

To: South Australian Heritage Committee  
From: Senior Historic Architect  
Subject: REGISTER NOMINATION REPORT: HOLLAND STREET BRIDGE, HINDMARSH/THEBARTON  
(FORMER TRAMWAY BRIDGE)  
Date: 4th May, 1982

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#### SUMMARY

This report has been prepared because of a Ministerial request to assess the historical significance of the Holland Street Bridge following the River Torrens Flood Mitigation Report which proposed that the bridge be replaced. The Cawthorne Street Bridge, the other of the two former Tramway Bridges was built as a duplicate of the Holland Street Bridge in 1922, when the Hindmarsh tram line was duplicated. The Branch does not intend to nominate the Cawthorne Street Bridge for two reasons:-

- 1) The heritage significance is diminished because the bridge was built considerably later than the Holland Street Bridge and was a copy of a much earlier design.
- 2) The Cawthorne Street Bridge has been declared unsafe for traffic because of extensive undermining of the piers and shear cracks in the webs.

Historically, the Holland Street Bridge is significant because it is one of the first reinforced concrete bridges constructed in the State and was designed by Sir William Goodman, whose responsibility to provide Adelaide with an electrified tramway system led to his knighthood.

Architecturally, the Holland Street Bridge is significant as one of the earliest known reinforced concrete bridges in South Australia, and possibly the first monolithic pier and beam bridge in the State.


Environmentally, the Holland Street Bridge is significant as an important local traffic link across the river, and also as a recognised local landmark.

The Integrity of the Bridge is high, and not diminished by the only noticeable alterations - the addition of protective fences and Hotmix laid over rails.

The Bridge is not in the Register of the National Trust, but has been identified in the Western Metropolitan Heritage Study.

#### RECOMMENDATION

It is recommended that the Holland Street Bridge, Hindmarsh/Thebarton, be included on the Register of State Heritage Items, and that it be categorised H.2, H.3, A.3.

  
Barry G. Rowney  
SENIOR HISTORIC ARCHITECT

CW:BAH  
4.5.82

REGISTER RESEARCH: HOLLAND STREET BRIDGE, HINDMARSH  
AND CAWTHORNE STREET BRIDGE, HINDMARSH

Linked with the State's public transportation development, the Holland Street bridge was constructed as part of the tram service to Hindmarsh and beyond. In 1876 the Tramways Act was first enacted in South Australia "to authorize the construction, maintenance and working of tramways for horse traction in and between certain parts of the City of Adelaide and the town of Kensington & Norwood and places suburban thereto, and for other purposes".<sup>1</sup> It was not, however, until 1881 that the Adelaide and Hindmarsh Tramway Co. were authorized to carry out works in the Hindmarsh area. This was one of many private companies that came into existence to provide transport. There is no evidence to indicate that the private company constructed a bridge over the Torrens in the area.

In 1901, the Adelaide City Council advocated the acquisition and electrification of all existing tramlines under central control<sup>2</sup> and after considerable controversy the whole of the city tramways were purchased by the State Government for two hundred and eighty thousand pounds in 1906. The Hindmarsh tram service was purchased as part of the new scheme, and the Municipal Tramways Trust came into being. Responsible for the construction of the new system, it employed Sir William Goodman as Chief Engineer and General Manager to supervise the installation of the electric tram system.

Messrs. Smith and Timms were contracted to carry out the work in 1908. It is reported that in the same year the contractors had extended lines along North Terrace West towards Thebarton and Henley Beach.<sup>3</sup> When approached the Thebarton and Hindmarsh Councils declined to contribute to the cost of erecting the new bridge so as a result no provision was made for road traffic. On June 26th, 1909, the Manton Street bridge was opened to horse drawn carts only (Parsons, p.205). Radcliffe & Steele (1974, 66) mention that subsequently:

"A major change took place on the Hindmarsh line on January 14, 1923, when the former route via Henley Beach Road and Parker Street was replaced ... The return journey was over a new bridge from Manton Street to Cawthorne Street and thence via Light Terrace, a reserved track on the eastern side of Shierlaw Terrace, and kerb running on the northern side of the Port Road".<sup>4</sup> (1974; 66)

This second bridge, now closed to all traffic, is jointly owned by the Thebarton and Hindmarsh Councils. The Manton Street bridges were converted for vehicular traffic after 1953, when a decision was made by the M.T.T. to replace suburban tram and trolley buses with diesel buses. At a conference between the Hindmarsh and Thebarton Councils in 1953 it was agreed that the bridge should be retained, but difficulties arose over the funding for repairs. Eventually, arrangements were made with the Minister for loads to strengthen the bridge's structure and after a limit of 5 tons was placed on traffic using the bridges, they were both opened for traffic in 1962. After the piles under the Cawthorne/Orsmund Street bridge were undermined by the river, the bridge was closed.<sup>5</sup> (Parsons, 1974; 265)

These bridges may be viewed as significant in a local context as part of early settlement patterns and as an illustration of the development of transportation during the late 19th century and early 20th century. They establish continuity between earlier travel patterns and contribute to an appreciation of the evolution of public transport in the metropolitan area.

Sources:

J.C. Radcliffe & C.J.M. Steele: Adelaide Road Passenger Transport 1836-1958

R. Parsons: Hindmarsh Town, Hyde Pk. Press, 1974.

"The Critic" The Tramways of Adelaide, Adel., 1909.

S.L.S.A. Archives

E. & W.S. Dept. Records.

Footnotes

1. The Tramways of Adelaide, 1909, p.9.

2. The Tramways of Adelaide, 1909, p.13.

3. The Tramways of Adelaide, 1909, p.19.

4. Radcliffe & Steele 1974, p.66

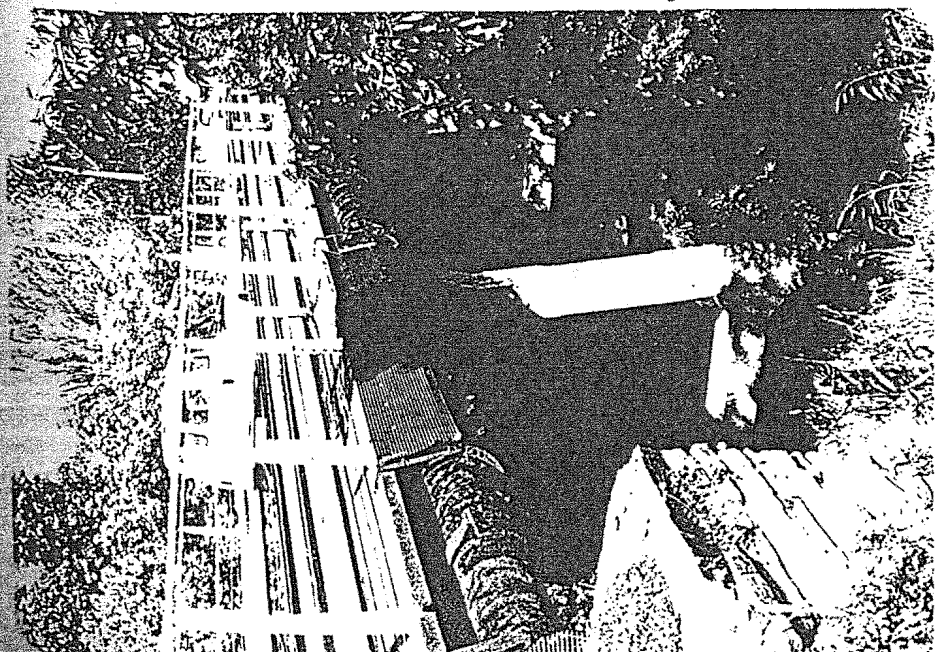
5. Parsons 1974, 265

Iris Iwanicki  
Register Historian

II:JD  
2/4/82

South Australian Heritage Act 1978-80	Register of State Heritage Items ITEM EVALUATION SHEET Buildings and Structures Item HOLLAND STREET BRIDGE, HINDMARSH.					
Age 1908	Theme TRANSPORTATION - LAND.	Office				
Period 1884-1913	Subject	Region Adelaide Metro.				
Building Type BRIDGE	Style -	Status -				
<u>Qualitative Data</u> Component <u>History</u>		Grading E VG AG FP NA				
1.Context: Associated with electrification of tram system in 1908 and the State's assumption of responsibility for public transport in the metropolitan area, and believed to be one of the first reinforced concrete bridges in South Australia.			*			
2.Person/Group: Sir William Goodman, born 1872 in Kent. Chief Engineer and General Manager of the Municipal Tramways Trust, was responsible for electrification of tramways and the design of the bridge.			*			
3.Specific Event: 26th June, 1909 - opened.			*			
<u>Architecture</u>						
4.Designer: Sir William Goodman.		*				
5.Design: Pier and beam bridge. Original drawing (see attachment) shows two designs. Wide bridge designed to carry cars as well as trams. As the Hindmarsh and Thebarton Councils were not prepared to contribute 1,500 pounds each to construction cost, a narrow 16 foot wide bridge was built for trams only.			*			
6.Construction: Reinforced concrete. Three continuous 12.2 metre spans of four in situ girders, monolithic with piers.			*			
7.Interior: Not applicable.						*
8.Representation: One of the earliest known reinforced concrete bridges in South Australia - (the railway bridge at Watson's Gap, Victor Harbor, was the first reinforced concrete arch bridge and possibly the first reinforced concrete bridge in South Australia). The railway bridge at Hindmarsh River, Victor Harbor, 1907, was the first reinforced concrete beam and slab bridge in Australia.		*				

South Australian Heritage Act 1978-80	Register of State Heritage Items ITEM EVALUATION SHEET Buildings and Structures Item HOLLAND STREET BRIDGE, HINDMARSH.						
Component <u>Environment</u>		Comment Grading E VG AG FP NA					
9. Continuity:	The simplicity of the structure and low horizontal lines of the balustrade are visible but not intrusive from the approach roads or from the adjacent landscaped banks.		*				
10. Local Character:	The bridge is an important local traffic link across the river as well as a familiar local landmark.	*					
11. Landmark:	Historical use for traffic as well as proximity to the landscaped banks beside the Brewery have contributed to the landmark status of the bridge.		*				
<u>Integrity</u>							
12. Alterations:	The only major alterations have been the installation of Armco protective fences within the original balustrade to provide a narrow pedestrian walkway and re-surfacing of the roadway with asphalt which covers the original rails and sleepers of the tram line.		*				
13. Condition:	Spalling of concrete on some structural members has exposed reinforcement. Rate of deterioration has slowed since the trams were removed, and it is anticipated that the bridge can carry present loads for some years.			*			
14. Compatability:	Still used for vehicular traffic - although private rather than public transport.		*				
<u>Supplementary Information</u>							
15. <u>Adaptation:</u>	The bridge has already been converted from use by trams and later, trolley buses to a road traffic link, and as it is not considered practical to strengthen the bridge, as restrictive load limit is likely to continue.						
16. <u>Interpretation:</u>	As a visible communication link will continue in a passive interpretive role.						
17. <u>Current Situation:</u>	The Engineering and Water Supply Department has carried out a more detailed examination of the River Torrens and no longer considers it necessary to demolish the bridge for flood mitigation purposes. Until such time as the Government constructs a north-south freeway, the bridge will be retained to assist in local traffic movements across the River Torrens.						
Evaluated By	Carolyn Wigg Register Architect	Iris Iwanicki Register Historian	Date				
Reviewed By				Date			
South Australian Heritage Committee Categorization			Date				

South Australian Heritage Act 1978-80	<h2 style="text-align: center;">HERITAGE SURVEY</h2> <h3 style="text-align: center;">ITEM IDENTIFICATION SHEET</h3> <div style="margin-top: 10px;">           ITEM NAME:      Bridge             Former or other      Tramway Bridge         </div>	PROJECT HINDMARSH HERITAGE SURVEY Item Ref. No.  Office Use ITEM No. DOCKET No.
<h4>HERITAGE SIGNIFICANCE</h4> <p>A most important event in suburban development generally, as well as in Hindmarsh, during the late 1870s was the construction of the horse tram system, one of the earliest companies formed being the Adelaide and Hindmarsh Tramway Co. Ltd. of 1877.</p> <p>By 1907 all the private horse drawn systems were taken over by the Municipal Tramways Trust and the lines were converted for use by electric trams.</p> <p>Sir William Goodman was employed to supervise the installation of the new system (a responsibility that led to his knighthood) and it was in this capacity that he designed the Manton Street-Holland Street bridge crossing the Torrens. Built to carry a single line of tram track only it was officially opened in 1909 and remains one of the earliest known reinforced concrete bridges in South Australia.</p> <p>Its heritage significance is further enhanced in that it remains one of two surviving Adelaide tramways bridges of the early twentieth century.</p>		LOCATION Address      Manton St.  Town      Hindmarsh Postcode Section      353 Hundred      Yatala County L.G.A.      Hindmarsh S.H.P. Region      2  C.T.      ,  SUBJECT 4.7 4.10  PERIOD State  Study Area 1875-1913
<h4>REFERENCES</h4> <p>National Trust 3276          Parsons, pp 205 and 266          Heritage Conservation Branch files</p> <p>Verbal      Denis Cumming, 1985          Archival photographs</p>		TYPE OF ITEM LAND Natural feature <input type="checkbox"/> Historical site <input type="checkbox"/> Historical Gdn. <input type="checkbox"/> BUILDING <input type="checkbox"/> STRUCTURE <input checked="" type="checkbox"/> PHYSICAL CONDITION
<h4>PHOTOGRAPH</h4> <div style="display: flex; justify-content: space-between;"> <span>Film No.      2</span> <span>Negative No.      17</span> </div> 		<h4>STATUS</h4> <p>Reg. of State Her. Items          Reg. <input type="checkbox"/> Interim L <input type="checkbox"/>          Nominated      X          National Estate          Reg. <input type="checkbox"/> Proposed L <input type="checkbox"/>          National Trust              CL <input checked="" type="checkbox"/> RL <input type="checkbox"/> File <input type="checkbox"/>          Other          Institution of Engrs. <input checked="" type="checkbox"/> <input type="checkbox"/></p> <h4>RECOMMENDATION</h4> <p>(A) State <input checked="" type="checkbox"/> (B) Local <input type="checkbox"/></p> <h4>PREPARED BY</h4> <p>HERITAGE INVESTIGATIONS          Date: 1984</p>



Holland St Bridge, Hindmarsh / Thebarton.

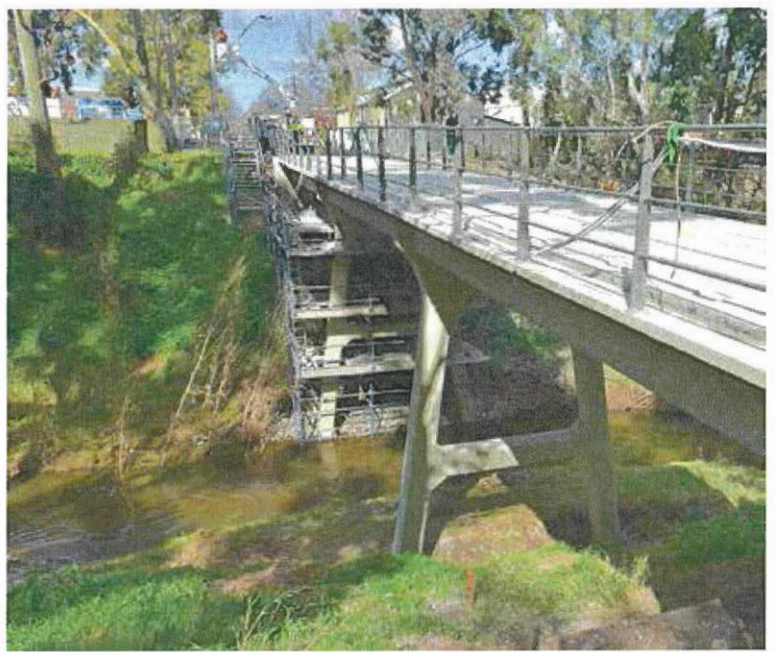
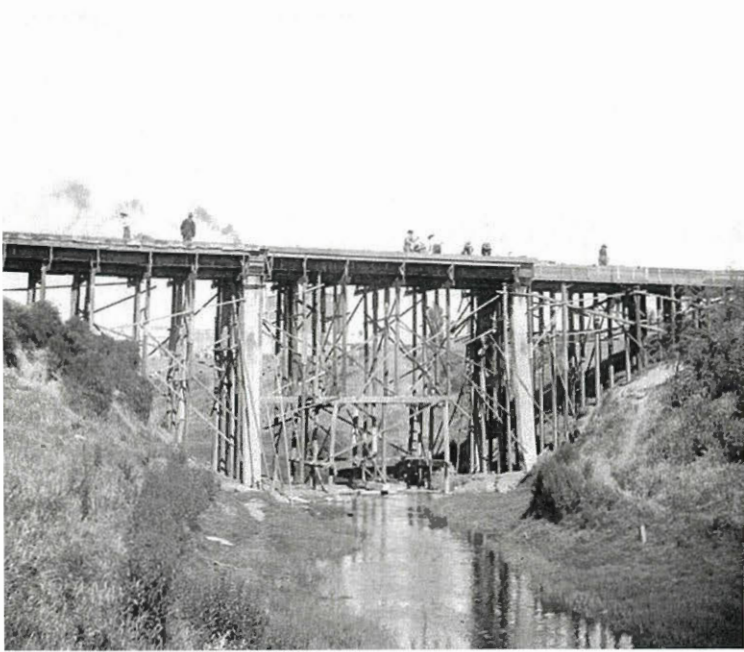




10987 Holland Street Bridge







# Sir William Goodman Bridge Official Opening Commemorative Booklet

The Sir William Goodman Bridge restoration is a \$2.6m project, jointly funded by the City of Charles Sturt, the City of West Torrens, Department of Planning, Transport and Infrastructure.

**Where:** Cnr Manton & Adam Street, Hindmarsh

**Date:** Saturday 13 September 2014

**Time:** 11.00am - 1.00pm

The original bridge, built in 1908 thought to be the first reinforced concrete bridge to be built in Adelaide metropolitan area and the second oldest reinforced concrete bridge in South Australia.



# Naming the Bridge

- The bridge has been commonly referred to by the general community, since the late 1940s, as the Holland Street Bridge. It was never formally or officially opened or named – it simply went into service when horse trams began using the bridge in April 1909.
- Engineering Heritage SA was invited to make recommendations which were submitted to the City of Charles Sturt on 12 April 2013. They favoured a name with a clear and direct association with the bridge and considered there were only two choices with direct relevance:

## **The Sir William Goodman Bridge**

This name has been used by the City of Charles Sturt in recent years and recognises the role of Sir William Goodman. Initially appointed Electrical Engineer, he was Chief Engineer of the Adelaide Municipal

Trust at the time the bridge went into service and was appointed General Manager on 24 August 1908.

Goodman was responsible for the conversion of horse trams to electric traction and the expansion of tram services from Adelaide to surrounding suburbs which led directly to the need for the bridge.

## **The Holland Street Tramway Bridge**

The “Holland Street Bridge” is the familiar name generally used by the community. It precisely describes its location but not its original purpose which is no longer apparent. The addition of “Tramway” would address this shortcoming.

- The City of Charles Sturt has formally named the bridge “The Sir William Goodman Bridge”. Engineering Heritage SA supports this move.



# Who is Sir William Goodman?

Sir William George Toop Goodman, KCB, MICE, MIEE, MIEAust 1872 – 1961



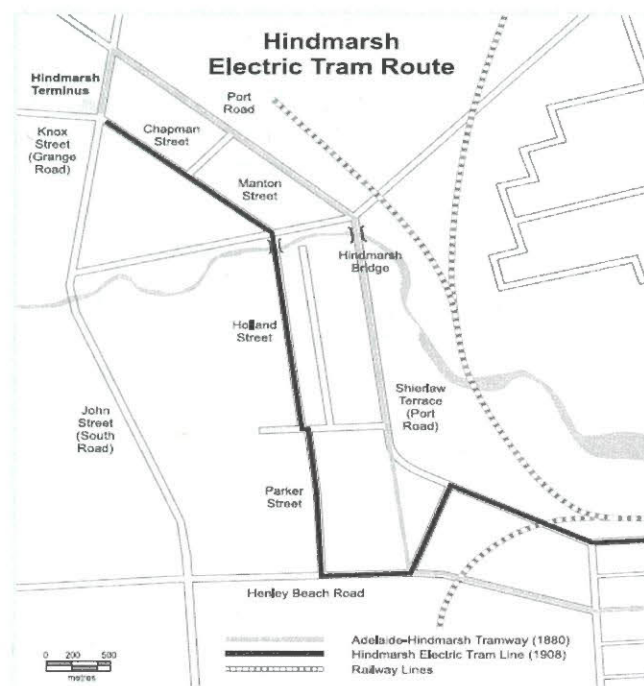
*W G T Goodman, JP, MICE, MIEE, & Chief Engineer and General Manager of The Municipal Tramways Trust of Adelaide, 1909*

- 1872 - William Goodman was born 14 March in Ramsgate, Kent, England where he attended St George's Boys' Central School, Ramsgate.
- He then joined the Poole & White, an engineering firm in London.
- 1893, 7 January he married Florence Letitia Attreed.
- 1895 he installed the first electric plant at the Mount Lyell mine in Tasmania.
- 1897-1900 NSW Assistant Electrical Engineer (tramway construction branch), Department of Public Works.
- After which he joined Noyes Brothers Pty Ltd (which built the tracks of New Zealand's first electric tramway at Dunedin).
- 1903 Goodman became that Dunedin's electrical engineer and inspected tramway systems around the world.
- 1907 Adelaide's new Municipal Tramways Trust (MTT) and Goodman became chief engineer. In 1908 he also became general manager. He held this joint role (Chief Engineer and General Manager) for 42 years.
- His proposals to open the grassed city squares and sacrosanct parklands and to remove 150 trees for laying tracks embroiled him in controversy but he won.
- Contracts were let for 90 km of track, a depot, 100 trams, an administrative building at Hackney, and a power station.
- Despite delivery delays, electric trams were running by November 1908 and the formal opening took place on 9 March 1909.
- Electrification was completed by 1914 and a separate Port Adelaide system was opened in 1917.
- 1917 – Commissioned by the Federal government to visit Britain, Europe and the United States of America to investigate munitions factories; while there he learned to fly.
- 1921 - He reported on Brisbane's electric tramway system.
- Early 1920's returned servicemen began to operate buses in competition with the Adelaide trams.
- 1925 - Goodman purchased forty American Mack buses as a counter measure although his choice was criticized; they lasted twenty-five years.
- 1927 he sat on the Metropolitan Omnibus Board which licensed private bus operators; he circumvented further competition by buying eighty-two private buses for the MTT.



- 1928 he served in Auckland on a royal commission into its transport and next year he was a member of a Commonwealth-States inquiry into the Hume Reservoir.
- 1929 the Trust took over the two Adelaide-Glenelg steam railways: Goodman converted the southern line to a high-speed, reserved track, electric tramway which still operated in its original form and with the same cars until 2007 when the track was upgraded and new cars imported from Europe
- 1931 he chaired the important royal commission on the South Australian Railways which reviewed Commissioner W A Webb's era.
- 1932 Goodman's services to Adelaide were recognized by a knighthood.
- 1938 - Goodman replaced Port Adelaide's trams with double-deck trolley-buses.
- 1937-1944 he was chairman of the new and successful South Australian Housing Trust which provided small homes at low rents.
- He was a director of several companies and a member of the council of the University of Adelaide from 1913 to 1954, playing a valuable role on its finance committee.
- 1945 Goodman received the Peter Nicol Russell memorial medal from the Institution of Engineers Australia
- 1950 Sir William Goodman retired.
- 1961, 4 February after three years in hospital, College Park, Sir William Goodman passed away.
- He was buried in North Road cemetery, Nailsworth.

## History of the Bridge



*Proposed route of the electric tram service to Hindmarsh – by moving the line away from Port Road, more households would have access to the cars*

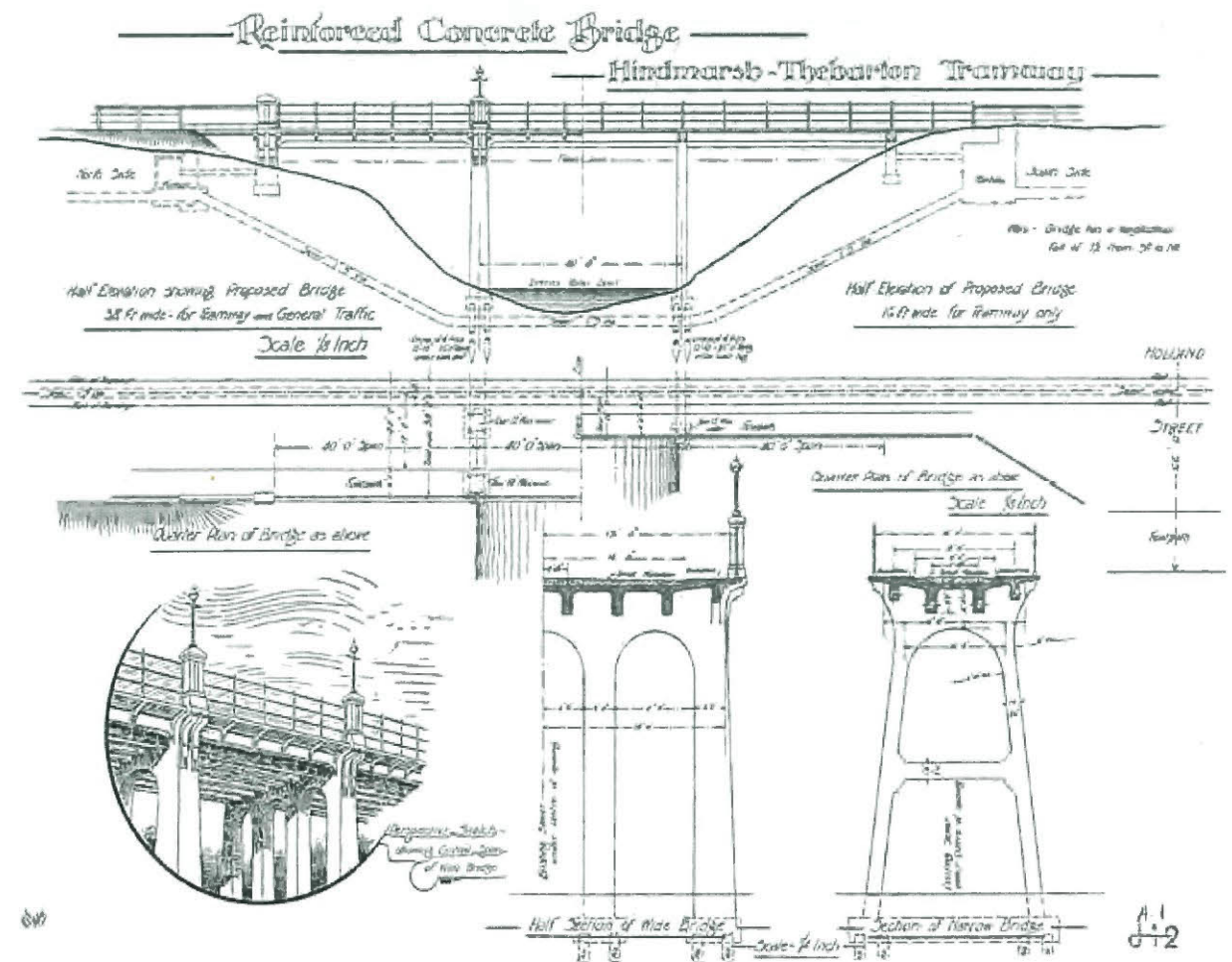
- In 1880 a tramway between Adelaide and Hindmarsh was constructed to allow either steam or horse transaction.
- The combination of train and tram services provided a boost to the Hindmarsh District's population by allowing residents working in the city to commute daily.
- By March 1908, the Municipal Tramway Trust had determined that the Hindmarsh line would cross the River Torrens at the end of Holland Street.
- The extension of the electric tramway from Adelaide in 1909 included a route change to Holland Street from its previous location skirting the Adelaide Parklands.
- The Sir William Goodman Bridge was built in 1908 as a tram bridge

- It was the first concrete bridge reinforced with steel to be built in the Adelaide metropolitan area and the second in SA to use the girder system
- The bridge was first used by a horse tram service while the electric network was being completed. The first electric tram services began using the bridge in March 1910

## Designing the Bridge

- The bridge was designed by Sir John Monash as the engineer for the Reinforced Concrete & Monier Pipe Construction Company in Melbourne, in conjunction with the South Australian Reinforced Concrete Company (which Monash had set up in 1906)
- In mid-April 1908, Monash provided William Harvey the SA Reinforced Concrete Company's (SARCCo) Resident Engineer with outline drawings and estimates for two bridges: a narrow tram-only bridge to cost £1400 and a wider bridge to also carry traffic, costing £2900
- At the end of May, the Municipal Tramway Trust (MTT) called tenders, allowing just under four weeks for responses; the advertisement appeared once and the *Register* said that two tenders had been received

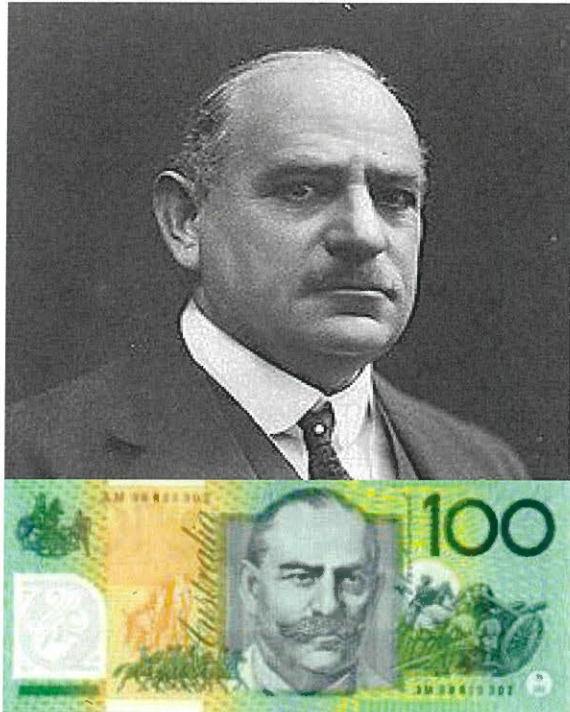
*The presentation drawing included in the SA Reinforced Concrete Company's tender and dated 14 April 1908 (Monash's preliminary calculations were also included and these are dated 5 April 1908)*





## Designer of the Bridge

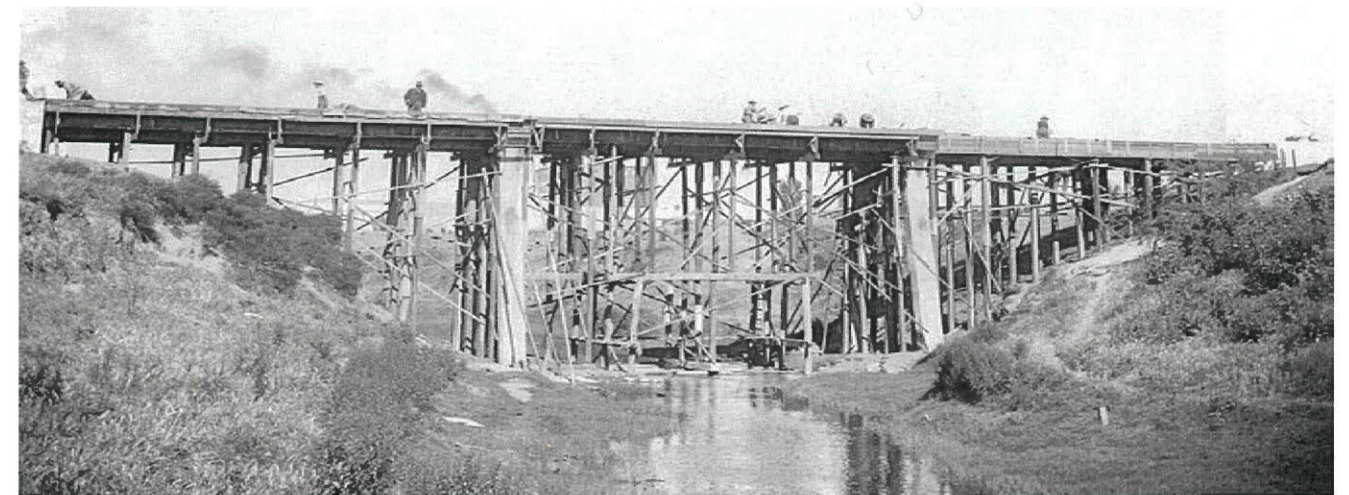
General Sir John Monash GCMG, KCB, VD 1865 – 1931



- Doctor of Laws (Melb), Doctor of Engineering (Melb), Doctor of Civil Law (Oxford) and Doctor of Laws (Cambridge).
- Civil and structural engineer 1891-1914 and an early exponent of reinforced concrete in Australia. Designed 6 bridges in SA
- Founder of the Reinforced Concrete and Monier Pipe Construction Company and SA Reinforced Concrete Company
- Served in First World War at Gallipoli and was the Allied Commander and became a Lieutenant General. Is the only Australian General ever knighted on the battle field by an English King
- General Manager and Chairman SEC, Vic
- **Fun Fact: Sir John Monash appears on the current \$100 bill AUD**

## Building the Bridge

- The MTT had accepted the SARCCo offer on 16 July and Harvey told Monash that work on the piling, which would provide the foundation for the supporting trestles, would start immediately
- The bridge was completed in December 1908, and the single track was laid in February 1909; however, the overhead electrical lines were not finished and a horse tram service began running in June.
- The bridge was fully complete ready for use by March 1910
- The piles were cast on the banks of the river and nearly two months were allowed for the concrete to cure before driving commenced at the end of September





## A New Life for Holland Street Bridge



- The Holland Street Bridge continued to be open for various uses to the public until 2010 when concern about the bridge's safety led to its closure.
- Engineering consultants reported on the bridge and, in February 2011, they concluded that the bridge had served its "functional life"; it was in a "state of disrepair" and should remain closed "indefinitely"
- However, the bridge is a popular and convenient crossing point. It provided a connection to the River Torrens Linear Path and access to the Hindmarsh Soccer Stadium and the Adelaide Entertainment Centre
- There were a few options:
  - Have the State Heritage listing removed, demolish the bridge, then construct a new one
  - Carry out minimal repairs to preserve the bridge as a "managed ruin" and then build a new bridge to complement the old
  - Remediate and re-use the bridge
- Heritage SA advised that they would not accept the first option. The most desirable option, from both a heritage and community point of view, was to remediate and reuse the bridge.
- Engineering assessment in 2011 found that the third option was feasible a trial repair of one girder in 2013 demonstrated remediation to be cost effective long term solution.

## Reconstructing & Repairing the Bridge

- The total cost of the works was \$2.6 million (including professional fees, trial repairs and \$200,000 construction contingency).
- The City of West Torrens made a contribution of \$0.8 million to the cost of reconstruction and ongoing maintenance.
- The City of Charles Sturt made a contribution of \$0.6 million to the cost of reconstruction and will maintain the bridge for the next 80 years.
- The State Government also provided an Open Space Grant of about \$1.2 million which provided the balance of the funds to allow the project to proceed
- Final cost of the work is \$2.3 million
- Additional steel reinforcement was added to the bottom of the outer beam together with additional N24 bars lapped with the badly corroded reinforcement; all new bars were coated with a zinc rich primer.
- The depth of the outer beams was increased by approximately 75 mm to accommodate the additional bottom reinforcement.
- New concrete was then poured into formwork to enclose the additional reinforcement and to restore the bottom of the beam.
- Carbon fibre reinforcement in discrete vertical strips was applied to the sides and bottom of all the beams as shear reinforcement, as the beams did not comply with current requirements.
- Two fairing coats (a thin render) were applied to the concrete surface to provide a suitable surface for the application of the coating system.
- A coating system, approved by Heritage SA, was applied to the beam and the underside of the cantilever slab adjacent to the beam to protect the existing and repaired concrete from future corrosion.

*The repair process involved the following:*

- All damaged and cracked concrete was removed, and a space provided around the existing bottom reinforcement to allow the new concrete to be poured around it
- All existing reinforcement which was corroded was grit-blasted back to bare metal.
- All existing reinforcement was then coated with a zinc rich paint.

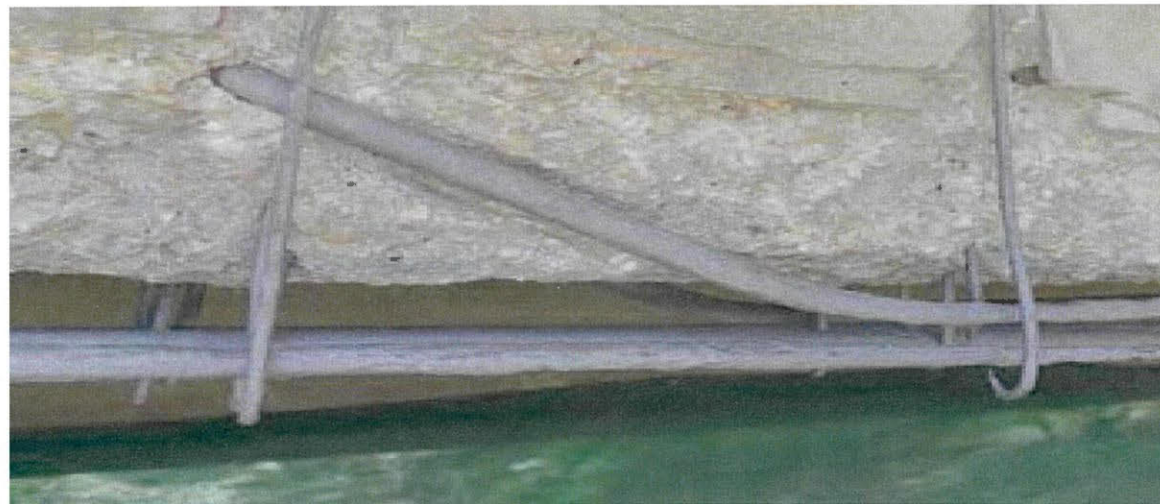


*The outer beam on the eastern side in 2011 – this was the worst-affected beam and the one chosen for the trial repair in 2013 [Photo: John Woodside]*



## Reconstructing & Repairing the Bridge

- The trial repair was carried out in February and March 2013 under guidance of J Woodside Consulting, the trial repair of one beam which include.
  - Where there was no corrosion of the steel and concrete spalling beyond the areas that were visible.
  - The existing concrete was found to be in sound condition and of a satisfactory strength. Where damage had occurred, these areas could be successfully repaired using appropriate concrete repair techniques. URS, the structural engineer, confirmed that the restored bridge could support the loads required by the current
- Australian Standards for a pedestrian and cycling bridge
  - The trial repair demonstrated that the bridge could be restored and strengthened in an economical and effective manner. The work was inspected by officers from both Councils and Heritage SA and met Heritage SA expectations.
  - Design was undertaken during September and October 2013 and the restoration and repair work was put out for open tender
  - Synergy Remedial Pty Ltd were awarded the contract and construction started on site on 8 January 2014 and was completed in September 2014



*Original bars were bent-up to provide shear reinforcement near the supports – note the corrosion of bars due to stray electric current from the trams [Photo: John Woodside]*

## Reconstruction & Repairs are finished!





## Those Involved

### City of Charles Sturt

Phil Hewitt, Michael Blythe and Naz Dastoor

### The Design Team for the project

J Woodside Consulting as project managers for the CCS

Flightpath Architects as the heritage architect and lead consultant

URS for the engineering services

Rider Levett Bucknall for the cost planning

### The Contractor

Synergy Remedial Pty Ltd

### Others

Peter Wells from Heritage SA for his support of the project

Richard Venus for the information in the Nomination for Engineering Heritage Recognition - Holland Street Tramway Bridge to Engineers Australia

