

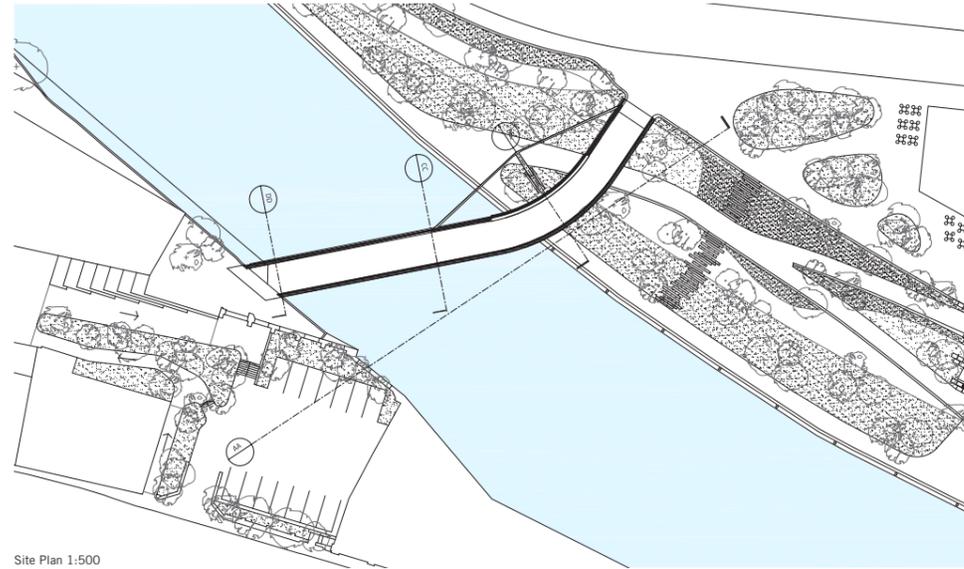


BATH QUAY BRIDGE DESIGN COMPETITION

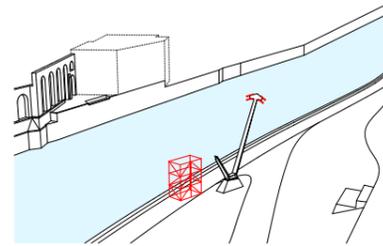
Design concept

This design embraces the amazing opportunity to build within a complex site that is hugely significant to both the history and future of Bath. The design is elegantly simple: a clean sweeping form that spans the River Avon and its riverside park to connect two new gateway plazas that serve as nodes in the development of Bath Quays. The curved alignment enables a smooth connection through the existing arches and onto the proposed thoroughfare to the west as well as a neat perpendicular interface with the new pedestrian/cyclist links to the north. Not only does the curved path create legible connections at both ends, it also encourages a wider range of views as the user's direction of travel gradually shifts as they move over the bridge. The curved section, which is also the highest point of the deck, is concentrated near the supporting mast on the north bank where a continuous bench invites lingering and the full appreciation of the uninterrupted view. In this way the bridge acts as a destination as well as a means of connection.

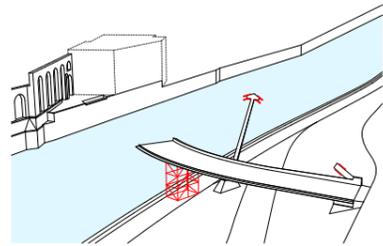
To compliment the plan form and enable continuous views along the blade thin eastern deck edge, an engineering solution has been developed that is both efficient and striking. The asymmetrical structure will create an incredibly dynamic experience for all users both on and off the bridge. This bridge walks the fine line between attracting attention in a memorable way and blending in with its rich context. Concentrating the visual mass and single intermediate support over the northern bank means the river spanning portion appears to hover before touching down gently on the sensitive southern abutment. High quality materials and refined detailing will create a timeless quality to be enjoyed for generations to come.



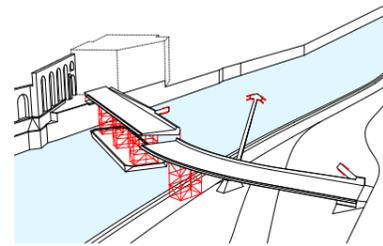
Site Plan 1:500



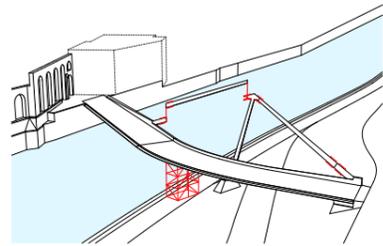
- Stage 1:
- Construct foundations and abutments.
 - Install mast pier, with temporary brackets ready to receive stay plates.
 - Install temporary bridge support on tow path.
 - Assemble steel bridge deck in sections, either off-site or adjacent.



- Stage 2:
- Deliver and install north part of deck onto abutment and temporary support.
 - Single lift approx. 250 tons requires large crane.
 - Alternatively, introduce additional temporary support and split into two parts (not illustrated).
 - Leave main pier prop unconnected.
 - Bridge deck placed 20mm above its final vertical alignment at the riverside temporary support.



- Stage 3:
- Deliver south part of deck on river barge.
 - Lift bridge deck up using jacks from the barge.
 - Alternatively use tandem crane lift (reaching over the arches on the south side).
 - Locate bridge deck on abutment bearings and temporary bolted splice to north part.
 - Release barge / cranes. Fully weld the deck splice.



- Stage 4:
- Install the stay plates by crane, using temporary restraints, and bolt to temporary brackets.
 - Form full strength butt welds at mast head.
 - Use small jacks at lower connection to stress stays to setting tension and form lower butt welds.
 - Lower the bridge deck at temporary pier onto main prop support and form permanent connection.
 - Complete all finishes and remove all temporary works.

Landscape

The landscape will create a beautifully choreographed experience that combines industrial heritage and the Bath Quay Bridge in a new riparian landscape setting as people approach and cross from both north and south banks. The green character of the spaces to the north will support the idea of a connective riverside landscape whose green structure continues up the river bank, through the landing plaza and into the surrounding streets and townscape.

A strong destination space at the southern landing is treated as another piece of the riparian landscape providing a dramatic setting for the new bridge and the retained arches. The arches will be retained to celebrate their historic significance and serve as a visual foil between the car park and busy road to the south. Generous terracing, steps and shallow ramps will allow all users to navigate the considerable level changes across the site to create a memorable environment accessible to all.

Structure

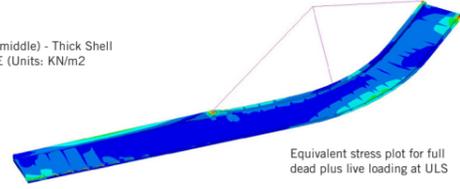
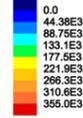
This is an innovative and original development of the cable stayed form. Flat steel plates instead of cables support the deck from a T-section mast in a seamless, integral assembly with no joints. With support along one side only, the closed steel box girder provides the torsional stiffness needed to resist the tendency to twist.

The deck is fixed to the north abutment, without bearings, and the slender main pier support prop is integral with the deck, easily accommodating the small thermal movements in bending. The deck rests on simple bearings at the south end, where an expansion joint accommodates thermal movements. The joint and bearings are all easily accessible for maintenance, and are the only moving parts requiring occasional inspection. A key advantage of this arrangement is that no horizontal loads are applied to the existing river wall or arch foundations.

The construction method uses tried and tested technology, with maximum off-site work to minimise disturbance. The stays are installed and stressed using temporary brackets and stressing bars. If ever they need to be replaced, for whatever reason, this can be done using the same procedure.

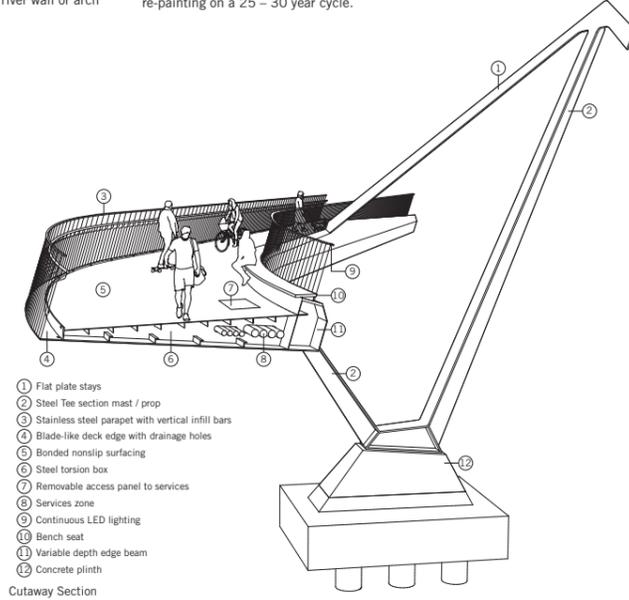
The bridge deck has a first vertical mode of vibration of 1.9 Hz (nicely between typical walking and jogging pace frequency) and a first torsional mode of 5.1 Hz (high enough not to worry about flutter). If dampers are required to control amplitudes, they are commonplace, inexpensive, and easy to install within the depth of the box girder with an access panel for inspection.

Entity: Stress (middle) - Thick Shell
Component: SE (Units: KN/m²)



Equivalent stress plot for full dead plus live loading at ULS

Maintenance requirements are low, with no bearings or joints except at the south end (where an integral abutment would be too risky because of the condition of the river wall). Externally painted weathering steel is used for the box girder so as to avoid the need for any internal painting during the life of the bridge, and all external surfaces are smooth for ease of re-painting on a 25 - 30 year cycle.



- Cutaway Section
- Flat plate stays
 - Steel Tee section mast / prop
 - Stainless steel parapet with vertical infill bars
 - Blade-like deck edge with drainage holes
 - Bonded nonslip surfacing
 - Steel torsion box
 - Removable access panel to services
 - Services zone
 - Continuous LED lighting
 - Bench seat
 - Variable depth edge beam
 - Concrete plinth



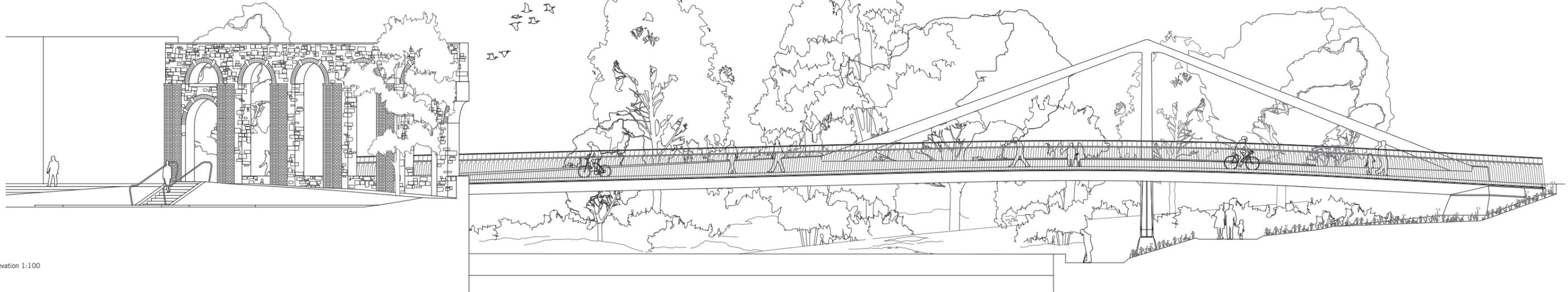
Aerial view looking north



View along park traversing path



View towards the south



Elevation 1:100