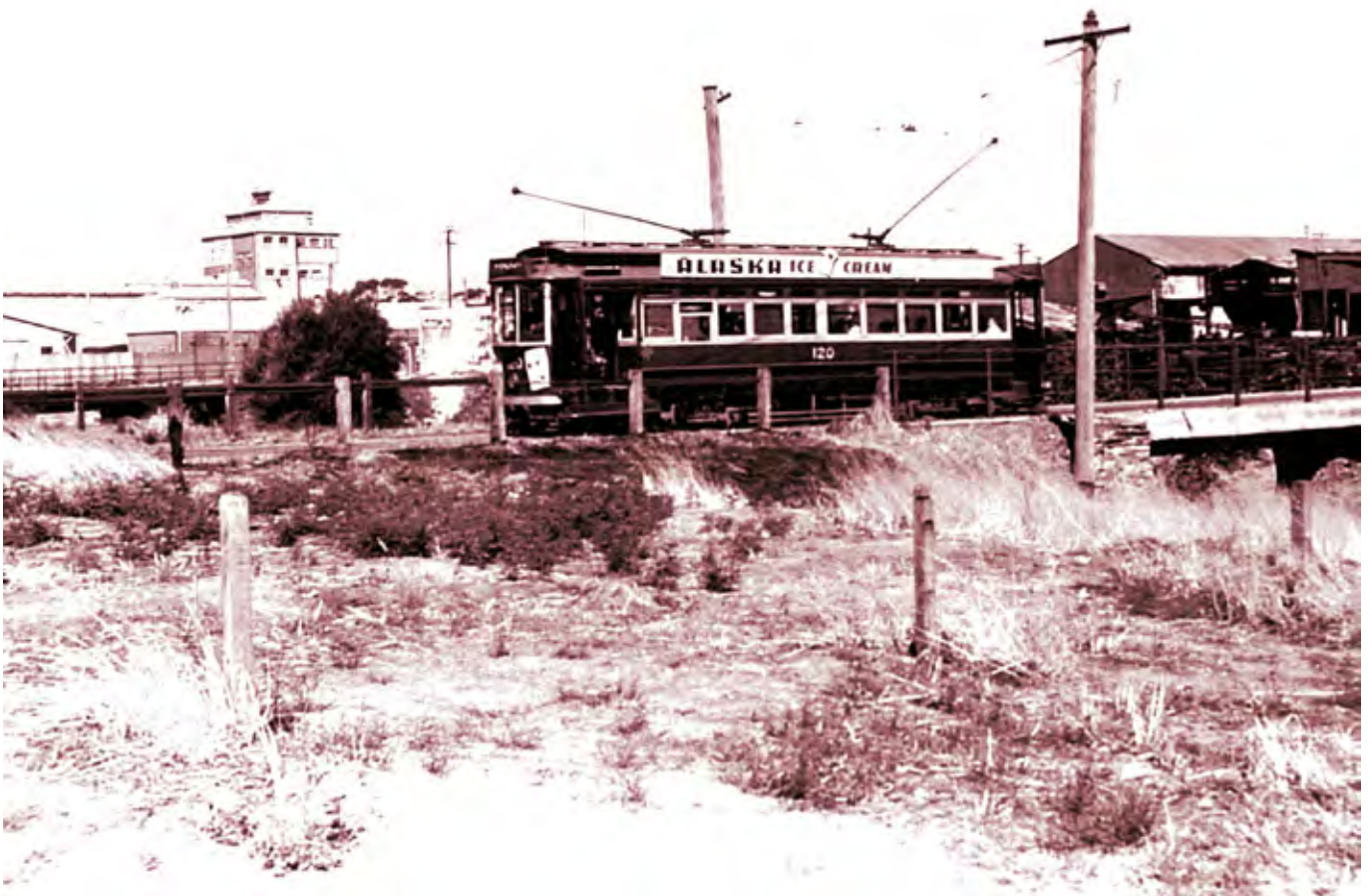


NOMINATION FOR ENGINEERING HERITAGE RECOGNITION

HOLLAND STREET TRAMWAY BRIDGE



ENGINEERS
AUSTRALIA

Engineering Heritage SA
April 2014

Cover photograph:

Type E1 tram No 120 crosses the bridge from Holland Street to Manton Street in 1951

[Photo: John Radcliffe]

Table of Contents

1.	Nomination for Engineering Heritage Recognition	1
2.	Agreement of Owner	2
3.	Description of Work	5
4.	Assessment of Significance	7
5.	The District of Hindmarsh	8
6.	The Holland Street Tramway Bridge	9
6.1	The Route to Hindmarsh	9
6.2	Designing the Bridge	10
6.3	Building the Bridge	13
6.4	The Electric Trams	15
6.5	The Cawthorne Street Bridge	19
6.6	The End of Trams	21
6.7	A New Life for Holland Street	22
7.	Reconstructing and Repairing the Bridge	24
7.1	Further Investigation and Trial Repair	24
7.2	Reconstruction of the Bridge	26
8.	Adelaide's Tramways	29
8.1	The Adelaide and Hindmarsh Tramway Co Ltd	32
8.2	The Western Extensions	36
8.3	Electric Traction	39
8.4	The Municipal Tramways Trust	40
9.	The Engineers	43
9.1	Sir William Goodman	43
9.2	The Sir William Goodman Bridge	44
9.3	Sir John Monash	45
9.4	John Bowman	47
9.5	Allan Cameron Harley	47
10.	Interpretation Plan	48
10.1	Significance	48
10.2	Interpretation Themes	48
10.3	Location Significance	49
Appendices		
A1.	Time Line & Key Dates	52
A2.	SA Reinforced Concrete Co Projects	53
A3.	References & Bibliography	54
A4.	Acknowledgements	54

1. Nomination for Engineering Heritage Recognition

The Administrator
Engineering Heritage Australia
Engineering House
11 National Circuit
Barton ACT 2600

Name of work: Holland Street Tramway Bridge

Location: Holland Street, Hindmarsh
-34.90985, 138.57349

Owner: City of Charles Sturt
PO Box 1
Woodville SA 5011
The owner has been advised of this nomination and a letter of agreement is attached

Access to site: Access over bridge closed because of safety concerns
Currently undergoing restoration, repair, and reconstruction to return the bridge to public use as a shared pedestrian/cycling crossing

Nominating Body: Engineering Heritage SA

Documentation by: Richard Venus
John Woodside
Richard Muncey

Submitted by: Engineering Heritage SA
Richard Venus
Chair, Engineering Heritage SA
Date: 24 April 2014

2. Agreement of Owner

72 Woodville Road, Woodville
South Australia 5011
PO Box 1, Woodville SA 5011

T 08 8408 1111
F 08 8408 1122
charlessturt.sa.gov.au



20 January 2014

Mr Richard Venus
Richard Venus MIEAust
Chair, Engineering Heritage SA
Engineers Australia South Australia Division
Level 11, 108 King William Street
ADELAIDE SA 5000

Dear Richard

Holland Street Bridge Engineering National Heritage Recognition Nomination

Thank you for your letter of 28 April 2013 seeking Council's support for the nomination of the Holland Street Bridge for recognition under the national Engineering Heritage Recognition Program.

The letter and other historical information were included in a report that was considered by the Council on 27 May 2013 being Item 6.88 about the outcome of the preliminary works. The recommendation was:

1. That Council note the contents of the project manager's report about the restoration trial work and the view of the consultancy team that the bridge can be economically restored.
2. That Council note the City of West Torrens is seeking an independent peer review of the trial restoration, the reports and structural calculations before it in a position to discuss the option to restore the bridge.
3. That Council note funding in the existing project budget for the bridge work is subject to funds being received through an Open Space Grant and from the City of West Torrens.
4. That Council note the request to support the nomination of the bridge for inclusion in the national Engineering Heritage Recognition Program from Engineers Australia.
5. That Council note that the bridge has not been formally named and possible options for naming the bridge.
6. That Council officers continue to work with officers of the City of West Torrens about these matters.

The Item was deferred until 3 June 2013 where the recommendation in the report was endorsed.

14/16381

On 15 July 2013 the Asset Management Committee received a further report (enclosed), but the brief and Motions are reproduced below:

Brief

This report recommends that Council accept the offer of the City of West Torrens to transfer its 50% ownership of the Holland Street bridge (project name being Sir William Goodman Bridge) along with \$800,000 and the Open Space Grant (applied amount being \$675,000) to the City of Charles Sturt and that the restoration proceed. It also recommends supporting the nomination by the Engineers Australia for the bridge to be included in its Engineering Heritage recognition Program and seeks to commence procedures to formally name the bridge as the "Sir William Goodman Bridge".

1. That Council note:

- (a) The high level of confidence gained from the trial restoration that significant variation to structural and surface condition are unlikely.
- (b) The advice of the Project Engineer that proposed restoration work can meet current standards for earthquake, wind, and flood design.
- (c) The initial capital cost of restoration is less than constructing a new bridge that will make the same contribution to the visual amenity.
- (d) The cost management plan for the restored bridge for the whole of life is less than constructing a new bridge.

2. That Council endorse restoration of the whole bridge, by accepting the offer of the City of West Torrens to transfer its 50% ownership share of the bridge to the City of Charles Sturt, subject to:

- (i) Payment of \$800,000 (plus GST) to the City of Charles Sturt toward the cost of bridge work: and
- (ii) Subject to the Open Space Grant in the order of the applied amount of \$1,300,000 being received.

3. That Council support the nomination of the bridge for inclusion in the national Engineering Heritage Recognition Program and participate in the preparation and placing of an Engineering Heritage Marker at the site and an appropriate ceremony on a suitable date.
The whole report from the Agenda is available here.

4. That Council formally name the bridge, the 'Sir William Goodman Bridge' by commencing procedures under the Local Government Act 199, Clause 219.

The recommendations of this report were endorsed.

The project summary including links to reports and attachments is available from our webpage www.charlessturt.sa.gov.au by selecting "Council", then "Major Projects".

in regard to these matters, I advise that:

Council has received payment of \$800,000 (plus GST) from the City of West Torrens which is no longer a part owner of the bridge. We received an Open Space Grant of \$1,187,500 from the South Australian Government. I confirm that, with funds also allocated by the City of Charles Sturt, sufficient funds are available for the restoration work to be completed.

We have since call Tenders and appointed Synergy Remedial Pty Ltd to undertake the restoration work. In the report you will find that the work was expected to commence in mid-November 2013 and be completed in May 2014. Due to delay in confirming funds and time taken for confirmation from the City of West Torrens, the project schedule has been delayed 8-weeks (excluding Christmas & New Year). The schedule is now for restoration to commence late January and be completed late July 2014 with an Official opening in August 2014.

I can therefore, confirm that Council is able to support the nomination of the Holland Street Bridge for recognition under the national Engineering Heritage Recognition Program as the Sir William Goodman Bridge.

I would be pleased if you and other representatives of the Heritage Engineering Branch of the Institute of Engineers Australia are able to attend the official opening. I will arrange for invitations later in the year.

Should you need to discuss this matter further, please contact me on (08) 8408 1291, or by e-mail at phewitt@charlessturt.sa.gov.au or by post.

Yours sincerely

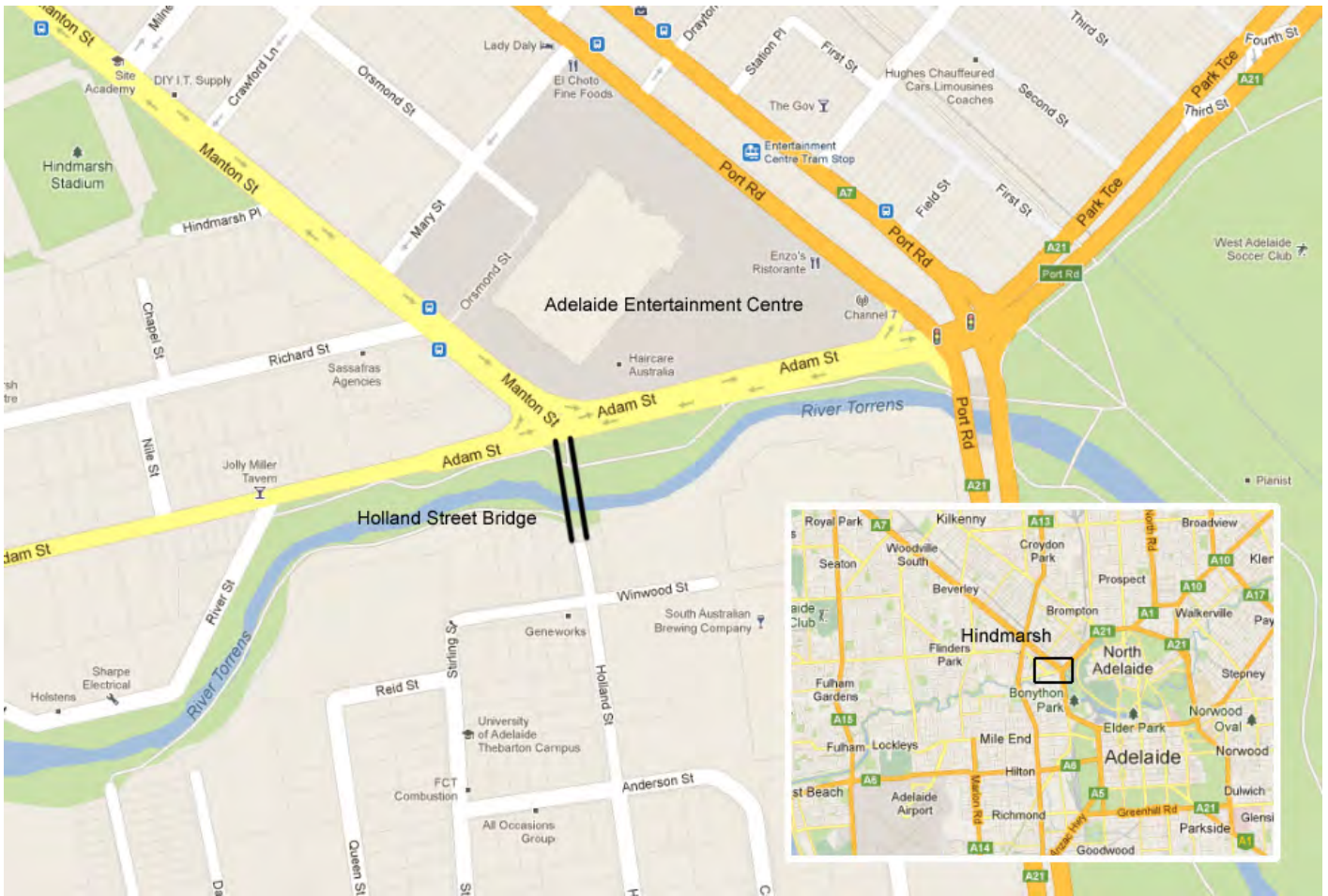


Philip Hewitt
Manager Engineering Strategy and Assets

Enclosure

3. Description of Work

Name of Work:	Holland Street Tramway Bridge
Other/Former Names:	Sir William Goodman Bridge This name has been adopted by the City of Charles Sturt and they propose to formally give the bridge this name when it is re-opened; the bridge was never officially opened nor given a formal name
Location:	-34.90985, 138.57349 (see map, page 4) The bridge crosses the River Torrens in line with Holland Street, Hindmarsh
Address:	Holland Street
Suburb/Nearest Town:	Hindmarsh SA 5007
State:	South Australia
Local Government Area:	City of Charles Sturt (north)/City of West Torrens (south)
Current Owner:	City of Charles Sturt
Original Owner:	Municipal Tramways Trust (MTT)
Current Use:	Closed to any access because of safety concerns
Former Use:	Electric tramway bridge until 1953; opened to one-way road traffic in 1962; closed to road traffic in 1990 and used by pedestrians and cyclists; closed in 2010
Proposed Use:	Currently undergoing reconstruction to return the bridge to public use as a shared pedestrian/cycling crossing
Designer:	John Monash
Builder:	SA Reinforced Concrete Company
Date Started:	July 1908
Date Completed:	December 1908 The bridge was first used by a horse tram service while the electric network was being completed; regular electric tram services began on 26 June 1909
Physical Description:	Reinforced concrete construction: trestle piers carried on driven concrete piles and supporting T-girders which carry the deck The bridge carried a single tramway track and two footpaths (a wider bridge able to also carry vehicle traffic was proposed by the MTT but the local councils were not prepared to contribute to the cost)
Physical Condition:	Deterioration evident A trial repair of one girder was carried out in 2013 and a tender has been let for the reconstruction of the bridge. Work is expected to be completed by August 2014
Heritage Listings:	State Heritage Register ID 10987 State Registered Heritage Place NR 9255 National Trust file number 3276



*Holland Street Tramway Bridge Location
[Google Maps]*



*Holland Street Tramway Bridge shortly after its completion in 1908
[Photo: John Radcliffe 23-29A]*

4. Assessment of Significance

Historical Significance:	<p>First reinforced concrete bridge to be built in the Adelaide metropolitan area and the second in SA to use the girder design</p> <p>An important river crossing to enable the expansion of the new electric tram network to residential areas north-west of Adelaide</p>
Technical Achievement:	<p>Early use of a new structural material in SA</p>
Social Impact:	<p>Enabled public transport to be provided to a significant area of suburban Adelaide</p>
Significant People:	<p>Sir William Goodman (Chairman of the MTT)</p> <p>Sir John Monash (designer and contractor)</p>
Rarity:	<p>One of only two examples of reinforced concrete bridges in SA personally designed by Monash; the other is a railway bridge over the Hindmarsh River outside Victor Harbor which is still in use</p>
Representativeness:	<p>An elegant structure with T-girders carried on trestle piers, a form of design which had been adopted by Monash in preference to arch construction because it made better use of the structural properties of reinforced concrete</p>
Integrity/Intactness:	<p>The bridge is in original condition; W-beam barriers were added in 1962 when the bridge was opened to vehicles; it also carried a gas pipeline and other services which were removed in 2013</p>
Research Potential:	<p>This nomination document provides a concise history of both the building of the bridge, which introduced a new method of construction to South Australia, and the establishment of the electric tram network in Adelaide</p> <p>A wealth of detail about the Holland Street bridge has been made available by Dr Alan Holgate; however, his work only goes to 1914 which leaves the Cawthorne Street bridge and other works by the SA Reinforced Concrete Company between 1914 and 1924 (when they ceased operations) to be explored in depth, hopefully with documents available through State Records SA</p> <p>The reconstruction of the bridge demonstrates the application of modern engineering methods and materials to the conservation of an historic structure which was showing significant deterioration</p> <p>One paper has been prepared for the Sixth Australian Small Bridge Conference held in Sydney in May 2014 and another will be prepared for the Concrete Institute of Australia Biennial Conference in 2015</p>

5. The District of Hindmarsh



All Saints Church, Hindmarsh, 1864
From a painting by James Shaw
[State Library of SA, B18890]

The Hindmarsh district, to the immediate north west of the Adelaide CBD, was a key location for the early development of rail transportation servicing the Adelaide metropolitan area. Hindmarsh was established as South Australia's first secondary town outside Adelaide and its first suburban village. Bowden and Brompton were laid out as villages soon afterwards. The appeal of the area's location for working class residents and for commercial and industrial users has never altered, making it the State's oldest and most persistently working class and manufacturing district.¹

The Hindmarsh district, in particular its villages of Bowden and Brompton, was served by the Adelaide-Port Adelaide railway for both passengers and freight since its opening in 1856, with freight and passenger traffic volumes requiring separate services by 1870 and duplication of the line undertaken by 1881.² A tramway between Adelaide and Hindmarsh, constructed under legislation for tramways for "either steam or horse traction", was also opened in 1880.³ The combination of train and tram services meant that many city workers could commute daily to and from Hindmarsh. This provided a further boost to the district's population.⁴

The importance of the rail services to and through the Hindmarsh district by the early 20th century was reflected in the level of debate at the time on the route location of the tram network, in particular in relation to pricing and also residential and commercial accessibility.⁵ The extension of the electric tramway from Adelaide in 1909 included a route change to Holland Street from its previous location skirting the parklands as "there is no traffic to be catered for on the eastern side".⁶

-
- 1 Susan Marsden, 1984, "Hindmarsh – A Short History", *SA175 website*, Professional Historians Association (SA), <www.sahistorians.org.au/175/documents/hindmarsh-a-short-history.shtml>, accessed 14 April 2014, p1
 - 2 Malcolm Thompson, 1988, *Rails through Swamp and Sand – A History of the Port Adelaide Railway*, Port Dock Station Museum, pp12-14
 - 3 *SA Register*, 25 October 1880, p4g
 - 4 Marsden, 1984, p21
 - 5 Ronald Parsons, 1974, *A History of The Village, District Council and Corporate Town of Hindmarsh South Australia*, Corporation of the Town of Hindmarsh, pp20-21
 - 6 *Chronicle*, 4 April 1908, page 39ab; *The Register*, 9 April 1908, p5b

6. The Holland Street Tramway Bridge

6.1 The Route to Hindmarsh

The MTT was formed in 1906 to take over the existing Adelaide metropolitan horse tram network and electrify the system. The MTT was also required to extend the system to provide a service to suburbs within a ten mile radius of the Adelaide GPO.

A major challenge for the Trust was deciding where the new electric routes would run. For the Western System, which included Henley Beach and Hindmarsh:¹

... the Henley Beach tramway will probably follow its present course. The contention has been put forward that the Hindmarsh line, instead of branching off at Mile-End should break from the Henley Beach track at the road dividing Thebarton from West Thebarton, and cutting Mile End in two, then cross the Torrens and go down Chapel street past Lindsay Circus – which now is a fine oval where sports are carried on – and finish at the present terminus.

A few days later came another determination:²

There is a general desire that the most populous part of Thebarton should be fed by the electric service, and that would mean transferring the Hindmarsh tramlines to the west of the present track. If that were done a substantial bridge would have to be built over the Torrens to connect with Hindmarsh.

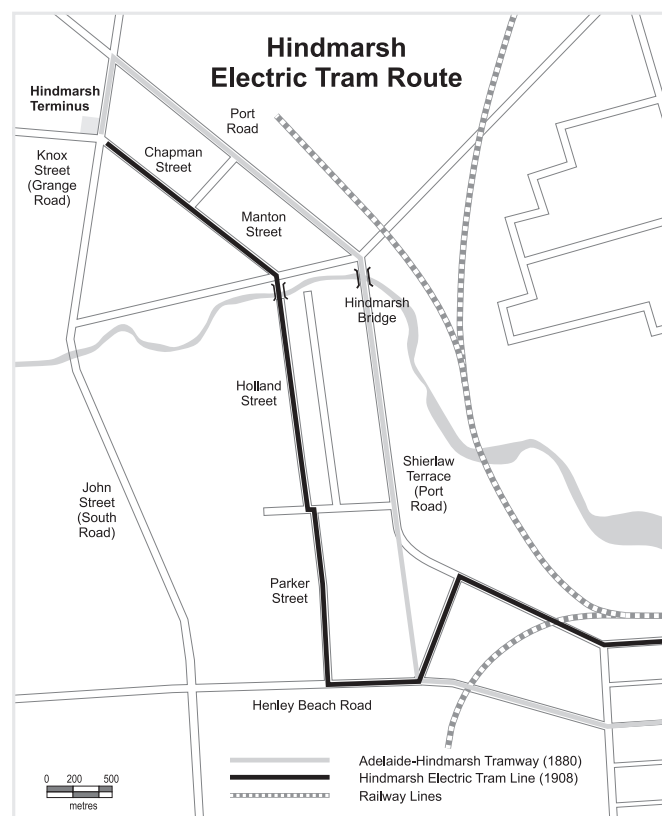
The “present track” of the Hindmarsh horse tram ran along what is now Port Road, skirting the Parklands to the east. By placing the new track further to the west, it would be able to serve residential areas on both sides:³

Consequently the Trust has resolved to alter the route, and instead of skirting the park lands the Hindmarsh cars will follow the Beach-road as far as Parker-street, into which they will turn. From Parker-street they will pass to Holland-street, and thence to Manton and Chapman streets, the terminus being at the end of the last-named thoroughfare. At present the cars run along the Port-road, which is the principal business centre, but the new route will serve a large district on either side.

By March 1908, the Trust had determined that the Hindmarsh line would cross the Torrens at the end of Holland Street. (This must have been an obvious crossing point because William Cawthorne, Secretary of the National Building Society, wrote to the Hindmarsh and Thebarton Councils in December 1884, asking if they would contribute to the cost of a footbridge there.⁴)

The *Register* noted that the estimated cost was only £300 and was of the opinion that this wouldn't pay for a very large bridge:⁵

... it was not thought that the trust intended to confer upon the local residents the boon of a commodious new bridge in a position where it would be useful, and a suggestion was



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

1 *The Register*, 21 February 1907, p7a

2 *The Advertiser*, 26 February 1907, p7h

3 *The Advertiser*, 28 March 1908, p9b

4 *SA Advertiser*, 10 December 1884, p6g; *SA Register*, 12 December 1884, p7f

5 *The Register*, 5 May 1908, p6e

made that the manufacturing firms of Hindmarsh and Thebarton should impress upon the trust the advisableness of making the bridge of sufficient size to accommodate vehicular traffic. One firm is said to have offered £50 toward the extra cost of such a bridge. Nothing definite was done in the matter, however.

However, in May 1908, the Trust put a proposal to the Hindmarsh and Thebarton Councils, inviting them to contribute to the cost of a wider bridge able to carry vehicular traffic.⁶

The present proposal is for a bridge, 16 ft. wide, to carry a single line of tramway, with a 4-ft. footpath on each side. On Monday evening, having referred to this in a letter to the Hindmarsh Council, the Trust asked if the council were prepared to combine with the Thebarton Council in contributing the extra cost of erecting a bridge 38 ft. wide to carry vehicle traffic on each side of the tramway, with 5-ft. footpaths. If this met with the approval of the council the Trust would advertise for alternative designs and tenders for a reinforced concrete bridge on the lines indicated.

Both councils refused the offer on the grounds they could not afford to contribute.

There was some considerable tension between the Hindmarsh Council (in particular) and the Municipal Tramways Trust at this point. The Council objected to the fare structure: a ticket to the city from Hindmarsh would cost threepence whereas it was only tuppence from other inner metropolitan areas such as Goodwood. “Hindmarsh was a working men’s district,” they said, “and, if for that reason alone, the suburb should at least be put on an equality with others.” They were also unhappy about two aspects of the proposed route:⁷

One was the decision to move the tramline from the Port Road and divert it down Manton Street, and another was the plan to commence the Hindmarsh trams from North Terrace instead of Hindley Street. The objection to Manton Street was twofold. It deprived the northern residents of the Town of a tram service and it would enter the district by a bridge over the Torrens which would be privately owned and not open to the public. True the latter objection could be overcome if the Corporation was willing to pay toward the cost of a larger bridge, but they didn’t feel inclined to spend the amount demanded.

Then there was the extravagance of the MTT headquarters, “reported to be in the vicinity of between £80,000 and £90,000”, which rubbed salt in the wound. Instead of the lavish tiles that had been specified in the plans, Hindmarsh kilns could have supplied perfectly adequate bricks.⁸

6.2 Designing the Bridge

The design of the Bridge is commonly attributed to Goodman, chief engineer of the MTT.⁹ A drawing for the “Hindmarsh-Thebarton Bridge” was signed by W G T Goodman in 1908 but this would have been to authorise or approve the structure. The bridge was actually designed by John Monash as principal 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).

By May 1908, the MTT had been in discussions with the SA Reinforced Concrete Company (SARCCo) for several months. John Monash had visited Adelaide in late July/early August 1907 to meet with the architect for the Kither’s building¹⁰ and SA’s Engineer-in-Chief Alexander Moncrieff who was also the Chairman of the Municipal Tramways Trust.¹¹ Moncrieff had been a long-standing advocate for reinforced concrete construction and he and Monash had previously met in Melbourne to discuss projects in South Australia. As a result, SARCCo had been awarded the contract to construct the new railway bridge over the Hindmarsh River at Victor Harbor.¹²

6 *The Register*, 5 May 1908, p6e

7 Ronald Parsons, 1974, *Hindmarsh Town: A History of The Village, District Council and Corporate Town of Hindmarsh, South Australia*, Corporation of the Town of Hindmarsh, p204

8 *Op cit*, p205

9 Goodman was appointed Electrical Engineer on 27 May 1907; he was made Chief Engineer and General Manager on 29 September 1908 [Ralph L Sangster, 1972, *Development of Street Transport in Adelaide: Official History*, The Municipal Tramways Trust, Adelaide, p4]

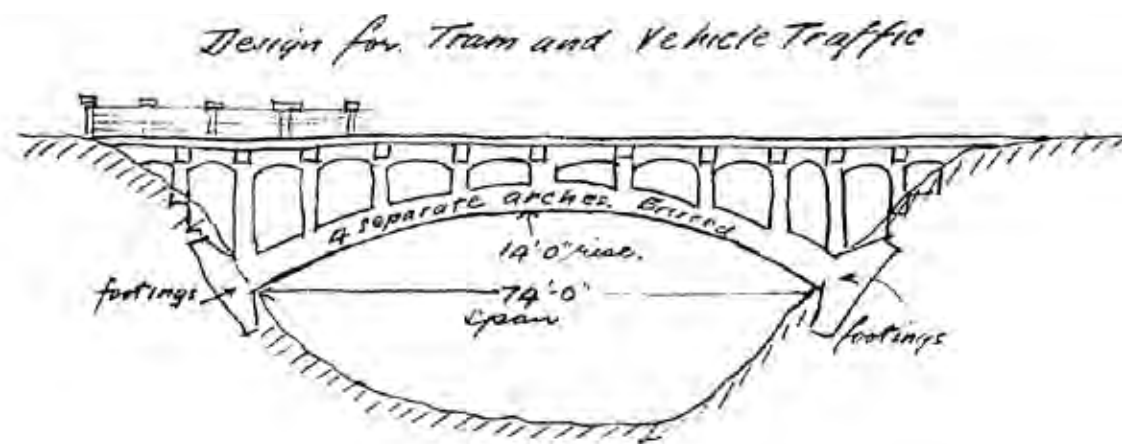
10 Alan Holgate, nd, “Kither’s Buildings, Adelaide”, *John Monash: Engineering enterprise prior to WW1* website, <www.aholgate.com/bldgtext/bldgs06.html#kithers>

11 Alan Holgate, 2012, “Sir John Monash and the South Australian Reinforced Concrete Co, *Inaugural South Australian Engineering Heritage Conference*, Engineers Australia, Adelaide, p4

12 Holgate, 2012, p5

The first correspondence between SARCCo's Resident Engineer, William Harvey, and Monash regarding the bridge occurred in August 1907.¹³ In the meantime, MTT engineer William Goodman had designed a bridge which Dr Alan Holgate described as having an "RSJ under each rail, with vague concrete outline for deck".¹⁴ In February 1908, Harvey attempted to visit the site but couldn't find Holland Street; he was successful a few days later and reported that "the waterway required and the nature of the abutment foundations rule out an arch". Monash had realised several years before that the Monier arch design was obsolete and from 1904 had been designing T-girder bridges which had been widely adopted in Victoria.¹⁵ Bowman, however, was persisting with an arch design and so, in March, Monash then provided a design using three 40-foot girders for Harvey to show Goodman. Goodman, who was proving hard to get and non-committal, said he had "no objection" to the idea, causing Monash to remark in frustration that he would hardly "submit objectionable proposals".¹⁶

On 25 March 1908, Harvey called on Goodman but he was referred to John Bowman, Permanent Way Assistant Engineer.¹⁷ Bowman promised to discuss Monash's proposals with Goodman and provide a response the next day. He also showed Harvey his design for the bridge, admitting during the conversation that he had not considered the flood level. Bowman also agreed with Harvey that his arch bridge would cost more than a plain girder design.¹⁸



William Harvey's sketch of John Bowman's proposed arch bridge at Holland Street
[Letter to John Monash, 25 March 1908]

Clearly there was an expectation that SARCCo would build the bridge at Holland Street because Monash continued to work on the design. In mid-April he provided Harvey 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. Harvey replied that Moncrieff would be calling tenders. Concerned that the specification might contain some clause which would rule out their proposal, Monash told Harvey to show or lend the plans to Goodman, saying:¹⁹

When, as in this case, we find an engineer floundering in ignorance of what he wants, and how to do it, the correct policy is always to nurse him and feed him with ideas until he becomes practically committed to you. A stand-off attitude leaves us entirely without any vested advantages of interest.

At the end of May, the Trust called tenders, allowing just under four weeks for responses.²⁰ The advertisement appeared once and the *Register* said that two tenders had been received.²¹ There is no record of another organisation submitting a second tender so this might be a reference to the tender

13 University of Melbourne Archives [UMA], Reinforced Concrete & Monier Pipe Company [RCMCP] Collection, *Thebarton Bridge (Hindmarsh-Thebarton Bridge)*, Folder No 775, letter from Harvey to Monash, 19 August 1907

14 Blueprint of Goodman's design dated 14 January 1908, UMA RCMCP Collection, Folder No 775

15 Holgate, 2012, pp2-3

16 Various correspondence in UMA, RCMCP Collection, Folder No 775

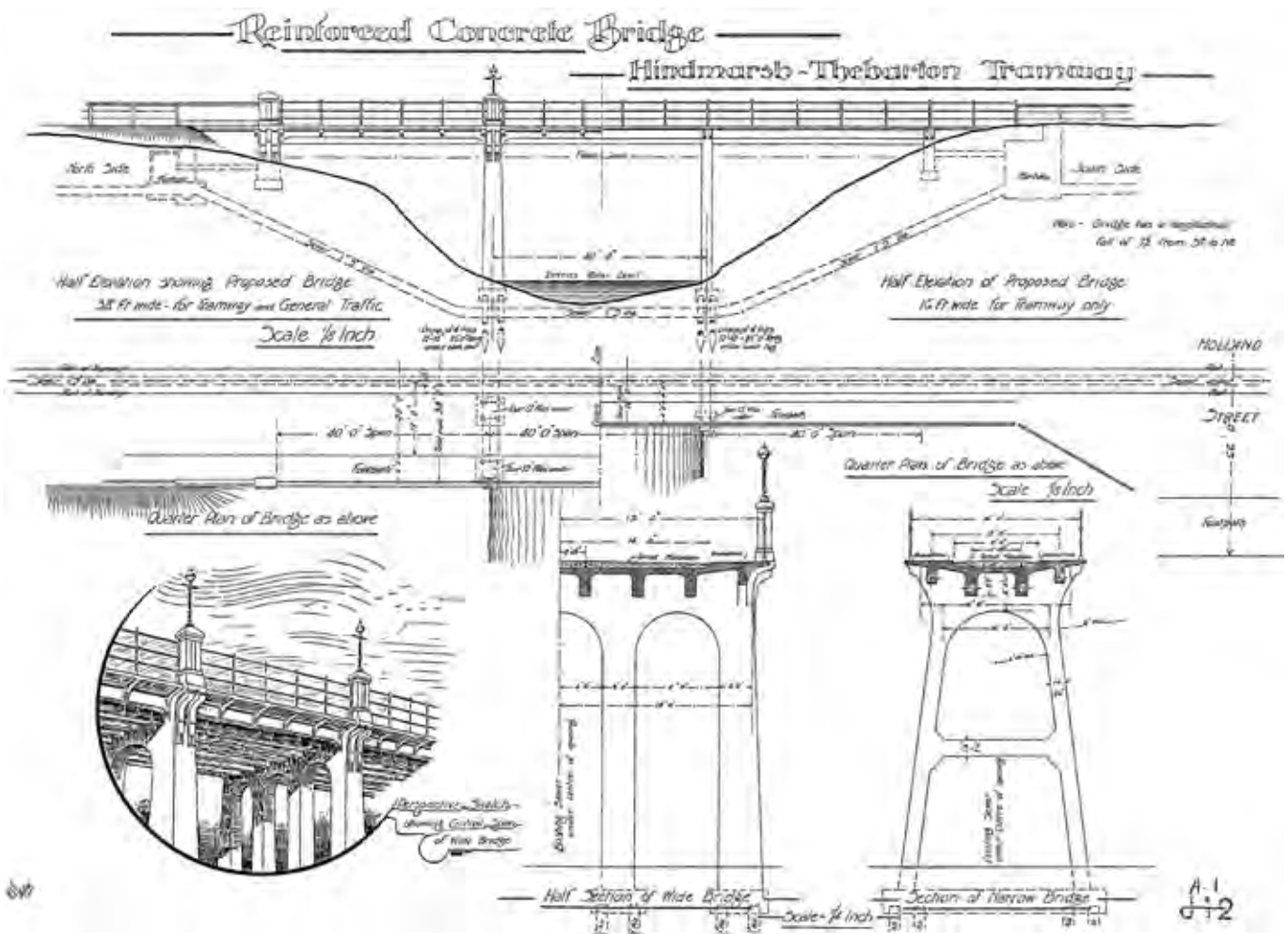
17 Anon, 1909, *The Tramways of Adelaide: Past, Present, and Future*, The Critic, Adelaide, p25

18 Letter from Harvey to Monash dated 25 March 1908, UMA RCMCP Collection, Folder No 775

19 *Ibid*; quotation from a letter to Harvey dated 25 April 1908

20 *The Register*, 28 May 1908, p2d; tenders to be received by noon on 22 June

21 *The Register*, 24 June 1908, p6e, said only one has been received; this was corrected to two the next day
[*The Register*, Thursday 25 June 1908, p4h]



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)

being for two bridges, a narrow one just for the tramway and a wider one able to carry other traffic. The acceptance of the tender required the Governor's approval and this was given to a meeting of the Trust on 21 July.²² Monash, however, was prepared to proceed as soon as "the Trust is absolutely committed to us, even though [the] contract is not signed".²³

A letter of acceptance was received by SARCCo on 16 July²⁴ and Monash revised the design of the bridge the next day, reducing the span between supports from 40 to 38 feet and increasing the rolling load per axle by 25% "to provide for impact stresses at a speed of 12 miles per hour". This would result in a factor of safety of 5 after 28 days which would increase to 6 after three months as the concrete cured. He also decided, "for simplicity", to make the outer girders under the footpaths the same as the two central girders to allow for the increase in the design load.²⁵

The calculations enabled Monash to draw up a schedule of the reinforcing bars which were to be supplied from Melbourne. In the accompanying letter, Monash told Harvey:²⁶

You will notice that the 1 1/8" diameter bars have been ordered in groups of one long and one short length each.— The intention is that these bars will have to be welded up locally.— It would be very cumbersome to have to transport to Adelaide bars up to 46 ft. long.— Consequently I have ordered each bar in two lengths, one short and one long length allowing an extra 12" for the making of welds.— It will pay the Company in connection with its several works to have a small field forge and anvil as a permanent item of its plant, and it will be easy for you to engage a blacksmith thoroughly skilled in welding.—

22 *The Register*, 22 July 1908, p4f

23 Letter from Monash to Harvey dated 2 July 1908, UMA RCMCP Collection, Folder No 775

24 UMA RCMCP Collection, Folder No 775

25 Calculations dated 17 June 1908, *Specification for Reinforced Concrete Bridge*, UMA RCMCP Collection, Folder No 775

26 Letter from Monash to Harvey dated 24 July 1908, *Specification for Reinforced Concrete Bridge*, UMA RCMCP Collection, Folder No 775

You should arrange to use the bars so that the welds come alternately at the opposite ends of the girder, that is four welds at one end and four at the other end.— These welds will occur where the bending moments are already much reduced from the maximum.— If you feel any anxiety about the soundness of the welds you can lay, over each, one or two extra $\frac{3}{8}$ " bars to make up for any defect in the strength of the welds.—

However, even the best laid plans “gang aft agley”. Somewhere in the chain of events, the requisition must have been transmitted orally because Harvey received a batch of $1\frac{1}{8}$ " diameter bars that were 40 feet long, not 14. These were to be welded to 30 foot lengths to make up the straight bars used in the girders. Monash’s solution was to cut some of the 30 foot bars: “By taking a 30’ bar and using an even subdivision of same, say 4’-6” or 5’-0”, you can, without waste, use up a certain number of the 30’ bars for this purpose ...”.²⁷ The surplus bars, he said, could then be used in the construction of Bowmans building in King William Street which SARCCo were also building.²⁸

6.3 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.²⁹ 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.³⁰ The *Register* described the work:³¹

The first reinforced concrete bridge in the metropolitan area is being constructed over the River Torrens at the corner of Messrs. J. Kitchen & Sons and Marsh’s soap and candle factory. It will be used to connect the electric tramline in Holland street, Thebarton, with Manton street, Hindmarsh. Sixteen piles, each consisting of a framework of steel rods embedded in concrete, were some time ago moulded on the river bank. These having dried were driven to the rock bottom. Four piles at each corner form the foundation of the bridge, on which the superstructure is being bonded, and the work promises great strength and durability. Portion of the new bridge will be on the section held originally by Col. Light.



*The Holland Street Bridge under construction – the trestles have been completed and concrete is being placed in the girder formwork (note man, right of centre, tipping wheelbarrow)
[University of Melbourne Archives, BWP/24366 Reinforced Concrete & Monier Pipe Construction Co]*

27 Letter from Monash to Harvey dated 24 July 1908, *Specification for Reinforced Concrete Bridge*, UMA RCMCP Collection, Folder No 775

28 Alan Holgate, nd, “Bowman’s Building, Adelaide”, *Notes on Building Projects* webpage, <www.aholgate.com/bldgtext/bldgs09.html#bowman>, viewed 30 March 2014

29 Letter from Harvey to Monash dated 17 July 1908, UMA RCMCP Collection, Folder No 775

30 Letter from Harvey to Monash dated 21 September 1908, UMA RCMCP Collection, Folder No 775

31 “A New Tramway Bridge”, *Register*, 27 October 1908, p4h

Monash described the work of placing the concrete (which he referred to as the “cement composition”) to a journalist during the construction of eight arch bridges in Bendigo between 1901 and 1902:³²

The composition is “punded” [pounded] closely and carefully between the iron network, first with those little hand pounders, and then with heavier sizes, and watered lightly. We keep on working continuously, “punding” and watering, watering and “punding”, so as to form one solid homogeneous mass.

The concrete in the deck, trestle piers, and piles had the traditional proportions of “1 part cement, 2 parts sand, and 4 parts of 1” stone screenings”; stone spawls or pieces, not exceeding 40% of the mass, were added to the abutments, wing walls, and pier footings.³³ Considering that it was mixed and placed by hand, the quality of the concrete is remarkably good. There is some highly visible spalling but the concrete in other areas is well graded and sound. The bridge is now well over 100 years old and this surface damage is easily repaired (see Section 7). The cement, of course, came from the Brighton Cement Company – Angas and Bakewell, the principal SARCCo shareholders, were on its Committee of Management – and the Tramways Trust had become a major customer:³⁴

The Brighton Cement Company ... is now one of the most prosperous in the State, and the output is increasing. The immense quantity of cement used in connection with the tramway works and the erection of reinforced concrete buildings, bridges, and other structures has caused such a demand for the commodity that the recently installed new machinery, like the old, plant, has had to be kept going from Monday morning until Saturday night to keep pace with the requirements.

Work proceeded rapidly and the last span was completed on 28 November.³⁵ The *Register* provided a detailed description of the bridge that same day:³⁶

New Tramway Bridges. Hindmarsh and Thebarton Connected.

The new reinforced concrete bridge over the Torrens River at Hindmarsh is now practically finished. The concrete work was completed on Friday, and the carpenters who had been employed in making the boxes left the work. All that now remains to be done is the plastering of the outside of the structure and the fitting of the iron posts and railings. The latter work is in the hands of Messrs. Stewart & Harley. The contract for the bridge was let to the South Australian Reinforced Concrete Company, and has been carried out under the supervision of Mr. P. Bennett. The structure is 120 ft. long and 17 ft. wide. The roadway is carried on girders, which are 2 ft. 0 in. wide and 13 in. thick. Running lengthwise through the girders are eight bars of 1½-in. round steel. Half-inch steel bars are laced across from girder to girder at intervals of three inches, and running along the bridge through the concrete of the roadway are quarter-inch steel rods; six inches apart. When this has been bound together by the hard concrete it makes a remarkably strong job. This is supported by the abutments at each end and two piers, which divide the bridge into three spans of 40 ft. each. The two legs of the piers are each 18 in. by 24 in., and have four 1 in. bars running throughout the length. The track for the trams is 8 ft. wide, and it has on each side footways each 4 ft. 0 in. in width. The construction of the bridge has taken about 13 weeks, but progress was delayed for some time at the beginning by the floods which went down the river. During the last heavy rain Mr. Bennett was occasioned anxiety because he had one of the boxes for the pier legs fixed, but there was no concrete in it to ballast it down. It was moved only about 1¼ in., however, and was levered back without much trouble.

Early in December, Harvey sent Monash photographs of the bridge, saying “this work will be very creditable architecturally” and that he expected to have the formwork taken down in a couple of weeks.³⁷ All that remained now was to lay the tram tracks and put up the poles for the overhead electricity supply. The poles had been erected as far as the southern bank of the river but work hadn’t started on the northern side, between the river and the terminus in John Street³⁸ (today’s South Road: see map, page 9).

32 Geoffrey Serle, 1982, *John Monash: A Biography*, Melbourne University Press, Melbourne, p137

33 Description of Materials, Para 6, *Specification for Reinforced Concrete Bridge*, UMA RCMCP Collection, Folder No 775

34 *Chronicle*, 5 December 1908, p39a

35 Letter from Harvey to Monash dated 28 November 1908, UMA RCMCP Collection, Folder No 763

36 *SA Register*, 28 November 1908, p6h

37 Letter from Harvey to Monash dated 3 December 1908, UMA RCMCP Collection, Folder No 775

38 *Advertiser*, 9 December 1908, p8c



*The Holland Street Bridge soon after completion (looking west) – “architecturally creditable”
[University of Melbourne Archives, BWP/23733 Reinforced Concrete & Monier Pipe Construction Co]*

6.4 The Electric Trams

In the first week of February 1909, track materials were delivered to Manton and Chapman Streets on the northern side of the river (today, all of this section is just known as Manton Street) and a gang of men set to work:³⁹

Although the contractors have been engaged only since early last Friday morning on the construction of the electric tram roadway in Hindmarsh, the work has proceeded at a rapid pace. Already the steam traction engine has broken the crust of the road from the new bridge over the Torrens along Manton and Chapman streets to the terminus near John’s street, and the one-furrow plough, which is pulled by a large number of horses, has been tearing up the earth to make way for the laying of necessary ballast. Commencing from John’s street the contractors have laid a large quantity of metal in the trench reaching as far as Lindsay Circus Oval, and already the roller has completed a large portion of its work in that vicinity. The service in Hindmarsh will be on only a single line for the present, and provision is made for space for a double line, by constructing the present track nearer the south side of the street.

By Friday 19 February the track laying had been completed but work was still being done on the line to the south, between Thebarton and Adelaide.⁴⁰ A few weeks later Adelaide’s electric tram service was inaugurated when Mrs Anne Price, the wife of the Premier, “drove”⁴¹ a decorated tram from the depot at Hackney to Kensington and back along Grenfell Street.⁴² However, an electric service to Hindmarsh was still many months away.⁴³

The electric tramway system for Thebarton, Hindmarsh, and Henley Beach presents more difficulties to the contractors than any of the other divisions. In the first place there are five expensive bridges, and, secondly, along the Hindmarsh route from the Henley Beach road complex curves abound, and in several places property has had to be purchased in

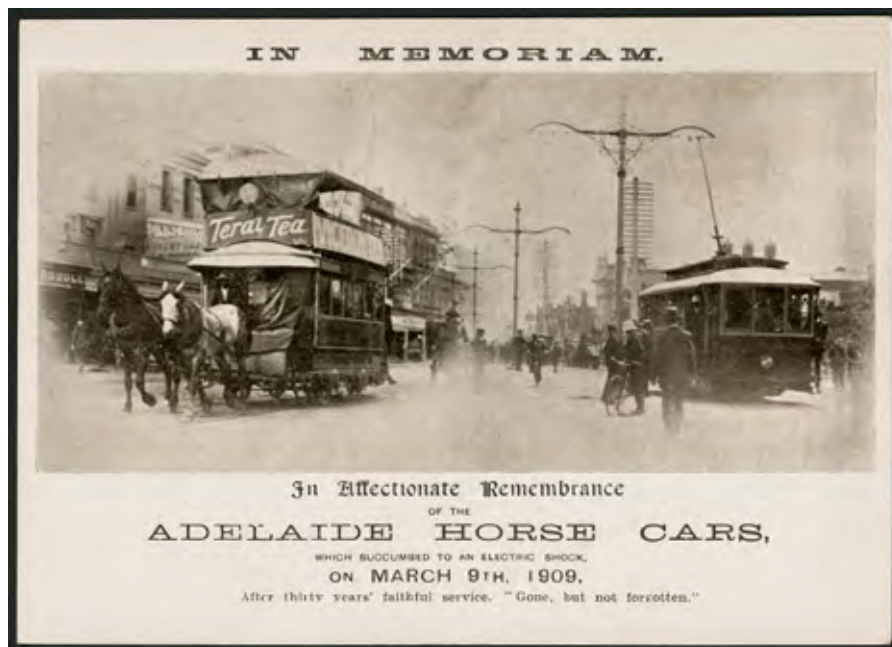
³⁹ *Register*, 8 February 1909, p4e; also *Register*, 6 February 1909, p8f

⁴⁰ *Advertiser*, 19 February 1909, p9a

⁴¹ *The Critic’s* souvenir publication revealed the secret: “... Mrs. Price ... with her hand on Mr. Goodman’s drove the car successfully through the suburbs ...” Anon, 1909, *The Tramways of Adelaide: Past, Present, and Future*, The Critic, Adelaide, p37

⁴² *Advertiser*, Tuesday 9 March 1909 p7hi

⁴³ “Western Suburb Lines”, *Register*, March 1909, p11g



Memorial post card to mark the end of the horse tram era on 9 March 1909; however, Hindmarsh and Thebarton still had some months to wait before a tram crossed their new bridge – and then it was a horse tram [State Library of SA, B16778]

order to give the line the proper sweep. ... So far the Hindmarsh and New Thebarton lines are the only ones that have been commenced. Hindmarsh could soon have electric trams if the track through the west park lands, the sewers yard, and along the Henley Beach road were ready. The rails for the single line have been laid from the Mile-End Hotel to the terminus at the intersection of John and Manton streets, Hindmarsh. The bridge over the Torrens has been ready for traffic for some time, and the centre poles and cross arms have been fixed on the Hindmarsh side of the river. It is not likely, however, that any further progress will be made until the New Thebarton route is definitely attacked.

When the bridge was completed, the MTT erected “No Thoroughfare” signs at either end; however, people wondered what was stopping pedestrians using the bridge – there were, after all, footpaths on either side. Then, in June 1909, the MTT:⁴⁴

... placed cattle pits at each end, and posts were put in so close together across the footways that perambulators and bicycles were debarred from using the short cut. When asked for a reason the Trust stated that the footways were too narrow to allow perambulators or bicycles to pass that way, as the conductors had to stand on the footboards to collect fares, and would be in danger of being struck. This was reported to the local council on Monday evening, with the proviso that if that body required it the Trust would place the posts wider apart. In the circumstances it was resolved not to request any alteration.

Horse-drawn tram cars were still running on the old Hindmarsh line. However, they couldn't run from Mile End (just west of the Parklands) into the city because this section of the line was being altered. It wasn't going to take much: according to the *Advertiser*:⁴⁵

... One rail was to be moved seven-eighths of an inch inwards to correspond with the gauge of the electric line” ... A start was made to reduce the gauge from the Mile-End point, and although fair progress was made a considerable time must elapse before the work is completed as far as King William-street.

Starting on Monday 21 June, a service was provided by horse-drawn omnibuses between the city and the Mile End junction where people could transfer to a tram car. “Passengers were greatly inconvenienced

⁴⁴ *Register*, 15 June 1909, p4g

⁴⁵ *Advertiser*, 22 June 1909, p9d

by the new system, the buses being crowded to excess during certain hours of the day," said the *Advertiser*.⁴⁶ However, regular horse tram services along the whole length of the new line were only days away. These began on Monday 28 June ("1908" said the advertisement) with cars running every half hour from 7:00 am to 11:00 pm.⁴⁷

However, the new track for the electric cars – and therefore the bridge – had a special opening the previous Saturday and the reason was very Australian: a footy match on Hindmarsh Oval. Norwood defeated West Torrens⁴⁸ and eight tram cars "were in readiness for passengers at the conclusion of the game".⁴⁹

Thebarton and Hindmarsh were the last of the inner metropolitan suburbs "to receive the benefit of the electric cars".⁵⁰ As the *Advertiser* pointed out, someone had to be last. The service to the western suburbs was dependent on the completion of the line to Henley Beach and that involved the challenge of building a viaduct across the flood-prone Reedbeds area. (There was also a shortage of coal to fuel the temporary power station and the need to complete the converter station at the Thebarton Tramway Depot which would supply the Henley Beach network with direct current electrical power.)⁵¹

But finally, a year to the day after Mrs Price "drove" the first electric tram, a trial run from the city to Henley Beach and back to the Hindmarsh terminus took place on Wednesday 9 March 1910: 55 miles of track had been completed in only three years, an achievement, the *Advertiser* said, that Mr Goodman "may well be proud of". The MTT Chairman A B Moncrieff said "he thought they had done fairly well".⁵²

That night –⁵³

An electric tramcar, bedecked from top to bottom with many-colored electric lights, was driven through the city streets ... and was an object of admiration to all who saw it. It was illuminated in honor of the completion of the inner circle of the tramway service, which was accomplished [on Wednesday] by the opening of the electric line from the city to Thebarton and Hindmarsh. The car was occupied by members of the Tramway Brass Band, who afterwards journeyed in it to Henley Beach, playing popular tunes as they went. At the seaside the bands-men provided a programme of music for over an hour.

Tramway operations were then transferred to the Thebarton Depot. The old horse tram depot at John Street, Hindmarsh, with its stables, sheds, and blacksmith's shop, was no longer required. An "enormous Catalogue" of building materials and the land itself – 2¼ acres which could be subdivided into 15 "Roomy Building Sites" – were offered for sale in August. The MTT said it was the "best available Residential Site in Hindmarsh" and promised that only homes and shops, no factories, would be built.⁵⁴

PUBLIC NOTICES.

**THE MUNICIPAL TRAMWAYS TRUST,
ADELAIDE.**

**SPECIAL NOTICE TO PASSENGERS ON THE
HINDMARSH LINE.**

On and after Monday, 28th June, 1908, and until further notice, Cars on the above line will follow the old route as far as the Mile-End Crossing, thence along Henley Beach-road, Parker, Holland, Manton, and Chapman streets, to terminus at John-street, Hindmarsh.

The sections on the new route will be as follows:—

Hindley-street Terminus to Parker-street intersection.

Parker-street intersection to Tramway-bridge loop.

Tramway-bridge loop to John-street, Hindmarsh.

The following timetable will be observed, as far as possible:—Daily—"Up" trip ex Hindmarsh, 7 a.m. and every 30 min. till 11 p.m. "Down" trip ex city, 7.30 a.m. and every 30 min. till 11.30 p.m. Extra cars will be run during business hours.

Sundays—"Up" trip ex Hindmarsh, 10.20 a.m., 12 noon, 2.0 p.m., and every 30 min. till 10 p.m. "Down" trip ex city, 11.10 a.m., 12.40 p.m., 2.50, and every 30 min. till 10.30 p.m.

By order,
W. G. T. GOODMAN,
Chief Engineer and General Manager.
8, King William-street, Adelaide, 28th June, 1908.

Advertisement (complete with typo) announcing the opening of the Hindmarsh line [Advertiser, Monday 28 June 1909, p2b]

⁴⁶ *Advertiser*, 22 June 1909, p9d

⁴⁷ *Advertiser*, 28 June 1909, p2b

⁴⁸ "Norwood, 7 goals 13 behinds; West Torrens, 5 goals 6 behinds. There was too much roughness throughout for a good exposition of football." [*Register*, 28 June 1909, p5c]

⁴⁹ *Advertiser*, 28 June 1909, p8a

⁵⁰ *Advertiser*, 10 March 1910, p9a

⁵¹ *Ibid*

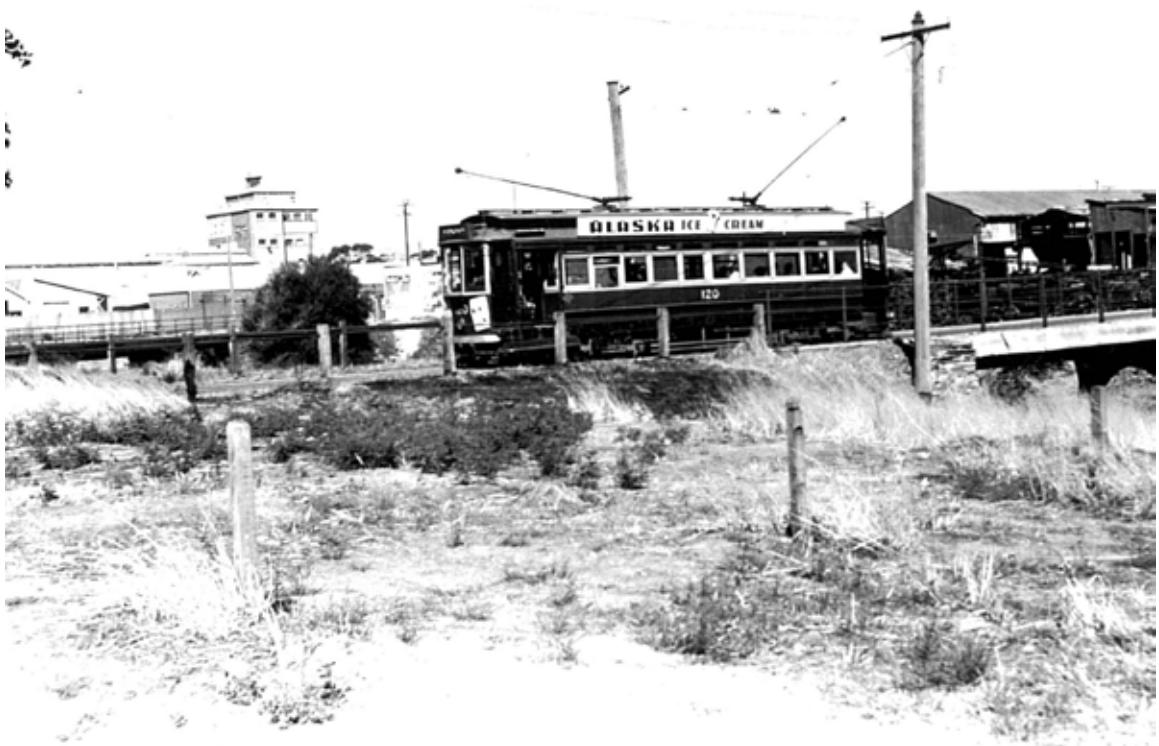
⁵² *Ibid*

⁵³ *Advertiser*, 10 March 1910, p9b

⁵⁴ *Advertiser*, 31 August 1910, p13h



*Hindmarsh-bound [Type X] tram No 67 negotiating the dogleg from Albert into Holland Street in 1910
Note the use of plain wooden poles in the side streets –
compare this with the ornate steel poles in Manton Street, page 19
[Photo: John Radcliffe]*



*Type E1 tram No 120 crosses the bridge from Holland Street to Manton Street in 1951
[Photo: John Radcliffe]*

Now that the Holland Street bridge was in service, a number of problems were encountered with other users. After the bridge was finished, ditches were dug at either end to prevent vehicles using it. These were filled in so the horse trams could cross and then opened up again after the electric trams began running. Timbers were laid over the ditches to form a cattle grid.; however, the one on the northern side was dangerously close to the footpath and the occasional cyclist came to grief. Red warning lights were erected and a night watchman was on duty from 6:00 pm until midnight.⁵⁵ But even these measures were not enough to stop people from trying to cross (other than pedestrians, for whom the footpaths had been provided). In May 1910, Goodman told the Hindmarsh Council:⁵⁶

Now the cattle stop and side posts had been painted white, and the word 'danger' written in red letters on the glass globe covering the cluster light. Thus it would be seen that every precaution had been taken, to ensure the public against risk of crossing the bridge which is not intended for their use.

6.5 The Cawthorne Street Bridge

The service to Hindmarsh and the other western suburbs proved so popular that within a few years the MTT was considering alterations and additions. In December 1919, the *Advertiser* reported:⁵⁷

Next in importance will be the laying of a new line to Hindmarsh, which will give the residents of Southwark especially, and Hindmarsh people in general, greatly improved facilities, and will make a double line right to the Hindmarsh terminus. It is impossible to lay a double track on the existing Hindmarsh route in some parts, and the new proposal is to branch off the existing line and carry a track down alongside the Port-road wood blocks to the Squatters' Arms, and thence along the side street and link up with the present line at the Albert-street loop. It is also proposed to take the second line along a street parallel with the line which at present runs from that loop and construct a new bridge across the Torrens on an angle from the street which separates the Union Engineering Co. and the Walkerville Brewery, and bring the line out near the existing line in Manton-street, whence it will run parallel with the existing line down Manton-street to the present Hindmarsh terminus.

The line running northeast from the bridge along Manton Street had been designed with duplication in mind. The steel supporting poles were placed in the middle of the street and a single ornate side arm carried the overhead electrical wires: to duplicate the service only required the fitting of another side arm.



*The first electric tram in Chapman (now Manton) Street, Hindmarsh, 1910
[State Library of SA, PRG280/1/6/115]*

⁵⁵ *Advertiser*, 28 March 1910, p6f

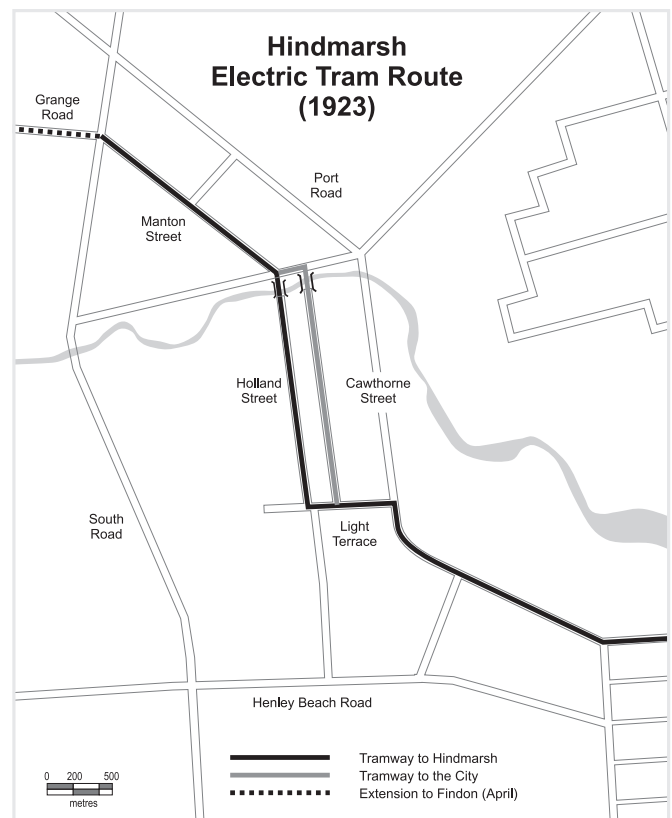
⁵⁶ *Register*, 17 May 1910, p6e

⁵⁷ "Tramway Extensions", *Advertiser*, 11 December 1919, p6fg

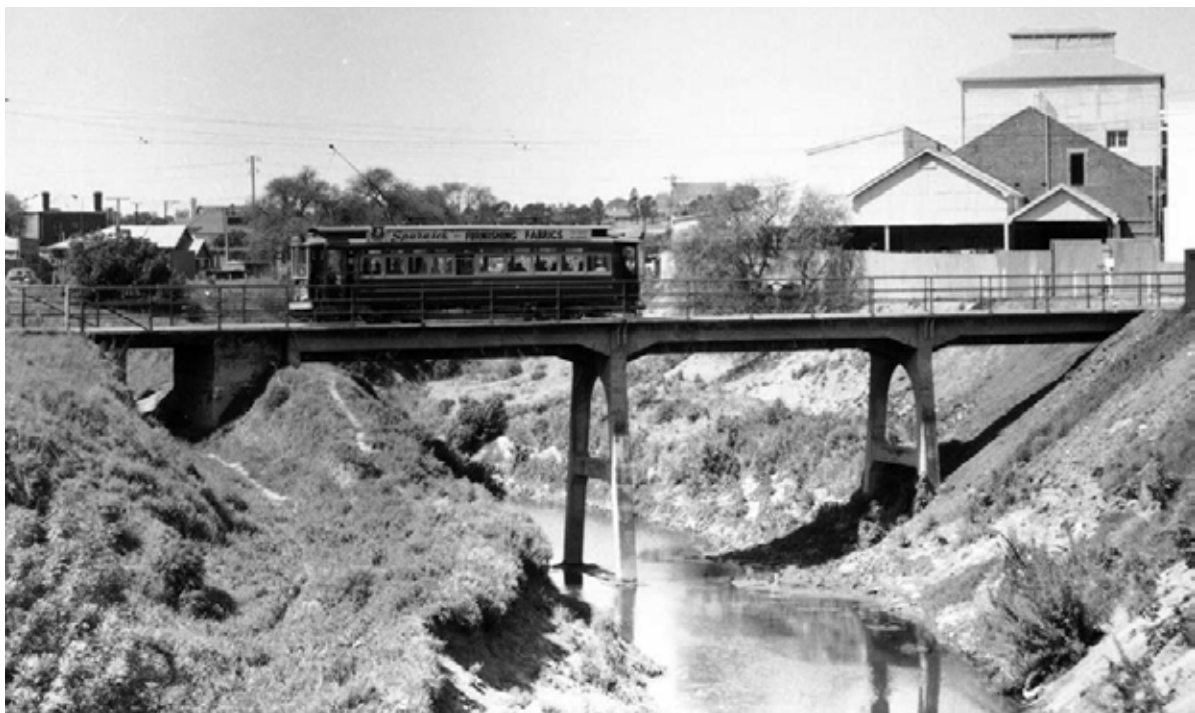
The “Down” Line (to Hindmarsh) would run along the south side of Port Road and then through George Street to connect with the old line at Albert Street. From here, it would follow the 1908 route over the Holland Street bridge and along Manton Street (the entire length of this street to South road had been given the one name in 1913⁵⁸).

The “Up” line (to the city) would run on the northern side of Manton Street, deviate a short distance along Adam Street, and then cross the Torrens, necessitating the construction of another bridge (the Holland Street bridge only carrying a single track). It would leave Thebarton via Light Terrace and run along the eastern side of Shierlaw Terrace (not yet renamed as part of Port Road) and the northern side of Port Road into North Terrace.⁵⁹

A crossing point in line with Cawthorne Street was chosen and the contract to build the bridge was let to the South Australian Reinforced Concrete Company in July 1922.⁶⁰ Work started promptly on a twin to the Holland Street Bridge and the new line was given a trial run on the morning of Sunday 14 January 1923. It was open to the public the same afternoon.⁶¹ A single track extension along Grange Road to Findon was opened on 15 April.⁶²



The duplication of the electric tram service to Hindmarsh opened in January 1923 – a single line extension along Grange Road to Findon opened in April



*A 23-29 tram No 111 crossing the Cawthorne Street bridge in 1952
The distinctive tower of the Southwark Brewery is in the background
[Photo: John Radcliffe]*

58 *Daily Herald*, 17 April 1913, p6d

59 John Radcliffe and Christopher Steele, 1974, *Adelaide Road Passenger Transport: 1836-1958*, Libraries Board of SA, p66

60 *Advertiser*, 9 July 1922, p11a

61 *Register*, Monday 15 January 1923, p6f

62 Radcliffe & Steele, *loc cit*

6.6 The End of Trams

Trams – first pulled by horses, then powered by electricity – served Adelaide for many decades. But then, following the Second World War, things began to change rapidly. New motor and trolley buses were ordered but parts for the construction of trams were hard to obtain and plans for the extension of tram lines were abandoned when supplies of rails failed to arrive. Goodman (now Sir William) retired on 30 November 1950. Manufacturing industries were being developed and there was a significant increase in population, sprawling across the Adelaide Plains to the north and south. To service these new areas, a number of bus lines – many of them privately operated – were established. The use of private motor cars began to climb and the use of public transport began to decline: the MTT was being squeezed on all sides.⁶³

In 1951 a Royal Commission was appointed to enquire into the affairs of the Trust.⁶⁴

Its interim report, released in February 1952, criticised many of the operations of the Trust, including a failure to plan for the future. Its final report suggested that the State Government should take over the Trust, that no new tramways should be built, and that the operations of the Trust should be examined by a transport expert.

Trolley or diesel buses began replacing electric tram services and new bus services were introduced. Not even the new streamlined Type H-1 tramcar, first used on 24 February 1953, could save the day.⁶⁵ The *Municipal Tramways Trust Act, 1935-1949* was amended to give control to a Board of five members appointed by the Government rather than the municipalities.⁶⁶ A complete review of Adelaide's transport system was undertaken and plans were made to replace all of the trams, including the Glenelg tram which operated on its own right-of-way, with buses.⁶⁷

In 1953, following the closure of the tram system, the Municipal Tramway Trust offered the bridge to the Highways Department. In March 1954, the Highways and Local Government Department refused to take over the bridge as it was considered unsuitable for vehicular use.⁶⁸

Towards the end of October 1953, the Mayors of the Thebarton and Hindmarsh Councils met at the site to discuss the possibility of converting the bridges to take road traffic, possibly involving removing or filling in the tram tracks.⁶⁹ In April 1954, the two Councils accepted joint ownership of the bridge, the Town Clerk of Thebarton adding that the bridges “would be available for pedestrian and bicycle traffic only”.⁷⁰ This was reiterated several months later when a Highways Department officer told them:⁷¹

... the bridges had been built specifically for trams. Tramway loading was distributed differently from highway loading, with all the weight resting on two rails. The decking of the bridges would have had to be completely reconstructed to carry road traffic. The general condition of the concrete on the bridges was poor, and extensive repairs would have been necessary.



This photograph of the two bridges appeared in the “Advertiser” of 22 October 1953 when the two Councils were discussing opening them to road traffic

63 Radcliffe & Steele, *op cit*, pp115-128 *passim*

64 Radcliffe & Steele, *op cit*, p128

65 Radcliffe & Steele, 1974, pp131-132

66 *Municipal Tramways Trust Act Amendment Act, 1952*

67 Radcliffe & Steele, *op cit*, p133

68 Email from Nigel Ridgway, Chairman of the Engineering Heritage & History Committee, Engineers Australia (SA Division), to Duncan Ross-Watt, SA Department of Environment & Heritage, 19 December 2002; there are no sources given but the letter was prepared in consultation with committee members having “civil engineering and heritage expertise” – and, presumably, access to Highways Department records

69 “Tramway Bridge Conversion Plan”, *Advertiser*, 24 October 1953, p3d

70 *Advertiser*, 29 April 1954, p7b

71 *The Mail*, 13 November 1954, p13a

The bridges were finally reopened to road traffic in May 1962. The 2002 report from the Engineering Heritage & History Committee of Engineers Australia provides further detail:⁷²

Following representations from the two adjacent councils to the Minister of Roads, the bridges came under the care of the Highways Department. Asphalt was laid over the tram rails, which were left in place, barriers installed to confine traffic to the centre 11 ft width of the structures, and the bridges re-opened in May 1962 to one-way road traffic with a 5 ton load limit. The Holland Street bridge carried south bound traffic and the Cawthorne Street Bridge carried north bound traffic. By 1966 the northern abutment of the Cawthorne St bridge was being badly scoured by the river, exposing the full length of some of the reinforced concrete piles. The bridge was closed and subsequently demolished before it collapsed. In 1982, the remaining (Holland St) bridge was found to have an inadequate opening to carry floodwaters in the Torrens and threatened with demolition. However it was reprieved when scour protection works on the river banks were carried out. In 1986 the load limit on was reduced to 2 tonnes and in May 1990 the bridge was closed to road traffic following the widening of Adam Street. It was transferred back to Councils and remains open to pedestrians.

The “Holland Street Bridge” was entered in the State Heritage Register, under the South Australian *Heritage Places Act 1993*, on 20 November 1986. It is on the Classified List of the National Trust of South Australia and is entered in the local Development Plan, under the South Australian *Development Act 1993*, as a State Registered Place. Because of its heritage listing, the bridge cannot be demolished.

6.7 A New Life for Holland Street

The Holland Street bridge continued to be used by cyclists and pedestrians until 2010 when continuing concerns about the bridge’s safety led to its closure. Engineering consultants were asked to report 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”.⁷³

However, the bridge had become 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 is a campus of the University of Adelaide on the southern side and, from March 2010, the terminus of the tram extension from the city to Hindmarsh on the northern side. Understandably, there was considerable community concern at its closure.⁷⁴



*The bridge viewed from Holland Street after its complete closure in 2011
[Photo: Richard Venus, 15059]*

⁷² Email from Nigel Ridgway to Duncan Ross-Watt, 19 December 2002

⁷³ “Holland Street Bridge Update”, 3 May 2001, Urban Services Standing Committee report, City of West Torrens

⁷⁴ For example, “Marisa Zerillo, “Stopgap bridge ‘too expensive’”, *Weekly Times*, 3 August 2011, p15, reported a petition signed by 300 people calling for at least a temporary bridge



*The Holland Street bridge during the trial repair in 2013 –
the access scaffold used by the contractors can be seen on the left
[Photo: John Woodside]*

With the merger of various councils, the Holland Street Bridge became jointly owned by the City of Charles Sturt and the City of West Torrens. The bridge owners had 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 which would somehow complement the old
- Remediate and re-use the bridge

Heritage SA advised that they would not accept the first option. Clearly the most desirable option, from both a heritage and community point of view, is the last but there were concerns that this would not be cost effective and result in a long-term maintenance liability.

Fortunately, another engineering assessment carried out in 2011 demonstrated that the third option could, indeed, be feasible and the two councils agreed to a trial repair of one girder in 2013.

7. Reconstructing & Repairing the Bridge

The Holland Street Bridge is a heritage-listed structure and the oldest reinforced concrete girder bridge in the Adelaide metropolitan area. Some structural deterioration of the bridge has been occurring for many years with corrosion of the reinforcement and spalling of the concrete. The initial corrosion of the reinforcement was due to stray electrical currents from the trams. The bridge had been inspected by engineers from the Highways Department on a number of occasions and, after the trams stopped running in 1953, the rate of corrosion appears to have slowed. Some upgrading work included filling in the tram tracks with bitumen and providing guard rails on either side of the road pavement was undertaken at that time. Despite this, the bridge has performed remarkably well for over 100 years and is a tribute to the original designer, Sir John Monash.

The Heritage Register Nomination Report (1982) says that the bridge's structure was "strengthened" before being opened to road traffic 1962¹; however, there is no evidence that any significant strengthening, repairs, or even maintenance had ever been carried out on the bridge. Before the bridge was opened to road traffic in 1962, asphalt was laid over the tram rails and barriers were installed to confine traffic to the centre of the structures. Otherwise, the bridge was in its original condition.



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

7.1 Further Investigation and Trial Repair

A previous engineering report had advised that the bridge could not be successfully repaired. Synergy Remedial Pty Ltd, an Adelaide company with extensive experience in repairing concrete and stone bridges, carried out intrusive testing. Their report of January 2011 confirmed that the bridge was not in good condition but said that it could be repaired to restore the necessary structural capacity to be again used by pedestrians and cyclists. The City of Charles Sturt then sought an independent assessment from J Woodside Consulting Pty Ltd (JWC), an engineering company with extensive experience in concrete repair and restoration projects, primarily for buildings, and strong working relationships with engineers experienced in this type of work. JWC noted the cracking and spalling of the concrete which had been occurring for many years but considered that, despite the highly visible deterioration, the bridge could be repaired successfully, with an estimated serviceable life of at least another 30 years.²

¹ Iris Iwanicki, 1982, Register Nomination Report: Holland Street Bridge, Hindmarsh/Thebarton (former tramway bridge)

² Phil Hewitt & John Woodside, 2014, "The Restoration and Repairs of the Heritage-listed Sir William Goodman Bridge in Adelaide", *Proceedings of the Sixth Australian Small Bridge Conference*, Sydney [initial draft pp15-18]

A team consisting of a project manager, architect, engineer and cost planner was assembled on behalf of the City of Charles Sturt and reported on the practicality of restoring the bridge in March 2013. On the recommendation of J Woodside Consulting, trial repair of one beam – including strengthening – was carried out to determine the feasibility of concrete repairs for the reconstruction of the bridge.

The chosen beam was one of the outer members which was not as deep as the two central beams under the tram track. Its depth was increased by approximately 75 mm with new concrete added and a coating system to protect the carbonated concrete. The trial repair was carried out in February and March 2013. Where there was no corrosion and spalling, 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 bridge.³



*(Left) Original bars were bent-up to provide shear reinforcement near the supports – note corrosion of bows
(Right) Examination of the reinforcement shows where the bar is slightly wider than it would have been when it was rolled – the forge welding been very well done and might not have been noticed without the evidence of Monash's letter to Harvey (note the modern reinforcing below which is part of the reconstruction project)*

[Photos: John Woodside]



(Left) Formwork in place for the trial beam repair: loose concrete has been removed, the old reinforcement primed, and new reinforcement placed

(Right) Carbon fibre strips being applied to provide shear reinforcement

[Photos: John Woodside]

The trial repair has demonstrated that the bridge can be restored and strengthened in an economical and effective manner. The work was inspected by officers from both Councils and Heritage SA and will meet Heritage SA expectations. The reconstruction of the bridge is both feasible and practical. The total estimated cost of \$2.6 million (including professional fees and \$200 000 contingency) is at least \$1 million less than constructing a new footbridge (which would have been extremely difficult because of the constraints of the site and the heritage listing of the old bridge).

³ Hewitt & Woodside, 2014, [initial draft pp21-22]

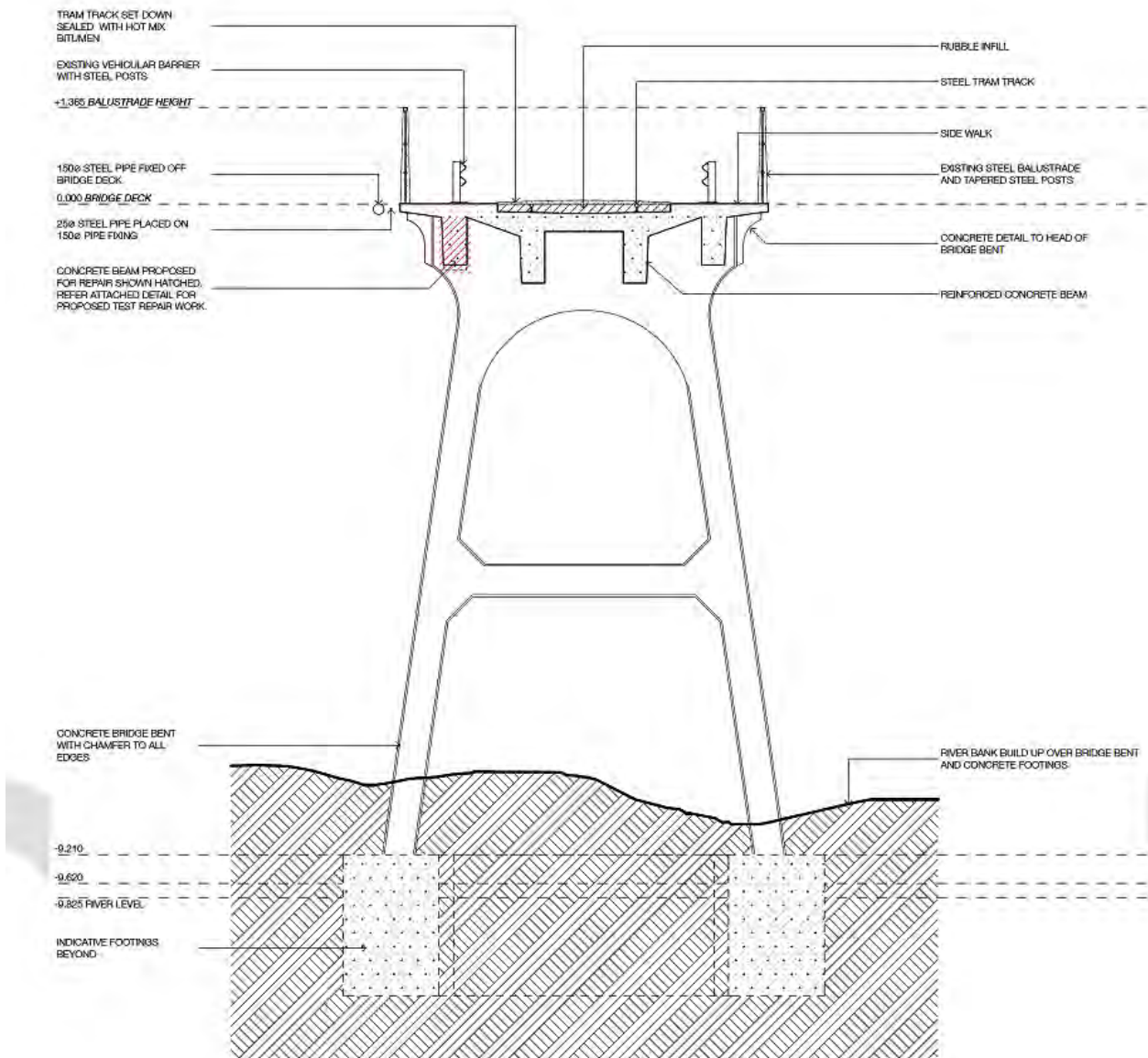
Despite this, the City of West Torrens decided that the best course of action was to construct a new bridge. If the City of Charles Sturt did not agree, it would seek to relinquish its responsibility for the bridge for 80 years, allowing the City of Charles Sturt to repair and reconstruct the old bridge and accept responsibility for its ongoing maintenance. This was the course adopted with the City of West Torrens making a one-off contribution to the cost. The State Government also provided an Open Space Grant of about \$1.2 million to provide the funds to allow the project to proceed.

7.2 Reconstruction of the Bridge

The bridge is a three-span continuous reinforced concrete beam and associated slabs. Both ends of the bridge are supported by reinforced concrete abutments whilst the two A frames of reinforced concrete support the bridge at the central span and are integral with the bridge superstructure. The deck slab is supported by two deeper interior and two shallower exterior beams. The tram tracks were located over the two inner beams.

The light poles shown on the presentation drawing (page 12) were never constructed. The bridge has the original cast iron balustrades on the outside edges of the bridge and vehicular W Beam barriers which were subsequently fitted in about 1962; they are 700 mm inboard from the balustrades.

The two central A frames (centre columns) are supported on pile caps which in turn are supported on concrete piles driven into the ground.



Section of the bridge as constructed [Illustration: URS]

The repair process involved the following stages:⁴

- All damaged and cracked concrete was removed, and a space provided around the existing main 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.
- Additional steel reinforcement was added to the bottom of the 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 beam 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 the beam as shear reinforcement, as the beam did not comply with current code 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 City of Charles Sturt confirmed the appointment of J Woodside Consulting as project managers, Flightpath Architects, URS as engineers, and Rider Levitt Bucknell as cost planners to finalise the design and documentation and manage the restoration and repair work. 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. The work includes not only the repairs to the existing structure but also a new concrete slab to fill the set down for the tram tracks, restoration of the existing handrails and provision of new handrails, and new lighting and civil works at the base of the pier foundations.

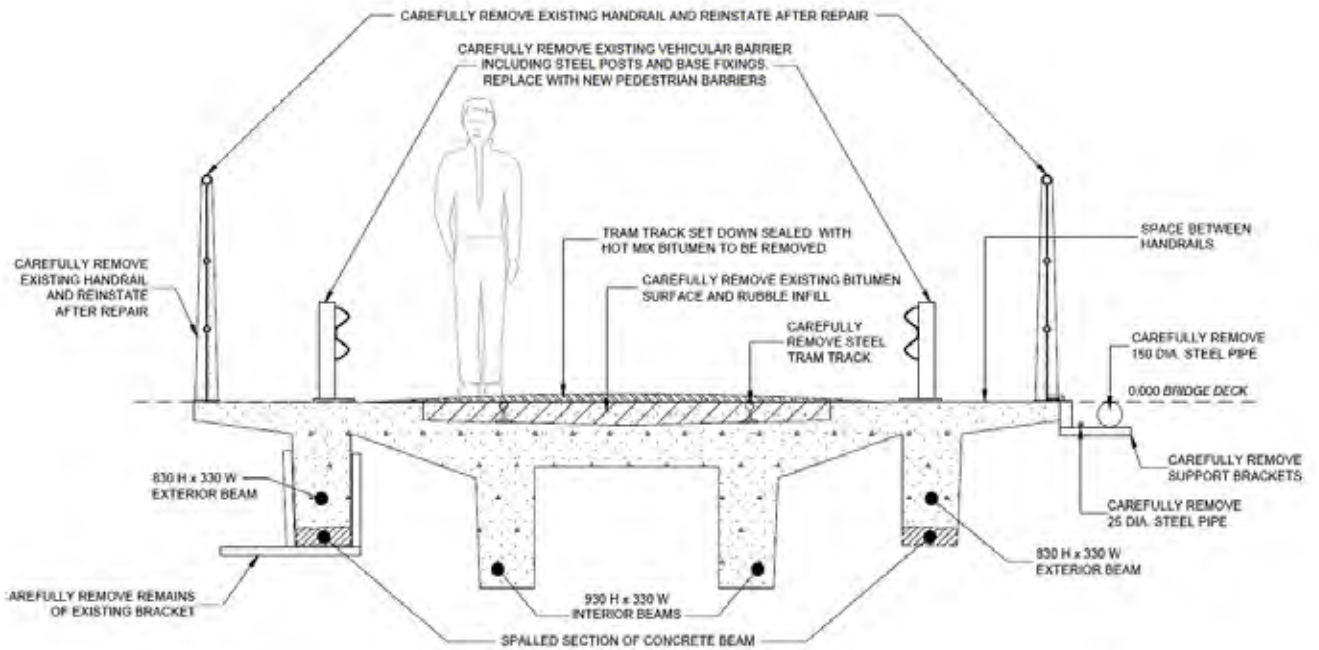
To date the repair and restoration work has shown that the expected extent of repairs is consistent with the documentation and the trial repairs. There have been few hidden surprises and all additional work has been well within the contingency allowance. Construction is expected to be completed by August 2014.



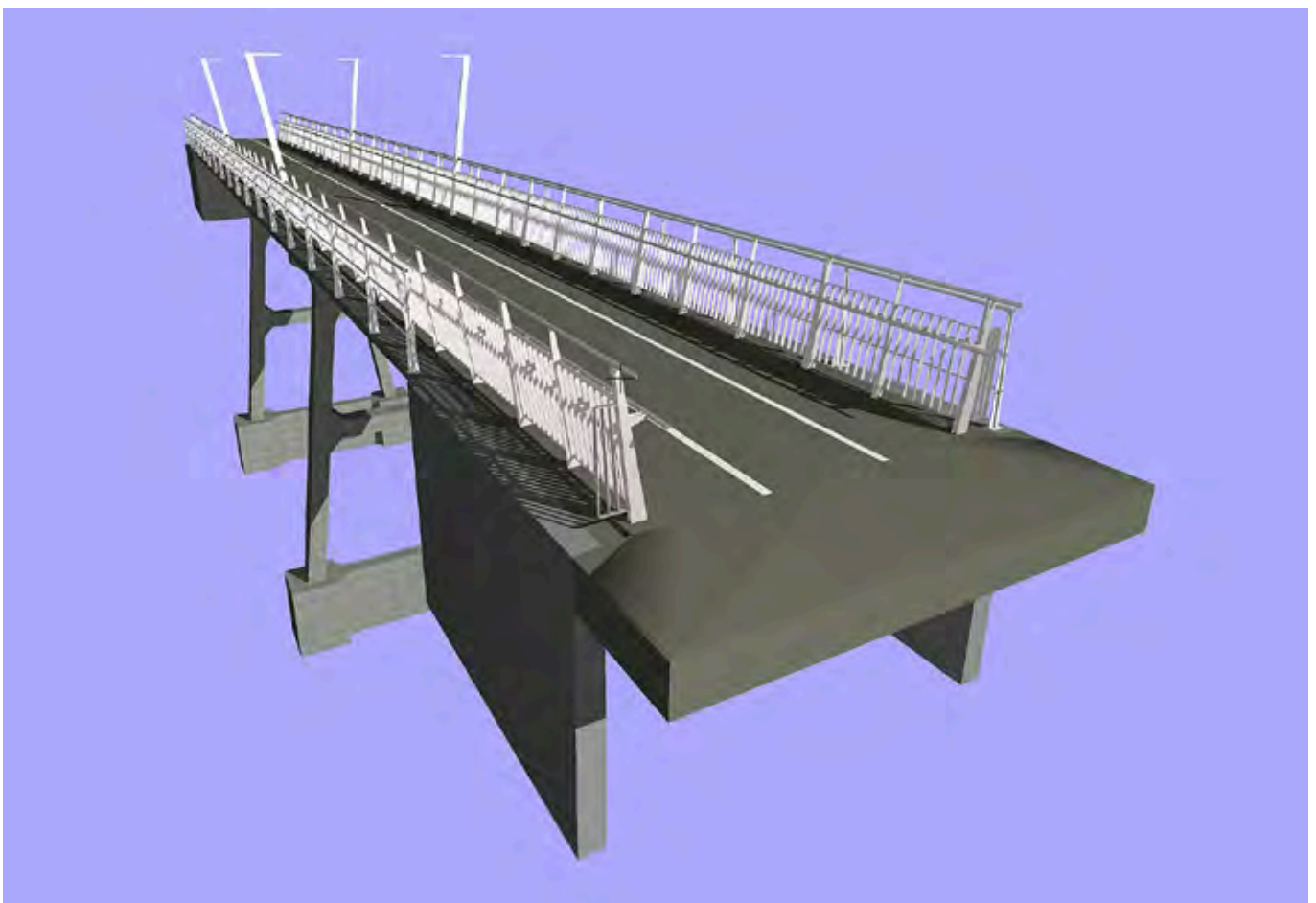
New concrete encloses the additional reinforcement and restores the bottom of the beam. This concrete has plasticisers with small aggregate and a strength of around 20 to 25 MPa to be consistent with existing concrete.

[Photo: John Woodside]

4 John Woodside, 2013, *Preserving Our Heritage: Engineering heritage recognition of Sir John Monash and the South Australian Reinforced Concrete Company (SARCC) in SA*, report prepared by J Woodside Consulting

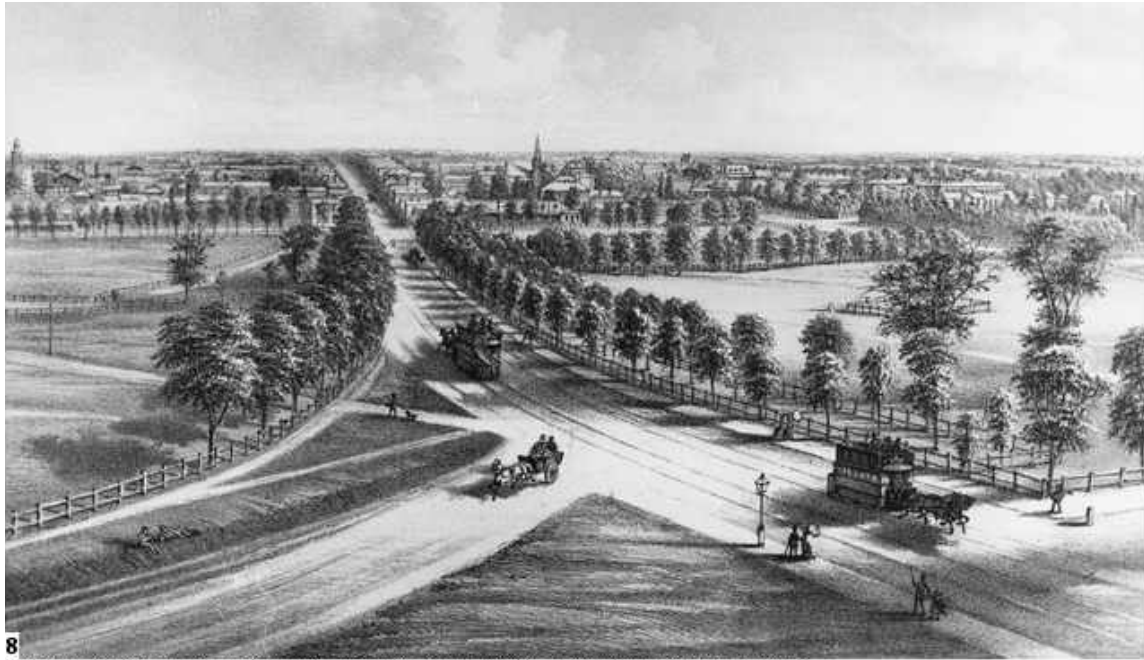


*Cross section of the bridge showing proposed reconstruction treatments
[Illustration: URS]*



*CAD model of the completed reconstruction – paving identifies the original position of the tracks while the original cast iron balustrades have been reinstated
A new Code-compliant balustrade and modern lighting have been added
[CAD model: Flightpath Architects]*

8. Adelaide's Tramways



*Horse trams on the Kensington line passing through the Eastern Parklands, c1881
[State Library of South Australia, B808]*

Being built on a relatively flat coastal plain, Adelaide was an ideal place for establishing a system of horse-drawn transport. Light spring carts were among the early imported conveyances and the auctioneer W H Neale offered a cart for sale with “a nearly new harness for same” in July 1837.¹

Enterprising carriers operating the mail service between Adelaide and the Port were offering to carry passengers as early as 1839² while John Bentham Neales, the Government Auctioneer, had transport firmly in mind in the promotion of his land development at Port Gawler:³

Two boats ply twice a week between Port Gawler and Port Adelaide, and a spring cart runs twice a week between Milner [the estate development] and Adelaide, and arrangements are making for a daily conveyance by land and water, to give intending purchasers constant opportunities of visiting this splendid property.

Kensington and Norwood were among the first settlements to be established on the plains outside the boundaries of Adelaide and soon became thriving villages. The publican of the Rising Sun Inn in Bridge Street, Kensington, began providing rides to the city in his spring cart for a shilling a head. This was followed about 1856 by an omnibus service.⁴

In January 1860, William Benjamin Rounsevell, proprietor of livery stables in the city, advertised that his two coaches, the *Red Rover* and the *Red Lion*, were available for hire “at any time during the NIGHT

ROYAL MAIL.
JOSEPH EDMONDS having purchased the Coach, Horses, &c., lately imported by V. and K. Solomon, ex *Norosa*, begs to acquaint the public that he has commenced running the same to and from the Port daily from the Southern Cross Hotel at 10 o'clock in the forenoon, returns from the Port at half-past four in the afternoon, for Adelaide. Places and parcels booked at Mr. Allen's, Southern Cross Hotel.
Fares Four Shillings each.
J. E. engages to deliver all parcels entrusted to his care within one hour after his arrival.

“THE DÉFIANCE,”
FROM THE SOUTHERN CROSS.
THE above commodious vehicle leaves the City, carrying the mail for Port Adelaide, at nine o'clock each morning and two in the afternoon, and returns from the Port at twelve each morning, and five in the evening, (Sundays excepted). In connection with *The Defiance*, a Mail Cart carrying passengers runs to and from Halifax Bay to suit the convenience of shipping at anchor there.
Passengers booked by Mr. ALLEN, at the Southern Cross, Adelaide, and by Mr. ASHBY, at the Port Hotel, Port Adelaide.

*[SA Gazette & Colonial Register,
16 March 1839, p4c]*

1 *SA Gazette and Colonial Register*, 29 July 1837, p1c

2 *SA Gazette and Colonial Register*, 16 March 1839, p4c

3 *SA Gazette and Colonial Register*, 16 March 1839, p3b

4 George Gooden and Thomas Moore, 1903, *Fifty Years' History of the Town of Kensington and Norwood: 1853-1903*, facsimile edition 1997, City of Kensington and Norwood, p25



**W. ROUNSEVELL'S
LIVERY AND BAIT
STABLES,
PIRIE & GRENFELL STREETS.**

STAGE COACHES RUN TO ALL PARTS OF THE COLONY

THE ONLY WEDDING TURN OUT IN THE COLONY.



**COBB & CO'S
CARRIAGE REPOSITORY,
Pirie and Grenfell Streets.**

STAGE COACHES RUN TO ALL PARTS OF THE COLONY.

The best Wedding turn-out in the Colony.

Carriages, Buggies, Cabs, Albert Carts, Victoria, Platform
Day Carts, Spring Carts, Gigs, and every other description of
VEHICLES ON HIRE.

*Advertisements for coaching services "to all parts of the Colony"
[Shawyer's South Australian Almanac, 1864, p104 and 1867, p143]*

or DAY for a TRIP to the BAY for 10s., including a good Bath"⁵. Rounsevell then established regular coach services "to all parts of the colony", starting with a daily service to Mount Pleasant (in the northern Adelaide Hills, near the Barossa Valley) which began on 1 October 1860, accompanied by a brass band and loud cheering.⁶

In February 1861, the celebrated and enterprising Victorian coaching firm of Cobb & Co announced their intention "to immediately extend the field of their operations to this colony" starting with a service from Adelaide to Wallaroo.⁷ In 1867, Cobb & Co took over Rounsevell's coaching business leaving him free to pursue other interests, including pastoral pursuits and politics (he served as Treasurer and introduced Australia's first income tax legislation in 1884).⁸

ROUNSEVELL'S NEW LINES OF COACHES.—
The New Omnibus TRAFALGAR will commence running between MOUNT PLEASANT and ADELAIDE on the 1st October. Leaves Mount Pleasant at 6 a.m., and Adelaide at 3 p.m., daily. Fares—Mount Pleasant, 6s.; Gumeracha, 4s. Parcels under 12 lbs., 1s. each; over 12 lbs., 1d. per lb.
The New Omnibus CROCODILE will commence running between Gawler and Clare shortly, leaving Gawler on arrival of first train, and Clare at 7 a.m., alternate days. Fares through, 20s.
Booking-offices, Sturt Hotel, Grenfell-street, and Exchange-colonnade, King William-street. x3

[SA Weekly Chronicle, 15 September 1860, p1f]

However, there were many complaints about the comfort and reliability of omnibus services and tramways (or railways – one is never sure which is which) were seen as a better option. A vehicle running on rails gave a much smoother ride and allowed the horse or horses drawing it to make a more gradual start.

In March 1875 William Buik, a former Mayor of Kensington and Norwood, led a deputation to that Council, seeking support for the establishment of a horse tram service.⁹

In April 1875, the *SA Register* reported:¹⁰

There seems a probability that the experiment of street tramway communication will shortly be inaugurated in Adelaide and its suburbs. A movement in that direction has been in course of progress for some time, and deputations a few weeks ago waited upon the municipal bodies concerned to secure their co-operation. It is only during the last day or two, however, that the scheme has assumed a definite form. In the present day there will be very little question as to the advantage which the tram-car affords under proper management in the accommodation of passenger traffic over short distances.

5 *SA Advertiser*, 26 January 1860, p1e

6 *SA Advertiser*, 2 October 1860, p3b

7 *SA Advertiser*, 23 February 1861, p2e

8 G L Fischer, "Rounsevell, William Benjamin (1843–1923)", *Australian Dictionary of Biography*, National Centre of Biography, Australian National University, <adb.anu.edu.au/biography/rounsevell-william-benjamin-8281/text14511>, viewed 15 February 2014

9 John Radcliffe and Christopher Steele, 1974, *Adelaide Road Passenger Transport: 1836-1958*, Libraries Board of SA, p23

10 "A Street Tramway Scheme", *SA Register*, 22 April 1875, p5bc

A Prospectus for the Adelaide and Suburban Tramway Company was issued in April 1875¹¹ but it would be another 18 months before the Governor assented to their enabling Act of Parliament.¹² However, no opportunity was being lost and in August 1875 the Company's banker, M Kingsborough, advertised property for sale "within an easy distance of the proposed Tramway"¹³.

Finally, the Act was passed in November 1876 and the *SA Register* observed that "the persevering attempts of the Adelaide and Suburban Tramway Company have this year been crowned with success"¹⁴.

Prudently, the Company had refrained from committing themselves to ordering equipment until their Act had been passed and it was another 12 months before the Governor laid the first rail with due ceremony on 29 October 1877. In contrast, the service itself began *without* ceremony on 10 June 1878 when cars began running to Kensington.¹⁵

Other companies were soon formed to supply horse tram services to other suburbs ranging from the modest objective of the City Tramway Company "to connect the northern extremity of O'Connell street. North Adelaide, with the southern extremity of King William-street at South terrace"¹⁶ to the Adelaide, Unley and Mitcham Tramway Company which began its service on 12 February 1879.¹⁷

In addition, the Port Adelaide, Queenstown, Alberton and Portland Estate Tramway Company Limited opened a line from Port Adelaide to Albert Park in May 1879, initially with a Merryweather steam motor, but replacing this with horses in 1882. The Glenelg, Brighton and Marino Tramway Company Limited built a line from Glenelg to Brighton and the service commenced in June 1883. It continued to run until 1914 but was never taken over for electrification. A few other companies were formed but never got around to laying any track while a number of the above companies faltered and were taken over.¹⁸

But this was clearly a step in the right direction and the *Register* looked forward to the improvement in comfort and amenity for passengers that the new tracked transport would bring.¹⁹

There can be no question that Adelaide is greatly behind many modern cities in facilities for street conveyance, those which are provided being in many respects a long way behind the times. The experience of other cities where railways worked by horse traction have been in use for some time is universal in their favour. The unpleasant jolting which is a general characteristic of a ride in most of our city conveyances is done away with, and greater safety and convenience are ensured.

PROSPECTUS
OF THE
ADELAIDE AND SUBURBAN TRAMWAY COMPANY,
To be Limited and Incorporated under the Companies Act, 1864.

— — — — —
NOMINAL CAPITAL, £25,000 (with power to increase) IN 5,000 SHARES
OF £5 EACH.
10s. per Share on application, and 10s. per Share on allotment; the balance in Calls of not more than 10s. per Share at intervals of not less than two months.

PROFESSIONAL COMMITTEE—
EDWIN THOMAS SMITH, ESQ., M.P. | W. D. OLYDE, ESQ.,
WENTWORTH CAVANAGH, ESQ., M.P. | CHARLES FISHER, ESQ.,
WILLIAM KAY, ESQ., M.P. | FREDERICK WRIGHT, ESQ., J.P.
W. C. BEER, ESQ., J.P. | FRANK HANN, ESQ.,
JOHN NEWELL, ESQ. | J. H. SIMPSON, ESQ.

SOLICITORS—
WAY & SYMON.
BANKERS—
BANK OF ADELAIDE.
BROKER—
M. KINGSBOROUGH.
SECRETARY AND TRK.—
J. S. SCOTT.

— — — — —

THE above Company will be formed for the purpose of Constructing and Working Tramways for Horse Traction, in, from, to, and between the City of Adelaide, Kent Town, Norwood, and Kensington, and Townships Suburbs thereof respectively, and such other Townships and places as the Shareholders may from time to time determine, with power to acquire by purchase, lease, exchange, or otherwise all lands buildings, rights, and easements that may be deemed necessary, and to sell, assign, let, or exchange any surplus or other lands and to obtain an Act of the Parliament of South Australia, and to do all such other acts, matters, and things, and with all such powers, privileges, and immunities as may be incidental, subsidiary, or conducive to the said purpose. It being proposed to lay the line along the public roads, the cost of forming the Proposed Way will be comparatively small.

The intention of the proposed Company is to provide a safe and easy mode of Passenger Traffic by means of Hibern Carriages drawn by horse-power. Street Tramways (generally unknown in South Australia) have for many years been in successful operation in the United Kingdom, America, and the Continent of Europe, and are destined to alter the whole system of street and suburban conveyance, by affording to the public increased comfort and accommodation, with greatly diminished expenditure of horse-power. The facility with which carriages can be drawn along the smooth rails permits them to be constructed of larger size and with greater regard to the comfort of passengers than ordinary carriages. The carriages are so arranged that the timid and infirm can get in and out of them without difficulty, and for gentlemen wishing an outside seat there is every provision made for comfort and safety.

The Tramway carriages do not interrupt, but on the contrary are found to regulate the general traffic. The carriages will be large and roomy, and similar to those on the London, Edinburgh, and Glasgow Tramways, which lines bid fair to be as remunerative to the proprietary Companies as they have proved a source of convenience and advantage to the public. The present amount of passenger traffic from the Eastern Suburbs will by the proposed mode of conveyance, it is believed, be greatly increased. The population of the Eastern Suburbs being nearly 10,000, warrants the Provisional Committee in bringing the Company before the public. The above scheme has been submitted by a deputation to the Council of the City of Adelaide and the Council of Kensington and Norwood, both of whom entertained the project favourably.

The Omnibus traffic in and around Adelaide and the Eastern Suburbs is already very large in proportion to the population, and whereas this has been the case Tramways have been proved by experience to be successful.

A Bill will be submitted at next session of the Parliament of South Australia seeking for powers to enable the Company to successfully carry out the enterprise.

When two-thirds of the shares are subscribed for and allotted, the Company will be considered formed, and a meeting of the Shareholders will be called for the purpose of approving Memorandum and Articles of Association, appointing Directors, and making other arrangements.

The only charges to be made to the Company before incorporation will be the preliminary and professional expenses, and the usual brokerage.

All applications for Shares to be made to
Ms. M. KINGSBOROUGH,
Currie Street, Adelaide.

April 29th, 1875.

Adelaide and Suburban Tramway Company Prospectus
[SA Advertiser, 24 April 1875, p3fg]

11 SA Advertiser, 24 April 1875, p3fg
12 SA Register, 28 October 1876, p4e
13 SA Register, 4 August 1875, p8d
14 SA Register, 18 November 1876, p5a
15 Radcliffe & Steele, 1974, p23-24
16 SA Advertiser, 9 June 1876, p5b; a substantial prospectus was advertised in the SA Advertiser, 16 June 1876, p2ef, but then the company faded from sight
17 Radcliffe & Steele, 1974, p24
18 Radcliffe & Steele, 1974, pp23-26
19 SA Register, 14 April 1876, p4f

Table of Horse Tram Companies

<i>Company</i>	<i>Commenced</i>	<i>Terminus</i>
Adelaide and Suburban Tramway Company	June 1878	Kensington
Adelaide and Suburban Tramway Company	December 1878	North Adelaide
Adelaide, Unley and Mitcham Tramway Co Ltd	February 1879	Mitcham
Adelaide and Hindmarsh Tramway Co Ltd	October 1880	Hindmarsh
Adelaide and Parkside Tramway Co Ltd	September 1882	Parkside
Adelaide and Hindmarsh Tramway Co Ltd	October 1882	Thebarton
Adelaide and Parkside Tramway Co Ltd	November 1882	Walkerville
Adelaide and Goodwood Tramway Co Ltd	November 1882	Goodwood
Adelaide and Parkside Tramway Co Ltd	December 1882	Maylands
Adelaide and Hindmarsh Tramway Co Ltd	February 1883	Henley Beach
Adelaide and Hindmarsh Tramway Co Ltd	May 1883	Grange
Adelaide and Parkside Tramway Co Ltd	July 1883	Marryatville
Adelaide and Suburban Tramway Co Ltd	August 1883	Magill
Adelaide, Prospect, Nailsworth and Enfield Tramway Co Ltd	September 1883	Enfield
Adelaide and Hyde Park Tramway Co Ltd	September 1883	Hyde Park
Adelaide and Parkside Tramway Co Ltd	October 1883	Burnside
Adelaide, Payneham and Paradise Tramway	December 1883	Payneham
Adelaide, Payneham and Paradise Tramway	February 1884	Paradise
Adelaide and Parkside Tramway Co Ltd	March 1884	Glen Osmond

8.1 The Adelaide and Hindmarsh Tramway Co Ltd

A prospectus for the Adelaide and Hindmarsh Tramway Company was published in April 1876.²⁰ “We understand that at a meeting held at Hindmarsh recently, and which was attended by influential citizens, it was unanimously agreed that a tramway would be very beneficial to the neighbourhood,” said the *Register*.²¹ News of the tramway’s imminent commencement certainly had an impact on land development. Some 40 acres of land at New Thebarton – “within a few minutes’ walk of the PARK LANDS and the ADELAIDE and HINDMARSH TRAMWAY” – were offered for sale in October 1877.²²

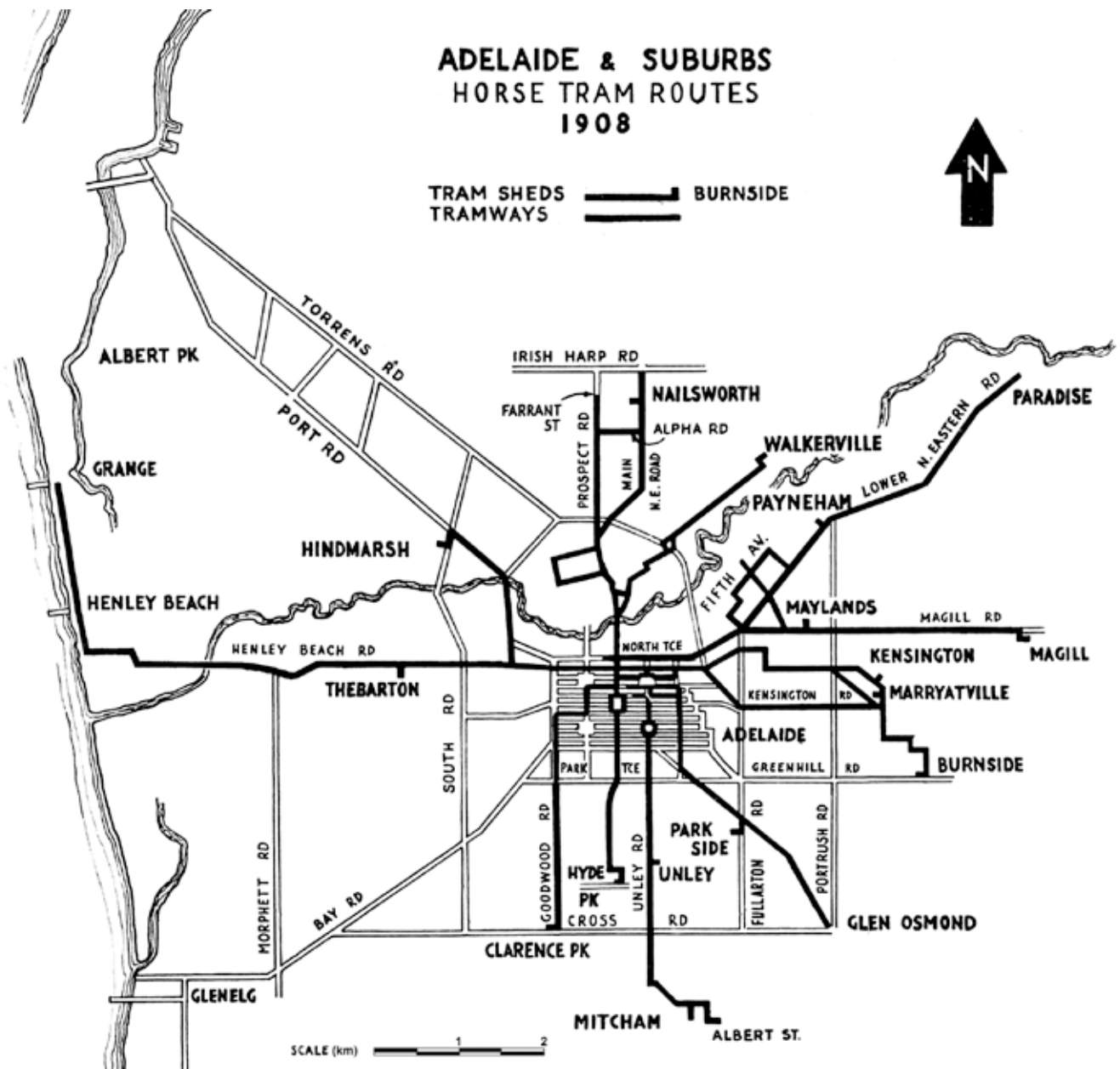
But the tramway to Hindmarsh was just the beginning. The Company also had in mind to extend their line through the city to connect with the terminus of the railway line to Glenelg (which was then in King William Street, south of Victoria Square) and then, “at some future time”, to build a tramway to Glenelg and Brighton. Another line running north-south would provide a direction connection between Hindmarsh and the contemplated line to Glenelg. (This idea of a transport route providing direct connections between suburbs, or what were then villages, was quite an advanced one. Most routes converged on the city which added significantly to the travel time of people wanting to travel across town – a problem which has persisted to this day.) Finally, they contemplated extending the line westwards to the coast, “thus affording the citizens, as well as the inhabitants of the Townships of Thebarton, Hindmarsh, Brompton, Bowden, Carron-down, and Findon an opportunity of reaching the beach by a short, safe, and easy mode of travelling”.²³

²⁰ *SA Register*, 29 April 1876, p2ef

²¹ *SA Register*, 14 April 1876, p4ef

²² *SA Register*, 20 September 1877, p8e

²³ *SA Register*, 29 April 1876, p2ef



*Adelaide and Suburban Tramway Horse Tram Routes, 1908
(Based on the map compiled by L R Kingsborough in 1945)²⁴*

In August 1877, the promoters offered the balance of shares to the public, still stating their intention to run lines to Brighton and directly west from Hindmarsh to the coast.²⁵ The Private Bill empowering the Company to carry out their works received Royal Assent in December²⁶ and the Company then got down to the serious business of actually building the tramway. An Extraordinary General Meeting was called in January 1878 “for the purpose of determining the townships and places into, from, and between which the Company shall construct, maintain, and work tramways, and to pass a special resolution authorizing the Directors to obtain and use steam power on such Tramways or portion of them”.²⁷

Another Extraordinary General Meeting was held in May because the desired number of shares had not been taken up. The Chairman, W C Buik, told the meeting:²⁸

The Directors having carefully considered the matter had come to the conclusion that it would be unadvisable to order plant and incur further liabilities with a less capital [sic] than would be represented by 4,000 shares, viz., £12,000, and to show their confidence in

²⁴ Ralph Sangster, 1972, *Development of Street Transport in Adelaide: Official History of the Municipal Tramways Trust, 1907-1972*, Municipal Tramways Trust, Adelaide, p1

²⁵ *SA Advertiser*, 14 August 1877, p5c

²⁶ *SA Chronicle and Weekly Mail*, 29 December 1877, p6f

²⁷ *SA Register*, 16 January 1878, p2c

²⁸ *SA Chronicle and Weekly Mail*, 4 May 1878, p9d

the undertaking they were prepared to increase their liability by taking up 250 additional shares if the share holders would take up the remaining 727. The lull in the demand for shares was caused he believed by the anxiety of the public to see the starting of the Adelaide and Suburban Tramway. From what he knew of that concern he might say at once that he believed it would be a success. With respect to the Adelaide and Hindmarsh Company the whole of the preliminary expenses, about £600, had been paid, the Act was a workable one, and they might proceed at once. ... The principal object of the present meeting was to decide as to steps for taking up the shares necessary to make the total amount 4,000. Now that they knew the cost of such a line they could get it laid down in twelve months.

In July, Edmund Wright – “Engineer to the Adelaide and Hindmarsh Tramway Co” – placed the first advertisement calling for tenders to supply timber for the construction of the line.²⁹ The timber was needed because the directors had decided that the rails would be laid on wood rather than chairs³⁰ “under what was understood as Wells’s patent, owing to the sandy nature of the soil “. They had also ordered the necessary plant “for the laying down of tram way line No. 1, from, at, or near the Hope Inn, Hindmarsh, to the junction of Hindley and King William streets”.³¹ Work was expected to begin in August³² and the *Register* reported that the rails had been ordered from England.³³

Meanwhile, the Adelaide & Suburban Tramway Company were in business. In the week ending 28 July they had carried 12 690 passengers.³⁴ This should have boded well for the Hindmarsh line but the directors were concerned about “the extraordinary apathy of the Hindmarsh and Bowden people in regard to carrying out the tramway” and felt that the only way the enterprise could succeed was if they built the line to the beach and this would require additional capital. The directors agreed to issue of 6000 new shares of £3 each.³⁵ As 1878 drew to a close, Wright was still calling for tenders to supply “best redgum or jarrah timber”.³⁶ At the half-yearly meeting in January 1879, the directors reported that not one share of the new issue had been applied for:³⁷

... Therefore the Directors, considering the present capital being subscribed for the sole purpose of constructing tramway line No. 1 from Hindley-street to the Hope Inn, Hindmarsh, and any deviation therefrom a breach of trust, have made their arrangements accordingly. While the above was under consideration the Directors suspended the order sent to London for the rails and fittings; this action on their part, from the decline in iron, has resulted in a considerable saving to the Company. The Directors have now to report that the rails and fittings for tramway line No. 1 have been ordered and may be shortly expected in the colony; that tenders for the necessary timber have been accepted; that two cars, and wheels, axles, &c, for two more have been ordered from New York, and that it is their intention to call for tenders for two cars to be built in the colony, the above, they consider, being sufficient to meet the first; requirements of the line. On the arrival of

TENDERS will be received by the undersigned until noon of Saturday, the 27th inst., from persons willing to Contract for **SUPPLYING TIMBER** for the **CONSTRUCTION** of a **TRAMWAY** between Adelaide and Hindmarsh.
No Tender necessarily accepted.
EDMUND W. WRIGHT,
 Engineer to the Adelaide and Hindmarsh Tramway Co.
 Imperial Chambers, Adelaide.
 July 17, 1878. z199-208

*Advertisement for work on the Hindmarsh Tramway
 [SA Advertiser, Friday 19 July 1878, p2b]*

29 *SA Advertiser*, 19 July 1878, p2b.

Wright is better known in Adelaide as an architect but he had also trained as an engineer and surveyor in England. He was also engineer for (and a shareholder in) the Adelaide & Suburban Tramways Company. [P A Howell, 2005, “Wright, Edmund William (1824–1888)”, *Australian Dictionary of Biography*, National Centre of Biography, Australian National University, <adb.anu.edu.au/biography/wright-edmund-william-13257/text4569>, viewed 22 February 2014]

30 Early rails had a narrow bottom profile and were supported by chairs or brackets laid on stone blocks;

later “flat bottomed” profiles were introduced with a broader base which could be laid on wooden sleepers

31 *SA Register*, 30 July 1878, p6e

32 *SA Advertiser*, 30 July 1878, p5b

33 *SA Register*, 8 August 1878, p6f

34 *SA Advertiser*, 30 July 1878, p5b

35 *SA Advertiser*, 27 August 1878, p6d

36 *SA Advertiser*, 18 December 1878, p2c

37 *SA Register*, 29 January 1879, supp p1e

the rails and fittings the formation of tramway line No. 1 will be immediately proceeded with. ... The Chairman, in moving the adoption of the report, said it was the intention of the Directors to prosecute the work with the utmost vigour so far as Hindmarsh was concerned. They hoped to have the work completed during next winter. ...

In March 1880, Wright (now working in partnership with James Reed³⁸) called for expressions of interest to construct the line³⁹ and work started on laying the track in April.⁴⁰ This work had been completed by July with the exception of the crossing over the Torrens on Port Road where work was still in progress on a new iron bridge.⁴¹ Wright & Reed then advertised tenders for the construction of “Extensive STABLES, CARSHED, STORES. &c. &c.” at Hindmarsh.⁴² Finally, in October, shareholders were “respectfully informed” that they could apply to the Secretary for tickets to the opening ceremony which took place on Saturday 23 October 1880 at 2 o’clock.⁴³

There was a great turnout to see the Governor, Sir William Jervois, and the invited guests clamber into five tram cars and set off for the terminus at Hindmarsh where His Excellency “formally declared the tramway open for traffic”.⁴⁴

This was the third tramway line that Edmund Wright had constructed in Adelaide and he adopted a new method of laying the rails:⁴⁵

In regard to the line, the principle of construction is novel as regards the colony. The rails are laid on the top of longitudinal sleepers, which are supported by transverse wooden sleepers. The transverse sleepers are cut from corner to corner, laid on the wide surface, and packed with limestone. These are put down 4 feet 6 inches apart. On these are placed the longitudinal sleepers, similarly cut, the apex being the width of the gauge— 4 feet 8½ inches apart. These are spiked to the transverse sleepers already mentioned, and carefully packed. On the top of these longitudinal sleepers, made to fit like the ridge of a house, the rail is placed and spiked. The road is then again packed and rolled, and the work is complete. Experience, so far has proved that this system promises success, and that the cars will ran much more smoothly than on lines where the sleepers are laid on iron chairs.

The new rails certainly gave a noticeably smoother ride. However, on the way back to the city after the official opening of the line, “much amusement were caused by three out of the five [cars] going off the rails at the same point in the first sharp curve. Passengers, however, put their shoulders to it, and lifted the cars bodily on the lines again, and the journey was continued”.⁴⁶

Regular services began on Monday 26 October 1880 although a timetable wasn’t published until a few weeks later.⁴⁷ The *SA Register* observed:⁴⁸

The Adelaide and Hindmarsh Company have been a long time in bringing their works to a conclusion, principally owing to the bridge on the Torrens at Hindmarsh not being finished; but now that the line is ready for traffic it is probable that the Company will do a large business by connecting the centre of the city with a suburb in which the working classes generally reside, and where fewer private vehicles are kept than elsewhere.

RAILWAYS, TRAMWAYS, &c.	
A DELAIDE AND HINDMARSH TRAMWAY COMPANY, LIMITED.	
On and after Tuesday, 9th November, 1880, Cars will leave daily (Sundays excepted) :—	
HINDMARSH.	ADELAIDE.
7 30 a.m.	8 0 a.m.
8 30 a.m.	9 0 a.m.
9 0 a.m.	
And from 9 o'clock a.m. every 30 minutes up to 10 30 p.m. from Hindmarsh and 11 30 p.m. from Adelaide.	
SUNDAYS.	
HINDMARSH.	ADELAIDE.
10 15 a.m.	11 0 a.m.
11 45 "	12 30 p.m.
1 30 p.m.	2 0 "
2 30 "	3 0 "
3 30 "	4 0 "
4 30 "	5 0 "
5 50 "	6 30 "
7 15 "	8 15 "
8 50 "	9 30 "
10 0 "	10 30 "
a314 8	C. J. COATES, Secretary.

*The Company's first timetable
[SA Register, 11 November 1880, p2b]*

38 The partnership “under the style or title of Wright & Reed, Architects, Surveyors, and Civil Engineers” commenced in September 1879 [SA Register, 10 September 1879, p2a]

39 SA Register, 9 March 1880, p2b

40 SA Register, 16 April 1880, p7c

41 SA Register, Thursday 29 July 1880, 6b

42 SA Register, 1 July 1880, p2d

43 SA Register, 21 October 1880, p2b

44 SA Register, 25 October 1880, p6a

45 Ibid

46 SA Register, 25 October 1880, p6b

47 SA Register, 11 November 1880, p2b

48 SA Register, 25 October 1880, p6a

8.2 The Western Extensions

No sooner had the line to Hindmarsh opened than calls began for the service to be extended westwards (which was the Company's intention). In November 1880, William Thompson of New Thebarton wrote to the *SA Advertiser* saying:⁵⁰

... as to the line being a boon to the inhabitants of New Thebarton or Hilton I must say you are mistaken, as the nearest approach to the tram is by a walk of about a mile and a half; thence to ride about one mile and pay exactly the same fare as a person from Hindmarsh. I cannot perceive any great boon in that. I should like to see the company lay a line as far as the Royal Hotel, New Thebarton (where they would obtain passengers from both places), and eventually carry it on to Henley Beach. This, I am confident, would repay amply the outlay, especially during the summer months, as well as leading to the opening up of this place, which at some future date will become as populous as Kensington or Norwood, as it is more healthy, being nearer the sea.

The extension to New Thebarton would involve the construction of more than a mile of track at a cost of £2,000 per mile and the directors were understandably cautious, given that the running of a tramway was proving to be not that profitable.⁵¹ The enabling legislation had given the Company the power to construct six other lines as well as the one to Hindmarsh⁵² and in June 1881 they sought powers to extend one of these routes and build another line from Henley Beach along the coast.⁵³

A Select Committee of the Legislative Council was formed and questioned the ability of the Company to actually construct all of the lines it was empowered to construct. The shareholders agreed and decided to relinquish all but the line through Thebarton to Henley Beach (see map, page 33).⁵⁴

In July 1882, Wright & Reed called tenders for laying the permanent way, supply swamp stone and limestone for ballast, and building a bridge.⁵⁵ The service to New Thebarton began running in the first week of October 1882.⁵⁶

And, as with the Hindmarsh line, the arrival of the tramway was expected to stimulate the sale of land, at New Thebarton and beyond, including:⁵⁷

... the whole of the unsold portions of the Estate known as HENLEY BEACH, which is soon to be connected with the City by a TRAMWAY, which is to traverse the whole length of the Estate, that is bound to become the most fashionable SEASIDE RESORT, on account of being so close and in such quick communication with the City that purchasers will know all the comforts of a 'MARINE RESIDENCE,' at little cost of reaching and loss of time in travelling.

To boost the appeal of the new estate, the promoters decided to build a jetty at Henley Beach which was also designed by Wright & Reed.⁵⁸

The jetty will be 810 feet long, fifteen feet wide, and well above high water, with two approaches at the shore end, and two steps and landing-stages for boats towards the end. The structure will be of jarrah, of the most substantial description, and in addition to such

Conveyances and Livery Notices	
A DELAIDE AND HINDMARSH	
TRAMWAY.	
NEW THEBARTON LINE.	
From October 9, 1882.	
TIME-TABLE.	
DAILY.	
New Thebarton—7, 8, 9, 10 a.m., 12 noon, 2, 3, 4.30, 5.30, 7.30, 9, 10.30 p.m.	
Adelaide—7.30, 8.30, 9.30, 10.30 a.m., 12.30, 2.30, 3.30, 5, 6, 8, 9.30, 11 p.m.	
SUNDAY.	
New Thebarton—10.30 a.m., 2.30, 5.30, 8.30 p.m.	
Adelaide—11 a.m., 3, 6, 9 p.m.	
SATURDAY EVENINGS.	
New Thebarton—6.30, 7.30, 8.30, 9.30, 10.30 p.m.	
Adelaide—7, 8, 9, 10, 11 p.m.	
Extra Cars as Required.	
Adult Fare, 3d., or 2s. 6d. per dozen tickets;	
Children's Tickets, available up to the age of 14 years, 1s. 6d. per dozen.	278-30

New Thebarton Timetable
[SA Advertiser, 7 October 1882, p1b]

49 Sangster, 1972, p1

50 *SA Advertiser*, 15 November 1880, p5b

51 *SA Advertiser*, 1 February 1881, p5g

52 *The Adelaide and Hindmarsh Tramways Act, 1877*, Clause 5, pp3-5

53 *SA Register*, 30 June 1881, p2b

54 *SA Register*, 8 September 1881, p5c

55 *SA Register*, 14 July 1882, p8g

56 *SA Advertiser*, 7 October 1882, p1b

57 *SA Register*, 14 July 1882, p8e

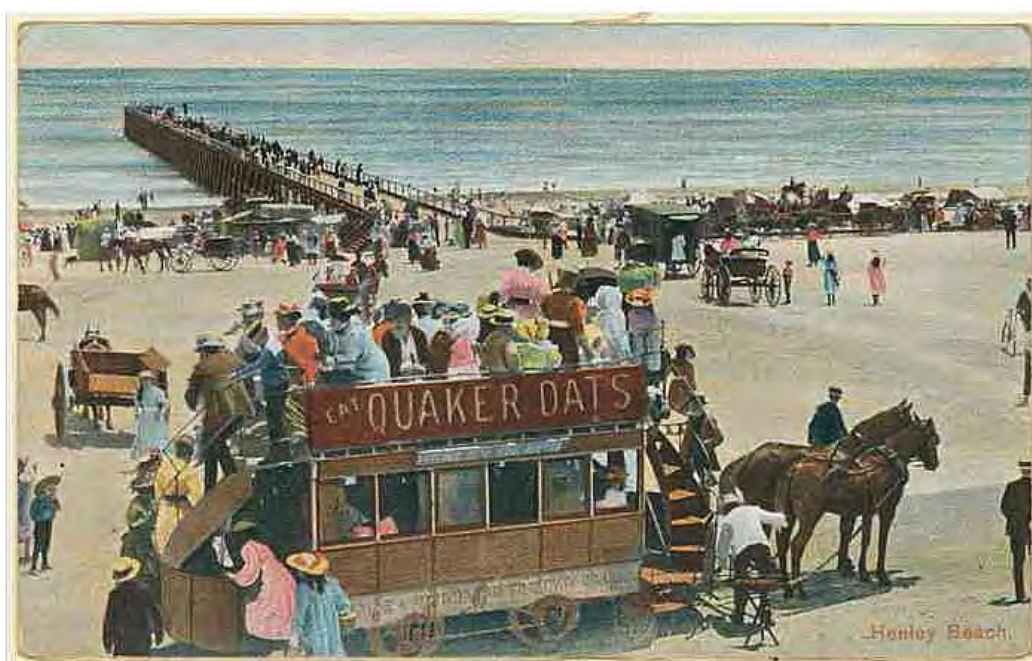
58 *SA Weekly Chronicle*, 30 September 1882, p7d ;*SA Register*, 18 November 1882, p2f

protections as will prevent children from falling through the railing it will have seats along the length on both sides to make it attractive as a place of resort for those who seek health and rest after the toils of the day.⁵⁹

The Company were expecting to have the new line completed by the end of October 1882 but they encountered “many difficulties”, not the least of which was the “non-delivery” of the all-important timber from Western Australia upon which the tracks were laid.⁶⁰ The timber duly arrived and a trial run on Thursday 8 February was pronounced successful: “There was no difficulty whatever experienced in running the car on the new rails.”⁶¹ In a dual ceremony at Henley Beach, the tramway was officially opened and the first pile of the jetty was driven on Tuesday 13 February 1883.⁶² A temporary timetable was published later that week.⁶³

The final section of the line – an extension along the esplanade to the Grange jetty – was opened on Tuesday 15 May and celebrated with “bumpers of champagne”:⁶⁴

The line had cost a great deal more than the directorate had anticipated, owing to the work in connection with the banking up, and the protection of the line from sand. The line from Adelaide to Henley Bench had, so far, realised the highest expectations of the directors and shareholders; and as to the traffic, they believed it would fully pay everything and leave a fair profit to shareholders.



“Adelaideans will in future be enabled to reach within a brief space of time one of the most pleasant spots of our coast, and enjoy a very pleasant ride.”
[Horse tram at Henley Beach, c1890: State Library of SA B14984]

59 *SA Advertiser*, 13 February 1883, p6b

60 *SA Register*, 23 January 1883, p5a

61 *SA Register*, 9 February 1883, p5b

62 *SA Weekly Chronicle*, 17 February 1883, p10e

63 *SA Register*, 16 February 1883, p1f

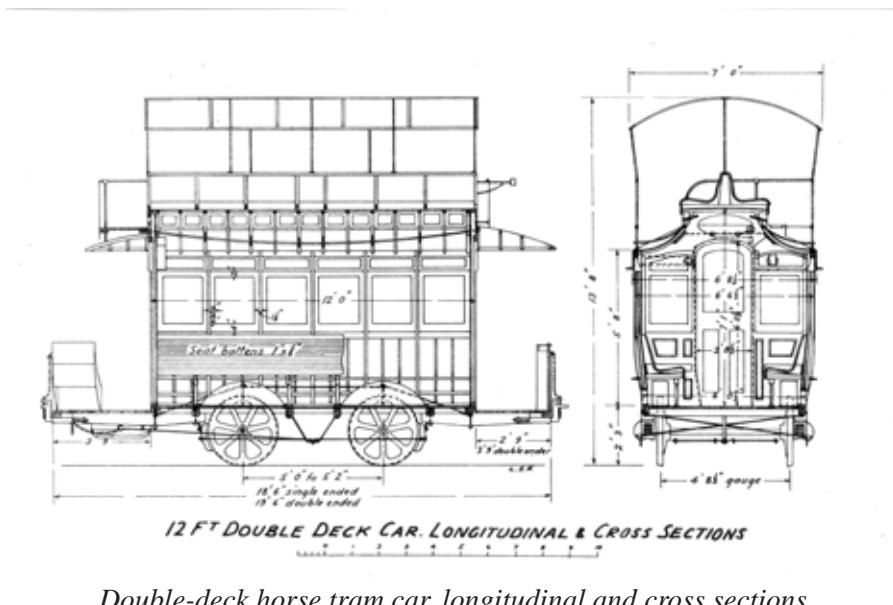
64 *SA Advertiser*, 16 May 1883, p6a



*The Hindmarsh horse tram line, Port Road, late 1880s
[Photo: John Radcliffe]*



*Concept drawing for Port Road tram stop, 2008
[Department for Transport, Energy and Infrastructure]*



*Double-deck horse tram car, longitudinal and cross sections
[Drawing: Lionel Kingsborough, John Radcliffe collection]*

8.3 Electric Traction

At the time of the opening of the extension to Grange, the Adelaide and Hindmarsh Tramway Company also noted that they had:

... legislative authority to work their line by motors; and it is not improbable that the directors, with the consent of the share holders, may utilise motors as soon as some improvements shall have been effected in their construction. But the company's consulting engineer in London has not yet recommended any motor as being adapted to their requirements.

In 1883 they would have been thinking of steam power. But in 1889 they made a bold step – a trial of electric traction. The appeals were many:⁶⁶

The service is more expeditious, the streets are less crowded and much cleaner, the motion is easier, and the cars are better lighted. In view of the high price of horsefeed in dry seasons it may be a distinct pecuniary advantage to the Tramway Companies of Adelaide, as it has been to Companies elsewhere, to substitute electric haulage for draught horses on their lines.

At the heart of the new propulsion method were “electric accumulators of an improved kind”⁶⁷, the invention of Edmond Julien, a Belgian engineer. In 1887 Julien had applied for a patent for “Improvements in Electric Batteries” through local agent Francis H Snow (later to play a key role in the electrification of Adelaide's tram network) in August.⁶⁸ Julien discovered that:⁶⁹

... by combining different metals, such as lead, mercury, and antimony, in certain definite proportions, an inoxidizable alloy is formed, which is found to be eminently adapted for use as supporting plates in storage batteries. By substituting the inoxidizable plate for the lead core the resistance is considerably lessened, the electro-motive force is increased, the return is greater, the output more constant, and the weight is considerably reduced.

Reports began appearing in Australian newspapers about trials carried out in Europe, America, and England, and also Sydney and Melbourne. A syndicate had been established in Sydney in 1887 and had gained approval to carry out trials.⁷⁰

The cars for the Henley Beach line had been built by the Adelaide coachbuilders Duncan & Fraser in their Franklin Street workshops⁷¹ and in late 1888 one of the double-decker cars from the Henley Beach line was modified for electric traction:⁷²

The tram had to take one electric motor and a battery of 130 accumulator cells that slid on trays under the seats. The tram weighed 5½ tons.

A trial run of the car was made on Wednesday 9 January 1889⁷³ and again on Thursday 17 January.⁷⁴

During the run the car excited a lot of curiosity, particularly as there is no outward indication of motive power. The trial was considered to be eminently successful.



*Julien's Patent Electric Traction on the Henley Beach line, 1890
[State Library of SA B5468]*

65 Sangster, 1972, p1

66 *SA Register*, 8 January 1889, p6d

67 *SA Register*, 8 January 1889, p6d

68 *SA Register*, 1 August 1887, p2a

69 *SA Register*, 8 January 1889, p6d

70 *Sydney Morning Herald*, 3 October 1887, p4c

71 David Chantrell, 2008, *Legacies Left Untold: Duncan & Fraser Ltd*, self published, Adelaide, pp32-35

72 *Op cit*, p38

73 *SA Advertiser*, 9 January 1889, p4f

74 *SA Advertiser*, 18 January 1889, p4f

Mark Bullimore established himself in Adelaide and Duncan & Fraser became agents for the Julien system. Then, in July 1890, Bullimore and James Cowan, the promoter of the system, were killed when their buggy was struck by a train at Dry Creek.⁷⁵ The Julien system seems to have died with them (although in December 1896, Julien himself applied for further patents in the design of batteries⁷⁶). It would be nearly 20 years before Adelaide saw a network of electric trams.

8.4 The Municipal Tramways Trust

At the beginning of the 20th century, two serious attempts were mounted to electrify Adelaide's tramway system. Neither was successful but they served to focus attention on what was clearly a desirable outcome.

The first scheme was promoted by Francis H Snow with the aim of bringing a number of horse tram companies under one management and allowing their shareholders to reinvest their money in a new electric tramway company.⁷⁸ As a patent agent, Snow was in an ideal position to monitor developments in new technology: as early as 1895, he was reporting on work by the Thomson-Houston Company of America to operate electric traction lines with alternating current.⁷⁹

In August 1899, the *Advertiser* reported:⁸⁰

We understand that following the general meeting of the shareholders of the Adelaide and Suburban Tramway Company on August 25 an extraordinary meeting will be held, at which the directors will recommend for acceptance by the shareholders an offer to purchase the lines. The offer is made by Mr. Francis H. Snow, acting on behalf of the Westinghouse Electric Company, of London and Manchester, Callender's Cable and Construction Company, London, their Australasian agents, Messrs. Noyes Bros., of Melbourne and Sydney, and himself. The terms have not yet transpired, but are understood to be favorable to the shareholders.

By April 1900, Snow had contracts with the Adelaide and Suburban Tramway Company, the Adelaide and Hindmarsh Company, and the Adelaide, Unley, and Mitcham Tramway Company.⁸¹ He was understandably "aggrieved" when he discovered that the Council had entered into an agreement with W Gentry Bingham who had arrived in Adelaide with an introduction to the Mayor. At the heart of it was the Council claim that, as the street authority, they should receive a rental of £1,000 a year: Snow and Noyes considered this "excessive" while Bingham not only agreed to it but said he would add 10% of the net profit.⁸² Bingham represented the British Electric Traction Company Limited and the Auckland Electric Tramways Company which, at that time, was converting the Auckland horse tramways to electric traction.⁸³

Snow's Bill was introduced into the Legislative Council on 27 June.⁸⁴ Meanwhile, the suburban councils were not happy that they had been ignored by the Adelaide Council and considered moves to form a municipal trust themselves to take over the tramways, a move which the Government would support.⁸⁵ However, transport historians John Radcliffe and Christopher Steele said this was "doomed to failure" because the councils would not have been able to raise the necessary capital, estimated at a minimum of £800 000. They go on to say:⁸⁶

After much heated debate, the bill to authorise the Snow scheme was passed in the State Parliament on December 6 1901. In a subsequent referendum on February 8 1902, the

75 "Terrible Railway Accident. A Public Man Killed. Death of Mr. J. Cowan, M.P., And Mr. M. Bullimore", *Advertiser*, 22 July 1890, p5e

76 *SA Register*, 7 December 1896, p2d

77 Sangster, 1972, p1

78 Radcliffe & Steele, 1974, p32

79 *Advertiser*, 1 January 1895, p3e

80 "The Adelaide Tramways", *Advertiser*, 18 August 1899, p4h

81 *Advertiser*, 18 April 1900, p5i

82 *SA Register*, 11 April 1900, p8ab

83 Radcliffe & Steele, 1974, p32

84 *Advertiser*, 28 June 1900, p7a

85 *SA Register*, 19 July 1900, p6b

86 Radcliffe & Steele, 1974, pp32-33

provisions of the Snow bill were overwhelmingly supported by local residents. However, the legislative proceedings had taken so long that the original source of capital for the scheme had been used on other projects, and in the then increasing financial stringency of the period, alternative support was not forthcoming. Consequently the whole scheme collapsed.

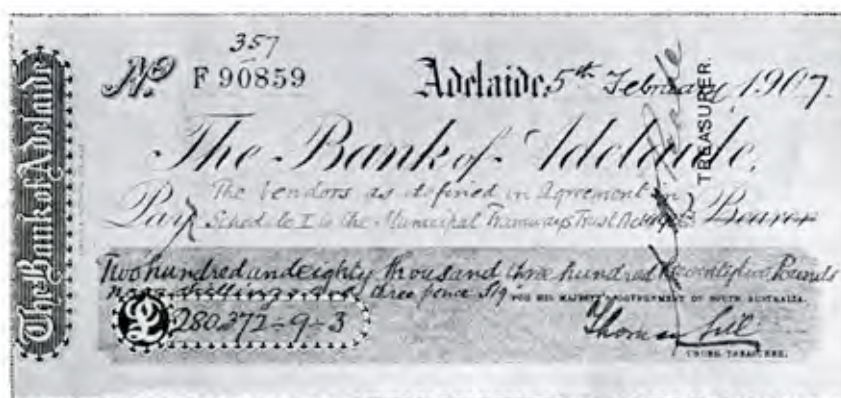
The State Government finally entered into direct negotiations with the companies and a price of £280 000 was agreed upon. The *Municipal Tramways Trust Act* was passed in 1906 to take over the existing Adelaide metropolitan horse tram network and electrify the system. Once this had been achieved, the MTT was required to extend the system to provide a service to suburbs within a ten mile radius of the Adelaide GPO.

Section 10 of the Act stated that the Trust:⁸⁷

... shall consist of eight members, of whom two shall be appointed by the Governor, two by the Corporation of the City of Adelaide, two by the Suburban Corporations, and two by the District Councils.

The “Suburban Corporations” were the municipalities of Unley, Kensington and Norwood, Hindmarsh, St Peters, and Thebarton; the other suburban councils such as Burnside and Mitcham, were classed as “District Councils”.⁸⁸

The horse tram companies continued to operate their services until midnight on Monday 4 February 1907 when the MTT took control. A formal ceremony took place in the Chief Secretary’s office when the Treasurer handed a cheque for £280 372 9/3 to Alfred Simpson, Chairman of the Adelaide and Suburban Tramway Company, who was representing all the companies.⁸⁹



*The Government cheque paid to the horse tram companies
[The Tramways of Adelaide, 1909]*

The Trust appointed the Engineer-in-Chief, Alexander Bain Moncrieff, as Chairman and immediately called applications for a tramway engineer. The man chosen for the post was William Goodman, the Electrical engineer for the city of Dunedin in New Zealand. He took up his duties in May 1907 and lost no time in calling contracts for the necessary work, totalling £457 000 in the first 12 months.⁹⁰ Goodman was also appointed General Manager on 24 August 1908.⁹¹

Adelaide’s electric tram service was finally inaugurated on Tuesday 9 March 1909 when Mrs Anne Price, wife of the Premier (who was too ill to attend himself), “drove” a decorated tramcar along the Norwood and Kensington route.⁹²

87 *The Municipal Tramways Trust Act, 1906*, p4

88 *Op cit*, p16

89 “The Passing of the Trams”, *Register*, 6 February 1907, p7a-d; the additional amount of £372 9/3 was for extra movable stock purchased by the tramway companies since the date of the agreement

90 Staff writers, *The Tramways of Adelaide: Past, Present, and Future*, The Critic, Adelaide, pp16-17

91 *Advertiser*, 26 August 1908, p8f

92 *Advertiser*, 10 March 1909, p6c: photographs of the event show that Goodman himself was actually at the controls



*Mrs Anne Price “drives” the heavily-decorated Car No 1 from the Hackney Tram Depot at 2:30pm on 9 March 1909 – however, William Goodman is clearly controlling the vehicle
[The Tramways of Adelaide, 1909]*



9. The Engineers

9.1 Sir William George Toop Goodman, KCB, MICE, MIEE, MIEAust

Sir William George Toop Goodman (1872-1961), engineer, was born on 14 March 1872 at Ramsgate, Kent, England, son of William Henry Goodman, carpenter, and his wife Emma Ann, née Limeburner. After attending St George's Boys' Central School, Ramsgate, he joined Poole & White, engineers, London. On 7 January 1893 he married Florence Letitia Attreed. In Tasmania in 1895 Goodman installed the first electric plant at the Mount Lyell mine. He then became assistant electrical engineer in the tramway construction branch of the Department of Public Works, New South Wales, in 1897-1900, before joining the firm Noyes Brothers Pty Ltd which built the tracks of New Zealand's first electric tramway at Dunedin. In 1903 Goodman became that city's electrical engineer and inspected tramway systems around the world.

Adelaide's new Municipal Tramways Trust was formed in 1907 and Goodman became chief engineer; from the following year he was also general manager. He was to hold this joint appointment for forty-two years and his policies were to have a major influence on the development of metropolitan Adelaide. 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 56 miles (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.

That year Goodman was 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. In 1921 he reported on Brisbane's electric tramway system. In the early 1920s returned servicemen began to operate buses in competition with the Adelaide trams. To counter this, Goodman purchased forty American Mack buses in 1925; although his choice was criticized, they lasted twenty-five years. From 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. In 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.

Goodman's decisions were often opposed by the Adelaide City Council but his view usually prevailed as, for example, when he sought to build an additional tramway depot in the city's heart – Victoria Square. In 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. In 1931 he chaired the important royal commission on the South Australian railways which reviewed Commissioner W A Webb's era. In 1932 Goodman's services to Adelaide were recognized by a knighthood.



*W G T Goodman, JP, MInstCE, MIEE, &c
Chief engineer and General Manager
[The Tramways of Adelaide, 1909]*

Goodman replaced Port Adelaide's trams with double-deck trolley-buses in 1938; a complementary service in Adelaide's eastern suburbs had already begun. In 1937-44 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. In 1945 Goodman received the Peter Nicol Russell memorial medal from the Institution of Engineers Australia. He retired in 1950.

Following three years in hospital, Goodman died at College Park on 4 February 1961 and was buried in North Road cemetery, Nailsworth.

Source: John Radcliffe, 1983, 'Goodman, Sir William George Toop (1872–1961)', Australian Dictionary of Biography, National Centre of Biography, Australian National University, <adb.anu.edu.au/biography/goodman-sir-william-george-toop-6423/text10985>, accessed 6 January 2014

9.2 The Sir William Goodman Bridge

The structure in question 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 1908: regular scheduled services began on Monday 28 April but special trams were provided on Saturday 26 April for a football match at Hindmarsh Oval.

The route to Hindmarsh was one of the last to be converted to electric tram operation in the initial conversion and expansion program of the newly-formed Municipal Tramways Trust. It was officially opened on 9 March 1910.

The opening of the bridge to pedestrian and cycling traffic in 2014 following its repair and refurbishment is an ideal opportunity to formally bestow a name on the bridge.

Engineering Heritage SA was invited to make recommendations which we submitted to the City of Charles Sturt on 12 April 2013. We favoured a name with a clear and direct association to the purpose of the bridge and considered there were only two choices with direct relevance. (A third possibility was "The Hindmarsh-Thebarton Tramway Bridge" which was the name used by Monash on the presentation drawing and tender documents; however, we saw no compelling reason to adopt that name.)

1. *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 Tramways 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.

2. *The Holland Street Tramway Bridge*

The "Holland Street Bridge" is the familiar name generally accepted 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 commenced procedures under the *Local Government Act 1999*, Clause 219: "Power to assign a name, or change the name, of a road or public place" to formally name the bridge "The Sir William Goodman Bridge". Engineering Heritage SA supports this move. Its former use as a tramway bridge is no longer apparent but our Interpretation Plan for the site will set that record straight.

9.3 Sir John Monash, GCMG, KCB, VD

Sir John Monash (1865-1931) was born in Melbourne on 27 June 1865 into a Prussian-Jewish family.

John Monash completed his secondary schooling at Scotch College in 1881, where he was equal Dux of the school and Dux in Mathematics and Modern Languages. He subsequently enrolled in the Arts faculty at Melbourne University with the intention of becoming an engineer.

In 1885 before completing his degree, he found employment on the new Princes Bridge and over the next two years assisted the contractor David Munro on this and other bridges in the Footscray, Moonee Ponds and Coburg areas.

In April 1888 he was appointed to take charge of the Outer Circle railway works, an eastern suburban line from Oakleigh to Fairfield via Camberwell, for the contractors Graham and Wadick. The project was completed in January 1891 and Monash subsequently took up a position with the Harbor Trust where he remained for two and a half years during the worst of the depression and was able to continue his studies part-time.

In August 1891 Monash completed the municipal surveyors course, and in November 1891 enrolled as a student of the Supreme Court. In 1892 he began studying the water supply engineers course and also completed his BA. He took out his master's degree in engineering early in 1893, and formally graduated in Arts and Law in 1895.

In June 1894 the firm of Monash & Anderson opened in Elizabeth Street, Melbourne. Joshua Noble Anderson had been a friend of Monash's since tutoring him for the water supply engineer's exam in 1891, and the two set up as civil, mining and mechanical engineers, and patent agents. Monash also came into demand as an advocate and expert witness in legal-engineering work, and between 1897 and 1899 spent much time in Queensland, New South Wales and Western Australia. In September 1897 Monash & Anderson became the Victorian agents for Monier reinforced concrete construction. This led to their involvement in the building of the Anderson Street (Morell) bridge over the Yarra and becoming contractors for the Fyansford (Barwon River) and other Victorian bridges. They also took up pipe manufacture forming, with David Mitchell, the Monier Pipe Co. Pty. Ltd. of Victoria in 1901.

In 1905 the Monash and Anderson partnership was dissolved and a new company, the Reinforced Concrete & Monier Pipe Construction Co Pty Ltd created, to concentrate on the use of reinforced concrete in general building construction. The company undertook work on tanks, culverts, silos, country post offices, suburban banks and warehouses. The South Australian Reinforced Concrete Co Ltd which Monash established (in partnership with Edward Bakewell, David Mitchell, John Gibson and John Angas) in 1906 was also a great success.

Although the Monier patents expired, the Victorian company continued to do well and carried out work on the Town Hall, the Melbourne Hospital, the State Savings Bank head office, the Centre Way Arcade and various government buildings, as well as bridge and road works.

Following the end of the war, and the completion of his duties with the Australian Forces in Europe, Monash was reunited with his family in England. During this time he received honorary degrees at Oxford and Cambridge. His book 'The Australian Victories in France in 1918' was later submitted to the



*John Monash at the time of his graduation
from Law School
[Monash University]*

University of Melbourne as a thesis on the subject of engineering applied to modern warfare and on it he was awarded the degree of Doctor of Engineering, the first to be awarded by an Australian University.

Monash's military career began in 1884 with his membership of the Melbourne University company of the 4th Battalion, Victoria Militia, and then moving to the North Melbourne Battery of the Metropolitan Brigade of the Militia Garrison Artillery. He was commissioned in 1887. By 1913 Monash had the rank of Colonel and was appointed to command the 13th Infantry Brigade. With the outbreak of World War I in 1914, Monash was transferred from the militia to active service. In 1915 he served as Chief Censor until taking command of the 4th Infantry Brigade (AIF). In this command he served at Gallipoli.

Promoted to Major-General, he commanded the 3rd Division, AIF in France in 1916. Monash succeeded General Birdwood as Australian Corps commander in 1918 and, in the same year, was knighted by King George V in recognition of his role in the Battle of Hamel Hill. With the conclusion of the war, Monash became Director-General of Repatriation and Demobilisation with responsibility for arranging the return of Australian troops from Europe.

After Monash's triumphant return to Australia he briefly took up his business activities again before withdrawing from his companies in 1920, after agreeing to become General Manager of the State Electricity Scheme, formed in the previous year. He assumed office as Chairman of the new State Electricity Commission early in 1921. The commission was established to develop open cut mining of the huge deposits of brown coal in the La Trobe Valley and to build the installations, which would transmit power statewide. In 1924 the first of the electricity from Yallourn was received in the city, and in the 1927 the SEC showed a profit.

In these last years Monash was also closely associated with the building of Melbourne's Shrine of Remembrance. He was a member of the executive committee formed in 1921 and of the site sub-committee, and chairman of the assessors choosing the design. He supervised construction of the Shrine and the public appeal for funds, and in 1930 rewrote the inscription planned for the west wall himself. In 1929 the Institute of Engineers, Australia awarded Monash its highest honour, the Peter Nicol Russell Memorial Medal, and in June 1931 he was awarded the University of Melbourne's Kernot Memorial Medal for distinguished achievement in Australian engineering.

John Monash died in Melbourne on 8 October 1931.

Sources:

National Archives of Australia, <www.naa.gov.au/aboutus/publications/factsheets/fs121.aspx,> 1997

Leading the Way: Sir John Monash The Engineer, Monash University, Sources for all text: John Monash: A Biography by Geoffrey Serle (Melbourne University Press, 1982) and Monash by Vernon R. Northwood with assistance from Dr. Gershon Bennett (State Electricity Commission of Victoria, 1950) <www.adm.monash.edu.au/records-archives/exhibitions/sirjohn/engineer/index.html>

9.4 John Bowman, DipRIEC, AMICE, MIEAust

John Bowman (1867-1951) was educated at Sydney Grammar School and received his Diploma from the Royal Indian Engineering College in England in 1889. After working on railways in India, he joined the Tramway Construction Branch of the NSW Public Works Department in September 1897.¹ When new city tramlines along Castlereagh and Pitt streets opened in December 1901, Bowman was engineer-in-charge of the Belmore Park to Fort Macquarie section.² In 1903 he took a position in the Construction Branch of the Dunedin Electric Tramways under Goodman and came with him to Adelaide in October 1907 when Goodman was appointed as electrical engineer for the newly-formed Municipal Tramways Trust.³ Bowman was appointed Permanent Way Assistant engineer:⁴ his duties included weekly inspections of the lines and ensuring any defects or damage were promptly repaired.⁵

With his plan for an arch bridge at Holland Street rejected, Bowman finally got an opportunity to design a bridge of his own in 1920 for the extension of the tramway to Croydon: the successful tenderer was the SA Reinforced Concrete Company.⁶

Bowman was a foundation member of the South Australian Institute of Engineers in 1913 and of the Institution of Engineers Australia, serving as a Councillor from 1922 to 1924 and as Chairman of the SA Division in 1923.⁷



John Bowman, AMInstCE
Permanent Way Assistant Engineer
[The Tramways of Adelaide, 1909]

9.5 Allan Cameron Harley

Allan Cameron Harley (1847 -1932) went into partnership with Colin Stewart in 1887. Stewart had arrived in the Colony in January 1874 and in 1886, on the corner of North Terrace and Gray Street, set up a foundry which he called the Sun Foundry after the works in Glasgow where he had been foreman. Harley had been manager at George Fulton's Parkside foundry. The foundry employed more than 20 men and produced a range of products from practical pipes to ornamental castings. In 1896, they transferred the foundry to the west end of Hindley Street where they produced the decorative cast iron lace work and ornamental pillars which are a feature of many Adelaide buildings.⁸

The partnership between Stewart and Harley was formally wound up on 6 May 1909 with Harley carrying on the business in his own name.⁹ The name of A C Harley & Co in its distinctive roundel can still be found around the city on gate posts, post bases, and especially downpipes.

In 1926, Forward Down purchased the business and transferred the foundry work to Kilkenny, selling the Hindley Street site to the West end Brewery. A C Harley & Co continued as a trading name until 1966.¹⁰

Harley died at his Goodwood residence on 21 January 1932.¹¹



1 Denis Cuming and Gwen Moxham, 1986, *They Built South Australia: Engineers, Technicians, Manufacturers, Contractors and Their Work*, self-published, Adelaide, p28; *Singleton Argus*, 26 January 1901, p1g

2 *Evening News (Sydney)*, 18 December 1901, p3c

3 Cuming & Moxham, *loc cit*

4 Staff writers, 1909, *The Tramways of Adelaide: Past, Present, and Future*, The Critic, Adelaide, p23

5 "Claim against the Tramways Trust", *The Register*, 5 August 1910, p3d

6 *The Advertiser*, 18 August 1920, p6h

7 Cuming & Moxham, *loc cit*

8 Geoffrey Needham and Daryl Thomson, 1998, *Men of Metal* (2nd Ed), self-published, p51

9 *Advertiser*, 18 May 1909, p2c

10 Needham & Thomson, 1998, p52

11 *News*, 21 January 1932, p16a

10. Interpretation Plan

10.1 Significance

There are a number of reasons why this bridge is important from an engineering heritage point of view and should have engineering heritage recognition:

- The bridge was the result of a new mode of public transport in Adelaide – electric trams – and was an essential river crossing to provide a service to the north-western suburbs of Adelaide.
- The bridge was the first in the Adelaide metropolitan area to use a new method of construction, reinforced concrete T-beams (girders), to carry the load and is now the oldest surviving bridge of its type in metropolitan Adelaide and the second oldest in South Australia.
- The bridge is one of the early examples of the use of pile foundations in South Australia.
- The bridge is associated with the famous engineers Sir John Monash, who personally designed the bridge and was the consulting engineer for the South Australian Reinforced Concrete Company, and Sir William Toop Goodman as general manager of the Municipal Tramways Trust.

10.2 Interpretation Themes

1. A new mode of public transport – electric traction
2. A new material for bridge building – reinforced concrete
3. The engineers – Sir John Monash, Sir William Goodman
4. Small details – balustrades cast locally by A C Harley in their Hindley Street foundry
5. A new lease on life – repair and reconstruction techniques

A draft interpretation panel has been prepared which cover these themes. The simple colour palette uses Tuscan Red as the accent colour. This traditional transport colour, along with Rich Cream, was adopted as the original livery for MTT tram cars in 1909.¹

Sir William Goodman Bridge

Adelaide's First Reinforced Concrete Bridge

Adelaide's Electric Tramways

In 1906 the Municipal Tramways Trust was formed. Its purpose was to convert the horse tram network (which began in 1879) to an electric system and to extend the service to all suburbs within 10 miles of the Adelaide GPO.

To reach the suburb of Hindmarsh, the tramway had to cross the River Torrens and a location in line with Hindley Street was chosen. The bridge was finished before the electric system was ready and a horse tram service was provided from June 1909.

The electric service began on 9 March 1910.

Concrete Construction

The MTT wanted a concrete arch bridge but John Monash was able to show that long beams supported by truss structures was a better design. It would be similar to the railway bridge at Victor Harbor completed in 1906, the first such structure in Australia.

The bridge was built by the SA Reinforced Concrete Co. Concrete piles were driven into the river bed to support the trusses and timber formwork was erected. Concrete was mixed by hand and carried in wheelbarrows.

The bridge was completed in 13 weeks.

The bridge carried a single tram line. However, the demand for the tram service grew rapidly. In 1923 a second bridge of the same design was built at Cambridge Street, 300 metres east.

Deodar Bark replaced trams in 1963 and the bridge was used by road traffic. From 1962 Cambridge Street was closed in 1966 and later demolished. Hindley Street was closed in 1989.

Castings

The iron handrails on the bridge were cast in the Hindley Street foundry of A C Harley.

Reconstruction

Over time, the concrete deteriorated. However, modern engineering materials and techniques have enabled any damage to be repaired. The depth of the beams has been increased and the 100+ year old bridge was returned to service in December 2014 for use by pedestrians and cyclists.

Engineering Heritage Marker

William Goodman (1872 - 1961)

William George Toop Goodman was the first Chief Engineer and General Manager of the Municipal Tramways Trust. Before coming to Adelaide, he had extensive experience with electric tramways in Tasmania, New South Wales, and New Zealand. In 1929 he converted the Adelaide to Glenelg railway to the electric tramway which still runs today.

General Sir John Monash (1865 - 1937)

In 1905 John Monash started the South Australian Reinforced Concrete Co to introduce the new construction material to the state. Following a brilliant military career in World War I Monash became Chairman of the State Electricity Commission of Victoria.

City of Charles Sturt

Engineering Heritage Marker placed on 1 December 2017
Engineering Australia, South Australia Division - City of Charles Sturt

*Draft Interpretation Panel for the Sir William Goodman Bridge
[Prepared for the 17th Engineering Heritage Conference, November 2013]*

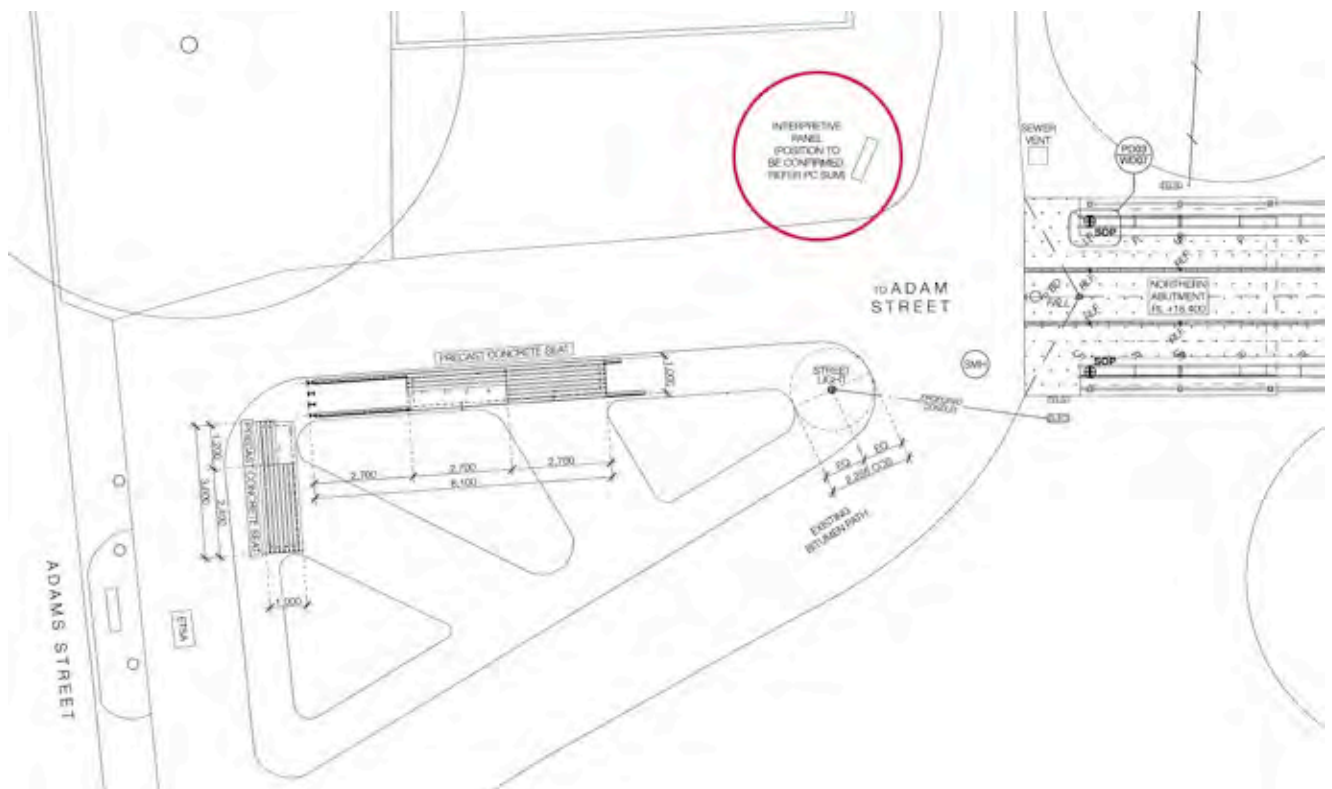
1 Norm Chinn & Bill Denham, "Researching Paint Schemes", *Proceedings of the Council of Tramway Museums of Australia Conference*, Sydney 1988, p55

When the reconstruction of the bridge is completed, its appearance will essentially be unchanged: the increased depth of the girders will not be noticed and the surface finish will maintain the appearance of the original concrete. The original balustrades are being restored and new balustrades complying with current BCA requirements and using contemporary material will be mounted towards the centre of the bridge. LED lighting will be incorporated into the hand rails and new contemporary fittings, clearly distinguishable from the bridge, will effectively light the whole area.

However, the original purpose of the bridge is no longer apparent. The tram tracks and overhead wires were removed from the streets in the 1950s.

The original tram tracks were recovered from the deck but, in order to provide for the safe passage of wheeled vehicles (bicycles and prams), they will not be relaid in the new surface. Instead, their position will be indicated by paving and plans are being developed by the architects to use sections of rail as sculptural features in the landscaping.

At the time of submitting this nomination document, a final decision about the location and style of interpretation at the site had not been made.



Section of the Proposed Bridge Deck Plan for the Restoration and Upgrade of the Sir William Goodman Bridge [Flightpath Architects, Drawing No 3027.SD01]

10.3 Location Significance

The location has several significant historical connections, not just the tramway bridge. On the northern side of the river, the township of Hindmarsh is laid out on a section of land originally owned by Captain John Hindmarsh, the Colony's first Governor (Section 353, Hundred of Yatala). On the southern side was the section of land originally owned by Colonel William Light (Section 1, Hundred of Adelaide) which he called Theberton after a house in Suffolk where he spent his boyhood. Thanks to a misprint when his journal was first published, the area and the ensuing suburb are forever known as Thebarton. Light also noted that it was simply a matter of good luck that he drew No 1 in the choice of sections.²

Light built a house here and was within a few days of moving to it when, in January 1839, a fire broke out in the house of James Hurtle Fisher, the Resident Commissioner, on North Terrace.³ It quickly spread to

² Geoffrey Dutton & David Elder, 1991, *Colonel William Light – Founder of a City* (2nd Ed), Melbourne University Press, Carlton, p235

³ "Destructive fire", *Southern Australian*, 23 January 1839, p2e

the timber and reed surveyor's hut next door where Light was living and destroyed his possessions including his paintings and a personal journal he had "diligently kept for the last thirty years".⁴

Light was left with only the clothes he was wearing and had to live in the dairy of the cottage until his new home was completed. He died there on 6 October 1839. A few years later the house was advertised to let and described by the *SA Register*:

ON the banks of the Torrens, at Thebarton, formerly the residence of the late Colonel Light, a substantial brick-built house, containing four large and lofty rooms, one underground and a back kitchen — commands a fine view of the bay — a garden in a high state of cultivation — a stable, with saddle room — and a well of capital water.

Immediately north of the tramway bridge is the site of John Ridley's flour mill and workshop. Here, in mid-December 1840,⁵ Ridley produced the first flour ground in the Colony. Prior to that, wheat had to be sent to other colonies or as far away as India to be milled.

Ridley had arrived in the Colony on 17 April 1840, bringing with him a steam engine, "part of the force of which I intended to appropriate to the driving of a saw mill, and part to the grinding of flour".⁶ The boiler was first fired on 11 August 1840 and Ridley said he expected to be able to commence milling in about six weeks.⁷

A few years later, Ridley and his staff built the first mechanical harvester in the workshop adjoining the mill. After a few modifications to his first attempt, the machine was successfully put to work in a wheatfield just south of the city on Tuesday 14 November 1840.⁸

Ridley's stripper was recognised in 1986 with an Historic Engineering Marker at Roseworthy College; that plaque is now missing and we propose this location at Hindmarsh for a replacement at what is, in fact, a more significant site.



*Plaque placed in 1997, adjacent the Holland Street tramway bridge, by the Royal Geographical Society of SA to recognise the site of Colonel Light's home on the far (southern) bank of the River Torrens
[Photo: Richard Venus 1653]*



Ridley's first Stripper – the horses are pulling a crossbar connected to a beam which pushes the machine ahead of them [State Library of SA SRG 112]

4 Quoted from Governor Gawler's despatch of 23 January 1939, Dutton & Elder, 1991, p266

5 *Southern Australian*, 25 December 1840, p3d

6 Letter from Ridley to the Editor, dated 13 August 1840, *Southern Australian*, 14 August 1840, p3e

7 *SA Register*, 11 August 1840, p3a

8 *SA Register*, 15 November 1843, p2c

Just upstream on the southern side is the Southwark Brewery which attracts large crowds at Christmas time with its lighting and displays along the banks of the Torrens. These were begun in 1958, the year of the first Adelaide Festival of Arts.¹

The brewery itself is also of heritage significance, dating back to 1886 when Alexander and Thomas Ware established the Torrenside Brewery in 1886. In 1898 they amalgamated with Edward Clarke's East Adelaide Brewery at St Peters to form Clarke Ware & Co and transferred all brewing to Torrenside.

Later that year the new company sold their interests to the long-established Walkerville Cooperative Brewery who closed their Walkerville premises and transferred all their equipment to Torrenside. The business was taken over by the South Australian Brewing Company in 1938 and the site became known as the Southwark Brewery in 1949.²



*Torrenside Brewery
[Photo: SA Brewing Co]*

In 1969, the first two stainless steel outdoor storage tanks, each with a capacity of 80 000 gallons and which are such a distinctive feature of the site, were installed at Southwark. This marked the move to close down the Company's city premises and transfer all brewing and packing operations to Southwark. The West End Brewery was closed in 1980.³ The subsequent expansion of the Southwark Brewery has swallowed up Winwood and later Cawthorne Streets with Holland Street now its western boundary.

Finally, just 325 metres from the Holland Street tramway bridge, is the site of possibly the most significant river crossing in the Colony – where the principal road between the city and its port crossed the River Torrens. This crossing, which dates back to November 1844, will be the subject of a separate recognition proposal.

THE PORT ROAD CROSSING

Wilkins' Bridge 1844-1847

The Opening of the New Bridge, near Thebarton.
WILL be celebrated by a Public Dinner, on Monday, the 16th instant, at 4 o'clock, p.m., at the Market-house Inn, kept by W. Wilkins, the proprietor of this great public convenience.
Dinner on the table at 4 for 6.
Tickets, 2s each, to be obtained of Mr Parker, and of Mr Denton, the Clerk of the Market; Mr Benjamin Neale, the Government Auctioneer, are kindly requested to take the Chair.



After waiting years for a decision, William Wilkins built his own bridge near his hotel, the Market-house Inn. It was opened on 16 December 1844. The bridge was built of solid logs and chained to a tree. For nearly three years it remained standing while other bridges in the city were washed away by floods. Finally, in July 1847, the stout little bridge and the tree it was tethered to were swept away in a great flood.

Thebarton Bridge 1848-1879

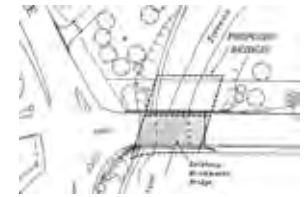
The loss of Wilkins Bridge was keenly felt and a new bridge was designed by Captain Edward Frome, the Colonial Engineer. Built by the Government, it was probably similar to another bridge designed by Frome in the city (see above). The new bridge was opened in August 1848. In 1860 a toll was introduced on the Port Road (only the second in the Colony) and a toll house was erected at the northern approach. Tolls were removed at the end of 1870.

Hindmarsh Bridge 1880-1993



By 1878, the wooden bridge was no longer safe for traffic. Tenders were called for a wrought iron girder bridge with masonry abutments in 1879 and the contractors, Davies & Wishart, began work in July. The cast iron piers were left over from the railway crossing at Murray Bridge. The iron bridge was opened on 14 August 1880 and named the Hindmarsh Bridge. As traffic increased over the years, the bridge had to be widened twice – once in 1926 and again in 1954.

Hindmarsh Bridge 1996



When tests showed that the 1880 bridge was overloaded, a new bridge was needed. In fact, two identical bridges were built. One was built to the east of the old bridge and traffic was diverted onto it. The old bridge was then demolished (in 1993) and the second bridge was built in its place. Concrete slabs covered the gap and formed the median strip. The bridge was opened on 11 November 1996. In 2010 a new girder and deck were constructed to carry trams down Port Road.

¹ Michael Cudmore, 1988, *History of the South Australian Brewing Company Limited: 1888-1988*, SA Brewing Co Ltd, Thebarton, p124

² Keith Deutsher, 1999, *The Breweries of Australia: A History*, Lothian Books, Port Melbourne, pp222-223

³ Cudmore, 1988, p154

Appendix 1: Time Line & Key Dates

December 1884	–	William Cawthorne proposes a footbridge at Holland Street
October 1877	–	First General Meeting of the Adelaide & Hindmarsh Tramway Company
January 1878	–	First shareholders meeting of the Adelaide & Hindmarsh Tramway Company
August 1878	–	Tenders called to supply timber for the tramline
March 1880	–	Directors authorised to use steam power on the line
	–	Tenders called for the construction of the line
June 1880	–	Tenders called for the construction of the Hindmarsh depot and stables
July 1880	–	All lines laid except for bridge over the River Torrens
August 1880	–	New iron bridge officially opened
October 1880	–	Official opening of the Adelaide & Hindmarsh Tramway [Saturday 23rd]
November 1880	–	Timetable published
February 1883	–	Official opening of the extension to Henley Beach
January 1889	–	Trial runs of the Julien Electric Traction system
December 1906	–	Municipal Tramways Trust Act
February 1907	–	Purchase of the metropolitan horse tram companies
May 1907	–	William Goodman appointed electrical engineer of the MTT
	–	Electric tramways officially inaugurated with “turning the first sod” ceremony
	–	Hindmarsh line requires new river crossing
August 1907	–	First correspondence between SARCCo and MTT concerning bridge
March 1908	–	Holland Street confirmed as crossing point
April 1908	–	Monash provides Goodman with estimates for two bridges
May 1908	–	Tenders called for bridge’s construction
July 1908	–	SARCCo tender accepted
	–	Casting of reinforced concrete piles begins on river bank
September 1908	–	First piles driven
November 1908	–	Last span completed [construction time less than three months]
February 1909	–	Tram tracks laid in adjacent streets
March 1909	–	Opening ceremony of Adelaide’s electric tram service
June 1909	–	Regular horse tram service to Hindmarsh commences
	–	First used for a football match on the Hindmarsh Oval [Saturday 26th]
March 1910	–	Electric tram services commence on the Hindmarsh and Henley Beach lines
December 1919	–	A double track line to Hindmarsh will need a bridge at Cawthorne Street
July 1922	–	Tender let to SARCCo who built an identical bridge to Holland Street
January 1923	–	New line opened [Sunday 14th]
November 1950	–	Sir William Goodman retires
February 1952	–	Royal Commission reports on MTT operations
January 1953	–	New MTT Board decides to replace trams with buses
August 1953	–	Buses replace trams on Hindmarsh service
April 1954	–	MTT offers tramway bridges to Thebarton and Hindmarsh Councils
November 1958	–	Last electric street car runs; only Glenelg tramline on its own right-of-way left
May 1962	–	Bridges finally reopen to one-way road traffic
1962	–	Cawthorne Street bridge closed because of concerns about scour around abutments; demolished shortly afterwards
1986	–	Load limit on Holland Street reduced to 2 tonnes
May 1990	–	Holland Street closed to motor traffic
2010	–	Holland Street closed to all users
March 2013	–	Trial repair of one beam carried out
January 2014	–	Contract let for repair and reconstruction of Holland Street bridge
August 2014	–	Expected completion date

Appendix 2: SA Reinforced Concrete Co Projects¹

BRIDGES

Location	Date
1. Hindmarsh River Railway Bridge	1907
2. Holland Street Tramway Bridge	1908
3. Port River Railway Bridge substructure	1910
4. Road bridge, Mitcham	1911
5. Road bridge, Reedy Creek	1914
6. Bowden Tramway Bridge	1920

BUILDINGS

Location	Date
1. Kither's Building	1908
2. Register Building	1909
3. Bowman's Building	1910
4. Moore's Building	1913
5. Verco's Building	1912/1914

WATER TANKS

Location	Date
1. Mile End Railway Yards	1911
2. Abattoirs, Dry Creek	1912
3. Mannum	1912
4. Renmark	1913
5. Tailem Bend	1912/1914

MARINE STRUCTURES

Location	Date
1. CSR Glanville Wharf	1909
2. Glenelg Breakwater	1909 [not completed]
3. Floating Pontoon, Port Adelaide	1910

¹ Principal source: Alan Holgate, nd, *John Monash: Engineering enterprise prior to WWI* website, <www.aholgate.com/mainpages/list_main.html>

Note that not all SARCCo projects are listed; some were minor works but most of those built after Dr Holgate's study period require further research

Appendix 3: References & Bibliography

- C A Andrews, L M Fenner, J W Hoffmann, and R White, 1982, *A Brief History of Adelaide Trams and Trolley Buses, 1878-1963*, Australian Electric Transport Museum (SA) Inc, Adelaide
- David Chantrell, 2008, *Legacies Left Untold: Duncan & Fraser Ltd*, self-published, Adelaide
- Henry Cowan, 1998, *From Wattle & Daub to Concrete & Steel: The Engineering Heritage of Australia's Buildings*, Melbourne University Press, Carlton South
- Michael Cudmore, 1988, *History of the South Australian Brewing Company Limited: 1888-1988*, SA Brewing Co Ltd, Thebarton
- D A Cumming and G C Moxham, 1986, *They Built South Australia: Engineers, Technicians, Manufacturers, Contractors and Their Work*, self published, Adelaide
- Keith Deutsher, 1999, *The Breweries of Australia: A History*, Lothian Books, Port Melbourne
- Geoffrey Dutton and David Elder, 1991, *Colonel William Light – Founder of a City* (2nd Ed), Melbourne University Press, Carlton
- George Godden and Thomas Moore, 1903, *Fifty Years' History of the Town of Kensington and Norwood: 1853-1903*, facsimile edition, 1997, City of Kensington and Norwood, Norwood
- Geoffrey Needham and Daryl Thomson, 1998, *Men of Metal* (2nd Ed), self-published, Adelaide
- Ronald Parsons, 1974, *A History of the Village, District Council and Corporate Town of Hindmarsh South Australia*, Corporation of the Town of Hindmarsh, Hindmarsh
- David Penn, 1997, *How Firm the Foundation: A Historical Survey of an Independent Venture that Founded the Portland Cement Industry in Australia*, Concrete Publishing Co, Sydney
- John Radcliffe and Christopher Steele, 1972, *Adelaide Road Passenger Transport: 1836-1958*, Libraries Board of South Australia, Adelaide
- Ralph Sangster, 1972, *Development of Street Transport in Adelaide: Official History of the Municipal Tramways Trust, 1907-1972*, Municipal Tramways Trust, Adelaide
- Geoffrey Serle, 1982, *John Monash: A Biography*, Melbourne University Press, Melbourne
- Malcolm Thompson, 1988, *Rails through Swamp and Sand – A History of the Port Adelaide Railway*, Port Dock Station Museum, Port Adelaide

Appendix 4: Acknowledgements

This nomination document could not have been prepared without the generous help and support of:

Dr Alan Holgate, independent scholar and expert on the engineering career of John Monash

John Woodside, principal of J Woodside Consulting and member of the Engineering Heritage SA committee

Leo Noicos, URS Asia-Pacific and Vice-Chairman of Engineering Heritage SA

Richard Muncey, member of Engineering Heritage SA

Dr John Radcliffe, South Australian transport expert

Trevor Porter, President of the Hindmarsh Historical Society

Rochelle Sideris, Senior Library Assistant at the Hindmarsh Library

Owen Peake, Chair of Engineering Heritage Victoria and Monash researcher

Vern Butler, genealogist and research assistant

The City of Charles Sturt; Mayor Kirsten Alexander; and Phillip Hewitt, Manager Engineering Strategy and Assets