CASE STUDY

BONCHESTER BRIDGE TEMPORARY BRIDGE ABUTMENTS

CLIENT: CONFIDENTIAL

LOCATION: UK

Highlights:

- Geotechnical Engineering Detailed Design
- Contractor Site Support
- Geotechnical Modelling

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THE CHALLENGE

To facilitate the replacement of a damaged outfall pipe from a Wastewater Treatment Works (WwTW) into the Rule Water, a tributary of the river Tweed; Arthian were asked to provide a design for temporary bridge abutments spanning a man-made drainage channel at a site near Hawick.

There was no suitable access for construction plant to facilitate the placement and installation of the pipe and rock protection within the Rule Water due the drainage channel. Our client sourced a temporary bridge as a pre-made engineering solution however the provider did not offer the abutment design as part of their temporary works solution.

The bridge was required to span the drainage channel to connect the existing Scottish Water WwTW site the only suitable access for plant and potential storage area, to the planned location of the outfall pipe replacement in the river.

Additionally, the temporary bridge sourced by our client was unable to be installed with tilt or a change in elevation. Access to the planned works location was again restricted by young and mature trees lining the bank of the rule water. A safe working distance from the anticipated root network of these trees was required.

Furthermore, a comfortable clearance of the channel was required to allow room on each bank for positioning of the abutments. As such, the location and orientation of the bridge was extremely limited by the site constraints.

THE SOLUTION

Arthian undertook a short ground investigation to determine soil characteristics and parameters for both sides of the drainage channel to ensure suitable ground conditions for the required abutments. Tilt and differential settlement would have resulted in potential failure of the bridge. A ground model was produced for each side of the drainage channel to determine the suitability of the footing of the abutments. As an additional safety measure, the abutment design incorporated platforms from which to support jacking the bridge to adjust for tilting or settlement if unforeseen ground failure was to occur.

To mitigate the constraints imposed by the limited manoeuvrability at either side of the bridge for vehicles. Arthian offered a choice of solutions to the client to establish a design which most aptly fits with their method of work. This solution involved an earthworks exercise on the WwTW side of the bank to facilitate maintaining the elevation of the bridge across both banks.

Arthian afforded our client savings in time and cost during the site visit by identifying similarities to previous projects undertaken together. The Arthian design specified materials we knew our client kept in stock. The use of gabion baskets as abutments were employed as an easily deployable, clean, and reuseable design solution to support the bridge. These were installed above a 300mm thickness of compacted DoT Type 1 subbase containing a basal and mid-level geogrid layer.

Arthian provided the justifications and summary for the design to our client along with cross-sectional, plan, and schematic drawings to clearly communicate the design solution for construction. These documents were accepted by local environment management trusts without comment.

The ongoing commitment to sustainability and client value ensured another timely and successful delivery of the work with a long-standing relationship with our client.

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