

PRECASTER

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Hawke Building – a precast icon of character, innovation and leadership

The new five-storey Hawke Building is a public portal to the University of South Australia and a focus for engagement with the community. Its design serves to support UniSA's commitment to its place in South Australia as the people's university now and in the future.

Precast concrete in this stunning public building demonstrates the clarity, consistency and completeness of the design resolution, as well as being a lasting contribution to the urban design. The fastidiously detailed faceting of the white precast concrete façade plays with light and shadow so as to alter the appearance of the façade as the sunlight changes over the day.

Designed by architects John Wardle in association with Hassell, the new \$35 million Hawke building (named after former Prime Minister Bob Hawke) brings a striking modern presence to the historic North Terrace precinct. With over 6500 square metres of floor space, the building includes a Civic Gallery, a 400-seat auditorium, a 150-seat forum space, and the second largest public art gallery in the state, with state-of-the-art facilities and services throughout.

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Using precast resulted in several months of time savings over an equivalent in-situ concrete façade.

Builder, Built Environs, prides itself in its ability to build on confined sites having constrained access. Central to their rationale was the choice of precast concrete for its value in reducing site storage requirements and site overheads in terms of virtually eliminating scaffolding and formwork – all important for a narrow site such as this. Using elements of the final structure as construction areas saved time and money, as did pulling forward the delivery and installation of key services. Despite requiring four months of soil remediation prior to construction, the project was delivered on time - a testament to precast construction and all involved.



Builder explains why precast works

Kantarra, the 88-unit development at Lindfield on Sydney's North Shore is notable for the efficient use of precast concrete walls and floors. The careful planning that has resulted in clever single storey and 'cross over' floor plans has been extended to the use of precast wherever possible to maximise construction efficiency. The development comprises five levels above basement in two separate buildings over one single and one double level of basement car parking.

The building was originally designed utilising a precast loadbearing wall structure, with the basement and ground floor slabs designed as conventional slabs and the slabs on levels 1 to 4 not designed at the pre-tender stage.

After a detailed review of the architectural layout and structural design, the builder, Kell & Rigby, chose the Hanson Precast hollowcore flooring system for the simply supported clear spans of up to 9m. Transfloor panels with integrated upturned spandrels were used for the balcony areas. An advantage of this flooring system is that the hollowcore planks did not require propping during installation, allowing internal fitout to commence earlier.

Procurement

Kell & Rigby's Project Manager Nathan Stamatis advised "Both Hanson Precast and Sasso Precast were responsible for producing shop drawings in consultation with each other and also in consultation with the project architect and engineer." The following procurement schedule was implemented:

- The precast manufacturers produced shop drawings including 3D elevations and section details level by level. The time frame for this process was four weeks per level.
- The principal architect and engineer reviewed shop drawings over five working days.
- Shop drawings were amended, if necessary, and resubmitted.
- After shop drawing approval, production of the precast commenced.

Construction

According to the builder, the tight accessibility of the site resulted in a 200 tonne mobile crane being used to erect the precast structure, to minimise re-establishment of crane locations. The following sequence was adopted:

1. The first vertical panels in the basements were erected prior to pouring the ground slab. A strip footing was designed to support the temporary bracing which was required during construction.
2. Basement and ground floor post-tensioned slabs were formed, poured and stressed.
3. From ground floor up, the set out for each panel on that level was surveyed.

4. Precast wall panels were delivered on semi trailers, lifted and placed into position and temporarily braced into the preceding slab. The 40 or so panels per level were supplied and placed over two days.
5. On the second day of the vertical precast installation, any lintels and back propping to Transfloor areas were supplied and installed ready for the following precast flooring installation.
6. Hollowcore and Transfloor panels were delivered on semi trailers and were lifted and placed into their final positions.
7. A 40 MPa topping layer was then poured over the precast flooring following the installation of mesh, drainage balcony steel, balcony rough-in, electrical rough-in, formwork set downs and hobs as required.

This project, using total precast concrete construction, was a first for Kell & Rigby. By understanding the important aspects of planning and establishing good communication between all the major parties, the optimistic construction programme was easily achieved on the project. Of course, good drawings with a purposeful review regime always contribute favourably to the success of any project.

It was decided to use the same erection crew and crane to erect all the precast concrete to maximise site efficiency and to reduce the possibility of delays on site. Each precaster was responsible for the erection of their own precast.



Kantarra

Architect:	Marchese + Partners
Engineer:	BG&E Consulting Engineers
Builder:	Kell & Rigby
Precast manufacturer (walls):	Sasso Precast
Precast manufacturer (floors):	Hanson Precast (hollowcore internal floors and Transfloor with integrated upturn spandrels external floors)
Precast manufacturer (lift shaft and stair wells):	Sasso Precast

Totally precast office building gains a 5 Star Greenstar rating

The Bishops See development is located at Perth's western 'gateway' to its CBD on the corner of St Georges Terrace and Mount Street, Perth. Recognised as the 'resources' precinct and occupied by the nation's largest resource companies, the development retains the historic Bishop's House with its gardens and St Georges House.

Developed by Hawaiian and built by Brookfield Multiplex, Bishops See is comprised of two office buildings. The Stage 1 south tower is a nine storey, 44 metre high 'garden' office building comprising 18,000 square metres and is due for completion early in 2009. The 26 storey Stage 2 building will comprise some 46,000 square metres of office space.

The Bishops See Stage 1 south tower has set a first for Australia in being the only fully precast office building to attain the coveted 5 Star Greenstar office design rating awarded by the Green Building Council of Australia.

The tower's success in achieving the first 5 Star Greenstar office design rating for a commercial property in Perth is further good news following its earlier success in gaining 100% in pre-committed leases late last year. Green Building Council Australia's Chief Executive Romilly Madew confirmed that Perth's first 5 Star Greenstar rating is important in setting a precedent in WA.

"The Australian property industry has clearly embraced green building and it's no longer a niche market, and it's a firm testimony to Hawaiian and Brookfield Multiplex in their commitment to sustainability that Bishops See will lead the way."

The green benefits

Adding to this performance as a significant environmental plus are the 'green' benefits of the totally precast concrete construction of this building:

- Environmentally friendly. After water, concrete is the most frequently used material on earth. Precast concrete is nontoxic, environmentally safe and composed of natural materials.
- Low maintenance. Precast concrete requires little or no maintenance, which makes it an ideal choice for nearly any design solution.
- The mass of precast concrete offers good thermal and acoustic control.
- Precast is well recognised for its fire resistant properties easily providing the fire resistance levels required by authorities.
- Efficiency. Precast concrete products arrive at the job site ready to install.
- Quality control systems are implemented in the factory.
- The factory environment eliminates adverse weather problems and removes environmental issues such as noise, dust and clean-up activities from the construction site.
- Precast permits parallel precast manufacture with site preparation.
- Not weather dependent. Precast concrete increases efficiency because weather will not delay production.

The precast structure

The structure of the Bishops See project is wholly precast except for the three levels of basement car parking, the podium and transfer levels plus the 13-level slip-formed core. All precast elements were supplied by Delta Corporation Ltd. Precast provided the architects with the high quality of finish they sought, while the engineers were able to achieve maximum structural efficiency while meeting cost objectives. The high thermal mass efficiency of precast concrete aided the 5 Star Green Star target.

As well as the 255 external precast column elements, a further 32 internal precast column elements were supplied. The precast perimeter beams totalled 287, each being supported on corbels cast into the precast columns to create a quickly erected vertical structure. A total of 1,840 DC170 hollowcore planks covering a total area of 16,610m² were supplied by Delta, with a further 360 DC200 hollowcore units of 3,000m² completing the floors.

The erection cycle

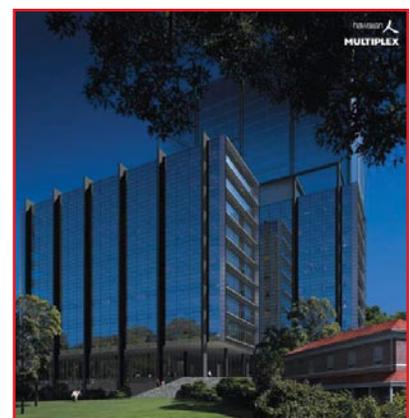
During construction, the typical seven to eight working day floor cycle involved erecting and grouting 32 internal precast columns, erecting and grouting 30 precast perimeter beams, erecting and grouting 206 precast hollowcore floor elements (2,150m²), fixing topping reinforcing, and finally pouring and finishing concrete topping for the total gross floor area of 2,420 m².

The exterior of the building has only the external precast columns exposed, with the curtainwall façade concealing the innovative precast structure. The combination of precast columns, precast beams and precast flooring as used here on a multi-storey building is relatively new in Australia and in its success is sure to be repeated.

Bishops See Office Tower Stage 1

Location: corner of St Georges Terrace and Mount Street, Perth

- Developer:** Hawaiian Group
- Architect:** Fitzpatrick & Partners
- Engineer:** Connell Wagner
- Head contractor:** Brookfield Multiplex Group
- Precast manufacturer:** Delta Corporation Ltd



Lorne Pier reconstruction project relies on precast

The Lorne Pier is a fantastic community and tourism asset for Lorne and a feature of Victoria's Great Ocean Road. First constructed in 1878 in response to the need for a safe place for ships to dock, it has been reconstructed several times since then.

In response to a 2005 government tender to replace the existing 1960's concrete pier, McConnell Dowell, with architects EDAW and engineer Maunsell, developed an innovative engineering method using hollow precast concrete piers to construct the new structure. The new Pier is the same length (196 metres) and width as the old pier but now features a superb platform on the end, with generous space for the large numbers of people who visit the pier for recreational fishing and sight-seeing.

The team's winning solution included the use of the existing concrete as a work platform during construction, enabling access for a 30 tonne excavator fitted with rock coring equipment, and a 50 tonne crawler crane to install the tubular precast piles and erect the superstructure.

Construction of the new pier was a massive project, requiring the installation of sixty four new concrete piles and the erection of more than 1,300 square metres of timber for the deck and fishing platform. An estimated 30,000 work-hours were needed to construct the new Pier.

In lieu of drilling a socket into the rock and pouring/pumping concrete in-situ into tubular steel formwork, McConnell Dowell developed an alternative piling strategy using precast concrete piles produced by Hollow Core Concrete, these being cast using super workable high flow concrete. The piles included a cast-in 80 mm PVC grouting tube and 100 mm steel shoe at the base with a two-metre freeboard allowance for pile casing cut-off after pile installation. Each pile was cast into its socket using 50MPa underwater grout.

The precasting process ensured improved control over concrete placement and vibration in the pile, removed the logistics and time constraints for curing involved in cast in-situ concrete, and minimised the environmental risk associated with pouring concrete in a marine environment.

The precaster also provided an alternative precast beam to headstock connection detail which was incorporated into the final solution. The revised detail allowed for more tolerance in the installation of the beams

and meant that the position of cast-in ferrule connections were not critical. The connection detail for the beam incorporated a temporary headstock frame which served as an access walkway to provide for safe installation of the beams and provided a simpler pin-to-bracket connection. Four headstock frames were fabricated to allow work on subsequent pile bents to be continued while stitch pours were curing to the required release strength. The edge beams were cast against timber form liners with many of the beams being cast to irregular curved faces requiring a high level of skill to achieve the required tolerances with recesses being cast within the beams to facilitate concealed light boxes.

Work on the new pier, including demolition of the old pier, took only 12 months to complete. The quality of the work was recognised in a Master Builders Awards 2008 Award for Excellence. It also won an IEAUST Victorian Engineering Excellence Award. The new Lorne pier has since become a major attraction along the Great Ocean Road.

Lorne Pier Reconstruction Project

Location:	Lorne, Victoria
Client:	Great Ocean Road Coast Committee and the Department of Sustainability and Environment
Design team:	Maunsell and EDAW
Head contractor:	McConnell Dowell
Precast manufacturer:	Hollow Core Concrete





Durability for all seasons - in polished precast

This is one house that will take anything the seasons can throw at it and still look good while performing well. Its polished precast construction will ensure that its appearance will stay unchanged for many years, requiring virtually zero maintenance. It was the need to ensure durability for the exposed beachfront site in Adelaide, with its salt-laden air, that persuaded the owners to research suitable materials.

In conjunction with the owner's architect, Mike Sims of Sims Architects, the decision was made to use polished reconstructed granite precast (using white quartz) for the exterior walls of the two-storey house. This decision meant that durability would not be a concern.

Situated on a corner block with direct beach frontage, the site presented numerous challenges including council planning restrictions, privacy issues and a western facing outlook. The owners were looking for a design which would capitalise on the beachside location. Working with the clients, a design evolved where primary living spaces were located on the first floor to capitalise on

the beach and water views, the ground floor contained additional accommodation, study and utility areas including laundry and garage whilst the basement provided the obligatory cellar, gymnasium and additional storage; all three floors being serviced by a lift.

The use of precast concrete was extensive and was supplied by Bianco Precast. Wall panels were 150mm thick in a variety of sizes, with some canopy panels over windows. Dummy joints were provided to the panels in the form of grooves to create a horizontal design emphasis and to help reduce the visual scale. For the extensive pergola area, generally 400mm square precast columns and beams were employed.

In all there were 18 grey concrete basement and lift panels, 58 polished granite pieces (nearly all of which were of different dimensions), and 18 fence panels and pillars which were also precast using the same granite mix but gritblasted on all exposed surfaces in order to create a textural difference between the fence and the polished house panels while maintaining that complimentary bond of like materials.

Webber Residence – Adelaide

- Architect:** Sims Architects
- Building contractor:** Bicton Constructions
- Precast manufacturer:** Bianco Precast



**Diary dates...
Conferences & exhibitions in 2009**

**Form & Function Melbourne
30th April – 2nd May 2009**

Melbourne Convention & Exhibition Centre

www.formandfunctionexpo.com.au

Form & Function is a must attend event for builders, architects, building designers, specifiers, developers, government and industry personnel who wish to view, for specification purposes, the latest products, services and technologies available for residential, commercial and industrial projects.

**Concrete09
17th – 19th September**

Luna Park Sydney

www.concrete09.com.au

Join concrete professionals and users at the Concrete Institute of Australia's 24th Biennial Conference. The conference provides the opportunity to share research, innovation and new practices within the concrete and construction industry.

**ICCX - International Concrete Conference & Exhibition Oceania
30th March – 2nd April**

Sydney Exhibition & Convention Centre

www.iccx.org

The conference and exhibition for all stakeholders in the concrete and precast concrete industries. The comprehensive conference programme includes an impressive line-up of international speakers who will report on new trends and developments in the international market. The integrated trade exhibition will cover all important aspects of modern concrete production technology.

**Designbuild Sydney
21st – 23rd May**

Sydney Exhibition & Convention Centre

www.designbuildexpo.com.au

Designbuild is recognised as Australia's premier exhibition for those involved in residential, commercial and industrial construction. With over 400 exhibitors, be the first to see new products and the latest sustainable building materials and ideas.

**Designbuild Perth
9th – 11th October**

Perth Exhibition Convention Centre

www.designbuildexpo.com.au

Experience all that the building and design industry has to offer at Designbuild Perth, WA's only building industry exhibition. With over 130 exhibitors, be the first to see new products and learn from the experts to maintain your competitive edge.

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Unique precast panels

The design of Hawke Building introduced a number of innovative materials, including high performance glazing, profiled copper insert panels, rendered sheeting, and zinc plate cladding – all to be co-ordinated with the precast elements.

The complex precast concrete and glass façade was modelled in 3D by a specialist façade engineer. The design of the façade introduced challenges for the precaster, particularly by ensuring that the geometry of the features was accurate and in accordance with the architectural intent. All precast panels were different, with each one being unique. Due to the faceting of the façade the panels had varying thicknesses up to 250mm. Fluted copper flashings between the precast concrete panels add to the feeling of permanence as they reflect the lasting qualities that we admire in buildings of a former era. Colour consistency had to be perfect for all 68 panels that comprise the façade, particularly as the new building would inevitably be compared with the other fine buildings on North Terrace that represent the pride of Adelaide over the past 100 years. An in-situ solution could not have delivered the quality of finish required.



Panels were cast in the factory face down on complex moulds of concrete, steel and timber. An off-form white finish was required using 45 MPa concrete comprised of Salisbury aggregate, white sand, Brighton Lite Cement with white titanium oxide to produce a lustrous finish. Face areas were applied with a Hydron anti-graffiti and anti-pollution treatment to ensure that the façade will look as good in the future as it does now. Joints between panels were stepped and sealed front and back to ensure permanent weather tightness.

Important in this age of energy conservation, the fully-sealed precast façade ensures that air leakages causing heating and cooling losses are eliminated – this is in contrast to some lightweight façade systems comprising many parts that have the potential to leak conditioned air through their many joints.

The compressed site proportion has been enhanced to express the functions of the building by a pair of concrete columns on opposing slants that support the black zinc enclosure of the auditorium space. The slim atrium space rises the full height of the building, with a pair of black-and-white scissor stairs slicing through the space. The soaring sky bridges within define not only the space but offer intriguing possibilities of direction.

Installation challenges Typically the precast elements were supported on steel corbels and fixed to steel plates which were cast into the insitu concrete floor. The challenge was to ensure that the precast connections allowed for movement due to temperature and shrinkage variations.

University of South Australia Hawke Building, Adelaide

Constructing authority:	The University of South Australia
Architects:	John Wardle Architects and Hassell
Structural and civil engineer:	Wallbridge and Gilbert
Façade engineering:	Arup
Contractor:	Built Environs
Precast manufacturer:	SA Precast

Top architectural honour for Hawke Building

The University of South Australia's Hawke Building has been honoured with the top prize for public architecture at this year's Royal Australian Institute of Architects (RAIA) South Australia Architecture Awards.

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