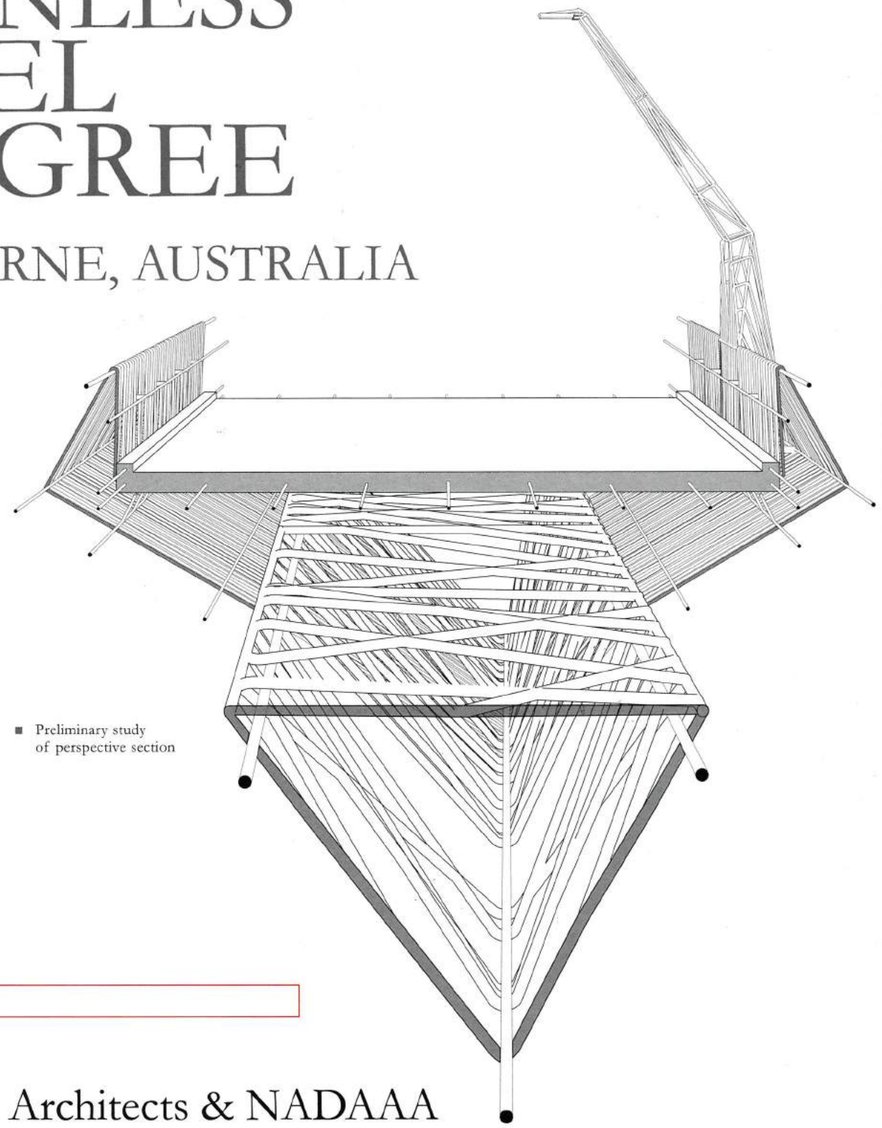
TANDERRUM BRIDGE

STAINLESS STEEL FILIGREE

MELBOURNE, AUSTRALIA



■ Preliminary study of perspective section

ARCHITECTURE

John Wardle Architects & NADAAA in collaboration with Oculus

«Our first reaction when walking the site for this bridge in winter was that it needed to become part of the landscape of the park, to emerge from the bare elm tree branches of the city's historic Speakers' Corner. This led us quickly to the idea of a filigree of thin steel threading around a minimal structure winding through the park».
John Wardle

«The vector-active system as a structural typology gains its strength and efficiencies through triangulation. However, part of that optimization comes from the hierarchies of structural members, with the separation of structure and skin that is part of classical tectonics. In this instance, the inquiry was to research a system of members - varied dimensions of rebar - whose redundancy might blur the relationship between structure and skin to help create a synthesis between the underbelly of the bridge (its fifth façade) and its other attributes such as the rail, guard, and lighting extensions. The intended result was to create a filigree structure, whose ephemeral presence in the garden could be in dialogue with the foliage that surrounds it».
Nader Tehrani

One of the most interesting challenges in today's urban fabric is how to use pedestrian infrastructure to reconnect disconnected sections of a city. Very often the new links follow the path of former railway lines. A key example is the case of Paris's Promenade Plantée, laid out some 30 years ago and perhaps the prototype of the overhead pedestrian walkway. The more recent High-Line in New York by Diller Scofidio + Renfro is further confirmation that the elevated pedestrian walkway has become almost a typological obsession, the epitome of a certain type of urban planning. Then there are other, completely new types of walkway that intelligently marry pedestrian flow requirements with often intriguing structural functionality, producing beautiful architecture that both blends with and embellishes its landscape context.

One such example is the pedestrian bridge opened last year in Melbourne, the capital of the State of Victoria. A joint three-year design, planning and construction effort across hemispheres by recognized Australian practice John Wardle Architects and the acclaimed American firm NADAAA, the new bridge is distinctly unique in its complex yet harmonious structure. Of singular interest is the program whereby the intricate structural frame and the vector forces holding up the bridge become an integral part of the architectural design with a series of variably angled 34 mm diameter steel tubes forming a transparent filigree cradle effortlessly sustaining the bridge spans and visibly demonstrating the workings of the structural frame.

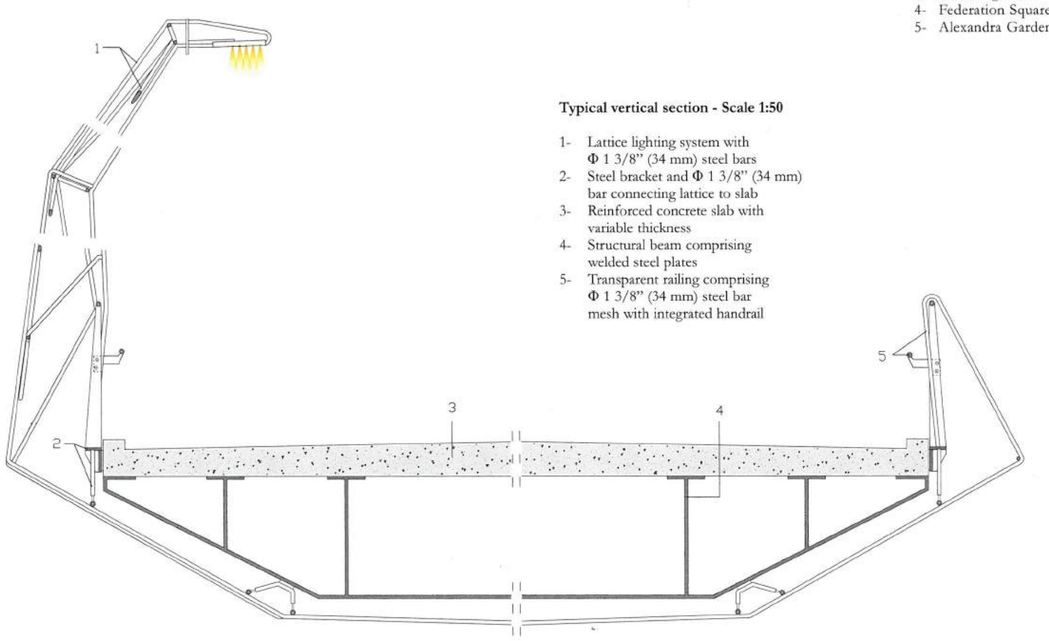
Resting on poured-in-place reinforced concrete piers, the bridge is a series of prefabricated elements. A main steel plate box girder beam, made of reinforcement rods and flat steel, is supported by a continuous filigree of steel tubes, revealing the static equilibrium forces acting on the beam. In this way, the weight-bearing elements mesh with the non-load bearing structure that rises to form 140 cm high filigree balustrading protecting walkers and bikers. The result is a wrap-around pattern of steel tubes revealing the forces at play over the bridge spans. Comprising a series of repeated modules, the steel tubes are mixed and matched to achieve an effortlessly lightweight architectural element enclosing the full 390-m length of the bridge whose main span over a busy highway stands some 44 m above the ground.

The bridge itself is divided into three main segments: two ramping access pathways and the span over the highway. The sides of the bridge and the balustrades are the result of a reiterated geometry while the elements of the central structure are unique one-off designs. The bridge's original shape follows the landscape topography before rising to span the highway. While the design provides many interesting viewpoints, it also proved a major challenge in terms of standardizing the steel profiles required. This entailed identifying homogeneous sections for which the structural elements could be repeated and so minimize fabrication costs and timeframes. In the end, however, only a small section of the bridge required uniquely fabricated elements. Each section of steel tubing comprises five different bend geometries that were mixed and matched to create the effect of a completely random ensemble. Each section wraps around the underside and is integral with the guardrail mounted on the edge of the bridge structure. In fact, real scale mock-ups proved fundamental during the design phase to define the minimum curvature of the filigree steel tubes.

The bridge was built to allow pedestrians to cross safely from Melbourne's cultural and commercial district to the city's large sports park with tennis courts that host the annual Australian Open tennis tournament but which during the rest of the year are open to anyone. The construction is part of a wider program to integrate Melbourne Park - the city's largest sports facility - with its historic center. In doing so the bridge passes by Middle Terrace, the inner city park of Birrarung Marr and into the city itself. The bridgehead is close to Speakers' Corner, the historic place where citizens can voice their opinions on any subject, similar to Speakers' Corner in London's Hyde Park. The architects underline the symbolic importance of starting from this particular point in the city synonymous with equality and democracy and ending in an equally democratic area whose sports facilities are available to all. In the same way, the bridge is at one with its setting and an integral part of the landscape.

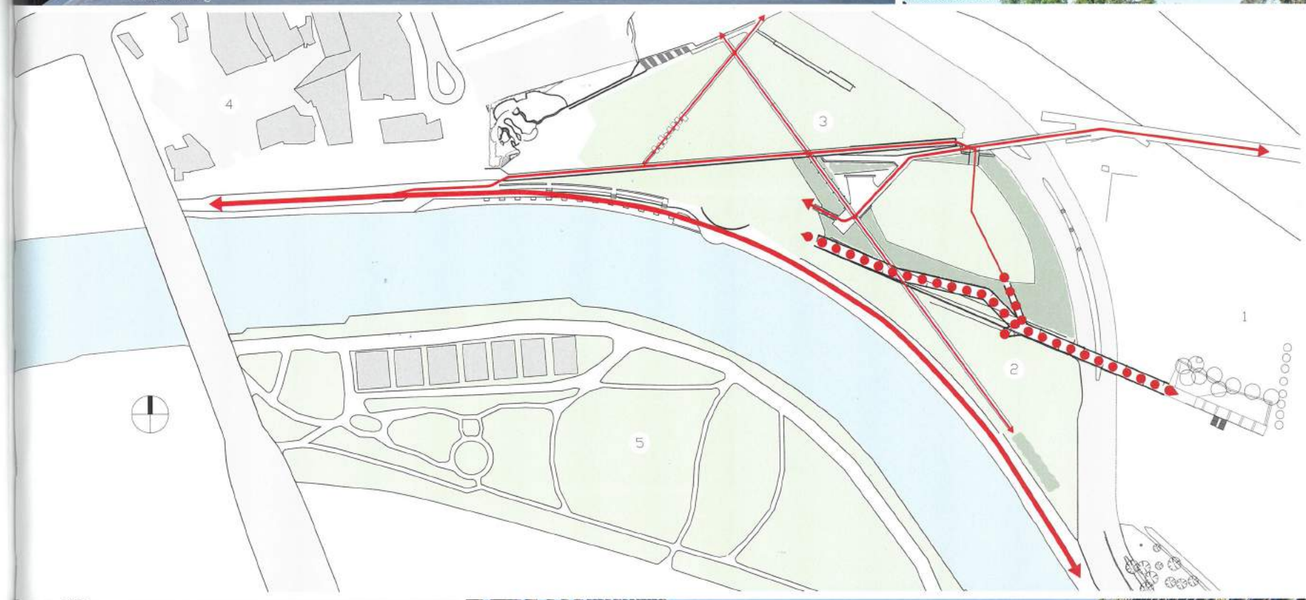
■ Site plan - Not to scale

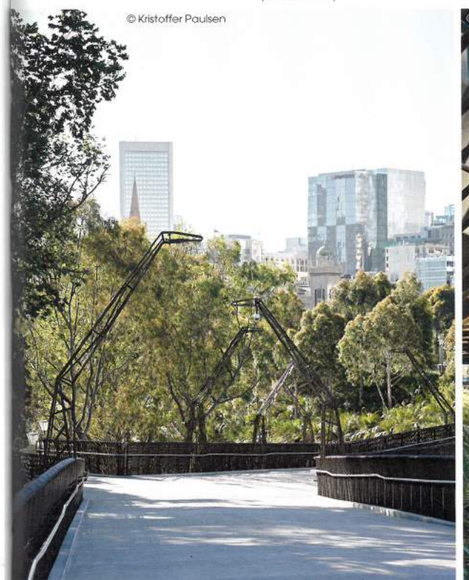
1- Melbourne Park
2- Speakers' Corner
3- Birrarung Marr
4- Federation Square
5- Alexandra Garden



Typical vertical section - Scale 1:50

1- Lattice lighting system with Φ 1 3/8" (34 mm) steel bars
2- Steel bracket and Φ 1 3/8" (34 mm) bar connecting lattice to slab
3- Reinforced concrete slab with variable thickness
4- Structural beam comprising welded steel plates
5- Transparent railing comprising Φ 1 3/8" (34 mm) steel bar mesh with integrated handrail





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CREDITS

Location: Melbourne, Australia - **Architects:** John Wardle Architects & NADAAA in collaboration with Oculus - **Client:** Development Victoria **Gross Floor Area:** 700 m^2 - **JWA Project Team:** John Wardle, Stefan Mee, Mathew van Kooy, Adam Kolsrud, James Loder, Paul Bickell, Jeff Arnold, Stuart Mann, Ruairi Molloy, Sharon Crabb - **NADAAA Project Team:** Nader Tehrani, Arthur Chang, Parke MacDowell - **Construction Team:** Fitzgerald Constructions Australia and Harris HMC **Stakeholders:** Sport and Recreation Victoria, Melbourne and Olympic Park Trust, Tennis Australia, City of Melbourne

Consultants
Structural, Building Services, Civil Engineer, Acoustics: GHD - **Geotechnics:** GHD, Golders - **Sustainability:** Cundall **Building Surveyor, Accessibility:** McKenzie Group - **Landscape Architect:** Oculus - **Lighting Designer:** Electrolight - **Heritage Architects:** RBA - **Signage and Wayfinding:** Buro North **Traffic and Pedestrian Modelling:** GHD

Suppliers
Steel Box Girder Beams: Shearform **Steel Tube Filigree Balustrading and Lightpoles:** Shearform - **Steel Paint System:** International Paint **Light Fixtures:** we-ef - **Signage:** Adherettes **Landscaping:** Ecodynamics - **Electrical:** Desa Australia

Text by Luca Maria Francesco Fabris, Milan Polytechnic
All images courtesy of John Wardle Architects and NADAAA