

Sydney Discovers the Economy of Precast

With the exception of NSW, precast concrete walling is widely used in the medium density housing developments of most states. In NSW the perception that brickwork is cheaper may not last for long. The growing availability of mobile cranes, together with the rising cost of bricklaying is seeing precast concrete walling capturing greater market share in NSW, and Sydney in particular.



The benefits of this system are:

- > **Off-site manufacture of building elements resulting in speed of construction and an unobstructed building site**
- > **Manufacturing under the quality-controlled conditions of a factory**
- > **Loadbearing single skin walls that provide greater floor space and are equivalent, if not better, than conventional building systems in thermal and acoustic performance**
- > **Structural soundness.**

Sunamber Developments – originally from Victoria – have previously reaped the rewards of this type of construction and believed it would also prove economical in the Sydney market. They have recently completed a three-storey development comprising 12 townhouses and commercial tenancies in the Sydney suburb of Lilyfield. Each townhouse has approximately 200 m2 of living area including a verandah and balconies on each of the first and second floor levels.

Key points of the project

The project used 182 precast wall panels and 250 hollowcore floor planks. The maximum size of the wall panels were 8.3 x 3.4m, weighing just over 10 tonne and floor planks 1.2 x 6.0m, weighing just under two tonnes. All external and party walls are 150-mm thick, solid load-bearing panels. The suspended floors at the first and second levels are 150-mm prestressed hollowcore floor planks with a 50-mm in-situ topping reinforced with F62 mesh for crack control. The floor braces the wall panels, producing a diaphragm action between the party and transverse end walls. Load-bearing walls and floor planks spanning the full width of each unit (six metre spans) reduced the number of structural supports providing greater living area.

The tight program suggested prefabrication. While groundwork proceeded on site, the precast wall and floor elements were manufactured in the precast factory. By limiting the number of types of wall panels fewer changes to the moulds were necessary, resulting in savings of time and cost during manufacture.

After the placement of footings, the precast units were transported to site and erected to produce a freestanding load bearing shell ready for fit out. Cranage of the precast units was easily performed with a 50-tonne mobile crane.

Simple connection details between wall panels consisted of individual galvanised steel angles, plates and dowel bars bolted to cast-in fixing ferrules that made installation and restraint of the wall panels quick and simple.

Precast wall-to-floor connections were as simple as bolting on galvanised steel shelf angles to wall panels while in the factory and then sitting the floor planks onto the shelf angles on site, again speeding up installation times. Tie bars were screwed into ferrules cast in the back of the wall panels. These bars were in turn cast into the floor topping for added restraint.

The high density of precast concrete panels produces thermal and acoustic properties that are an important benefit of the construction. The performance* of a 150-mm thick solid precast concrete panels has been shown to equal cavity construction and generally outperform brick veneer.

Construction sequence

Strip and pad footings were poured for the first six units while the precast wall panels and floor planks were being manufactured off site. Ground floor wall panels for these units were transported to site, installed and propped. The first floor hollow-core planks were installed and supported by these wall panels. While this was being done the footings for the remaining six units were poured. Installation of the walls and first floor of the remaining six units proceeded while the first floor in-situ topping was poured for the first six units. When the topping had reached sufficient strength, the props were removed. The procedure was repeated for the next two floors.

After all the precast elements had been installed, the ground floor slab was poured, the roof trusses and balcony framework were fixed to the wall panels with masonry anchors or into cast-in ferrules.



Painting of the panels.



Hollowcore floor planks are installed at the second floor level.

PROJECT DETAILS

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| Project | Twelve townhouses. |
| Location | Corner of Lilyfield Rd & Justin St, Lilyfield. NSW |
| Structural Engineer | S.W. Healey & Associates |
| Builder/ Developer | Sunamber Developments Pty Ltd |
| Precast Concrete Manufacturer | Rescrete Industries Pty Ltd |
| Architect | Zone Architects |

Article courtesy of the Cement and Concrete Association of Australia.