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PRECASTER

Divine intervention for Parramatta Cathedral

An arson attack in February 1996 opened the way for St Patrick's Cathedral to be divinely transformed into a magnificent blend of old and new. In a resurrection of some precision, the project involved refurbishment of the heritage-listed cathedral, the construction of a new precast concrete 800-seat cathedral, a new cloister and a parish hall.

A project of such magnificence inherently requires exacting detail.

Designed by the architect famous for designing the new Parliament House in Canberra, Romaldo Giurgola has again made his mark in salvaging the remains of the old St Patrick's and transforming it into a sensitively created chapel and entrance into the new adjoining cathedral.

The new cathedral makes a dramatic architectural statement with its brilliant polished precast concrete walls contrasting the magnificent Sydney sandstone of the original.

Whilst east-west walls feature copper panels fixed to a steel structure, the north-south walls boast beautifully polished grey precast concrete panels.

The screen-like nature of the precast panelling is made prominent through subtle articulation. The panels cantilever beyond the building ending with the panel edges exposed, revealing their relative thinness. There is no coping, and the tops of the vertical joints are protected by recessed stainless steel plates. The screen is raised above the ground, supported by concrete piers.

The horizontal joint lines between panel rows relate to horizontal mouldings on the old sandstone cathedral, resulting in the height of each row of panels differing. Taller panels at the base and shorter panels at the top provide a subtle variation and avoid a too regular, top-heavy appearance. The distribution of the vertical joints reflects the regular spacing of the old church and marks the structural bay of the new cathedral.

All forty one precast panels were colour matched in the manufacturing process to exactly match the colour required by architects of the new structure, MGT Architects. A reconstituted granite mix comprised of Queensland crushed granite and a light sand was used by Brisbane manufacturers Precast Concrete Pty Ltd to achieve the desired shade of grey.

To cover the 9m high façade, the 40MPa panels of approximately 4800mm wide by 150 mm thick and of varying height were cast in the Brisbane factory and delivered to the Parramatta site. The panels were fixed directly to the steel structure from the rear, by bolting through the steelwork to ferrules cast in the panels.

Externally, the work required the realisation of various architectural specifications. Off-form off-white concrete plinths that form part of the structure are exposed internally, and were cast to a two millimetre tolerance, then protected during the subsequent works. Off-white precast concrete also features in the entrance steps of the cathedral, and also in the retaining walls throughout the structure.

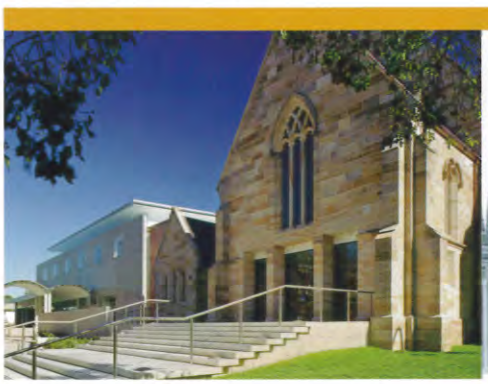
Rocla Building Products supplied 52 columns for the St Patrick's Cathedral Cloister Area. The columns were manufactured using off-white cement to match other in-situ and pre-cast concrete building elements. Building the top and base connections into the columns helped the builder St Hilliers to speed up construction of the Cloister. The base connection detail of the columns allowed the columns to be erected quickly and free-stand without the need of propping. Similarly ferrules were cast into top of columns to provide ease of connection of the roof frame. All 52 columns were installed in a single day (at about 10 minutes per column) so that the steelwork for the roof structure could be erected the next day.

Whilst the fire may have destroyed the old cathedral, what has been created is surely a result of divine intervention. Eight years on and the site now boasts a new St Patrick's Cathedral which stands gracious, elegant and coherent.

Polished precast panels on the north-south walls contrast beautifully with copper panels on the east-west walls and the magnificent sandstone of the original building. Photo: John Gollings.

Project Team:

Precast panels and steps: Precast Concrete Pty Ltd
Precast columns: Rocla Building Products
Principal contractor: St Hillier's Contracting Pty Ltd
Architect: MGT Architects Canberra with Romaldo Giurgola, Architect
Engineer: Connell Mott MacDonald



An arson attack in 1996 has allowed for a new St Patrick's of divine splendour. Photo: John Gollings.

52 off-white precast columns allowed a speedy construction of St Patrick's Cloister area.

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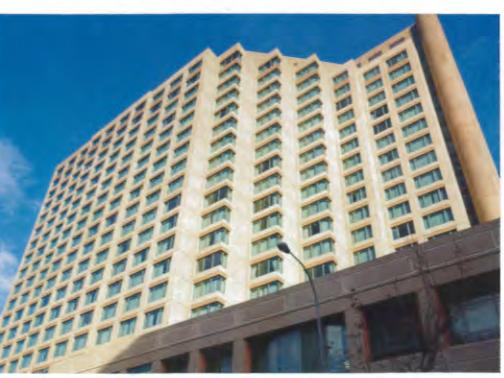
Chevron to Nikko to IKON

custom designed forms

Macleay Street Elevation

Detail showing balcony blades, spandrels, wall panels and framing units



The original Nikko façade featured a combination of sandblasted and painted finishes.

Photography: Eric Sierens

The building known to Baby Boomers as the Chevron in Sydney's Potts Point has undergone another transformation. The original building, with the famous hole in the ground next to it, disappeared in 1988 to be replaced with a larger hotel which traded as the Nikko. After the 2000 Olympics, Mirvac purchased the hotel in order to convert it into apartments.

Mirvac removed most of the perfectly sound precast façade that was supplied in 1988 and made extensive architectural and structural modifications to the building. Both the 1988 façade and the new façade were manufactured by NPCAA member, Rescrete.

HPA Project Director, architect Ara Tchorlian, saw this as a unique opportunity, in an extremely prominent and historical sector of Sydney, to create a spectacular expression in sculptural design with innovative use of precast concrete, steel, glass, and colour.

The precast components comprised a complex array of balcony blade panels, spandrels, wall panels and other elements. There were almost 700 painted panels in total. The retro-fit nature of the job meant that there were complex structural connections to be manufactured; the architectural requirements of elements such as the balcony blades with their angled openings meant that sophisticated moulds and casting techniques were required. Some of the original end-wall panels were retained and new parapet panels were detailed to sit on top of them. Most new elements were structural.

In describing this aspect of the project Ara Tchorlian said; "The use of precast concrete allowed me to create custom designed forms that achieved specific functions. The balcony blades with calculated shaped slots and aluminium aerofoils capture precious views while preserving privacy between apartments and creating vibrant façade accents. The large square precast features with a steel-laced design on the podium perform a scaling transition from the tower to the street while acting as a expressive filtering privacy screen for the terraces beyond. The IKON façade is a statement in Minimalism using geometric sculpture with the careful use of materials and colour."

Gavin Rea, Mirvac's Project Manager, said that the team responsible for the precast; the consultants, builder, precaster and erector worked together to produce a very efficient result from the builder's viewpoint; there was some very difficult geometry in the shop drawings. The difficult fixings necessary for the retrofit worked well enough to get crane times down to under 15 minutes a panel and a disciplined approach to shop drawings and preplanning ensured that precast was available whenever the site called for it. Gavin believes that precast was by far the best solution for the construction issues posed by this technically challenging project.

The IKON experience is another example of the ability of the Australian precast industry to deliver sophisticated technical products to major projects.

Project Team

Precaster: Rescrete Industries Pty Ltd
Erector: LW Contracting Pty Ltd
Builder: Mirvac Constructions Pty Ltd
Architect: HPA Pty Ltd
Engineer: Taylor Thompson and Whitting Pty Ltd

It's not *just* cricket

Century-old Adelaide Oval is renowned as the home of cricket heroes. But cricket isn't all the splendid ground is famous for. Completed in time for the 2003 World Rugby Cup, Adelaide Oval now has a new look. On show to sporting fans around the world are three stunning new grandstands and a storage bunker featuring work by Adelaide precast concrete manufacturer SA Precast Pty Ltd and Hicrete Precast SA and Perth manufacturer Delta Corporation.

Located on the eastern side of picturesque Adelaide Oval, the two Chappell Stands and the Clem Hill Stand have vastly improved the amenity of the ground to the general public and to SACA members. Based on a 'country carnival' fairground atmosphere, the design approach for the redevelopment uses expressive colour and forms through use of banners, flags and sails, set on both off-form and architecturally finished precast structures.

The seating plats for the two Chappell Stands sit on fourteen very impressive large sandblasted precast beams. Designed to withstand the axial load which is introduced through the back outrigger to the tiers supporting the roof structure, each beam weighs in excess of 31 tonnes. Each grandstand houses a tensioned fabric roof structure, between structural steel primary supports. A vertical cable at the front of the stands resists uplift wind pressures on the roof structure and mitigates dynamic response.

The beams were cast flat on a prestressed concrete base with steel shutters. Given the enormity of the beams, lifting and positioning posed a challenge.

The beams were transported to site on a special heavy trailer, sitting horizontal in a frame during transport. On arrival one end was marginally lifted, a support pin removed, and then one end of the beam was dropped down into an incline position. From there, the mobile crane was rigged to lift the precast beams into their final position over the starter bars from the precast columns below.

The new Chappell stand during the 2nd Test in December 2003.

The new Victor Richardson Gates comprise of sixteen columns and thirteen spandrels. The lower half of each column is polished while the top half is sandblasted to match the spandrels. The spandrels have recessed lettering cast on both vertical faces.

The Clem Hill Stand, otherwise known as the South Mound Stand, includes two primary suspended hollowcore floors, being the mezzanine floor within a storage bunker and the platform level floor beneath the fabric roof.

Precast concrete retaining walls have been erected along three faces of the bunker. The North Mound storage bunker comprises a single suspended hollowcore floor at the platform level, which will accommodate future terracing.

With both polished and sandblasted finishes, the Victor Richardson Gates stand tall at the entrance to the ground.

Project Team:

Precast concrete:
SA Precast Pty Ltd
Hicrete Precast Pty Ltd

Precast flooring: Delta Corporation Ltd

Principal Contractor: Built Environs

Architect: Hassell Architects

Engineer: Connell Mott MacDonald

Precast flooring speeds Civic Tower

innovative floor

On the corner of Castlereagh and Goulburn streets in the Sydney CBD, Grocon is developer and builder of Sydney's Masonic Centre. The new tower is supported by a complex transfer structure comprising massive inclined concrete-filled fabricated steel tubes and post-tensioned concrete tie beams forming the base floor of the tower. The whole tower of some 1000m^2 floorplate is founded upon the existing Masonic lift core of only 200m^2.

The original concept for the tower floorplate design was for a post-tensioned concrete slab-and-beam arrangement with an overall depth of 420mm to cater for the live load of 4kPa, plus an additional 1kPa for superimposed live load and a 10kPa live loading for a compactus in some zones. Involving NPCAA member Ultrafloor in the planning stage, the engineering design team were able to bring about savings in construction time and floor zone thickness.

Conventional Ultrafloor is a system of profiled precast beams set between 500mm and 700mm apart and in-filled with fibre-cement formboards. Reinforcing mesh is placed over it and the concrete topping is poured. This system caters for spans of up to about 8m under conventional office loading, and can be combined effectively with the company's band beam systems to provide the support structure.

The programming challenge of the Civic Tower required a flooring system with a greater spanning capability, but with the speed of erection associated with precast concrete.

This led to the selection of the company's new metaldeck system, tested earlier at Melbourne University for structural integrity and resonant frequency. Protruding shear reinforcement ties in the precast beams ensure proper engagement between the topping and precast concrete, and provide longitudinal shear capacity. Spacing the beams typically at 1.7m, spanning up to 11m, and bridging the gaps with a 0.75mm gauge ribbed metal sheet, the floor thickness was reduced to 370mm. This is made up of 250mm deep precast beams and a 120mm concrete topping thickness. RF82 mesh is placed over the deck before the 32MPa grade concrete is placed in-situ. The ends of the beams are tied into the jump-formed external elements. One row of temporary midspan props was the only other support. Up to 1000m^2 of metaldeck floor needed to be installed per day to keep up with the tight construction programme.

A principle feature of the project has been the rate at which the floors have been constructed. Judicious planning, aided by the extensive use of precast concrete floor beams, led to an innovative construction method whereby each level was constructed in four and five day cycles.

Peter Whyte, Grocon's Project Manager added that "this flooring system worked hand in glove with the two jumpform systems, to cast the core and exterior walls of the building. A day after casting the external and internal core, the jumpform was raised to its next position and construction of the 1000m^2 floor slab began. The slab was poured some 4 days later, and the next day the window units, mechanical services ducting, sprinkler pipework and other sundry materials were all preloaded onto the open deck prior to commencing the floor beams for the floor above".

Whyte also confirmed that "Whilst these activities were being conducted at the upper workface, painting of the external columns were done on the very floor below, all within the building's perimeter climbing screen system. Immediately on the floor below this, windows were being installed, thus allowing total enclosure of the building only 2 floors behind the slab structural works.

Achieving such close interfacing of trades was only possible by the use of this particular flooring system as there was only minimal backpropping in place, which also led to other efficiencies and greater safety for the project".

The installation of sprinklers, ductwork, plumbing and electrical trades worked in the same level as the windows and one floor below, with all trades keeping to a 5 day floor cycle to meet the structural programme.

The plasterboard for the internal walls was preloaded directly onto the finished floor slabs at the active deck utilising only 3 loading platforms for the entire project. All these works could be carried out in an uncluttered, clean site with a minimum of waste. This is where the precast floor elements delivered their benefit.

The construction of the entire 25 storey tower structure, took only five months. This is a record and is directly attributable to the innovative floor and jumpform systems.

Project Team:

Precast flooring: Ultrafloor Pty Ltd
Developer: Grocon
Principal Contractor: Grocon Constructors Pty Limited
Architect: PTW
Engineer: Connell Mott MacDonald

Ultrafloor beams radiating from centre core to façade

Soffit ready the next day for follow on trades

Tower built in record time

Cast-in bricks give heritage feel

Custom-produced precast arches with a brick façade are a good example of how versatile precast can be, blending structural, functional precast with architectural features.

Application of Bricksnaps have given a heritage appearance to the new creek crossing in the Sydney subdivision of Holroyd Gardens.

The product has been used as a veneer feature on the crossing's eight arches, to complement the existing heritage-listed brickworks within the Delfin Lend Lease subdivision at Parramatta.

The two lane crossing, which is designed for local traffic and pedestrian use, bridges a dry creek bed within the subdivision and is 25 metres long and 15 metres wide.

More than 60m^2 of red-blend bricks were cast into the façade of the spandrels after the developer requested precast arches with a heritage appearance to replicate other heritage brickwork within the subdivision.

As a standard profile offered by NPCAA Member Humes (NSW), the two piece arches were selected because of the product's geometric versatility and ability to meet the need for a creek crossing with an overall internal span of 16 metres. In order to meet the needs of the contractor, BMD Constructions, the arches were then customised by being cut down from the customary 7 metres internal height to an internal height of 2.5 metres. In all, eight modified two piece arches weighing 28 tonnes per full arch, and four 250mm thick spandrels weighing 17 tonnes per half, completed the project.

The arches were delivered in halves, as only one unit would fit at a time on the delivery trailer. Four half spandrels were delivered overnight under escort due to wide load regulations.

Installation of all eight arches was completed in a single day.

Project Team:

Precaster: Humes (NSW)
Principal: Delfin Lend Lease
Contractor: BMD Constructions
Consultant: Sinclair Knight Merz

Bricksnaps cast into bridge spandrel facades give a heritage appearance.

Precast wins over in-situ for GPO

The redevelopment of the historic Melbourne GPO is an exciting project, currently in progress. The nineteenth century structure is preserved in the facades facing the Bourke Street Mall and Elizabeth Street, while the interior will reflect a grand, belle époque atmosphere enhancing the fashionable boutiques and shop tenancies planned for the site. A new 6-level building housing restaurants, shops and offices, will connect with the original GPO. Whilst connecting foot traffic and services with its historic partner, the new building is structurally separate so as not to impact the structural integrity of the original structure.

The new building, which will have all-glass exteriors, was originally conceived as in-situ construction due to the architectural requirement of cantilevers on three sides and the lack of wall panels to provide structural rigidity. However, the builders (St.Hilliers) and consulting engineers (Arup) in conjunction with Hollow Core Concrete Pty. Ltd. decided prior to the commencement of the project that there would be considerable advantages to the use of pre-cast components, and asked the precast manufacturers to suggest appropriate construction techniques. The project team agreed to proceed down this path, and the company has provided the majority of the precast components required for the project, including precast columns, beams, hollow core planks, solid cantilevered planks and lift panels for the new building as well as the stair panels and stair flights for the original building.

Constructed almost entirely out of precast components, the new building has approximately 2300m^2 of hollowcore plank floor area. The floor planks make sliding contact with the steel structure of the old building ensuring that the two building components are entirely separate structurally.

The builder cites speed of construction and the rapid access available to following trades as the major advantages for using precast components. Overall, some six weeks in time were saved and this could have been higher but for unavoidable design requirements. There are other advantages to this method of construction. As the architectural design calls for angled, cantilevered terrace and floor sections facing both Elizabeth Street and Little Bourke Street, the solution was found in the use of solid cantilever sections cantilevering from the precast beams.

Also the structural rigidity was obtained by providing a precast moment frame at the Elizabeth Street end of the building. The use of hollowcore planks allowed the relocation of the air-conditioning plant to below the ground floor permitting the drilling of 200mm diameter holes in the planks on a 1200mm grid.

The construction method is economical in terms of material and labour costs. Savings relative to on-site concrete pour construction vary but can be as high as 15%.

Project Team:

Precaster: Hollow Core Concrete Pty Ltd
Contractor: St. Hilliers Contracting
Engineer: Arup
Architect: Williams Boag

The striking North West corner of the new GPO Structure at the corner of Elizabeth Street and Little Bourke Street. Note the requirement of a cantilevered floor in two directions.

Top view of typical footprint of GPO structure during construction.

Bianco Walling Constress

member profile

Bianco moves into architectural precast

When Bianco Walling marked its tenth anniversary in March, it was the celebration of a decade of spectacular growth. Bigger plans were on the horizon.

Beginning as a small bricklaying contractor in 1994, the company today employs a workforce of some 95 people following a recent move into the manufacture of architectural precast panels. The recent acquisition of Constress Pty Ltd will see the company not only producing quality precast walling panels, but also a range of architectural and structural precast concrete elements.

As a result of great demands placed on building trades and the explosion of high rise and investment building in South Australia, builders, developers, architects and engineers changed their thinking toward using precast concrete. This astute Adelaide precaster rose to the challenge with investment in people and technology to produce the sought after perfect panels. Confidence in the market and in its capacity to deliver pushed Bianco forward with great momentum.

The company has pursued the total service vision with its planning as precise as one of its panels. Part of this strategy was to attract the most experienced people in every aspect of precast production. This, added to a passion for best technology, quality and service has resulted for ten years of forward progress and a brilliant future.

According to Director Russell Bianco, "The market for walls is changing. Although there will always be a need for bricklayers and blocklayers, the demand for high quality finished precast panels is growing and we are well placed to service both areas.

"More buildings are being designed for precast and in the future more buildings will be designed to incorporate maintenance free finished architectural panels. Following our recent move to acquire Constress, we can now supply all of these products, enabling the builder to deal with a one stop shop".

Always looking to improve and implement new technology Russell will be travelling overseas to study new methods of precast wall manufacture that will produce high quality panels more efficiently than current methods with the expectation that architectural panels will become more affordable.

Russell attributes the success of the company to the excellence and professionalism of its people and a "can do" culture. He said, "We strive to provide the best product and best service on time and within budget."

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Email: sales@biancoconstress.com.au

A cad driven laser mounted to the roof frame of the factory casts a laser layout of the panel and all accessories giving an accuracy of + or – 2mm.

Quay West Melbourne features 330 polished architectural panels, 200 of which are curved.

NPCAA

National Precast Concrete Association Australia

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