

Parramatta River Bridges

by RiverCat

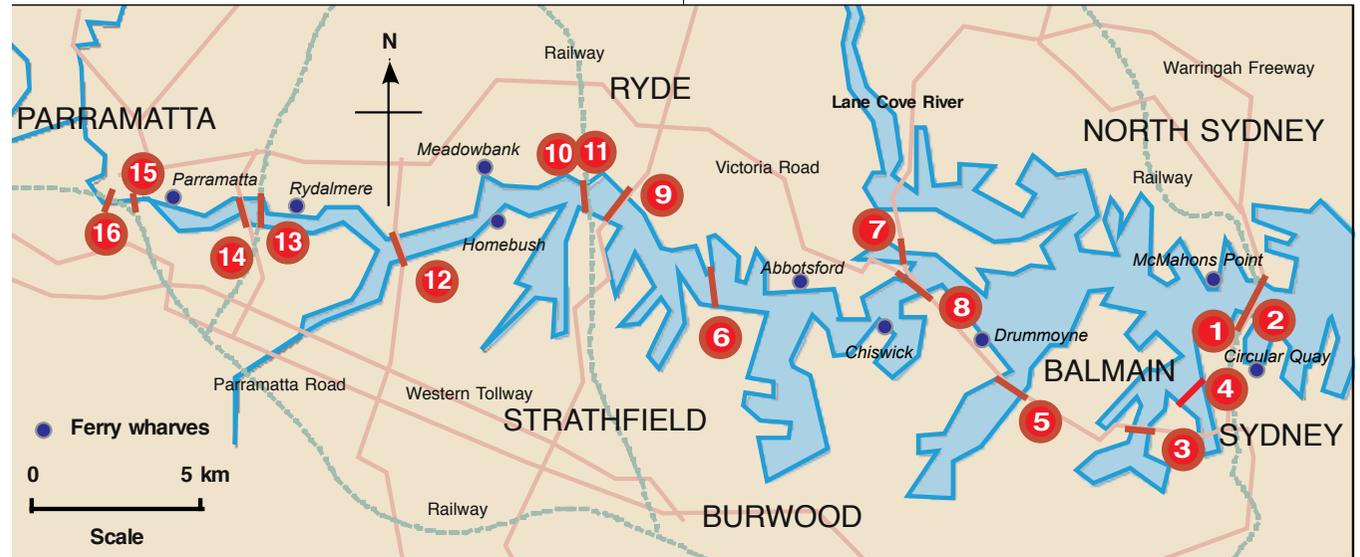
This self-guided tour describes how you can explore the many crossings (bridge, tunnel and ferry) across Sydney Harbour and the Parramatta River as you travel by RiverCat from Circular Quay to Parramatta or reverse. The journey from Sydney to Parramatta takes a little over an hour.

Services depart from Wharf No 5 at Circular Quay. You can also join the RiverCat at other points. Information and printed timetables are available from the kiosk at Circular Quay.

At Parramatta, you can return to Sydney by RiverCat or by one of the frequent fast train services that take you back to the city in 30 minutes.



Self-guided tour



Sydney Harbour and Parramatta River

Sydney Harbour was formed when the estuary of the Parramatta River, and its tributaries, were drowned by a rise in sea level of about 60m at the end of the last Ice Age, around 10,000 years ago. It has a single relatively narrow entrance, which gives protection from the worst of weather, and the steep valley sides allow ships to moor close to shore. It is one of the great natural harbours of the world.

Officially, its name is Port Jackson and it was the site of Australia's first British settlement, chosen for its potential as a port and for a fresh water stream that flowed into it at the future Circular Quay.

But the characteristics that made it such an outstanding harbour for shipping soon proved to be a formidable barrier to land transport. The 35km combination of harbour and Parramatta River isolated settlements on the north side from the town of Sydney on the south side.

The need to provide crossings, particularly bridges, has been a challenge to professional engineers for more than two centuries. This tour explores their solutions.

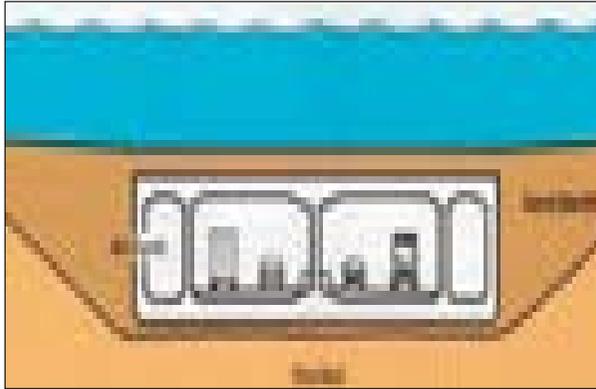
1 The Harbour Tunnel

As the RiverCat begins its turn to pass under the Sydney Harbour Bridge, there is, below the water and slightly to the east, a one kilometre long 4-lane tunnel.

It is made from 8 precast immersed tube sections made of reinforced concrete each weighing 27,000 tonnes. These were manufactured 80km south of Sydney at Port Kembla and then floated up the coast to their harbour site. Land tunnels at each end were driven through sandstone to link up the motorways, a total of 2.3 kilometres.

The ventilation system is located just to the right of the north-east pylon of the Sydney Harbour Bridge and the waste gasses are exhausted through the pylon's hollow interior, like a chimney.

The Sydney Harbour Tunnel proposal by Transfield/Kumagai Gumi Joint Venture was adopted by Parliament in 1987, with Sydney-based consulting engineers Wargon Chapman Partners appointed as Design Managers. Construction began in January 1989 and the tunnel was opened on 31 August 1992. The total 2.3km project cost \$560 million.



Cross section of the submerged tunnel

2 Sydney Harbour Bridge

This mighty steel arch, completed in 1932 was only the third road bridge to cross the waterway after the 1880s iron lattice trusses at Gladesville and Parramatta. A full description of the arch and construction is beyond this brochure but can be seen at the Museum of Sydney.

The method of construction was to build out from both shores, tying back with steel cables anchored deep in the rock behind the unfinished pylons. When the two cantilevers met in August 1930 the structure became an arch, thrusting on the pairs of huge bearing pins at the bases of each pylon. The cranes then moved back down the arch erecting the hangers and deck system.



The Harbour Bridge being constructed, October 1929

Sydney Harbour Bridge Engineers

The concept design was by local engineer JJC Bradfield, with detailed design by British engineer Ralph Freeman. The bridge was built by Dorman Long & Co. of England, supervised by Lawrence Ennis and monitored by Bradfield's team.

The bridge was declared an International Engineering Landmark by the American Society of Civil Engineers in 1988.

This location, where Harbour becomes River and the waterway is only 500m wide, was the site for the earliest crossing; a rowing boat service. A cable-guided steam paddle punt took over in 1842 and continued until 1932, and one of the loading docks can be seen on the eastern side of Dawes Point.

3 Anzac Bridge and 4 Pyrmont Bridge

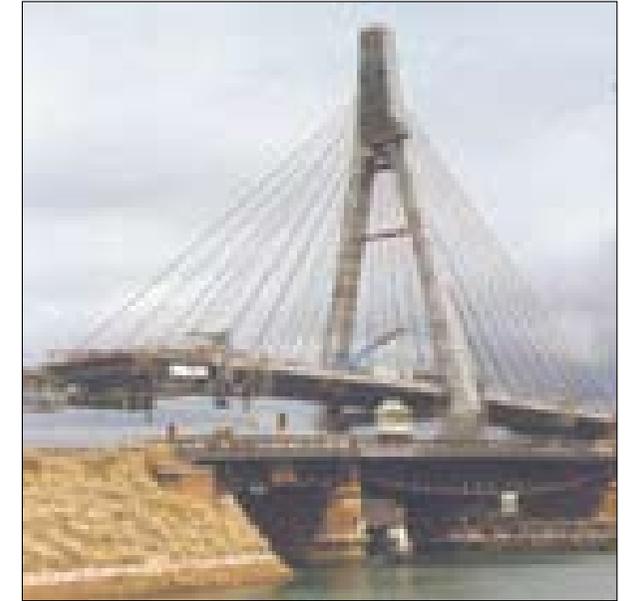
As the RiverCat approaches Goat Island, look left. In the distance are the towers of the cable-stayed Anzac Bridge.

Completed in December 1995 this bridge's centre span of 345m places it in the middle range of the world's large cable-stayed bridges.

To the left of Anzac Bridge, and out of sight is the 1902 Pyrmont Bridge.

This bridge, designed by Percy Allan, was among the earliest electrically operated swing bridges in the world.

Pyrmont Bridge can be reached by walking from the city down Market Street, Anzac



The Anzac Bridge during construction and the 1903 Glebe Island swing bridge, in 1994

Goat and Cockatoo Islands

Your RiverCat passes Goat Island and soon after, Cockatoo Island.

Goat Island was a convict base from 1833–38 when the stone gunpowder magazine was built. The island is part of the Sydney Harbour National Park and tours are available.

Cockatoo Island also began as a prison for convicts then became a ship building and repair facility, and is now disbanded.

5 Iron Cove Bridge

Before the RiverCat reaches Cockatoo Island, look south and in the distance is a long steel truss bridge that was completed in 1956 replacing an 1884 iron lattice bridge carrying Victoria Road over Iron Cove.

This main road continues through the suburb of Drummoyne and on to the Gladesville Bridge.

6 Vehicular Ferries

Vehicular ferries or punts were widespread in New South Wales during the colonial period but most have been replaced by bridges.

There were four sites on the route of this tour but only one is still in service. The old sites were:

- Where the Harbour Bridge is now.
- Just past Gladesville Bridge from Abbotsford Point (south) to Bedlam Point (north).

This site was chosen because of the narrow waterway and the ferry operated from 1831 to 1881 when replaced by the lattice bridge at Gladesville. It had been an essential link in the convict-built Great North Road.

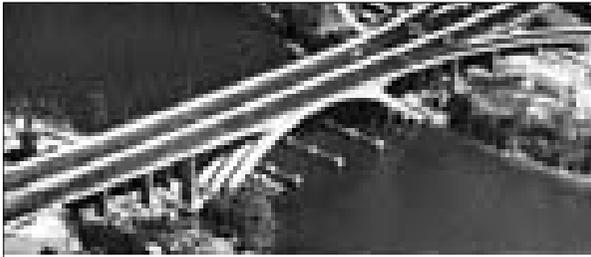
- Where Uhrs Point (Ryde) Bridge is now.

The Kissing Point ferry service operated from 1836 to 1935 linking the suburbs of Rhodes and Ryde.

The only surviving service is:

- Mortlake to Putney.

This ferry came into operation in 1928.



Tarban Creek Bridge

7 Tarban Creek Bridge and 8 Gladesville Bridge

As the RiverCat approaches the large concrete arch of Gladesville Bridge, it will turn to the left. The inlet on your right is called Tarban Creek and it may be possible to glimpse the prestressed concrete frame and sloping legs of Tarban Creek Bridge.

This bridge is part of the Gladesville Bridge complex completed in 1964. Prior to that, Parramatta River was crossed a little west by an 1883 iron lattice bridge with a swing span near the southern shore which allowed colliers and other vessels to pass.

Gladesville Bridge is in fact four arch ribs side by side—look up as you pass under the bridge.

Each rib was assembled from precast hollow concrete boxes on falsework right across the river. When a rib was made self-supporting it lifted off the falsework which was then moved sideways for the next rib and so on. The traffic deck is a series of prestressed concrete girders on slender reinforced concrete columns. At completion in 1964 this bridge was the largest concrete arch in the world with a span of 305m. It contains 50,000 tonnes of concrete and has a clearance of 37m above high tide.



Hollow concrete box units being assembled to construct the Gladesville Bridge

As the RiverCat continues the journey to Parramatta, there appears on the south side an extensive park land and a large mansion.

It was built in the 1860s by wealthy philanthropist Thomas Walker and currently the whole estate is part of the Repatriation Hospital for ex-service people.

9 Uhrs Point (Ryde) Bridge

Ahead is a set of steel trusses and two steel towers, the Uhrs Point lift bridge completed in 1935.

This was the only lift bridge built across the Parramatta River whereas all the other moveable span bridges were swing bridges because they did not restrict mast or funnel heights. Initially it was financed by the Ryde Municipal Council to stimulate development of its suburbs. Tolls were charged until the bridge was handed over to the Government in 1949. With the decline of upstream shipping needs, the lift span was locked and the counterweights removed.

Residential development, and some industries, duly occurred, and expanded, such that by the 1980s traffic demands exceeded the old bridge capacity. A new bridge was built on the eastern or downstream side using steel trough girders, closed on top by a composite concrete running deck, and completed in 1987.

10 Meadowbank Railway Bridge and 11 The John Whitton Bridge

These are the old and new railway bridges at Meadowbank.

The two bridges display different technologies that are 100 years apart. The first to come into view is a typical iron lattice bridge completed in 1886 to carry the Main North railway out of Sydney to Newcastle. It was typical of the British bridge favoured by Engineer-in-Chief,

John Whitton, whose achievements during 35 years in office earned him the title of 'Father of New South Wales Railways'. This bridge was erected on temporary timber falsework between the cast iron piers. This double-track bridge has been out of service since 1980 but is now to have a narrow concrete deck added for pedestrians and cyclists.

The replacement bridge on the upstream side is a marked contrast, being pairs of welded steel box girders, fabricated off-site and trucked to the north shore and conveyed to their piers by a special floating crane.

12 Silverwater Bridge

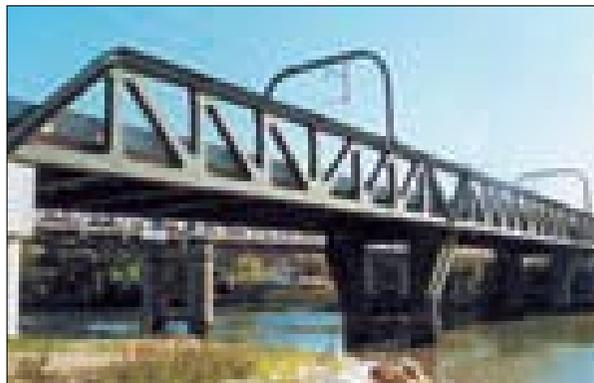
Upstream, a graceful concrete road bridge with curved undersides crosses the river.

It was the first prestressed concrete box girder bridge in New South Wales. It was built from a series of precast concrete boxes supported on temporary steel trusses between the piers and was completed in 1962.

13 Camellia Railway Bridge

This bridge comes into view after the River-Cat negotiates a sharp S-bend.

It is welded steel truss and is the latest bridge, 1995, over the river.



The Camellia Railway Bridge

14 James Ruse Drive Bridge

This prestressed concrete bridge was completed in 1966.

15 The Macarthur Bridge

Iron lattice bridges were common from 1870 to 1893, about 20 road bridges and 12 railway bridges were built and most are still in service. Unofficially called the 'Gasworks' bridge after a nearby gasworks, it was completed in 1885.

16 Lennox Bridge

David Lennox was the great stone arch bridge builder in the 1830s and 40s. Completed in 1839 to carry Church Street, this is the oldest bridge on the tour. The downstream half is original construction with concrete widenings of 1912 and 1935 on the upstream side.



The Lennox Bridge

ASHET self-guided tour brochures

This brochure is one of a series describing self-guided tours to places of engineering and technological interest in the Sydney area. All of the brochures are published in pdf form on the ASHET website www.asvhet.org.au where they may be viewed and downloaded for printing on a desktop printer.

The full set of brochures is as follows:

The Sydney Harbour islands

Self-guided tours by ferry

Ryde to Tempe: discovering the history and industrial heritage of Rhodes, Concord, Canterbury and the Cooks River

Self-guided cycle tour

Sydney's colonial fortifications

Self-guided tours

Sydney Harbour Bridge

Self-guided walk

The engineering heritage of Sydney's maritime industries

Self-guided tour by ferry

Steam at the Powerhouse

Self-guided visit to the museum

Parramatta River bridges

Self-guided tour by RiverCat

Sydney Water: A day tour of the water supply dams south of Sydney

Self-guided tour by car

Engineering and industry on three Sydney Harbour islands

Self-guided tours of Fort Denison, Cockatoo and Goat Islands

An engineering walk around the Sydney Opera House

Self-guided walk

ASHET, the Australian Society for History of Engineering and Technology, was formed in June 2003. Its objects are to encourage and promote community interest and education in the history of engineering and technology in Australia. For more about ASHET, visit the website www.ashet.org.au.