

Causeway Pedestrian and Cyclist Bridges Project

Construction Fact Sheet



Figure 1 View of the bridges from Point Fraser (concept only)



Figure 2 View of the bridges from McCallum Park (concept only)

The Causeway Pedestrian and Cyclist Bridges Project will see two iconic cable-stayed bridges, comprising a 6-metre-wide segregated path linking the Victoria Park foreshore with Heirisson Island (Matagarup) and Perth's CBD at Point Fraser. The bridges are being built about 90 meters downstream (to the west) of the existing Causeway traffic bridge. The bridges will be made of weathering steel, which looks worn and rusted over time and requires low maintenance. This rusted look has been selected to blend with the natural environment and architectural vision.

Work sites have been established at McCallum Park, Heirisson Island (Matagarup), and Point Fraser, as well as construction occurring in the river channels north and south of Heirisson Island. The project is being delivered by the Causeway Link Alliance (the Alliance) comprising Civmec, Seymour Whyte, WSP Australia together with Main Roads WA.

Whether you are a path user, road user or river user, please always proceed with caution and adhere to signage throughout the area.

What's extraordinary about the bridges design?

- The bridges are the widest in the world to have a cable stay attachment on only one side of the deck. The width of the bridge deck is at least six metres throughout and 13 metres at its widest point.
- The bridges have only three pylons entering the river, to minimise the impact on the culturally and environmentally significant Swan River (Derbal Yerrigan).
- The bridges are supported by 64 steel cables, which equates to almost three kilometres of cable end to end. If it were to stand alone, the largest cable can hold a weight of 760 tonnes, which is equivalent to about 150 elephants!
- This will be the first bridge in Australia (and possibly the world) to feature a boomerang-shaped pylon. You can read more about the Aboriginal Cultural Heritage and design elements of the project in this [Fact Sheet](#).

- The bridges have been designed and tested to accommodate people running in a large marathon event (the standard requirement is to design and test for just four people jogging in a group).
- The lighting system is a bespoke design for the bridge. There are lights integrated into the stay cable every 300mm on both bridges and they light up both sides of the cables. This integrated design is world-class and will allow for moving light displays on the bridge’s cables.

Manufacturing the bridges

The bridges are being built of steel, with the fabrication works being carried out at Civmec’s Fabrication Workshops in Henderson, 35 kilometres south of Perth. Steelworks for the bridge consist of deck segments, piles and three pylons.



Figure 3 Premier, Deputy Premier and Federal Member for Swan walking along a bridge segment with apprentices at Civmec’s Workshop

The curved steel deck segments, which include the deck and all the supporting infrastructure, are complex to manufacture as they curve both horizontally and vertically. Each bridge deck segment measures 22 to 42 metres in length, with a total of 16 segments that will be joined together to form the two bridges. No two deck segments are the same, which adds to the complexity of the installation methodology.

Also manufactured at Civmec’s facility are the three pile caps. A pile cap is a support structure placed in the river which attaches to the piles and pylon, which is then attached to the bridge segment. A pile cap creates a stable foundation by distributing the weight load of the bridge over the piles. Three pile cap shells, one for each pylon, are being made by pouring concrete into a steel mould. Each shell weighs approximately 85 tonnes.



Figure 4 Bridge structure

Due to the large size and weight of the bridge deck segments, pylons and pile cap shells, they will be transported to the site by road. This will mostly occur at night under traffic management to minimise the impact on public road users.



Figure 5 The first of the fabricated bridge deck segments’ being delivered to site.

Preparing the land for the bridges' installation

Ground improvements are required to create a solid landing for the bridges to touch the ground at each location. This is to ensure the stability and safety of the bridges. Ground improvements involve the installation of columns and a platform to provide a stable base for the embankments, which are then preloaded with yellow sand fill. To allow for settlement, the fill must rest for a period of time, ranging from six to 12 months. This is essential to ensure the longevity and safety of the bridges for the community.



Figure 6 The bridge abutment constructed at McCallum Park

Marine works

Construction work in the river began in November 2023 with the creation of a temporary loadout facility, resembling a jetty, at the Project's McCallum Park site. This facility is being utilised to transport equipment and materials onto vessels and barges working in the Swan River (Derbal Yerrigan).

Works started in the southern channel between McCallum Park and Heirisson Island (Matagarup), before moving to the northern channel and across to Point Fraser.

The first step involved piling in the river, where piles fabricated at Civmec's Workshop were driven into the riverbed to support the new bridges. Six piles are required for each of the three pylons. Additionally, temporary piles have been installed as temporary supports for the bridge structures during the construction process.

There are several management controls in place to minimise potential impacts to aquatic fauna during construction. These include underwater noise and vibration monitoring and the use of spotters during all

marine works. This will ensure that no potentially harmful activities (such as pile driving) are undertaken if fauna are present within the designated exclusion areas.



Figure 7 The Alliance team conducting water monitoring



Figure 8 Piling in the river in the northern navigation channel

Once piling is complete, each of the three pile cap shells are installed onto a set of six piles. Once installed they are filled with approximately 50 tonnes of concrete to reinforce the structure.

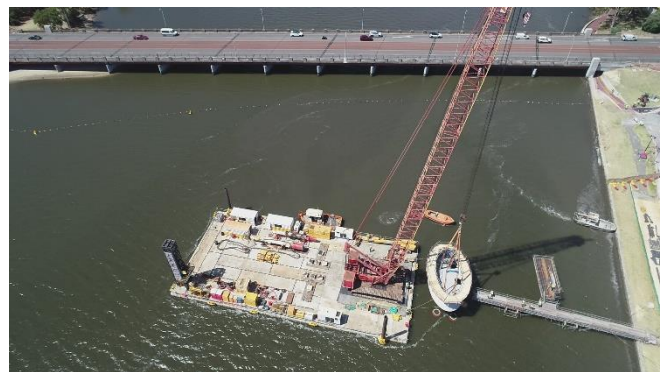


Figure 9 Pile cap shell being installed in the southern channel

Bridge installation

The construction methodology for the bridges is complex due to their unique design.

Segment and pylon installation

Bridge segments ranging from 22 to 42 metres in length will be installed from McCallum Park to Point Fraser in a south-to-north direction. Each bridge deck segment will be installed using a combination of crane lifting strategies depending on their size, weight and placement.

The segments will be lifted, swung slowly into place and gently lowered onto temporary piles. Once in place, the bridge deck segment will be bolted to the connecting deck segment. As the bridge segments reach each pile cap, the pylons will be installed. Due to their size and weight, pylons will be installed by a dual crane lift, with the pylon being swung slowly into place over the pile cap, lowered and aligned to the pile cap base plate, which will then be bolted and welded. This methodology is subject to change.



Figure 10 Installation of the segments, pylons and pile caps is complex and will involve a range of crane lifts (dual and single). Images shows one crane, fabricated piles and a pile cap shell on site at McCallum Park.

Stay cable installation

Once all the bridge segments have been fully installed, welded, inspected, and signed off, the next step is to install the bridge stay cables.

Each stay cable is composed of multiple steel cable strands that are delivered in a coil and then cut on-site. The length of the shortest cable is 17 meters, while the longest one is 94 meters. The number of strands in each cable varies from three to 27, depending on the weight-bearing capacity required.



Figure 11 Each cable will have multiple steel strands inside.

To do this, a crane will be used to lift and place each cable into position. Each cable will be attached to the pylon and the bridge deck segment, one cable at a time, in a symmetrical manner. The shortest cables will be installed first from the bottom of the pylon to the longest cables at the top.

Each cable will be pre-tensioned before the installation of the next cable. The stay cables will be installed at one pylon at a time for each of the three pylons, from McCallum Park to Point Fraser in a south-to-north direction. After installing and completing stages one and two of tensioning all the stay cables, the weight of the bridge will be carried by the three pylons and the bridge will slightly rise off the temporary piles. Once this happens, the temporary piles can be removed, and the structural bridge installation process will be complete.

Next steps

After the installation of the bridges, additional work is required before they can be opened to the public. This includes the installation of safety measures such as handrails, lighting and CCTV. The cables of the bridges will be fitted with feature lighting, and landscaping, including public art installations will be undertaken around the three sites at McCallum Park, Heirisson Island (Matagarup), and Point Fraser.



Figure 11 Landscaping concept (trees at maturity)

Further information

If you have any questions, please contact 138 138 or email enquiries@mainroads.wa.gov.au

More information about this project is also available on the project webpage and you can also subscribe for updates: www.mainroads.wa.gov.au/causeway-path