

Aqueduct Bridge (Grade II Listed)

PREPARED FOR: Steve Hollins

COPY TO:

PREPARED BY: Matthew Day

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Introduction

Following a request from Telford & Wrekin Council a special inspection was carried to assess the ongoing deterioration of the arch barrel. Access to the intrados was hampered as the timber board platform to the protective scaffolding had been removed to eliminate any potential vandalism. A hammer survey between the arch springing and quarter point both sides of the structure was carried out.

Existing Condition

The stonework to the arch barrel is in poor condition with extensive areas of spalled and saturated masonry to the south side. During the hammer survey numerous random areas of spalled stone up to 20mm thick dislodged which highlights the ongoing deterioration of the arch barrel. No significant cracking or movement to the foundations was noted and the shape of the arch barrel appeared to be good however several viewpoints were partially blocked by the scaffolding.



Photo 1 – Removed spalled stonework



Photo 2 – Typical view of south side of barrel

Discussion

This ongoing moisture saturation and freeze thaw cycles will continue to deteriorate the stonework and reduce the overall thickness of the arch barrel. This deterioration will lessen the structures load carrying capacity and eventually lead to isolated areas of failure (collapse). At this stage there is a low likelihood and no indications that the structure will fail catastrophically as no hinge points or movement to the foundations appear to have formed. However it is necessary to assess any risk and determine when the structure will become a danger to the public. A detailed assessment of the structure could be carried out to determine the theoretical minimum arch barrel thickness. As the structure is subjected to limited live loading (pedestrian only) and the bridges own dead weight has a

beneficial stabilising effect it is possible any analysis would highlight that significant localised spalling can be sustained until failure occurs. Further site investigation will need to be carried out to confirm the existing thickness of the arch barrel and too accurately measure the arch profile. Should this approach be accepted regular inspections of the structure would be necessary to monitor any change in shape or cracking to the arch barrel. Accurate depths and extent of spalled stone could be measured and a potential deterioration rate could be determined indicating the possible life span of the structure. This figure would be theoretical but could in the structural monitoring. This approach may give a reasoned timeframe for when major intervention works are required.

Recommendations

The following actions are recommended:

1. Carry out an intrusive trial hole investigation to determine the arch parameters.
2. Carry out an assessment of the structure to determine the theoretical minimum arch barrel thickness that can be tolerated.
3. Following the above activities review the existing monitoring regime and provide a detailed and auditable report outlining inspection frequency, action triggers and mitigation measures in accordance with BD 79/13 – The Management of Sub Standard Highway Structures.

There are also high and low voltage cables (33 & 11kv) which extend through the structural fill and it is recommended that Western Power Distribution (WPD) are contacted and informed of the structures current condition and deterioration.