

Footbridge across Thames Features Triple Arches

By Catherine A. Cardno, Ph.D.



A three-span footbridge planned to cross the River Thames has successfully passed through a second round of planning permissions. Two larger outer arches, which arc above the deck, are joined in the middle by a shorter, smaller arch that passes below the deck. One-World Design Architects

A new footbridge crossing planned for the River Thames in London has passed its second review hurdle.

December 17, 2013—Today there are 18 vehicular bridges and nine rail bridges over the River Thames, in Greater London, but only three footbridges. But a new footbridge has passed its second round of planning permissions as the city seeks to offer pedestrians and cyclists greater access. Designed by the London-based architecture firm One-World Design Architects with structural engineering by London-based Expedition Engineering, the sleek, £22-million (U.S.\$36-million) triple-arch bridge will cross from Battersea, in the London Borough of Wandsworth, to Chelsea Harbour, in the London Borough of Hammersmith & Fulham, alongside a historic railway bridge that dates to the 19th century.

The Hammersmith & Fulham Council approved the project last month; the Wandsworth Council approved the project this past summer. Once the project receives final approval from the Greater London Authority, which is anticipated by March 2014, funding to build the structure will be sought.

In an unusual move, the design was developed and the planning permissions sought pro bono by One-World Design. “We instigated the project simply because we believe it’s the right thing to do,” said Chris Medland, RIBA, the director of One-World Design, who wrote in response to written questions posed by *Civil Engineering* online. “One-World Design is an RIBA

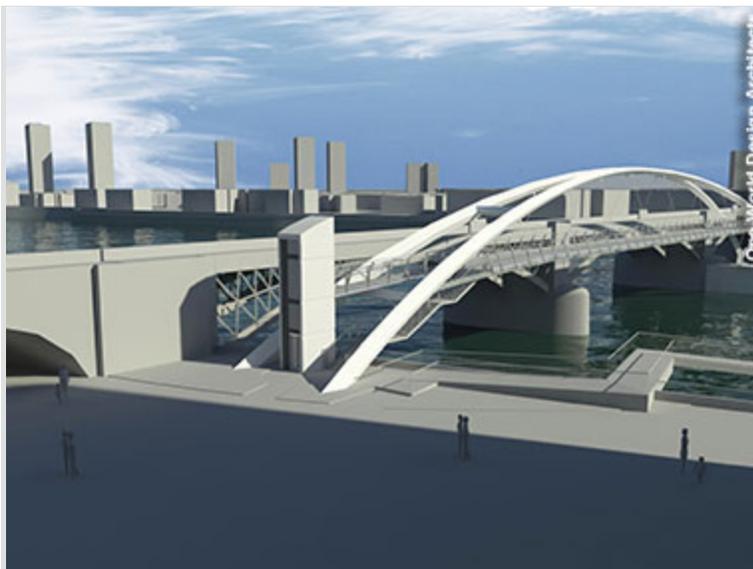
chartered architectural practice with collaborative and sustainable design at its core, [and] our focus is delivering sustainable, elegant, and practical solutions. We seek out opportunities for energy reduction and renewable energy production—even if we don't have a client.”

The bridge would be open 24 hours a day, 7 days a week, and would connect residential and commercial developments on either side of the river, facilitating leisure and shopping as well as commuting, according to the planning documents filed with the Hammersmith & Fulham Council.

The bridge is a three-span crossing supported on four piers, only two of which are located in the river. “This [three-span] arrangement gives two longer, outer spans, and one shorter central span,” Medland said. “The bridge spans by means of tied arches, the ties formed by the deck. Residual thrust from the arches [that is] not carried by the ties is resisted by the abutments and piers.”

The arches, which will be created off-site and moved by barge into place, are fabricated steel boxes with diamond-shaped cross sections. The orientation of the diamond sections is arranged to diminish the desire and ability of passersby to climb the arches, Medland noted.

“The arches intersect in plan at the center of each span, allowing the pairs of arches to provide some lateral stability to each other,” Medland said. “Below the deck at the river piers, the arches change angle to run parallel to the span of the bridge. This minimizes the lateral dimension of the new river piers.”



The planned footbridge is designed along an alignment beside a historic 19th-century railway bridge, though it will remain completely independent structurally. This includes the two piers of the new footbridge that will be located in the river and aligned

with the two central piers of the historic bridge. One-World Design

Architects

To tread as lightly as possible on the river, the two bridge piers that are located in the water would be placed in alignment with the two central piers of the historic 1863 wrought iron Cremorne Bridge, the Grade II* structure listed by conservation agency English Heritage. (A Grade II* listing indicates that the bridge is “particularly important, of more than special interest.”) Although the piers of both bridges will be aligned, the new footbridge’s piers will be completely independent of the historic bridge’s supports, Medland pointed out.

To address concerns raised by English Heritage that the new footbridge might block sight lines of the historic railway bridge, the structural elements of the footbridge have been designed to be as thin as possible, according to the planning documents.

The structural steel deck will be supported vertically by tension hangers that extend from the arches above, Medland explained. “Where the arches are below the deck, the deck is supported by tubular steel props,” he said. “Diagonal bracing [in plan] will transfer transverse loads on the bridge deck to the hangers and the intersection points with the arches.” A light, perforated steel walkway will enable rainwater to fall into the river, obviating the need for gutter systems.

“The bridge design is an elegant response to unique site constraints,” Medland noted, adding that the design will require only a limited increase in right-of-way—from a 6 m wide river path near the site—which will help control costs. “Land values in the area are some of Europe’s highest,” he explained.

Additionally the design accommodates the navigational clearance required for the Thames and height restrictions imposed by an approach zone for the nearby London Heliport. It will also protect the intertidal mudflat habitat that the bridge will cross over, Medland said.

Despite these difficulties, “the position of the bridge could not be moved more than a meter or two upstream due to existing developments on the river banks and not downstream due to the existing railway structure,” Medland explained. “All these issues and more have led the bridge design to evolve, almost naturally, to what is the optimum solution.”

In addition to offering a crossing for local residents and workers, the new footbridge would also improve access to a so-called “linear park” located along the Thames within the city, formed by a portion of the Thames Path. This national trail follows the route of the River Thames for 184 mi, almost the river’s entire journey from its point of origin in Gloucestershire, through the heart of London, to the Thames Barrier in the London Borough of Greenwich, according to planning documents for the bridge. (The Thames continues its journey past this point, ending at an estuary in Essex, where it meets the North

Sea.)

In 2012, Queen Elizabeth set sail from the location chosen for the bridge's crossing as part of her Diamond Jubilee Celebrations. "A new pedestrian and cycle link in this location at this time will be a fitting legacy for the Diamond Jubilee celebrations and one [that] makes financial and common sense," Medland said.

The idea of creating a bridge along this stretch of the river has a much longer history however. "On carrying out research, we found that as early as 1924 Viscount Curzon acknowledged in the House of Commons that a bridge between Wandsworth Bridge and Battersea Bridge was needed," Medland said. "Our vision for the bridge was that it should celebrate the river, becoming a key part of a new destination at the Battersea riverside, complementing the new bars, hotels, and restaurants along both sides of the river."

One-World Design hopes to secure a corporate sponsor for the project by spring 2014, according to Medland, so that detail design work can occur over the summer and construction can begin in the fall. The target completion date is spring or summer 2015.

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