



PRECASTER

ACN 051 987 181 • ISSN 1037-9908

www.nationalprecast.com.au

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Holy trinity

A heritage-listed 1865 sandstone cathedral and its staid, 1930s rear addition have received a total new look thanks to the clever addition of a third uniting element – with award winning results.

St Mary's Cathedral is one of Perth's historical landmarks, so when the decision to refurbish the beautiful old church was made, all eyes were upon the \$32 million project.

The requirement was to develop an architectural treatment that would unify its disparate front and rear buildings and remain true to the classical beauty of the original sandstone church proper, – while also meeting modern day practical requirements.

This included expanding seating numbers, improving the internal layout and sight lines to the church's sanctuary, improving the acoustics and ensuring the integrity of the mausoleum crypt – while still accommodating the practicalities of the church's administrative and parish functions, including the provision of public toilets and car parking.

To help meet this challenging brief, architect Peter M Quinn decided to situate some of the practical functions – such as car parking – underground, giving him free rein on the aesthetic front at street level.

Precast concrete was chosen for a number of different elements because of its architectural and structural qualities. The feature columns and stairwell panels form an integral part of the building structure but also provide a high quality architectural finish.

The architect invited Delta Corporation to work with the design team and the building contractor to provide its architectural precast expertise to supply a product that would fulfil all aspects of the project's stringent requirements.

According to Delta Corporation's Matt Perrella, these precast components were all designed and moulded to echo the features of the original 1865 building, and included soaring columns up to 15,540mm high, 1200mm wide and 300mm thick, the signature spired tower, the clerestory, nave, spandrel wall panels and processional forecourt columns. Also in stainless steel reinforced precast, and manufactured in a purpose-made fibreglass mould, is the Cathedral's signature feature: the cross that sits atop and clearly unites the elements of the cathedral precinct.

To ensure sympathetic blending with the original sandstone building, the precast featured a mixture of coloured off-form and lightly grit (sand) blasted finishes.

These new precast elements now form a third, uniting link between the two original sections of the church, providing a literal 'happy medium' that now presents a seamless face to the world.

The verdict on the finished project has been that all-too-rare one in public and heritage architecture circles: overwhelmingly positive. Parishioners, the design

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and architectural community and the Roman Catholic Church are united in their appreciation of their new place of worship. And the outstanding vision of architect, Peter M Quinn has also been recognised. The project received top billing in the 2010 WA Architect Awards, winning the top award, the George Temple Pool Award, an Architecture Award in the heritage category and the Jeffrey Howlett Award for Public Architecture.

According to reports of the Awards presentation, the project was described by the President of the Australian Institute of Architects' WA Chapter as a 'clear standout' from more than 100 entries.

- Location:** Perth WA
- Developer:** Roman Catholic Church
- Head contractor:** EMCO Building
- Architect:** Peter M Quinn Architect
- Engineer:** BG & E Consulting Engineers
- Precast manufacturer:** Delta Corporation



Precast boardwalk specified for durability and low maintenance



A concrete boardwalk manufactured by Rocla has provided a durable and attractive solution for a steeply graded section of a discovery trail at a new dam project in the ACT.

The Cotter Dam is being increased in capacity to secure the ACT's water supply. A new dam downstream of the existing one will increase the Cotter reservoir capacity from 4 gigalitres to around 78 gigalitres, almost 20 times its current size. ACTEW Corporation, working with ActewAGL, formed the Bulk Water Alliance with GHD, Abigroup and John Holland to design and construct the enlarged dam, as well as other water infrastructure projects to secure future water supplies and address drought, climate change and climate variability.

Following community feedback, a discovery trail was designed and installed to allow access by the public to get a better and safer viewing location of the construction process at the new dam wall. The boardwalk system was used to connect the elevated viewing platform to the river trail below via gently graded accessible sections, with stepped 'short cuts'.

"The platform is situated approximately 350 meters southeast of the new dam, so visitors are close enough to see construction teams working on the eighty meter high dam wall," ACTEW Managing Director, Mark Sullivan said. "It's not often that a dam of this scale and size is built, particularly in such a picturesque setting so close to a major city."

Around 400 metres of boardwalk connects the walkway track beside the river up to a viewing platform, then down a steep gully on the other side to rejoin the access track.

The boardwalk is supported on precast stumps and 375mm diameter steel-reinforced concrete pipes, both also manufactured by Rocla, with galvanised handrails and wheelchair rails. The system was specified by the Bulk Water Alliance landscape architect for its durability and low maintenance.

The 2m wide walking trail and 16m wide viewing platform allow the public to enjoy the Cotter River environment and watch construction of the dam wall.

- Location:** Cotter River, ACT
- Client:** Bulk Water Alliance (GHD, Abigroup, John Holland, ACTEW Corporation, ACTEW AGL)
- Precast manufacturer:** Rocla



An architect's Modernist approach with precast

With the construction of 25,000 homes per year required to keep up with the demand for Sydney's expanding population, the challenges faced by Modernism have resurfaced in a local context.

In describing the project, architect Philip Thalís writes, "A central tenet of Modernism, beyond style, was the provision of mass economical housing, constructed of authentic techniques."

According to Michael Lewarne and Angelo Korsanos from Redshift Architecture & Art, precast concrete with its systematic approach to construction provides an efficient and cost effective solution for supplying housing to Sydney's expanding population.

"The apartment building at Jacobs Street Bankstown exemplifies many of Modernism's principles, providing 54 apartments organised in a highly efficient arrangement with one lift core and only two corridors over nine floors. Almost all units are cross ventilated with a high proportion of service areas located on perimeter walls, avoiding the necessity for mechanical ventilation. The character of the building is developed from its organisation, construction, assembly and response to solar orientation", says Angelo.



The plan of the building is configured as a "T". The head of the "T" defines the street edge and faces west. It is comprised of narrow cross-section single level apartments serviced by a lobby at each level. Its stepped and modulated street facade of precast with projecting balconies angled to north and overlaid with metalwork elements regularise the facade, screen the western sun and provide privacy from adjoining balconies.

Two storey crossover units located in the downstroke of the "T" are oriented to north and are consolidated around two corridors over 6 floors. The overall composition is articulated as a series of paired balcony bays attached to a linear block with the deep slots between the bays providing light and ventilation to the depth of the plan. Built over a landscaped podium for communal use incorporating three levels of carparking, the character of this portion of the building is more directly characterised by its precast assembly.

According to Chris Parsons from Hanson Precast, the structure of the building is comprised of 1055 precast units. 376 off-form precast wall panels (or 5,694m²) were used, which ranged between 150mm and 200mm thick. The floor structure included 606 precast hollowcore planks (4,865m²) which were 150, 200 and 250mm thick, together with 73 Transfloor panels (640m²) which were 65mm and 75mm thick with 150mm wide by 180mm high upstands.

Talking about the role of precast in the project, Redshift believes that the use of precast complemented the organisational efficiency of the building with a speed of erection that can only be achieved by prefabricated construction. "Precast is a natural match to the systematic approach of the building and the principles of Modernism" says Angelo.

Location: Bankstown NSW

Developer: Gridcorp

Architect: Hill Thalís Architecture & Urban Projects and Redshift Architecture & Art (working as architects in association).

Engineer: Central Engineers

Builder: JSN Hanna

Precast manufacturer: Hanson Precast



Precast saves time and money for good health

Precast has provided a cost saving solution for the new \$1 billion Royal Children's Hospital currently under construction in Victoria.

Victorian company Westkon Precast has been involved with the project for the level two transfer slab and has been responsible for the design, manufacture, installation and certification of the structure.

With Lend Lease honoured with the 2010 Excellence in Health and Safety Award by the Master Builders Association of Victoria for its work on the project, a high standard of safety was required for all companies involved.

"Lend Lease had high standards on safety and everything had to be planned and documented. This was a complicated structure that we had to build in stages to meet their construction program and site access," says Lorenzo Cremasco from Westkon Precast. Lend Lease had originally designed the transfer slab as a structural steel and in-situ concrete design, but early in the project explored the idea of using precast concrete for the columns, beams and hollowcore planks for the whole transfer slab.

Initially, Lorenzo says the project seemed daunting due to its large scale, but after breaking it down into smaller parts, Lend Lease realised how much time could be saved using precast. "It is not uncommon for similar slabs, if done in-situ, to take double the length of time to construct when compared to what we achieved," he says.

"The fact that it's manufactured off-site means it has good tolerances, the columns are all exposed so you have good finishes and there is minimal work on site, whereas if in-situ, there'll be a lot more patching going on at the end."

A massive 350 tonne mobile crane was transported to the site from Sydney to lift the 32 tonne precast shell beams into position. This required part of the site to be shut to accommodate the crane as it needed to be set up adjacent to the structure. The exact location of the crane, located on a suspended slab, required complex engineering checks as the construction loads were large.

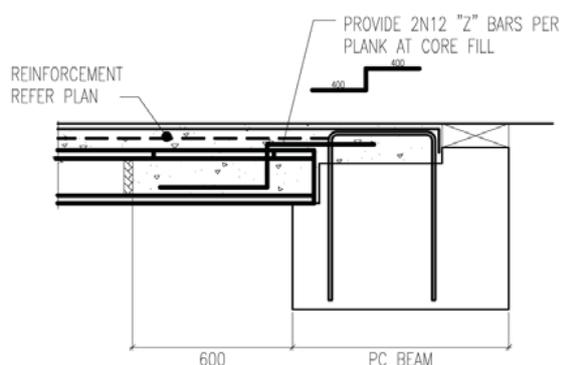
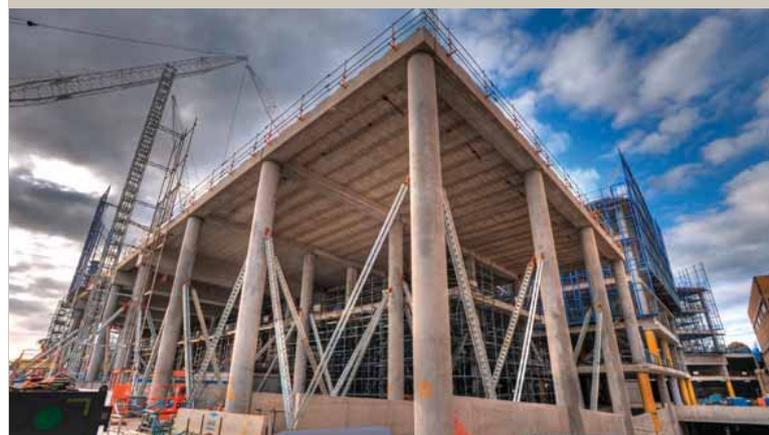
Access wasn't the only challenge on the project. The precast manufacturer also deviated from its usual process of using beams which supported the hollowcore and slabs. "The beams on this project had a special feature where they were hollow. Normally precast beams are pre-stressed, however these beams were manufactured as shell beams that were post-tensioned after the in-situ screed had been poured," Lorenzo says.

Due to the large scale and complexity of the project, the precast company spent around three months involved in pre-design work determining the logistics of the installation. This ensured as smooth a process as possible.

A substantial amount of time was spent by all parties in completing the certification of the structure, with the precaster working in consultation with Lend Lease and Irwinconsult to ensure it met Lend Lease's requirements and adhered to the necessary engineering requirements.

The new hospital will open at the conclusion of stage one of the project in 2011. Stage two will be completed in 2014.

- Location:** Parkville, Melbourne
- Client:** Department of Health, Victoria
- Architect:** Billard Leece Partnership and Bates Smart
- Engineer:** Irwinconsult
- Builder:** Lend Lease
- Precast manufacturer:** Westkon Precast



Typical detail - hollowcore to precast edge beam connection

■ Precast: looking back and looking ahead

When one starts to think about where the precast industry will be in 10 years it helps to look back at where we have come from. At the turn of the new millennium we were consumed about the Y2K bug and what dire ramifications were going to befall us all on the stroke of midnight... so what has happened since then? The precast industry has seen an exciting decade of change and here we explore some of the developments.

Flat panels

Hundreds of flat precast panels are now manufactured every day in Australia and for many designers it has become the building method of choice. A recent report showed that precast wall panels have grown over the last decade to now be the dominant choice of walling for non-residential buildings. Every state of Australia has many precasters that can offer building designers the unique advantages of precast flat panels.

Precast insulated sandwich panels

With more stringent energy efficient requirements demanded for BCA compliance, the precast industry has risen to the challenge with the now widespread availability of precast insulated sandwich panels. Sandwich panels consist of two layers of concrete held together by connectors, which sandwich an insulation layer. These panels have superior thermal and acoustic performance and can be fire rated to up to four hours. As well, they offer a fast, safe, durable, long-life, minimal maintenance construction solution.

Automation

Manufacture of hollowcore planks has always been automated. To add to that the last 10 years has seen some National Precast members investing heavily in manufacturing technology, and automated carousel manufacturing factories now exist in some states. These modern factories are extremely efficient and are able to manufacture a large number of panels quickly and in a very short lead time with less labour.

3D modelling

Precast manufacturers are increasingly adopting 3D modelling as a means of combating the poor documentation that is often presented for many projects. The trend by developers to partially document a project and go to tender to test

the market conditions, has introduced some bad building practices into the construction industry. Maximising the benefits of precast (and the construction process generally) requires good documentation and the advantage of 3D modelling is that buildings are easily built in detail before any precast elements are made. This is an encouraging development.

Quality

The trend away from site-cast concrete elements has gained momentum over the last decade with many architects appreciating the improved quality that factory-cast, quality-tested precast can deliver.

Large infrastructure precast

We have seen an increase in the use of precast concrete for large infrastructure projects. In some instances dedicated factories have been built to manufacture the precast for a particular project.

Cranes and lifting

Over the last 10 years the boom in the availability of large mobile cranes in every state of Australia is staggering. These sophisticated machines are surprisingly manoeuvrable and relatively quick to set up. Their increased availability has resulted in a general increase of the average weight of individual precast elements on projects. Because a considerable portion of the cost of a precast element is based around the unit size and weight, this has led to a reduction in the manufacturing cost of precast concrete.

The on-going development of robust proprietary lifting systems has helped greatly in the safe erection of precast. The role of an erection engineer in some states has also improved the safe erection of precast concrete with this to become the norm for all states with the new National Code.

Knowledge

With the increased use of precast, there has been a corresponding improvement in the general knowledge of precast among specifiers and other stakeholders. Assisting this knowledge growth is the Precast Concrete Handbook. First released in 2002, the Handbook has been widely accepted, and the second edition was published in 2009. To further enhance the growth of knowledge among specifiers and users, National Precast has run many seminars and workshops and has been actively involved in reviews of relevant Australian Standards.

Profile

The last 10 years has seen a significant shift in the precast industry's profile within the construction industry. A strong marketing and education focus has seen National Precast become a known brand within architectural, engineering and building offices alike. This has resulted in benefits for Association Members in terms of growing market share with its high quality precast being accepted as the 'material of choice' and the Association is now the first point of contact on all matters precast.

'Total precast' structures

More and more buildings are being designed and constructed as 'total precast' structures, as specifiers realise the benefits of using off-site manufactured precast walls, floors, beams and columns, and as the manufacturing capacity of the precast industry continues to expand. Many projects can have two or more manufacturers providing precast concrete to a project.

Recognition that precast is sustainable

A better understanding among specifiers of why precast is more sustainable than alternative products and even cast in-situ concrete

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(less waste, locally supplied, less concrete used with precast vs in-situ concrete, long life, low maintenance, faster construction, safer sites, less noise and dust, thermal mass benefits etc) is seeing precast being used in sustainable design to its full effect. Specific initiatives can include use of sandwich panels, TermoDeck® and the use of recycled material in the precast concrete mix.

New techniques

With rising raw material costs (such as steel and cement), the precast industry has been driving advancements in the way concrete is mixed to better utilise raw materials. Use of supplements allows precast manufacturers to reduce water usage which in turn allows reduced cement usage... all at the same time as producing faster curing concrete with longer lifespans.

Other newer techniques have added value to traditional grey wall panels. The increased availability and application of form liners and stains over the last 10 years, has provided designers with a vastly increased array of textures and patterns, and colour stains that are friendly to our environment require no on-going maintenance. And the finishes can be applied in the factory.

**What's new and innovative in the precast industry?**

- Precast concrete sandwich panels – concrete/insulation/concrete held together by non-conductive connectors, with the bulk of the thermal mass on the inside of the structure (maximising use of thermal mass) – high R-value, durable, fire resistant.
- Automation in many precast factories.
- Increased use of 3D modelling.
- Increased availability of large mobile cranes.
- Continued development of robust proprietary lifting systems.
- Increased design of 'total precast' structures.
- Use of recycled waste materials (e.g. flyash, recycled aggregate) in concrete mixes.
- Optimising concrete mixes to reduce raw material use and for higher quality, more workable, faster curing concrete.
- Form liners – increased availability & range, providing a myriad of cast-in patterns (e.g. brick, stone, geometric).
- Staining – 25 year guarantee, minimal maintenance needed, environmentally friendly product, providing translucent to opaque colours.
- TermoDeck® – using cores in hollowcore flooring and the high thermal mass of the concrete to pump hot/cold air for energy efficient air-conditioning.

In summary...

Reflecting on the last 10 years in the precast industry highlights an exciting journey of successes and change. In that time National Precast members have kept up with the changing needs of their customers, have embraced larger and more complex projects, have embraced the need to produce a holistically sustainable product and have implemented new strategies and technologies. Investment into the industry by multinationals and competitive sector organisations in recent years recognises that precast concrete is now a mainstream building option for the construction industry that provides financial returns for shareholders.

And what of the next 10 years? We can expect more of the same... more change, more developments. Committed to producing ever increasing quality products, the precast industry is working more efficiently with better manufacturing systems and supplying value-added services. Today's clients are less tolerant of a marginal quality product and expect a lot more than they did 10 years ago and we expect tomorrow's clients to be even more so. The industry is up to the task.

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Published by

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