

# PRECASTER

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## President's report

### Cultural precast linking Australia's heritage

**La Perouse Headland located on the northern shores of Botany Bay provides spectacular cliff top views across the Bay and out to sea. The Headland is one of the most significant cultural heritage sites in Australia.**

This has been recognised by a heritage listing and creation of a National Park over most of the Headland. Other significant cultural heritage elements include the La Perouse Memorial, Watch Tower, Bare Island Fort and the former Telegraph Station that connected Sydney to London.

The combination of heavy visitor use and inadequate infrastructure had left the Headland in poor condition, with uncontrolled parking along the loop road and no path available for pedestrians. Randwick City Council's commitment to upgrade the amenity resulted in a brief to integrate the new section of Coastal Walk with works to upgrade the Loop Road as a one-way system and provide efficient parking.

"A key aspect of the site that we immediately recognised was the need to maintain the spectacular open views from the Headland. At the same time we needed to replace the steel crash barrier with an  
**...story continues on page 2**

It is always a difficult time to make the call, after all the necessary analysis and planning is done, to invest significantly in new plant or equipment. The return on investment always needs to be considered when any business decision is made and it is no different with a precast operation. Furthermore, for precasters in particular, the decision can be made harder if the precast factory is busy.

The financial investment in the Australian precast industry is significant and would run into the hundreds of millions. National Precast Members are committed to producing quality precast by continuing to invest in their businesses to ensure that our industry continues to be viable in the years ahead.

In recent times most of the National Precast Members that manufacture architectural precast in Australia have undertaken a significant upgrade of their existing polishing capacity by upgrading to automatic CNC polishing machines.

These latest generation polishing machines operate at significantly greater speeds - at least 4 times faster, can polish concave or convex surfaces and they can undertake many operations at the same time. They have fully automated parameters, requiring no direct labour other than the initial setup of the precast element and can operate at any time over a 24 hour cycle when power is at its cheapest. The finishes on panels can be crafted to be completely unique, given the infinite array of finish variables now available. Subtle adjustments to polishing levels can now be easily achieved, producing highly reflective lustres right through to more rugged textures.

The significant investment is in response to the increase in demand for quality architectural precast elements from developers, architects and builders. Architectural precast is often considered the most difficult precast to manufacture with many variables - panel shape and size as well as a myriad of colours and textures. An understanding by the precaster of the designer's intentions is paramount to converting the designer's concepts into exquisite results.



**LEO VALENTE**  
PRESIDENT



**...story continued from page 1**

attractive element that was strong enough to stop out-of-control vehicles from going over the cliff, while allowing pedestrians to gain access from their parked cars to the new section of Coastal Walkway” says Noel Corkery of Corkery Consulting.

The highly corrosive coastal environment created by salt spray required careful consideration of materials, with concrete the obvious choice in terms of its impressive durability and minimal maintenance. The choice was the use of nearly 600 elements in five different shapes - wheel stops, separation blocks, kerbs and two styles of bollards that provided a ‘garrison look’ to the project.

Working closely with Hanson Precast in the detailed design stage, a cost effective process was achieved in moulding, manufacture, delivery and installation. For example, gang moulds were used for the bollards, which made for the perfect alignment of the elements on site. Also, a void across the bottom of each bollard removed the need for visible lifting anchors.

Transport was also a very important part of the project with each precast element individually protected before palletising to prevent any minor handling damage. The delivery of all elements was undertaken by a crane truck.

“We decided to use precast concrete to ensure we achieved the precise dimensions and control of colour and texture that we wanted for the bollards. It also allowed us to create a distinctive profile for the precast wheel stops. The concrete bollards not only form a unifying urban design element but also provide seating along the full length of the Coastal Walk” says Noel Corkery.

**Client:** Randwick City Council  
**Builder:** KK Civil Engineering  
**Architect:** Corkery Consulting  
**Precast manufacturer:** Hanson Precast



**Iconic precast internationally recognized**

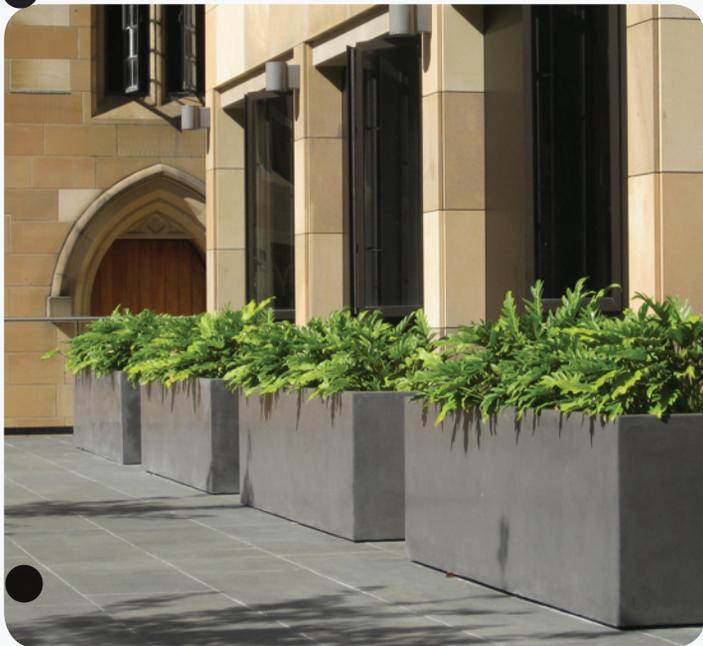
**Featured in National Precaster issue 64, iconic buildings The Oracle on the Gold Coast and AAMI Stadium in Melbourne have been recognised as international award winners.**

**The Oracle** has won four design awards, including a Gold Coast Urban Design Award in 2011 and more recently the Best Mixed-use Architecture, Australia award in the Asia Pacific International Property Awards. Peter Harrison of IGNITE Architects, the Sydney based designers of the GRC lightweight concrete retail podium, believes that the attention paid during the design phase to the integration of the DBI-designed towers and the street level buildings has paid off for the two firms by creating a strong and unique mixed use development which is being justly recognised for its contribution to the urban environment.



**AAMI Stadium's** most recent glory was at the World Stadium Awards where it was dubbed as ‘the world’s most iconic and culturally significant stadium’. Cox Architecture’s Design Director Patrick Ness says “we are honoured to have designed this world breaking stadium that not only was recognised in Victoria as the recipient of the Victorian Architecture Medal in 2011 but has now been recognised internationally as an exemplar stadium.”





## Keeping it simple

**One of the challenges of landscape contracting is sourcing high quality planter-boxes, pots and bowls for projects. It's particularly difficult to find larger items that look good, are well-made, robust, and relatively lightweight.**

National Precast Member Quatro Design claims that its products tick all of the boxes when it comes to pots and planters. Since 2004, the Gold Coast-based company has been manufacturing a large range of planters in glass fibre reinforced concrete, otherwise known as GRC. Most of its clients are landscapers, builders and local government councils.

According to general manager John Curry, GRC products are ideal for landscape applications. Firstly, they are lightweight – typically around 20% the weight of similar products made in precast concrete. This is because GRC needs to be only one fifth as thick to achieve the same strength. “GRC is essentially a mat of bundled glass fibre strands set into a dense sand-cement matrix, and this explains its high compressive and tensile strength”, says John.

The design approach is to ‘keep it simple’. The company’s minimalist approach means that its planter-boxes, pots and bowls avoid classical ornamentation, and instead reflect the simplicity of shapes such as the cube, the rectangle and the hemisphere. This design philosophy seems to appeal to landscape architects and designers who regularly specify their products. Projects include The Star Casino in Sydney, WIN Stadium in Wollongong, Townsville Hospital, Pacific Fair on the Gold Coast, and Crown Casino in Melbourne.

Size also matters when it comes to bowls and planters. There are plenty of small pots available in the marketplace, with much of it being imported from Asia. But for large items, such as a 1.5 metre diameter bowl or a 2.4 metre long trough planter, then the choice is very limited. Manufactured at their Currumbin factory, Quatro’s products range from small to very large. Their largest bowl is 2.3 metres in diameter, and the largest square planter is 2m x 2m x 1m high. “We are continually adding to our product range”, says John Curry. “Our newest bowl is 1.8 metres diameter, and it is designed to match the 2.3 metre bowl”.

Although the company has a large range of standard planter-boxes, pots and bowls, it also custom-manufactures for its clients. Recently, 16 custom bowls were supplied for the Westfield Carindale redevelopment in Brisbane. The elliptical-shaped bowls are 3 metres long x 2 metres wide, and double as seats and planters. Another recent project was the supply of 20 sculptured water-walls for a Stocklands shopping centre in Townsville.

## INTRODUCTION TO PRECAST FOR STRUCTURAL ENGINEERS SEMINAR

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## ■ The missing link

**The award-winning centrepiece of a much-needed infrastructure upgrade addresses the needs of pedestrians, motorists, cyclists and trams – and meets environmental design principles.**

The \$32 million Glenelg Tram Overpass is an eight-span bridge over Adelaide's busy South Road and forms a vital part of the more extensive South Road Upgrade project.

The design brief included the development of a multi-use structure that would serve to improve the 60,000 vehicle a day arterial traffic flow below, support heavy overhead tram traffic and open the area to cyclists and pedestrians. It was also required to service the needs of bus commuters. At the same time, it needed to blend in with the surrounding urban environment, without being monolithic or taking up an excessive footprint, as the site concerned was extremely narrow. And, in line with all public works projects in South Australia, it had to meet Water Sensitive Urban Design principles.

The final completed project features reinforced earth wall embankments on the approaches and a central platform above South Road. Lifts and stairs provide access to and from the tram platform and across South Road, with a shared-use pedestrian and bicycle path over South Road. The cycle path forms an addition to the City to Glenelg cycling route, as part of the Government's long term Tramway Park vision. The overpass itself comprises a combination of precast concrete structures, glazed elements and perforated mesh.

Bianco Precast was awarded the contract for the precast supply, a complex job requiring production of a variety of elements. These included bridge beams, abutments, noise walls, hollow section piers, columns, and stair and lift panels – totalling 264 units in all.

Different units called for different finishes, ranging from plain grey off-form concrete to sandblasted panels and white off-form architectural panels for the stair and lift shafts. The stair panels presented a particular challenge, featuring skewed elliptical penetrations. These were formed by an innovative mould manufacturing technique which required the sandwiching of profile-cut polystyrene between steel plates, which were then rendered with an epoxy coating and sanded to give a smooth, off-form finish.

After over a year in operation the Overpass already blends seamlessly with the surrounding environment and every day provides greatly increased amenity to thousands of commuters and local residents.

Testimony to the project's success is the fact that the project won an Excellence Award at the Institute of Public Works Engineering Australia Awards. This recognises excellence in the innovation, development, completion and management of public works projects and the people involved.

"The judges were impressed with the manner in which the project met its objectives and outcomes, the involvement of community and other stakeholders and the focus on safety for all," said Paul Gelston, project director. Another factor in the awards' judging was the manner in which site constraints were successfully overcome without the need to stop essential tram services.

**Client:** South Australian Government

**Builder:** McConnell Dowell

**Architect:** Swanbury Penglase

**Engineer:** Maunsell AECOM

**Precast manufacturer:** Bianco Precast



## Melbourne water

**The new Melbourne Water headquarters is located in Melbourne's rapidly developing "Digital Harbour" precinct, blending perfectly with the docklands area. The building - for one of Melbourne's most environmentally conscious occupants - has been a success, completed on time, on budget and achieving its essential green credentials.**

The builder Equiset, approached Hollow Core Concrete to prepare a design that would meet both budgetary and programme targets, for what was an extremely short construction timeline. This 9 level structure was erected in just 8 months comprising a gross floor area of over 20,000m<sup>2</sup>. The structure is divided into two separate buildings connected by a central in-situ core.

The northern structure was constructed as an independent building; allowing early access for following trades and also taking the south build off the critical path. It incorporates a lower multilevel car park, with six levels of office space above. It is a more conventional precast skeletal-framed structure incorporating both precast and in-situ columns, precast/pre-stressed beams, hollowcore floor planks and precast solid slabs to create the cantilever areas, with beams cantilevering up to 4 metres. The car park levels provided challenges with limited column locations and tight head clearances particularly at the ramps. This resulted in an ingenious solution to utilise the ramps' side barrier walls and stepped precast beams as structural support. This was achieved with the use of sophisticated 3D modelling software to model the entire structure, including the reinforcement within the precast components.

The southern wing adopted a different design solution, as this area was required to span over an operating public road leading to Etihad Stadium. To support the building structure over the road a two level steel truss, 54 metres in length was constructed. This truss supported hollowcore planks spanning 16 metres on levels one and three (level two did not exist on this side of the structure as the architectural design required a large open atrium on level one). On level three, the hollowcore planks cantilevered a further three metres, which in turn supported the perimeter precast edge beams that supported the extensive external glazing. Above level three, the structure was converted to a post-tensioned precast shell beam system supporting 200mm thick hollowcore planks spanning 8 metres. This design was able to provide a marginally lighter floor structure in order to reduce the loads on the steel truss, with temporary falsework required to support the shell beams during construction.

Part of the Digital Harbour design philosophy is to not only provide green buildings, but adaptable structures as well. As a result, the building not only had to meet all of the requirements of a 6 Green Star rated building, but also had to provide exposed soffits and achieve a class 2 'white painted' finish throughout - even in the car park. By using precast components this was easily achieved.

A further contract awarded to Hollow Core Concrete was for the design and construction of the trafficable elevated roadway from Latrobe Street to the entrance of the Melbourne Water building.

Again, due to the complex geometry and many restrictions due to vehicle movements, large pre-stressed precast beams supporting hollowcore were used. Precast barriers were fixed into the final structure with ramps and cross falls. In order to achieve the required geometry, 3D modelling was used to achieve the complexity and tight tolerances. The end result was just 10 days to install all the precast components for this complex area.

This structure utilised many different precast design solutions to provide a remarkable building. The end result is a stunning example of the flexibility of precast concrete as a building material and of what is possible with a bit of imagination and support from the principle contractor and design team. The result is a beautiful mix of construction techniques achieving a remarkable result, showing that precast buildings do not need to be repetitive or modular. By simplifying the component geometry and standardising connection details, complex structures are easily achieved.

**Client:** Melbourne Water

**Builder:** Equiset Construction

**Architect:** Woods Bagot

**Engineer:** Irwinconsult

**Precast manufacturer:** Hollow Core Concrete

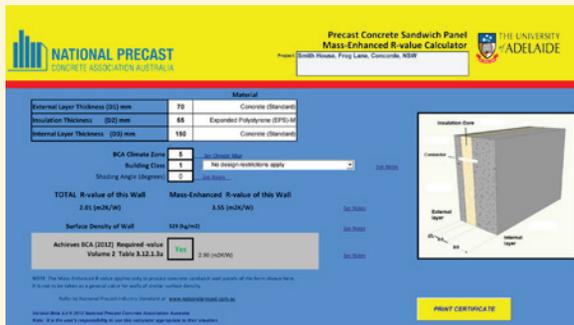


## R-value Calculator

**National Precast has engaged Assoc Prof Terry Williamson from The University of Adelaide, to develop a range of R-value calculators for precast. Calculators have been put together for precast sandwich panels, single layer panels and precast flooring. They are available on the National Precast website.**

The R-value Calculators make an easy job of calculating R-values. Simply choose from a number of variables such as concrete thickness, insulation, climate zone, building class, and the Calculator will provide the total R-value of the wall or flooring system. A printable certificate shows the system results and can be used as documentary evidence of compliance with the Building Code of Australia (2012) Elemental Deemed-to-Satisfy requirements.

*What is special about the Sandwich Panel R-value Calculator is that it also provides a Mass-Enhanced R-value for a sandwich panel wall. The methodology for this calculation is described in*



*The Mass-Enhanced R-value of Precast Concrete Sandwich Panels - an Industry Standard. This document, authored by Williamson, allows the high thermal mass benefit (and associated reductions in energy load) of precast concrete to now be recognised as being an Alternative Solution means of achieving BCA compliance.*

## Explaining shop drawings...

Shop drawings are fundamental for building construction when using precast concrete elements. This fact would be undisputed by everyone in the building industry but it seems that their preparation is not always a seamless activity. With technology advances and today's almost incessant demand for instant communication, it would appear that the preparation of shop drawings has become an area of angst for many.

### So what is meant by shop drawings?

As with many terms or phrases used for a long time in the building industry, 'shop drawings' means many different things to different people and is often described poorly in contracts and project documentation. Local variations in understanding between the states and territories of Australia are also often seen.

In simple terms a shop drawing is the drawing containing all the information necessary for the manufacture of an individual element. Shop drawings are always prepared for elements such as wall panels, beams, and columns that are manufactured specifically for a project. Some elements, such as standard pre-stressed flooring elements, will not require individual shop drawings, in which case their intended use will be shown on a floor marking plan.

The review and approval of shop drawings should always be undertaken by the project design team, i.e. principal contractor (builder), project design engineer and architect, before any manufacture is commenced. The review process increasingly uses online project document management systems to control this activity.

### Shop drawings: what should they show?

- Drawing number and revision status
- Project name and location
- Scale and drawn/checked/verified details
- Element number and weight
- Number of elements to be cast
- Element dimensions and centre of gravity
- Concrete grade and cover to reinforcing
- Surface finish to all surfaces
- Position and size of all reinforcement
- Location of all cast-in fittings
- Location and size of all cast-in lifting inserts
- Any special handling or storage requirements, e.g. strongbacks
- Quality assurance checks



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*The information provided in this publication is of a general nature and should not be regarded as specific advice. Readers are cautioned to seek appropriate professional advice pertinent to the specific nature of their interest.*

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