HERITAGE COUNCIL OF WESTERN AUSTRALIA

REGISTER OF HERITAGE PLACES – ASSESSMENT DOCUMENTATION

11. ASSESSMENT OF CULTURAL HERITAGE SIGNIFICANCE

The criteria adopted by the Heritage Council in November 1996 have been used to determine the cultural heritage significance of the place.

PRINCIPAL AUSTRALIAN HISTORIC THEME(S)

- 3.8 Moving goods and people
- 3.8.6 Building and maintaining roads

HERITAGE COUNCIL OF WESTERN AUSTRALIA THEME(S)

- 112 Technology and technological change
- 201 River and sea transport
- 203 Road transport

11. 1 AESTHETIC VALUE*

Fremantle Traffic Bridge (1939) is distinguished by its timber superstructure and decorative concrete pillars with bronze lanterns, arising from the decorative concrete abutments. (Criterion 1.1)

Fremantle Traffic Bridge (1939) & Ferry Capstan Base collectively form part of a cultural environment which marks the crossing of the Swan River between Fremantle and North Fremantle. (Criterion 1.2)

Fremantle Traffic Bridge (1939), is a distinctive landmark which marks the transition from the Swan River to Fremantle Harbour. (Criterion 1.3)

11. 2. HISTORIC VALUE

Fremantle Traffic Bridge (1939) is located at a site which has been a river crossing point since 1866 when an earlier bridge, associated with the convict era of Western Australian history, was built. (Criterion 2.2)

Fremantle Traffic Bridge (1939) is also built on the site of the earlier 1898 bridge, associated with the development of Fremantle Harbour and the expansion of public works in Western Australia in the Gold Boom of the 1890s. (Criterion 2.2)

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* For consistency, all references to architectural style are taken from Apperly, R., Irving, R., Reynolds, P. *A Pictorial Guide to Identifying Australian Architecture. Styles and Terms from 1788 to the Present,* Angus and Roberston, North Ryde, 1989.
For consistency, all references to garden and landscape types and styles are taken from Ramsay, J. *Parks, Gardens and Special Trees: A Classification and Assessment Method for the Register of the National Estate,* Australian Government Publishing Service, Canberra, 1991, with additional reference to Richards, O. *Theoretical Framework for Designed Landscapes in WA*, unpublished report, 1997.

Fremantle Traffic Bridge (1939) demonstrates the continued use of timber in bridge building in Western Australia into the 1930s, where its cost was low, relative to other materials, and its qualities well understood. (Criterion 2.2)

Ferry Capstan Base contributed to the development of Fremantle through its use in hauling vessels on the river in the nineteenth century. (Criterion 2.2)

Fremantle Traffic Bridge (1939) was designed by engineer E.W. (Ernie) Godfrey, who was in charge of the Bridge Section of Main Roads from his arrival in Perth from Victoria in 1928 until his retirement in 1957, and was responsible for the design of all the bridges built in Western Australia in this period, and construction of the major ones. (Criterion 2.3)

11. 3. SCIENTIFIC VALUE

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11. 4. SOCIAL VALUE

Fremantle Traffic Bridge (1939) is valued by the community as an important public amenity, as demonstrated by the documenting of maintenance works to the structure in local and State news media. (Criterion 4.1)

Fremantle Traffic Bridge (1939) is well used for recreational fishing, as it is the only bridge on the Swan River from which it is legal to fish. (Criterion 4.1)

Fremantle Traffic Bridge (1939) contributes to the community's sense of place, both as a landmark in its own right, and for its situation on the site of earlier 1866 and 1898 bridges. (Criterion 4.2)

12. DEGREE OF SIGNIFICANCE

12. 1. RARITY

Ferry Capstan Base is rare as an uncommon structure as it may be the only remaining capstan base in Western Australia and one of a few in Australia. (Criterion 5.1)

Ferry Capstan Base is rare in demonstrating a function of hauling river vessels, which is no longer practised. (Criterion 5.2)

12. 2 REPRESENTATIVENESS

Fremantle Traffic Bridge (1939) is representative of large timber bridges built in Western Australia during the twentieth century. It is one of six timber bridges over 100 metres in length built during the 1930s in Western Australia. (Criterion 6.1)

12. 3 CONDITION

Fremantle Traffic Bridge (1939) is in a fair condition and shows evidence of ongoing maintenance and repairs.

The Ferry Capstan Base is in a poor condition and has been only intermittently maintained. The growth of vegetation and the screed cement applied to the top of the base are contributing to deterioration of the fabric.

12. 4 INTEGRITY

Fremantle Traffic Bridge (1939) has a high level of integrity. It has been in continuous use for both vehicular and pedestrian traffic since its construction. Main Roads WA believes that the bridge is not sustainable in its current form in the long term.

Ferry Capstan Base has a moderate level of integrity as the base to the former ferry capstan. None of the functioning mechanical parts of the ferry capstan remain.

12. 5 AUTHENTICITY

Fremantle Traffic Bridge (1939) has a moderate to high level of authenticity. Some timber elements in the superstructure have been replaced, with a mixture of timber and steel components. Concrete bases have been installed to the timber piles, concrete fenders have been fitted to the navigation piers and the deck has been overlaid with bituminised concrete. The handrails and light fittings to the vehicular deck have been replaced. The Ferry Capstan Base has a moderate level of authenticity as the base to the former ferry capstan despite the loss of associated functioning parts.

13. SUPPORTING EVIDENCE

The documentary evidence has been compiled by Wayne Moredoundt, Historian. The physical evidence has been compiled by Palassis Architects.

13. 1 DOCUMENTARY EVIDENCE

Fremantle Traffic Bridge (1939) & Ferry Capstan Base comprises a four lane vehicular and pedestrian, timber, concrete and steel traffic bridge (1939), and a limestone capstan base (date unknown).

In the first years of the Swan River Colony, the river was the main means of communication between Perth and Fremantle. As early as 1831, a monthly (whaling) boat service ran between Fremantle, Perth and Guildford. If winds were favourable, the crew used their sails, but usually the journey was powered with long oars. In 1833, a punt service was started at the Narrows to serve settlers traveling between Perth, Canning, Pinjarra and Bunbury. About 1834, the Government established shipyards on the foreshore at Mt Eliza and, in 1836, the first locally built boat was launched. In 1842, John Watson commenced a daily service by sailing boat, carrying passengers and cargo between Fremantle and Perth. Two months later, Henry Grey used a whale boat on a daily run to the port and a twice weekly service to Guildford and the Upper Swan. The same month, the Mill Street Jetty was opened to cater for the ever-increasing river traffic.[1]

According to an account from 1930, the earliest ferry (during the early 1830s) that operated across the river from Fremantle to North Fremantle, travelled from Preston Point to 'Billygoat Farm', which fronted Minim Cove.[2] The Fremantle-Perth road followed the southern side of the river to Preston Point, where there was a ferry north across the river, this being a short passage and less exposed to strong winds and tidal currents than the alternatives closer to Fremantle. From this point, produce was ferried to various locations along the Swan River.[3]

In 1836, it was reported in the *Perth Gazette and Western Australian Journal* that a 'large substantial ferry boat' was built (at a cost of 100 pounds) by Mews and Cox for the ferry at Fremantle. This was to be trialed during the approaching winter for suitability in the windy conditions of the coastal area. If this was successful, then 'jetties [would] be constructed on both sides of the river'.[4] A year later, the same newspaper complained that the ferry was a 'constant drain on the colonial chest', and was ineffectual public transport. Moreover, with a northwesterly wind blowing, it was 'nearly impossible' to cross the river; the place selected for the ferry was 'inappropriate'.[5]

Again, the following year, the *Perth Gazette and Western Australian Journal* criticized the operation of the Fremantle ferry, claiming that it should be moved to a more suitable site before winter- 'even a temporary bridge would be better'. The newspaper also called for the proposed construction of a causeway over the

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1 Keith O. Murray, 'From Oar to Diesel on the Swan', paper prepared for the WA Historical Society, n.d., pp. 1-3. held in Battye Library.

2 *Fremantle Advertiser*, 25 September 1930.

3 Information found at the web-site of the Swan River Trust, http://www.wrc.wa.gov.au/srt/, 20 October 2003.

4 *Perth Gazette and Western Australian Journal*, 7 May 1836.

5 *Perth Gazette and Western Australian Journal*, 18 May 1837.

river at the flats of the Heirisson Islands to be expedited.[6] The Fremantle ferry service ceased operating, with the boat removed, when the original North Fremantle Bridge opened for traffic in November 1866.[7]

The date of construction for the Ferry Capstan Base is unknown and its relationship to ferry boat services at Fremantle is unclear. Early maps of Fremantle do not show the Ferry Capstan Base, and no textual evidence has been uncovered that would provide insight into this structure.[8] A common view is that the ferry capstan was connected to a ferry boat by a moving rope cable. In the centre of the capstan base was a vertical axle, around which a wood and iron bolted capstan rotated, supposedly powered by ten convicts (according to some accounts, or animals, according to others) pushing around an iron bar.[9] Existing newspaper accounts of the history of the Ferry Capstan Base do not, however, stand up to critical scrutiny. The *Western Mail* of 14 April 1927 published a photograph of the capstan site with a caption stating, 'the convicts, ten men on a bar, used to pull up the old "*Black Swan*", the first dredge used on the river'.[10] The *Fremantle Gazette* (14 March 1984) repeats this assertion and adds that 'the structure was associated with the boat repair yards then operating … used to haul vessels up the slope towards Tilly's yard'. The *Fremantle History Society Newsletter* (Autumn 1988) also repeats the assertion about pulling the dredge, the '*Black Swan'*.[11]

However, the '*Black Swan*' (actually unnamed at this time) was not imported into the Colony from England until 1869, and was not used until 1871, by which time the bridge was built and a ferry in this location was unlikely. At that time, it was worked with convict labour to dredge a channel from the Narrows to the William Street Jetty. The dredge continued operation in the vicinity of Perth until 1878. Nine years later, it was decided to widen the north passage through the bar at the mouth of the river at Fremantle. As the bottom had rusted away, this part of the dredge was replaced with jarrah boards. The buckets were also repositioned so that they ran through the bow instead of being worked from the centre, as had been the case. After these modifications, the dredge was re-launched at

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6 *Perth Gazette and Western Australian Journal*, 31 March 1838. Possible routes between Fremantle and Perth were either along the north side of the river from North Fremantle (which involved a river crossing at Fremantle), or south across the Canning River then north from (what is now) Victoria Park. The Perth Causeway was commenced in 1839 and completed in 1843.

7 *Perth Gazette*, 21 November 1866.

8 Numerous sources, both primary and secondary have been accessed during the course of research. In addition to sources specifically referenced, these sources include: newspapers of the nineteenth century; Battye Library photographic and map collection, accounts of rivers and ferries in Western Australia, internet searches in regards to capstans both in Australia and internationally; and, the Fremantle Library Local Studies collection.

9 According to the *Western Mail* (14 April 1927), the capstan was used to pull up the *Black Swan*, the first dredge used on the river. However, according to the *Fremantle Gazette* (14 March 1984), the capstan base contained a large winch in the central hole, with the winch used to haul vessels up the slope towards Tilly's boat yard. Another version of the history of the capstan base is found in the *Fremantle History Society Newsletter* (Autumn 1998).

10 Considering that the *Western Mail* of 14 April 1927 regarded the structure as old at this time, then it is likely to have been constructed during the second half of the nineteenth century.

11 Information found at the Swan River Trust's web-site claims that: 'The Western Australian Museum has identified a circular limestone structure which formed the base of a capstan on the southern side of the river, east of the Fremantle Bridge. This was used to pull large boats out of the river for repairs and to tow barges.' The reference for this statement is to a Western Australian Museum publication, however there is no record of such a publication having been produced by the Western Australian Museum.

Fremantle, christened (for the first time) as the '*Black Swan*'. The dredge was later used up the Canning River (1892), in clearing channels for the Mends and Coode Street Jetties (1897), and in reclamation work from Pt Lewis to the Causeway (1904-1911). After this, the '*Black Swan*' was idle at Fremantle until, in 1923, the dredge was towed behind the North Mole and sunk.[12]

In 1850, convicts were transported to Western Australia for the first time. These men were used to quarry and level for the Perth to North Fremantle Road from 1851, a project employing as many as 250 convicts at a time.[13] In 1863, plans were made, under the direction of Governor Hampton, for construction of a bridge across the Swan River between North Fremantle and Fremantle. Responsibility for the design and construction of the bridge was shared by Captain Grain, a Royal Engineer who was attached to the Fremantle Depot of the Comptroller-General's organization, and James Manning, a Clerk of Works attached to the Imperial Establishment, who had accompanied Captain Henderson to Western Australia on the 'Scindian' in 1850.[14]

Manning had trained in England as a civil engineer and, after working on the construction of various stately homes in London, joined the Ordinance Department at Tilbury. Before Manning retired in 1872, he was responsible for the construction and maintenance of all sea jetties at Albany, Vasse, Bunbury, Fremantle and Champion Bay. He also built bridges over the Upper Canning River, the King and Kalgan Rivers at Albany, and over the Avon River at York, Northam and Toodyay. The Fremantle Bridge would have been, however, his largest and most difficult bridge construction project.[15]

In July 1863, an announcement appeared in the *Perth Gazette* that the tender of B. Mason for the supply of all the timber for the bridge had been accepted. However, by the end of 1864, only six piles had been driven into the river bed, a task made difficult by the swift tidal currents at this point in the river.[16] Work must have speeded up, however, as the *Inquirer* reported in March 1866 that all the piles had been driven for half the distance across from the south side of the river, and that the upper section was fixed and the flooring laid.[17]

During the first two years of construction of the bridge, the average number of convict workers on the project was 48, of which 28 laboured in chain gangs, mainly blasting and quarrying stone for the bridge approaches.[18] Because of the long walk back to the prison, their midday meal was brought to them on handcarts and distributed from a stone building to the east of the bridge embankments, on the south side of the bridge. There too, the convicts sheltered in inclement weather.[19]

There was opposition to the construction of the Fremantle Bridge both from those who were upset at the neglect of other public works, and from lightermen, who plied their trade between the capital and the port. According to the *Perth Gazette*:

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12 Murray, 'From Oar to Diesel', pp. 9-11.
13 James Robinson, 'North Fremantle- A Changing Environment', 1987, p. 28.
14 *Western Roads*, July 1979, p. 11.
15 *Western Roads*, July 1979, p. 11.
16 *Inquirer*, 28 December 1864.
17 *Western Roads*, July 1979, p. 11.
18 *Western Roads*, July 1979, p. 11.
19 *West Australian*, 31 August, 1933.

> The construction of the North Fremantle Bridge is already beginning to make itself disagreeably felt by the lightermen on the river, who are informed that the covered arch will not admit of boats passing under it whose masts are more than 36 feet high … We are told that the design has been approved by W. Dennison and others, but we very much doubt whether any engineer acquainted with the situation required to be bridged would ever have said that the bridge now erecting at North Fremantle is suitable or will be no serious obstacle to navigation of the river.[20]

In November 1866, the *Perth Gazette* reported that the new bridge at North Fremantle was completed and that Governor Hampton had passed over it in his carriage on the 14th of that month, and that the bridge was opened to general traffic seven days later.[21] There was no official public opening for the bridge, however, as the Governor was visiting Champion Bay at the time. Nonetheless, the *Inquirer* reported that there was an unofficial ceremony:

> [The day after the bridge was open to general traffic] our volunteer Corps assembled on its parade ground for a moonlight march. The strains of the Band … soon attracted a numerous concourse of our inhabitants, who accompanied them on their march to the North Fremantle Bridge, and having crossed it, they, on their return, halted in the centre when Captain Manning gave a short address … he expressed regret that … no public rejoicing has announced its being opened. The Corps then gave three cheers for His Excellency, and marched off in a cloud of dust, raised by the juveniles who preceded them.[22]

The new Fremantle bridge had a total length of 940 feet and consisted of two navigation spans each of 45 feet, and 33 spans varying between 25 feet and 26 feet. The width of roadway on the bridge was 18 feet and, at the navigation spans, the bridge was 44 feet above high water level. The bridge was founded on 319 timber piles and, except for the navigation spans, these were braced longitudinally approximately 14 feet above high water level. The junction between this bracing and the piles was then used as a springing point for sloping props, which supported the deck superstructure at the third points of each span. At the navigation spans, the superstructure was stiffened with two Queen Post trusses projecting above the deck on each side of the bridge. This was the standard type of construction used in the Colony at this time, and had been employed on both the Causeway Bridge and Du Cane's bridge at Guildford.[23]

A report prepared in 1865 stated that the estimated final cost of the bridge was 2,752 pounds and, by the end of 1867, the expenditure would be 2,986 pounds, with the bridge still not finished. As account reporting methods changed after this time, the final cost can not be ascertained, but has been estimated at between 3,000 and 4,000 pounds. An idea of how the money was apportioned can be derived from the 1865 report. Of the expenditure to that date, 2,072 pounds had been spent on timber and 81 pounds on powder and fuse for blasting. The estimate of the amount required to complete the job was 340 pounds for iron and spikes, 119 pounds for powder and fuses, and 140 pounds for extra timber.[24]

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20 *Perth Gazette*, 15 May 1866.

21 *Perth Gazette*, 23 November 1866. However, the *Inquirer* (2 October 1867) reported that the work on the bridge was finally complete at that time.

22 *Inquire*r, 28 November 1866.

23 *Western Roads*, July 1979, p. 11.

24 *Western Roads*, July 1979, p. 11.

With the bridge having been opened to traffic for 12 months, in 1867 the *Herald* felt compelled to respond to the pessimistic predictions of the structure's critics:

> We feel it our duty to say the Fremantle Bridge notwithstanding the fears of some and the prophecies of others that it would come to grief the first gale, has escaped the anticipated danger.[25]

Regulations were also passed to ensure the bridge's preservation: 'horned cattle, not being milch cows' were barred from the bridge, if in a herd of more than ten, while no cattle, 'saving milch cows and draught oxen', could be driven over the bridge except between ten at night and eight in the morning. Breaches of these regulations carried a fine of 20 pounds, with any damage to the bridge requiring the cost of repairs to be paid by the 'person, his master or employer' who owned the stock.[26]

With the construction of the Perth to Fremantle road and bridge, vehicles carrying goods and passenger vans were able to make daily journeys between the settlements.[27] A few years after the bridge opening, in June 1869, the first telegraph line between Perth and Fremantle was opened, speeding communication between the capital and the port. In 1881, a wooden railway bridge was constructed downstream from the traffic bridge, completing a Perth to Fremantle rail link. This railway bridge partially collapsed in the floods of July 1926, was repaired over a period of three months, and was finally replaced by a new rail bridge built further upstream in 1964.[28]

In October 1891, the Fremantle Traffic Bridge was reported to be unsafe by the Under-Secretary for Works and Railways. As a precautionary measure, in 1892 the maximum load allowed on the bridge was reduced to one and a quarter tons. In 1894, a Fremantle Ratepayers' meeting recommended that the State Government obtain a professional opinion as to the bridge's safety. As a result of this request, on 13 August 1896, 'North Fremantle Road Bridge: Copy of Various Reports on its Condition' was tabled in the Lower House of State Parliament by the Director of Public Works, containing what was probably the first traffic count ever carried out in the State. This recorded that, over a 24 hour period on 17 May 1893, carriage over the bridge included 107 vehicles (including horses) at an estimated weight of 140 tons, 31 saddle horses (estimated weight 21 tons), and 476 foot travelers (estimated at 24 tons). Over a year, this load was estimated at 60,000 tons. The Report's recommendation was that a new bridge needed to be constructed.[29]

In January 1897, the Government decided that a low-level 'temporary' bridge would be built to the immediate west of the existing bridge. This new structure was expected to take three months to build and would use the existing approaches of the old bridge- as this was aligned with the approach road and utilized embankments built at considerable expense, which would be left in place for when a new and permanent structure was built. It was expected that the new Fremantle Low Level Bridge (as it was known) could be built for around 2,500 pounds, and that the materials could be re-used- 'if proper dimensions of timber were selected'- when the temporary bridge was replaced by the new bridge. The

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25 *Herald*, 29 June 1867.
26 *Herald*, 11 May 1867.
27 *Herald*, 9 March 1867.
28 *Western Mail*, 29 July 1926; *West Australian*, 5 August 1926; *West Australian*, 1,2, December 1959; *West Australian*, 16 June 1960; *West Australian*, 28 January 1964; *West Australian*, 14 September 1964.
29 *Western Roads*, July 1979, pp. 12-13.

low-level bridge was to have an opening 36 feet wide 'in the clear' and a drawbridge spanning that distance. This was to be raised by a winch when river craft needed to pass that point.[30]

The Fremantle Low Level Bridge was opened on 28 September 1898, and the old bridge was closed to all except pedestrian traffic. It was intended that the old bridge be removed and replaced with a wider structure, having two 75 feet navigation openings. [31] However, nothing further was done until 1908, when the Fremantle and North Fremantle Municipal Councils wanted to extend the existing Fremantle tramway system to North Fremantle. This could not be achieved with the low level bridge, so a proposal was put forward to investigate the possibility of using the older 1866 bridge. An inspection was carried out on and under the old bridge and this found that of 319 piles examined, 306 were absolutely sound, and only 13 had some defect, and no piles required replacing.[32]

The Government decided to adapt the old bridge to tram and road traffic by cutting down its superstructure to remove its hump and, at the same time, the bridge was widened, with new piles sunk and new decking added.[33] The low level bridge was closed on 18 June 1909, and was partially demolished by the end of that year.[34] A section of the low level bridge from the north abutment to the north side of the navigation opening was cut down and decked over to form a landing stage.[35] Further repairs to the renovated 1866 bridge were carried out in 1915 when it was re-decked.[36]

In 1928, the newly-formed Main Roads Board assumed State-wide responsibility for 503 'developmental' roads, 19 'trunk' roads and three 'arterial' roads. Many more roads remained the responsibility of the local Road Boards through whose territory they ran. Although the *Main Roads Act* did not give the Main Roads Board responsibility over Perth metropolitan roads in general, it was made responsible for the Perth-Fremantle Road and the North Fremantle Road Bridge, as well as the Causeway and some other metropolitan roads.[37] When the State Government decided, at the end of 1933, to widen the Perth to Fremantle Road (the present Stirling Highway) many members of the public hoped that a new bridge would be built across the river. However, the Government did not have the financial resources to undertake this project at the time. Moreover, the matter was complicated by planned expansion of the Fremantle harbour facilities.[38]

In 1935, the head of Main Roads, Tindale, informed the Minister for Works that the old Fremantle Traffic Bridge could be maintained for another eight to ten years, but at a cost of about 10,000 pounds a year. A new concrete bridge could be built for 650,000 pounds, but it would take a year to design and let tenders,

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30 *West Australian*, 16 January 1897.
31 *West Australian*, 17 February 1934.
32 *West Australian*, 17 February 1934.
33 *Morning Herald*, 17 December 1907.
34 The foundations of the Low Level Bridge remained in place and could be seen at very low tides. Photograph in *Western Mail*, 14 April 1927.
35 *West Australian*, 19 October 1909.
36 *West Australian*, 17 February 1934.
37 Leigh Edmonds, *The Vital Link: A History of Main Roads Western Australia, 1926-1996*, UWA Press, 1997, p. 27.
38 *West Australian*, 17 February 1934.

and another three years to built. On the other hand, a similar bridge could be constructed from timber for about 75,000 pounds.[39]

In 1936, after the State Government had proposed the building of a new Fremantle Traffic Bridge from timber, this was opposed by the North Fremantle Council. A wooden bridge, they considered, would be 'unsuitable and inadequate', and it was thought that if the Government could not afford to erect a 'modern' steel or concrete and steel structure at that time, then the old bridge could be maintained until the costlier proposition could be financed. The idea of a wooden bridge was scorned by Councillor F. Shirley, who described the proposal as 'ridiculous'. Furthermore, according to Shirley, 'Fremantle, as the gateway to Australia, should not be asked to accept any such thing'. Other councillors considered that the railway bridge, which was 'almost as dilapidated' as the traffic bridge, should also be replaced by a structure able to carry all forms of transport. Councillor G.F. Dedman, was particularly hopeful, in advocating the provision of a bridge 'similar to the famous structure over the Sydney Harbour, with a toll similarly imposed.'[40]

In June 1937, the State Government approved a survey of the proposed Fremantle bridge site and the preparation of cost estimates. Ernie W. Godfrey,[41] the Main Roads Bridge Engineer (and designer and project supervisor of the bridge project), estimated the cost at about 78,000 pounds, made up of around 60,000 pounds for the bridge, 12,000 pounds for the approaches, and 3,000 pounds to demolish the old structure. The bridge would be 'temporary', because it would have to be demolished if the Port of Fremantle expanded further up the river, but, nonetheless, it was designed to look pleasing, and to have a life of forty years.[42]

Work on the new bridge began in May 1937, only a month after the Canning River Bridge was opened.[43] It was to be 720 feet long, with a roadway 40 feet wide between the curbs, and a footpath 6 feet wide. A number of essential services such as water mains, gas mains and electricity cables were to be installed underneath the roadway. In the middle of the bridge were to be three navigation openings, two 70 feet wide and one 56 feet wide.[44]

The piers supporting the bridge were made out of jarrah piles up to 65 feet long. These were driven into limestone beneath the sandy top layer of the river bed. However, the limestone subsurface was not uniform in depth, so the engineers shattered it by drilling and blasting, then the piles were driven in to a depth of about 20 feet below the bed of the river. Where the project required longer piles, top sections of wandoo logs were spliced onto the jarrah piles, once they had been driven in. To protect the piles from marine borers, a concrete collar was put around each one. These collars were made out of concrete pipes 24 inches in diameter and six feet long, joined together with hemp saturated in bitumen. They

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39 Edmonds, *The Vital Link*, p. 86.

40 *Fremantle Advocate*, 8 October 1936.

41 Godfrey had been in charge of the Bridge Section of Main Roads since his arrival in Perth from the Victorian Railways in 1928. Until his retirement in 1957, he was responsible for the design of all the bridges built in Western Australia in this period, and the construction of the major ones. He had also been in charge of work on Stirling Highway and the Eyre Highway. Edmonds, *The Vital Link*, p. 154.

42 Edmonds, *The Vital Link*, pp. 86-87.

43 Planning for a new Canning Bridge commenced in 1936; in July 1937, construction commenced; and the bridge was opened on 29 April 1938. The cost of the bridge and approaches was 24,830 pounds. Edmonds, *The Vital Link*, p. 86.

44 Edmonds, *The Vital Link*, p. 87.

were lowered over the tops of the piles in successive stages until the pipe sat on the riverbed. A diver then used a water jet to blast away the sand beneath the pipe, so that it settled about four feet into the riverbed sand. The concrete sleeves also extended four feet above normal water level and the space between the pile and the inside of the pipe was filled with clean sand.[45]

As each section of the bridge's basic structure was completed, the outrigger that carried the pile frame and driving machine rolled forward to hang over the water 20 feet beyond the previous piers, and so the bridge gradually extended out over the river. Above the waterline, most of the bridge was of timber construction, with workers using axes to fashion the splices and joints of the whole superstructure. Running in the same direction as the road were stringers made of durable wandoo logs. On top of these were transverse jarrah bearers and, running longitudinally on top, a deck of jarrah. Four ornamental concrete pillars, surmounted by lanterns cast in statuary bronze, were positioned at the entrances to the bridge. Wire mesh paneling with timber posts and wrought iron handrails fenced the bridge.[46]

The new Fremantle-North Fremantle Traffic Bridge (as it was called on the official invitation) was opened by the Premier, J.C. Willcock, on Friday 15 December 1939, with the official ceremony held on the north side of the river. However, the bridge was not actually completed until early in the following year, as progress had been slowed by Australia's entry into war in September 1939. Although it was planned to demolish the old 1866 bridge when the new one was opened, the earlier structure remained for the duration of the war, in case the new one was damaged in an enemy attack. The road surface sealing of the new bridge was completed in 1941, to prevent the timbers, which were seasoned by then, from becoming loose. The old 1866 bridge was finally demolished in the late 1940s.[47]

Maintenance work on the Fremantle Traffic Bridge (1939) was of a minor nature until the end of 1973, when two damaged pylons were replaced.[48] A section of the bridge was found floating in the harbour, after a 30 foot long pylon and several timber beams, weighing more than a ton, broke away from the rest of the structure. One of the navigation spans of the bridge was closed to river traffic while work was under way. The following year, a concrete overlay was put on the bridge deck to help preserve it, at a cost of around $100,000.[50]

In November 1977, the ferry *Temeraire II* collided with bridge piers, sparking concern at the use of the bridge piers for recreational fishing. Part of the existing catwalk was removed and signs were erected warning of the dangers of fishing from under the bridge.[51] During the 1970s and 1980s, Main Roads tried to

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45 Edmonds, *The Vital Link*, pp. 88-89.

46 Edmonds, *The Vital Link*, p. 89.

47 'Souvenir Invitation: Opening of Fremantle-North Fremantle Traffic Bridge by Hon. J.C. Willcock, Premier, 15th December, 1939'; Edmonds, *The Vital Link*, p. 90. The foundation piles to the old (1886) bridge remained visible at low tides - photograph in, Engineering Heritage Panel of the Western Australia Division of the Institute of Engineers (Australia), *Large Timber Structures in Western Australia*, Vol. 3, 1998, p. 1060.

48 Telephone conversation with Jeffrey Oo, Project Manager (Development), Metropolitan Region, Main Roads Western Australia, 6 November 2003.

50 *West Australian*, 13, 15 December 1973.

51 Menno Henneveld, Commissioner of Main Roads WA, letter to HCWA, 5 July 2004, on HCWA file P4027

completely ban fishing from the bridge, but met with strong resistance.[52] Although recreational fishing from under the bridge is technically illegal, under Regulation 88 of the Jetties Act Regulations 1940,[53] the bridge is now known as the only one on the Swan River from which people can fish without being prosecuted.[54]

It was also in 1974 that the Stirling Bridge was completed to the east of the Fremantle Traffic Bridge (1939); opened on 17 May of that year by the Premier, Sir Charles Court. This structure- at 1,361 feet, the longest public road bridge in the State at the time of its completion- was to form the basis of a future route linking Stirling Highway with Cockburn Road and beyond, as a traffic bypass to Fremantle. As part of the proposed Fremantle Eastern Bypass, the bridge was designed to keep through traffic out of the residential and commercial areas of Fremantle. The 1974 bridge- built at a cost of almost $3.5 million- was, however, only the first of two planned stages. The second stage involved the duplication of the existing structure on the upstream side, adding an extra three traffic lanes and giving a combined width of 114 feet.[56] As of 2003, the second stage has not been constructed.

In 1985, the structure of Fremantle Traffic Bridge (1939) was strengthened when a steel support was attached from the water line to the deck. This effectively transferred the stress load from any weakened piles to the stronger deck in the event of water craft impacting on the bridge piles.[57] In order to carry out this work, the bridge was partially closed (from 28 November 1985 to 16 December 1985), with north-bound traffic having to use the Stirling Bridge to travel towards Perth. Throughout the work, the bridge's cycleway and footpath remained open.[58]

In spite of the 1985 repair work having been expected to extend the life of the bridge for another 15 years,[59] in the late 1980s, by which time the bridge was around fifty years old, the timber piles of the bridge were found to be rotting inside the sand-filled sleeves placed around them. This meant that if a large river craft had hit the bridge, the road surface could collapse. Twenty-three of the worst affected piles were repaired and the remainder treated to inhibit further rot.[60]

At the end of 1990, Main Roads accorded renovations to Fremantle Traffic Bridge (1939) a high priority in its works programme. An amount of $500,000 was to be spent in the 1990-91 financial year improving bridge stability, lighting and navigation systems. In December 1991, the Bridge Branch of Main Roads began an eight-month project, at a cost of $1.3 million, to refurbish the bridge. In

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52 Telephone conversation with Jeffrey Oo, Project Manager (Development), Metropolitan Region, Main Roads Western Australia, 6 November 2003.

53 Menno Henneveld, Commissioner of Main Roads WA, letter to HCWA, 5 July 2004, on HCWA file P4027

54 Telephone conversation with Jeffrey Oo, Project Manager (Development), Metropolitan Region, Main Roads Western Australia, 6 November 2003.

56 *Gateway*, June 1973, Winter 1974; *Port of Fremantle Quarterly*, Autumn 1973; *West Australian*, 11 May 1973, 17 September 1973, 18 May 1974; *Western Roads*, November 1984.

57 *Fremantle Herald*, 5 November 1990.

58 *Fremantle Gazette*, 26 November 1985.

59 *Fremantle Gazette*, 26 November 1985.

60 Edmonds, *The Vital Link*, p. 156.

particular, major works were to be undertaken to repair the serious problem caused by fungal rot of the timber piles at the water level. The rot had occurred at the top of the sand collars which were placed to prevent attack by ships' worms.[61]

Repair of the bridge was part of a comprehensive computer management programme for the State's bridges, including 1,500 wooden bridges. Using United Nations standards, that emphasized preservation rather than replacement of built structures, the State Government aimed to become a world leader in timber bridge management. The Main Roads Department claimed that the ultimate cost savings, and preservation of hard wood forests worldwide, justified this approach. Fremantle Traffic Bridge (1939) was to be one of the first major structures to benefit under the new scheme. Piles could be replaced, the deck strengthened and navigation channels could be rebuilt.[62]

Repairs to Fremantle Traffic Bridge (1939) commenced on 18 November 1991, and were expected to continue until June 1992. Originally, Main Roads had intended to completely close the bridge for this time but, after discussions with Fremantle City Council, agreed to allow one lane of traffic in each direction for the duration of the work.[63] By early August 1992, the repairs to Fremantle Traffic Bridge (1939) were completed. Alterations included new safety railing- designed on the advice of the Heritage Council of W.A.- similar to that featured on the original bridge.[64] These changes were, however, vigorously criticized by some members of the Fremantle community. In a letter to the *Fremantle Herald*, a resident asserted that:

> The uglification [sic] of our Fremantle Traffic Bridge is almost complete. The Main Roads Department has been working for months to replace the symmetry and style of our old bridge railings with hideous new barricades that look like remnants of the Berlin Wall … We will now be stuck with one of the ugliest bridges in Perth … Our traffic bridge is the gateway to Fremantle. Why have we failed to defend it?[65]

During the 1990s, regular maintenance work on Fremantle Traffic Bridge (1939) has continued. Some of this work, involving replacement of the fabric of the structure, included: replacement of various timber members with equivalent steel components; repair or replacement of sections of timber piles with concrete sleeves installed at the splashing zone (most deterioration occurs at the 'splash zone', caused by water and marine organisms); and replacement of guardrails. At the navigation spans, the bridge piers were modified by installation of fenders for protection of vessels. Some of the deteriorated sections of piles has been replaced by cutting a section out and splicing it with old or recycle timber. Timber suitable for use on the bridge would need to have been seasoned for a

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61 *Fremantle Herald*, 5 November 1990.
Note: Main Roads' current practices are to undertake preservation of a timber bridge rather than replacement if it is economically feasible for safe and efficient road transport to do so. Main Roads' schedule of works includes both replacement of individual timber elements with other materials and complete replacement of timber bridges where this is considered appropriate. Menno Henneveld, Commissioner of Main Roads WA, letter to HCWA, 5 July 2004, on HCWA file P4027

62 *Fremantle Herald*, 5 November 1990.

63 *Fremantle Gazette*, 29 October, 26 November 1991; *Fremantle Herald*, 30 September, 28 October, 11 November 1991.

64 *Fremantle Gazette*, 4 August 1992.

65 *Fremantle Herald*, 10 August 1992. Other criticism of the new safety rails, by a Fremantle architect, was published in the *Fremantle Gazette*, 18 August 1992.

considerable period of time to achieve the timber properties compatible with the rest of the structure and therefore, equivalent timbers for replacement are generally difficult to obtain.[66]

Main Roads Western Australia has a number of ongoing safety concerns regarding the Fremantle Traffic Bridge (1939). These include: the bridge has limited capacity to resist vessel impact; road lanes and footpath widths that are too narrow; continuing settlement of piles; development of pot-holes on the deck surface (due to deteriorated timber deck planks and timber bearers which need replacement in the foreseeable future); ongoing high cost of maintenance of old timber structures; and a traffic loading higher than the bridge was originally designed to take. While the original intention of Main Roads was to demolish the bridge after 40 years, the growth of residential, commercial and industrial areas nearby has meant that the Fremantle Traffic Bridge (1939) will need to be either replaced with a new structure or reconstructed to bring it in line with present engineering standards.[67] Main Roads WA believes that the bridge is not sustainable in its current form in the long term.[68]

Main Roads is managing the traffic safety concerns through monitoring of the structural defects, carrying out ongoing maintenance work and developing plans to either replace or reconstruct the bridge. As an indication of the extent of the maintenance work carried out by Main Roads, in excess of $500,000 has been spent in the last three financial years to maintain the bridge to a minimum serviceable condition and avoid load limit posting on the bridge. [69]

As of November 2003, Fremantle Traffic Bridge (1939) continues to be used for road and pedestrian transport, linking Fremantle with North Fremantle.

13. 2 PHYSICAL EVIDENCE

Fremantle Traffic Bridge (1939) & Ferry Capstan Base comprises a four lane vehicular and pedestrian timber, concrete and steel traffic bridge (1939) and a limestone capstan base (date unkown).

The bridge is located across the Swan River between Fremantle and North Fremantle. It marks the transition of the Swan River (to the east) in to Fremantle Harbour (to the west). The bridge carries traffic on Queen Victoria Street across the river in both the north and south directions. At the southern end, Beach Street runs along the embankment and under the bridge. The capstan base is located on the western side of this southern embankment.

Directly to the west of the traffic bridge is a steel railway bridge. To the east is the concrete Stirling Bridge, which also carries vehicular traffic across the Swan River on the Stirling Highway. To the north of the bridge is the relatively flat locality of North Fremantle. To the south of the bridge is the landmark Cantonment Hill.

The northern embankment to the bridge, which is retained by a limestone wall to the east and bartered to the west, runs directly into the river. An industrial area is

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66 Telephone conversation with Jeffrey Oo, Project Manager (Development), Metropolitan Region, Main Roads Western Australia, 6 November 2003.

67 Telephone conversation with Jeffrey Oo, Project Manager (Development), Metropolitan Region, Main Roads Western Australia, 6 November 2003.

68 Menno Henneveld, Commissioner of Main Roads WA, letter to HCWA, 5 July 2004, on HCWA file P4027

69 Correspondence from Jeffrey Oo, Project Manager (Development), Metropolitan Region, Main Roads Western Australia, 11 November 2003.

located to the west and the recent residential development of 'Northbank', at North Fremantle, to the east. A gravel car park is located on the eastern side of the bridge at its northern approach. An access stair with timber treads and galvanized metal handrails is located on the eastern side of the northern embankment.

The southern embankment, accessed at its base from Beach Street, and from the top (on the eastern side) by concrete steps with galvanized metal handrails. The foreshore in this area comprises a grassed public park, bitumen car park and the East Street public jetties to the east. There are Fremantle Port Authority single storey buildings, access roads and jetties to the west.

Fremantle Traffic Bridge (1939) is 222.9 metres in length and 14.23 metres wide. It has a predominantly timber superstructure with a flat bituminised concrete deck carrying four lanes of traffic and a concrete pedestrian deck. The vehicular deck is approximately 12 metres wide and is marked with painted lines for the two lanes of traffic in each direction. Metal safety rails are located to either side of the vehicular deck. Standard Main Roads lights are located at fixed intervals to the eastern side. The concrete pedestrian deck, which is approximately 2 metres wide, is located to the western side of the bridge. It has a timber, steel and wire mesh handrail, which is distinguished by the white painted handrail posts, which have curved heads, and the circular steel rails.

The north and south abutments to the bridge are painted reinforced concrete. The abutments, which have bartered wings are tapered back to the top of the embankments. The bridge is defined by four pillars, which mark the entry points to the bridge, rising from the abutments. These painted, square concrete pillars have moulded string courses and are adorned with distinctive lanterns, capped by hooded bronze spheres.[70]

The circular timber piles which form the superstructure of the bridge have concrete bases. Each of the concrete bases has been fitted with a pair of galvanized metal straps around the circumference. The timber piles, which are predominately jarrah, have been inscribed with roman numerals. While varying in size they are approximately 450mm in diameter. They are set in rows, called piers. There are a set of thirteen piers of seven timber piles each supporting the northern end of the bridge and a set of eleven piers of seven timber piles each supporting the southern end of the bridge. These sets of piers are half-capped and cross-braced, above the high water line, with sawn timber.

Ten rows of circular timber stringers, reinforced by timber corbels, are carried by the timber piles. A section of stringers to the southern end of the bridge has been replaced with steel I beams. Timber joists and bearers support the concrete deck, which has a concrete kerb. Timber access planks with galvanized metal handrails provide access at water level to the piers from either end. These access planks are well utilised by local residents for recreational fishing.

The central section of the bridge has two navigation spans approximately 16 metres wide with a central span of approximately 12.5 metres wide. This central section of the bridge comprises four double pile piers with nine pairs of timber piles each. These piers support a system of five riveted steel girders across each of the navigation spans. Steel bearers are fixed to the girders across the width of the bridge and are sway braced to both sides of the bridge. Concrete fenders

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70 The site inspection noted these lanterns as being bronze with sandblasted glass. Main Roads has informed HCWA that their recent site inspection identified the lanterns as having white plastic covers with spherical bronze hoods. (Menno Henneveld, Commissioner of Main Roads WA, letter to HCWA, 5 July 2004, on HCWA file P4027)

have been constructed to the double pile piers to prevent river vessels from striking the timber piles.

The Ferry Capstan Base is located to south western embankment of the bridge, towards the base of the embankment on Beach Street. The embankment comprises a grassed area to Beach Street and shrubs to the upper section adjoining Queen Victoria Street. A concrete path winds up the embankment to the south of the capstan base.

The capstan base is almost completely hidden from view by vegetation, which has grown on and around it. It comprises a circular limestone base approximately 6 to 8 metres in diameter, which sits proud of the embankment at its north western side. The base is supported by dressed limestone blocks, approximately 400mm high ranging in size from 400mm to 700mm in length, arranged in a circular pattern. The base has a cementitious screed applied across its surface. An slight indent is visible in the centre of the base.

The Fremantle Traffic Bridge (1939) is in a good condition and shows evidence of ongoing maintenance and repairs. The Ferry Capstan Base is in a poor condition and has been only intermittently maintained. The growth of vegetation and the cementitious screed are contributing to deterioration of the fabric.

13. 3 COMPARATIVE INFORMATION

Fremantle Traffic Bridge (1939) & Ferry Capstan Base may be compared to traffic bridges, of similar age, design and construction method, and to capstans with a similar purpose. There do not appear to be any other bridges with capstans in close proximity.

According to the Main Roads Western Australia database, the Fremantle Traffic Bridge (1939) is one of over two thousand timber traffic bridges in the state. The majority of these bridges are small to medium traffic bridges. Six large (over 100 metres) traffic bridges were constructed between 1930 and 1940. These are (HCWA 4027, MRWA 916), Garratt Road Traffic Bridge (HCWA 11342, MRWA 950, classified by National trust, on Municipal Inventory), Canning Bridge (HCWA 4659, MRWA 913), Guildford Road Bridge (HCWA 14558, MRWA 910, on Municipal Inventory), Clackline Bridge (HCWA 10910, MRWA 608, on Municipal Inventory) and Browns (Arthur River) Bridge (HCWA 13109, MRWA 442).

Of these bridges the Fremantle Traffic Bridge (1939) and the Clackline Bridge are also identified as bridges of heritage significance in *Large Timber Structures in Western Australia,* produced by Engineering Heritage Panel of the Western Australia Division of the Institute of Engineers (Australia) in 1998. These bridges demonstrate the construction methods that became commonplace in large timber bridges in Western Australia, from the 1930s, namely sawn timber half caps, round timber stringers and a superstructure which supported longitudinal decking over transverse beams.[71]

Clackline Bridge (HCWA 10910, MRWA 608) was constructed in 1936 and is located on the Great Eastern Highway at Northam. It is 126.35m long and 8.97m wide. It is a timber bridge with a reinforced concrete overlay constructed in 1978. The Clackline Bridge displays the typical timber superstructure construction methods of the 1930s and has an unusual horizontal/vertical curvature.

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71 Engineering Heritage Panel of the Western Australia Division of the Institute of Engineers (Australia), *Large Timber Structures in Western Australia*, Vol. 1, 1998, p. 1-5.

There are over two hundred bridge listed on the HCWA database. Of these bridges, there is only one bridge (now demolished) constructed in the inter-war period, listed on the State Register of Heritage Places. Gascoyne River Bridge (HCWA 463), now demolished, was a concrete and steel bridge constructed in 1931. It had heritage value as the first concrete and steel bridge constructed in the north west of Western Australia and it is also associated with engineer E.W. (Ernie) Godfrey, who as head of the Bridge Section of Main Roads from 1928 to 1957, was responsible the design of all the bridges built in Western Australia during this time, and construction of the major ones.

Fremantle Traffic Bridge (1939) is representative of large timber bridges built in Western Australia during the twentieth century. It is one of six large timber bridges built during the 1930s in Western Australia.

The Ferry Capstan Base may be compared to other capstan bases. A search of heritage databases Australia wide has revealed only one other capstan. The Horse Capstan Pump and Well, located off the Strzelecki Track in South Australia is an Indicative Place in the Register of the National Estate. The iron whim of the capstan is extant, but little is known of its history. It appears to have been constructed to provide water along the track, which became a major stock route in 1882. A wider search has revealed that there is also a capstan on Kangaroo Island. Its date of construction is unkown, however it was believed to have been a horse drawn winch used by light house keepers to haul their stores up from the sea landing at Harvey's Return.

The Ferry Capstan Base is rare as an uncommon structure as it may be the only remaining capstan base in Western Australia and one of a few in Australia. It is also rare in demonstrating a function of hauling river vessels, which is no longer practised.

13. 4 KEY REFERENCES

No key references.

13. 5 FURTHER RESEARCH

Further archaeological and historical research- possibly using British Government records held in London- could to undertaken to uncover more information about *Ferry Capstan Base*.