

PRECAST DELIVERS INNOVATIVE, LONG LIFE SOLUTION

The new Northern Link tunnel project in Brisbane consists of two bored tunnels capable of carrying two motorway-grade lanes of traffic in each direction. The tunnels, 4.6 kilometres in length, pass underneath the suburbs of Toowong, Auchenflower, Milton, Paddington, Red Hill and Kelvin Grove and are expected to carry 34,200 vehicles a day. Officially known as Legacy Way, the tunnels have been named in honour of the brave men and women who have served in the Australian Defence Force.

The tunnels have several interesting precast concrete features including a storm water management system, a longitudinal ventilation system and a fire protection system. The project's contractor, Transcity Joint Venture, engaged National Precast member Humes to supply these precast elements for the project.

The type of stormwater management system chosen was a clean water precast sump solution, because it could be adapted to meet the complex project requirements. By customising the system and exceeding standard requirements, the precaster delivered a future-proofed solution, which improves the structure's fatigue management. The ability to tailor the system's design was a key requirement for the client, as it was being installed beneath a major arterial road. This meant repairs or enhancements could not be made without digging up the road and causing major traffic disruption. The design incorporates dragging access for every row of modules. This is an important safety feature as it is easier for a maintenance worker to be



The above-ground precast outlets comprise 470 precast segments.

rescued if needed; they can be pulled through the chambers without negotiating any upstands.

By taking advantage of strength and durability of precast concrete, the asset owners were provided with a stormwater management system with a certified design life of 100 years.

The precaster supplied a fire protection system consisting of 140 precast units.

The system was manufactured with built-in weirs, which separate and contain chemicals in precast chambers. In the event of a spill on the tunnel roadways, the hazardous fluids flow by gravity into the system, minimising the opportunity for fire to start and spread within the tunnel. The trapped chemicals can be easily extracted by a vacuum hose and appropriately disposed of. Any clean run-off from the wash down would then be separately

pipled to the tunnel's low point structures. Each unit provides a storage volume of approximately 100 litres.

The mould designs for the precast elements needed to be flexible enough to accommodate varying site locations. Units were installed in both negatively and positively graded positions. The high quality precast design of the units ensured a rapid and simple installation.

Above-ground ventilation outlets are typically constructed using the slip form or steel form in-situ methods. Constructing above-ground ventilation outlets using traditional methods, however, typically requires many weeks and is susceptible to bad weather.

This was the first time a segmental precast solution had been used as the core structure for an above-ground ventilation outlet. Extensive research, modelling and testing was conducted ensuring the outlets could withstand wind conditions and seismic loadings while also meeting durability requirements. The precaster provided a one-stop shop solution for the project, providing design, documentation, manufacturing and delivery.

The above-ground precast segmental outlets were manufactured nearby and assembled on site within days. Located at the eastern and western portals of the tunnel, the two outlets measured 24 metres high and 19 metres high. Each outlet comprises a footing structure and series of rings made up of 470 precast segments. The outlet exteriors were finished with architectural treatments sympathetic to the local environment. ■

PRECAST INTEGRAL TO GATEWAY WA PROJECT

Gateway WA Perth Airport and Freight Access Project is Western Australia's largest ever road project, at a cost of \$1 billion. Gateway WA aims to create an iconic gateway to the state, as well as improving the safety and efficiency of one of WA's most important transport hubs. This significant project is jointly funded by both the Federal and Western Australian Governments, and delivered by an alliance of partners.

The project incorporates construction of

165 kilometres of road, seven underpasses, seven kilometres of noise walls, thousands of square metres of retaining walls, numerous ancillary precast elements and 11 major bridges. Precast concrete was an essential component of the build. Of the 11 bridges, seven have been constructed using TeeRoff precast prestressed concrete beams, while four used precast pre-stressed concrete planks.

Perth-based precast concrete manufacturer

and National Precast member Delta Corporation Ltd was contracted to supply precast concrete for parts of this significant infrastructure project.

The precaster supplied TeeRoff beams, parapet panels, earth retaining wall panels and Deltacore floor planks. All these elements were manufactured at Delta's precast factory in Herne Hill.

According to Delta Executive Director Matt Perrella, the company's expertise

is well recognised in the civil construction industry. "Our state-of-the-art facilities and high capacity prestressing beds cater for varying component sizes and high volume," he says.

"Precast was chosen for this project because of its structural quality and the speed of construction. It's simply more efficient to manufacture off site. In this case it was less expensive and it also ensured there was minimal disruption to traffic," Mr Perrella adds.

The precaster manufactured 86 TeeRoff beams in varying sizes ranging from 75 to 168 tonnes each for the project. The largest beam weighed 168 tonnes, with dimensions of 39.5 metres long, 4.85 metres wide and 1.6 metres thick. These beams are the heaviest Delta has ever produced.

Two of the major Gateway WA bridges support single point urban interchanges



Eleven bridges were constructed as part of the Gateway WA Project.

to ensure efficient movement of the large traffic volumes involved. The larger of these bridges utilises 26 TeeRoff beams for the major part of its width, and a combination of precast and in-situ concrete for the flared edges. In addition, Delta manufactured 1916

square-metre retaining wall panels, parapet panels and more than 1000 square-metre Deltacore floor planks and parapet panels for this project.

The Gateway WA Project aims to standardise design throughout the project as much as possible. But each bridge needed to meet distinctive requirements that called for customisation.

To meet the varying constraints across the project, precast was ideal to accommodate varying foundations and support conditions.

The delivery program for Gateway WA is planned in a staged approach to minimise disruption to the community and road users. As a result of this staged approach, Delta completed the final delivery of the TeeRoff beams 10 months ahead of schedule.

The full scope of works is due for completion by the middle of 2016. ■

THE RIGHT INFRASTRUCTURE INVESTMENT WILL PAY OFF



National Precast CEO Sarah Bachmann

Sarah Bachmann, CEO, National Precast

Let's face it, infrastructure spending decisions are politically driven. The Treasurer Joe Hockey claims his Government is "rolling out the biggest infrastructure programme in Australia's history, with new road and freight corridors being built right across the country". In its recent budget, the Federal Government describes itself as "nation building", investing to build world-class infrastructure for a stronger Australia. But is this going to be enough to support our living standards and economic competitiveness?

Last year's Productivity Commission Inquiry

Report into Public Infrastructure found that while investment in efficient infrastructure provides services which can improve productivity and the quality of life, poorly chosen infrastructure can do the opposite by reducing productivity and financially burdening the community for decades. The Commission highlights just how important it is to properly assess and prioritise infrastructure investments. The key is that any spending on infrastructure has to be on the right projects.

Strengthening the argument and pinpointing the gaps is Infrastructure Australia's Australian Infrastructure Audit Report. With population and economic growth set to cause increasing congestion and bottlenecks, it warns that productivity and quality of life will be tested without proper infrastructure spending. According to Infrastructure Australia Chairman Mark Birrell, "experiences of transport networks failing to keep pace with demand, water quality standards being uneven, energy costs being too high, telecommunication services being outdated, or freight corridors being neglected are now so common that they necessitate a strategic response".

Another issue raised by the Audit is the need for integrated infrastructure and land-use planning across all levels of government. You'd think that would be a given, but

instead all levels of government are failing to meet community expectations for strategic decision-making. We should be demanding better.

At the same time, there is political pressure on federal and state governments to reduce debt levels and improve their budget positions. The result: cash-strapped governments loath to increase debt. The thing is, if we look beyond political pressures, infrastructure spending can in fact significantly boost growth. It's potentially a win-win. The infrastructure not only provides jobs, the manufacturing and construction sectors are bolstered, the government gets income tax from the workers and communities get better facilities for the future.

With unemployment rate at a relatively high 6.1 per cent and interest rates at an all time low, now should be the time to borrow big and give our construction and manufacturing industries a vital boost through even more infrastructure. It's time to prioritise, borrow and build, engage with local communities and have our three tiers of government working efficiently together. We need to invest in essential facilities and services - better roads, rail, harbours, water, power, hospitals and schools. Now is the ideal time to borrow billions and invest in Australia. ■