



ALDWARD TOLL BRIDGE LLP

Application to Raise Tolls on the Aldward Toll Bridge

Summary of Structural Works undertaken on the bridge, 2020 to date

1st July 2024

REPORT 18967-H-RP-008-R1

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1. 2020 Principal Inspection

Mason Clark Associates undertook a Principal Inspection of the Bridge on 9th January 2020 and, using a pontoon plus scaffolding tower and a support team from Northern Divers, we were able to inspect the underside of the bridge and produce a comprehensive report on its condition.

The reported assessment from the results of the inspection was that the bridge was in fair condition and stated that there were primary defects in the structure which included:

- A number of hollow sounding areas of masonry.
- A number of places where masonry arch spandrel walls bulge outwards.
- Large cracks in arch barrels.
- Concrete parapets defective in many areas.
- Brick loss in some areas of masonry spans.
- Most drainage outlets from the deck blocked.
- Arch barrels damp and saturated.
- Rotten timber deck.
- Loss of deck fittings along main span.
- Vegetation and tree growth along face of spandrel walls.
- Corrosion and paint loss to iron-framed members.
- Parapet to masonry arches, timber rails and concrete posts not compliant with current standards.

Further details of the condition in 2020 can be found in MCA report 18192-H-RP-001-R2 dated January 2020.

The report from the inspection concluded in respect of the masonry arch spans that there were defects in the superstructure which could be attributed to foundation movement. The significant water seepage through the arches had a negative effect on the condition of the masonry and there was cracking and bulging of the masonry. The parapet posts were cracked and debonded, the beams had failed and carriageway drainage was poor with edges of the carriageway deteriorating.

The report from the inspection concluded in respect of the iron-framed spans that there were defects in loss of protective coating and corrosion. Timber planks had loss of bolts and fittings, timber decking planks were severely wet and some had rot and were depressed.

The overall conclusion was that the bridge was in a fair condition, but that remedial works were required in order to maintain and preserve the structural and aesthetical integrity of the structure and consistent with the Grade II listing.

The report from the inspection recommended remedial works and priorities, high: within 6 months, medium: within 18 months, low: within 24 months. The works included:

High

1. Undertake a structural analysis of the iron-framed-spans.
2. Replace timber decking planks.
3. Replace lost and loose fittings to timber decking planks.
4. Cut back vegetation around structure in watercourse
5. Provide transverse tie rods and pattress plates to arch spans.

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6. Undertake an assessment and provide a vehicle restraint system to carriageway along arch spans.
7. Clear blocked drainage to arch spans.
8. Remove trees and vegetation to arch spans.

Medium

9. Prepare and paint iron frame, due to loss of coating and corrosion.
10. Rebuild buttress and foundation separated from arch span.
11. Improve drainage in the carriageway over arch spans.

Low

12. Stitching repairs, replace spalled/damaged bricks.
13. Mortar repointing brickwork.
14. Prepare and paint steel ties to arch spans.

2. 2020 Load Assessment

In March 2021, MCA undertook a structural assessment of the iron-framed spans of the bridge in accordance with DMRB documents CS 454 Assessment of Highway Bridges and Structures, BD 56/10 Assessment of Steel Highway Bridges and Structures, BS 5400 Part 3 Code of Practice for Design of Steel Bridges, and BD 21/01 Assessment of Highway Bridges and Structures.

The results of the assessment were that for the iron-framed spans and with a timber deck, the structure was adequate for the 7.5 tonne weight limit, and for the masonry arch spans, the structure was adequate for more than 7.5 tonne weight limit.

3. 2022 Principal Inspection

In early 2022, MCA undertook a further Principal Inspection of the bridge, the results of which can be found in report 18967-H-RP-005-RO dated February 2022.

The report from the second inspection concluded in respect of the iron framed spans that there were defects in significant loss of protective coating and corrosion, the loss was worse than had been identified at the first inspection. The top flange of the transverse beams have experienced more corrosion due to being in direct contact with the saturated timber decking. Timber planks had loss of bolts and fittings, timber planks were severely wet with numerous occurrences of rotten timber.

The overall conclusion was that the bridge was in a fair, but deteriorating, condition and that since the first inspection there were elements of the structure which showed a marked deterioration, most noticeably the conditions of the paintwork and the timber decking.

4. 2022 Scour Inspection

Northern Divers undertook an Underwater Bridge Examination and Scour Survey of the Bridge on 28th January 2022 and prepared report 2018 dated 8th February 2022.

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They reported that the river bank construction was sloped mud and grass with tree growth and no erosion. The natural riverbed consisted of small stones and mud with 200mm depth of silt, the foundations of the bridge were not visible above bed level.

The eastern abutment had a grout mattress at riverbed level, was in good condition and stable, except for a small void. Separately there were concrete bags scattered at mid-point on top of the mattress. All masonry above and below the water line was in good condition, there was no scour, or open or damaged joints.

The trestles to the three river piers were in good overall condition and with no scour at riverbed level. There was some minor damage to paint coatings caused possibly as a result of strike damage. There was a single vertical timber at one pier, and a vertical and two horizontal timber members at another pier, all in poor condition and parts of former fendering systems, much of which was missing.

The overall conclusion was that the structure is in good condition, except for deterioration of the timber fendering and growth of vegetation.

5. 2022 Parapet Assessment

MCA undertook a parapet assessment in accordance to CS461 Assessment and Upgrading of In-Service Parapets, in relation to the masonry arch spans. The assessment adopts an as low as reasonably practicable ("ALARP") risk based approach, which assess the tolerability of risk levels. Where parapets are upgraded, the risk should be reduced either to "broadly acceptable", or to satisfy the ALARP principle.

In relation to the masonry arch spans of the bridge, based on the results of the ALARP based risk assessment, the existing parapet fails the "high risk" category, and therefore requires parapet upgrade to N1/N2 containment level. This level relates to a 1.50 tonne car test vehicle.

The substandard parapets of the bridge should be considered for upgrading as an item of future maintenance but, since the bridge is listed, any remedial or upgrading works must not adversely affect the character of the structure and would agreeing with the local planning authority and Historic England.

6. 2023 Strengthening Works

MCA scoped, designed, specified and competitively tendered proposed remedial repair and maintenance works in respect of the iron-framed spans of the bridge.

The repair works include:

- Replace all existing lower timber members fixed back to cross beams.
- Replace all existing upper timber members and fix back to lower timbers.
- Replace all timber kerbs and coach screw through both upper and lower deck timbers.
- Replace all loose or lost fixings in steel transverse cross beams via bolts.
- To the lattice girders, replace all loose or lost rivets/bolts with new rivets.
- In areas near ends of spans, the existing rivets/bolts are to be replaced with new rivets.
- Remove all loose/defective paint to all areas of the lattice girders and reapply new.
- Remove all paint to all areas of steel transverse cross beams and reapply new.

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- Remove all paint to all areas of the support columns and cross-bracing and reapply new.

MCA held discussions with, and made applications to, statutory consultees for consents/approvals for the proposed refurbishment works to the bridge. These included

- The Canal and Rivers Trust
- The Environment Agency
- North Yorkshire County Council
- Harrogate Borough Council / Hambleton District Council
- Historic England
- Natural England

All relevant permissions were obtained prior to the works commencing.

Works were tendered and awarded to Dimestage in December 2022 with the first programme showing a start date of 2nd May 2023, a certificate of completion was issued on 9th February 2024.

As part of the scheme, and further to the itemised works highlighted in the Principal Inspections, the following works were completed:

High

1. Undertake a structural analysis of the iron-framed-spans.
2. Replace timber decking planks.
3. Replace lost and loose fittings to timber decking planks.
4. Undertake an assessment of the existing vehicle restraint system.
5. Clear blocked drainage to arch spans.
6. Remove trees and vegetation to arch spans.

Medium

7. Prepare and paint iron frame, due to loss of coating and corrosion.

These works were all supervised by MCA Engineers and were satisfactory, subject to a 12 month defect inspection.

7. Future Works

There are a number of items of works which are still required to be undertaken at a later date. These include:

High

1. Cut back vegetation around structure in watercourse – To be undertaken as part of ongoing maintenance.
2. Provide transverse tie rods and pattress plates to arch spans – Yet to be undertaken.
3. Provide a new vehicle restraint system to carriageway along arch spans – To be developed as part of a different scheme.

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Medium

4. Rebuild buttress and foundation separated from arch span – Yet to be undertaken.
5. Improve drainage in the carriageway over arch spans – Yet to be undertaken.

Low

6. Stitching repairs, replace spalled/damaged bricks – Yet to be undertaken.
7. Mortar repointing brickwork – Yet to be undertaken.
8. Prepare and paint steel ties to arch spans – Yet to be undertaken.

8. Discussion

The river spans of the bridge have been strengthened with a new timber deck and the protective paint coverings renewed.

The bridge has signed 7.5 tonne weight limit and 'weak bridge' which are intended to restrict the weight limit of vehicles, these match the assessment previously undertaken.

The bridge has a designated speed limit of 5mph which is intended to assist with minimising damage and impact of live loading especially from any heavy vehicles and it is recommended that this limit is maintained so as to preserve the integrity of the bridge.

Further works as listed above are needed in the future, and the bridge will also need to be inspected with General Inspections undertaken every two years and Principal Inspections every six years.

9. Costs to date

Dimestage Enabling Works

We understand Dimestage were paid £3,500-00 + VAT for scaffold design and method statements prior to commencement of the main contract

Dimestage Contract

A total of £569,610-60 + VAT has been paid to Dimestage to date for the works.

A further payment of £14,605-40 + VAT will be due to Dimestage in February 2025 bringing the cumulative amount to £584,216-00 + VAT.

Lane Rental Services

We understand Lane Rental Services have been paid £6,650-00 + VAT to adjust the tarmac carriageway where it abuts the bridge deck.

Mason Clark Associates

MCA have invoiced a total of £120,282-80 + VAT. This includes professional services, Northern Divers access for inspections plus supporting the previous public enquiry.

Permits and Approvals

Various permit costs will have been paid directly by ALDWARK TOLL BRIDGE LLP of which we are unaware.

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for Mason Clark Associates

A handwritten signature in black ink, appearing to be 'A. Thompson', with a long horizontal flourish extending to the right.

Andy Thompson B.Eng. (Hons.), C.Eng., M.I.C.E.
Director