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**BASELINE**  
CONSTRUCTIONS

# In-situ to precast:

the next  
generation >



Can precast and modular construction techniques be successfully applied to a large scale in-situ design, while retaining all the aesthetics, features and utility of the original? Going by the experience of this extraordinary Sydney project, the answer is a resounding 'yes'. The \$90 million approximate build cost inner-city development at Rhodes is not only faithful to the original PTW design – but was delivered by Baseline Constructions faster, and at considerably lower cost, than other tenderers.

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It is hard to imagine that what is now Sydney's largest precast residential development was originally conceived by architects PTW as an in-situ design. What is more extraordinary is that the first round of building tenders for this very large Statewide Developments project had well and truly been submitted before Baseline Constructions even came into play.

Baseline is a dynamic company that is rapidly building a name for itself across a number of construction disciplines, with projects spanning large-scale residential through to commercial fitouts, hospitality projects and more.

The use of innovative construction techniques is one of a number of areas in which Baseline is making its presence felt: the company is, for example, an acknowledged leader in the field of high-end off site modular construction. It was Baseline's work with precast on another major residential development, the HIA-award winning Metro development in the Sydney suburb of Roseberry (see breakout box), that first caught the attention of the Rhodes project developer.

"We came into the action very much at the back end of the tender process," explains Nicholas Bettar, Baseline's Managing Director. "Although other

builders tendering on the job were already well-entrenched, the developer was interested in what we could come up with after seeing our work on the Metro project."

The job in question is at Marquet Street in the inner-western suburb of Rhodes. It is a reclamation site on the shores of Sydney's Parramatta River, comprising 11 separate buildings of different design and function and of varying heights up to eight storeys sitting on top of two level carpark. This includes 25 four-storey Torrens title homes, five penthouses, 249 apartments and a café.

The site's design includes shared spaces and common garden areas, private space and elements to take advantage of its waterfront location. To this end, and forming a chief characteristic of the completed project, are the massive, cantilevered balconies with large concrete upturns that offer both privacy and an ideal vantage point for river views. Other features of the design include sweeping curves in counterpoint to the more typical rectangular forms make for a friendly, liveable feel, maximising use of the available space without introducing alienating or imposing elements.

## Design methodology: in-situ to precast

Step one for Baseline was for its design team to swing into action and assess the existing in situ plans against precast requirements. The brief was to retain the architectural integrity of the design and at the same time comply with previous agreements and all relevant development consents. Then, of course questions of time, money and ensuring a safe workplace in which to execute. All factors formed part of the new plan.

"After assessment we were very confident that we could deliver fully in relation to all the expectations," says Nicholas Bettar. "There were a number of critical design features that had to be addressed at the outset, including ceiling heights, load bearing, accommodation of lift boxes and some of the unique façade elements, in particular the balconies. Once we determined that the quality, safety and other requirements around these met the brief, we were in a position to fine tune. The rest of the design centred around those issues."

Having taken care of step one, the bulk of the design and specification work then fell back to Baseline's design team, under design manager, Alan McNamara. This involved developing the workshop drawings from which the precast panels for walls, flooring and balconies would be made. To this end, early involvement and input from two precast concrete manufacturing specialists, Giroto Precast and Rescrete Industries (now Hanson Precast), was invaluable.

"After establishing the broad specs it was then up to us to detail them to ensure 100% accuracy," explains Alan McNamara. "Making sure all members

of the team were there from the outset and having excellent communication between us meant we were able to leverage on our collective experience and make sure any potential hitches were identified at the right stage – the beginning. It also meant that we could toss around ideas and see if they were achievable in practice so we could go for optimum results and make the best use of the possibilities offered by the modular methodology."





## The devil in the detail: where precast leaps ahead

So what are the possibilities offered by the off site construction methodology? Certainly those in the trade are aware of its application for certain building types, in general what would be recognised as 'modular' construction. But, according to Nicholas Bettar - and certainly as demonstrated by the scale, quality and features of Baseline's Rhodes and Metro developments - this is a field in which the Australian construction industry lags behind the rest of the world.

In fact, he says, use of modular techniques, whether exclusively or in concert with conventional construction methodology, opens a whole world of possibility for improvements in both the construction process and outcome.

## Factory quality and finishes speed installation

When components such as floors and walls are built off-site under factory conditions - including objective quality controls - then they offer a consistency in quality and accuracy of design that can be very hard to replicate when the same components are being built or poured on-site.

In the case of the Rhodes development, for both walls and floors, every service penetration was already in place before they were installed. Further, each piece was factory designed to accommodate unique façade details from the outset. The rebates and ferrules required for installation of the double-height aluminium shutters, for example, were in place and ready for fit-out from the moment they were installed. Similarly, punched windows were already accommodated, so the requirement for on-site measurement for glazing and doors was dramatically reduced, and most windows could be ordered off the workshop drawings.

The Transfloor upstand balustrades were not only fitted in a single piece (see below under 'Record turnarounds' and 'Built-in features for smarter works' for more details), but were done so finished and ready to paint - in fact, finish quality exceeded specifications.

## Built-in features for smarter works

The Baseline approach to the Rhodes project was to integrate all the critical requirements of the job into one comprehensive plan.

The progress and features of the works were deliberately structured to reduce or eliminate the need for elaborate scaffolding or screening, and the associated hazards, time and costs their use poses. This was achieved both through clever design of the precast external wall and balcony components, and timely installation of staircases, both internal stairs and fire stairs.

Pre-built modular steel staircases were installed on the same day as each floor, taking pressure of the requirement for scaffolding by offering instant access to the next floor. Timber-finished treads were then installed at the end of the job. As well as ready-fitted lanyard eyeholes to various wall and balcony parts to enable safe, easy use of appropriate harnessing, Baseline's workshop specifications also required balconies to be pre-fitted with a safety handrail spigot hole. Safety handrails were fitted before the lift, thus ensuring appropriate safety features from the moment of installation. These spigot holes also doubled as the site for the permanent balustrades, which were fitted later.

## Marquet Street, Rhodes: the vital statistics

The following information is drawn from a presentation about the Rhodes project made to the Australian Institution of Engineers late last year by Giroto Precast:

- The development used 6,000+ precast concrete panels sourced from four factories, delivered to the site in some 985 deliveries.
- Precast components used included 25,160m sq hollowcore floors, 5,950 m sq Transfloor pieces, 1,594 separate wall pieces and 72 lift shafts.
- 180mm thick loadbearing external walls feature shiplap joints and incorporate window openings that include sill/header details.
- Giroto Precast played a key role in the project from the outset - an essential for success. They oversaw construction of the wall panels and the erection process.

"Baseline Constructions had a clear construction methodology," says Giroto Precasts' marketing manager, Robert Power.

"All parties were consulted early in the design process and worked through buildability issues and all product details. This meant the detailing process could begin well in advance of construction, in the order which they were required. Working together, we were able to design the panels to reduce lifts and minimise site activities. In addition, we were able to work well with the other precast supplier, Hanson Precast. This project demonstrates that the capability to deliver a total precast solution does exist."

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## PRECAST FEATURE



### Lessons from the Rhodes Project from a Precast Supplier's Perspective

- Engage precaster/s early in the process and leverage off their experience
- Don't be concerned about multiple precast suppliers
- On major projects commence detailing as early as possible
- Maintain open communications between the parties
- Maximise panel sizes, reduce lifts and minimise site activities
- Simplify connections (where possible)
- Baseline Constructions had a clear construction methodology
- All parties were consulted early in the design process and worked through buildability issues and all product details
- The detailing process commenced well in advance of production
- Scheduling Production - Precast elements produced in the order they are needed on site
- Large projects to multiple cranes require stock build of product
- Plan carefully to avoid delays
- Good communication is essential

## Record turnarounds

Integral to the design of the Rhodes job, and the progress of the works, were the floor plates, based on hollow core floor planks connected that were connected to load bearing internal and external walls (see diagram). Again, timing and planning enabled the team from Baseline, Giroto and Hanson to achieve floor turnarounds in less time than a conventional structure.

"The design of the floors, walls and their critical intersections was carefully thought through and as a result we managed great turnaround per floor - each comprising around 600 square metres. We were working in a smooth rhythm. There was no requirement for wet trades or time to let concrete cure and go off. We were all ready to start again the next day, the next floor," says Alan McNamara.

Similar benefits in timing were achieved in the design, lift and installation of the trans-floor balconies. This was no mean feat given that the plans called for balconies with a massive three metre, two-way cantilever. Considerable engineering detail was required to determine how to accommodate the design in precast, in particular its two-way action. The final solution accommodated a number of needs in a single piece - requiring a corresponding



single lift. The net result of this planning was balconies and Transfloor pieces, pre-fitted with safety features and accommodations for the facade, installed in a single 15-20 minute lift, finished and ready to paint. It was an outstanding achievement by any measure.

Another significant benefit was the site workforce required to install this modular structure.

Installation of the structural elements required a significantly smaller crane crew and team of riggers than to achieve the same result on a conventional concrete structure.

Further, fewer preliminaries, hence risk were required and the end result carried a factory-quality finish that would have been very difficult to replicate using site based applications.

## The bottom line

An examination of both the Rhodes development and Baseline's Metro project throws considerable light on the potential of a relatively unsung area of Australian concrete construction.

Each of these developments has forced sceptics to rethink preconceptions about both the design constraints and the aesthetics of using precast and modular construction techniques for high-end projects. The HIA Award for Metro is just one

testimonial to this. And, design and aesthetic considerations being equal, it seems likely that the considerable bottom line benefits offered by this construction methodology will result in the increased interest of architects, developers and other members of the construction industry.

However, as Baseline's Nicholas Bettar stresses, off site construction alone is by no means a magic bullet. "It is experience, keeping up with overseas

innovations and almost fanatically meticulous planning that makes the difference.

If you go through every detail and make allowances for them all, and can think creatively about how best to achieve the result you want, then modular methodologies offer the potential to deliver benefits of increased quality and reduced risk, time and cost when compared to conventional construction methods," he says.

## Award-winning Metro development Showcases Precast



Another of Baseline Construction's precast projects is the Metro apartment development in Sydney's inner-city suburb of Roseberry.

The commercial, retail and 274-unit residential development was last year named the 2006 HIA Australian Apartment Project of the Year. The \$57 million dollar project was built using a methodology that is the precursor to that used in the larger Rhodes site, the development was required by Council to align with, and contain the streetscape, and includes 3,670 square metres of commercial and retail space.

As for the Rhodes development, meticulous planning from the earliest possible stage was the key to success. Steel and concrete panel sizes were optimised for transport and to reduce and/or concentrate reliance on craneage, while remaining faithful to the architecture and aesthetics.

It was characterised by innovative use of precast technology mixed with steel efficiency, where connections and components were designed to accommodate the broadest possible spectrum of requirements, from service penetrations to architectural intentions.

As with Rhodes, use of steel and precast for all structural elements virtually eliminated the need for formwork handling or propping.

The end result is now recognised as a prime example of intelligent design. The sterility and lack of character that springs to some minds when the 'modular' word is heard is nowhere in evidence.

On the contrary, the lively and vibrant development artfully combines use of light and space, private and communal space, intriguing shapes and voids to award-winning effect.

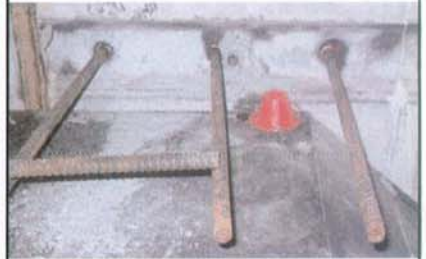


## CASE STUDY

### REIDBAR™ THREADED INSERTS PROVIDE CONTINUOUS CORE WALL TO SLAB CONNECTIONS

**PROJECT:** Charlotte Towers, a 44 storey high-rise building in the Brisbane CBD combining a mix of commercial space on the lower floors and 396 apartments above.

**PROJECT DESCRIPTION:** The last 5 years have seen Southgate Formwork use a variety of systems in high-rise projects in order to provide continuous core wall to slab connections.



*ReidBar Starter Bars and ReidBar Threaded Inserts combine to provide a fully self-supporting system.*

Southgate's project team at Charlotte Towers opted to use the ReidBar Starter Bar and Threaded Insert system. Features that influenced the decision included:

- 1** - The system is a bar break system, (the thread does not diminish the carrying capacity of the bar).
- 2** - No bending of bars is required, overcoming potential OH&S issues.
- 3** - The bar is self supporting, (it does not have to be tied to steel), which sped up the process and assured the engineers that every starter bar could be relied on to carry the intended load.
- 4** - A further feature not identified originally was that two trades on site, form worker and steel fixer, were now able to work independently because the bars do not have to be tied to the steel.

Reid technical support staff assisted with ensuring engineering requirements were met as well as providing on-site support for the form workers. This extended to help with the design of a project specific rebate board to hold the threaded inserts in place.

For further details on ReidBar continuous threaded reinforcing systems, call **1300 780 250** or visit [www.reids.com.au](http://www.reids.com.au)

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PROJECT ENGINEER:	Robert Bird and Partners
FORMWORK:	Southgate Formwork
REID REPRESENTATIVE:	Barry McCormick
REID ENGINEER:	Claus Rotstein
REID products/systems:	ReidBar Starter Bars, ReidBar 16mm Threaded Inserts and Nailing Plates

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