

ENGINEERS AUSTRALIA

Engineering Heritage Queensland

NOMINATION OF THE

Walter Taylor Bridge

For Engineering Heritage International Marker

Engineering Heritage Recognition Program



Walter Taylor Bridge over the Brisbane River – Brisbane City Council Archives

Submitted by; Engineering Heritage Australia (Queensland Branch).
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January 2025

Nomination-Walter Taylor Suspension Bridge

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Nomination-Walter Taylor Suspension Bridge

General

Name of Item:	Walter Taylor Suspension Bridge
Description of Item:	Steinman/Florianopolis type road suspension bridge
Engineering Heritage theme(s): ¹	Bridges
State/Territory Heritage listing:	Queensland State Heritage Register. Register No. 600181. Date entered in Register: 21 October 1992.
Relevant Dates:	1931-Design: 1932-Construction: Commenced 1936-Opened as Indooroopilly Toll Bridge Limited Co. Accommodation in both Pylons provided for Toll Staff 1965-Ownership transferred to BCC 1993-Timber deck replaced with precast concrete panels. 2010-Last toll family members vacated Nth Pylon. 2015-Extensive refurbishment from 1968 of bolts, plates and cables completed
Location:	Crossing of Brisbane River between Chelmer and Indooroopilly
Local Government Area:	Brisbane City Council (BCC)
Former and/or Current Uses:	Opened as a franchised private toll bridge with 2 lane road traffic and one pedestrian walkway in 1936. Taken over by the BCC in 1965 and toll removed
Owner:	Brisbane City Council
Marker Type sought ² :	Engineering Heritage International Marker Appendix A has supporting information.

Description

The bridge, which is still operating since 1936 as originally intended, has a main span of 600 feet (182.9m). When it was completed, this was the second longest clear span of any bridge in Australia, and the longest for a suspension bridge. The back-span lengths, from pylons to anchorage are 185 feet (56.4m) on the Indooroopilly (left) side and 198 feet (60.4 m) on the Chelmer side.

Although Taylor envisaged a conventional suspension bridge, the bridge eventually adopted a technique invented by the celebrated American civil engineer D.B. Steinman who built the first bridge of this type in 1926 in the town of Florianopolis, in southern Brazil, so this style is now referred to as a Florianopolis bridge. This new design differentiated from conventional suspension by raising the top member of the stiffening truss to join the catenary at the quarter points of the span. This had the effect of cancelling out some of the opposing forces, enabling cost savings in material. Taylor replaced the steel eye bar chains used in other Florianopolis style bridges with the surplus steel cables he obtained from the Sydney Harbour bridge. To achieve this, Taylor had to develop special bolted steel plate joints to connect the suspension cables to the steel trusses, and these were successfully tested by Professor R Hawken at the University of Queensland

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Engineering Faculty of Engineering. The combination of these two innovations have resulted in a unique variation of design, truly ONE OF A KIND

- The Road design provided a two-lane roadway of 26 feet (7.9 metres) and a pedestrian walkway of 5 feet 6 inches (1.6 metres).
- The decking was originally timber, consisting of 9-inch (225 millimetres) x 4-inch (100 millimetres) hardwood planks, covered with 2.5-inch (64 millimetres) asphalt. Later in 1993 all timber was replaced with precast concrete panels.
- A minimum height of 46 feet (14 metres) above high-water level was provided for shipping clearance

Significance³⁴

Historical and Social Significance

<p>An item is important in the course, or pattern, of a region's history (a);</p> <p>An item has potential to yield information that will contribute to an understanding of a region's history (d)</p>	<p>After being opened by the Governor of Queensland Sir Leslie Wilson on 14 February 1936, the new crossing provided tremendous motivation for residential development on the southern side of the river, due to improved cross river access for western suburbs. The bridge's franchise allowed the private operator to charge tolls, initially 6 pence per car and light truck but only including the driver, while passengers were charged another penny each. These were paid at the toll gate on the Indooroopilly side under the pylon and the total profit in its first year of service was £2581.</p> <p>The Indooroopilly pylon was occupied by the Toll Master, with the southern tower occupied by toll collectors and bridge maintenance. The original Toll Master was Morton John Green, and was later succeeded by his son Ron Green who remarkably had seven children growing up in their bridge home. Three generations of Green family lived in the Indooroopilly pylon for over 70 years, until 2010, when the last family members moved out.</p>
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<p>An item has strong or special association with the life or works of a person, or group of persons, of importance in a region's history (b)</p>	<p>Walter Taylor was born in Sheffield England in 1872 and emigrated to Australia in 1882. His father was a builder and Walter joined him to learn the construction industry on the job. To further his knowledge and expertise, he moved his family to England and Europe. There he spent 10 years to study and gain more experience in the construction industry, particularly in the developing field of reinforced concrete.</p> <p>From 1912 back in Australia, he spent the rest of his life developing a successful construction business in Brisbane and surrounding regions. Specialising in reinforced concrete structures, Walter Taylor developed many projects including bridges, warehouses, apartment blocks, factories, schools, hospitals, and churches.</p> <p>His first concrete bridge was the Abbotsford Road bridge over Breakfast Creek, Albion, which at that time was the longest of its type attempted in Brisbane. Although not a trained professional engineer, Walter Taylor was an astute builder and businessman, ensuring that he assembled suitably trained engineers for the detailed design work needed. He was later awarded the Queensland University of Technology's Distinguished Constructor Award and inducted into their Construction Hall of Fame.</p> <p>In 1955, Walter Taylor died at the age of 93, and while his legacy is seen around Brisbane, his suspension bridge at Indooroopilly is by far his greatest achievement.</p>
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Engineering or Technical Significance

<p>An item is important in demonstrating creative or technical achievement (c)</p>	<p>Early in 1931, Walter Taylor envisioned a suspension bridge at Indooroopilly could use the steel cables becoming redundant after construction of the Sydney Harbour Bridge. The cables had been used to support the two sides of the arch as they were cantilevered towards each other. Taylor had read a newspaper report about the arch being closed and wondered what they were doing with the redundant cables. Seeing a great opportunity to save costs, he secured a purchase agreement from Dorman Long and Co. in Sydney for the following:</p> <ul style="list-style-type: none"> • Two groups of 12 cables, with each cable 2.76 inches (70 millimetre) in diameter and 1060 ft long (323m).
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	<ul style="list-style-type: none"> Each cable contained 217 cores of gauge number 8 wire (being 0.160 inch, or 4 millimetres in diameter) wound in eight layers. Total breaking strain per cable is 350 tons, and in the design for Indooroopilly, these operate at a maximum strain of only 84 tons each.
<p>An item possesses uncommon or rare aspects of the development of engineering practice (f);</p> <p>An item could yield new or further substantial scientific and/or archaeological information (g)</p>	<p>The Walter Taylor Bridge is a rare example of a Steinman (Florianopolis) style suspension bridge. In this type, the suspension cable also forms the top chord of the stiffening truss for a section (50-60%) of the main span. The type is named for D. B. Steinman, who designed the first bridge of this style in the Brazilian city of Florianopolis, constructed in 1926 (Hercilio Luz Bridge). Others were built in West Virginia, USA, in 1928, across the Ohio River. These were demolished in 1967 following the collapse of the Silver Bridge at Mt Pleasant.</p> <p>The bridge at Florianopolis is extant. Between 1988 and 2020 access to the bridge was limited, on safety grounds. After considerable refurbishment the bridge was reopened to general traffic in 2020.</p> <p>The Walter Taylor Bridge continues to operate as intended, making it only one of two Florianopolis/Steinman type suspension bridges left in the world, and the only one to remain in continuous service throughout its life.</p> <p>As a Steinman/Florianopolis type, the Walter Taylor Bridge is unique, in that the suspension cable is comprised of wire ropes. All bridges of this type constructed in the Americas used high strength steel eye bar chains. In this respect the bridge at Indooroopilly is considered one of a kind.</p>

History

During the 1880s, a lack of a nearby road bridge led to frustrated residents lobbying the colonial government to link vehicle access from Indooroopilly to Chelmer. Their deputations were unsuccessful at this time, leaving the Victoria Bridge as the only road crossing available to cars travelling over the Brisbane River. In 1924, a Sherwood Progress Association chaired by Walter Taylor, produced a proposal for a bridge to mark the centenary of Lieutenant John Oxley's first visit to Brisbane in 1824. This would allow the old 1892 vehicular ferry used at this point to finally be replaced.

Various progress associations and shire councils then came together, forming the Indooroopilly-Chelmer Centenary Memorial Bridge League. Representations for a new vehicle suspension bridge were then made to the Brisbane River Crossing Commission, which had been appointed by the Brisbane City Council and chaired by Professor Robert Hawken of the University of Queensland engineering faculty to investigate options for future river crossings.

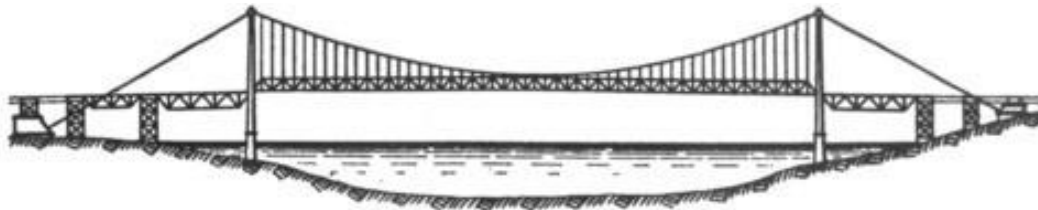
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Further traction from the 1930s great depression sparked the need for large public and private works to be implemented to provide economic stimulus. The then Moore Ministry of the Queensland Government passed measures to allow franchises to be granted to private enterprise, to build and operate public projects.

In 1931, with support from the newly established Brisbane City Council, an agreement was made with the Queensland Government for a 35-year franchise to Walter Taylor for a road suspension bridge. Walter Taylor then assigned his franchise to the 'Indooroopilly Toll Bridge Limited' private company, which raised £75,000 in capital, a formidable task during a great depression. Walter Taylor was both a director, project manager and constructor; however, all designs and plans were subject to approval by the Main Roads Commission. Although their involvement was never fully recognized at the time, it is now widely acknowledged that the detailed bridge design was completed by Walter J. Doak, Chief Engineer, Queensland Rail. The pylons of reinforced concrete and foundations designs were by Queensland engineering consultant, Russell J. McWilliam. Throughout all the design processes, Walter Taylor engaged with several consulting engineers to resolve all technical aspects to the satisfaction of the Brisbane City Engineer, E.F. Gilchrist, and the Main Roads Commissioner John R. Kemp in accordance with the terms of the franchise.

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Gallery

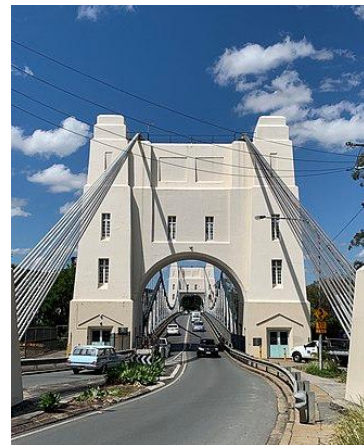
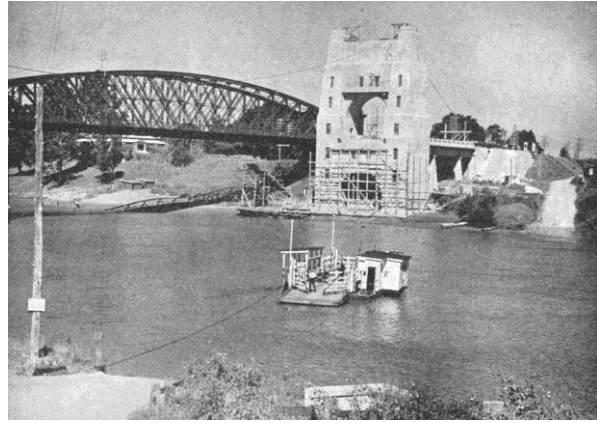


Conventional Design



Steinman/Florianopolis Design

Diagrams courtesy EHQ Brochure



Photos courtesy of BCC Archives.

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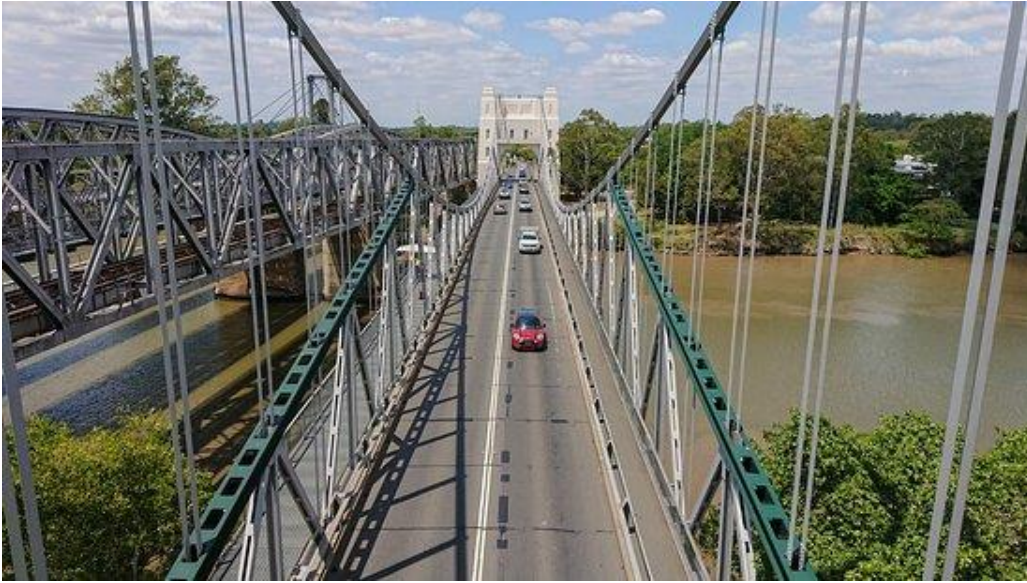


Photo courtesy of B Becconsall

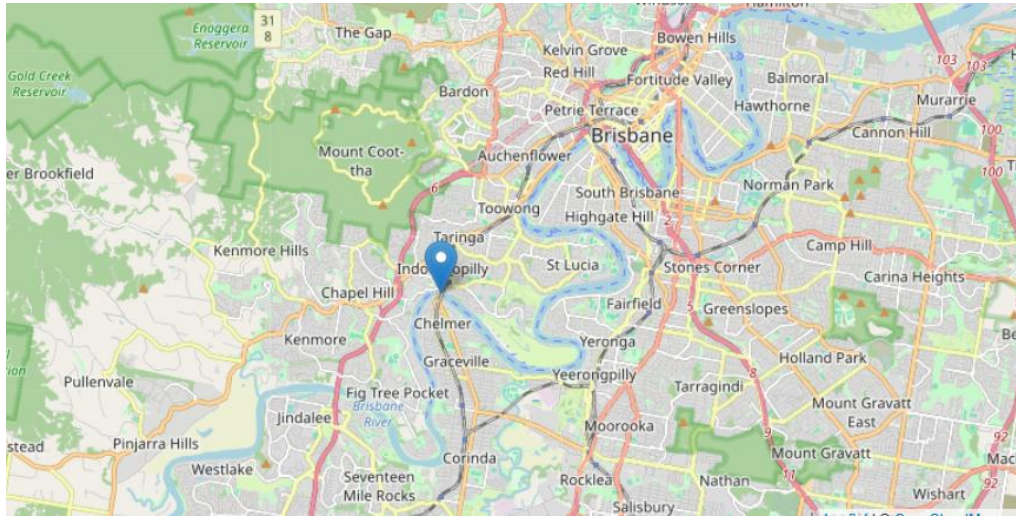


Photo courtesy BCC

All photos can be provided in high quality.

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Location Map



Notes - Interpretation Panel and Ceremony.

The Interpretation Panel (IP) will be designed in collaboration with the Brisbane City Council. EA and BCC worked closely to produce the [Walter Taylor Bridge Brochure](#). It is proposed the ceremony be held in conjunction with the 90 year celebration (of the opening of the bridge) in early 2026.

References.

Stuart Rothwell-MIEAust –EHQ-

‘The Walter Taylor Bridge- Florianopolis Australis’, paper presented to New York City Bridge Engineering Conference, 2019. Risk - Based Bridge Engineering (Ed. K. M. Mahmoud). CRC Press.

Brian Beconsall-FIEAust- Stuart Rothwell MIEAust – [Walter Taylor Bridge Brochure](#)

Colin O’Connor FIEAust -1998- “Walter Taylor Bridge” (I.E. Aust. Qld Division Engineering Update v.6, n.1, p3-8) & -2003 “Walter Taylor Bridge Conservation Plan” (Brisbane City Council)

Nick Stevens FIEAust- 2008 “Report on Walter Taylor Bridge Investigation” & -2012 “Report on Verification of Structural Adequacy of Walter Taylor Bridge after completion of Joint Maintenance”, Brisbane City Council.

[American Society of Civil Engineers “Silver Bridge Collapse and Creation of National Bridge Inspections Standards”](#)

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APPENDIX A - Supporting the International Marker Nomination

The 2024 EHRP Guidelines pp7-8 state:

The Engineering Heritage International Marker is intended for those items which have significance beyond Australia. The item (the specific item, not a “representative example”) must meet the following criteria:

1. Must be “Australian” as defined in the previous Section

To be considered “Australian” the item must be:

- a. Invented or designed in Australia or by Australians, or
 - i. ***While the Florianopolis (Steinman) style of bridge is the concept of the celebrated American bridge engineer, David B. Steinman, the Walter Taylor Bridge was planned and designed in Australia by Australian engineers.***
 - ii. ***The Walter Taylor Bridge has always been the only Florianopolis/Steinman type in Australia.***
- b. Constructed in Australia or by Australians (from Australian or imported components), or
 - i. ***The Walter Taylor Bridge was fully constructed in Australia from Australian materials. All structural steelwork was fabricated on site.***
 - ii. ***The steel wire rope used for the suspension cable was sourced from remnant material used for the tiebacks during construction of the Sydney Harbour Bridge.***
 - iii. ***At the time of construction, it was the second longest span of any bridge in Australia after the Sydney Harbour Bridge.***
 - iv. ***When constructed it was the longest suspension bridge in Australia. It still is.***
- c. Operated in Australia for a substantial portion of its life, or
 - i. ***The Walter Taylor Bridge was operated as a toll bridge from 1936 to 1965 by the Queensland company Indooroopilly Toll Bridge Ltd.***
 - ii. ***From 1965 the bridge has been maintained by Brisbane City Council.***
- d. Operated by Australians overseas as part of an enterprise significant in Australian history (e.g. military service, exploration, scientific study).

Not applicable

2. Must be of international engineering significance (recognised internationally and of interest to international researchers and visitors) due to:

a. Innovation, design, construction, or

- i. ***The Walter Taylor Bridge is based on a style developed by the celebrated American bridge engineer, David B. Steinman, for a bridge (the Hercilio Luz Bridge) constructed at Florianopolis in Brazil. Hence, this style is described as either a Florianopolis or Steinman type.***

The principal characteristic of a Steinman/Florianopolis type bridge is that the suspension cable forms a part of the top chord of the stiffening truss. In a usual suspension bridge, the suspension cable and stiffening truss are separated.

The Walter Taylor Bridge and the Hercilio Luz Bridge (in Brazil) are now the only extant examples of this type in the world.

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The Hercilio Luz Bridge used eye bar chains as the suspension cables, while wire rope suspension cables were adopted for the Walter Taylor Bridge, salvaged from the tie-back falsework used to construct the Sydney Harbour Bridge. To connect these cables to the stiffening truss, the Australian designers of the Walter Taylor Bridge developed bespoke bolted clamp plate joints and tested them locally at the University of Queensland. These two distinct particulars, the wire rope suspension cables and the bolted clamp plate joints make the Walter Taylor Bridge an internationally unique Steinman type.

b. By association with an internationally significant enterprise, or

- i. The Walter Taylor Bridge, adopted wire rope suspension cables salvaged from the tie-back falsework used to construct the Sydney Harbour Bridge.*
- ii. The Walter Taylor Bridge is based on a style developed by the celebrated American bridge engineer, David B. Steinman, who - in association with the English Electric Company of Australia – submitted an unsuccessful suspension bridge bid during the Sydney Harbour Bridge (SHB) tender process, circa 1924, which predated the eventual first constructed example of this type at Florianopolis in Brazil. An elevation of the proposed Steinman bridge in the SHB tender report indicates a style like the one eventually adopted by Steinman at Florianopolis and by Taylor et al at Indooroopilly. Although Steinman used eye bar chains for the Hercilio Luz Bridge at Florianopolis, the tender design for the SHB proposed steel wire rope suspension cables, so the Australian designers of the Walter Taylor Bridge had a model for their bridge at Indooroopilly, which adopted steel wire rope suspension cable.*
- iii. The Australia Section of the American Society of Engineers wishes to nominate the bridge as an ASCE International Historic Civil Engineering Landmark (IHCEL) and will welcome EA endorsement.*
- iv. In August 2019, an EA Queensland Heritage Committee member (and ASCE – Australia Section Director) presented a paper on the Walter Taylor Bridge at the 10th New York City Bridge Conference, which was subsequently published as follows:
Rothwell, Stuart (2019). “The Walter Taylor Bridge – Florianopolis Australis”. Risk-Based Bridge Engineering (ed. K. M. Mahmoud). CRC Press.*
- v. David Steinman became one of the great American bridge engineers. His achievements include the Mackinac Bridge in Michigan (1957). While Steinman had no direct involvement in the Walter Taylor Bridge, it remains a legacy of his early career.*

c. May qualify on the grounds of international rarity

- i. Only four ‘Steinman’ type suspension bridges have been built.*
 - The Hercilio Luz Bridge at Florianopolis, Brazil (1926)*
 - The Silver Bridge over the Ohio River at Mt Pleasant, West Virginia (1928)*
 - A sister to the Silver Bridge on the Ohio River at St Marys, West Virginia (1928)*
 - The Walter Taylor Bridge at Indooroopilly, Brisbane, Australia (1936)*

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So, the Walter Taylor Bridge is a member of an exclusive club.

The Hercilio Luz Bridge is still extant. From 1988 – 2020, access to the bridge was limited, on safety grounds. After considerable refurbishment the bridge was reopened to general traffic in 2020.

The two bridges in West Virginia, over the Ohio River, were removed in 1967, following the collapse of the Silver Bridge at Mt Pleasant.

The Walter Taylor Bridge continues to operate as intended, making it only one of two Florianopolis/Steinman type suspension bridges left in the world, and the only one to remain in continuous service throughout its life.

- ii. The Hercilio Luz Bridge, and the two Ohio River bridges all used eye bar chains as the suspension cables.*

Steel wire rope suspension cables were adopted for the Walter Taylor Bridge, salvaged from the tie-back falsework used to construct the Sydney Harbour Bridge. The Walter Taylor Bridge was the only Florianopolis/Steinman bridge anywhere in the world to use steel wire rope for the suspension cables. To connect these cables to the stiffening truss, bespoke bolted clamp plate joints were developed and tested locally by the Australian designers.

The clamp plate joints were tested at the University of Queensland under the supervision of Prof R W H Hawken, Dean of Engineering. Hawken was instrumental in founding the Institution of Engineers, Australia and was President of its Provisional Council in 1923.

These two distinct particulars, the wire rope suspension cables and the bolted clamp plate joints make the Walter Taylor Bridge an internationally unique Steinman type.

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