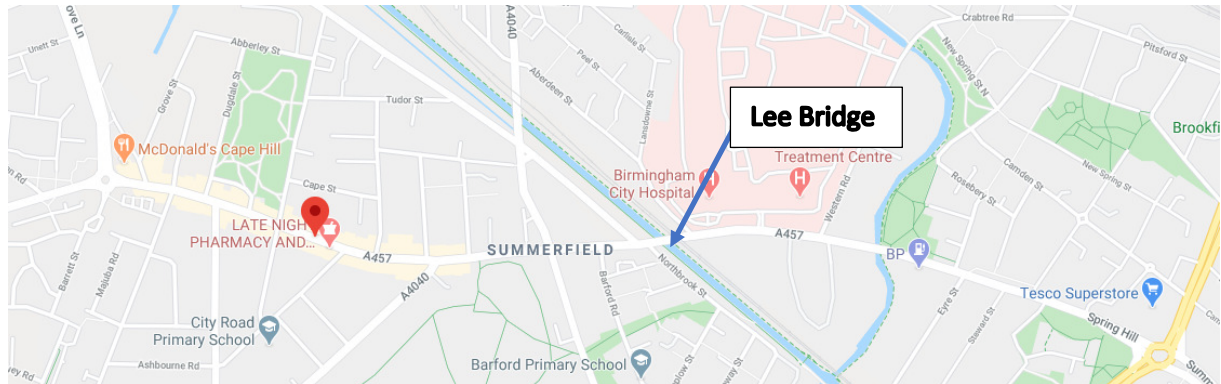


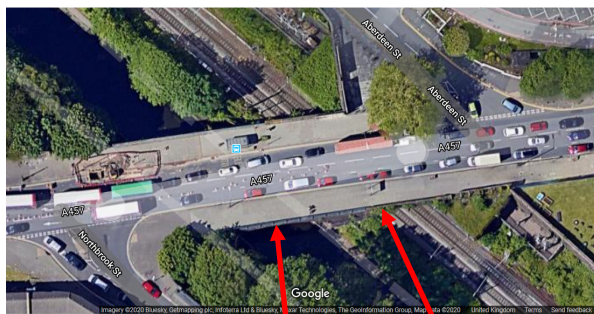
## Lee Canal Bridge – Technical Note

### 1.0 Background

Lee Bridge is located approximately in the middle of the Dudley Road Improvement Scheme.



The bridge consists of a number of structures which span the railway and canal which are owned by Network Rail (NWR) and Canal & Rivers Trust (CRT) respectively. Birmingham City Council (BCC) is responsible for the public highway which is located on the Lee Bridge.



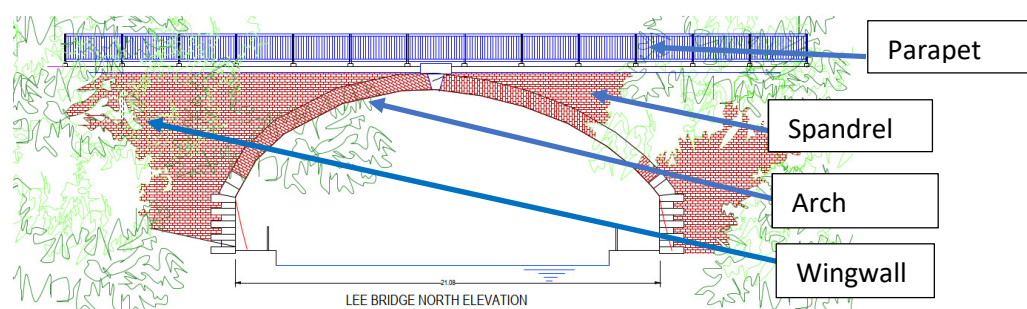
Lee Bridge (Canal and Railway)



Lee (Canal) Bridge

The Dudley Road Improvement Scheme will widen the carriageway over Lee Bridge by reducing the footway widths. BCC has a right to maintain the existing highway over Lee Bridge but changes that affect the highway require approval from the structure owner (CRT). The changes that still require approval / agreement include load increases to the following:

Arch	There is an existing crack through the arch which is located approximately below the eastbound lanes.
Spandrels	Widening the carriageway will bring traffic closer to the spandrels which increases the load on the spandrels.
Wingwalls	These are similar to the spandrels.
Parapets	Impact loading



## 2.0 Approvals Process

The New Road and Street Works Act 1991, Section 88, BCC as the highway authority is required to consult CRT as the bridge authority and comply with reasonable requirements made by CRT to protect the bridge.

The following provides an outline of the approvals process to that would normally be followed to obtain approval:

Approval in Principle (AiP)	Agreement of the methodology for the assessment.
Inspection	Surveys to obtain information required to assess the structure.
Assessment	Analysis of the structure to determine the existing and proposed loading to determine strengthening / mitigation (if required by assessment).
Options Selection	Agreement of preferred option to strengthen / mitigate (if required by assessment).
Design and Approval	Detailed design and approval of preferred option to strengthen / mitigate (if required by assessment).

## 3.0 Progress to Date

The AiP was agreed by CRT on 26 March 20.

A series of inspections and investigation have taken place throughout 2020. These have included trial holes, testing of brick samples and core holes with the latest being undertaken w/c 12 October 2020.

The provisional assessment has shown that the arch (superstructure) is adequate for the proposed loads. CRT's concern is that the existing crack might become worse as a result of the changes in load. CRT have therefore requested a legal agreement (Deed of Indemnity) that should the load changes cause damage to the structure that BCC would fund the repairs. To help confirm whether the proposed load changes affected the existing crack in the arch monitoring was installed in May 2020 to provide baseline readings before any work commenced (Q3 2022?). The aim of the monitoring is to determine if there is any existing movement which is not as a result of the work.

The provisional assessment has also shown that the original scheme alignment increased the load on the spandrels and wingwalls by up to 30%. A maximum load increase of 10% had been requested by CRT in the AiP. The proposed highway alignment over Lee Bridge has therefore been amended to reduce the carriageway widening (and narrowing of the pavements) by the closure of Northbrook St which removes the need for a number of pedestrian islands. The ongoing core holes will confirm whether the load increase of a maximum of 10% required by the AiP can be achieved or if further works will be required.

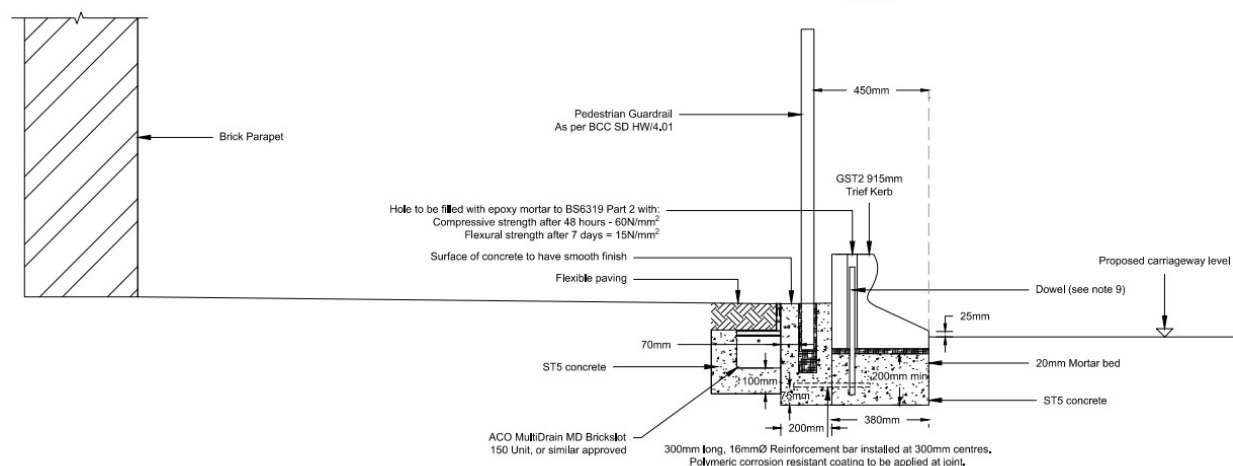
The provisional assessments work has indicated the need to reduce the carriageway width and increase the footway width to reduce the load increases on the spandrels and wingwalls. A number of alternatives alignments have been examined to test the minimums that can be achieved. If the absolute minimum lane width of 3.0m is used then there is still a need to widen the carriageway and reduce the footway widths (by 0.73m(N) and 0.44m(S)) and hence to deliver the Dudley Road

Improvement Scheme there will always be a change in loading on the bridge which requires approval.

Description	Width (min)			
	Lanes	Carriageway	Footway (N)	Footway (S)
Existing	2.60m	10.40m	4.95m	5.05m
Original Design	3.25m	14.10m	3.15m	3.35m
Feasibility Design (Emergency Travel Plan)*	3.25m	13.05m	3.70m	3.50m
Concept Option 1*	3.19m	13.34m	3.85m	4.03m
Concept Option 2*	3.00m	12.00m	4.22m	4.61m

\*includes closure of Northbrook St which reduces width of islands at Heath St junction

The existing parapets do not comply with current standards (impact resistance). Provisionally it has been agreed with CRT that a trief kerb and pedestrian guardrail will be acceptable.



Trief Kerb and Pedestrian Guardrail Detail provisionally agreed with CRT to protect existing parapet

#### 4.0 Deed of Indemnity (DoI)

CRT have requested a deed of indemnity from BCC before they will agree to the proposed changes to be made to Lee Canal Bridge. A draft DoI has yet to be received from CRT but CRT have indicated that they are seeking an indemnity from BCC that should the proposed works cause damage to the structure that BCC will arrange and fund the cost of the repairs.

Lee Canal Bridge was constructed in 1826 and has a number of existing defects which have been identified by the inspections. These defects represent a liability it has been discussed with CRT that BCC should only be liable for any changes that occur as a result of the BCC scheme. As such monitoring of the main cracks on the bridge commenced in May 2020 to provide baseline data against which to measure changes. It is anticipated that this monitoring should continue through the construction phase (Aug 2022 to Jan 2023) and for a period after completion (to be agreed).

In addition it has been discussed with CRT about limiting the duration of the agreement (eg to next principal inspection) so limiting the potential expose for BCC to future claims.

## 5.0 Alternatives

A number of alternatives have / are being explored.

<b>Alternative</b>	<b>Advantage</b>	<b>Disadvantage</b>
CRT have offered to transfer the ownership of the bridge to BCC (rejected to date)	Control of maintenance to ensure that Dudley Road remains open to traffic.	Significant cost associated with taking on this liability
Repair work (eg stitch the crack)	Reduce risk of future liabilities	Significant cost for both design / approval and construction which may not remove the need for a Dol
Deck over existing structure	Reduce risk of future liabilities	Significant cost for both design / approval and construction which may not remove the need for a Dol
Local load transfer slabs (similar to decking over but more local application)	Reduce risk of future liabilities. Lower capital cost.	This will not remove the need for an Dol.
Replace existing bridge	Removes future liabilities.	High capital cost Historic Structure (Telford 1826) but not listed

Further analysis is ongoing assess the structure and reach agreement with CRT to allow the works to proceed

## **Appendix A – New Road and Street Works Act 1991**

# **New Roads and Street Works Act 1991**

### **1991 CHAPTER 22**

An Act to amend the law relating to roads so as to enable new roads to be provided by new means; to make new provision with respect to street works and, in Scotland, road works; and for connected purposes. [27th June 1991]

Be it enacted by the Queen's most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:—

#### **88 Bridges, bridge authorities and related matters.**

(1) In this Part—

- (a) references to a bridge include so much of any street as gives access to the bridge and any embankment, retaining wall or other work or substance supporting or protecting that part of the street; and
- (b) “bridge authority” means the authority, body or person in whom a bridge is vested.

(2) In this Part “major bridge works” means works for the replacement, reconstruction or substantial alteration of a bridge.

(3) Where a street is carried or crossed by a bridge, any statutory right to place apparatus in the street includes the right to place apparatus in, and attach apparatus to, the structure of the bridge; and other rights to execute works in relation to the apparatus extend accordingly.

*New Roads and Street Works Act 1991 (c. 22)*  
*Part III – Street works in England and Wales*  
*Document Generated: 2020-08-20*

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*Status: This version of this Act contains provisions that are prospective.*

*Changes to legislation: There are outstanding changes not yet made by the legislation.gov.uk editorial team to New Roads and Street Works Act 1991. Any changes that have already been made by the team appear in the content and are referenced with annotations. (See end of Document for details) View outstanding changes*

References in this Part to apparatus in the street include apparatus so placed or attached.

- (4) An undertaker proposing to execute street works affecting the structure of a bridge shall consult the bridge authority before giving notice under section 55 (notice of starting date) in relation to the works.
- (5) An undertaker executing such works shall take all reasonably practicable steps—
  - (a) to give the bridge authority reasonable facilities for monitoring the execution of the works, and
  - (b) to comply with any requirement made by them which is reasonably necessary for the protection of the bridge or for securing access to it.
- (6) An undertaker who fails to comply with subsection (4) or (5) commits an offence in respect of each failure and is liable on summary conviction to a fine not exceeding level 3 on the standard scale.
- (7) Subsections (4) to (6) do not apply to works in relation to which Schedule 4 applies (works in streets with special engineering difficulties).

#### **Modifications etc. (not altering text)**

- C72** *S. 88(4)(5): functions of a local authority made exercisable by, or by employees of, such person as may be authorised in that behalf by the local highway authority whose function it is (23.7.1999) by S.I. 1999/2106, art. 2, Sch. 2 para.4(d)*