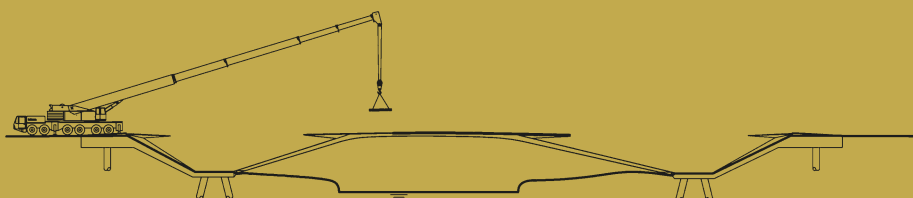
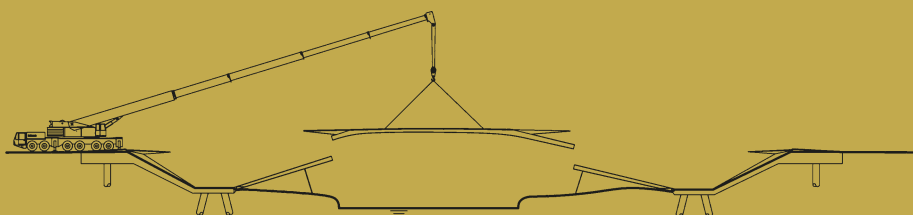


River Douglas Bridge



by DKFS Architects

Project Details

Practice:	DKFS Architects
Designers:	Dirk Krolikowski and Falko Schmitt Krolikowski and Schmitt contributed equally to this project through their joint practice DKFS Architects. The competition entry was submitted under the name JDA, which was the practice’s name at the time. Since then the practice has been renamed as DKFS Architects.
Title:	River Douglas Bridge
Output type:	Design
Function:	Pedestrian, bicycle and equestrian bridge
Location:	Preston, United Kingdom
Client:	REMADE, Lancashire County Council
Practical completion:	To be confirmed, pending funding
Budget:	Approx. £3,500,000
Span:	90m
Structural engineers:	Arup, London: Ozan Yalniz, Pat Dallard, Angus Low





1

1
Perspective, River
Douglas Bridge,
first prize in
an international
competition

Statement about the Research Content and Process

Description

The design of the River Douglas Bridge in Preston won an open two-staged international RIBA competition. The chosen structural system is classified as self-anchored stressed ribbon bridge which integrates the existing abutments of a 19th-century railway bridge and provides for continuous pedestrian pathways on the lower banks of the river.

Questions

The stressed ribbon bridge is a rare typology as fewer than 50 have been built worldwide and of these only two are examples of a self-anchored system. The design endeavours to move beyond these built precedents through its level of interdisciplinary and contextual integration. The combination of arch and struts, integration of existing bridge abutments and overall architectural expression adapted to River Douglas Bridge are unique.

The project's innovativeness is achieved by addressing three key research questions:

1. How can the architectural design of the bridge achieve the highest level of local historical contextualisation?
2. How can an interdisciplinary understanding of global structural system principles, particularly of the stressed ribbon bridge, be tailored to a site-specific solution but still express the intrinsic structural logic of the stressed ribbon system?
3. How can prefabricated methods of construction and erection on-site minimise environmental impact on a biological heritage area?

Methods

- 1. Strategies of historical, spatial and technical contextualisation.**
- 2. Research into the principles of the rare and largely undocumented structural typology of a stressed ribbon bridge.**
- 3. Research into prefabricated methods of construction and erection, and development of an approach that minimises impact on the existing ecological heritage site.**

Dissemination

Exhibited in the Netherlands and Argentina, presented in five lectures in the UK and Germany, and featured in a film.

Statement of Significance

Won first prize in an open two-stage international RIBA competition with 110 entries, against competitors including Grimshaw Architects and Guy Nordenson and Associates (USA).



2

2

Perspective abutment.
The closed system is legible, enhancing the experience of passing 'through' a closed structural system.

Introduction

The design of the River Douglas Bridge in Preston, UK, was the winning entry of an open two-staged international RIBA-administered competition with 110 entries.

Dirk Krolkowski and Falko Schmitt, who designed the winning scheme, are the Directors of DKFS Architects (formerly JDA), a young studio that focuses on the innovative integration of architecture and engineering, and specialises in design research into bridges. The structural

system chosen for the River Douglas Bridge is classified as self-anchored stressed ribbon bridge which integrates the existing abutments of a 19th-century railway bridge and provides for continuous pedestrian pathways on the lower banks of the River Douglas. A highly interdisciplinary understanding of historical, spatial and ecological parameters is integrated within a rare non-linear structural system. [fig. 1]

Aims and Objectives

The River Douglas Bridge will carry a linear greenway incorporating a multi-user path for pedestrians, cyclists and equestrians. The new bridge aims to be a gateway to the internationally recognised wildlife habitat of the Ribble Coast and Wetlands Regional Park. It will provide an alternative crossing point to the busy road bridge which crosses the river at Tarleton. Organisations and groups, including the Northwest Regional Development Agency (NWDA), Lancashire County Council, West Lancashire District Council, South Ribble Borough Council and the Ribble Coast and Wetlands Regional Park group, consider that the bridge will help deliver a number of strategic benefits such as the development of a new section of the National Cycle Network between Southport and Preston. It is anticipated that the new river crossing will function not only as an access route but also as a flagship attraction within the Regional Park alongside other visitor attractions, such as the Martin Mere Wetland Centre and the Royal Society for the Protection of Birds (RSPB) Hesketh Out Marsh Reserve.

1. The project took a highly contextual approach. The aim was to research the complex historical, spatial and technical context of the site, the given boundary conditions and the existing materials from the old railway bridge, and to integrate these findings within a design solution that, as per the brief, was required to be 'a modern structure in harmony with its surroundings'.
2. By studying existing examples of stressed ribbon bridges, the project worked to understand the typology of this relatively new and rare structural system. The aim was to use this projected understanding in order to manifest the intrinsic logic of the stressed ribbon system in the tectonic form of the proposed River Douglas Bridge.
3. Due to the site location within a biological heritage area, minimising environmental impact has been a main objective of the research and design. Owing to its typology and the high degree of prefabrication, the bridge can be erected without the need of falsework or shoring, reducing the impact of erection on the site. The bridge's simple construction sequence means heavy lifting machinery access is only required from one side, thus reducing impact on the local ecology (see Methods, section 3).

Questions

How can the architectural design of the bridge achieve the highest level of local historical contextualisation? How can a contextual response to the existing ruins of the 19th-century railway bridge be combined with a light, innovative and contemporary tectonic solution that elegantly and legibly marks the crossing?

The integration of the old abutments and the reuse of the existing brick as visible building strategies add historical references to the new design. The remaining bricks are used to fill the concrete box of the abutments, simplifying the foundation design significantly. The increased weight of the abutments reduces the need for tension piles.

How can an interdisciplinary understanding of global structural system principles, particularly of the stressed ribbon bridge, be tailored to a site-specific solution but still express the intrinsic structural logic of the stressed ribbon system?

As there are only a few precedents for this kind of structural system, research into its structural engineering and fabrication aspects was necessary. The resulting knowledge informed the design process in order to achieve a high degree of architectural articulation.

How can prefabricated methods of construction and erection on-site minimise the environmental impact on a biological heritage area?

The bridge is prefabricated and can be erected without falsework or shoring. Maintenance is greatly reduced by encasing all structural steel elements. Overall the intelligent typology of the bridge has minimal impact on the environment while ensuring habitat connectivity across the greenway.



3
Elevation. The bridge incorporates riverwalks on the lower bank sides.

4
Ulrich Finsterwalder,
Proposal for the
Bosporus Bridge,
a gigantic stressed
ribbon, 1958

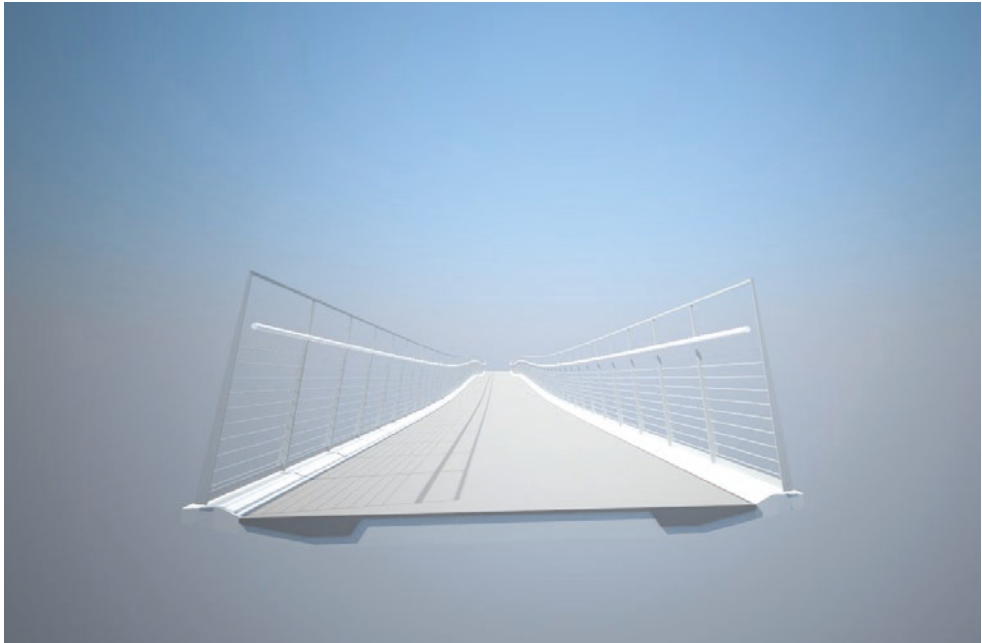
Context

Although stressed ribbon structures have a simple structural principle, their analysis is complex, mainly due to the behaviour of the tension structure which requires in-depth knowledge of non-linear principles.

The stressed ribbon bridge is a rather new type of bridge and classified as a rare typology, as fewer than 50 have been built worldwide. Of these only two are examples of a self-anchored system known to the author (Olomouc, Czech Republic, 2007 and Brno, Czech Republic, 2007 – both by Jiri Strasky). German engineer Ulrich Finsterwalder first introduced the concept of a stressed ribbon, and the first stressed ribbon bridge was constructed in Switzerland

in the 1960s. A world-renowned specialist on stressed ribbon bridges, Strasky has built traditional stressed ribbons since the 1980s and has conducted research into self-anchored systems. His work was studied in great depth throughout the research and design of the River Douglas Bridge.

The achieved integral and self-anchored solution for the River Douglas Bridge is seen as an innovative variation from the traditional stressed ribbons. The design endeavours to move beyond built examples by integrating site-specific aesthetic, engineering, historical and ecological factors. [fig. 4]



5

5
Topology of the
stressed ribbon
generated by
the structurally
required sag

Methods

The River Douglas Bridge develops its research propositions through specifically architectural practice-led processes:

Integrative strategies of historical, spatial and technical contextualization

a. Self-anchored stressed ribbon

The aim was to design a structure which integrates with the complex historical, spatial, ecological and technical context while being perceived as an appropriate solution that, as per the brief, was required to be a modern structure ‘in harmony’ with its surroundings. Intensive research into structural typologies was required to arrive at a solution that responds ideally to the given boundary conditions.

The chosen typology for the new crossing is a self-anchored stress ribbon bridge, which incorporates a supporting steel arch to reduce the effective span and anchor forces. The resulting prestressed slender deck hangs in a cable-like form between the banks. In light of the surveyed and reported poor geological conditions, a self-anchored structural system allowed for introduction of mostly vertical loads into the abutments, thus making it a highly economical solution, further helped by in-parts simple ‘gravity box’ foundations. [fig. 3]

Furthermore, it was established that the geometry of the arched stress ribbon bridge responded ideally to the

incorporation of required clearances for the embankment footpaths and the navigation freeboard above the waterline into the structural system. The exposed compression link in conjunction with the arch makes the closed system legible, enhancing the experience of passing ‘through’ a closed structural system, when approaching the bridge on embankment level. This is seen as a key aspect of the experiential quality of the structure. [fig. 2]

b. Deck topography

The ‘topography’ of the deck is generated by the structurally required sag, which mirrors the flow of the natural forces. The deck topography aims to embed the experience of the bridge into the greenway as a continuous experience of the landscape. The key to the achieved architectural expression was focused research into the system’s structural behaviour and the relationship of necessary structural sag and the resulting forces. The parapet itself consists of steel frames with a stressed wire infill which helps to decrease the visual height of the deck, keeping it extremely slender in elevation and reducing wind loads. The River Douglas Bridge is a controlled geometric intervention into the existing landscape which expresses the concept of the stressed system and elements legibly. [fig. 5]



6



7

6
**The River Douglas
 at Hesketh Bank**
 Photo courtesy
www.heskethbank.com

7
Alan Fearnley,
Day's work done.
 A steam engine crossing
 the River Douglas
 Photo courtesy
www.heskethbank.com

c. Historical context

The original railway bridge, demolished in the 1960s, was a multi span steel bridge with a swinging centre section supported on a pier in the centre of the river. The bridge would swing open to allow masted vessels through, providing access to the Alty's Brickworks site and to the towns and settlements along the River Douglas and the Leeds & Liverpool Canal, through to Wigan.

No drawings or other technical data relating to this structure are available. Photographs indicate that the pier foundations appear to be large diameter steel or cast iron tubes, generally protected by timber piles. Remains of some of the tubes are visible in front of the West abutment. The extent of the remains of the other piers is unknown. The abutments were not demolished with the rest of the bridge and remain. They appear to be constructed from engineering brick; however, it is typical of these types of structures to be brick faced reinforced or mass concrete.

– REMADE, Lancashire County Council: www.lancashire.gov.uk/corporate/web/?REMADE/20250

The design replaces a 85m long railway bridge structure demolished in the 1960s. Research revealed that the old railway bridge was a key element of the regional infrastructure; as such, the site is still an active part of local memory. An important part of the desired contextualisation of the new structure was the integration of the old bridge abutments which are made from engineering brick. During study of

the required foundations it became clear that the existing abutments in their current state could not provide any reliable structural function.

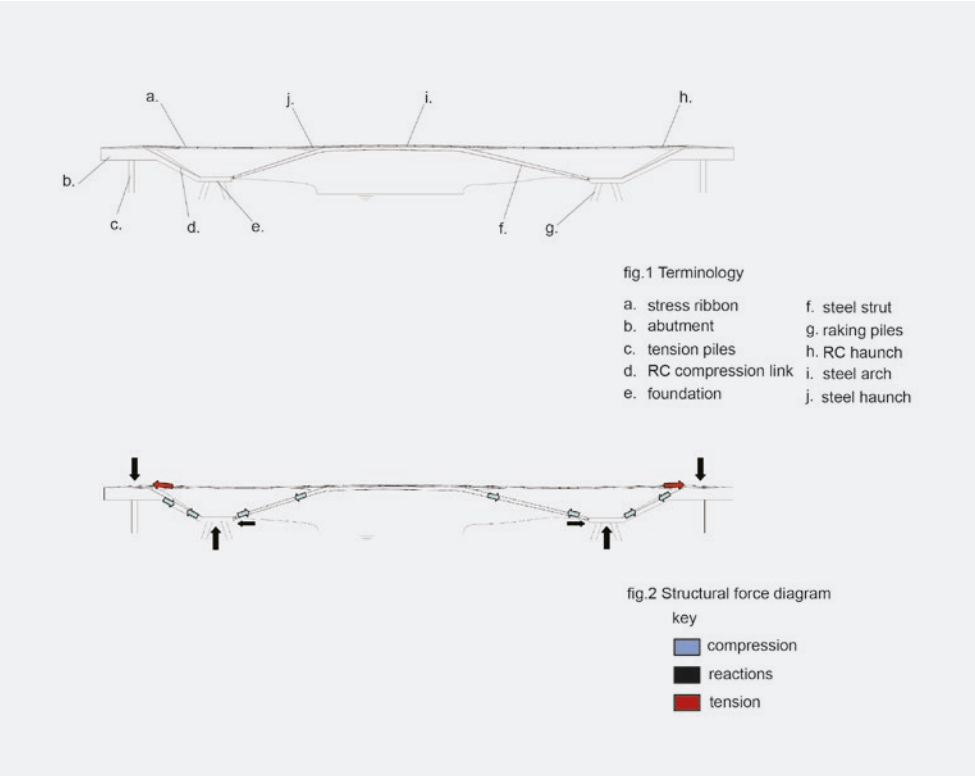
However, as the new bridge abutments require restraint against uplift, it was deemed feasible that the existing bricks of the historical structure could be used as gravity foundations placed into the so-called 'gravity box'. This solution provides immense ecological advantages (no transport of additional material). By incorporating the old structure in a modern way that is clearly visible to the user of the bridge in the new abutment surface, the River Douglas Bridge creates an innovative means of historical as well as technical contextualisation. [fig. 6 & 7]

Research into the principles of the rare and mainly undocumented structural typology of a stressed ribbon bridge

a. Structural behaviour

The typology of the self-anchored stressed ribbon required intense research into analysis strategies and structural behaviour of this rather new, rare and relatively undocumented system. The basic principle of a stressed ribbon is comparable to that of liana bridges which hang in catenary form between two points. However, in a stressed ribbon this principle is combined with the strategies employed for prestressed concrete roofs, such as for Eero Saarinen's 1958 Washington Dulles International Airport roof structure.

The examined variant on more common simple stressed ribbons is supported by a steel arch and strut system coupled with a reinforced concrete



8
**Diagram of components
of the bridge structure
and diagrammatic
flow of forces**

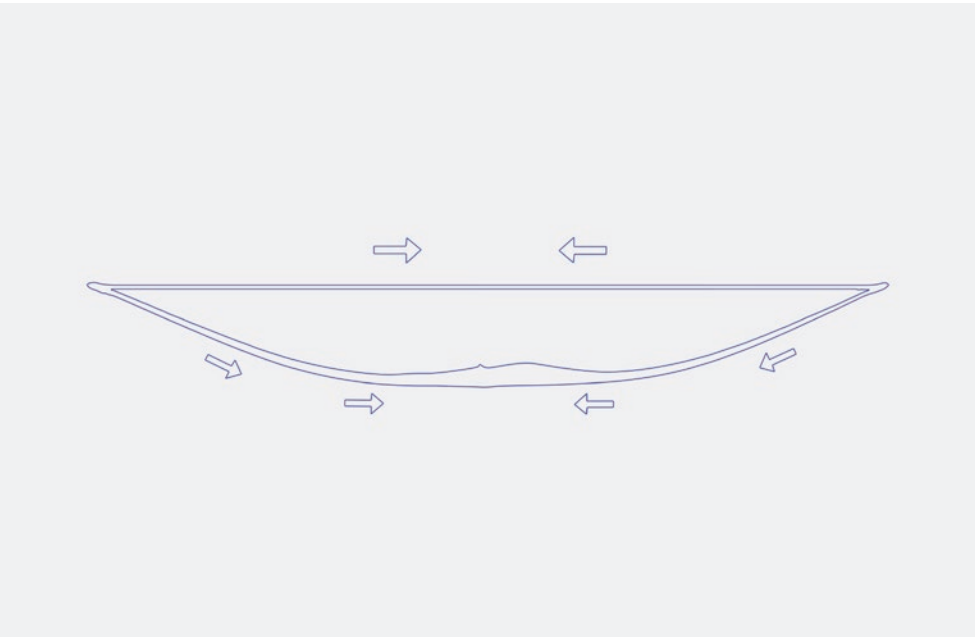
compression link between the abutment and the foundation on both sides [see fig. 1]. Standard stress ribbon bridges consist of a slender concrete deck over a bearing tendon in the shape of a catenary. This classic type of stress ribbon results in large horizontal forces at the abutments. Through careful research it was found that combining the catenary with a steel arch, which is connected to the foundations, not only reduces the span but also minimises horizontal forces significantly. The horizontal component of the stress ribbon reaction at the abutments is transferred to the lower foundation by inclined compression links on the banks where it is reacted by the horizontal component of the compression in the steel arch. The structural system becomes self-anchored as the majority of horizontal forces are resisted and contained by the system. This strategy compares to the structural logic of a longbow, where introduced forces are contained within the system and released on demand. [fig. 8–10]

After the competition's first stage, and based on further study of the structure, the pure arch has been replaced with a combination of arch and struts. It was found that this strategy avoids unnecessary bending of the curved arch legs due to compression. Therefore, the steel compression struts are designed to be straight, avoiding any bending moment other than that due to self-weight. The middle span remains as a shallow arch, spanning between struts, and serves as

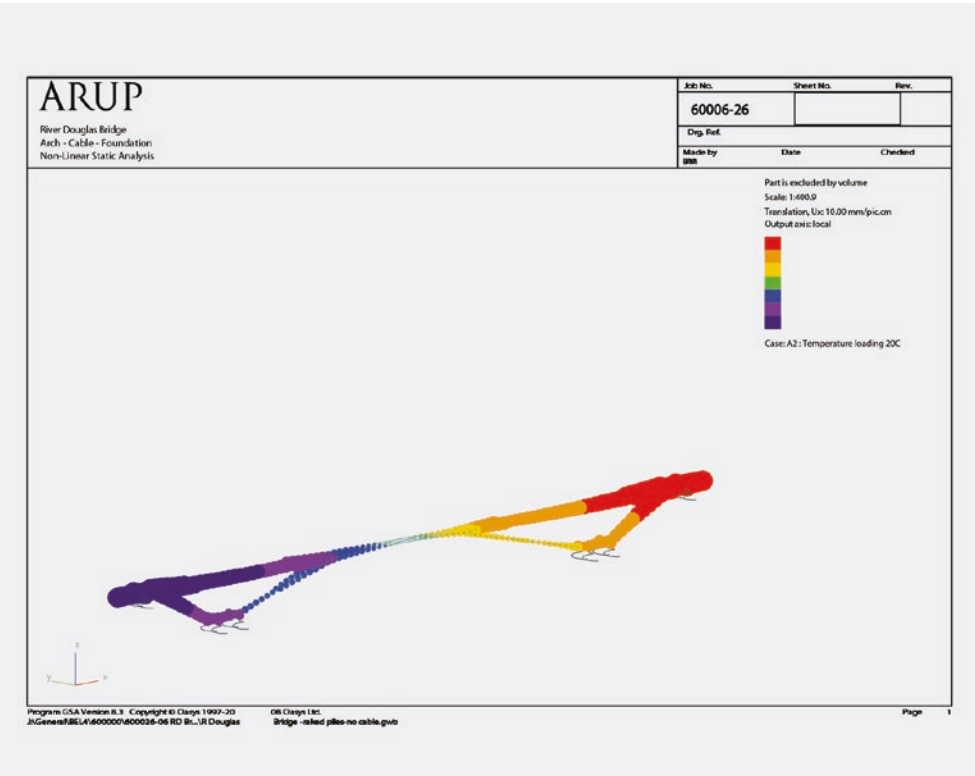
a 'saddle' for the bearing tendon in the construction stage. The deck of the bridge follows the catenary form and is made up of 3m-long precast segments, cast in-situ topping and joints. The deck is prestressed, which enhances the tension stiffness, gives enough flexural strength to the deck and guarantees the transverse stiffness of the bridge. For the catenary form to be effective, the bearing tendon needs to sag; this has been interrogated extensively to satisfy architectural requirements.

b. Structural elements

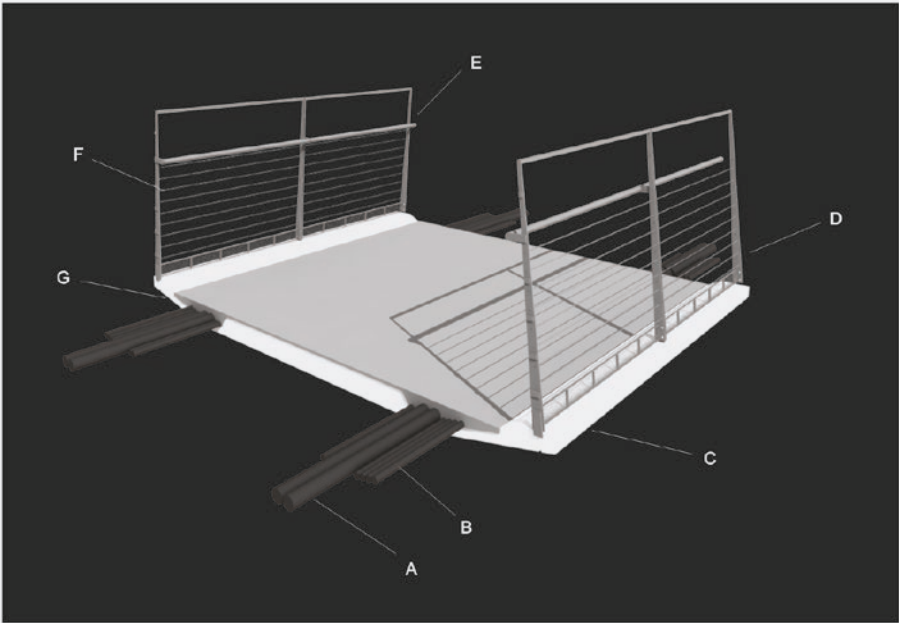
Deck: The high-strength concrete deck is made up of 3m-long precast segments, and topping and joints that are cast in-situ. During the construction stage, the precast segments are suspended from the bearing tendons anchored at the ends of the deck. Bearing tendons and prestressing tendons are situated in troughs in the deck [see fig. 3]. At this stage, there is still a gap between the last unit on the deck and the abutment. Post-tensioning of the deck is applied after the topping and joints are cast, which ensures the structural integrity of the deck. Once the deck is post-tensioned, the pocket and the gap are grouted. The precast segments are designed to have minimal self-weight to reduce the tension in the bearing tendons. Coffers are introduced underneath the units for this purpose, which also enhance the perception of a 'kit-of-parts' strategy expressed by the segmented walking surface.



9



10



3D precast element

- A BEARING TENDONS
- B PRESTRESS TENDONS
- C PRECAST ELEMENT
PIGMENTED CONCRETE
- D PARAPET GALVANIZED
UPRIGHTS 2x 10 MM FLATS WITH 10 MM SPACER
WITH HEXHEAD COUNTERSUNK BOLTS
WITH KICKER PLATE_MESH 8x8 MM
- E HANDRAIL S/S 50 MM
OPTIONAL: INTEGRATED LIGHTING SYSTEM
LED LUMINAIR OR SIMILAR
- F STRESSED WIRE S/S INFILL 6 MM
- G INSITU CONCRETE_PIGMENTED

9
The structural principle of a longbow is comparable to a self-anchored system. All induced forces are contained within the structure.

10
Structural analysis. The flow of major forces is a legible part of the bridge's architecture.

11
The deck

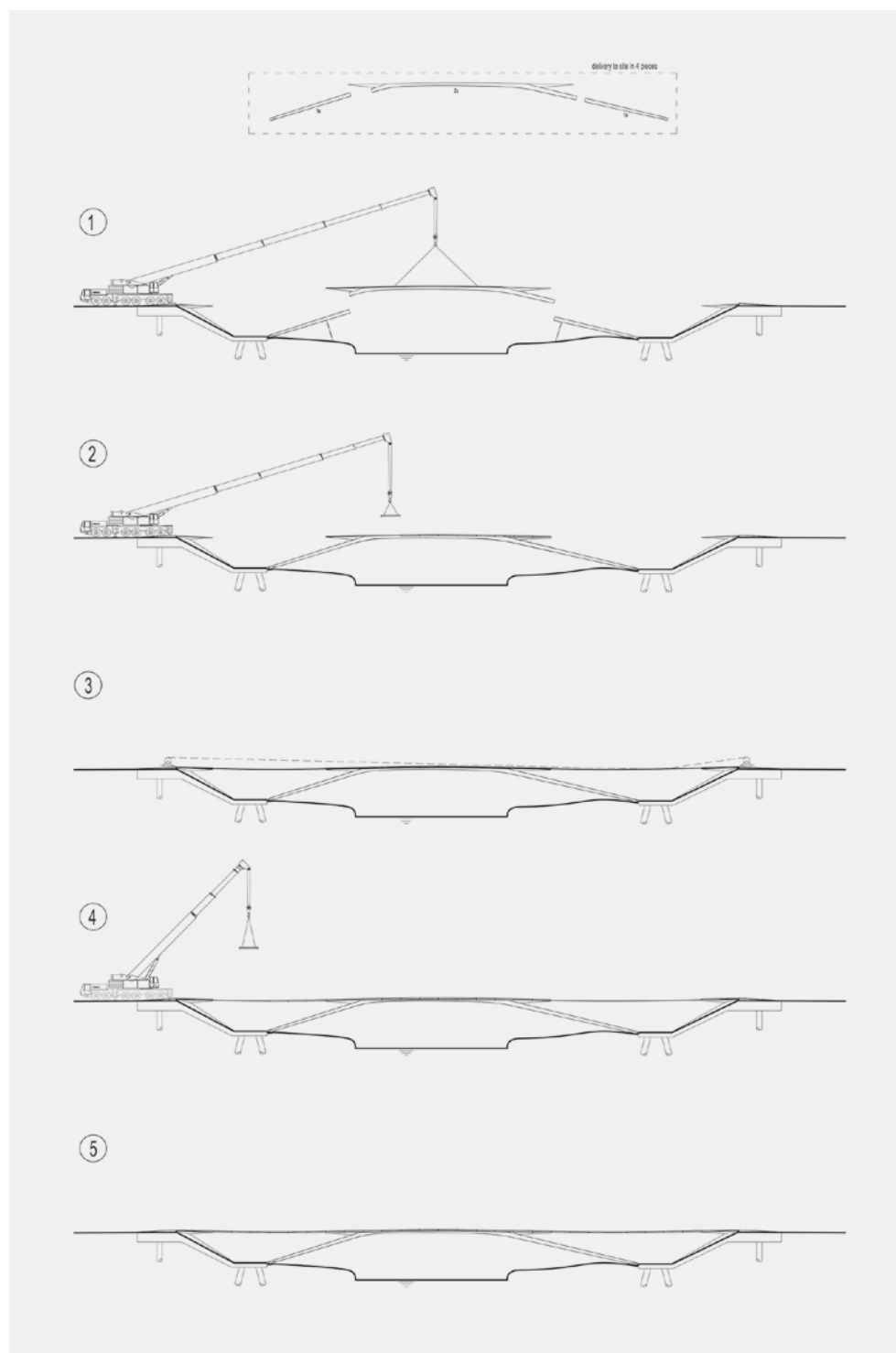
Bearing tendons: Bearing tendons are the fundamental elements of the catenary action. During erection the structure acts as a flexible cable and the bearing tendons are loaded by their self-weight and dead load of the deck. The system is locked (i.e. the ducts are grouted) after the prestress is applied. Bearing tendons are placed within the deck instead of using external ones underneath, to minimise the maintenance requirements. The bearing tendons consist of four 90mm diameter strands. The four strands are chosen instead of two bigger strands to minimise the need for the deck depth and to add redundancy to the design. The bearing tendons span approximately 29m and 35m on the west and east sides of the arch respectively. [fig. 11]

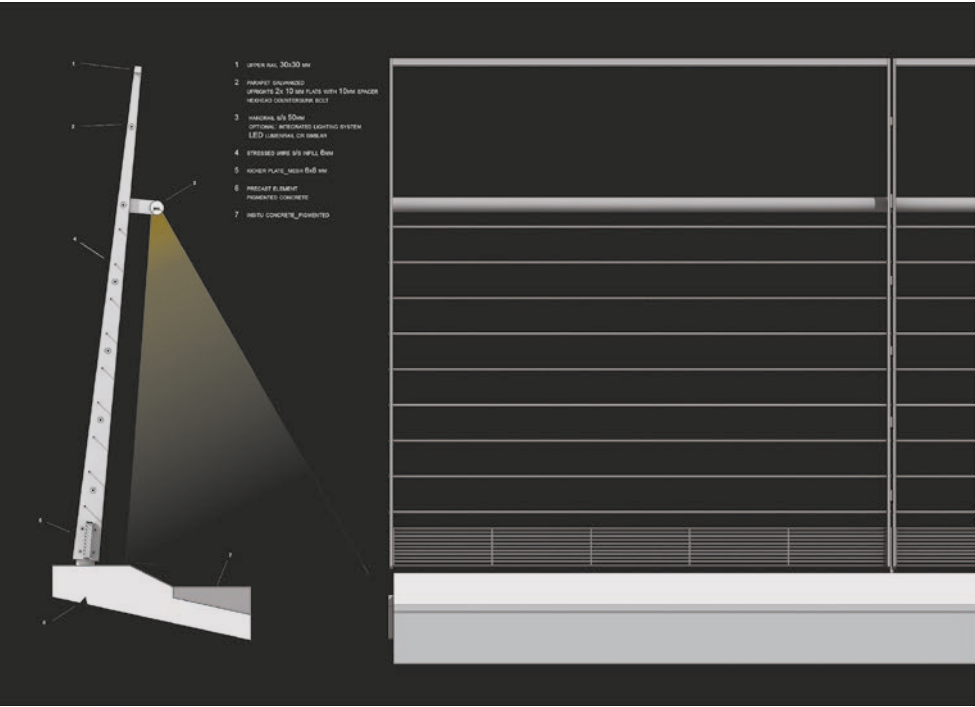
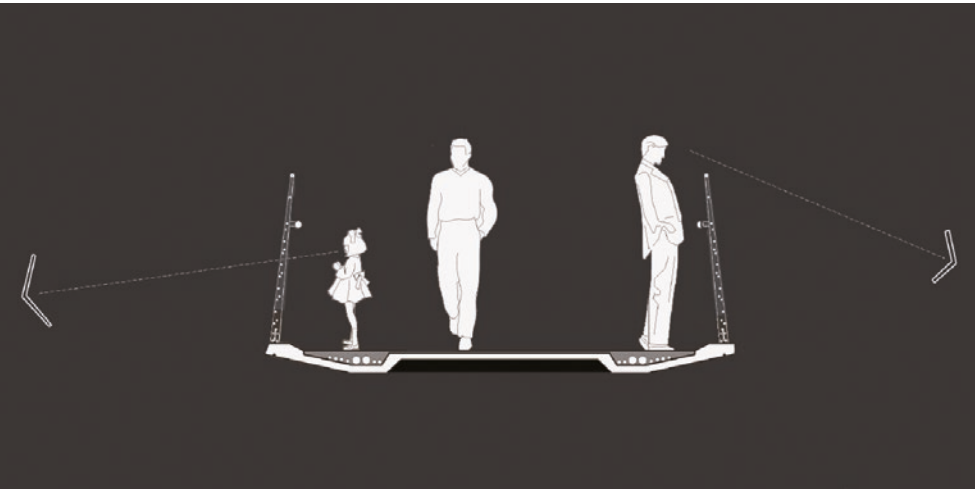
Arch arrangement: The arch and struts are designed as hollow steel box sections welded from plates. The cross section varies along the length of the struts as the two legs merge into one at the base. The section size varies along the length. The shallow arch in the middle between the struts provides support to the stress ribbon at the construction stage and takes the vertical loading of the deck along its length in the

permanent case. The arch and struts system also reduces the need for lateral support at the abutments and foundations. The foundation and the abutments are connected with a reinforced concrete compression link on both sides. This element is an integral part of the self-anchoring of the system. The haunches, extending beyond the abutments and the steel arch, reduce the support bending moment and enhance the architectural expression of the tension system.

During the process of the two-staged competition the various arch arrangements, splayed and converging, were examined in great detail. It was found that stress ribbons have substantial lateral stability and, therefore, a single point converging arch was introduced in the second stage. Further analysis of the arch performance suggested straightening the arch legs to improve their axial force resistance. The amended top of arch arrangement does not visually interfere with the deck edge, maintaining clarity in the expression of the continuous and extremely slender deck. This enhances the legibility of the structural diagram where the bearing tendons are continuous over both spans. [fig. 12]







Minimising impact on the existing ecological heritage site

Because the site is part of a biological heritage area, the bridge's construction, maintenance and environmental performance have been subject to thorough research. The intelligent typology of the bridge has minimal impact on the environment while it also ensures habitat connectivity across the greenway.

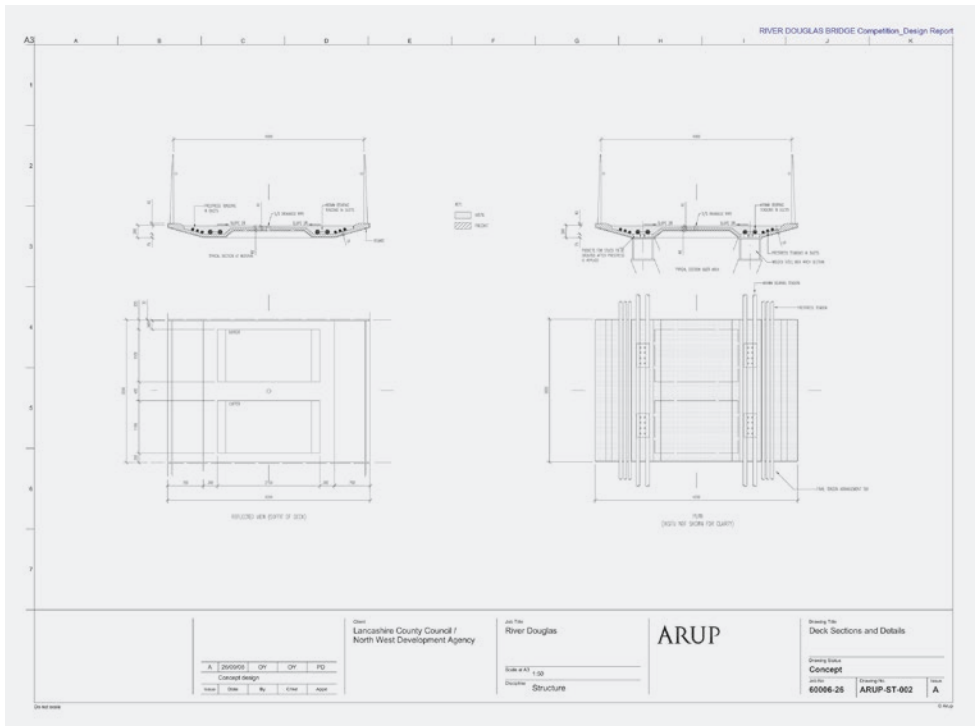
Owing to its typology and the resulting high degree of prefabrication, the bridge can be erected without the need of falsework or shoring, reducing the impact of erection. A further advantage of the stress ribbon bridge is the simple construction sequence, where heavy lifting machinery access is only required from one side, thus reducing impact on the biological heritage site. [fig.13]

Throughout the process, life cycle and long-term maintenance requirements have been important factors in driving design parameters. Maintenance is greatly reduced by the limited requirement for specific structural details and through the encasing of all structural steel elements (no bearings, no expansion joints, cast-in bearing tendons). [fig.14–18]

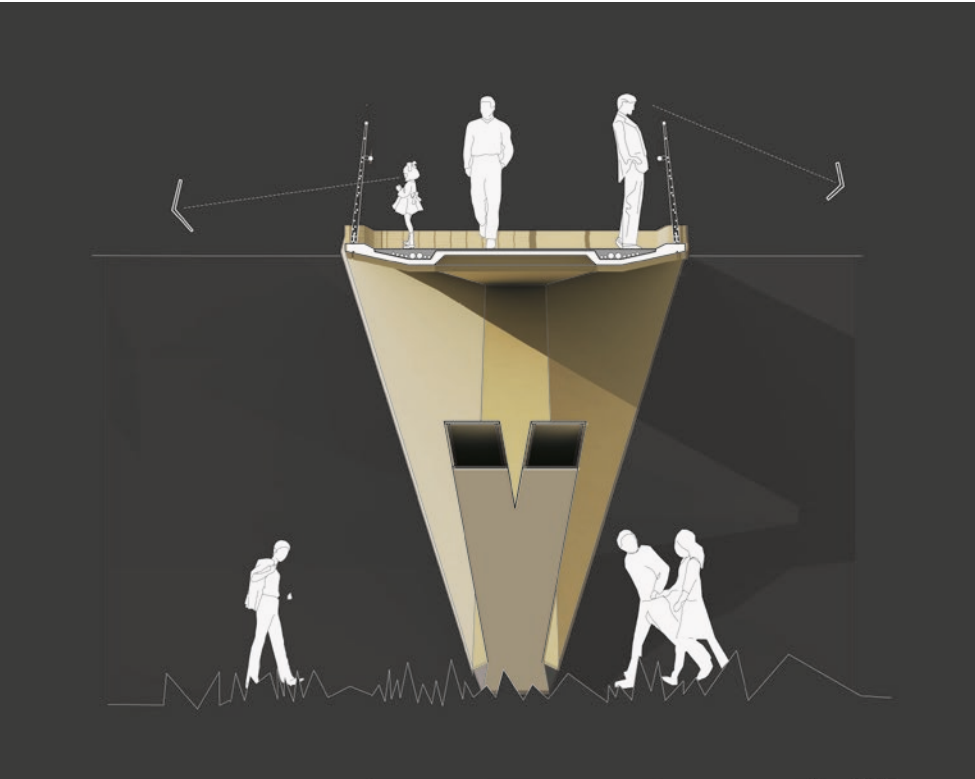
Furthermore, the remaining bricks of the old railway bridge are used to fill the concrete box of the abutments, simplifying the foundation design significantly. The increased weight of the abutment reduces the need for tension piles. The integration of existing abutments and material reuse as a visible legible strategy is seen as an innovative approach while adding historical reference to the new structure.

14
Section through segmented precast slender deck which is in tension. The segments are fixed to the bearing tendons during erection and cast in with a concrete topping in-situ.

15
Elevation and section balustrade







18
Section abutment
with walkway
on lower bank

Dissemination

The competition

The River Douglas Crossing was a international two-stage RIBA competition, run in 2008 for Lancashire County Council's REMADE ('REclamation and MAnagement of DErelict land') programme. The competition was managed by Lancashire County Council and funded by the Northwest Development Agency as part of their commitment to tackle the area's derelict land problems. The competition was widely disseminated and attracted 110 entries, seven of which advanced to the second stage.

The first stage jury panel consisted of representatives from REMADE, the Northwest Regional Development Agency (NWDA), RIBA, Lancashire County Council, the Ribble Coast and Wetlands Regional Park and a specialist bridge advisor. The second stage jury panel also included representatives from West Lancashire District Council and South Ribble Borough Council. Over 80 stakeholders, including representatives from the county, district and parish councils, were invited to view and comment on the 110 submitted designs. The seven shortlisted proposals underwent a further design consultation process, which gathered 271 written consultation feedback forms from local residents and other stakeholders.

Since the announcement of DKFS's win, REMADE has been working to agree a way forward with the NWDA, Ribble Coast and Wetlands Regional Park steering group and the two district councils, and to secure the required funding for building the bridge. REMADE maintains a dedicated page on the River Douglas Crossing competition on the Lancashire website: www.lancashire.gov.uk/corporate/web/?REMADE/20250

The practice

In 2007 Krolkowski and Schmitt formed the research-led creative studio DKFS Architects (formerly JDA) to share their common interest in exploring the boundary between engineering and architectural design in creating structures such as bridges. Their iterative approach explores architecture with a holistic and interdisciplinary attitude to design, partnering with industry leaders and engineers such as Arup. At the core of their innovative output is the examination, implementation and contextualisation of existing and new diagrammatic structural solutions.

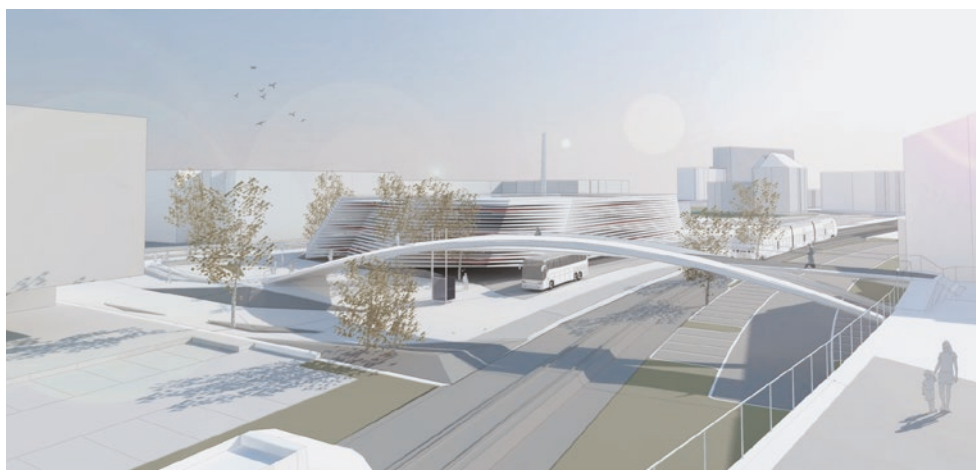


19

19

Wienfluss Brücke
‘Connecting Link’, first
prize in an international
competition. When
open, the bascular
bridge will rise to
about 50m height in

the centre of Vienna.
It connects and
reinstates the banks of
the Wienfluss as a key
component of the city’s
urban development
strategy.



20

20
Lüdenscheid
Bridge, first prize
in an international
competition. The
new bridge will
connect the old city
centre with the new
museum. Completion
is scheduled for 2014.

The studio has already won several international competitions, among them the international RIBA competition for the 90m River Douglas Bridge with Arup as structural consultant. Working with structural engineers Jane Wernick Associates, in 2010 DKFS also won the first prize in a prestigious international competition for a 52m moving bridge in the centre of Vienna; the winning design will be Vienna's first bascule bridge. Another competition win, for the New Museum Bridge in Lüdenscheid, Germany, is expected to reach practical completion in 2014. [fig. 19 & 20]

Exhibitions

Roots – Young Emerging Talent, Heerlen, the Netherlands, (Sep – Dec 2010).

Europe 40 under 40 [travelling exhibition of 'Europe 40 under 40' laureates, selected by the Chicago Athenaeum and the European Centre for Architecture Art Design and Urban Studies] (2011).

13th International Biennale of Architecture, Buenos Aires (Oct 2012).

Film

'One and One' (directed by Chris Pencakowski, 2010), shown in Heerlen, the Netherlands, 2010. *[A short film including interviews with Dirk Krolkowski, Falko Schmitt and Ozan Yalniz, exploring the collaboration between DKFS and Arup, and the pivotal role played by the interaction of architects and engineers.]*

Lectures

Dirk Krolkowski, 'The architecture of bridges', Arup, London, 2009.

Dirk Krolkowski and Ozan Yalniz, 'Engineering and architecture', Form Follows Technology Symposium, RWTH Aachen, Germany, 2010.

Dirk Krolkowski, 'The architecture of bridges', RWTH Aachen, Germany, 2010.

Dirk Krolkowski, 'Bridges', Structural Symposium, University of Nottingham, 2011.

Dirk Krolkowski, 'Work of DKFS', University of Regensburg, Germany, 2012.

Related writings by others

Dirk Krolikowski and Falko Schmitt won the River Douglas Crossing competition working under the name JDA. Since then, they have renamed their joint practice DKFS Architects.

Competition

pp. 28–33

REMADE, 'River Douglas Crossing', *Lancashire County Council* (Oct 2008):
www.lancashire.gov.uk/corporate/web/?REMADE/20250

Architectural press

p. 34

Richard Waite, 'Finalists in international River Douglas Contest unveiled', *Architects' Journal* (29 Jul 2008): www.architectsjournal.co.uk/news/finalists-in-international-river-douglas-contest-unveiled/1767377.article

p. 35

'JDA and Arup win river crossing', *Builder and Engineer* (28 Oct 2008):
www.builderandengineer.co.uk/news/jda-and-arup-win-river-crossing

pp. 36–37

'River Douglas Crossing shortlist announced', *Bustler* (18 Aug 2008):
www.bustler.net/index.php/article/river_douglas_crossing_shortlist_announced

Newspapers

p. 38

'First picture of stunning new bridge', *Lancashire Evening Post* (24 Oct 2008):
www.lep.co.uk/news/local/first-picture-of-stunning-new-bridge-1-81760

p. 39

Michael Byrne, 'Design selected for new bridge over the River Douglas at Hesketh Bank', *Ormskirk and Skelmersdale Advertiser* (30 Oct 2008): www.osadvertiser.co.uk/news/ormskirk-news/2008/10/30/design-selected-for-new-bridge-over-the-river-douglas-at-hesketh-bank-80904-22151385

Bartlett Design Research Folios**ISSN 2753-9822****Founding Editor:
Yeoryia Manolopoulou****Editors:
Yeoryia Manolopoulou,
Peg Rawes, Luis Rego****Content © the authors****Graphic Design:
objectif****Typesetting:
Axel Feldmann, Siaron Hughes,
Alan Hayward****Proofreading:
Wendy Toole**

Bloom

by Alisa Andrasek
and José Sanchez

House of Flags

by AY Architects

***Montpelier Community
Nursery***

by AY Architects

Design for London

by Peter Bishop

2EmmaToc / Writtle Calling

by Matthew Butcher
and Melissa Appleton

River Douglas Bridge

by DKFS Architects

Open Cinema

by Colin Fournier
and Marysia Lewandowska

The ActiveHouse

by Stephen Gage

Déjà vu

by Penelope Haralambidou

Urban Collage

by Christine Hawley

Hakka Cultural Park

by Christine Hawley,
Abigail Ashton, Andrew
Porter and Moyang Yang

House Refurbishment

in Carmena
by Izaskun Chinchilla
Architects

***Refurbishment of
Garcimuñoz Castle***

by Izaskun Chinchilla
Architects

Gorchakov's Wish

by Kreider + O'Leary

Video Shakkei

by Kreider + O'Leary

Megaframe

by Dirk Krolkowski
(Rogers Stirk Harbour
+ Partners)

***Seasons Through the
Looking Glass***

by CJ Lim

Agropolis

by mam

Alga(e)zebo

by mam

Chong Qing Nan Lu Towers

by mam

ProtoRobotic FOAMing

by mam, Grymsdyke Farm
and REX|LAB

Banyoles Old Town

Refurbishment
by Miàs Architects

***Torre Baró Apartment
Building***

by Miàs Architects

Alzheimer's Respite Centre

by Níall McLaughlin
Architects

Bishop Edward King Chapel

by Níall McLaughlin
Architects

***Block N15 Façade,
Olympic Village***

by Níall McLaughlin
Architects

***Regeneration of
Birzeit Historic Centre***

by Palestine Regeneration
Team

PerFORM

by Protoarchitecture Lab

55/02

by sixteen* (makers)

***Envirographic and
Techno Natures***

by Smout Allen

Hydrological Infrastructures

by Smout Allen

Lunar Wood

by Smout Allen

Universal Tea Machine

by Smout Allen

British Exploratory

Land Archive
by Smout Allen
and Geoff Manaugh

101 Spinning Wardrobe

by Storp Weber Architects

Blind Spot House

by Storp Weber Architects

***Green Belt Movement
Teaching and Learning
Pavilion***

by Patrick Weber

Modulating Light and Views

by Patrick Weber