alan johnston
partnership

Bennet Street

Cornbrook Culvert Condition Survey

JANUARY 2025

Ref. 222-176

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Rev 01	C MITCHELL	Mike Carr	K O'BRIEN	24.01.2025

consulting
engineers

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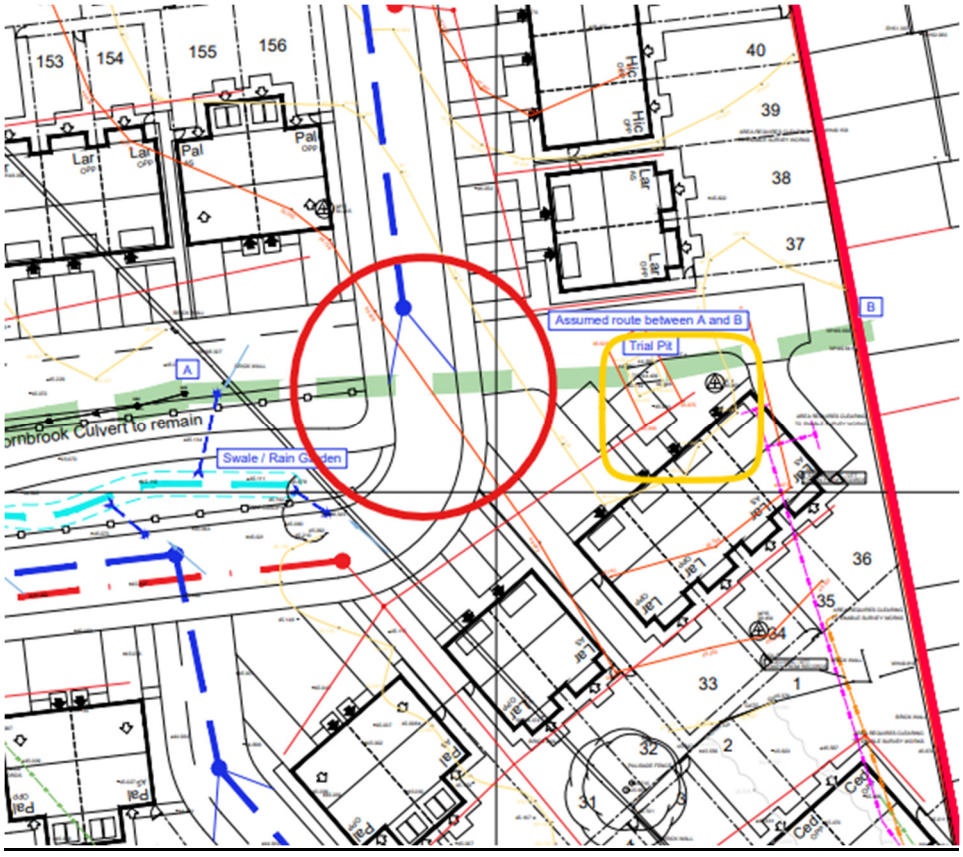
Bennet Street Culvert Survey- Comprehensive Report and Recommendations

1. site location

Site address - Bennett Street, Manchester, M12 5NL
National Grid Ref- E 386189, N 397031

Google Maps Site View

Site Layout



Culvert collapse Location

2. Overview

This report has been prepared to address the findings from the inspection and survey of the Cornbrook culvert located on Bennet Street, Manchester. The report highlights the structural failure observed, the proposed remedial works, and the recommendations to restore the culvert's structural integrity and operational capacity. The partial collapse of the culvert was identified as being caused by the tracking of heavy machinery, exacerbated by reduced ground cover, which significantly weakened the structural capacity of the brick arch.

3. Observations

During the initial inspection carried out on the 29th of October 2024, several key observations were made regarding the condition of the culvert and surrounding area. These observations provided valuable insight into the root causes of the failure and the immediate measures needed to stabilize the site. The observations include:

- A partial collapse of the culvert's brick archway was noted, resulting in a 1.5m diameter opening.
- The reduced ground cover above the culvert was identified as a contributing factor to the structural failure, as it limited the arch's capacity to distribute the applied loads.
- Debris and loose bricks were observed within the culvert, but it was confirmed that water flow remained largely unobstructed at the time of inspection.
- Ground investigations revealed a layer of site fill material, approximately 500mm thick, above a stiff clay layer encountered at a depth of approximately 1m. The clay stratum provided sufficient bearing capacity for the proposed remedial measures.

There was approx. 400/500 of existing site fill/stone from E.G.L until we reached the clay strata. Clay become very stiff at approx. 500mm. Approx. 1m total from E.G.L

4. Immediate Measures Implemented

To ensure the immediate safety of the site and to prevent further damage to the culvert, the following temporary measures were implemented promptly following the inspection:

- A road plate was installed over the affected section of the culvert to protect against further collapse and to allow limited vehicular access above the structure.
- Temporary fencing was erected around the collapse area to restrict access and reduce the risk to personnel and equipment.

5. Proposed Remedial Actions

Following the initial site inspections and subsequent structural evaluations, a detailed remedial strategy was developed to restore the culvert to full functionality while ensuring long-term stability. The proposed works are outlined as follows:

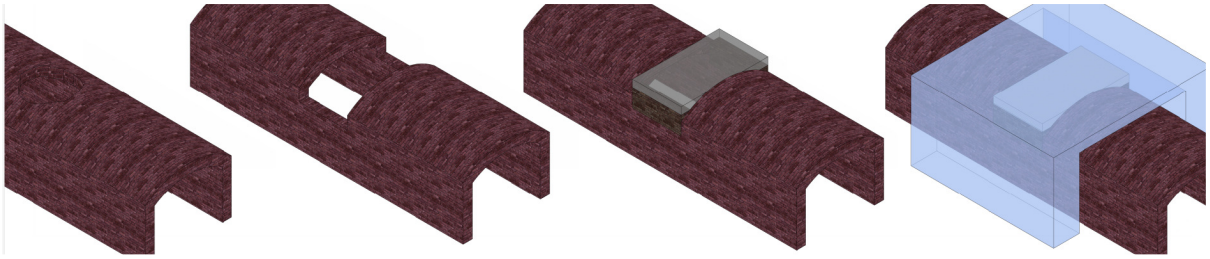
1. Removal of Damaged Brickwork:
   - The damaged brickwork of the culvert will be carefully removed back to the spring line of the arch to ensure the stability of the remaining structure.

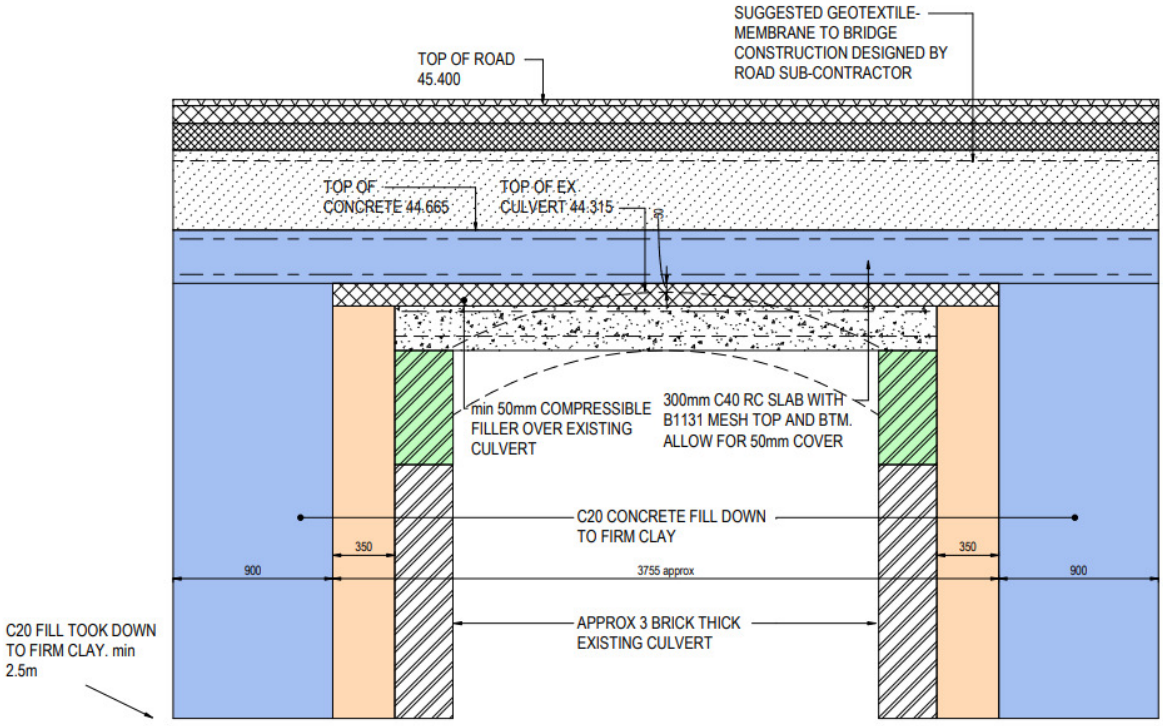
2. Construction of a Reinforced Concrete Slab:
   - A new 250mm thick reinforced concrete slab will be cast over the culvert using hollow-rib metal decking as permanent formwork. This slab will provide a durable and robust load-bearing surface.
   - A 50mm compressible filler layer will be installed between the new slab and the existing culvert walls to mitigate any direct loading on the brickwork.

3. Installation of Foundations:
   - New trench fill foundations, approximately 900mm wide, will be constructed on either side of the culvert to support the reinforced concrete slab.

4. Bridging Slab Installation:
   - A secondary 300mm thick reinforced concrete slab will be installed over the trench fill foundations to span the culvert and form a bridging structure capable of supporting vehicular and pedestrian loads.

5. Final Surface Restoration:
   - A geotextile membrane will be incorporated into the road build-up to improve load distribution, followed by the placement of standard road layers to reinstate the surface.





Full details and information can be found on AJP drawing 222-176-SK100 C03.

6. Recommendations

6.1 Design and Construction

The remedial design proposed is structurally sound and incorporates measures to protect the existing culvert from future damage. Key considerations include:

- Ensuring compliance with relevant British Standards, such as BS EN 206 for the specification and production of concrete.
- Verifying that the reinforced concrete slab and foundations are capable of accommodating the anticipated loads from vehicular and pedestrian traffic.

6.2 Hydraulic and Environmental Considerations

Given that the new cover slab will be installed at the same level as the crown of the existing culvert, future hydraulic flows through the culvert will not be impeded. This ensures that the structure

maintains its full capacity to manage water flow even during peak flow conditions. To further enhance environmental and hydraulic performance:

- Silt control measures should be implemented during construction to prevent debris from entering the watercourse and impacting downstream ecosystems.
- Post completion CCTV survey to inspect the culvert once capped.

6.3 Long-Term Monitoring and Maintenance

To ensure the long-term performance of the remedial works and the culvert structure, the following measures are recommended:

- Conduct regular inspections to monitor for signs of settlement, cracking, or other structural deficiencies.
- Implement a proactive inspection regime after extreme weather events to assess the impact on the structure.

7. Conclusion

The remedial strategy proposed in this report addresses both the structural and hydraulic needs of the Cornbrook culvert. By implementing the proposed design and adhering to the outlined recommendations, the culvert's structural integrity and functionality can be restored, ensuring its continued performance for years to come. Regular monitoring and maintenance will be crucial to safeguarding the investment and minimizing the risk of future failures.

A video can be issue don required which shows the current flow