UNSTUDIO

MOBILITY + // Infrastructural Sustainability

Bridge Projects

“Analysing movement means developing a method by which to combine accessibility, publicness and time. Studying the way user groups interact and combine with each other forces to plan the city in a topdown manner, while observing the mode of dynamical forces distributes the ingredients of the city in time.”

Ben van Berkel

Content

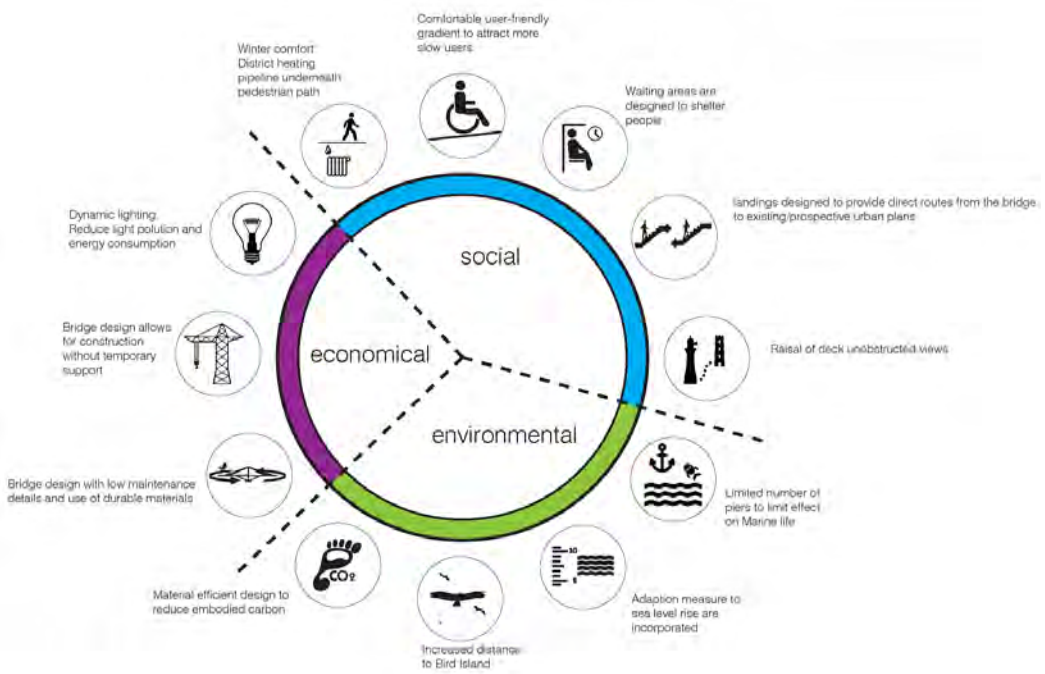
Infrastructural Sustainability

Experience

UN Studio has experience designing and realizing a variety of bridge typologies, from viaducts and pedestrian foot bridges to bascule and asymmetrical cable stay bridges. In each project careful studies are made where structural, urban and programmatic requirements are combined with architectural expression in order to develop a distinctive design. As urban infrastructural projects, the governing programmatic element that guides the design strategy are the traffic flows that the bridge is to support. These trajectories are examined, their volumes defined and their connection to the city grid integrated. A systemic integration with the urban fabric is essential for a successful bridge development.

An informed design is capable of synthesizing existing routes with new transport links and will be able to respond to both local present and future needs. Constructed to facilitate the orchestration of traffic, the bridge design is inspired by, and in turn reflects, the individual character of the neighbouring area, adding to the narrative of the city.

Inherent in their structural scale and design articulation a number of the bridges designed by UN Studio have become distinctive landmarks within their surrounding skylines. Functioning as points of recognition and orientation they have become symbols, icons of the location in which they operate.



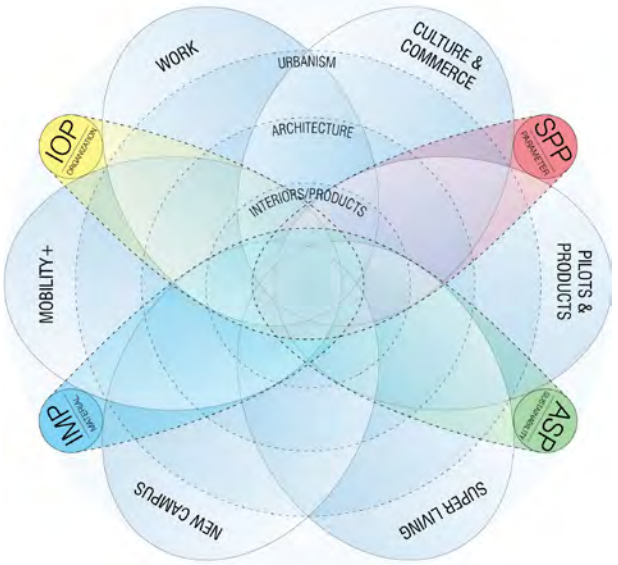
Mobility +

UNStudio's portfolio of bridge designs contains diverse approaches to attainable structure, referring to social, structural and environmental sustainability.

Sustainabile flows // The imperative when drawing on qualities found in the location of a bridge project is to ensure the most convenient and natural flows between the connection points. Conditions of the topography and accessibility requirements are carefully integrated, allowing for absolute ease of use for users and their unimpeded circulation.

Sustainabile materiality // Close collaboration between architect and engineer is essential to ensure an integrated design solution. The industrial nature of this typology allows for a tectonic expression, articulated joints and a clear, optimum use of materials for comprehensible reading of its structural principle and method of assembly.

Environmental benefits // Sustainable bridge designs make a positive impact on the environment. Enhancing public transport connectivity, providing functional and attractive bicycle and pedestrian connections and creating a green landscape design within the infrastructure greatly reduces C02 consumption on site. The planning and programming must have both a strong organizational principal as well as the ability to adapt to changing needs, allowing it to be sustainable over a long period of time.



London Meander Bridge

Tied Arch Bridge

Sustainability Highlights: Bicycle Ramp Solution, Urban connectivity

The London Meander Bridge is poised as a solution to many challenges. Pedestrians ascend and descend along inviting staircases into a new community square on the Pimlico side, and a vibrant new public space on the Nine Elms on the South Bank side. It will establish an active connection between two important partners on the Thames, balancing the goal of preservation with that of urban transformation.

- One seperate bicycle ramp leads from on side to the other. Therefore, the cyclists can ride over the bridge without "walking" their bikes. Due to the fact of seperating the predestrian from the bicycle track, the traffic safety is enhanced.
- The urban connection intervenes softly in the historic Pimlico Garden and creates the possibility for a new community space at the Nine Elms.

Project Information
Bike / Pedestrian Bridge

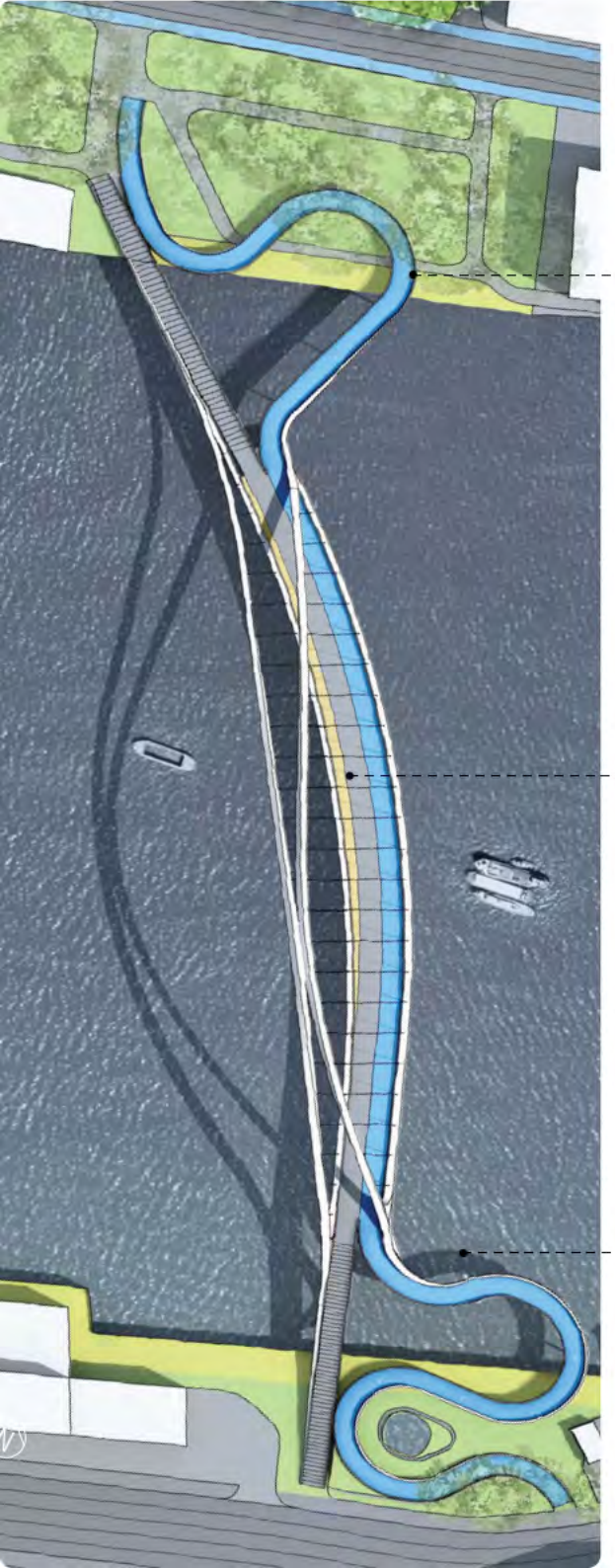
Location
London, United Kingdoms

Client
City of London

Project Team UNStudio
Ben van Berkel, Wouter de Jonge with Imola Bérczi and Milena Stopić, Jay Tsai, Yuxiao He and Ki Yoon Kil

Scale
Maximum spanning length: 150m
Height: 45m

Status
Design Entry for the NEP Bridge Competition

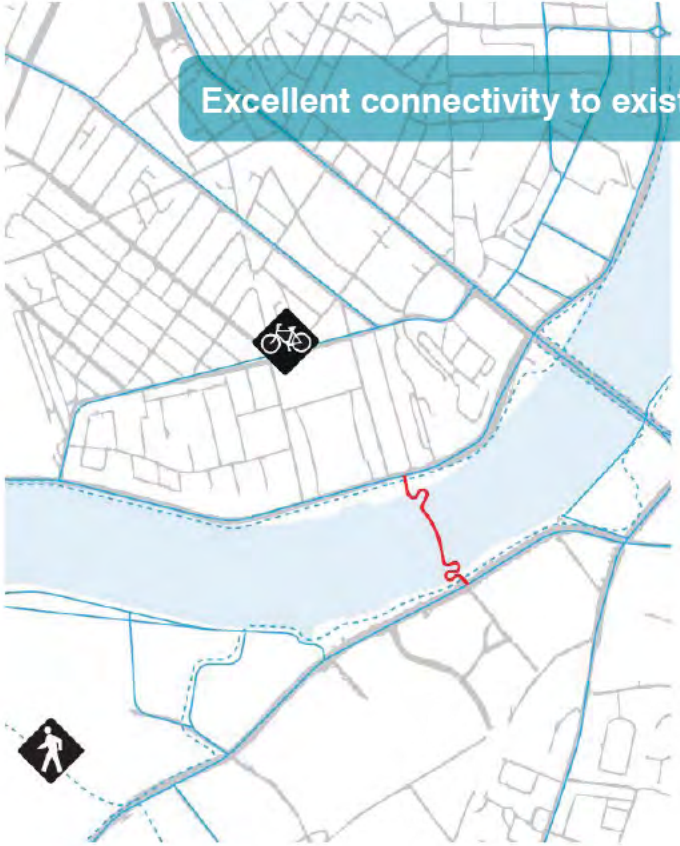


Opportunity for involvement of light artists

Moment of pause and enjoyment of view

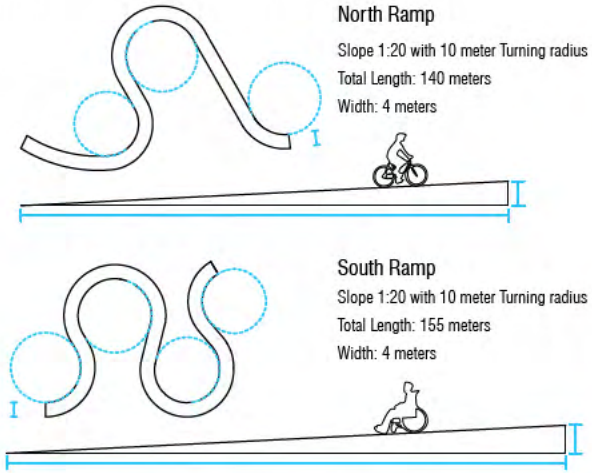
A new artisan cycle hub and café

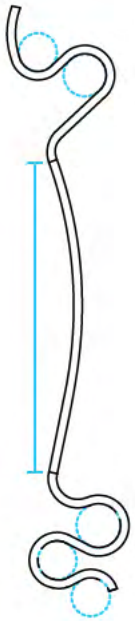
Excellent connectivity to existing city cycling routes



The primary design driver is the ambition of creating a bridge that ensures unimpeded access to and from the bridge for cyclists and pedestrians. Elegant meandering ramps echo the figural flow of the Thames river and provide a smooth ascent and descent from the bridge for cyclists. This way cyclists never have to interrupt their ride or "walk" their bike, rendering the bridge fully integrated into the existing biking infrastructure of London.

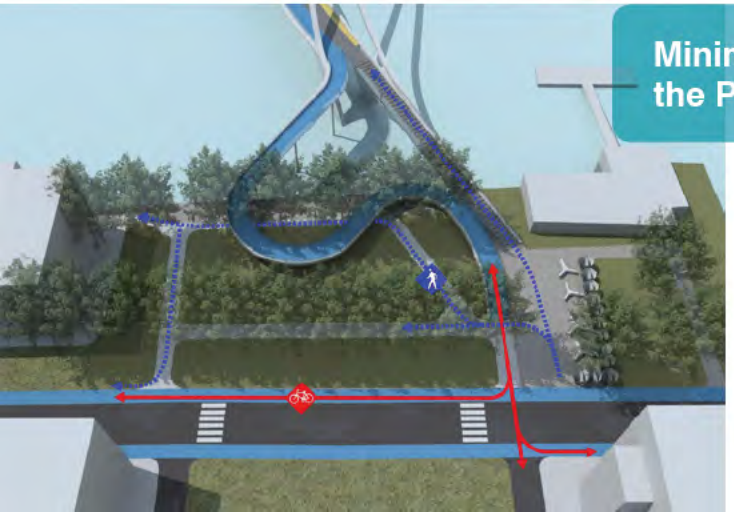
Slope Solution

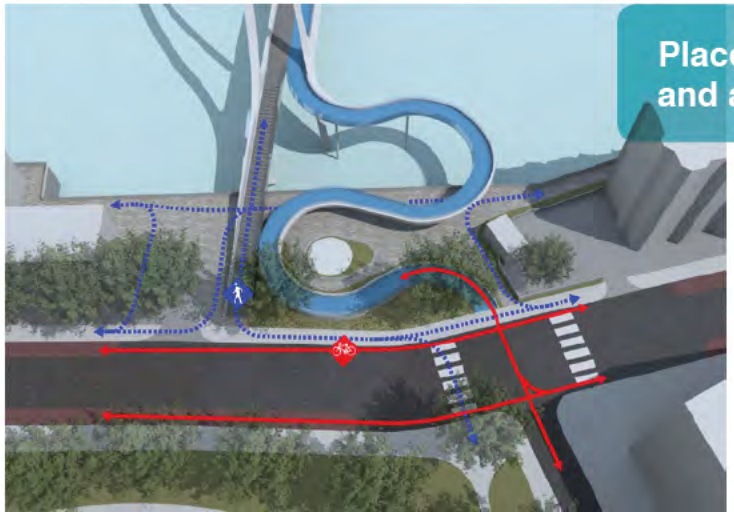


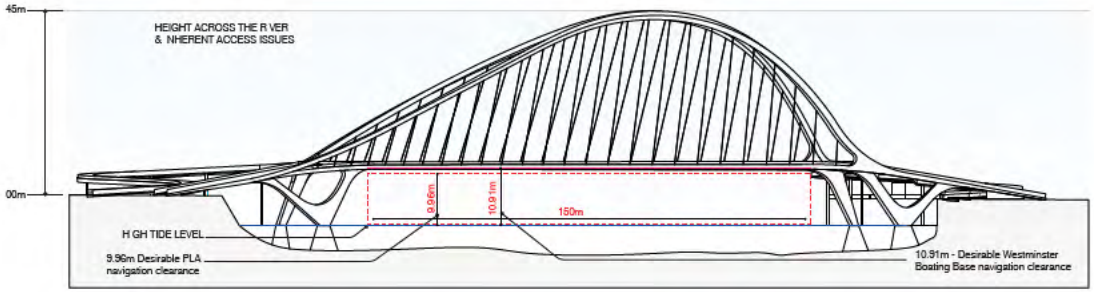


On the side of the historic Pimlico Gardens, the mature plane trees and grass areas for community use are preserved and maintaining a green area of respite and relaxation. Views of the river continue below the thin profile of bridge, as cyclists weave their path through the tree canopies. The landing of the cycle and pedestrian bridge provides the opportunity to create a new community square near the activity of the boat house. Lighting at night will be elegant and subdued creating safe access for cyclists and pedestrians without over lighting the gardens.

Nine Elms on the South Bank is a neighbourhood in rapid transformation from an industrial quarter into London's largest regeneration zone. The landing reflects this dynamic, exciting urban character with its direct connection to the Vauxhall Linear Park and the new high rise residential developments along the river. A new artisan cycle hub and café is located in the bend of the cycle bridge adjacent to the river walk. The public space adjacent to the river is an ideal location for an artist's intervention, celebrating the energy of this new area of London and drawing pedestrians to the river's edge.



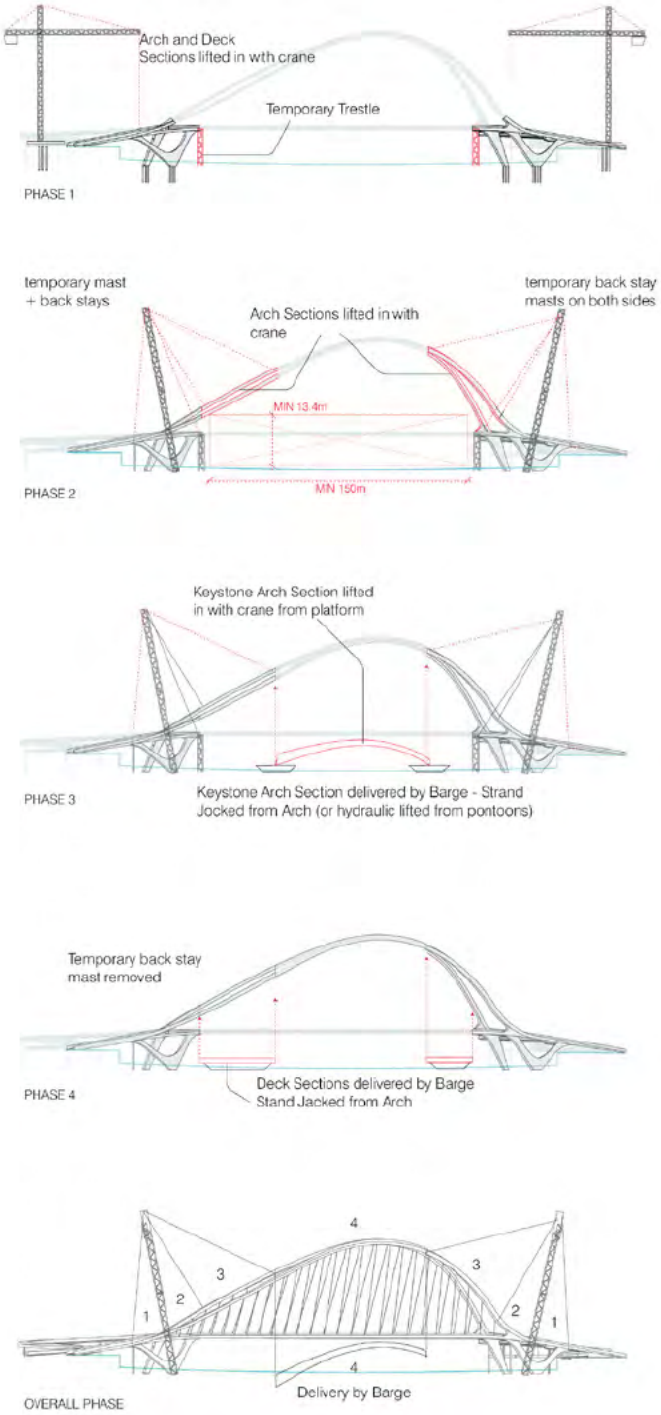




The designed bridge is a so-called "tied-arch bridge" as a tie (the bridge deck) has been placed between the ends of both arches, thus creating a 'tied-arch'. The deck is located on the appropriate level to carry the horizontal force, a result of resolving the arches' forces, as a tie member, as shown below. The bridge is provided with vertical cable hangers and these hangers can only act in tension.

By taking the arch thrust through the tie member, the primary requirement for the substructure – both the single piers and the V-shaped piers - reduces to principally carrying vertical loads. Nevertheless the abutments on one side of the Thames are requiring a longitudinal restraint to carry wind, braking, acceleration and skidding forces, and that the other abutments are permitted to move longitudinally.

Construction Sequence



Neue Donaubruecke Linz Bridge

Tied Arch Bridge

Sustainability Highlights: Intelligent Light Control, Traffic Safety

The bridge acts as an inner-city communication space. The new bridge over the Danube serves as an important urban connection between Urfahr and the center of Linz.
In addition to determining the connection and gain the roads, the bridgeheads and the connection in the immediate vicinity of the bridge play an important role.

In this area of the Danube river the bridge can act as a stand-alone station and destination in the structure of the existing activity centers such as Lentos , Bruckner House, Sculpture Park, Football and fun park are in close distance.

- The Intelligent Light Control solution adapts during the daytime. Furthermore, architectual lighting are only installed at places of the necessary roadway lighting.
- Fast and slow traffic are seperated from each other to achieve a higher traffic safety.

Project Information
tram/ pedestrian/ bicycle bridge

Location
Linz, Austria

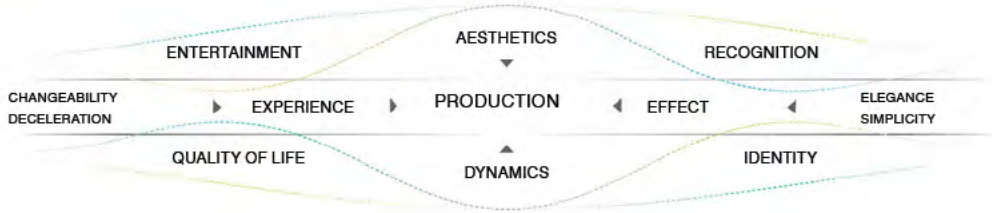
Client
City of Linz

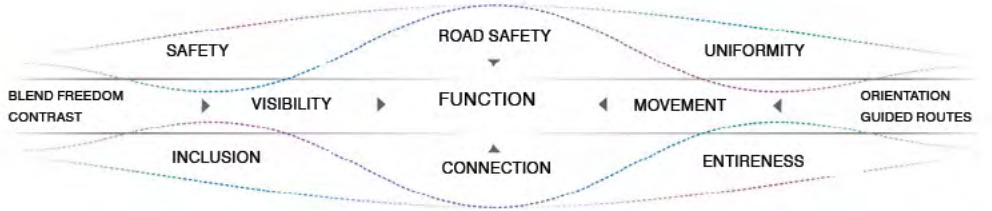
Project Team UNStudio
Ben van Berkel, Astrid Piber with Arjan Dingsté, Ger Gijzen and Martin Zangerl, Sontaya Bluangtook, Shuang Zhang, Dana Behrman

Scale
Total length: 393m
Maximum span lenght: 123m
Height: 17m
Width 36,5m

Status
Competition Entry

Sustainability Concepts





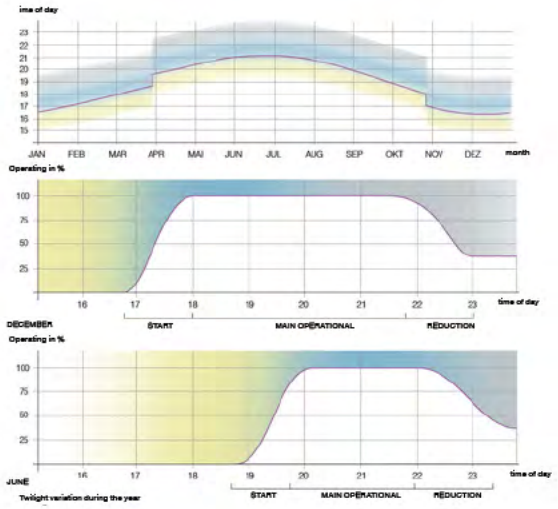
Due to good visibility from many points, the bridge will activate its characteristics as a landmark in the city. High recognition creates a strong identity and thus contributes by connecting the neighborhoods. The new bridge over the Danube serves as an important connection between Urfahr and center of Linz as a 'inner-city communication space'. The direction of the architectural lighting has been designed in a way to balance between orientation effects, media coverage and adequate everyday lightings. The versatility of the lighting effects has a special significance for the use and integration of urban design for cultural, seasonal and festival events, as well as national holidays.

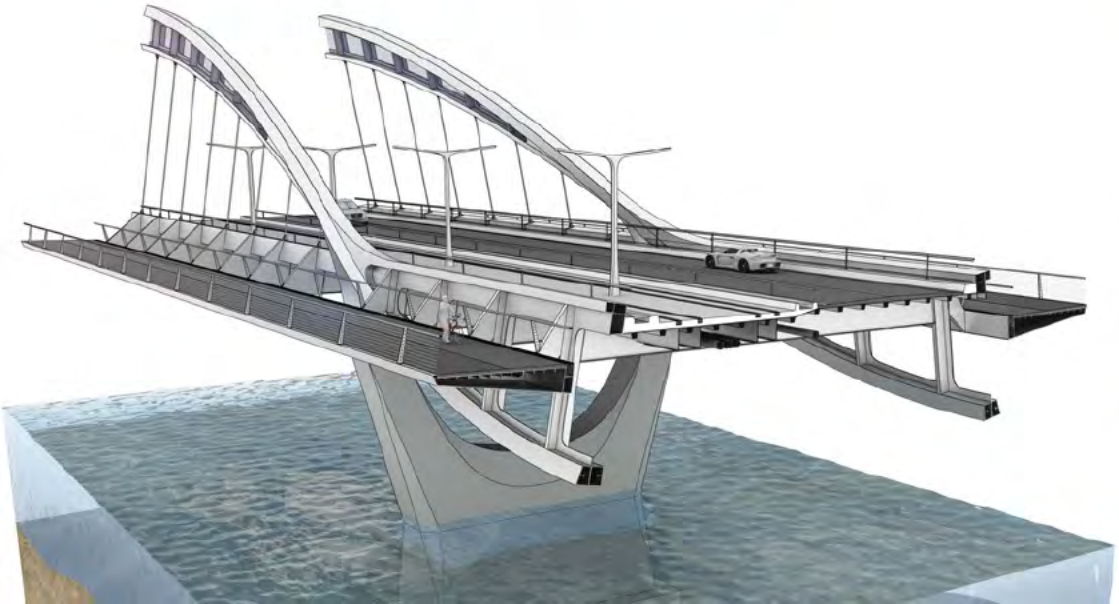
Light Control

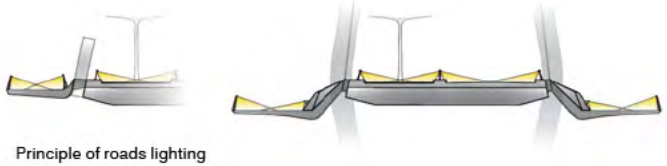
Intelligent Controller

Intelligent Control solution is used to operate the bridge lighting, which allows automation and use of artificial light adapted for the daytime. Technological system allows a reduction in actual time used for lighting, with high level of energy saving transforming lighting transitions fluidly from day to night. Presets for the effects of the lighting scenes can be accessed and adjusted internally, and available to be programmed with sequences in advance. The lighting of the sky opposite to the arches, is adequately selected for effective and selective use of light, produced by installing lenses and light-cone masks. This ensures no unnecessary stray light in the night sky or on the water surface.
The lighting underneath the bridge is only at the landparts, installed respecting the ecosystem of birds and insects.

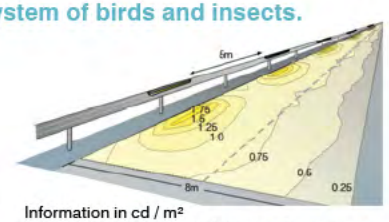
The arch bridge, in its formal language and scale resembling the historic notion of a bridge, but nevertheless has an independent character. The dynamic movement of the main arc is in a continuous gesture associated with the side panels and thus fits into an elegant movement across the Danube. The chosen height of the bridge and the continuous gesture results in a very good action at a distance, yet remains the benchmark in size and features well detailed in the embeded environment.







Principle of roads lighting



Information in cd / m²
LMED: 1.65cd / sqm with bilateral illumination

Bridge over the Ijssel

Tied Arch Bridge

Sustainability Highlights: Color Effect, Structural Integration

In the design for the new Ijssel Bridge in Zwolle a connection was sought with the existing truss bridges in the area. In this design however, the truss bridge typology is combined with a cable construction, in order to create transparency and minimise the width of the deck. The railing, sound barriers and overhead wiring are incorporated into the overall design, whilst the pole layout for the overhead wiring follows the rhythm of the bridge cables.

- The interior colour refers to the brigde's surrounding. The passagers can orientate by the bridge as a result of the colour effect.
- The structure intergates the crossing arch in the surrounding landscape by its structural efficiency and a smooth silhouette.

Project Information
Rail, Pedestrian, Bike Bridge

Location
Zwolle, The Netherlands

Client
ProRail

Contribution UNStudio
Competition entry

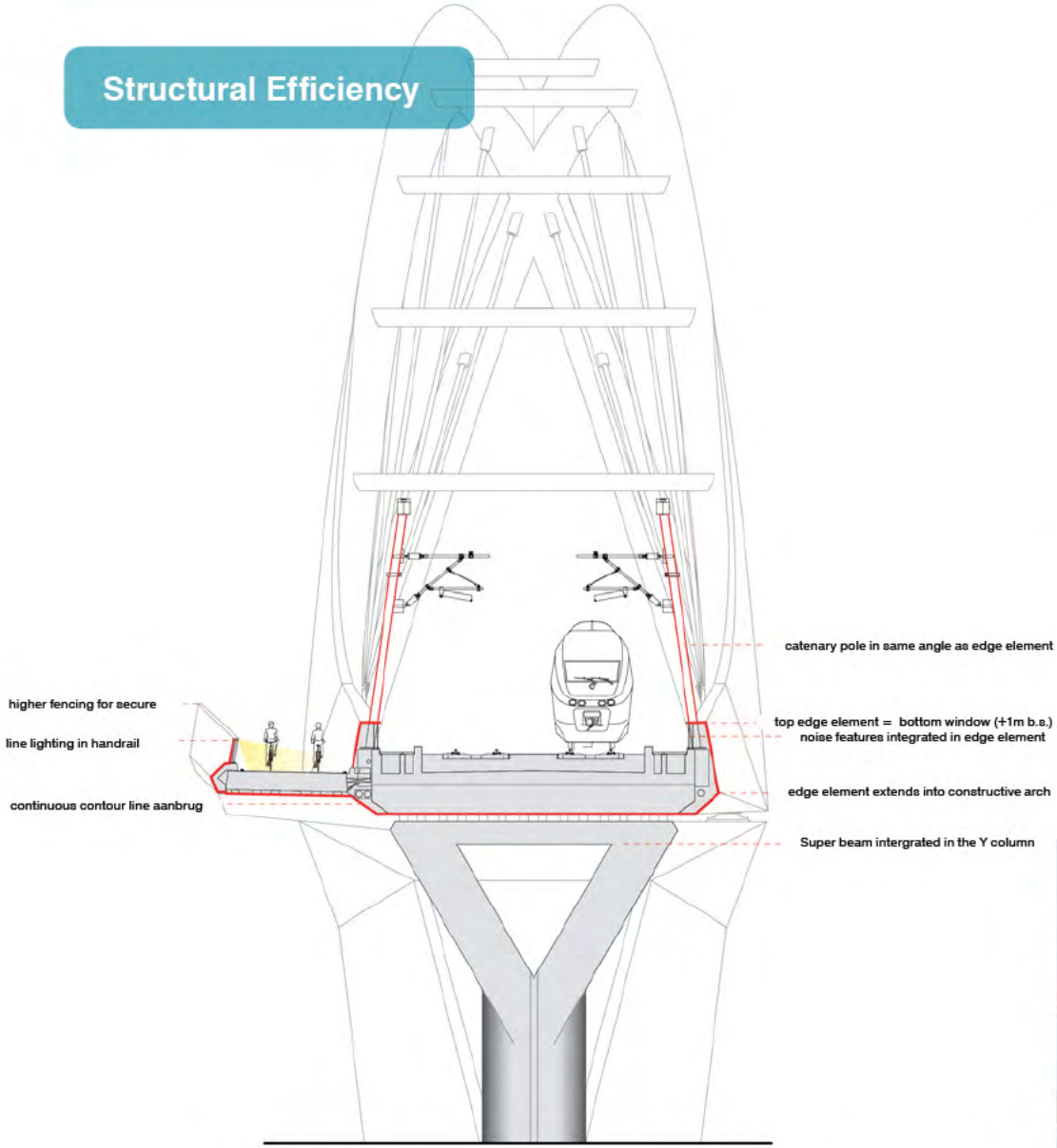
Project Team UNStudio
Ben van Berkel, Gerard Loozekoot with Eric den Eerzamen and Cynthia Markhoff, Lars Nixdorff, Marc Salemink, Ger Gijzen, Wouter Hilhorst, Colette Parras, Jesca de Vries, Jan Schellhoff Ditte Lang, Arnau Salles, Chris tian Schmidt, Hanka Drdlova

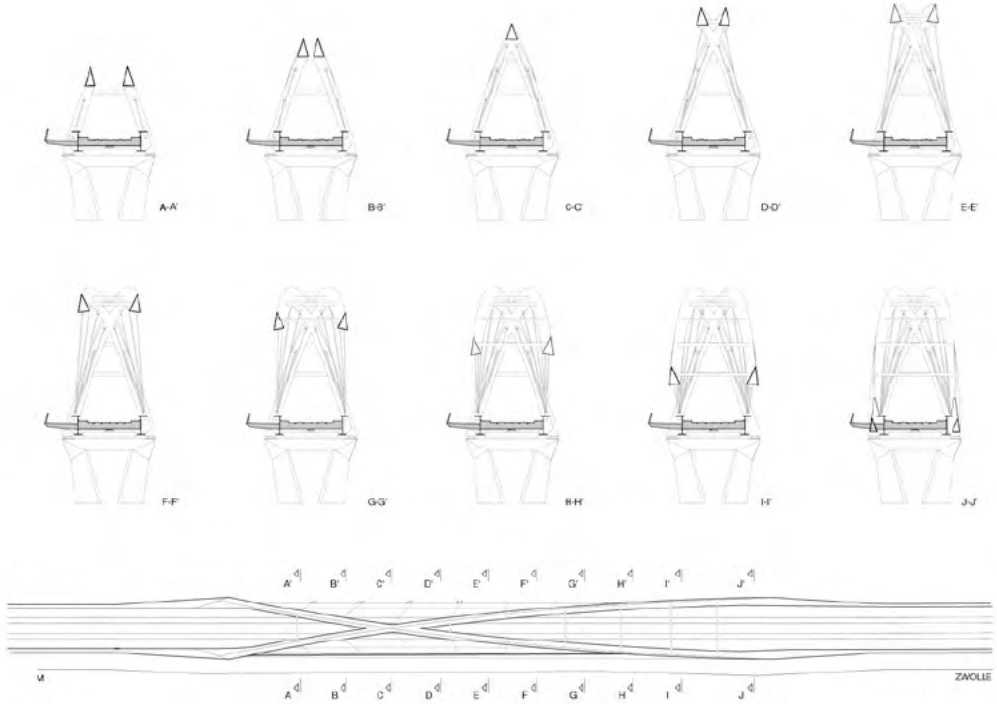
Visualisation: rendertaxi, Aachen

Scale
Bridge length: 950 m main span 153 m
Bridge height: Deck 15m +NAP
arches 21 m

Status
Competition entry

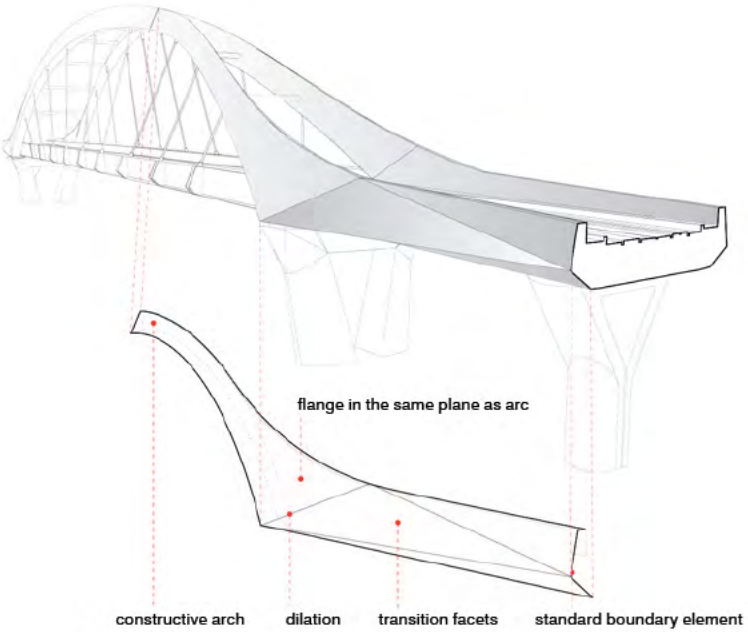
Structural Efficiency



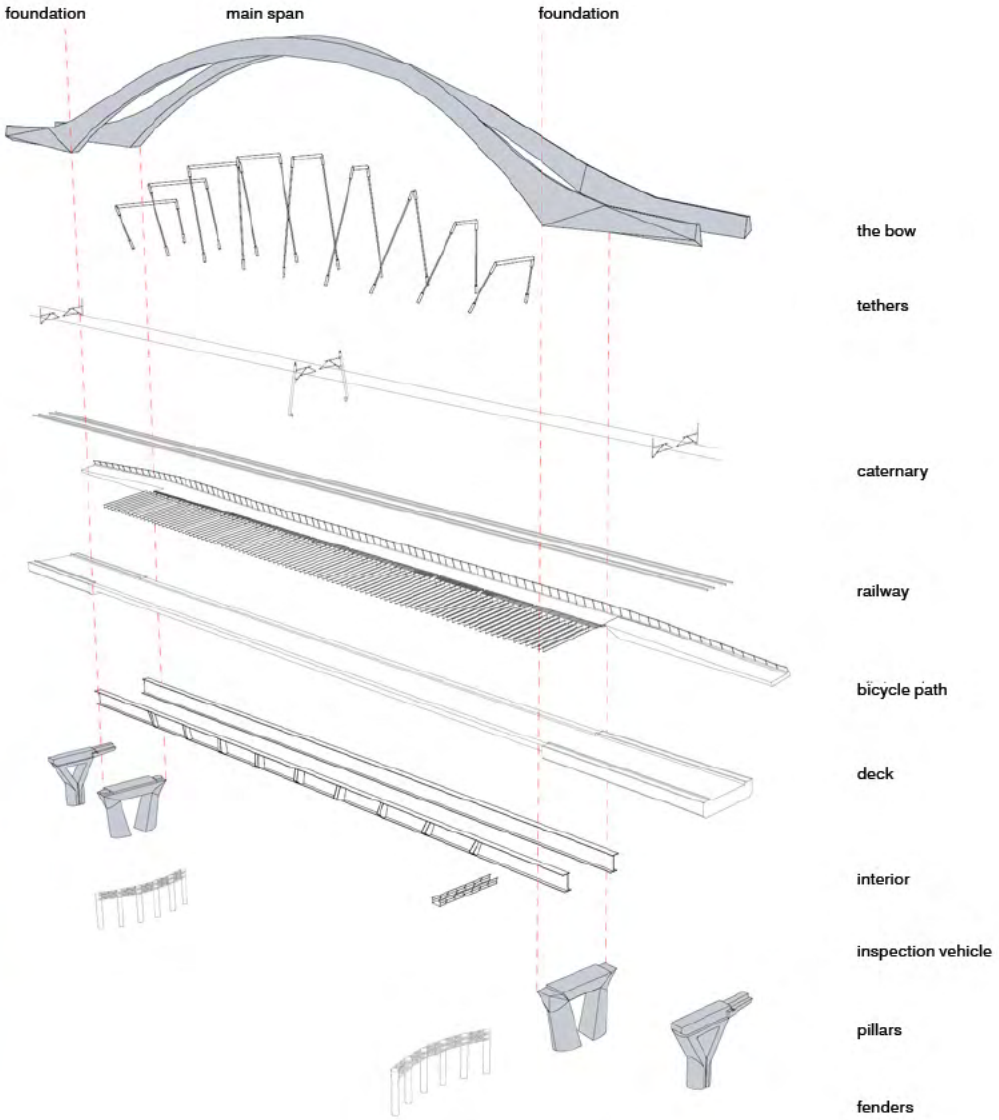


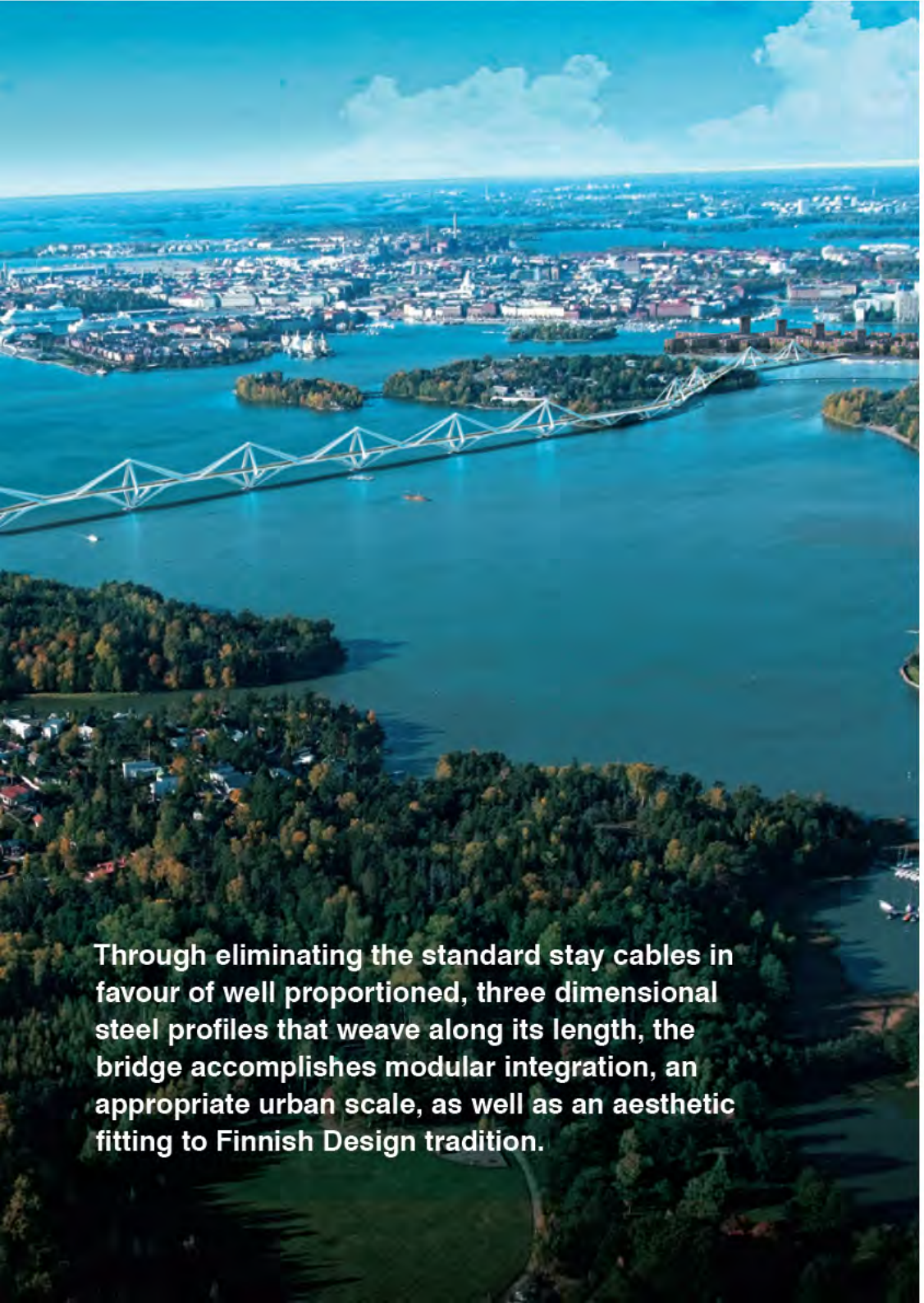
An important element in the design is the integration of the structure into the characteristic river setting. The fluent silhouette of the two asymmetric, crossing trusses forms a link with the surrounding landscape, whilst on both sides of the river the deck joins the river banks by means of a fluid landscape treatment. In addition, green dikes and long fluent crossings mean the bridge fits naturally into the landscape. The long organic line of the silhouette, in combination with the crossing trusses, forms a point of recognition in the area, while the asymmetric form of the trusses offers a unique view from every angle.

The outer sides of the trusses are coloured in a neutral, light, bluish grey which reacts to the color of the surrounding water and skies. Sometimes the color stands out against a stormy sky, whilst on other days the silhouette of the bridge appears almost black against the setting sun. The colour in the interior of the bridge refers to the typical orange rooftops found in the mainly green Ijssel landscape. This indicating colour acts as a signal to the passengers of their imminent arrival at Zwolle train station.



Structural Analysis





Through eliminating the standard stay cables in favour of well proportioned, three dimensional steel profiles that weave along its length, the bridge accomplishes modular integration, an appropriate urban scale, as well as an aesthetic fitting to Finnish Design tradition.

Kruunusillat Bridge

Cable Stayed Bridge

Sustainability Highlights: Circulation Separation , Heated Bridge, Material Efficiency

UNStudio's design for the Kruunusillat Bridge owes much of its figuration to the surrounding landscape and to the legacy of elegant Finnish design. The 2233m long tram, pedestrian and bicycle bridge is composed of a series of faceted modules. The woven diamond shapes segment the Kruunuvuorenselka area into framed vistas of land and sky. For designing the Kruunusillat Bridge, careful attention and study was given to the Helsinki landscape and the urban planning of the city.

- Circulation separation allows for safe and unimpeded flows of people, cars and public transport. Slow terrain gradation allows full use of the bridge to visitors with limited mobility, without introducing an elevator.
- Heated Bridge - pedestrian pathways are secured against harsh and slippery winter conditions by integrated heating
- Material Efficiency is demonstrated through use of low maintenance and durable materials, as well as construction possibility without termporary support.

Project Information
tram/ pedestrian/ bicycle bridge

Location
Helsinki, Finland

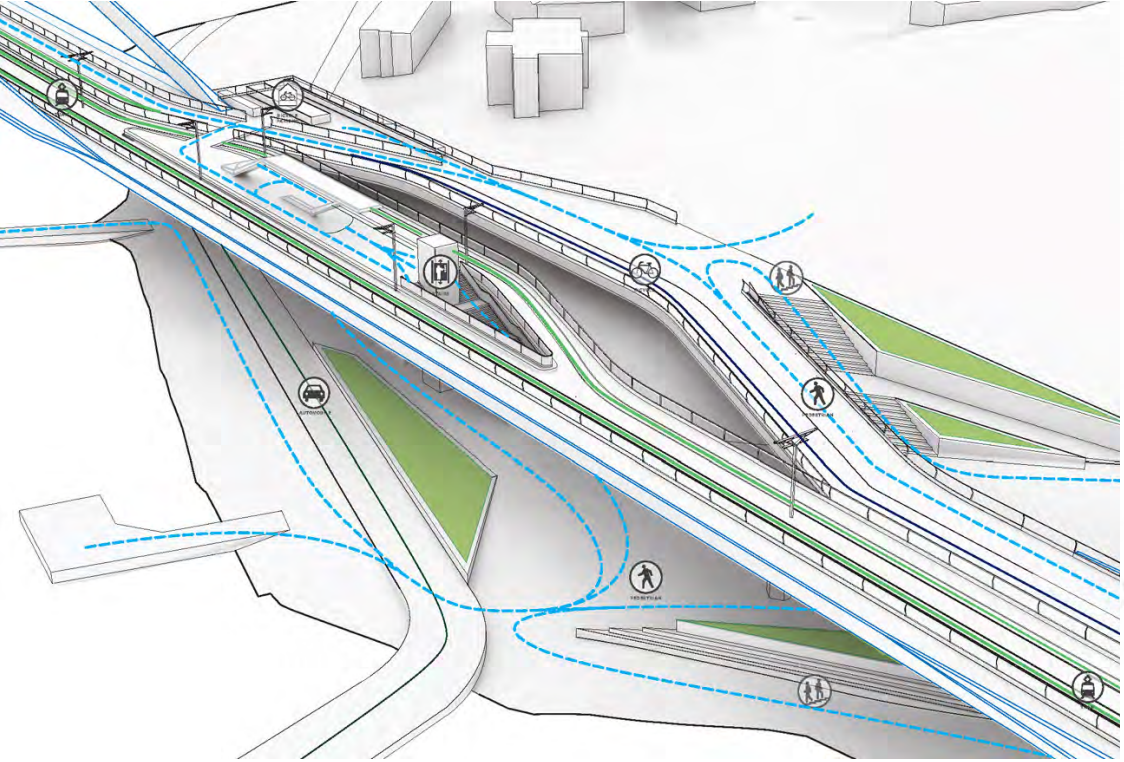
Client
City of Helsinki

Project Team UNStudio
Ben van Berkel with Arjan Dingsté and Marc Hoppermann, Seyavash Zohoori
Arup (principally responsible for project): Sander den Blanken, Laurent Rus,Jan-Willem Breider (Steel Structures) and Artur Czarnecki (Concrete Structures), Patrick Casey and Daniel Goes (Geotechnical), Laurens Tait, Kelvin Vervuurt, Mia Tsiamis and Vivian Scheepers (Master planning), Simone Collon (lighting), Edwin Thie (sustainability), Richard Hornby (construction sequence), Emma O'Brian and Janet Noone (BoQ), Roel van de Straat (3d), Anthony Cortez, Colin Hanford, Nicole Washington and Jason Sanga (Visualisations)

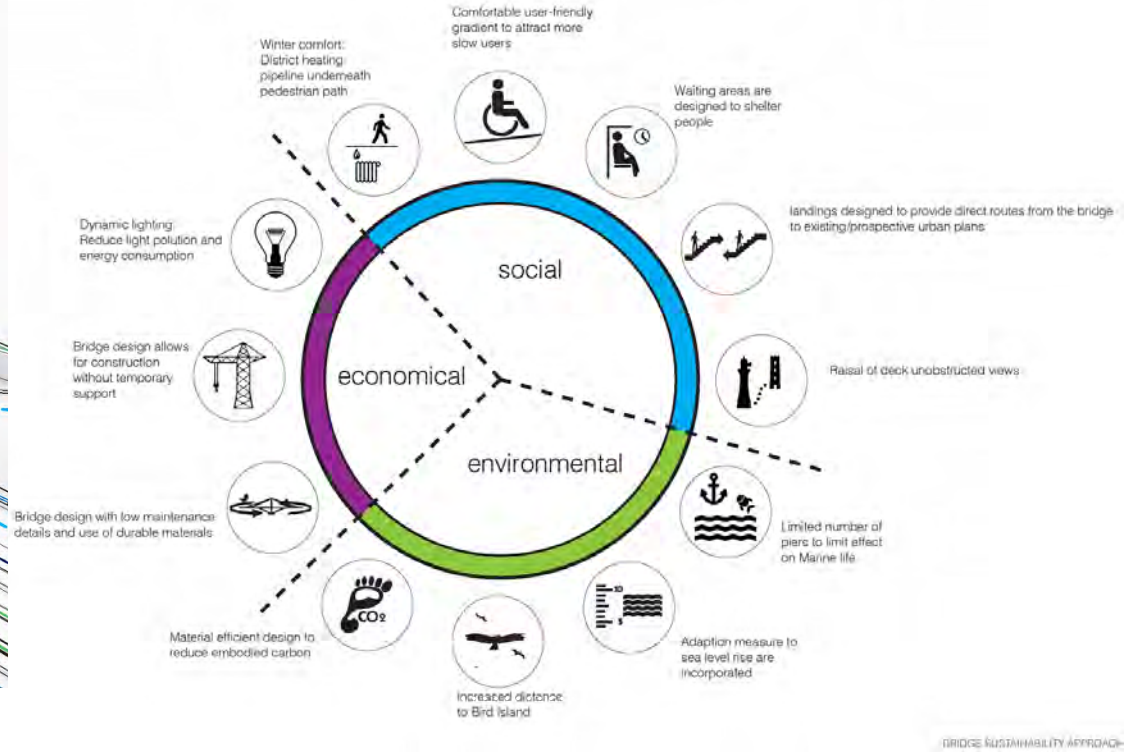
Landscape: FCG – Finish Consulting Group: Juhana Marttinen, Taina Tuominen

Scale
2km

Status
Competition Entry



Sustainability Concepts



Topological design concept

Horizontal load transfer and clearance profile

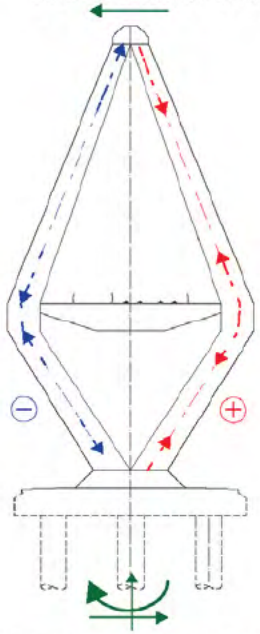


FIGURE 4: HORIZONTAL LOAD TRANSFER

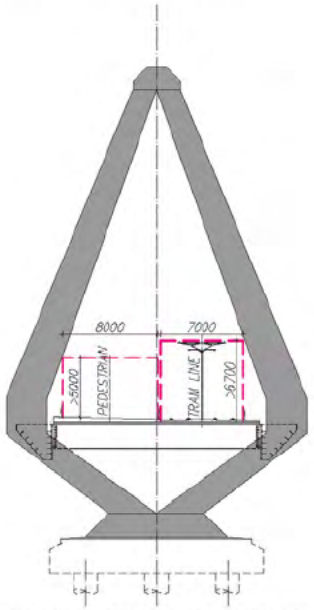


FIGURE 5: CLEARANCE PROFILE ON BRIDGE DECK

Designed through detailed typological structure studies, as well as urban analysis, UNStudio's design is composed of asymmetrical, cantilevered structural modules which are balanced and stable within each unit. The design is a hybrid of the traditional cantilever and cable stayed bridge typologies.

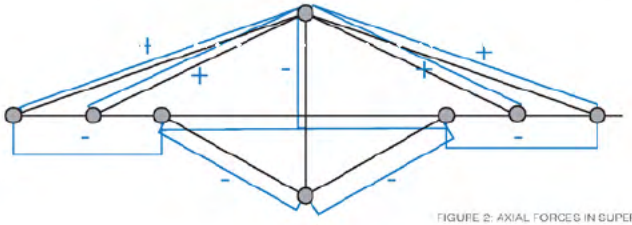


FIGURE 2: AXIAL FORCES IN SUPERSTRUCTURE

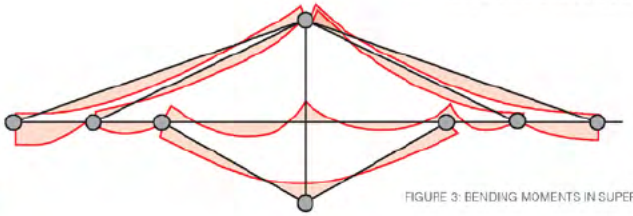
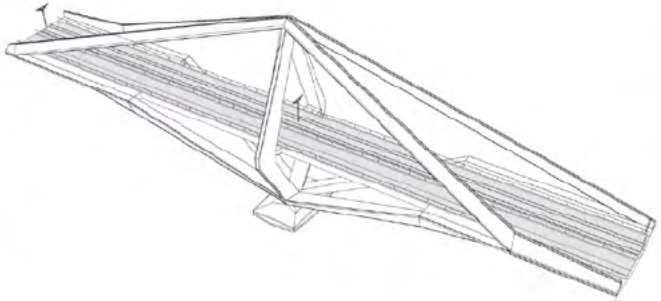


FIGURE 3: BENDING MOMENTS IN SUPERSTRUCTURE



Structurally the continuous nature of the bridge facilitates the asymmetrical load distribution, reducing the impact of the heavy tram system in comparison with the pedestrian and bike loads. The structural integrity of the bridge has been designed from both the modular and network levels, allowing for a multifaceted view on performance and operability.

Lock Island Bridges

Beam Bridge

Sustainability Highlights: Modular Facade Panel Rationalization, Climate Bridge, Divided Circulation

The lock island bridges are part of a series of bridges crossing the Arabian Canal within the master plan for area 01. All bridges differ in span, width, use and landing conditions, altogether creating a variety of the Lock Island Bridges enriching the experience of the Arabian Canal from the water and the edges.

- The designed modular tellis provides a subtle way of shading; on the lower part of the bridge the elements are deployed as a directional tool for way finding; in a three-dimensional system the elements are used as structural basis for the bridge.
- The small distance to the water allows a cooling on the lower deck as a micro-climate bridge.
- The traffic flows are separated into the functional traffic of vehicles and fast bicycles on the upper bridge deck, while the pedestrians and recreational bicycles use the lower bridge deck, which is then shaded by the upper one.

Project Information
3 Arch Bridges with 2 circulation divided vertically

Location
Dubai, UAE

Client
Limitless LLC

Contribution UNStudio
Concept Design

Project Team UNStudio
Ben van Berkel, Astrid Piber with René Wysk, Luis Etchegorry and Ger Gijzen, Cynthia Markhoff, Cristina Bolis, Marina Bozukova, Marcin Koltunski, Peter Moerland

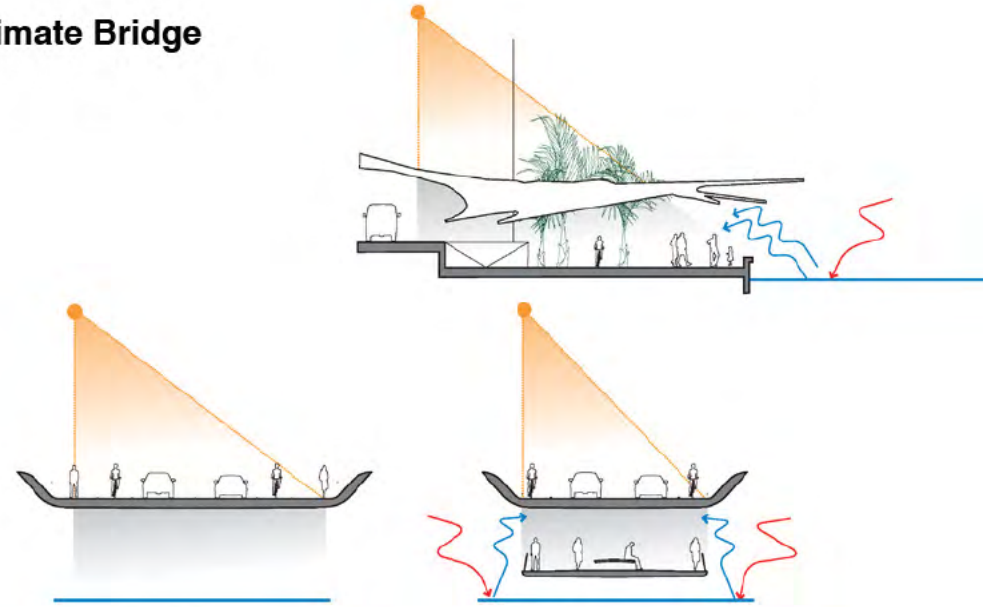
Structural Engineer: Schlaich Bergermann und Partner - Structural Consulting Engineers.
Model: Patrick Noome, UNStudio
Materialise, LeuvenRenders and
Visualizations: UNStudio and Rendertaxi, Aachen

Status
Design

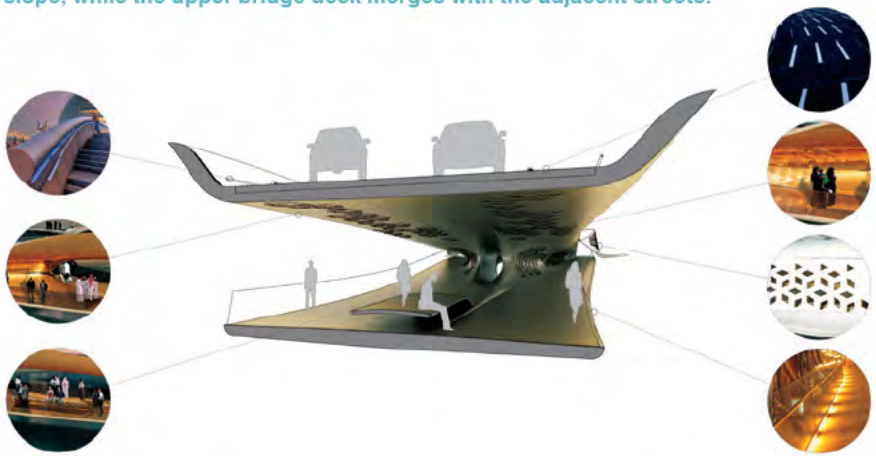
Circulation Separation

The two bridges serve as connections for cars, bicycles and pedestrians. Traffic flows are separated into the functional traffic of vehicles and fast bicycles on the upper bridge deck, while the pedestrians and recreational bicycles on the lower bridge deck, which is then shaded by the upper one.

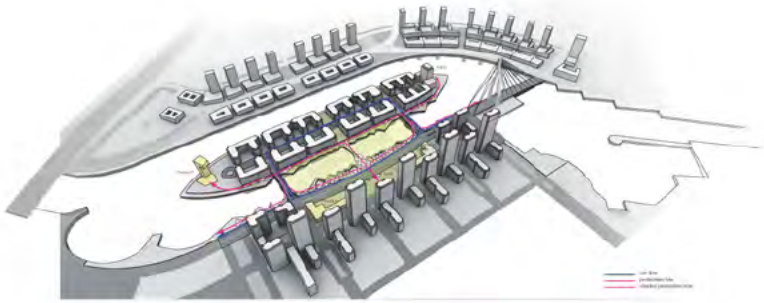
Climate Bridge

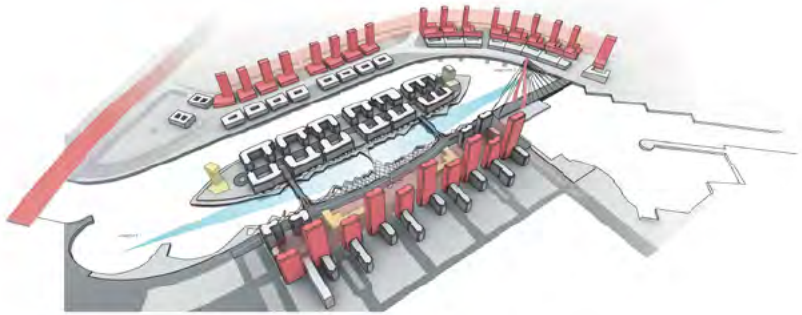


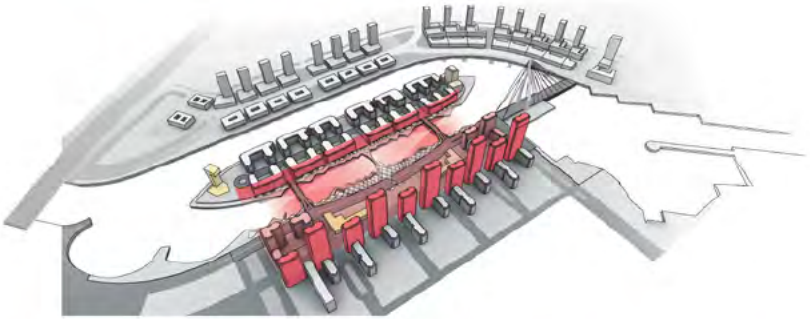
The lower deck is closer to the water line where evaporative cooling takes place. The landings of the lower bridge deck merge with the pedestrian promenades in a slope, while the upper bridge deck merges with the adjacent streets.



The functional and recreational traffic flows remain separated. The pedestrian walkways on the promenade are covered with shading trellis, which are integrated elements of the bridge, creating a unity and continuity of well tempered pedestrian paths around the tidal Water features.

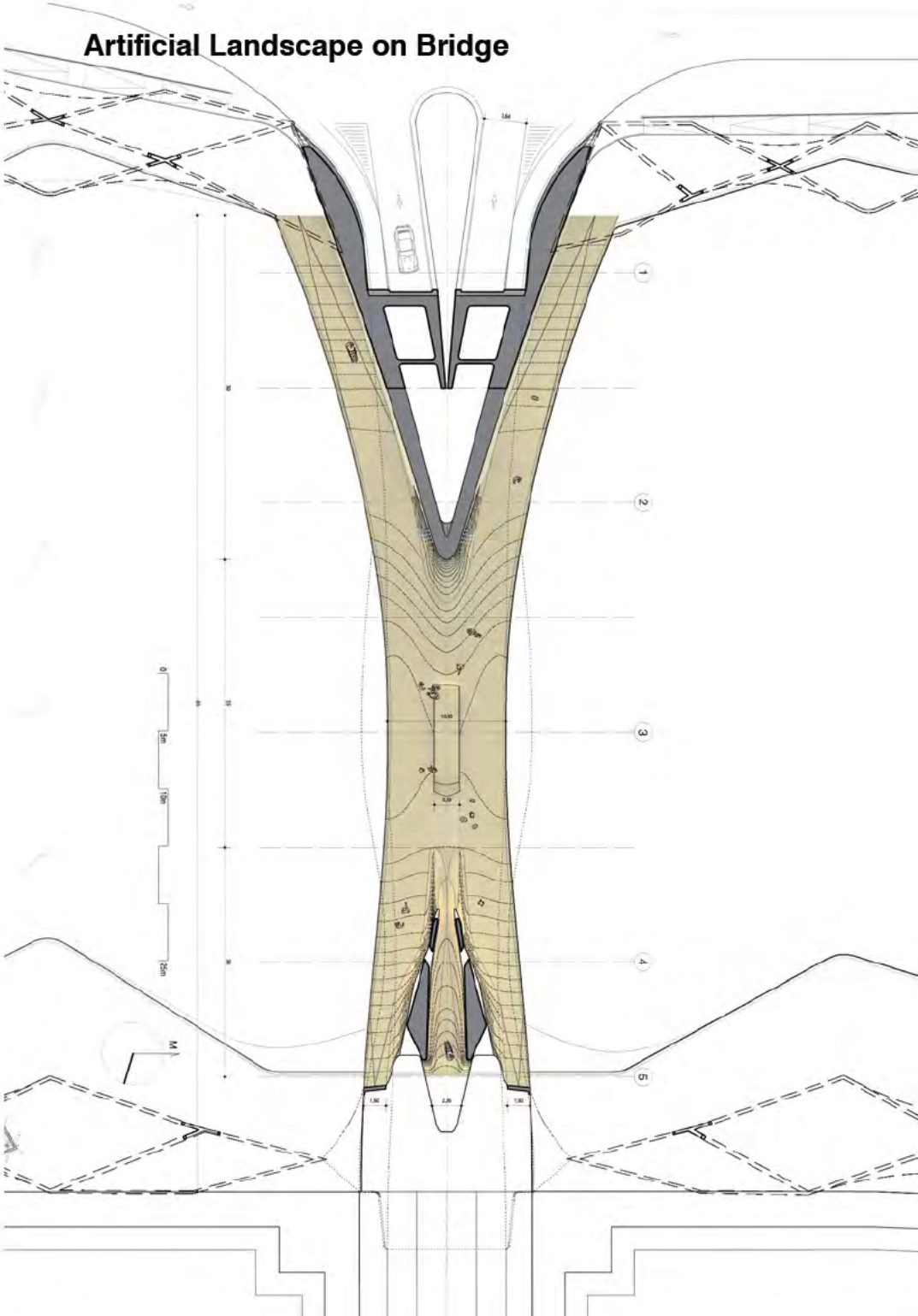






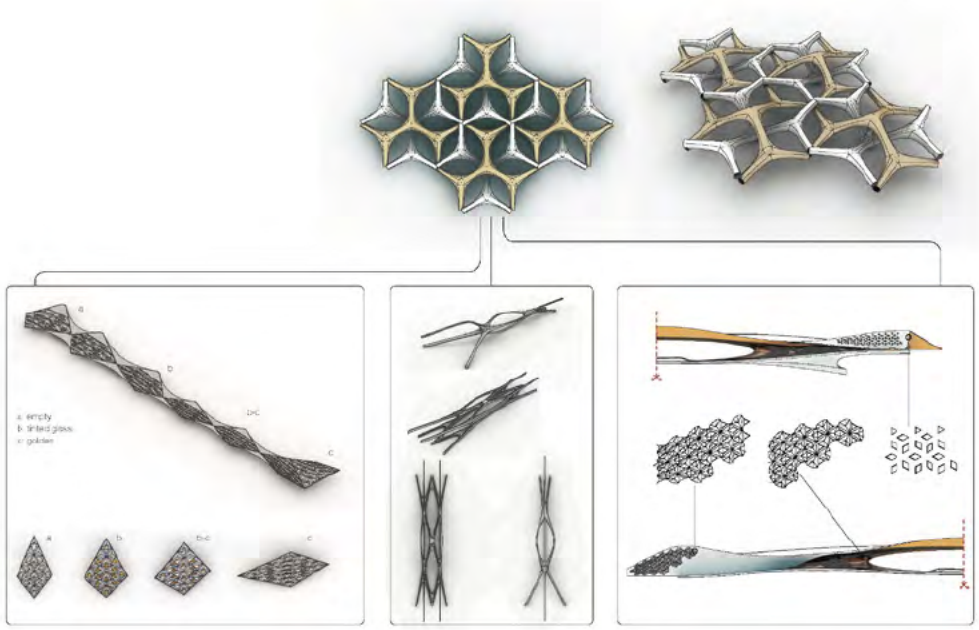
Along the water edges the embankments between the two lock island bridges are urban spaces with high recreational potential. The new bridges become part of and frame the continuous urban space of the tidal water features and the canal Front park. The bridges are seen as public moments in themselves, rather than merely providing an infrastructural connection between two water edges. The bridges and the public landscape provide spaces for residents sheltering from the sun and become part of the community park.

Artificial Landscape on Bridge



Repeated Modules

The physical appearance of the design reflects different geometrical adaptations of classical arabic patterns. Referring to more than one thousand years of ornamentation history, the reinterpretation of these patterns creates a tool for the design of several constructive elements: the designed trellis provides a subtle way of shading; on the lower part of the bridge the elements are deployed as a directional tool for way finding; in a three-dimensional system the elements are used as structural basis for the bridge. Applying an arabic pattern in this manner creates a spatial device for the bridge, whilst also unifying the bridge with its surroundings.



Pasarela de la Ballena // Footbridge Las Palmas

Beam Bridge

Sustainability Highlights: Landscape Bridge, Living Bridge Concept

The footbridge spans a bypass which connects two densely populated quarters: the historical town of Las Palmas and a newer suburb. The bridge design integrates infrastructure, landscape and recreational facilities. Spanning 93 meters, the bridge incorporates existing pedestrian and cyclist lanes on three levels. The exterior of the structure is cladded with perforated metal sheets, the interior features wood for the 'slow' lanes and a combination of concrete and perforated steel for the 'fast lanes'.

- The landscape bridge proposal is designed to provide a fitting background for the Pedestrian Bridge. It furthermore provides a recreational park for the local population.
- The living bridge concept combines infrastructure with a building. The beginning boulevard changes into a galleria and then back again.

Project Information
Footbridge with facilities

Location
Gran Canaria, Spain

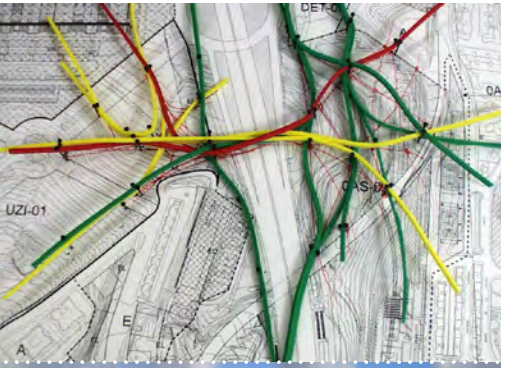
Client
Municipality of Las Palmas de Gran Canaria

Contribution UNStudio
Design

Scale
Building area: 2.500 m2

Project Team UNStudio
Ben van Berkel with Alicia Velázquez, Daniel Borruey, Olga Vázquez, Astrid Piber, Igor Kebel, Cynthia Markhoff, Andrew Benn, Colette Parras, Santiago H. Matos, Fabián Hernández, Tiago Nunes, Cristina Bolis, Khoi Tran
Structure engineering: Arup London Charles Walker, James Fleming, Martin Self
Infrastructure: Arup London, David Johnston
Cost estimate: Arup London: Strachan Mitchell Arup Madrid: Richard Bickers
Landscape architect: Lodewijk Baljon
Landschapsarchitecten Lodewijk Baljon, Uta Krause
Programme feasibility: Jose Miguel Iribas, Pablo Vaggione

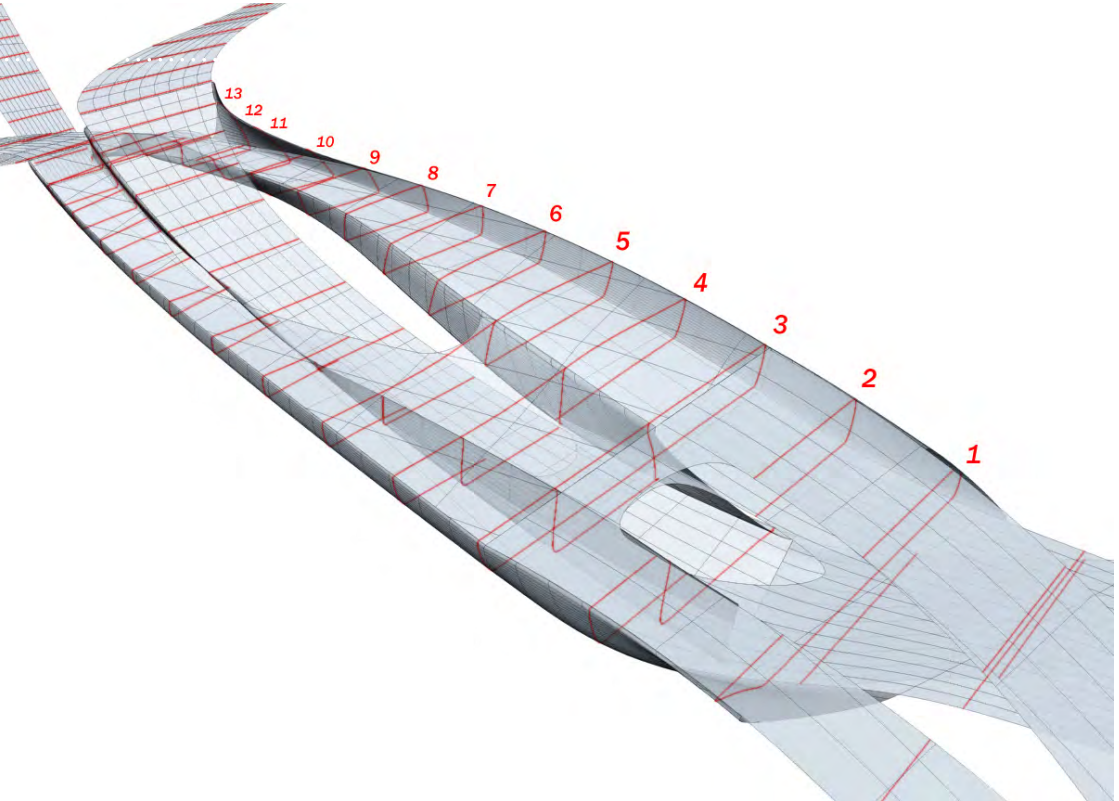
Status
Design



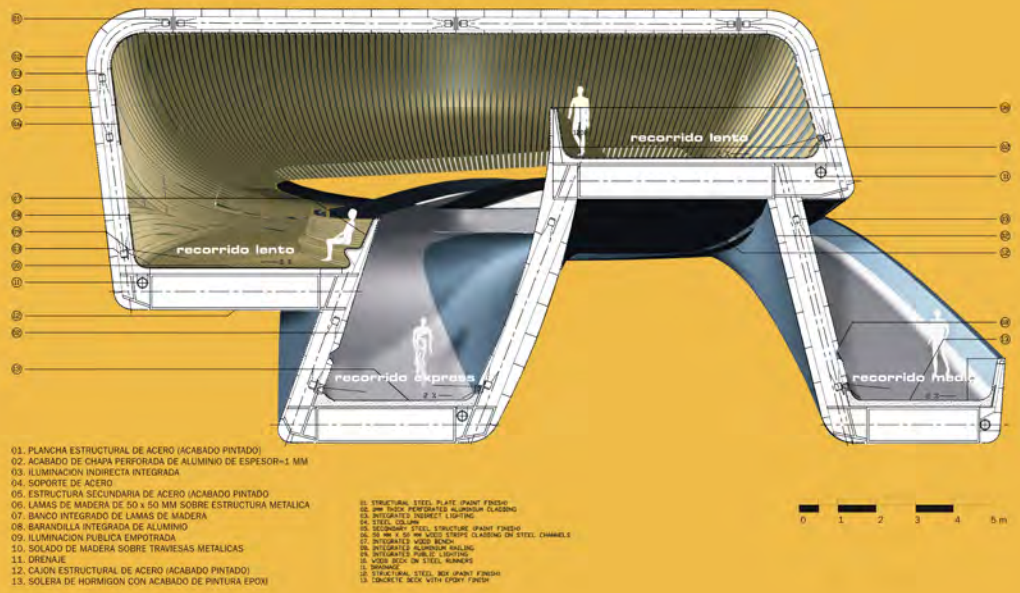
Ecological Feature

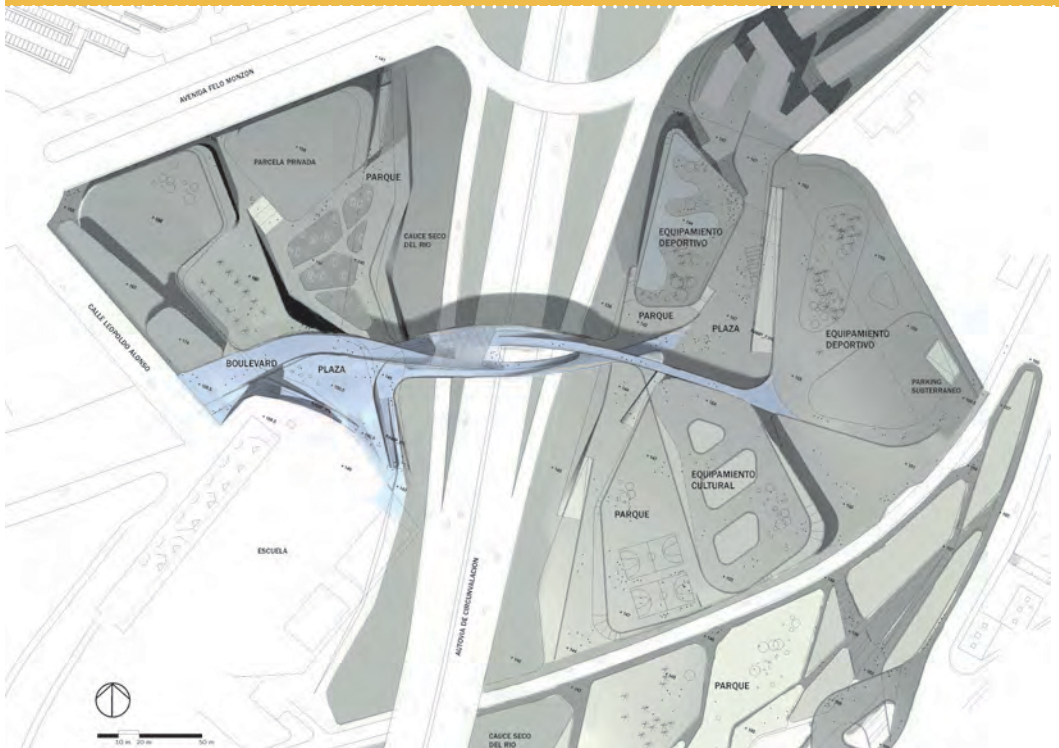
Living Bridge program

The bridge is a hybrid, combing infrastructure and building; the crossing is conceived as a boulevard that turns into a galleria and back again, being partly enclosed and partly open. When contemplating possible functions inside the pedestrian bridge we need to consider aspects of construction, sustainability, safety and maintenance. If we wish to minimize the potential risks pertaining to all those aspects, we would recommend that the crossing itself is kept lightweight, clean and simple and the recreational facilities are clustered around the two landings.

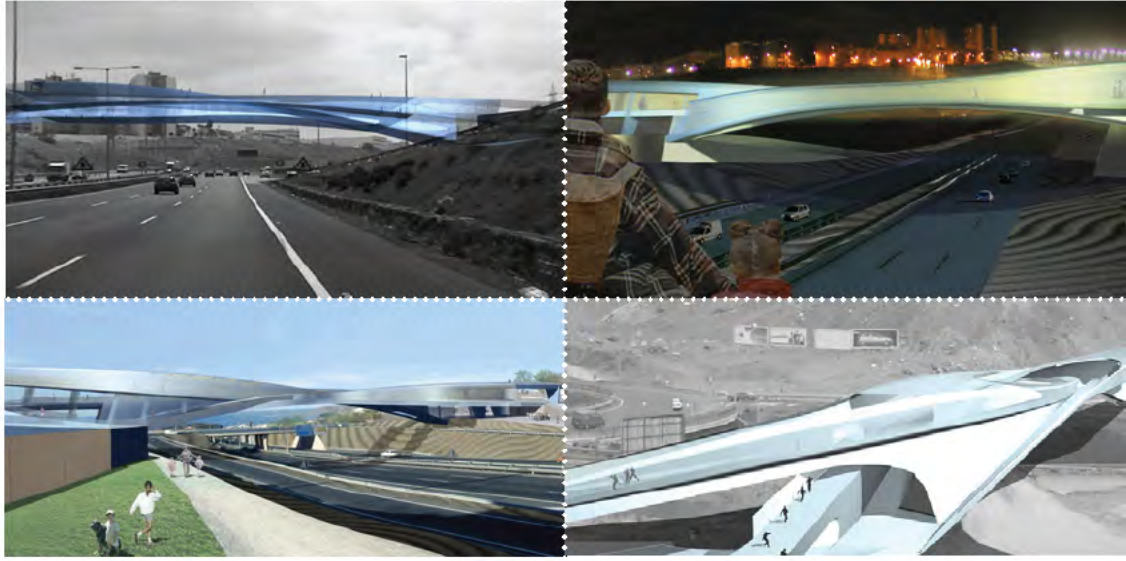


Circulation Separation

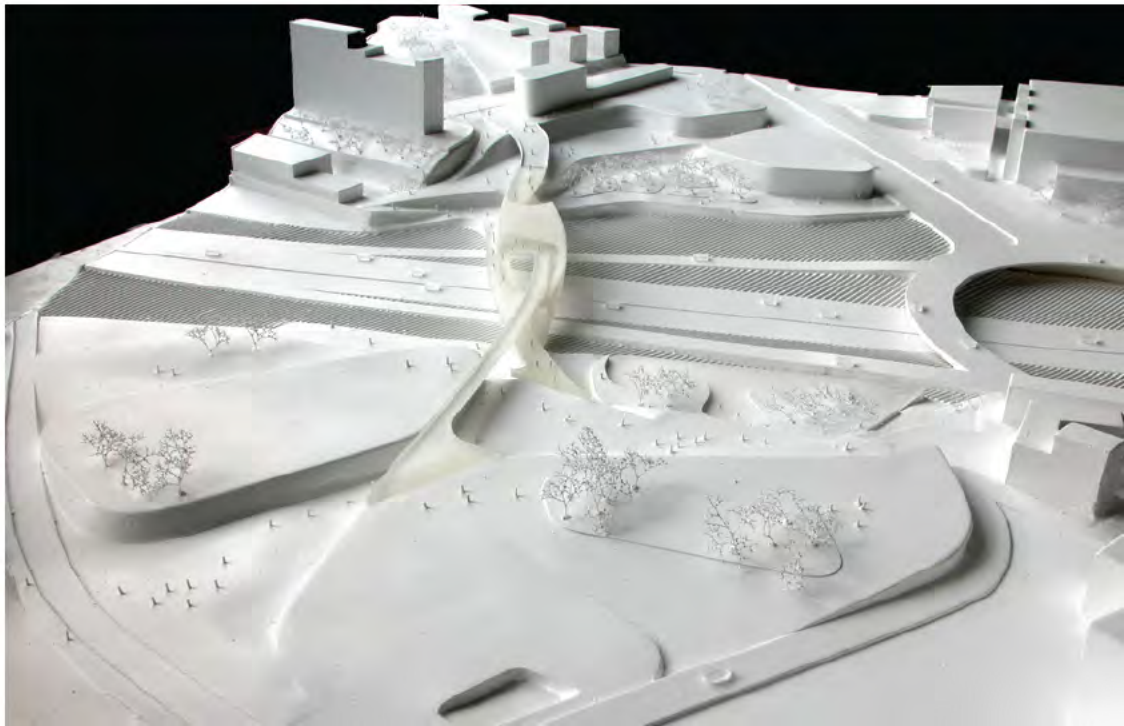




Bold Gestures



Responding to the experiential variety and to the landscape in which it is situated, the bridge superimposes a gesture upon the scenery that is simultaneously bold and refined. The 93 m span of the Pedestrian Bridge consists of intertwining and interweaving arches for pedestrians and bicycles. One of the symbolic readings offered by the suspended and solidified flows is that of hands and forearms clasping each other in a gesture of muscular solidarity.



Erasmus Bridge

Cable Stayed Bridge

Sustainability Highlights: Structural Efficiency, New tech construction, Culture Making

The Erasmus Bridge is the product of an integrated design approach. Construction, urbanism, infrastructure and public functions are given shape in one comprehensive gesture. Nevertheless, during preliminary and definitive design phases, the design was continuously refined, although its main outlines and features were constant.

- The five differently shaped, concrete piers, the railings, the landings, the details of fixtures and joints, and the maintenance equipment were all integrally designed with new techniques in construction. This includes for instance extensive use of cutting pieces directly from the CAD drawing.
- The Erasmus Bridge has become a distinctive cultural landmark within the city and has picked up the nickname “The Swan” showing a local appreciation of the design aesthetics, from the people who matter most.

Project information
Single pylon bridge
Architectural design of bascule bridge;
Spido grand café, multi functional space;
Spido office, parking (for 330 cars);
Willemsplein (new design for existing square).

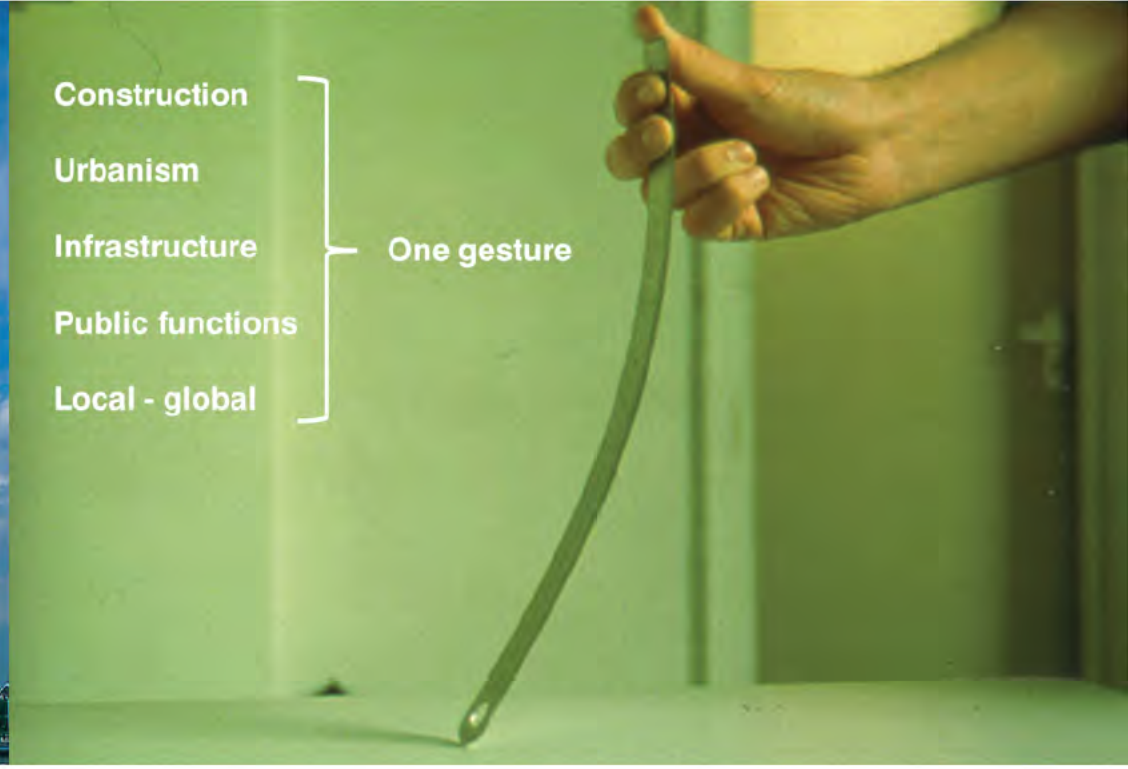
Location
Crossing the river Maas, Rotterdam

Client
Ontwikkelingsbedrijf

Project Team UNStudio
Ben van Berkel with Freek Loos, Hans Cromjongh and Ger Gijzen, Willemijn Lofvers, Sibo de Man, Gerard Nijenhuis, Manon Patinama, John Rebel, Ernst van Rijn, Hugo Schuurman, Caspar Smeets, Paul Toornend, Jan Willem Walraad, Dick Wetzels, Karel Vollers
Engineering: Ingenieursbureau Gemeentewerken Rotterdam, Rotterdam
Contractor steel works: Grootint, Dordrecht
Contractor concrete works: MBG/CFE, Brussel/Antwerpen

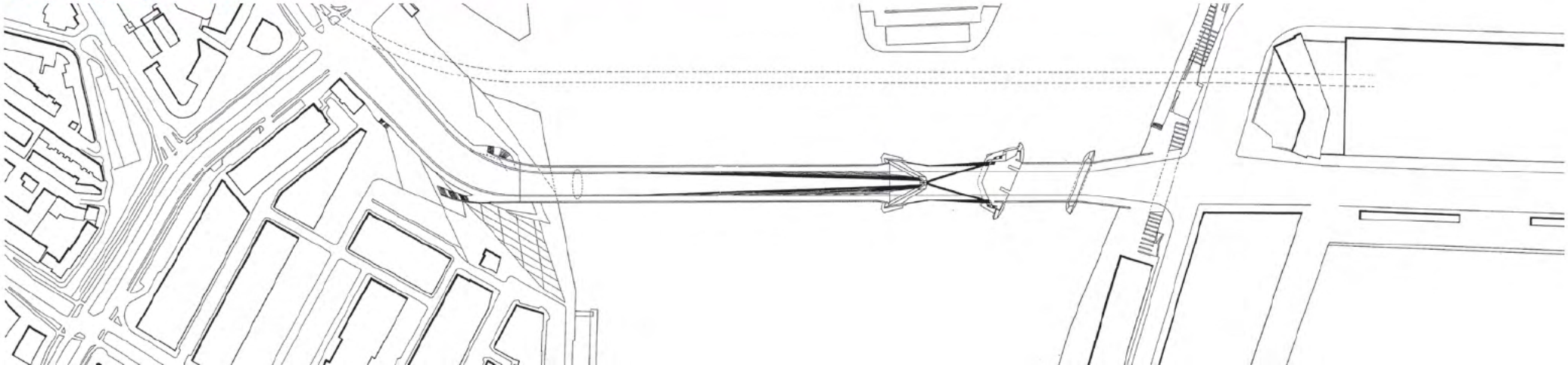
Scale
Total length bridge: 802 m
Top Pylon bridge: 139 m
Surface 50.000 m^2

Status
Realized 1996



Rising to a height of 139 metres and extending to a length of 800 metres, the bridge, which spans the river Maas, forms an orientation point within the city. The asymmetric pylon with its bracket construction in sky-coloured steel can appear thin as a needle, or wide as a harp, which is one of its nicknames. The long, diagonal cables physically and metaphorically link Rotterdam South to the city centre. Thirty-two stays attached to the top of the pylon and eight backstays keep the construction in balance. Five concrete piers carry the steel deck that is divided into different traffic lanes: two footpaths, two cycle tracks, tram rails, and two carriageways for cars.

Sweeping concrete staircases lead up from the parking garage on the north side, extending the curve of the landing to pedestrian level and contributing to the public quality of the bridge as a square in the sky. At night, when the bridge is reduced to a silhouette, a special light project emphasizes the interior of the bridge, with its bundled cables rising high above the water as a dematerialized reflection of its daytime identity.



The finger-like arrangement also results in extra mooring space for smaller boats. A cycle path runs below the bridge, along the waterfront.

Bascule Bridge & Bridgemaster's House

Cantilever Bridge

Sustainability Highlights: Traffic Flexibility, Urban Connection

An intense mixture of technique and infrastructure has resulted in a bridge consisting of three individual decks, which open and close asynchronously, imitating the movement of playing fingers. In the flat polder landscape, the bridge links a new housing development to the main road.

- The seperation of the movement on three desks enhances traffic safety. Two pedestrian and cycle routes and one road for cars link on side to another.
- The bridge is an urban connection with a new housing project with the main road.

Project Information
Bascule bridge and bridge master's house

Location
Purmerend, Netherlands

Client
Municipality of Purmerend

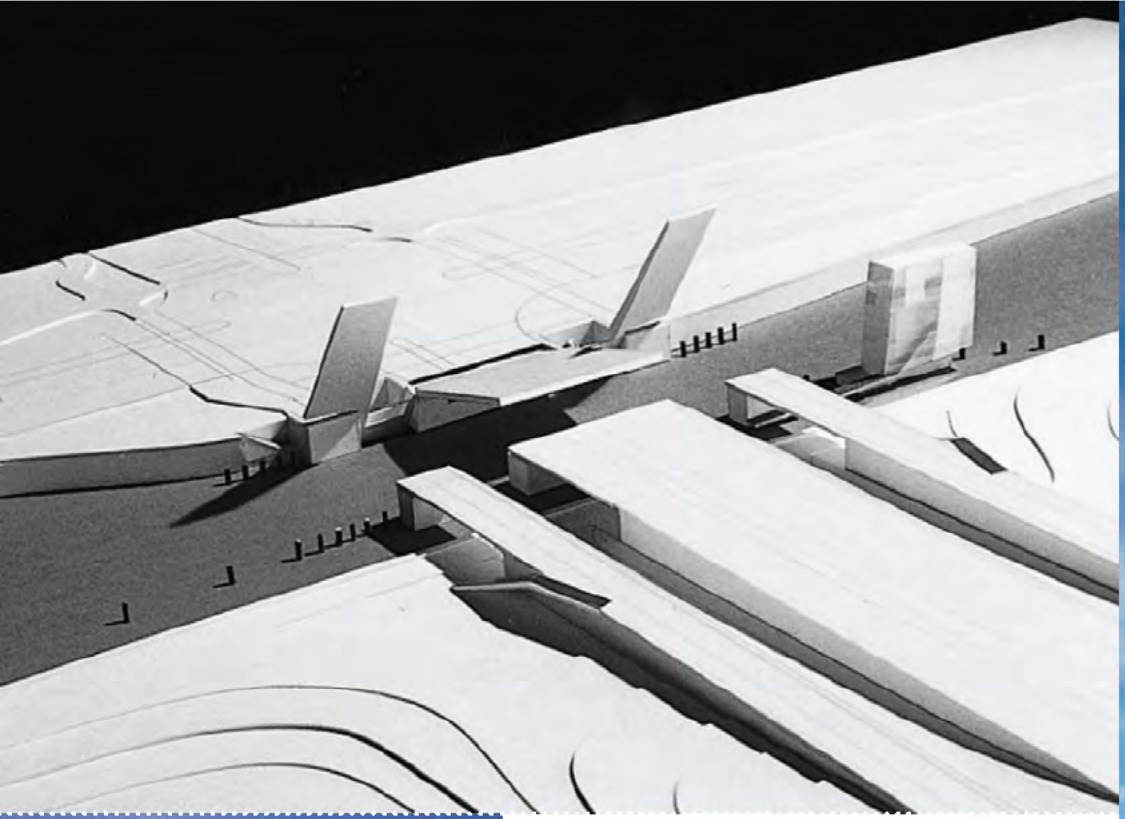
Contribution UNStudio
Design development, 3D-planning and implementation during all planning processes

Project Team UNStudio
Ben van Berkel with Freek Loos, Ger Gijzen and Sibo de Man, John Rebel, Stefan Böwer, Stefan Lungmuss

Management: IBA, Amsterdam
Engineering: IBA, Amsterdam

Scale
Gross floor surface: 90 m²,
Volume: 300 m³

Status
Realized 1998



Sustainable Traffic Solution

The longitudinal separation of the bridge deck into two pedestrian and cycle routes and one road for cars enhances traffic safety.

The bridge elements are controlled from the bridge master's house, a small edifice that is perched 8m above the water level. Perforated steel plates, which are applied to the concrete core of the building, make it semi-transparent.

The constructive pylon of the bridge transforms geometrically from a cone form at the top descending into a box shape as it connects with the main deck.

Prins Claus Bridge

Cable Stayed Bridge

Sustainability Highlights: Structural Efficiency ,Traffic Safety

The single-pylon bridge connects an austere post-war neighbourhood of Utrecht with a new high-end business area. The torsion, constructive pylon of the bridge transforms geometrically from a cone form at the top descending into a box shape as it connects with the main deck. The deck of the Prins Claus Bridge is split into four separate lanes which enables difference in steepness for slow and motorised traffic.

- The separation of the bridge-deck into several lanes enhances traffic safety. Pedestrians and cyclists follow a low-slung trajectory, while motorised traffic climbs up to a higher level. By splitting up the various traffic streams, openings in the bridge-deck ensue, through which light reaches the ground level.
- The single-pylon bridge typology with special structure system is chosen for site-specific reasons; it needs only a small number of piers and so does not become an oppressive presence in residential areas. The long ramps of the bridge, which are separated by the grounded pylon, weave like ribbons through the surroundings.

Project Information
Single pylon bridge with Pedestrian lane, bicycle path, motorized traffic, bus lane

Location
Utrecht, Netherlands

Client
Municipality of Utrecht/ projectbureau Leidsche Rijn

Project Team UNStudio
Ben van Berkel with Freek Loos, Ger Gijzen and Armin Hess, Suzanne Boyer, Jeroen, Jacques van Wijk, Ludo Grooteman, Henk Bultstra, Tobias Wallisser, Andreas Bogenschütz, Ron Roos

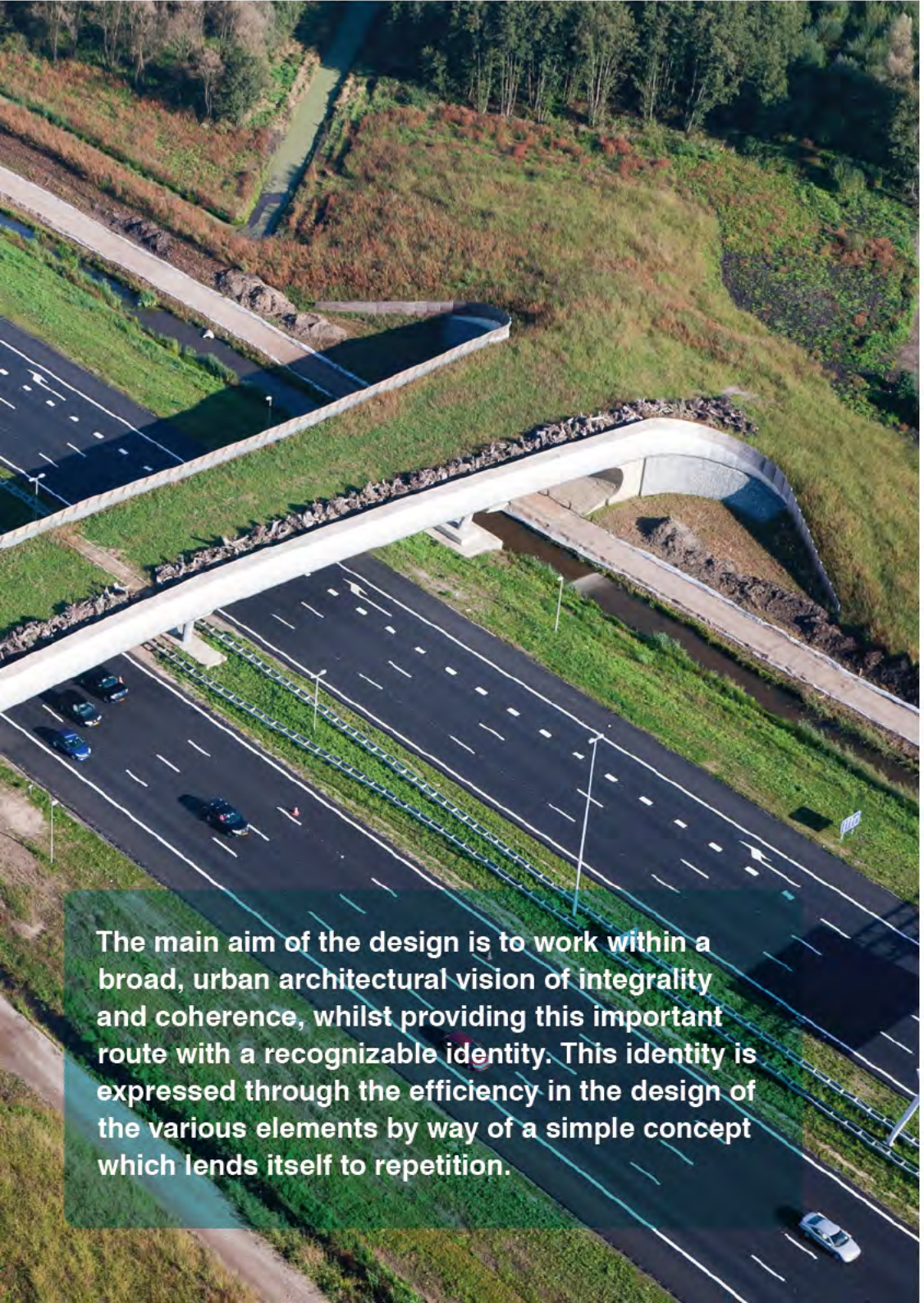
Management: DHV, Amersfoort
Engineering concrete foundations: DHV, Amersfoort
Engineering pylon and deck: Halcrow UK, London and Swindon

Scale
Main span: 150 m
Length bridge deck: 300 m
Width bridge deck: 37 m
Clearance: 9,30 m
Height pylon: 91,4 m

Status
Realized July 2003

With the realization of the Prins Clausbridge the Utrecht neighbourhood Kanaleneiland became a central part of the city. The route crossing the canal give an important impulse to the area.

The bridge is more than a connection between the Utrecht neighbourhood Kanaleneiland and the office location Papendorp, it communicates with its surroundings. The bridge colours changes with the weather and reacts on the building on both sites of the canal.



The main aim of the design is to work within a broad, urban architectural vision of integrality and coherence, whilst providing this important route with a recognizable identity. This identity is expressed through the efficiency in the design of the various elements by way of a simple concept which lends itself to repetition.

A2 Highway Everdingen-Empel

Beam Bridge

Sustainability Highlights: Ecoducts , Modular Construction

The re-shaping of A2 provides an opportunity to introduce a more consistent visual aspect to this stretch of motorway. The structural elements are durable and low-maintenance while the detailing is designed to withstand the effects of weathering and pollution.

- The modular construction is applied as relief in the concrete retaining walls. This allows for a dynamic play of shadow and light and minimizes the visual contamination of the concrete over time. In the relief of the concrete different surface textures are used, from rough to smooth.
- Ecoducts - wildlife crossings are structures allowing animals to cross human-made barriers safely. Ecoducts are a practice in habitat conservation, allowing connections or reconnections between habitats and combating habitat fragmentation.

Project Information
Infrastructural projects: overpasses, soundscreens and tunnels

Location
A2 route Everdingen to Empel

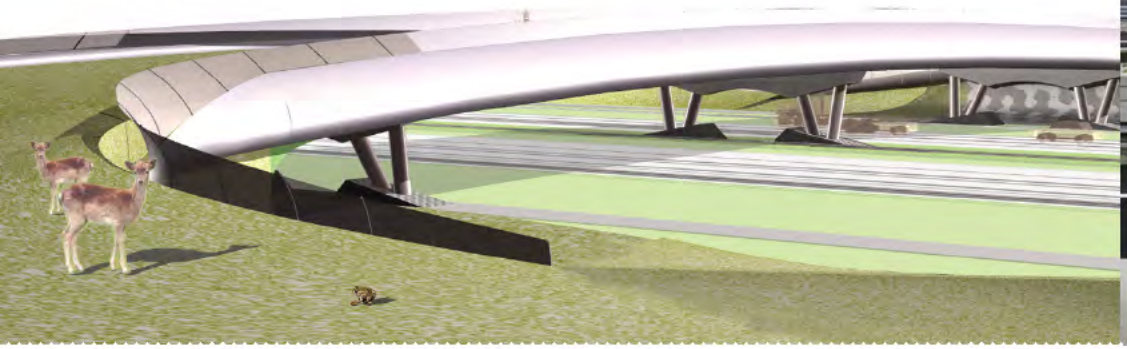
Client
Rijkswaterstaat, directie Oost Nederland

Project Team UNStudio
Ben van Berkel and Gerard Loozekoot with Eric den Eerzamen, Jacques van Wijk, Ton van den Berg, Markus Berger, Jeroen Tacx, Khoi Tran, Christian Bergman, Ramon Hernandez, Colette Parras, Kristian Lange, Marc Salemink

Scale
Ringweg`s-Hertogenbosch:
Length 12km
New overpasses 10
soundscreens 7

Status
Built

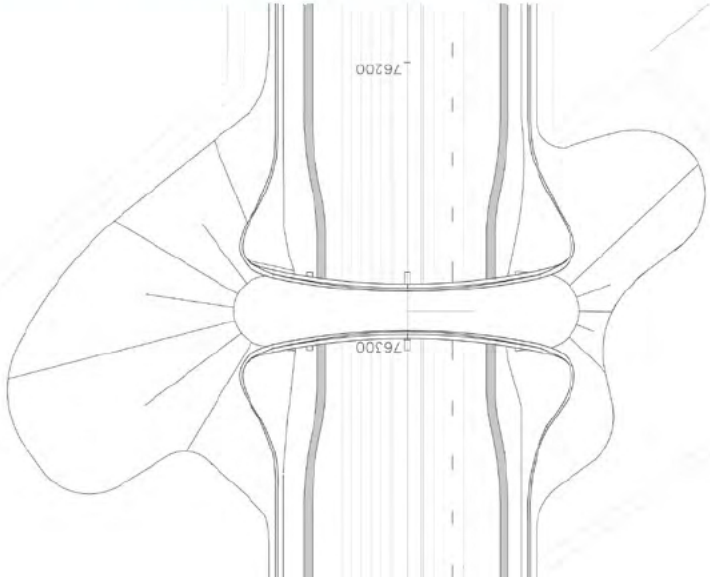
ECODUCT



MAASBRUG EMPEL

The infrastructural interventions including the soundscreens are durable without requiring much maintenance. The detailing has been designed to anticipate the effects of both erosion and pollution. The design device used in the detailing of the elements is an abstract pattern of migratory birds. The concrete sound screens have a relief pattern of the birds creating shadow effects which gives the walls an animated look and enhanced as it ages. The same pattern is sandblasted onto the transparent plexiglas of the sound screens as well as in the detailing of the slope pavements of the underpasses.

An abstracted migrating bird pattern was developed. This lends itself to repetition which alluds to the identity of the A2 as a section of the larger European route from Amsterdam to Palermo. The structural elements are durable and low-maintenance while the detailing is designed to withstand the effects of weathering and pollution. The concrete sound barriers are clad in a continuous relief, while the transparent barriers are printed with this same pattern.



STANDAARD KUNSTWERK

To give identity to all the sound barriers and flyovers, a design approach was developed based on the rhythm and dynamics of the highway, as well as sound absorption and reducing the effects of contamination over time. This identity should be experienced by users with different speeds; local, regional or national. This resulted in a 'bird pattern' , which transforms along the route. Through the use of patterns, the retaining walls and sound barriers obtain a visual quality and give continuity to the flyovers.

The essential words to describe the vision of the A2 route are: inclusiveness and coherence, with the aim of providing the long freeway with a recognisable identity and contributing to a positive experience of the road. The identity is expressed through the designing of infrastructural interventions, on and around the highway. Soberness and efficiency are the centre of the design, which consists of a simple concept with different applications that can be repeated.

Waldschlösschen Bridge

Sustainability Highlights: Landscape Integration

The main challenge of the design for the Waldschlösschen bridge in Dresden is to create an infrastructural connection that spans a length of 800 meters, crossing the widest parts of the Elb flood plain. The bridge is designed as an integral part of this landscape. From the banks of the surrounding area, wide transitions taper to establish an interconnecting network for the continuous flows of the diverse users.

- The bridge connects both banks with a gentle slope landscape deck and opens up as a green network.

Project information
Landscape bridge for vehicular, bike and pedestrian traffic

Location
Dresden, Germany

Client
City of Dresden

Contribution UNStudio
Competition design

Project Team UNStudio
Ben van Berkel, Caroline Bos, Astrid Piber with Ger Gijzen, Mirko Bergmann and Hamit Kaplan, Rene Wysk, Margherita Del Grosso, Altan Arslanoglu, Simon Kortemeier, Juergen Heinzel

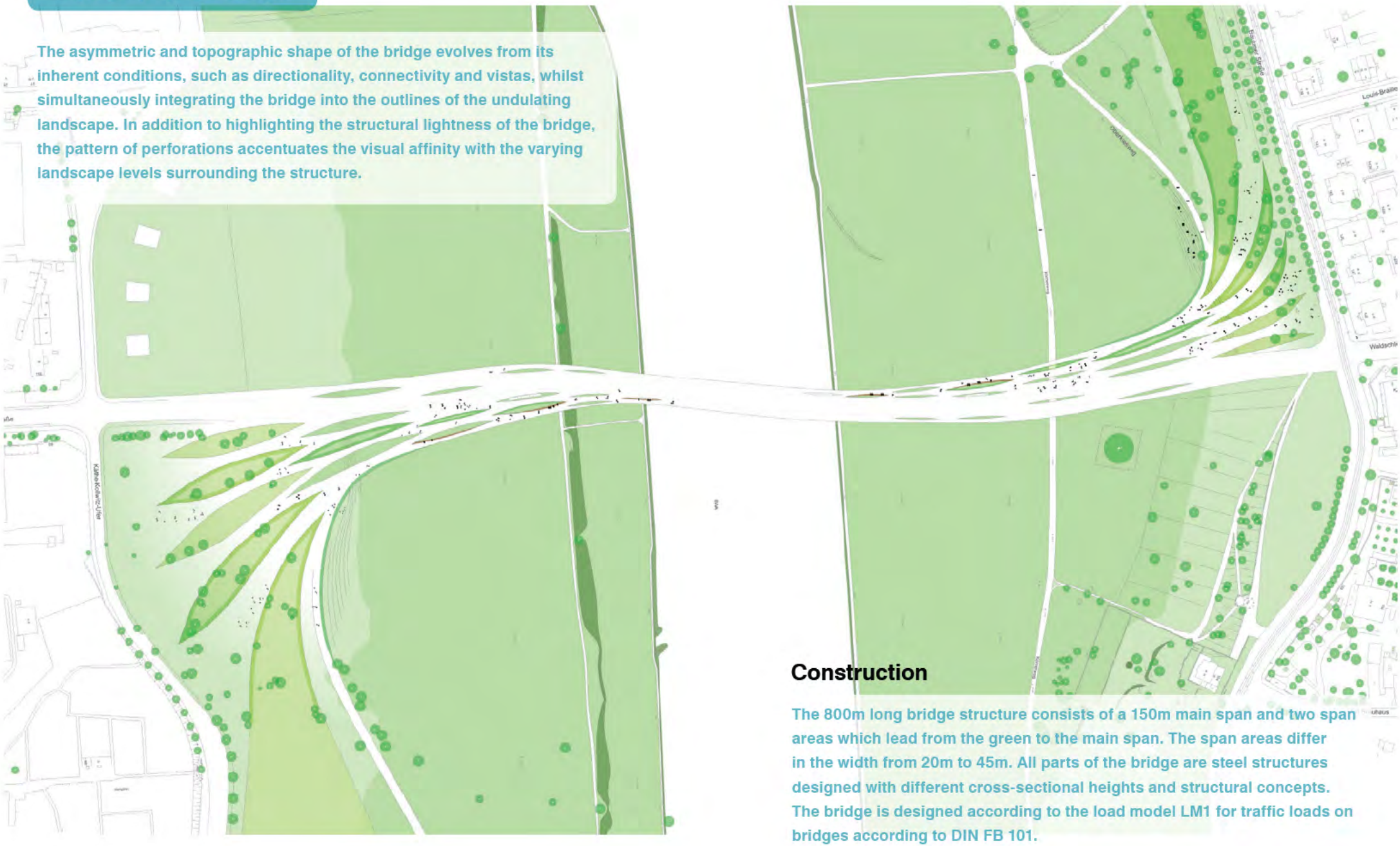
Advisors
Structural engineers: B + G Ingenieure
Bollinger und Grohmann GmbH

Scale
Length of bridge: Total 750m
Main span 150m
Width: Variable, between 20m and 45m
Height: Max. 18m

Status
Competition Entry

Topography on Bridge

The asymmetric and topographic shape of the bridge evolves from its inherent conditions, such as directionality, connectivity and vistas, whilst simultaneously integrating the bridge into the outlines of the undulating landscape. In addition to highlighting the structural lightness of the bridge, the pattern of perforations accentuates the visual affinity with the varying landscape levels surrounding the structure.



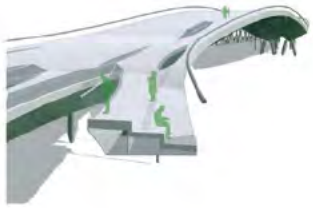
Construction

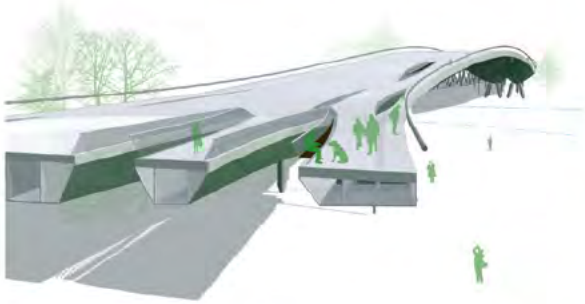
The 800m long bridge structure consists of a 150m main span and two span areas which lead from the green to the main span. The span areas differ in the width from 20m to 45m. All parts of the bridge are steel structures designed with different cross-sectional heights and structural concepts. The bridge is designed according to the load model LM1 for traffic loads on bridges according to DIN FB 101.

Different connections in a network

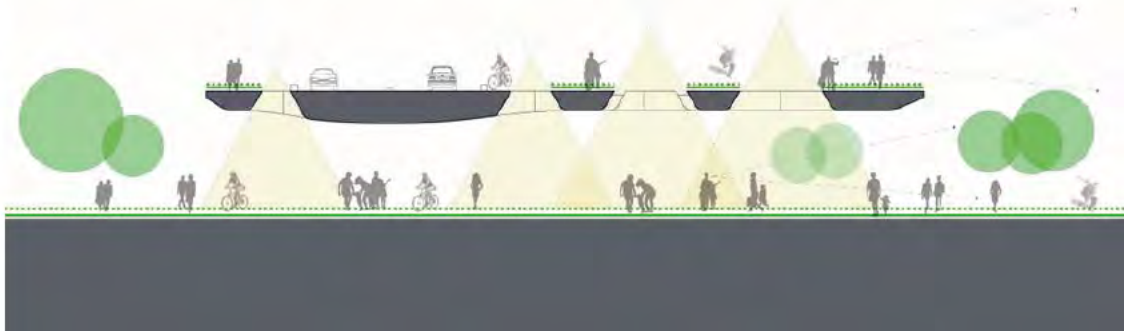
The bridge is connected to both banks with a gently sloped landscape deck. The level of development of the bridge deck follows the natural contours of the land, with the bridge landscape dissolving from different connections in a network. Cyclists, joggers, skaters and walkers have a variety of opportunities to stroll on the deck. Viewpoints and benches for rest and repose are part of the bridge landscape. Ramps, stairways and entrances are combined with the deck and are given continuous motion sequences within the bridge landscape. Many possible paths of either urban or landscape spatial links are provided. Accessibility for the slow private transport is facilitated and lends itself to easy use. This reinforces the perception of the bridge as 'a line in the landscape'.

Typical Superstructure





The 150m long main span is divided into a haunched box girder with a portion of 5m height for cross-section and 2m cross-sectional height for trussed central region. The top of the superstructure describes a slight curve with a height of 5m. The box girder is performed as a classical hollow box, which is amplified to preserve the shape fidelity with transverse bulkheads and longitudinal stiffeners.



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