



## 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 km 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.

### **Storm water management system**

The type of storm water management system that was chosen as a clean water precast sump solution, because it could be adapted to meet complex project requirements. By customising the system and exceeding standard requirements, the precaster delivered a future-proofed solution which improved 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, which meant repairs or enhancements could not be made without digging up the road and causing major traffic disruption. The design also met strict safe access requirements, by incorporating dragging access for every row of modules. This was an important safety feature which makes it easier for a maintenance worker to be rescued if needed, as they can be pulled through the chambers without negotiating any upstands.

### **Precast manufacturer**

Humes Australia

### **Contractor**

Transcity

[www.nationalprecast.com.au](http://www.nationalprecast.com.au)



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

### **Fire protection system**

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 natural gravity into the system, minimizing the opportunity for fire to start and spread within the tunnel. The trapped chemicals can be easily extracted by vacuum hose and appropriately disposed of. Any clean run-off from the wash down would then be separately piped to the tunnel's low point structures. Each unit comprised a bottom, middle and top chamber with a grated lid and solid cover, providing a storage volume of approximately 100 litres. The units were installed at regular intervals in the tunnel roadway.

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

### **Longitudinal ventilation system**

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 entire solution was certified by the precaster, reducing the risk to the contractor and providing a certified design life of 100 years for the asset owner.

The above-ground precast segmental outlets were manufactured nearby and assembled on site within days, delivering a rapid and cost effective solution. 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.