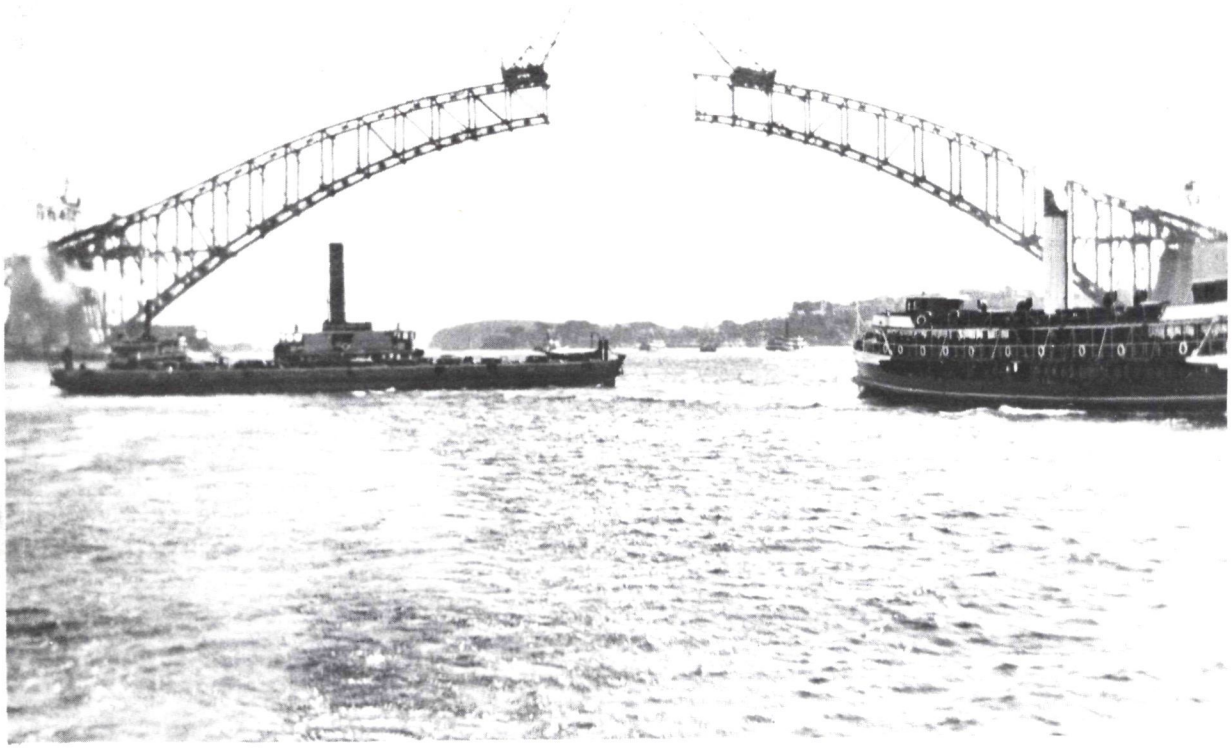
# TROLLEY WIRE

1952 30 1982
YEARS

Journal of
AUSTRALIAN TRAMWAY MUSEUMS

NUMBER 199
APRIL, 1982
ISSN 0155 - 1264



REACHING THE NORTH SHORE

*Registered by Australia Post — Publication No. NBH 0804*

# TROLLEY WIRE

*APRIL 1982*
*Vol. 23 No. 2*
*Issue No. 199*

*1952* 30 *1982*
*THIRTIETH YEAR OF PUBLICATION*

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*PRODUCTION* Bob Merchant
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*DISTRIBUTION* Mal McAulay
Peter Hallen

Published by the South Pacific Electric Railway Co-operative Society, Limited, Box 103 P.O. Sutherland N.S.W. 2232.
Printed by Newey and Beath Printers Pty. Ltd., 10 Belford Street Broadmeadow N.S.W. 2292.



Subscription rates for six issues per year to expire in December.

Australia $7.50
Overseas $9.00

*$1.25* Recommended selling price.

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FRONT COVER: *The two halves of the Sydney Harbour Bridge reaching out for each other are soon to forge a permanent link between the city and the north shore that will replace most of the ferries that are crossing the harbour in this mid 1930 photo.*
*BACK COVER: Charlie horse under the control of Len Millar pulls car 253 away from the outer terminus of the Hudson Park tramway. 7 March 1982.* - William F. Scott

# REACHING THE NORTH SHORE

**By K. McCarthy**

This article has been written to mark the 50th anniversary of the opening of the Sydney Harbour Bridge. After fifty years this structure still ranks as one of the engineering wonders of the world, while the manner in which it can still cope with the city's transport demands continues to enhance Dr. Bradfields's farsightedness and his understanding of Sydney's transport needs more than half a century into the future.

Bradfield was also fortunate in that many politicians of his time, both conservative and radical, could see the worth of his arguements and between 1925 and 1932 the metropolis of Sydney not only witnessed the construction of the Sydney Harbour Bridge, but the electrification of the suburban railways and the opening of two major sections of the city underground railway.

Sydney owes much to Dr. J.J.C. Bradfield as well as to the cabinet members of the Storey, Dooley, Fuller, Lang and Bavin state governments of the 1920's.

## Prelude

From the earliest days of European settlement in Sydney, reliable transport between the main settled area on the southern shore of Port Jackson and the slowly expanding North Shore became a problem.

As early as April 1788, just three months after establishing the settlement in Sydney Cove, Governor Phillip, with Hunter and Bradley, explored the northern shoreline as far as Middle Harbour and Manly[1]. From October 1794, 30 acre grants were made in what is now the Gore Hill-Artarmon areas of the North Shore, followed by smaller 25 acre grants[2]. During the early 1800's the North Shore-Lane Cove area was the principal source of timber for the Sydney market[3]. This cleared the land for farming, consisting mainly of small holdings, orchards, dairy herds and market gardens.

By 1841 the population of the Parish of Willoughby amounted to 586 persons living in 92 houses. This Parish was contained in a region bounded by Lane Cove and Parramatta Rivers, Port Jackson, Middle Harbour and the present Boundary Road in the Chatswood-Roseville area. The employment categories of these families included merchants, bankers, professionals, shopkeepers, retail traders, mechanics as well as those employed as domestic servants, gardeners, stockmen, and in agricultural pursuits.(4) These statistics indicate that North Sydney by this stage was becoming a dormitory suburb of Sydney.

Between 1846 and 1851 a land salesman, W. Meadows Brownrigg, prepared parish maps of the County of Cumberland in N.S.W. His map of North Sydney (Parish of Willoughby) reveals the present main road structure of Lane Cove Road. (Pacific Highway) extending north westwards, Military and Spit Roads reaching east and north east, together with trunk thoroughfares branching to Ball's Head, McMahons Point, Greenwich Point, Curraghbeena Point and Bradley's Head. A suburban street grid has emerged by this stage along Miller Street and Walker Street between what is now St. Leonards Park in the north and Lavender Bay in the south.

By 1868 the northern boundary of this urban corridor had extended to what is now Palmer and Pine Streets Cammeray and by 1893 street grids in the region bounded by the North Shore railway, Middle Harbour and Port Jackson resembled those of today.(5) By 1891 the population of this region was made up as follows:-

| | Population |
|---|---|
| North Sydney | 17,106 |
| North Willoughby | 3,411 |

Sydney urban population growth for this period is best illustrated by the following table:-(6)

| | Census returns:- | | | |
|---|---|---|---|---|
| | 3-4-1881 | 5-4-1891 | 31-3-1901 | 2-4-1911 |
| City of Sydney | 105,901 | 118,358 | 126,138 | 119,771 |
| Suburbs South of Harbour | 107,423 | 238,362 | 312,907 | 421,162 |
| Suburbs North of Harbour | 14,835 | 32,038 | 53,364 | 95,416 |
| Totals | 228,159 | 388,758 | 492,409 | 636,349 |

## Ferries

Early transport connections between Sydney and the North Shore generally consisted of residents rowing their own boats across the narrow part of the harbour, but a "waterman" service was soon established where rowers and their boats plied for hire from Sydney Cove to locations around the harbour for either a set fee or a negotiated charge.

By 1883 "Waterman" hiring rates were:-[7]

From Sydney Cove per person to vessels lying in:-

| | |
|---|---|
| Sydney Cove | 6d. |
| between Fort Denison and Millers Point. | 1s 6d. |
| between Fort Denison and Bradley's Head | 2s 6d. |
| in the stream | 1s 6d. |
| between Bradley's Head and Watsons Bay | 4s 6d. |
| between North and South Heads. | 7s 0d. |
| From Sydney Cove to Dawes Point | 6d. |
| to Mossman's Bay | 4s 0d. |
| to Quarantine Grounds | 8s 0d. |
| to Manly. | 8s 6d. |

By this stage regular ferry services operated between Circular Quay (Sydney Cove) and Milsons Point, a journey for which a "waterman" would possibly demand 1s 6d.

In March 1841 a Mr. Buddivant built a wooden vehicular punt named "Princess" fitted with a 20 h.p. steam engine imported from England. The service did not commence until August. Mr. Ralph Mansfield, the first secretary of the Australian Gaslight Coy. was also secretary of this ferry enterprise. A public notice of March 1842 indicates that the "Princess" plied between Windmill Street (Walsh Bay) and the North Shore offering passage for 3d per person with a 2s 6d toll for four wheeled horse hauled vehicles. This venture was not successful and during the following year the steam engine was removed and used in a steam flour mill at Maitland.[8]

During 1845 Thomas and Joseph Gerrard established the first regular steamer service between Windmill Street and Blues Point (Walsh Bay to McMahon's Point). This vessel, which carried the name "Fairy Queen",[9] towed punts on each side for the benefit of horse drawn vehicles. This boat was replaced by "The Brothers" in 1847 when W. Waterhouse took over the business from the Gerrard Brothers. Fares at this stage were 3d each way for passengers throughout the day to 7pm, then 6d. from 7pm to 11pm.

Mr. Hall commenced an opposition ferry service in 1849. His steamer "Herald" spent much of the day towing sailing vessels through the Heads so Hall's service did not prove very reliable for North Shore residents. The "Herald" finally foundered at the Heads in 1884 while engaged in towing duties.

Messrs. Hunt and Greenwell introduced "Gipsy Queen" and "Victor" in 1851 between Dawes Point and Blues Point while "Fairy Queen" was subsequently purchased from Mr. Waterhouse to operate to Milson's Point. "The Brothers" was sold by Waterhouse to Hudson Brothers and this was lost c.1886 at Port Stephens.

The North Shore Ferry Coy. was established in 1861 by Messrs. James Milson, Charles Frith, Francis Lord and William Tucker. Their first steamer was "Kirribilli" which was able to carry 60 passengers between Circular Quay and Milson's Point. Traffic increased steadily causing "Alexander" with a capacity of 75 passengers to be commissioned followed by "Waratah", "Cammeray", "Gomea", "Galatea", "Coombra" and "Nell". The fares remained at 3d each way during the day and 6d between 7pm and 11pm. Weekly tickets were available for 2s 6d and monthly family tickets cost 12s 6d.

As early as 1858 a ferry service worked by "Black Swan" operated during holiday periods from Woolloomooloo Bay to Mosman. Around 1871 R. Harnett commenced a weekday service between Circular Quay and Mosman using "Herald" on an hourly frequency between 9am to 6pm. An advertisement in "The Sydney Morning Herald" during December 1871 announced a half hourly timetable on this run on Saturdays; fares charged were 6d each way for adults, children under 12 years of age were half price, while those under six were carried free.

This Mosman ferry service did not prove profitable. In January 1872 Mr. Harnett held a meeting of Neutral Bay residents, and although this was not attended to the degree which Mr. Harnett had hoped, he altered his ferry route to operate between Princess Stairs (Quay) and Mosman calling at Neutral Bay (Abbots Wharf). He subsidised Mr. J. Halstead to run the "Aberona" on this service. Patronage increased and the ferries "Florence", "Golden Rose", "Speedwell" and "Matilda" are recorded as operating on this route. This ferry run passed through the hands of Mr. Shipley, Chapman and Coy., Mr. Jeanneret and was ultimately purchased by Sydney Ferries Ltd.

## Reformed Companies

During 1873 the North Shore Ferry Coy. was reformed as the North Shore Steam Ferry Coy. and by 1878 this undertaking had taken over the steamers "Gomea", "Galatea", "Nell", "Coombra", "Darra", "Florence" and Bungaree". The Company's board of directors consisted of Mr. I. Ives as Chairman, Captain James Bremner, J. Garvan, W. Goddard and F. Franklin. Captain T. Summerbell occupied the position of manager and he carried out the design work which resulted in the construction of the first successful doubled ended screw steamer "Wallaby".


*The paddlewheel vehicular ferry* Warrane *crosses the harbour from McMahons Point. Built in 1883 this small 14 vehicle capacity vessel was withdrawn in 1921 and replaced by the* Kooroongabba. - Dennis O'Brien collection

The company's success resulted in constant additions to the ferry fleet right up to the opening of the Sydney Harbour Bridge in 1932. In 1899 the North Shore Company was reformed as Sydney Ferries Ltd., and this body absorbed the Parramatta River service on 5 December 1900, the Balmain Ferry Coy. in 1918, the Watsons Bay Company during 1920.

Prior to the opening of the Harbour Bridge the North Shore and the later Sydney Ferries companies commissioned the following vessels:-

| | |
|---|---|
| "Wallaby" 1879 | "Bennelong" ("Benelon") 1880 |
| "Warrane" 1883 | "Cammeray" 1884 |
| "Victoria" 1885 | "Waratah" 1885 |
| "Bunya Bunya" 1885 | "Lotus" 1886 |
| "Barangaroo" 1890 | "Kangaroo" 1891 |
| "Waringa" 1894 | "Carabella" 1897 |
| "Wallaroo" 1897 | "Kurraba" 1899 |
| "Kiribilli" 1900 | "Kamilaroi" 1901 |
| "Koree" 1903 | "Kummulla" 1903 |
| "Kulgoa" 1905 | "Kareela" 1905 |
| "Kookooburra" 1907 | "Kai Kai" 1907 |
| "Kailoa" 1908 | "Kanimbla" 1909 |
| "Killara" 1909 | "Kirrule" 1912 |
| "Kiandra" 1911 | "Kosciusko" 1911 |
| "Kubu" 1912 | "Kedumba" 1912 |
| "Kirawa" 1912 | "Kanangra" 1912 |
| "Kamiri" 1912 | "Kameruka" 1913 |
| "Karingal" 1913 | "Kuramia" 1914 |
| "Kooroongaba" 1921 | "Koompartoo" 1922 |
| "Kuttabul" 1922 | "Koondooloo" 1924 |
| "Kalang" 1926 | "Kara Kara" 1926. |

This is not an exhaustive list as some of the more modern ferries operated by the other ferry companies were absorbed into the Sydney Ferries fleet after amalgamation.

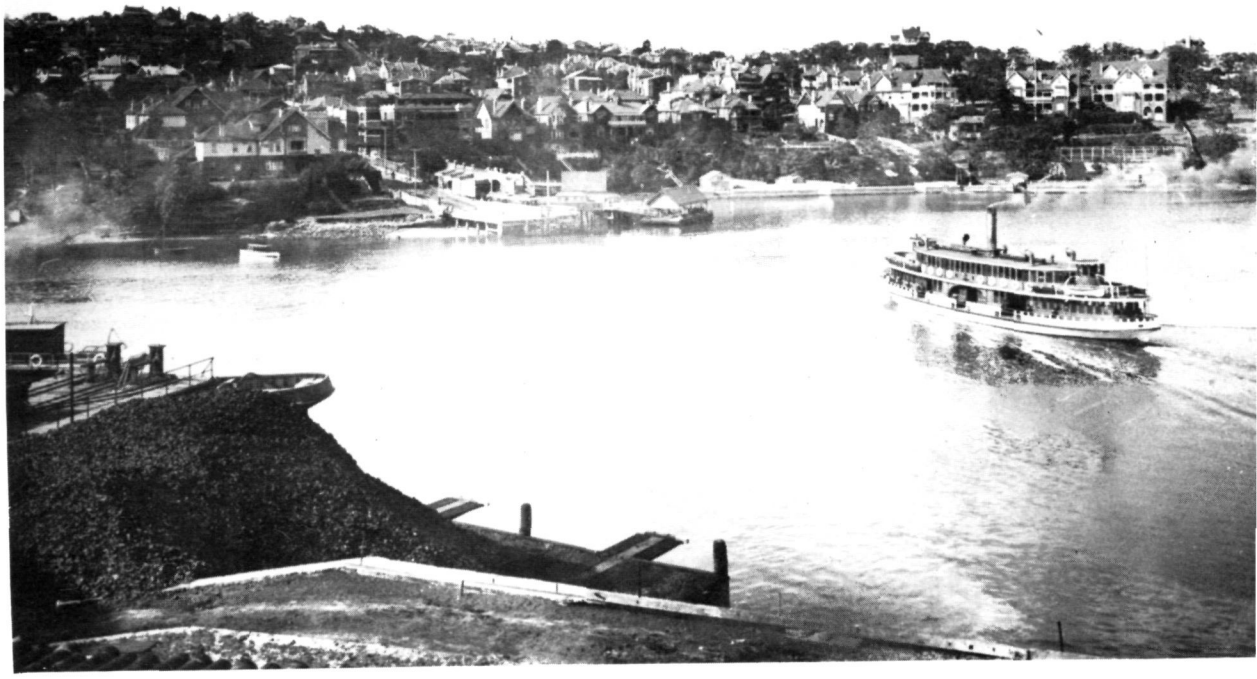
From 1878 to 1886 the bulk of the North Sydney ferry traffic landed at Lavender Bay. During 1886 the North Shore cable tramway opened for traffic from a new Arcade and pontoon wharf at Milson's Point. From that time this wharf became the major interchange point. In 1893 the railway from Hornsby opened to a new station constructed adjacent to the tram terminus which further increased the traffic at this location.

In 1884 an all night steamer service was established from Circular Quay to Milson's Point, Lavender Bay and McMahon's Point. The fare was 1s 0d each way or 10s 0d for a monthly ticket. In June 1895 these fares were reduced to 6d and 6s 0d respectively.

During 1909 the Chatswood and Lane Cove trams were diverted from Milson's Point to a new terminus at McMahon's Point which took some pressure from the Milson's Point ferry terminal. Other tram services on the North Shore eventually connected with ferries at Neutral Bay, Cremorne, Mosman and Athol.

### Vehicular Ferry Services

In 1866 the North Shore Ferry Coy. introduced the "Transit" on a vehicular ferry service to the North Shore. As the volume of traffic increased further larger steamers were introduced on this specialised service. These were all free moving



*A ferry approaches the Neutral Bay wharf, circa 1905, while a C-D tramcar set waits at the jetty. At the left can be seen the light railway at the unloading wharf of the original North Sydney gas works.* - K.McCarthy collection

ferries and not of the design used in quieter waterways where the craft draws itself across the channel on cables.

The vehicular ferries worked the services during the periods shown; a later date in brackets indicates eventual withdrawal from later work away from Sydney Harbour:-[10]
"Bennelong" 1880-1932
"Warrane" 1883-1921
"Barangaroo" 1890-1932
"Kamilario" 1901-1932
"Killara" 1909-1932 (1961)
"Kedumba" 1912-1932
"Kooroongabba" 1921-1932 (1971)
"Koondooloo" 1924-1932 (1971)
"Kara Kara" 1926-1932 (1973)
"Kalang" 1926-1932 (1972)

The North Shore Ferry Coy. operated their vehicular ferry fleet between Bennelong Point and Milson's Point. During 1901 the Sydney Ferries Coy. inaugurated the parallel Dawes Point to McMahon's Point service.

Photos of 1871 indicate that the vehicular ferries terminated a Circular Quay East just north of the foot of Phillip St. By 1880 this Sydney slip had been transferred adjacent to Fort Macquarie, still in Circular Quay, just north of the foot of Macquarie St.[11] With the construction of Fort Macquarie tramway depot in 1902 on Bennelong Point, the vehicular ferry terminal was again moved to the extreme north east tip of the point. The terminal ramps were visible until the 1960's when works associated with the Opera House construction covered the site. The Dawes Point ramp, however, is still in position.

By the mid 1920's duplicate ferry landings had been constructed at Bennelong, Dawes, McMahons and Milson's Point. A search through photos of the harbour front reveals that dual ramps were constructed at the two north side ferry slips prior to the duplication of those on the southern shore.

On 20 July 1925 new dual vehicular ferry slips were brought into use at Jeffrey St. Kirribilli to replace those at Milson's Point. These abandoned slips remained in position until the time of the general harbour shore cleanup during 1932-3, but access to these old ramps was blocked by the northern pylon base of the Sydney Harbour Bridge.

The capacity of these vehicular ferries ranged from 14 road vehicles on the "Warrane" to 56 on the last three vessels delivered in 1924-6. Even with the two parallel services operating to dual ramps, long lines of cars and lorries could be seen awaiting the punts at busy times. The Rev. Frank Cash in his book "Parables of the Sydney Harbour Bridge" stated on page 60:

> "The punt system is painfully slow and costly to the traveller. Queues of motors stand waiting at the peak periods of the day and on holidays as much as half a mile or more in length, two and

three abreast. In a single line it is not uncommon for the line of waiting cars to measure more than a mile long".

"The journey across in the slow moving punt occupies only a few minutes. The cost, however, for an ordinary five seater motor car with passengers is 3s 4d return".

Ten ferries were built between 1880 and 1926 for the North Shore harbour crossing. "Kooroongabba" replaced the "Warrane" in 1921, otherwise all nine vessels were available until the opening of the Sydney Harbour Bridge in 1932. The growth of the service is best illustrated by the following table:-

| | | | |
|---|---|---|---|
| 1880-1883 | 1 vessel | 1883-1890 | 2 vessels |
| 1890-1901 | 3 vessels | 1901-1909 | 4 vessels |
| 1909-1912 | 5 vessels | 1912-1921 | 6 vessels |
| 1921-1924 | 6 vessels | 1924-1926 | 7 vessels |
| 1926-1932 | 9 vessels | | |

By 1912 19 million passengers and 510,000 vehicles were being carried each year to the North Shore by the ferries. They produced a gross revenue of £113,000. The total vehicular ferry capacity per annum at this stage was 2,857,000 vehicles or 7,800 per day. Some 320,000 vehicles made the crossing between Milson's Point and Bennalong Point and 190,000 on the Dawes Point to McMahons Point route.[12]

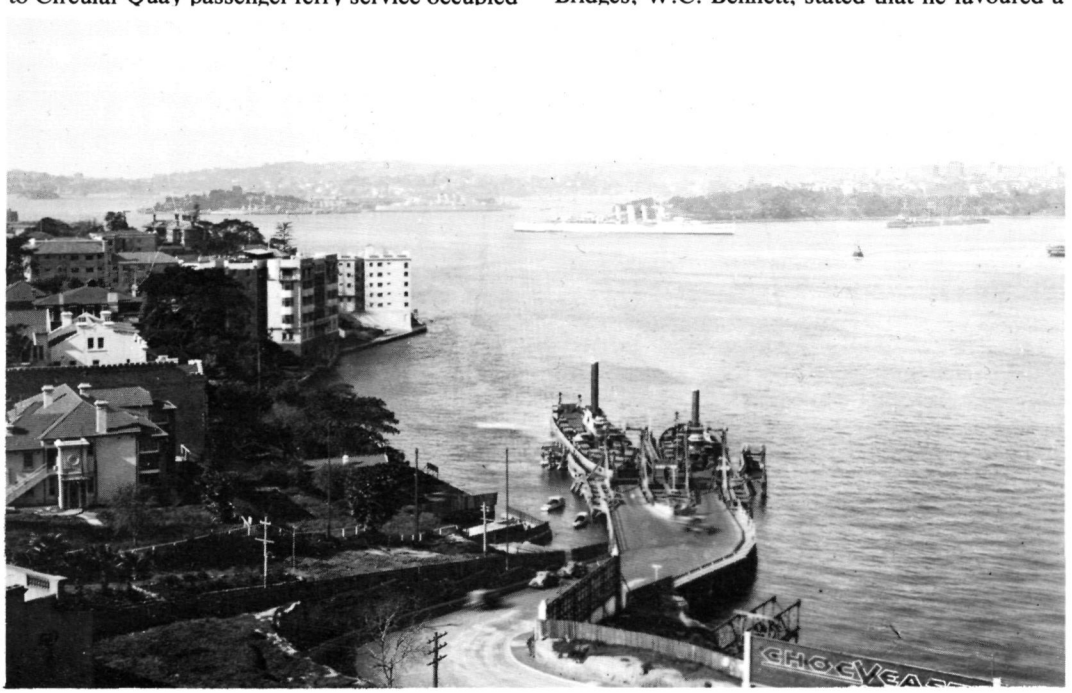
By the end of the 1920's the main Milson's Point to Circular Quay passenger ferry service occupied about 6 minutes. Two boats were engaged in the daytime service and these were joined by an additional two vessels during peak periods providing a six minute frequency. Just prior to the completion of the bridge Sydney Ferries were carrying over 40 million passengers per annum on all services. This fell to 14 million by the mid 1930's.

## Early Harbour Crossing Proposals

In 1815 Francis Greenway outlined the prospect of constructing a bridge from Dawes Point to the North Shore in a report to Governor Macquarie. There are no technical details available of this proposal.[13]

Engineer Peter Henderson of Minto Villa, Woolloomooloo Bay, advanced a proposal in 1857 for a bridge between Dawes Point and Milson's Point. Henderson had served his time in the shops of George Stephenson and had been associated with various works conducted by Brunel. The sketch of his proposal has been published from time to time and it appeared to be based on Stephenson's tubular Menai Strait design of 1850. The roadway was to be clear of all shipping but the depth of the truss or tube was much too small in these drawings to span 1,600 feet.[14]

During 1878 the Commissioner for Roads and Bridges, W.C. Bennett, stated that he favoured a



*Two vehicular ferries about to unload at the new dual slip opened at Jeffrey Street Kirribilli in 1925 to replace the Milsons Point installation.*
N.S.W. Government Printer

Kubu *approaching Circular Quay with passengers keen to disembark standing on the rail. October 1952. This vessel was the last coal fired steam ferry to work on Sydney Harbour.* - Noel Reed

floating bridge (vehicular ferry) rather than a conventional span for the Dawes to Milson's Point crossing. Such a vessel should be designed to carry a railway train as well as passengers and road vehicles. As related, this proposal was not new as vehicular ferries had been used on this crossing since 1841. In addition, the design for a cable guided steam ferry had appeared in the "Illustrated Sydney News" during 1854.[15]

In 1879 T.S. Parrott offered to build a high level bridge to the North Shore. The "Illustrated Sydney News" published a sketch diagram of this proposal in 1880. It consisted of lattice through trusses carried on high stone piers. Four spans appeared to have been planned for the southern approach, with as many as nine on the northern shore. Four piers were to be erected in the stream with a large 500ft span in the centre with a shipping clearance of 130ft and a truss depth of 64ft.[16]

This bridge would have carried a two track railway on the lower chord and a 35ft wide roadway 16ft above the railway deck, but still within the truss. This wrought iron structure ressembled parts of the River Tay bridge and the Hawkesbury railway bridge of that era.

Mr. Parrott represented a company which was willing to spend £850,000 on the project if the government could guarantee an amount equal to 3½% p.a. for a period of 30 years upon the cost of construction. Sir Henry Parkes, then Premier of N.S.W. signed a cabinet minute on 26 October 1881 that Parrott's proposal be accepted by the government and during March 1882 Parrott lodged security of £5,000. All that remained was for the necessary act to be passed, but a change of government in 1883, with Sir Alexander Stuart as Premier, resulted in the matter being dropped and the deposit returned.[17]

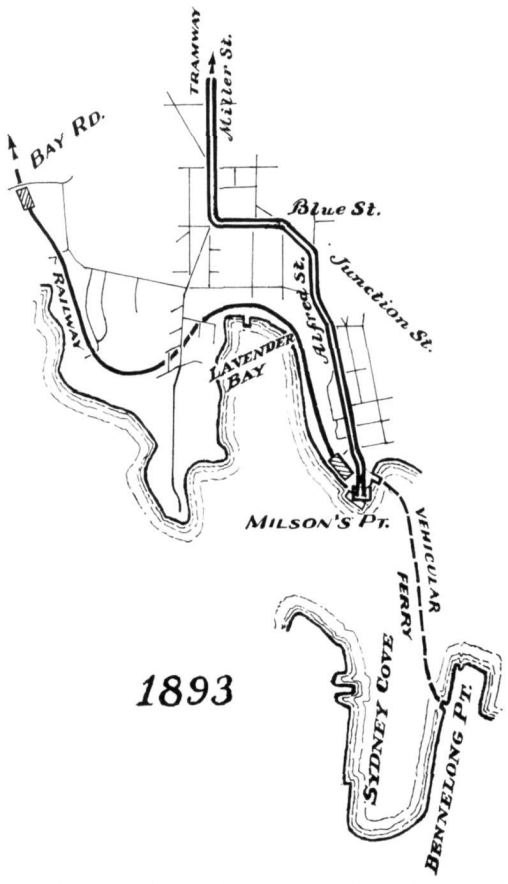
Soon after, Sir John Fowler prepared plans for a suspension bridge from Dawes Point to Milson's Point at an estimated cost of £400,000.

### Tunnel Schemes

During 1885 tunnel schemes for the crossing received publicity. One such proposal was made by C. O'Neill in association with a Mr. Gipps. This scheme was made in January 1885 and in 1887 the government was requested to guarantee a return of 4% p.a. on £450,000. Two tunnels were proposed, linking Sydney with North Sydney, one for road traffic and the other for a railway.

A local engineer, Mr. J. Rock, speaking at an Engineering Society meeting in 1885, outlined a definite plan for a tunnel to cost £107,000 and be ready for traffic within one year if work could advance concurrently from both ends.

Rock's scheme planned for the Milson's Point cable tramway to enter the bore on a 1 in 6 grade




and dip to a level which would place the tunnel below any harbour bed rock flaws. The tramway would then pass under the harbour on the level for a distance of 380ft with an average roof of rock amounting to 70ft. At the Sydney end the cable cars would climb to emerge at George St. North on the western shore of Circular Quay, where vehicular traffic could gain access. The trams would continue around Circular Quay to the foot of Phillip Street, being one block from the city's steam tramway terminus at Bridge Street.[18]

This scheme would provide passenger accommodation in the usual cable tram rolling stock but horses with vehicles, as well as freight items would carried on flat trucks from the George Street interchange.

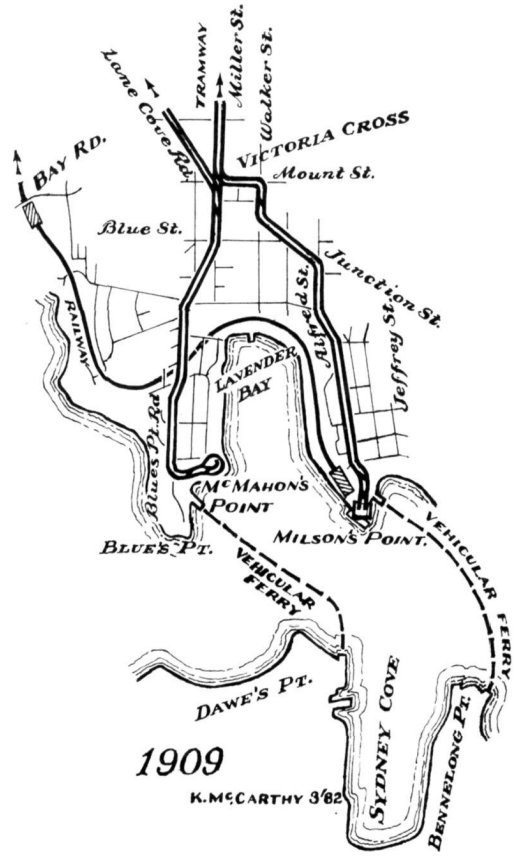
Rock's scheme required a tunnel 825 yards in length with a 51 square yard cross sectional area giving a content of 42,000 cubic yards. Excavation at £2 per cubic yard was estimated to cost £84,000. Approaches were to be £5,000, cable tramway extensions and additional rolling stock £6,000, lighting and drainage £2,000 making a total of £107,000 which included £10,000 for contingencies.

## Further Initiatives

Agitation brought about some action in 1888 when a deputation waited upon Sir Henry Parkes to urge construction of a bridge to mark the centenary of the colony. This resulted in the appointment of a Royal Commission during March 1890 to enquire into proposed extensions of the railway into the city together with a connection to North Sydney. Eight schemes were presented for bridges and a further four for tunnels.[19]

This Commission compiled their report in 1891 and reached the recommendation that "at present it was inexpedient to connect the North Shore with Sydney by means of a bridge or tunnel, but the Commission is of the opinion upon evidence before it that, if it should be found necessary to connect the North Shore with Sydney, it should be by means of a high level bridge. It is were possible to throw a bridge across in one span, such a plan should be adopted."[20]

Between 1896 and 1899 four bills were considered by parliament, two for bridge connections and two for tunnels. Mr. John Sulman presented tunnel schemes whereby an electric railway would



operate from Milson's Point to King Street Sydney, with an intermediate station at Circular Quay. The three underground stations at Milson's Point, Quay and King Street would be reached by hydraulic lifts and at no point would the railway be closer to the surface than 35 feet. An additional tunnel for pedestrians and road vehicles was to be bored between Circular Quay and Milson's Point to a 27 feet diameter. This tunnel, commencing at the foot of Phillip Street, would descend under Government House on a 1 in 27 grade and cross under the harbour floor between Fort Macquarie and Milson's Point where the road would emerge at the harbour side near Milson's Point station. The electric railway scheme was expected to cost £350,000 while the road tunnel would amount to £25,000.[21]

## 1903 Advisory Board Recommendations

Under pressure from further deputations the Hon. E.W. O'Sullivan, Minister for Works, called for designs and tenders for the harbour crossing. None of the submitted designs were considered satisfactory so on 25 March 1901 the Minister appointed an advisory board. (Dr.) J.J.C. Bradfield was the member of this committee appointed to check calculations of the three submissions considered suitable from the nineteen designs considered by the Board.

The Board called for tenders on 25 November 1903 and recommended the adoption of the design submitted by J. Stewart and Coy. This was for a cantilever bridge somewhat similar to the later Story Bridge in Brisbane. The completion cost was estimated at £1,940,050 which included land resumptions, a railway between Bay Road (Waverton) and the intersection of Princes and Grosvenor Streets in Sydney, and a roadway between Blues Point Road North Sydney and Princes Street Sydney.

This bridge was planned to link Dawes Point with McMahons Point with a clear span of 1,350ft while the shore arms of the cantilever were to be 580ft on the north side and 500ft on the southern shore. The bridge would carry a 35ft woodblocked roadway on the eastern side, a double track tramway would be situated along the centre line of the bridge, while a double track railway was to be situated along the western cantilever. Two 10ft wide footways were to be situated on either side of the bridge outside the cantilevers. The tramway and roadway would be 82 chains long while the railway was planned at 154 chains.

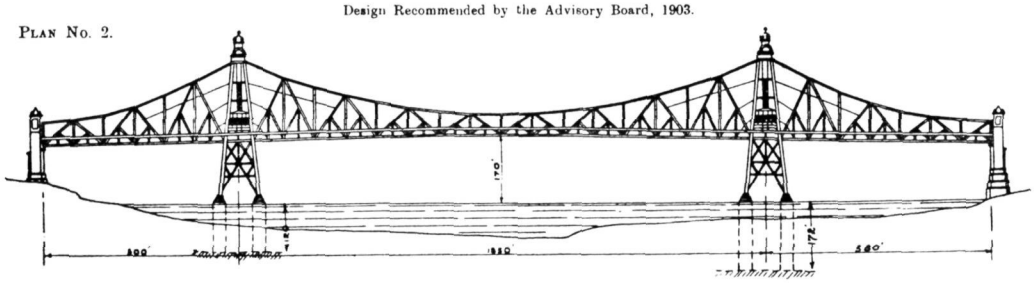
This design had been formulated by Mr. Norman Selfe in conjunction with the Vereinigte Maschinenfabrik of Ausburg and Maschinenbaugesellschaft of Nurnberg. Unfortunately this was a period of financial stringencies and no action was taken on the Advisory Board's recommendations.[22]

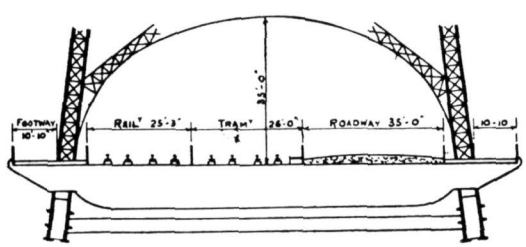
## 1913 Public Works Committee Recommendations

On 11 May 1908 a Royal Commission on "Communication between Sydney and North Sydney" was appointed by the Wade Ministry, to make an investigation into increased and improved facilities of communications across the harbour. On 29 March 1909 this Commission reported in favour

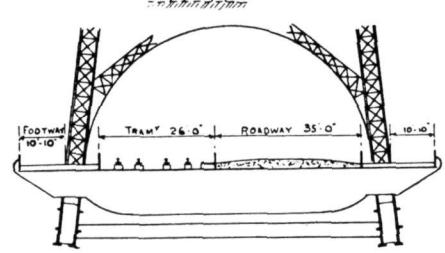
SYDNEY HARBOUR BRIDGE, DAWES' POINT TO McMAHON'S POINT.
Design Recommended by the Advisory Board, 1903.

PLAN No. 2.

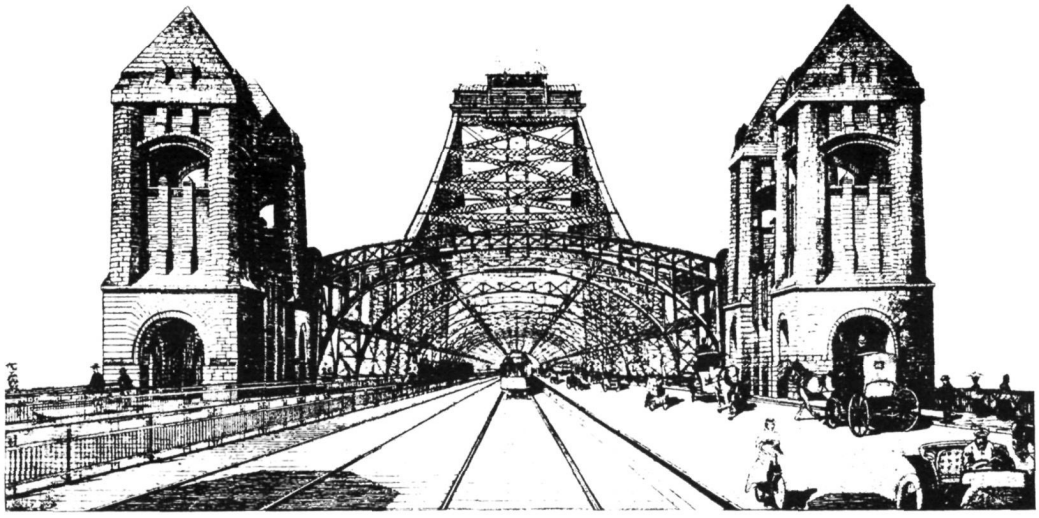



CROSS SECTION WITH RAILWAY,
as approved by Advisory Board.




CROSS SECTION WITHOUT RAILWAY,
as Submitted to Parliament.



*Artists impression of the deck, looking north through the ornamental towers, of the 1903 proposal for a bridge by J.Stewart & Co.*

of various tunnel schemes. Several proposals recommended for further government consideration were:-[23]

1. Railway tunnel. Lavender Bay via Kirribilli Point and Fort Macquarie to Martin Place. £753,000
2. Tramway tunnel. Arthur Street North Sydney via Milson's Point and Dawes Point with a loop at Circular Quay West. £460,000
3. Vehicular tunnel. Arthur Street North Sydney via Milson's Point, Dawes Point to link with a road at Hickson Street Walsh Bay. £502,000

On 14 December 1909 the railway tunnel project was referred to a Standing Parliamentary Committee for Public Works and the estimated cost was revised to £1,101,476 which took into account all the Railway Commissioner's requirements.

On 19 July 1911 the Hon. A. Griffith, Minister for Works, announced the Cabinet had decided that designs for a bridge to carry tramway, pedestrian and vehicular traffic be submitted to the Public Works Committee and that a tunnel design be considered to connect the North Shore railway with the city railway system. This bridge was to be a cantilever design between Dawes and McMahons Point similar to the 1903 design by J. Stewart and Coy. It was now estimated to cost £1,730,400. The spans were to be the same size as the 1903 design while the clearance for shipping for the central 600 feet was 170 feet above high tide.

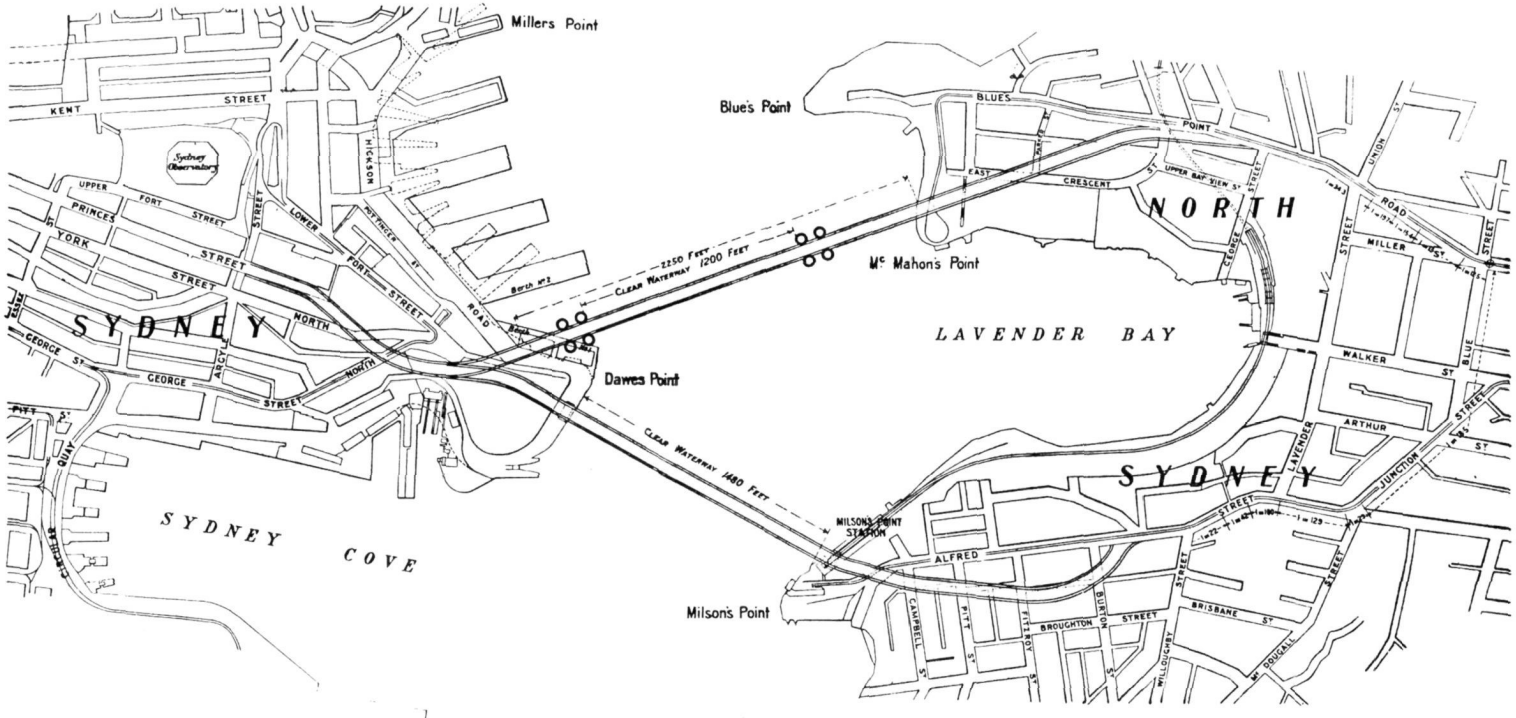
A subway to carry the double track electric railway would dip underground at Lavender Bay at the foot of Walker Street and pass under the harbour between Kirribilli and Fort Macquarie. The Sydney terminal was to be located under the location of the present elevated Quay station. The north side grades were to be 1 in 50 and the southern incline 1 in 40. The cost of the scheme was estimated as £1,046,474.

During December 1911 Minister for Works Griffith requested Dr. J.J.C. Bradfield to submit a bridge proposal with a clear span between Milson's and Dawes Points.[24]

Bradfield has joined the Public Works Department as a draftsman in 1891 in the Roads and Bridges Branch. By 1911 he had risen to the post of Principal Designing Engineer. Bradfield compared tunnel schemes with bridges, investigated various means of communication such as railways and tramways and arrived at the recommendation that a cantilever bridge be built between Dawes and Milson's Points with a clear span of 1,600 feet between shore based piers. The bridge would have cantilever spans of 500 feet over each shore.

This structure would carry an 18 feet wide "motor roadway" beyond the girders on the eastern side, a 35 feet wide roadway inside the eastern girders for horse hauled traffic, four lines of railway inside the western girders and a 15 feet wide western footway. The vertical members of the bridge frames were designed at 94 feet 6 inches apart. Grades of 1 in 39 would be involved in the approaches while the centre span was to be located 170 feet above high water mark.

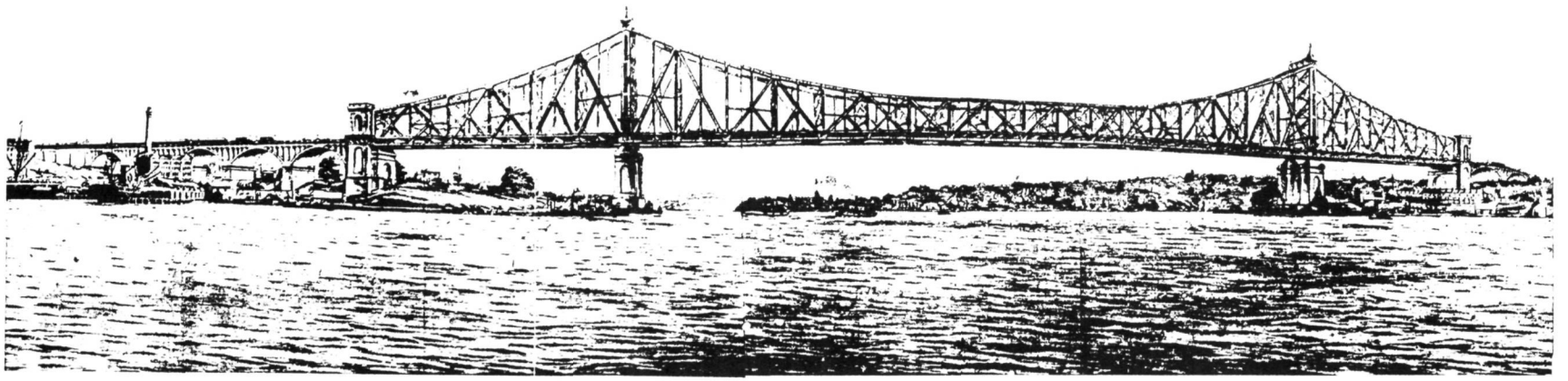
The estimated cost of this cantilever bridge was £2,750,000 and two of the railway tracks could be




MAP OF SYDNEY AND NORTH SYDNEY SHEWING SCHEMES.

*ABOVE: The two 1913 schemes for a bridge across Sydney Harbour, in each case from Dawes Point. The alignment to McMahons Point was based on the 1903 proposal.*
*BELOW: The 1903 proposal for a bridge from Dawes Point to McMahons Point by J.Stewart & Co.*
*BOTTOM: The 1913 Public Works Committee preferred proposal for a bridge from Dawes Point to Milsons Point.*

ELEVATION OF BRIDGE, WITH HIGH PIERS (Bridge recommended by the Public Works Committee, 1913)



used for tramway traffic.[25]

In 1908 the Chief Commissioner for Railways, Mr. T.R. Johnson had addressed the Royal Commission recommending that the tramways should not be taken across the harbour. Four tracks of electric railway should be constructed and the tramways be developed as feeders to this railway system. For the seven years ending 30 June 1913 the percentage of railway expenditure to earnings was 60.08% while this percentage in tramway working was 82.91%.[26]

Bradfield had investigated both single arch and cantilever styles but recommended the latter due to its ease of construction.

**Parliamentary Activities**

The enabling Bill for this recommendation was brought down in Parliament in 1916 and was linked with proposals for the construction of the city underground railway system as well as the electrification of the suburban network. This Bill twice passed through the Legislative Assembly but was rejected by the Upper House or Legislative Council.[27]

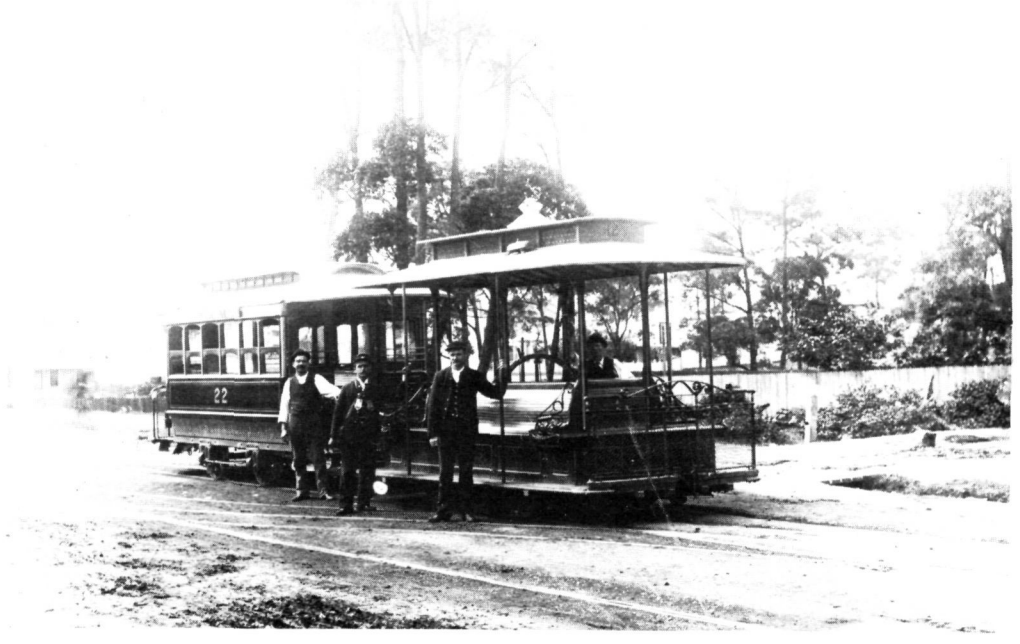
In 1920 the Hon. R.T. Ball, Minister for Works in the Holman Government revealed his support for Bradfield's proposals. The Storey Labour Government defeated the conservatives that year and Bradfield was called upon to complete bridge details so that tenders could be called on 30 September 1921. John Storey died soon after this date but John Estell, the Minister for Works, introduced the new bridge Bill which passed the lower house.

In June 1922 the Labour Government of James Dooley was defeated by Sir George Fuller but the new Minister for Works, Hon. R.T. Ball, guided the Bill through parliament and on 24 November the Harbour Bridge Act received the governor's assent.

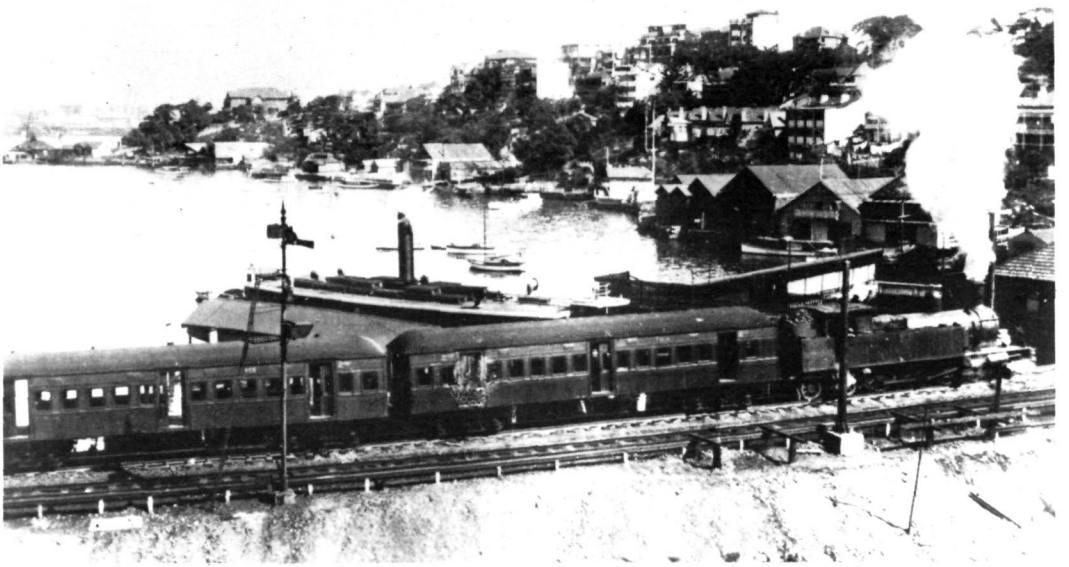
On his visit to U.S.A. in 1914, Bradfield had displayed interest in the single arch Hell Gate bridge in New York and on making further investigations learnt that the construction of a bridge to this design over the harbour span of 1,600 feet would cost £35,000 less than the proposed cantilever structure. This 1922 Act contained the alternative of building either a cantilever or an arch bridge between Dawes and Milson's Points.[28]

In 1923 the arch bridge plans and general specifications were prepared by Bradfield, together with roadway and railway approach details. World wide tenders were called for this or alternative designs of bridge crossing. In the meantime the first sod was turned near the site of the present North Sydney Station by Hon. R.T. Ball on 28 July 1923.[29]

Tenders for the bridge construction contract closed on 16 January 1924 and on 24 March the tender of Dorman Long & Coy. for a two hinge single arch bridge was accepted by the government for £4,217,721 with a six year completion period. The acceptance carried the proviso that as much




*Cable grip car and trailer at the Crows Nest terminus of the 1893 extension of the North Sydney cable tramway.* - Kerry photo



*3091 hauls a train of widened cars around Lavender Bay away from Milsons Point station. A stanchion for the impending electrification is to the right.* - Postcard

local material as possible must be contained in the structure while fabrication had to be performed in a locally situated workshop.(30)

### Cable Tramways on the North Shore

What is not generally realised is that the North Shore cable tramway construction was carried out at the same time as the first Melbourne cable line to Richmond! Woods Carson was awarded the contract to build the 1 mile 31½ chain double track standard gauge cable line between Milson's Point ferry wharf and St. Leonards Park at Ridge Street on 21 January 1885. This part of the contract (no. 85/3801) was completed on 13 October 1885 at a cost of £38,230 7s 6d. This price included the supply of 8 dummy grip cars at £1760 and four single truck saloon trailers for £1040.

Woods Carson constructed the tramway through the Tramway Cable Construction Coy. and although the civil engineering work was ready by October 1885 the winding gear, engines and cables were not completed until March 1886. The tramway was not opened to the public until Saturday 22 May 1886 due to a delay in obtaining an adequate water supply for the boilers.(31)

The car shed at Ridge Street North Sydney does not appear to have been completed until 30 November 1886 at a cost of £1496 10s 5d. This contract (No. 86/3796) had been awarded to Gatty & Coy. on 23 June 1886.

According to contemporary accounts it seems that the construction of the Spencer Street to Richmond cable tramway in Melbourne commenced during October 1884 and the undertaking opened on 11 November 1885. George Duncan was the engineer for the Dunedin N.Z., the North Shore in Sydney and the Melbourne cable projects.

Lord Carrington arrived by steam launch at Milson's Point Wharf on Saturday 22 May 1886 and after being drawn up the hill in a horse drawn carriage he was escorted into the cable winding house by the Tramway Superintendent at 1pm. His Excellency the Governor then turned on a steam valve which started the Fowler winding engine and set the cable in motion. After partaking of a luncheon under a marquee in nearby St. Leonards Park the Governor then joined a tram in Miller Street and travelled back to his steam launch at Milson's Point.

### North Shore Railway

Prior to the opening of the through Homebush to Waratah (Strathfield to Hamilton) railway on 1 May 1889, tenders were called during December 1885 for the construction of a branch railway from Hornsby (on the new Homebush to Waratah railway) to St. Leonards near the present junction of Lane Cove Road (Pacific Highway) and Rocklands Road. Although quotations were received for this route, the North Sydney end of the planned

railway was redesigned to terminate at what is now Crow's Nest Junction. The cable tramway, then under construction, was to be extended from its first terminus at Ridge Street to this railway station.

New tenders for the 11 mile railway were called during 1887 and work commenced in July 1887. There was such a volume of rejection to this scheme that the Crow's Nest terminus was abandoned and the railway finally opened between Hornsby and St. Leonards (present station) on 1 January 1890. This new location was to be a temporary rail head from which later construction would take the tracks to the tramway and ferry interchange at Milson's Point.[32]

The railway extension of almost 3 miles from St. Leonards to Milson's Point ferry wharf was carried out by O. McMaster for a cost of just over £230,000. The contractors locomotive made the trial trip to Milson's Point on 12 January 1893. This loco departed from St. Leonards at 11am hauling a number of wagons and a brake van. Refreshments were provided at the Bay Road (Waverton) tunnel and the journey was completed to Milson's Point yard. The press report stated that this railway extension was expected to be available for traffic within 10 days.[33]

Travellers on the North Shore railway were eager to see the Milson's Point extension opened for traffic as soon as possible. As a result of deputations, the Minister for Works consented on 18 January 1893 to allow the contractor to carry passengers beyond St. Leonards at 3d. each way pending the official opening. Contractor McMaster responded that he expected to be able to provide this service within a few days of the announcement.[34]

Lady Darley assisted in the opening ceremony of the Milson's Point railway when the first government worked passenger train departed from the harbour side at 2.40pm on Saturday 29 April 1893. Regular public service commenced on Monday 1 May.[35]

## North Shore Tramway Expansion

Although the deviation of the planned railway route from a terminus at Crow's Nest to the more convenient Milson's Point station removed the possibility of heavy traffic being carried on the outer end of the cable tramway, the tramway extension of almost ¾ mile from Ridge Street to Crow's Nest was constructed and opened for traffic on Sunday 16 July 1893.[36] The extension and the manufacture of new winding engines and gear was carried out on behalf of Messrs. Hudson Brothers of Clyde by Mr. Thomas Irons under the supervision of Mr. G. Fischer of the Government Tramways Department. The cables were transferred to the new drums and winding gear on Saturday 15 July and the cars ran through to the new terminus on the following day.

The original 8 grip cars and 4 saloon trailers supplied in 1886 were progressively joined by further rolling stock and by 1893 the North Shore tramway reached the maximum of 13 grip cars and 23 trailers.

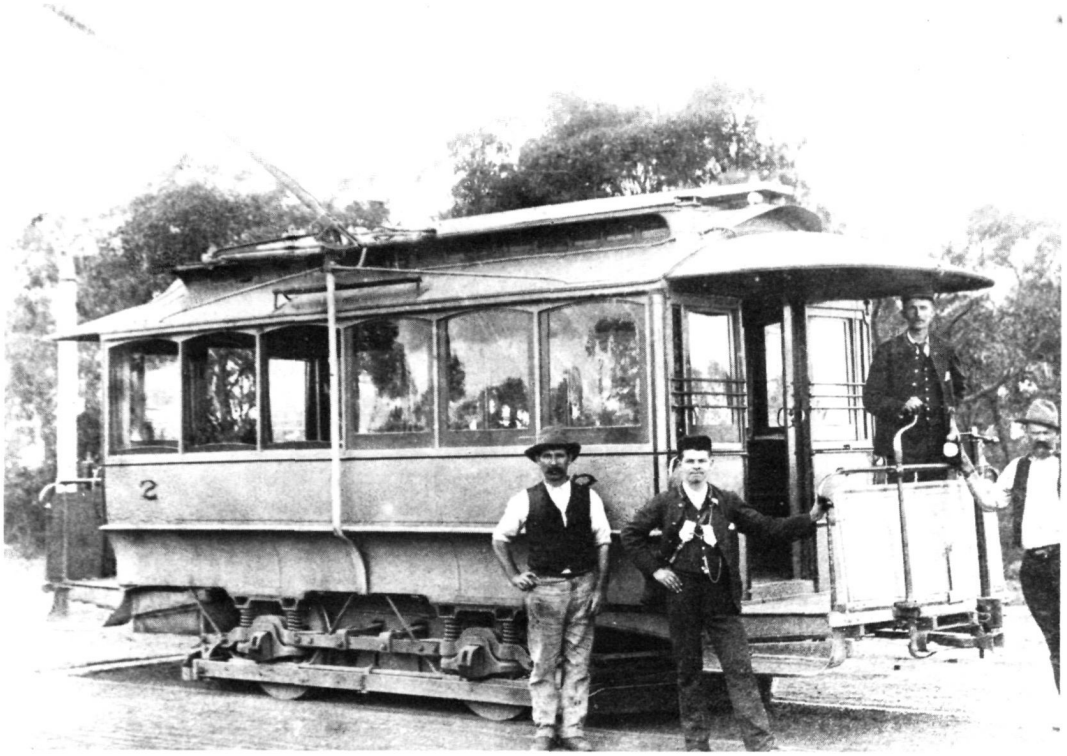
## North Shore Tramway Company

Another curious venture at this period was the North Sydney Tramway and Investment Company's[37] projects. Michael Cannon in his work "The Land Boomers" related how Henry Gore MLC, a Melbourne engineer told the Ballarat Supreme Court "I was induced by misrepresentation to buy £5000 worth of shares in the North Shore Tramway Coy. of Sydney . . . which was nothing more than a line on the map drawn through impenetrable scrub on the north side of the Sydney Harbour."

This company was established to subdivide a large estate in what became the suburb of Northbridge. Canon is incorrect, however, to dismiss this company's attainments as a "line on a map". This company constructed the Suspension Bridge across the Long Bay arm of Middle Harbour as a cost of £60,000 to provide access to "some thousands of acres" of land. It is believed that a tramway was actually constructed from the cable line at St. Leonards Park northwards to the bridge. The company constructed the suspension bridge between 1887 and 1892 but due to the financial slump, did not proceed far with the land subdivision and development. Although a petition to wind up the company failed in December 1892, court litigation concerning the undertaking's debts did take place early in the following year.[38]

During January 1893 court litigation took place concerning accounts between Mason Brothers and the North Sydney Tramway and Investments Coy. This may throw some light onto the nature of the planned motive power for their tramway. On 20 December 1882 the NSWGT loaned Mason Brothers one Eames vacuum brake ejector set for a Merryweather steam tramway locomotive.[39] Approval was given on 20 April 1883 for the purchase of this tram motor from Mason Brothers for £650. The actual transaction was completed on 27 April and it commenced operating on the Sydney tramway system as a goods motor on 6 June 1883 carrying fleet number 55.

At this stage Baldwin tram engines cost approximately £1,500 landed in Sydney so the purchase price of the Merryweather unit was something of a bargain. Although this transaction was conducted some five or six years before the North Shore Tramway Coy's. activities, the involvement of Mason Brothers in litigation with the Company




*Sydney electric tram 2 soon after transfer, together with 1 and 3, to North Sydney in 1893 to operate the new electric line to Mosman (now Spit Junction).* - Robin Cale Studio

seems to indicate that a similar motor may have been proposed as the motive power for the private tramway.

Little development took place on the north side of the Suspension Bridge due to the financial depression of the 1890's. The tramway was abandoned but the debenture holders of the company, however, derived a modest income from the bridge by allowing pedestrians to cross for 3d return, providing the tudor towers as tourist vantage points and hiring the structure for dances and picnics. By the early 1900's these activities were earning the debenture holders £600 per annum.(40)

On Saturday 16 November 1912 the State Premier, Mr. McGowen accepted the Suspension Bridge as a gift on behalf of the government. The company had been restructured as the New North Sydney Investment and Tramway Coy. Ltd. and Sir Allen Taylor, on behalf of this company made the presentation. The gift was made on the understanding that the government would not impose a toll and that a tramway extension would soon be constructed to Northbridge to serve the groups estates then being further developed for building lots.

On 17 May 1909 a 70 chain electric tramway extension had been opened by the NSWGT from the corner of Falcon and Miller Streets to the heights on the southern side of the suspension bridge. Abandoned rails of the 1890 tramway were excavated when the government project was undertaken. On 7 February 1914 the promised 24 chain electric tramway across the Suspension Bridge to central Northbridge opened and the final extension to a terminus near the Woonona and Sailors Bay Roads corner was commissioned on 21 March 1914.

### Electric Tramway Expansion

On 20 September 1893 an electric tramway extension was opened by the NSWGT from the Ridge Street depot, along Miller Street parallel with the recent cable tramway construction, then via Falcon Street and Military Road to what is now Spit Junction. This route, situated along relatively level terrain was planned for steam traction. On 28 April 1892 a large group of unemployed marched to the Public Works Department Offices in Sydney to urge Mr. Lyne, Minister for Works in the Dibbs government, to start additional public works to


*A view looking west along Lane Cove Road (Pacific Highway) from the overbridge at St. Leonards Station, circa 1905. Four wheel sprinkler car 28W is approaching in the distance.* - K.McCarthy collection from original glass negative

*Gore Hill tramway terminus circa 1905, looking south east towards Sydney. This photo is a mystery; the number 60 can be seen on the tram on the original plate glass negative, yet the car is a D class numbered in the 98 to 121 series!* - K.McCarthy collection from original glass negative

absorb the unemployed.[41] Mr. Lyne indicated that work would start soon on the Military Road tramway to cost £9000 as well as the Ocean Street cable tramway and the North Coast railway projects.

Three electric tramcars together with generating equipment, had launched an experimental service along the Randwick to Waverley steam tramway in November 1890. At the conclusion of this trial in April 1892 the decision was reached to transfer the electric rolling stock and plant to Military Road North Sydney. H.H. Kingsbury received the contract for taking down and re-erecting the overhead wires and poles from Waverley to Military Road for £200 while that firm received a further contract for £92 17s 11d for "rounding off abrupt angles on the line and the extension of wire into and along roads in the car shed".

The North Sydney tramway system thus developed from a trunk cable route opened in 1886 between Milson's Point and Ridge Street, a westwards cable extension to Crow's Nest, an eastern electric line to Spit Road and the northward private tramway built c 1889 but not reconstructed and opened for the public by the NSWGT until 1909.

Further tramway expansion on the North Shore used electric traction. The Military Road line was extended to Mosman Wharf in March 1897 and the Spit during October 1900. Western tramway extensions were made to Willoughby in April 1898 and to Gore Hill in February 1900. The 1893 cable extension was replaced by the Willoughby electric cars in 1898 and the main electric/cable interchange was at the original terminus at Ridge Street.

The opening of the central tramway generating station at Ultimo in December 1899 and the commissioning of the North Shore submarine DC feeder cable soon after, enabled electric trams to take over from the cable cars between Milson's Point and Ridge Street on Sunday 11 February 1900. When this additional power became available during late January, full peak frequency electric tram trials were conducted along the cable route between 1am and 4am on several mornings to test the reliability of the new electric circuits.[42]

### Major Tramway Expansion

The availability of high voltage AC transmission from Ultimo, the construction of substations, the popularity of the electric trams and the rapid development of home building in the North Sydney region resulted in the following new tramways being opened:-

Neutral Bay Wharf 25 June 1900.
Willoughby to Chatswood 24 July 1908.
Gore Hill to Lane Cove 22 March 1909.
Falcon Street to Suspension Bridge 17 May 1909.

Although all of these tramway services were not through routed to Milson's Point Wharf, the increased tramway traffic did create considerable peak hour congestion on the trunk Milson's Point to Ridge Street tramway. The main problems was brought about by the Milson's Point tramway


*Willoughby tram terminus circa 1905 with E car set 595–596. The 1908 extension to Chatswood turned into Victoria Avenue at the right of this view.* - K.McCarthy collection from original glass negative

arrival and departure times being controlled by ferry movements. The trunk route tramway frequencies could not be evenly spread, but were operated in divisions.

### Tramway Diversion to McMahon's Point

On 27 September 1909 a major rerouting procedure came into operation on the North Shore tramway. A new route was opened along North Sydney Road/Lane Cove Road (Pacific Highway) between Crow's Nest and Victoria Cross (71 chains) and Blue Street to McMahons Point (60 chains). This enabled the Chatswood and Lane Cove trams to avoid the Milson's Point bound trams and meet the ferries at McMahons Point. Five days previous to this diversion, on 22 September, the 25 chain Walker Street deviation opened enabling trams on the Milson's Point routes to pass through Victoria Cross without sharing tracks used by the McMahons Point trams.

A new larger depot was opened in Military Road, Neutral Bay on 3 June 1909 replacing the cramped Ridge Street sheds originally built in 1886 for the cable services but progressively extended as the electric tramway extensions were opened.

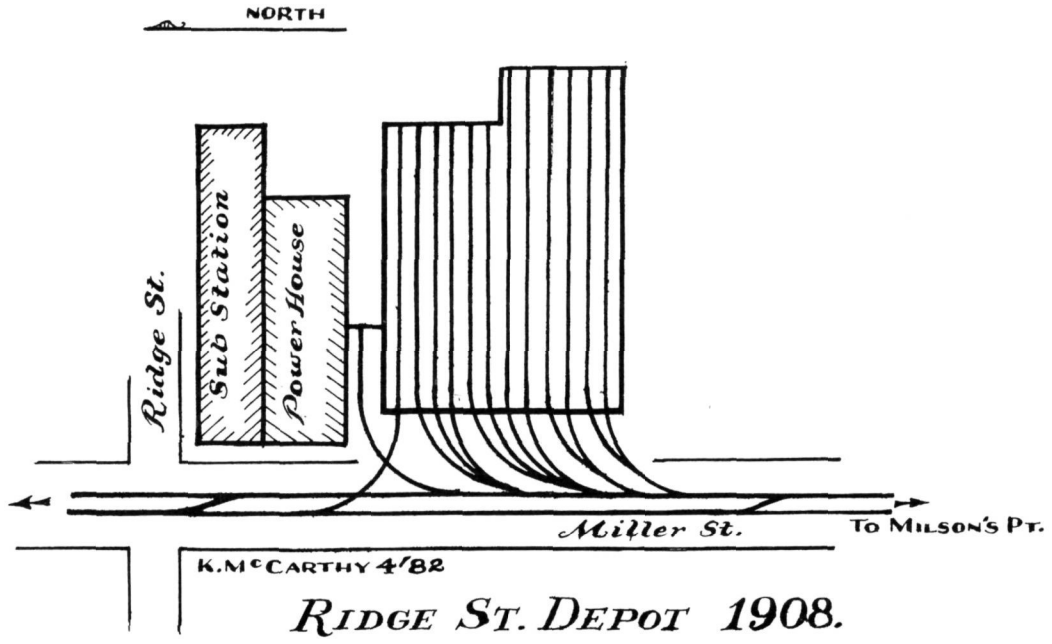
The new depot and the McMahons Point diversion cleared the way for further North Sydney tramway extensions. The following routes opened, some however, were local services feeding into ferry services at suburban jetties:-

Northbridge 7 February and 21 March 1914
Cremorne Wharf 18 December 1911
Taronga Zoo Park 9 October 1916
Athol Wharf 27 October 1917
Georges Heights 13 August 1919
Balmoral Beach 29 May 1922

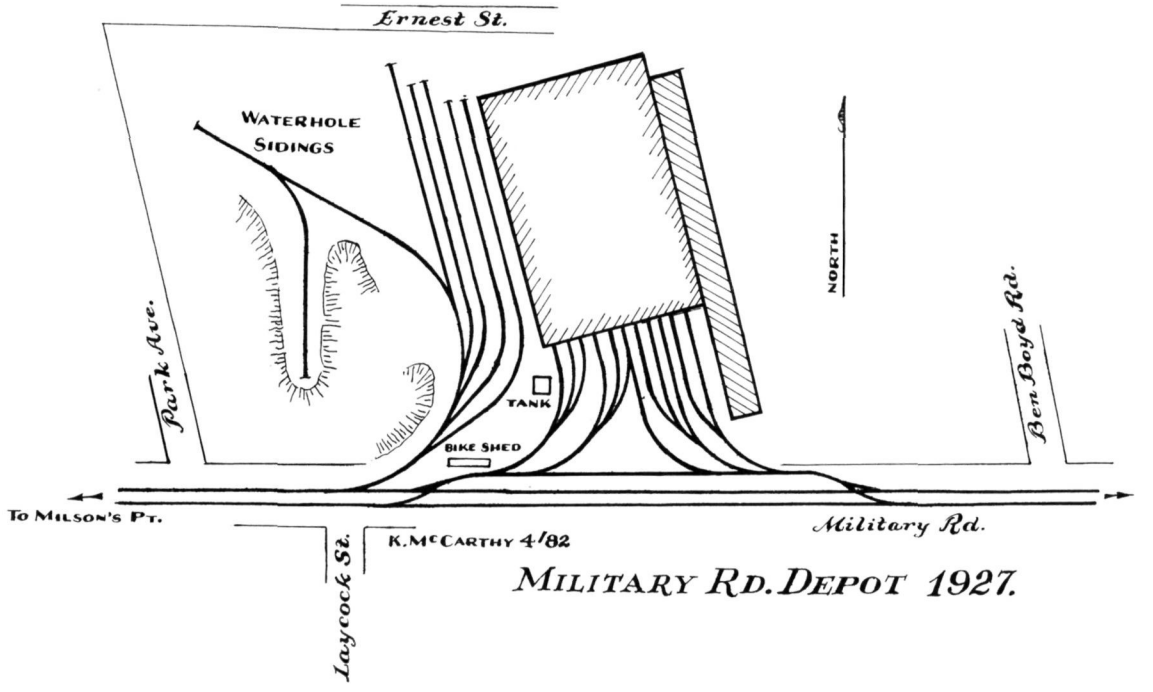
The Georges Heights tramway was commissioned as a shuttle operation from Spit Road Junction but from 29 September 1919 the service was altered to run from Mosman Wharf on weekdays. With the opening of the Balmoral Beach line during 1922 the outer end of the Georges Heights line remained to serve a military hospital and an otherwise sparsely settled area. On 17 December 1923 the Georges Heights tramway closed to regular operation. On the afternoon of Wednesday 9 April 1924 the route was hurriedly reopened to cater for crowds returning from vantage points after the arrival of the British Fleet. The Georges Heights tramway again reopened on Thursday 23 July 1925 to carry passengers to observe the arrival of the U.S. Fleet. The lifting of the track was completed on 12 October 1925 between Gordon Street on the Balmoral line and the military hospital terminus.[43]

### Unsuccessful Attempt to Separate Milson's Point Railway and Tramway Passengers

With the main tramway traffic now divided between two ferry interchanges at Milson's and McMahons Point and other routes serving jetties of Mosman, Cremorne and Neutral Bay, the next improvement was to separate the railway pas-




RIDGE ST. DEPOT 1908.




MILITARY RD. DEPOT 1927.

sengers from the Milson's Point tram terminus.

During November 1914 work commenced on the construction of two island railway platforms at Lavender Bay about 18 chains on the Hornsby side of Milson's Point station. The new platforms, overhead bridge and ferry wharf were brought into operation on 30 May 1915.

Train passengers disliked the new interchange arrangements, particularly as a large number of steps had to be negotiated between the platforms and the ferry. Incoming trains still drew ahead to the old Milson's Point station to reverse so many train passengers indulged in a confrontation action by refusing to alight at the new station. They remained in their seats until the tram terminus jetty could be reached. On 18 July 1915 regular services returned to the original Milson's Point station and the separate railway ferry service withdrawn.(44)

The two platform layout at the original Milson's Point station was severely overtaxed. Between 12 December 1920 and 24 March 1921 the terminus was rearranged by the removal of the loco release road and the provision of three dead end platforms.

With the acceptance of the Dorman Long tender for the construction of the Sydney Harbour Bridge the area around the Milson's Point ferry terminus had to be cleared. The site of the northern pylon was situated across the tram terminus approaches and the railway station dead end. The contract conditions stipulated that machining and fabrication of the bridge parts had to be undertaken by local labour, while the bridge workshops had to be located close to the bridge site and accessible to deep sea shipping. The area selected for the workshops was on the Milson's Point railway yard area between Lavender Bay and Milson's Point station.

### Ferry, Tramway and Railway Terminus Alterations

As outlined earlier, the Milson's Point vehicular ferry slips were transferred to new dual ramps at Jeffrey Street Kirribilli from Monday 20 July 1925. Later during that day some difficulty was experienced with the mechanism which raised and lowered the ramps and the ferries had to return to the old Milson's Point slips. This fault was rectified and the vehicular ferries returned permanently to Jeffrey Street on the following day.(45)

The railway and tramway traffic used the Milson's Point Arcade ferry wharf for the last time on 28 July 1924. On the following day trains terminated at the 1915 Lavender Bay station while the tramway was diverted from Alfred Street into Dind and Glen Streets to terminate above the Lavender Bay Station (known as Milson's Point). The unpleasant aspects of this railway terminus experienced in 1915 were avoided. The four railway platforms were reconstructed at their eastern ends so that three tracks became dead ends and passengers could join the ferry at the new wharf without climbing staircases.

Although the new tramway terminus was located high above the jetty and railway yards, three sets of escalators and a lift were installed and the two staircases need only be used in emergencies. These escalators eventually were transferred to Wynyard to link the western concourse with York Street.

### Electrification of North Shore Railway

Due to its semi-isolated nature, the North Shore railway was intended to be the first application of electric traction in the Sydney region. The Illawarra suburban line was the first to receive electric trains, however, in 1926 enabling the first section of the underground city section between Central station and St. James to be opened on 20 December 1926.(46)

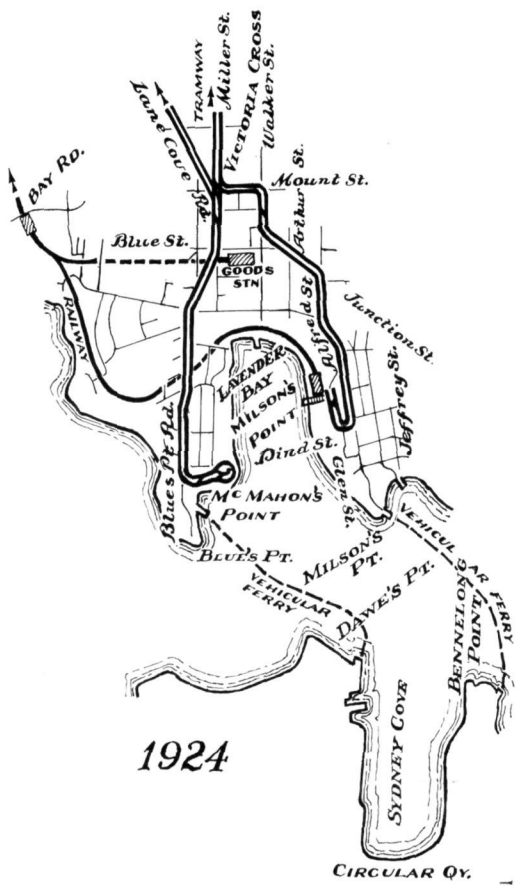
The North Shore railway had received clearance adjustments to allow the use of wide rolling stock designed for electric operation, but hauled by steam locomotive from January 1921. Not until 2 August 1927 was overhead and feeders ready for the first North Shore electric train trial. The first electric train set took up passenger operation on 15 August 1927 sandwiched amongst the regular steam services. Complete electric schedules were finally achieved on 15 July 1928. The Milson's Point to Hornsby electric train service remained electrically isolated from the Sydney services until December 1928 when the electrified link between Strathfield and Hornsby was completed.

### Harbour Bridge Construction

The first sod turning ceremony performed by Hon. R.T. Ball at the site of the new North Sydney station on Saturday 28 July 1923 was quickly followed by site preparation activity. The homes marked for demolition were offered for auction on Wednesday 1 August for the value of their retrievable material and the occupants were given one weeks notice to vacate the premises. The station site was cleared by December 1923 and eventually used as a goods terminus from 1925 pending the completion of the Harbour Bridge.(47)

On 5 January 1925 excavations commenced in the vicinity of the old Dawes Point Battery at the proposed site of the south side pylons and main arch bearings. Seventeen days later the first explosives were fired at this same location.(48)

The main activity at this time on the North Shore was the clearance of the former Milson's Point station area for the construction of the workshops. Some 65,000 cubic yards of rock and earth were brought down from the cliff sides in order to reclaim some land from the harbour which enabled three main work shops to be erected: the 580ft x 130ft light fabrication shop; a 540ft x 147ft heavy fabrication shop; a 200ft x 130ft template shop. A deep sea wharf was constructed beside the work-

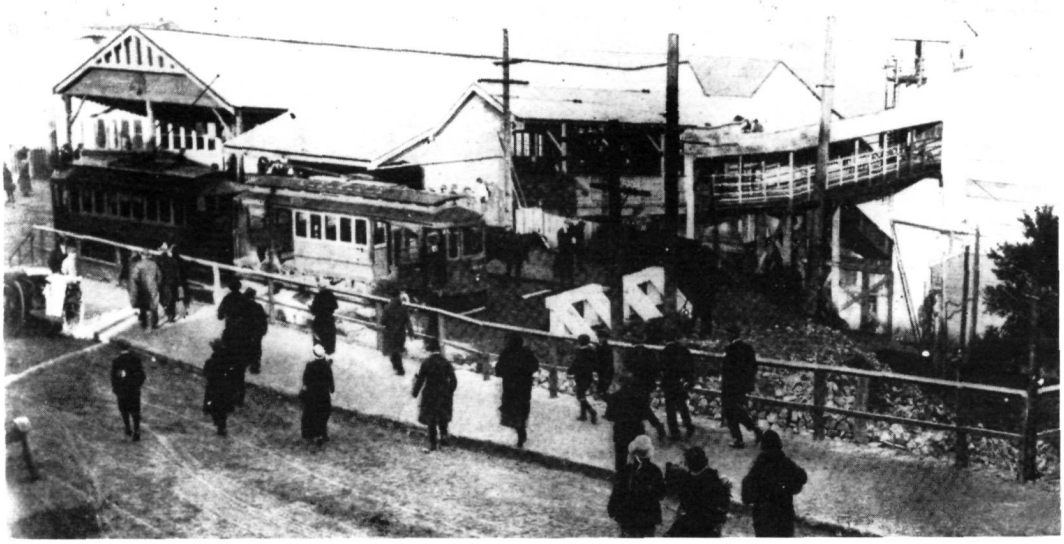



shops and a dock excavated into the workshop bay at the eastern end of the buildings so that barges could be manoeuvred under the travelling workshop crane for receiving bridge members.

Photos reveal at this stage improvements were still being made to the vehicular ferry service. Between late 1924 and mid 1925 the second ferry dock at Dawes Point was erected.

By 23 February 1925 the workshop site was reasonably clear. At the start of September the steel framework of the shops had been erected and a start made on cladding the structure. The cost of constructing these buildings and installing the machinery amounted to £500,000.(49)

On 26 March 1925 Hon. R.T. Ball, Minister for Railways and Public Works in the Fuller Government set the foundation stone of the bridge at the cleared site for the southern abutment and pylon. The Governor, Sir Dudley de Chair, the Premier Sir George Fuller, Dr. Bradfield, aldermen from both sides of the harbour, Directors of Dorman Long and Coy; Sir Arthur Dorman, Sir Hugh Bell and Mr. L. Ennis participated in the ceremony witnessed by over 2,000 people.(50)



*A coupled set of C and D cars stand at the relocated Milsons Point terminus. Escalators and a lift lead to the railway station and ferry wharf below the cliff.* - Evening News

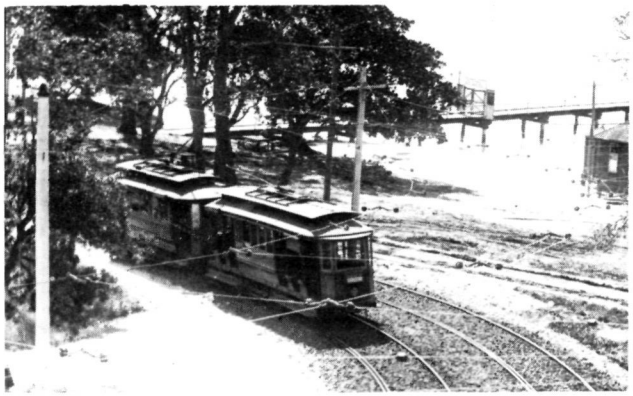
The main components of the bridge are:-

1. Approach roads, local street overbridges. Carried out by Public Works Department.
2. Approach spans, five on each shore, requiring 12,000 tons of steel. The southern most span is 238ft in length, the rest 174ft 6ins each.
3. Steel decking through pylon regions, 1,200 tons of steel.
4. Main arch, 28,000 tons of steel.
5. Droppers and decking between pylons, 9,000 tons.

Progressive dates which marked important stages in the construction of the bridge were:-

| Date | Stage of Progress |
|---|---|
| 28-10-1926 | First steel member of southern approach span placed on oregon falsework. |
| 5-1927 | South east main bearing placed in position. |
| 5-1928 | Southern side approach spans completed. Crib for creeper crane in place so that this crane could move onto arch members as they are assembled. |
| 26-10-1928 | First steel member of arch positioned on SW bearing. |
| 7-11-1928 | First steel member of arch positioned on SE bearing. |
| 2-1929 | South side first arch panels completed. |
| 6-1929 | North side approach spans completed. |
| 9-11-1929 | Six arch panels on south side almost completed. |
| 26-11-1929 | Record steel erection day. 578 tons lifted and fixed between 5am and 5pm. |
| 7-8-1930 | Bottom chords of arches completed. |
| 19-8-1930 | Cables holding two half arch sets finally let out enough to allow bottom chords to come into contact at 4.15pm. Bridge a 3 pin structure. |
| 10-9-1930 | Top arch chords completed, centre panel members connected, arch becomes two pin member. Centre road droppers then lifted and fixed to arch. |
| 11-1930 | Nine pairs of deck hangers in place, eight deck panels completed. |
| 6-1931 | Metal deck framework and plates completed. |
| 19-1-1932 | First steam locomotive on bridge No. Z1902. |
| 4-2-1932 | Load tests commenced using locomotives. |
| 11-2-1932 | Test of road lighting on bridge. |
| 20-2-1932 | Workshops being demolished. |
| 10-3-1932 | Tramway trials using cars 1106 and 1212. |
| 15-3-1932 | Minister for Works takes over bridge from contractors. Contractors must maintain bridge for six months. |
| 16-3-1932 | Children's Day on bridge. |
| 19-3-1932 | Bridge officially opened. |
| 20-3-1932 | Regular public access commenced, regular tram and train services, vehicular access. |

The ten approach spans were lifted onto oregon



*A coupled set of C and D cars approaches Balmoral Beach in the mid 1920s.*

framework by 25 ton capacity electric cranes and 7 ton standard gauge steam travelling cranes. When these 25 ton cranes finally moved forward to the pylon sites the main creeper cranes as well as the minor crane booms were lifted onto the cradles from which they could move onto and progressively up the main arch members.

The main crane on each creeper frame could lift 122 tons. As the crane frame moved up the arch the main crane could traverse across the frame. These cranes lifted the arch members from barges manoeuvred under the structure.

As the arch members were gradually assembled the two parts of the structure reached across the harbour. The shore ends of the arch halves were held back by cables looped in tunnels under the approaches. By the time the 7th panels were erected from each shore four batches of 128 cables each were attached to each of the four corner posts of the arches. Each cable was 2.76 inches in diameter made up with 217 wires each.

When 13½ panels had been erected from each shore the total pull on the cables amounted to 27,440 tons and the thrust on each of the four main bearings reached 17,660 tons.[51]

On 7 August 1930 a gap of 3ft 6ins existed between the arch members in the centre of the bridge. On 19 August 1930, at 11am, the task of slackening the cables had reached the stage where the gap between the arch halves had been reduced to approximately 4½ inches. By 4.15pm the guiding pins were home in the sockets and the arches closed. Contraction during the cool of that evening took the arches again apart but by 10pm the structure was united again.

On 8 September 1930 the top chords were completed and the two half arches jacked apart. This enabled machined packing pieces to be fitted in the spaces and two days later the final fastening of the centre members was completed and the structure became rigid on its two pairs of base bearings.

The last of the supporting cables were removed and the creeper cranes gradually moved back down the arches back to their starting points lifting the road hangers and decking members. When these cranes completed their tasks the 25 ton cranes dismantled the creepers while these smaller cranes in turn were taken apart by the 7 ton steam cranes.

*TO BE CONTINUED*

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# HERE AND THERE

## NEWS ITEMS OF INTEREST FROM ALL OVER

## NEWCASTLE ACTIVITIES.

Many readers have no doubt seen the model tramway layout displayed in recent years at model railway and other displays in Sydney, Wollongong and Newcastle. The layout depicts N.S.W. tramcars, mainly Newcastle LP types, operating in an environment suggesting the Newcastle scene. The display includes a video display of Newcastle and other city tramway scenes, while the operating tramcars are controlled from a reconstructed LP drivers cab bearing number 147.

When this display was operating in the Hunter Valley recently a spectator enquired from where the group had obtained the cabin of 147. When it was pointed out that it had been constructed from new materials, the person said that he had the genuine item and it was available for preservation!

The relic turned out to be LP 284 which has stood in a shed in the Hunter Valley since disposal with 171. No. 171 was sold on 16 July 1951 and could be seen from the New England Highway until 1959. No. 284 followed on 1 August 1951 but was not placed in an exposed position!

The group plan to retrieve the tramcar and it may be housed in the old brick goods shed at Wallsend station. "It never rains but it pours" . . . . in November 1981 an old house was demolished near the Minmi Road on the outskirts of Wallsend to make way for the subdivision of the Marylands Estate. This revealed the body of a C2 type steam tram trailer. Although the side panels were in poor condition the floor, chassis and roof proved to be reasonable. A local initiative scheme planned to have this taken to the Wallsend good shed as well, but by late March 1982 the tramcar was still standing at Marylands. Clear identification has not been possible although the figure "8" could be detected in the middle of the centre side panel. It is possible that the vehicle was 38B (2nd); ex 27, which was sold from Newcastle depot in August 1935.

Two options are opened for this trailer. It may be restored in Newcastle, although the group's time will be fully occupied with LP 284, or it may be taken by the Steam Tram Preservation Society for spare parts.

Not so happy is the report on other Newcastle N.S.W. activities. A report on the preservation of the body of LP 327, R 1884 and ex Melbourne "W3" 668 (in working order) appeared in this magazine in October 1978. During 1980 these three tramcars were transferred from Tighes Hill and the Walka Water Works at Maitland to Richmond Main Colliery yard near Kurri, together with the collection of buses. In addition a separate group has transferred the O-4-OST standard gauge saddle tank loco *Marjorie* (Clyde 462 of 1938) from static display at Edgeworth (Young Wallsend) to covered store at Richmond Main where restoration to running order can commence. Some work has been carried out by the railway group, but when the collection was viewed in January the tramcars and buses formed a very sorry vista standing in the open at the colliery.

Although given time and money no restoration project is impossible, it would now seem that LP 327 could be judged as being beyond retrieval, while W3 668, which was received in running condition, is sadly in need of attention.

It is certainly hoped that the new group which plans to restore LP 284 succeeds . . . . . but the Newcastle district, which supports a population of over half a million people, certainly does not have a good track record to

date in this field. Hopefully the corner has been turned and some progress can be anticipated in the near future.

Since the foregoing was written the new Newcastle preservation group has been registered as Newcastle Tramway Museum and has made considerable progress in the collection of items for preservation and restoration.

The first tramcar to arrive in Newcastle for this museum is former Brisbane Phoenix car 550. This car was built after the Paddington Depot fire in 1963/4 and arrived in Sydney, without bogies, on 5 May 1969 after the closure of the Brisbane tramway system. The tramcar was delivered to the Allambie Heights school as a play room, a project sponsored by the French's Forest Lions Club. The car was transported south from Brisbane on the E & A Coy ship *Arakawa*, all wharfage, handling and transportation costs being waivered.

Considering its exposed position the tramcar has been well maintained in the intervening 13 years. The vehicle was lifted onto a low loader trailer on 29 March 1982 and stored overnight at the former Dowling Street Depot in Sydney. The next day Brambles Transport Industries delivered the body to Newcastle.

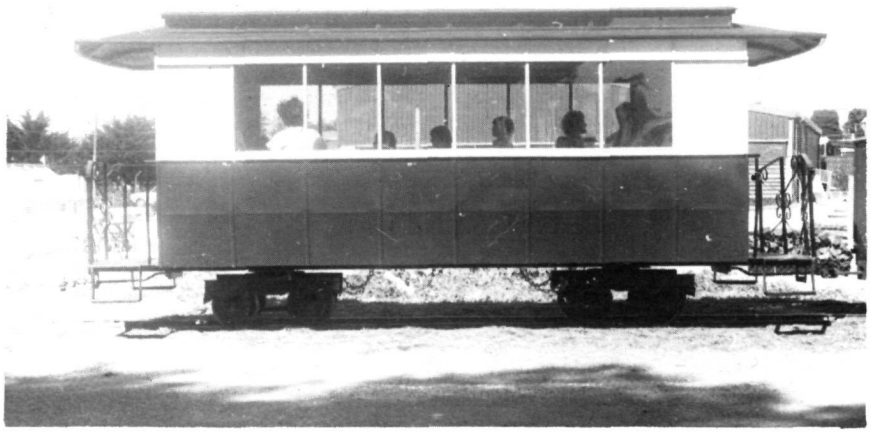
The report prepared for the Newcastle City Council and released on 7 November 1950 by the Sydney Branch of the AETA recommended, amongst other aspects, the reopening of some tram routes and the use of tramcars, built locally, to the Brisbane four motor car design. Thus, after 32 years, one of these vehicles has arrived in that city!

As well as 284 and 550 the body of Sydney LP 337 has been obtained and a complete W2 from Melbourne is being negotiated for.

Two operating sites are available to this Museum group. The one which has present priority is at Wallsend. The former Wallsend goods shed in the now cleared station yard has been secured as the initial depot and workshop and Newcastle Council is considering the use of the former railway roadbed between Low Street at the foot of Newcastle Road and Lake Road, a distance of approximately half a mile, for tramway operation. This right of way is adjacent to, and parallel with the outer end of the former NSWGT Wallsend and Plattsburg tramway. The scheme would be an important part of a shopping Mall scheme being considered for Wallsend, the tramway linking one end of the shopping thoroughfare with scattered car parks.

Further expansion would be possible if the project succeeds. Southwards, beyond Lake Road the museum tramway could gain the reserved track roadbed of the Speers Point/ West Wallsend tramway, abandoned after May

*Brisbane 550 arrives at Dowling Street Depot for an overnight stay enroute between Allambie Heights and Newcastle. 29 March 1982.* - R.Phemister



*The new all steel replica cable car trailer in use on the 2ft gauge railway at Goulburn.*

Day 1932, and a further expansion of 2 miles to Brush Creek Junction near Young Wallsend (Edgeworth) would be possible!

The Museum group has been guaranteed help from local industrial undertakings, while it would seem that the scheme is viewed favourably by the Newcastle City Council as well as the adjacent Lake Macquarie Shire. The B.H.P. Steelworks has promised the donation of enough rail for the initial tramway through Wallsend so the establishment of this project, which is not associated in any way with any other similar local schemes, is well advanced and the prospect of further progress is assured.

## GOULBURN STEAM MUSEUM.

The only remaining steam loco at the Goulburn Museum, O-6-OT engine *Stella* (Krauss 3423 of 1896) returned to service on 1 June 1980 after a major boiler overhaul. This was observed in traffic during September 1981 hauling the museum's new passenger car, a bogie end loading saloon car. This vehicle is mounted on 2ft gauge bogies and is a steel version of the Melbourne four wheel cable trailer cars. Although the car side has room for eight windows, only six are glazed, the corner positions being covered with panels. The roof is ribbed with steel square sectioned tubes curved in an identical pattern to the wooden ribs of the cable cars.

Former M&MTB cable trailer 110 is now standing disused, in very poor condition, at the museum.

## CABLE TRAILER 131.

Acting on accumulated evidence, SPER members John Shoebridge and Ken McCarthy inspected former Melbourne cable tram trailers 110 and 131, on wheels at Rushworth Vic. in June 1968 where they had stood for the previous 40 years. As the established tramway museums were hard pressed at the time with other projects the location of these two vehicles was passed on in 1969 to Mr. B. MacDonald, the then manager of the Marsden Museum at Goulburn (now Goulburn Steam Museum). The story of the retrieval of 110 and its restoration at Goulburn by the local Jaycee club has been documented in this magazine. (Oct 1970, Aug. 1971, Apr. 1971). By September 1979 110 was still in service but in a pitiful condition.

The Goulburn Museum did not take delivery of 131, but the Lachlan Village Museum at Forbes obtained the tramcar for future use as a passenger car on their 2ft gauge museum railway at the Vintage Village.

This relic was observed at Forbes in May 1976 in a very poor condition and circa 1979 it was sold and appeared at Luddenham with the remains of a 2ft gauge former Tasmanian Government Railways G class 0-4-2 Sharp Stewart loco. By December 1980 the cable car had collapsed into a rotting heap and it disappeared during late 1981.

The tragedy in the saga of these two cars is that Mr Coyle of Rushworth, their previous owner, carried out basic maintenance on both vehicles when they stood in his backyard for forty years. In the short space of ten years, in

the hands of groups which are established with the purpose of preserving our heritage, both vehicles have possibly passed beyond the stage of being saved.

Back in December 1964 the present writer prepared an editorial comment in that issue of *Trolley Wire* entitled "Junkman Spare That Tram". This comment was reprinted in several overseas magazines of kindred museum organisations. It is a pity that car 131 has followed the course which was the subject of the warning contained in our editorial almost 20 years ago!

# THE SYDNEY SCENE

## *Transport News from the Sydney Region*

## SYDNEY HARBOUR BRIDGE CELEBRATIONS.

The 50th anniversary of the opening of the Sydney Harbour Bridge was celebrated with various functions and displays from Monday 15 to Sunday 21 March 1982.

The major celebrations were on Saturday 20 and Sunday 21. A transport display was organised on the former bridge approach tramway right of way at North Sydney (now a car park) with well known former North Sydney K car 1296 as the centre piece supported by some early trucks and various buses, including, on Saturday, UTA Mercedes articulated 2550. The SRA had a photographic display on the concourse of North Sydney station and this was joined by the XPT and the Railway Institute Band on platform 2 on Sunday.

Eighteen double and single deck buses from the BCSV, HCVA, HTMM, STM, UTA and Top Deck Travel provided a free service over the bridge between North Sydney and Wynyard

*K 1296 and road vehicles on display at North Sydney while the XPT shunts into no. 2 platform of North Sydney station. Sunday 21 March 1982.*

stations from 9am to 5pm on Sunday. The ARHS ran a suburban single deck electric train tour on Saturday which went to Bondi Junction then across the bridge to North Sydney car sidings while a shuttle service ran between Ashfield and Chatswood using single, W and double deck stock on Sunday. This service and the break in the free bus service was occassioned by the major event of the celebrations – the closing of the bridge roadway to all traffic, except emergency vehicles, between 10am and 3pm and its opening to the public to walk across between 11am and 2pm.

Proposed by the Minister for Roads, Paul Whelan, and surprisingly agreed to by Police and other authorities, the walk across the bridge attracted between 100,000 and 500,000 people, despite rain storms, depending on whose estimate is taken, although from observation the latter figure would be closer to the mark. The two western lanes next to the railway were barricaded off to provide access for emergency vehicles. Only a very heavy down pour enabled police to clear the roadway which was re-opened at 3.20pm.

A procession of veteran and vintage vehicles, including four buses –AEC dd 1286, Albion dd 1615, Melbourne Leyland half cab 370 and Mercedes articulated 2550, crossed the bridge starting from Millers Point at 2pm. As the roadway was not cleared the emergency lanes were used.

During the bridge closure some free bus trips were operated between North Sydney and Crows Nest and between Wynyard and Walsh Bay.

# ROYAL EASTER SHOW.

The SRA and UTA mounted a comprehensive display at the Sydney Royal Easter Show from 2 to 13 April 1982. Once again rollingstock was displayed outside the Manufacturers Pavilion. Steam was represented by a replica of Stephenson's Rocket which was built for the Liverpool and Manchester Railway 150 years celebrations in 1980 together with a replica LMR passenger car built in 1930, which before the Show opened operated on a temporary track in Hyde Park (Sydney, that is, although a similar operation had taken place in Hyde Park, London). These vehicles were on a short piece of track which was as 90° to a longer track on which stood an XPT power car and trailer (XP2004 and XF2206) and 0 class tramcar 1111, behind which Mercedes articulated bus 2550 was positioned to effectively show the articulation.

# WYONG ELECTRIFICATION

After some weeks of trial running with interurbans and locomotives, both 46 and 85 classes, the belated extension of the electrification from Gosford 50½, miles from Sydney on the main northern line and the end of the wires since 23 January 1960, over the 12½ miles to Wyong was officially opened by the N.S.W. Premier, Neville Wran, on Saturday 3 April 1982. This is the first stage of electrification from Gosford to Newcastle and beyond.

The Official party travelled from Sydney to Wyong in a six car double deck interurban arriving at 3.45 pm. An eight car dd interurban followed from Gosford and operated a return trip from Wyong for the public. The official train left for Sydney at 5.15pm.

Wyong now has an improved, but still irregular, service comprised of through electric services, a few shuttle trips from Gosford, some through trains to Newcastle and beyond and Newcastle and beyond connecting services which still run from Gosford.

The northern electric line has always seen major diesel usage on through services and this continues; locomotives still change at Gosford when necessary and interurban stabling also remains there. Eveleigh based drivers leave Wyong trains at Gosford which are then worked out and back by Broadmeadow drivers and then return to Sydney with Eveleigh drivers.


*Headboard on the Sydney end of the Official Train at Wyong. 3.4.82.* - D.Gash

# ★ Museum Notes and News

## Tramway Museum Society of Victoria

## HUDSON PARK HORSE TRAMWAY OPENED

The Victorian Minister of Tourism, Mr. Graeme Weiderman officially opened the Hudson Park tramway on the afternoon of Sunday 7 March 1982, but not before saying to the gathering that he saw considerable merit in the long range plan to establish an electrified tourist tramway between Bylands and Hudson Park.

Standing on the rear platform of the zoo replica car no. 253, Mr. Weiderman said he considered the ambitious proposal to link up the Bylands Museum and Hudson Park Kilmore as a wonderful facility for Kilmore and would attract many more people from Melbourne as visitors at weekends. He also stressed the value of tourism to country centres and was sure that the Society's efforts in preserving the historic tramcars would be remembered for many generations to come.

The Shire President, Cr. Allan Knight extended a welcome to Mr. and Mrs. Weiderman, TMSV President Hamish Haugh, Member for Gisborne Tom Reynolds, Goulburn Regional Tourist Authority Directoe Llew Fernando and all other persons in attendance. Cr Knight said that the occasion culminated considerable voluntary effort and praised TMSV members, Kilmore Apexians and Shire staff for their contributions, he also said the horse drawn tram helped upgrade the facilities in Hudson Park by providing a unique attraction.

The TMSV President praised the Council for its foresight in encouraging the Hudson Park tramway as a rather unique and worthwile project.

Mr. Weiderman said there were many cities in the world which had tramcars and he considered Melbourne must be the most known; he went on to say that 'Tourism' had become the magic word of the 1980s and pointed out that Victoria had a £1000 million tourism industry employing 35,000 people. He then turned his attention to the local project commending the horse tramway and link up proposal for the future and congratulated the Tourist Authority, the Shire and the TMSV on their initiative.

The Minister then declared the tramway open, giving an assurance that all his Department's promotional expertise would be used to advise tourists of its existence. Mr. Weiderman, Cr. Knight and Mr. Haugh then boarded the tram together with many others for the first official trip. The car set off at a brisk pace with Len Millar behind the reins, along the 200 yard line and back to the shed were car 256 was inside. The Minister and various guests then joined a most enjoyable informal luncheon at the Kilmore Civic Centre.

Prior to reaching Hudson Park Mr. Weiderman was taken on a tour of inspection of part of the Kilmore Shire beginning with the Bylands Tramway Museum. The opening provided an opportunity for TMSV and Shire representatives to lobby the Minister in regard to State Government assistance for projects in the area; in particular financial assistance towards the future link-up proposal.

*General view of the Hudson Park depot area as car 253 prepares to make the second outward journey after the official opening.* 7.3.82. - William F. Scott

# ALBION PARK . . .

## Illawarra Light Railway Museum Society

### TENTH ANNIVERSARY

On Saturday 27 February 1982 the Illawarra Light Railway Museum Society held a special running and Members day to mark the 10th anniversary of the founding of the Society. From noon to 3pm free rides were provided for the public. After that time rides were provided for members and their families with run pasts of rollingstock items which only leave the compound on special occasions.

Couplings and draw gear had been fitted to the Queensland rail motor trailer P 119 during the previous week and this large vehicle made its maiden passenger run during the afternoon. Saloon car 2 also made several trips loaded to capacity with about 20 passengers.

During the evening about 40 members and their families celebrated over a picnic barbecue meal while a party of invited guests, including the Mayor of Shellharbour, Alderman R.Harrison and the society honorary solicitor, and their families dined with the museum committee members using car P 119 as a restaurant vehicle.

### TRACK EXTENSIONS

With the lease extension formalities completed, work is now pressing on with the main line circuit. By 27 February the nortwest rail head had been extended across a culvert and the fire trail into the bush area of the ILRMS northern boundary. During the week ending 26 March the blue metal road bed had been tipped along almost 200 metres of the northern part of the circuit and all but 30 metres had been graded.

A further 75 metres of road bed from the northeast railhead across a small swamp still has to be prepared. The museum committee hopes that the final 275 metres of track will be completed prior to the end of this year enabling the circle of 650 metres to be used for passenger operation. A further 500 metres of track make up the main station passing loop, the Croom Road delivery siding and the compound sidings. The load of 42½lb rail from the QR Millmerran branch arrived at Albion Park on 15 October 1981. This plant is being used on the main line circuit while the excess, as well as similar weight rail received recently from local collieries, will be used to relay the lighter Croom Road track.

### RAILWAY OPERATION

The museum opened for public operation every Sunday between 27 December and 31 January during the summer tourist season. In spite of some wet weather occasions, approximately 2500 visitors took steam rides on the six operation days. The passing loop at Yallah station was brought into use on 27 December while the northeast rail head was extended almost 30 metres on 23 January.

### NEW VERTICAL BOILER

During the first week in February the large standard gauge Brown Hoist steam crane was cut up for scrap at the AIS plant at Port Kembla. On 25 February the large vertical boiler, tanks and fittings from this crane arrived at the Albion Park museum. The boiler is now being overhauled and will replace the smaller vertical one at present used to supply steam to the stationary engines. The Steel Works management is thanked for making these items available to the museum for preservation.

### PRESERVATION–RESTORATION PROGRESS

During late September 1981 the external repainting of 0–6–0T standard gauge loco 'South Bulli No.2' (Hudswell Clarke 297 of 1888) was completed. By the end of March the Corrimal Coal Coy standard gauge coal hopper had been lettered as its restoration neared completion. This work on the hopper has been carried out by member Allen Watson. Work has commenced on preparing the AIS CHG type brake van for repainting. This was last painted during 1977.

During January steel plate end aprons were fitted to saloon car 2 and during March the fitting of new timber slats to the interior longitudinal seats was almost completed.

The second of a pair of new low height 2ft gauge bogies for QR rail motor trailer P 119 is nearing completion. In addition to the fitting of draw gear, four sets of side running boards were fitted to this vehicle in time for the 10th anniversary running day.

The restoration of Yallah station was also completed in time for 27 February 1982. During January a new ceiling was fitted in the main waiting room section, while the interior and outside walls were repainted.

Work is progressing on the restoration of the three items of rollingstock which once worked on the explosives railway at Dry Creek South Australia. The iron work which controls the braking is being repainted and will soon be refitted to the vehicles.

The vintage floor pedestal drilling machine obtained from the old PWD powerhouse at Port Kembla in 1981 has been overhauled and is now giving useful service in the rollingstock restoration programme. A large shaper was received earlier this year and is a welcome addition to the Society's growing range of heavy duty machinery.