

## VITAL INFRASTRUCTURE REBUILD IN BRISBANE

Commuters and businesses in Brisbane have welcomed the completion of several new ferry terminals along the Brisbane River. Severe flooding in January 2011 damaged or demolished much of the maritime infrastructure along the river, including the Brisbane City Council's ferry terminals.

The Council awarded builder McDonnell Dowell the construction contract for the Flood Recovery and Milton Ferry Terminal construction contract. The project scope included new ferry terminals, replacing or upgrading existing facilities along the river and relocating two terminals to improve accessibility to other public transport and infrastructure.

Precast concrete was the clear choice for this major project, chosen for its high quality, durability, off-site manufacture and ease of installation. National Precast member Precast Concrete Products, based in Carole Park in Brisbane's west, was engaged to supply precast pilecaps, spires and stairs.

According to Precast Concrete General Manager Colin Ginger, the project called for a total of 14 pilecaps, with seven lower and seven upper components. The lower pilecaps weighed 10 tonnes, and were 4 metres x 5 metres x 1.2 metres tall. The upper pilecaps were heavier at 15 tonnes

and 3 metres tall. There were also seven spires, one for each pile cap. These were up to 10 metres tall and weighed up to 20 tonnes. Two main stair flights were also manufactured for a couple of the terminals.

The elements were installed at seven new terminals: at the University of Queensland at St Lucia, Regatta at Toowong, North Quay in the CBD, Queensland University of Technology Gardens Point in the CBD, Holman Street in Kangaroo Point, Sydney Street in New Farm and Milton.

Mr. Ginger says the finish for this project was particularly important. "We needed consistency of colour and a blemish-free finish, so we used super flow self-compacting concrete. The result was a superior quality off-form finish," he says.

The stair flights were finished with off-form colour-controlled grey, while the pile caps and spires have an off-form finish in black concrete.

Steel moulds with stronger than usual bracing were used to manufacture the complex shapes required. Six of the ferry terminals are on one side of the Brisbane River, but for the seventh on the opposite side, the moulds had to be rebuilt from scratch to manufacture a mirror image.

"The geometric shapes required for the terminals were quite complex," says Mr.



One of the completed ferry terminals.

Ginger. "The use of heavily braced high performance moulds allowed us to contain the shapes and the result was impressive."

The new terminal designs integrate technical innovation, flood resilience and elegant form. They have been constructed to be flood resistant and withstand a one-in-500-year flood event. ■

## NARROWS MARINE CROSSING PROJECT



The Narrows Crossing Tunnel is one of the longest trenchless marine pipelines ever constructed.

One of Queensland's biggest gas industry projects has been connected to the world, with a complex under water tunnel. It's one of the longest trenchless marine pipelines ever built.

The Narrows Crossing Tunnel has been constructed under Gladstone Harbour, off the central Queensland Coast. It's a vital link in a 420-kilometre underground pipeline route transporting coal seam natural gas from near Roma to the Santos GLNG facility on Curtis Island, where the gas is converted into liquefied natural form for export.

Contract miner Theiss required a technical solution to optimise productivity, while protecting the marine mangrove environment and causing minimal impact to the surrounding coastal areas. Theiss completed the works for Saipem Australia, the principal contractor on the multi-billion-dollar Santos GLNG Gas Transmission Pipeline Project.

National Precast member Precast Concrete Products, based in Carole Park in Brisbane's west, was contracted to supply the precast concrete for the project. The 4.3-kilometre-long tunnel, with a 3.4-metre internal diameter, was constructed with high performance

precast segmental lining.

Director Ian Coulter says precast concrete was chosen to ensure reliable delivery, easy segment installation and a high quality finish. "We had to specially manufacture 22,000 concrete segments for the tunnelling," he says

The timeline of the project was challenging. According to Mr. Coulter, high-precision moulds were cast twice a day, six days a week using advanced concrete technology and curing methods: "That ensured we met the tight delivery schedule and meant the

tunnel-boring machine could run uninterrupted around the clock."

The precast segments were installed as the tunnel was bored and a cement-based grout was injected behind the segment lining to permanently seal the tunnel.

The Narrows Crossing Tunnel project has also been recognised for its innovation, with Theiss, Saipem Australia and Santos GLNG winning the prestigious 2014 Premier's Sustainability Award in Australia, under the category "Innovation in Sustainable Technologies". ■

## WAEGER PRECAST CONTRIBUTES TO NEWCASTLE ANZAC MEMORIAL WALK

National Precast member Waeger Precast has contributed to the Newcastle Memorial Walk, a new structure commemorating the sacrifices of ANZAC soldiers.

Waeger Precast supplied the precast concrete for the \$4.5 million project to holding company Waeger Constructions, winner of the competitive tender to build the project. The company is based at Rutherford, in the Hunter Region of New South Wales, and specialises in small to medium-sized bridges, civil construction and precast products.

The raised walk stretches 450 metres with a 160-metre-long cliff-top bridge structure and connects Strzelecki Lookout to Sheppard's Hill Reservoir at Bar Beach, NSW. The project includes seven precast pylons, which hold the bridge span above the cliffs. These "Y" shaped piers are up to 8.8 metres high, with a width at the top of 3.4 metres. The seven columns were manufactured with custom steel moulds and a sandblasted finish.

According to Managing Director of Waeger Constructions Michael Waeger, manufacturing the columns had its challenges.

"It was very important to achieve a high quality finish, the columns were manufactured from a coloured mix containing limestone aggregate, with quite a heavy sandblasted finish to accentuate the aggregate. Despite the sandblasted finish, attention to detail with the mould fabrication to prevent surface defects and mould leakage was very important to achieve the high quality finish. De-moulding and onsite handling was also an issue due to the columns being quite long slender elements," Mr. Waeger says.

The company also manufactured viewing



The Newcastle Memorial Walk raised walkway stretches 450 metres.

platform seats, made using the same concrete mix as the columns. With a polished finish, the seats are an impressive feature of the project. These seats were cast upside down in custom steel moulding. To avoid lifters in the seen faces, the seats were installed using an inverted lifting arrangement. Integrated LED lighting gives the impression at night that the seats are floating.

Other features include artwork cutouts at the beginning and end of the bridge, a stainless steel truss system, stainless steel handrails, a composite fibre deck and three viewing platforms.

Mr. Waeger says the Memorial Walk project is important in terms of what it represents. The Walk incorporates silhouettes of soldiers, with 3,860 family names engraved on them. These names represent almost 11,000 men and women from the Hunter Valley, known to have

contributed to the World War One war effort. As well as commemorating the Gallipoli landing in 1915, the project also marks 100 years of steel making in Newcastle, which was established to provide steel rail to the war effort. In recognition of this link, BHP Billiton contributed \$3 million towards the project, with another \$1.5 million coming from Newcastle Council.

"This is such a significant undertaking, and a career highlight," Mr. Waeger says.

"During my 25-year engineering career I have worked on some exciting projects, but I see this as being the pinnacle project to date. I am extremely excited and particularly proud to be involved in the Memorial Walk."

The Memorial Walk is expected to become a major tourist attraction for the region after opening in April in time for the 100th anniversary of ANZAC Day. ■