A) which currently spans Sproughton Road. It will be constructed at a level such that it maintains the limited headroom clearance of approximately 4.6m above road level (signed at 4.4m).

4.3 The Chord tracks will cross the bridge approximately 650mm higher than the tracks on the existing bridge, for two reasons. The first is the increased construction depth of the new bridge deck resulting from the longer span of the structure and the fact that modern standards require the structure to be more robust. The second reason is that the existing headroom under the bridge must be maintained whilst making allowance for the rising road level under the proposed bridge. The road ramps upwards towards the Sproughton Road roundabout from the bridge, so the soffit level of the bridge has to be lifted slightly to maintain the existing headroom clearances.

4.4 The span of the bridge will be approximately 18m and the width of the deck 7.005m measured between the centre lines of the main girders. The bridge superstructure design is to be based on the Network Rail Standard Half Through Type E Bridge with a filler beam deck. There will be two main welded steel girders approximately 1.75m deep. The cross girders, spanning square between the main girders, will be arranged in a parallel fashion. The bottom flanges of cross girders will be connected with a profiled deck plate, providing permanent formwork for the in-situ concrete slab. The bridge structure will be provided with a grey painted finish to match the existing bridge.

4.5 A new maintenance walkway and parapet on the east side will project 0.8m from the top flange of the main longitudinal girder.

4.6 The new bridge abutments are to be constructed behind the existing bridge wing walls. These abutments will be in the form of a contiguous piled wall comprising 900mm diameter piles. There will be 10 No. piles forming each abutment. Each group of piles will support an in-situ reinforced concrete capping beam. Bridge bearings will be supported on concrete plinths located on top of the capping beams.
4.7 Wing walls will be provided to each abutment on the east elevation. These will similarly comprise 900mm diameter CFA piles constructed contiguously, and topped with a reinforced concrete capping beam. The capping beams for wing walls will be made continuous with those for the abutment, and will aid distribution of longitudinal live loads to the ground.

4.8 The bridge abutments have been designed to be constructed behind the existing wingwalls. The rationale for this is to minimise the impact on the existing bridge structure, to assist the constructability of the structure, to minimise the impact on the pedestrian footpaths and the highway, to provide passive provision for a future cycleway/footpath to be constructed on the north side of Sproughton Road and to provide the potential to increase the footpath width on the south side of the bridge.

4.9 The abutment/wingwall piles, where exposed above ground level, will be faced with blue engineering brickwork. A concrete footing foundation will be provided to support the brickwork, which will be connected to the piles.

4.10 A new collision protection beam will be installed on the approach to the east face of the new structure to replace the existing beam. This will take the form of a concrete filled steel hollow section, and will comply with the necessary highway and Network Rail design standards.

4.11 The existing railway embankment will be widened on the east side (adjacent to the existing Up line) to accommodate the additional two tracks that form the Chord. To the south of the bridge, a retaining wall will be constructed along the east side of the widened embankment to minimize the spatial impact on the adjacent properties. To the north of the bridge, the embankment will be widened using traditional earthwork methods, which will create a 1 in 2 slope earth structure between 3 and 4m high. The bridge wingwalls have been designed to interface with these structures.

4.12 The existing wingwalls on the east side of the existing bridge will remain in place. However, the existing sloping profile of the walls will be altered to provide the appearance of an extended abutment/wingwall structure from the existing bridge. The level of the wing wall will be raised and partially reconstructed to provide a 45 degree return to interface with the face of the new bridge abutments. This is provided to minimise the potential of hidden areas for pedestrians walking under the bridges from the west.

4.13 The reconstructed wingwall will act as a facing wall to dress the poor appearance of the sloped earth that would otherwise remain exposed under the new bridge deck. Over a period of time the vegetation on the slope is likely to be affected by the reduced natural light, so it is proposed that this surface is finished with paving slabs. This will also
provide maintenance access to the bearings of the new bridge. To access the area behind the facing wall for maintenance purposes, a security door will be constructed within the wall of each wing wall. Leaving the space behind the facing walls open will reduce the works required to demolish the structure at a future date if a cycleway/footpath through the structure is created.
5.0 ARCHITECTURAL DESIGN OBJECTIVE

5.1 The proposed new Underbridge is parallel and to the north east of the existing Underbridge, and makes the existing Underbridge wider by approximately 8.480m. It provides the support for the two new tracks, while the two current tracks remain as they are now. It is therefore effectively doubling the width of the existing Underbridge and doubling the number of tracks supported over Sproughton Road. The south west bridge approach is not affected by these works and therefore stays unaltered.

5.2 The existing Underbridge is approximately 80 years old and will be serviceable for the foreseeable future. It has a clear span of 8.950m wide and accommodates the Sproughton Road highway and two adjacent footpaths as they pass under the two existing tracks. However, this 8.950m width prevents possible highway improvements that may desirable, for example providing cycle ways.

5.3 The life expectancy of this existing Underbridge will inevitably be less than that of the proposed new structure. It would therefore be an advantage to design the new Underbridge with a wider span so that, at some future date, when the existing Underbridge has reached the end of its serviceable life, it could be replaced with another structure of a span similar to that of the proposed, to create the improved cycleway/footpath widths. In addition to this the existing road levels could be lowered to provide an improved headroom clearance under the structures. This approach also allows for the new bridge abutments to have minimal structural impact upon the existing masonry abutments.

5.4 The existing Underbridge abutments are load bearing blue engineering brick and we are keen to use the same material for the new abutments. We considered simply aligning new brick screening abutments with the existing load bearing abutment and allowing the longer span of the new bridge to over sail to be supported on the piled abutments behind. However, this approach would cause an unnecessary restriction to the north eastern approach along Sproughton Road. We therefore propose to introduce bevel screening abutment walls mid-way under the bridge, which will align with the existing bridge load bearing abutments. In order to allow inspection for maintenance and replacement of the new bridge bearings, steel doors are provided in the screening walls to allow access into the bevelled void between the brick walls and the piled abutments.

5.5 In the future, when the existing Underbridge portion is ultimately replaced, it is expected that the replacement bridge span would match that of the wider span currently proposed. This would enable the bevelled abutment screen walls to be removed and the existing abutments to be removed so that the increased width would then extend for the entire length of the Underbridge.
5.6 This approach achieves the following design objectives:

- All bridge abutments (new and existing) are in blue engineering brick – which provides visual consistency and colour.
- The north east approach is made as wide as possible (16.00m), which increases the visual openness, daylight penetration and improves safety for vehicles, cyclists and pedestrian users.
- The bevelled brick screening abutments ensure there are no hidden corners and therefore makes it safer for pedestrian user, especially late at night.
- The new span is protected by a collision beam formed from a 760mm diameter circular hollow steel section which spans parallel to the new bridge deck. This will replace the existing collision beam on the north eastern approach. A circular tube was chosen because it is visually simpler than other forms.
- The new bridge span is of a greater width than the existing span and thereby allows for future highway improvements when the existing Underbridge is ultimately replaced.

5.7 We recognise the visual prominence of the existing Underbridge, and acknowledge the constriction it presents to road users and local residents. The existing bridge is lower in clearance and narrower than the ideal and has a character which could be described as “functional engineering”. The proposed parallel new bridge effectively doubles the width of the existing bridge. Its appearance is a commonly used design and a modern interpretation of the original functional design.

5.8 The additional width of the new structure achieves two key benefits. Firstly, it minimises any increase in visual restriction caused by the doubling of the existing bridge width. Secondly, when the existing bridge has reached the end of its operational life its replacement can follow the example of the new proposed spans. This will allow the total width to be significantly increased (from 8.950m to 16.000m) and, at this time, the highway could be lowered, which would increase still further the openness of the bridge and could allow for the collision beams to be removed.
## GLOSSARY

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