South Australian Heritage Act 1978-80

HERITAGE SURVEY ITEM IDENTIFICATION SHEET

HERITAGE SURVEY REGION 5

Item Ref. No. 92

ITEM NAME: Road Bridge

Former or other Murray Bridge

Office Use
ITEM No.
DOCKET No.

HERITAGE SIGNIFICANCE

This impressive iron girder bridge is one of the single most significant heritage items in the State as well as in the riverlands region. When it was opened in 1879 it was the first bridge built across the River Murray in South Australia, providing an essential link with the eastern colonies. This role was reinforced when the intercolonial railway was completed between Adelaide and Melbourne in 1886 and the bridge was used for both road and rail traffic until 1925.

The brass plate on the corner stone, which was laid by Governor Musgrave in November, 1873, includes the names of H.E. Bright, the Commissioner of Public Works and H.C. Mais, Engineer-in-Chief.

The tiny settlement of Edwards Crossing sprang to life with the construction of the bridge (1873 to 1879) and it was subsequently called Murray Bridge.

Easton Amos and Anderson of London supplied the bridge. Ironwork was made by Kinnard Brothers of South Wales and Hawkes Crawshap and Co. of Gateshead, England and was landed in South Australia in 1868.

LOCATION
Address Princes Highway
Town Murray Bridge
Postcode
Section
Hundred Mobilong
County
L.G.A. Murray Bridge
S.H.P. Region 5
A.M.G. Ref.

SUBJECT
4.7

PERIOD
State

Study Area
1853-1880

REFERENCES

Australian Heritage Engineering Record S25
H.W. Jones in Highway Oct. 1969, pp. 8-11
Dix, Murray Bridge 1924-1974
Heritage Unit,"Murray Bridge" (Notes on South Australiana 5)
National Trust 2656
South Australian Parliamentary Papers 79-1877, 160-1867
Sladden, Our Town and District, pp. 33-39
Ansell, "Bridges", Railways Institute Magazine Jan-Feb 1972

TYPE OF ITEM
LAND Natural feature ☐
Historical site ☐
Historical Gdn. ☐
BUILDING ☐
STRUCTURE ☒
PHYSICAL CONDITION

PHOTOGRAPH Film No. 772 Negative No. 9
Direction of view to E

STATUS
Reg. of State Her. Items
Reg. ☒ Interim L. ☐
Nominated ☐
National Estate
Reg. ☐ Proposed L. ☐
National Trust
CL ☒ RL ☐ File ☐
Other
SA Highways Dept.
Inst. of Engineers

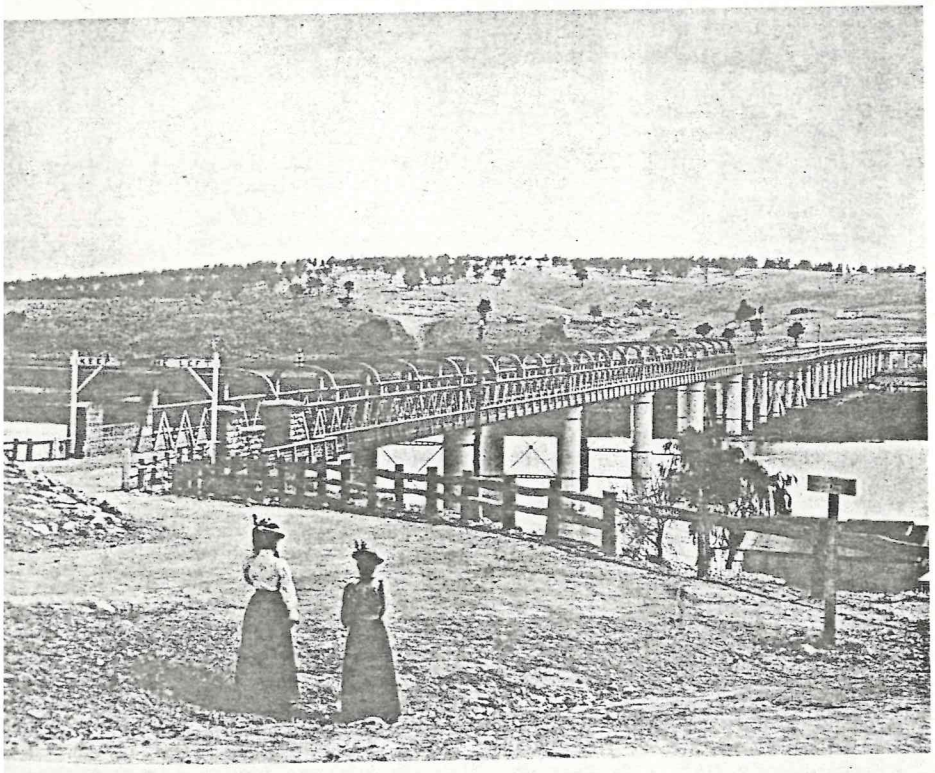
RECOMMENDATION
(A) State ☒ (B) Local ☐

PREPARED BY
HERITAGE INVESTIGATIONS

Date: 1983

IIS/D4/25.11.81

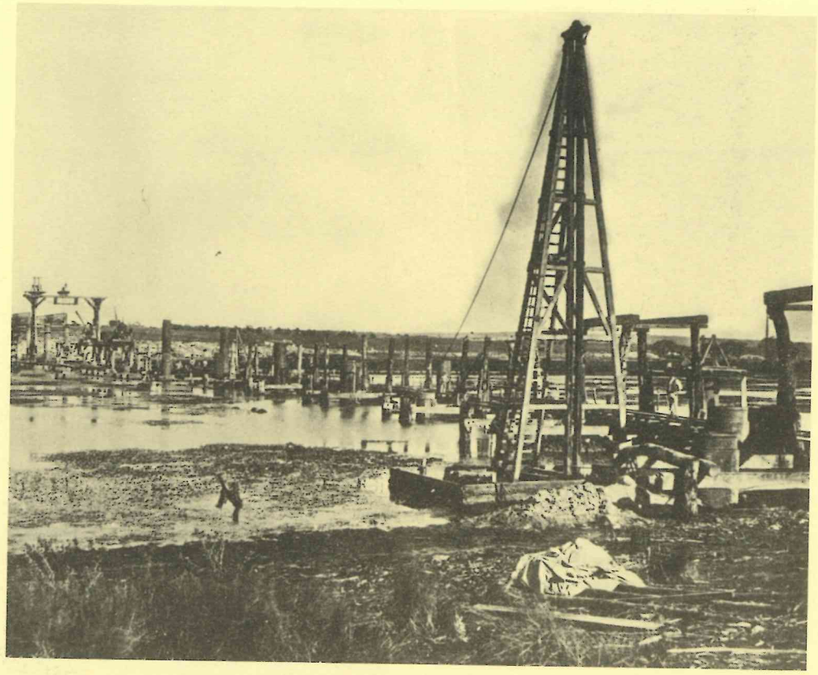
6727-10287
Road Bridge over
River Murray
Murray Bridge



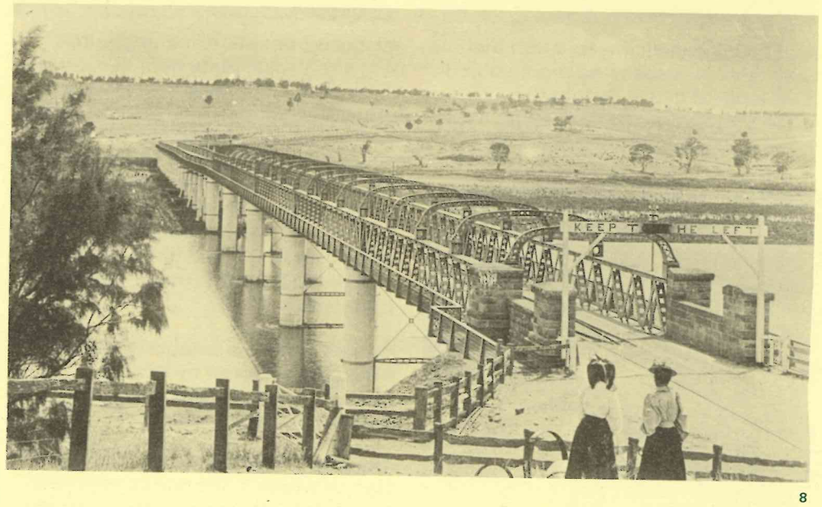
In 1864 it was thought desirable that South Australia should have a bridge across the River Murray, and in a burst of enterprise the ironwork was obtained from England in 1867. Then came the reaction. It was said that to spend money on erecting a bridge was an extravagance, and the materials lay rusting for another four years. But eventually the foundation stone was laid in 1873, and the first bridge across the River Murray in South Australia was opened in 1879—just fifteen years after the initial planning. These photographs show workmen on the bridge during the course of its construction, and the completed Murray Bridge. It carried a roadway for horse-drawn traffic and pedestrians. The railway across the bridge was not laid down until 1886.

ILLUSTRATIONS

1. Underside view of Murray Bridge, 1979.
2. Northern aspect, from the west bank, 1979.
3. Bridge under construction circa 1874. Note pontoons and stagework for the construction of the number 2 span.
4. Commemorative photograph taken at completion of the bridge, circa 1878. Note steam-operated crane in distance, for use on the construction of the eastern causeway.
5. Southern side of causeway from the east bank, 1979.
6. Causeway under construction, circa 1878. Note track for steam crane under wooden formwork.
7. Causeway under construction, circa 1878.
8. Murray Bridge, circa 1896.



7



8

Department of Environment and Planning
G.P.O. Box 667
ADELAIDE 5001

D. J. Woolman, Government Printer, South Australia

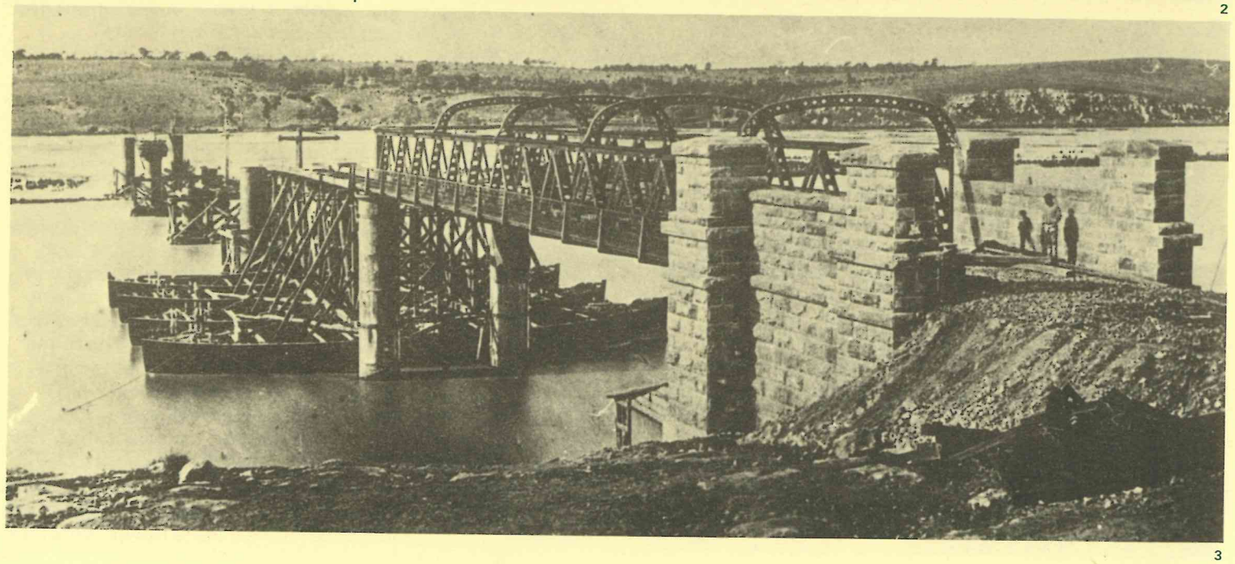
3773F

DEPARTMENT OF ENVIRONMENT AND PLANNING
SOUTH AUSTRALIA

MURRAY BRIDGE

1

2



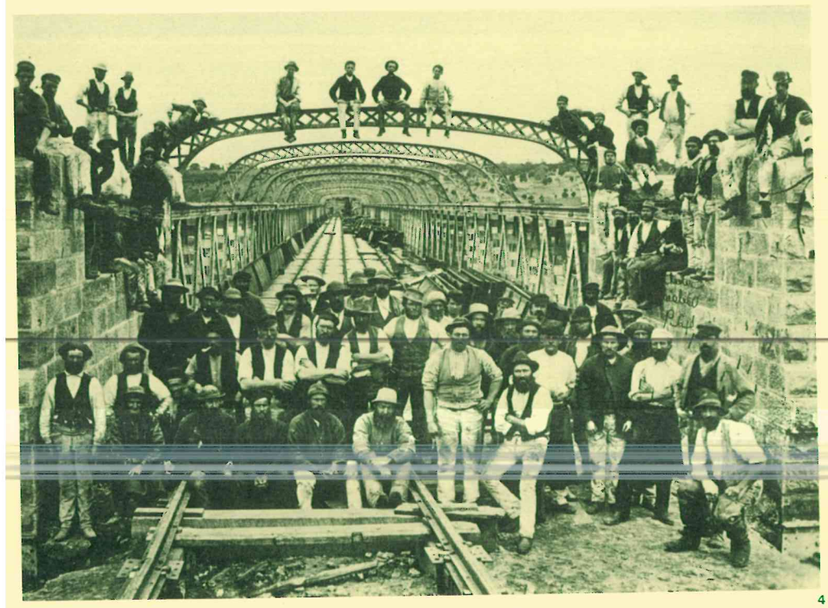
3

Murray Bridge, originally known as "The Bridge at Edwards' Crossing", represented an important landmark in South Australian history as it provided the first permanent crossing over the River Murray to link the State with its eastern neighbours.

A Select Committee of the House of Assembly was appointed in 1864 to report on suitable sites over the River Murray for the construction of a bridge to cost no more than £20,000. Four sites were proposed, viz. Edward's, Mason's, Thompson's and Wellington's Crossings.

In 1865 W. Hanson, the Engineer and Architect for the Province, was instructed by the Government to write to Mr. Dempsey, the consulting engineer, of Great Georges St., Westminster, London, to obtain estimates for the construction of iron bridges at the four proposed sites. Site profiles indicating the width and depth of the river accompanied Hanson's letter; however, no details of river bed soil formations were included.

Dempsey's reply was prompt and included an offer from the firm of Easton, Amos & Anderson of London to supply a suitable Warren Girder bridge on cylindrical cast-iron piers for construction at Edwards' Crossing for £7,500 before shipping. The offer was accepted and on 26th July Hanson forwarded an indent to the Agent-General in London for £9,500 to cover the cost of purchasing and landing the bridge in South Australia. H.C. Mais, the Engineer-in-Chief, discovered in August 1867 that no levels or bores had been obtained, and so, despite the pending shipment of bridge material, plans for its eventual construction could not proceed. Parliament approved Mais' request for an engineer to obtain this data; however no work was carried out when it was discovered that the eventual cost of the bridge would be £17,164, a figure greatly in excess of the £9,500 predicted. The ironwork was stacked at Dry Creek for five years while Parliament debated what should be done.



4

Construction was commenced in 1873 and Allen Bros. of Nairne was paid £1,000 to transport the bridge components to Edwards' Crossing. The foundation stone, a 4 ton block of local granite, was laid by Governor Musgrave on 7th November, 1873. Under the supervision of Mr. F. George the first span was erected and some pontoons prepared for the erection of the remaining spans. Mr. H. Parker arrived from England in 1874 and supervised the construction of the remainder of the bridge.

Sinking the cylinders met with major difficulties because of the great depth required to penetrate the river formations until granite bed rock was encountered. The cylinders for Pier No. 3, for example, extend 119 feet below girders before reaching bed rock.

In 1874 it was decided to make the bridge carry a railway line, a contingency not considered in the original design which had specified that the bridge was for the conveyance of cattle and sheep and ordinary road traffic. A causeway had been planned for the eastern approach, but this had to be abandoned in favour of a wrought and cast-iron viaduct. The viaduct approach (which forms part of the bridge proper) made the bridge the largest such structure in both Australia and New Zealand, the length of the viaduct alone being 1,300 feet.

The bridge has five spans measuring 121 feet 6 inches each; each span is composed of two wrought iron double Warren trussed girders of nine feet depth on cross-girders built up out of flat plate and angle iron. The decking was Mallet patent buckle plates with a tread of compacted metal. The main girders rest on masonry bed stones which are supported by the mass concrete with which the cast-iron cylinders were filled after sinking. The cylinders are of 7 feet internal diameter and 1¼ inch wall thickness fitted together in segments and bolted together as they were lowered into the river bed. The great depth of the piers necessitated the use of heavier bracing than that originally provided: castings for the new bracings (each weighing 89 tons) were fabricated by James Martin & Co. of Gawler.

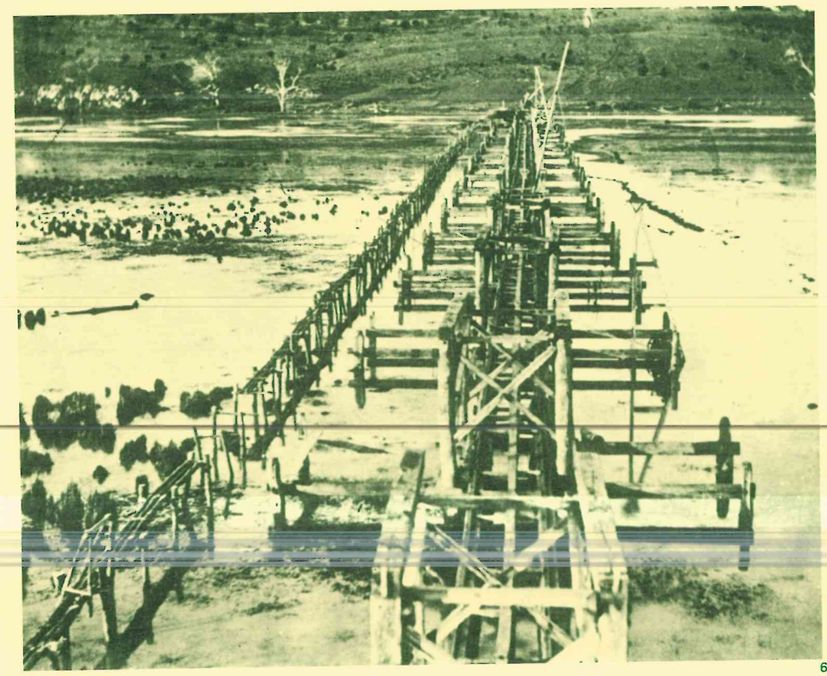
The girders, previously assembled on floating stages, were lowered and fixed to the bed plates when the pontoons were flooded. The pontoons were then removed and located under the next span until all spans were in position.

Ironwork for the river spans was fabricated at the Crumlin Viaduct Works, South Wales, Great Britain.

The eastern approach viaduct is composed of 23 spans of 60 feet each, the superstructure being constructed of Warren girders 180 feet in length continuous over every 3 spans. The girders are seven feet deep and sit on cast-iron cylinders of three feet six

5

inches internal diameter and 1 inch wall thickness socketed together in 6 foot lengths and sunk into the river-side swamp to an average depth of 60 ft. Cross-girders consist of one section of flat plate and angle-iron with the buckle plate floor secured to them by suitable bearers. The main girders were lifted into position using a "Goliath"—a kind of steam crane which ran on rails. The construction of the bridge took 12 months longer than originally predicted due chiefly to the difficulty of transporting the additional 2,560 tons of viaduct ironwork to the site and to the difficulty of sinking the cylinders.



6

Iron-work for the eastern approach was manufactured by Hawkes, Crawshay, Gateshead & Co., New Castle-on-Tyne, England.

The total length of the bridge is 1,980 feet, of which 1,375 feet constitutes the eastern approach. The total weight of wrought iron used is 1,936 tons, the total weight of cast-iron being 2,191 tons making 4,127 tons of iron altogether. The final cost was £124,000 or approximately £30 per ton including land and sea transportation. It was the cheapest bridge for its size to have been erected in Australia and New Zealand at that time.

The bridge was opened to traffic on 26th March, 1879.

that contained in the indent and estimate forwarded from the colony in 1865, both of which were based upon the offer of Messrs. Easton, Amos & Anderson to construct the bridge in England, to fit the cross section of the river bed, for the sum of £7,500; but prior to the order for the eastern approach being forwarded to England, borings were taken (vide Parliamentary Paper No. 79 of 1877) and designs and estimates obtained for Mr. Dempsey of the cost of the approaches, and on receipt of this information, an indent and full instructions were forwarded to the consulting engineer, by whom the working drawings were made, and under whose supervision the contract for the construction of the iron work has been carried out.

9/12/77.

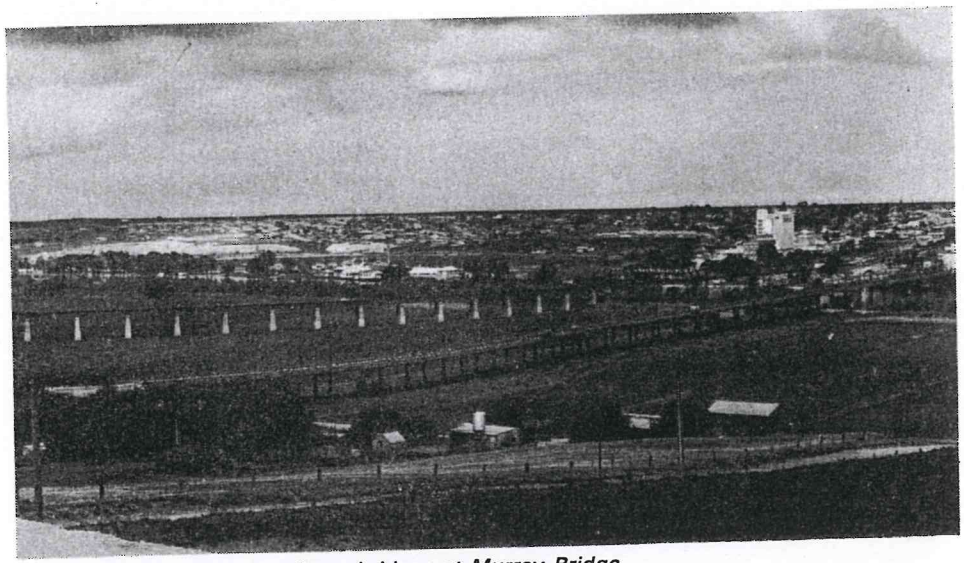
H. C. MAIS, Engineer-in-Chief."

Despite these trials and tribulations the bridge was opened on 26th March, 1879, and cost £130,000. In terms of present day money this is equivalent to about $1.5 million. The bridge was used as a road bridge until 1886 when the railway to Serviceton was opened and it then carried both rail and road traffic. With the railway lines located in the centre of the roadway, road traffic had to be stopped from using the bridge during the passage of a train!

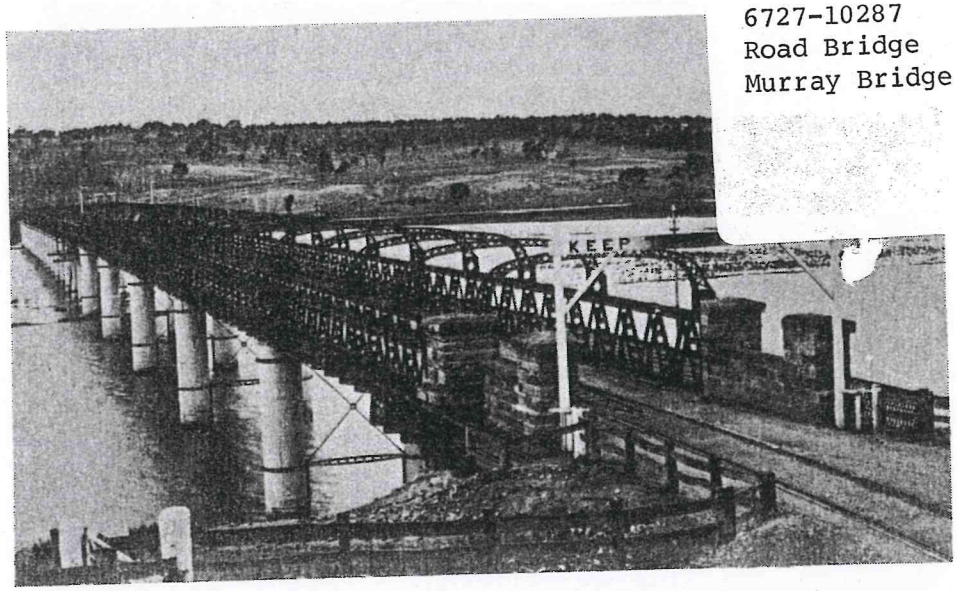
Shortly after trains started using the bridge, trouble due to the settlement of the piers of the spans across the swamps was experienced. This was overcome by packing under the truss bearings as well as additional pieces in the iron cylindrical piers to take up the settlement and by grillages placed around some of the piers to increase the bearing area to prevent further settlement. These measures were successful. With the introduction of much heavier rolling stock by the South Australian Railways in 1925, a new railway bridge was constructed and the old bridge reverted to its original role of a road bridge.

It is still serving this function.

This article was published in the October 1969 issue of the Highways Department's magazine "HIGHWAY"—author, Mr. H. W. Jones, a former Engineer of the Highways Department.



A view of the road and railway bridges at Murray Bridge.



BRIDGE CENTENARY

On 26th March, 1979 the road bridge at Murray Bridge will be 100 years old.

The Institution of Engineers, Australia, South Australian Division, in its August 1969 bulletin published a very interesting item concerning the highway bridge at Murray Bridge.

The "Memorandum" which was prepared by the then Engineer-in-Chief and was dated 9th December, 1877 is reproduced below:

"Memorandum to accompany the Correspondence in connection with the History of the Murray Bridge:—

Parliamentary Paper No. 148 of 1864, contains the Report of the Select Committee of House of Assembly appointed to report on Murray River Crossings, recommending that 'if a suitable bridge can be erected at a cost not exceeding £20,000, the required amount should be included in the Estimates for next year".

In July 1865, Mr. Hanson, the late Engineer and Architect for the Province, was instructed by the then Government—'at a day's notice'—to write to the consulting engineer in London, Mr. Dempsey, 'for a statement of costs for an iron bridge to span the River Murray". The width and depth of the river, at four different sites, was forwarded to the consulting engineer; but, beyond these dimensions, there was absolutely no data on which to frame an estimate, either then or for many years afterwards. It was not known whether the foundations for bridge piers would be on rock or quicksand, and the value of estimates made on such data might easily have been predicted.

In September, 1866, Mr. Hanson, amongst other estimates, furnished on estimate for a Warren girder bridge, with piers composed of cast-iron cylinders, from Easton, Amos & Co., for the sum of £7,500, free on board ship. These sketches are substantially the same as the designs finally agreed upon; and this is the first or original estimate made of

the cost of the material of the Murray Bridge. On the 26th July, Mr. Hanson forwards an indent, for transmission to the Agent-General, for a 'Warren girder bridge to cross the River Murray, amounting in value to £9,500 landed in this Colony'. This estimate being based on the offer of Messrs. Easton, Amos & Co., to supply and deliver such a bridge, free on board ship in the Thames, for £7,500.

In December of the same year, or four months after the bridge was ordered, Mr. Hanson writes to the Commissioner of Public Works, pointing out the advisability of having a correct section made of the river at the intended site of the bridge, and asking for authority to employ men to take borings to ascertain the nature of the foundations. To this letter no answer is returned, and no men are employed. At this date there is still an absence of information as to the nature of the river bed, and there is no section of the river in existence, but the bridge is being proceeded with in England notwithstanding.

In August, 1867, the present Engineer-in-Chief, having learnt that the iron-work for the Murray Bridge would soon be shipped from England, ascertains for the first time, to his surprise, that neither levels nor borings of the intended site have been taken; and he accordingly addresses the Commissioner, on the 13th August, for authority to employ an engineer to take the necessary levels and borings. The engineer is appointed and all appliances got ready, when it is found there are no funds remaining, and the appointment is cancelled, matters remaining in statu quo.

In 1868, the ironwork of the bridge arrived in the Colony, and for five years stacked at Dry Creek. The estimated cost of £9,500 proved inadequate, the bridge material having cost, delivered at Dry Creek, £17,164; and so ends the first section of the history of the Murray Bridge.

In 1872, Mr. Bundey's motion, in the House of Assembly, to place the bridge at Edward's was carried, and the erection of the bridge began in 1873. It should be noted here, that so far it is only the bridge proper that has been provided and estimated for, and at this date no data as to the quality of foundation had been ascertained.

THE SOUTH AUSTRALIAN GOVERNMENT GAZETTE.

NOTICE is hereby given, that the Murray Bridge is now open to the public for traffic.

G. C. HAWKER,
Commissioner of Public Works.

March 26, 1879.

The question of constructing the eastern approach over a quarter of a mile of apparently bottomless swamp and quagmire had been allowed to remain sleeping until the bridge proper had been dealt with and decided. Now that the five spans crossing the Murray are being erected, the Engineer-in-Chief communicates with the consulting engineer, Mr. Dempsey (5th September, 1874) as to the best mode of crossing the swamp, and forwards to him the necessary data for framing an estimate of the cost of the ironwork for such approach.

The consulting engineer is informed that the bridge will, in all probability, have to carry a railway—a contingency quite foreign to the original intention when the bridge was ordered.

Mr. Dempsey, in December, 1874, forwards to the Engineer-in-Chief estimates, accompanied by explanatory sketches of the eastern viaduct approach, forming in itself (a part of the bridge proper) one of the most considerable bridge structures in Australia, and having a length of 1,380ft. Design 'D' with a gradient of 1 in 80, was adopted, and an estimate of cost furnished to the Government, based on Mr. Dempsey's report. The estimate for ironwork material furnished by Mr. Dempsey has, however, been largely exceeded, owing to the very great depth to which it was found necessary to sink the cast-iron cylinders, thus involving a great increase in the weight of cast-iron.

From lithographs (Parliamentary Paper No. 79 of 1877) it will be seen that very full information accompanied the indents for ironwork for eastern approach; but it was impossible to tell to what depth the cylinders would have to be sunk before actual experiment on the ground.

On 31st August, 1875, an indent was sent to England for the straight portion of the approach; and on the 2nd of December, in the same year, an indent was sent for the balance, being that portion shown on the plan as being on a curve of 10 chains radius.

It will be seen from the correspondence, that this bridge was designed originally for the conveyance of sheep and cattle, and ordinary traffic only, with a causeway for the eastern approach; that it was subsequently determined to strengthen the cross girders, in order to enable the bridge to carry a railway; and that the causeway proposed for the eastern approach had then to be abandoned and a viaduct approach of wrought and cast-iron was substituted in its place.

In addition to all this the Engineer-in-Chief found that owing to the bridge having been designed in the absence of data with reference to levels in 1865, it was necessary to raise the whole structure 10ft. for a length of 1,880ft., thus enormously increasing the weight of the cast-iron work.

Under these changing circumstances and varying conditions, it was absolutely impossible to frame an estimate which could be regarded as final and conclusive. The cylinders for No. 3 Pier of the bridge had to be sunk to a depth of 119ft. below the soffit of the girders before granite was reached, and estimates for the bridge in 1865 were ordered at 'a day's notice' in ignorance of any single fact as to the nature of the strata to be met with—in ignorance, indeed, as to whether any bottom whatsoever could be found on which to base the foundations of the bridge.

From the above correspondence it will be seen that no original plans and specifications for the Murray Bridge were ever sent to England, or any other information other than