



## Dollars and Sense: The Place of Concrete in Residential Towers

Concrete offers significant benefits for residential tower developments according to the architects of Metro Apartments, a new 50 metre, 16 storey apartment tower in inner city Auckland.

**T**he construction of tower blocks for residential living is a continuing trend as density increases in the inner cities of New Zealand's major urban centres. On the recently completed Metro Apartments, Clark Brown Architects worked closely with the project management and construction company Arrow International in what architect Paul Brown says was a partnership approach to the development of the detailed design and construction documentation.

Concrete was a key ingredient in the tower block. It is an effective tool in implementing control strategies for noise, fire and temperature swings in such developments. But of course, at the end of the day, cost effectiveness is a primary consideration and the kind of detailing required in apartments as opposed to office blocks means concrete makes the grade.

In comparison to commercial towers, building services for residential 'high-rise' developments are minimal, with only buildings at the expensive quality end of the market provided with mechanical control of ventilation and air conditioning. For the majority of developments, the provision of ventilation extracts to internal rooms is all that is

included, beyond the necessary opening windows for ventilation, and it is in this environment that concrete's thermal lag can be used to good effect.

Significant solar gain, particularly in north-facing units, means that apartments can be subject to considerable overheating. In a concrete building, however, the thermal mass of the structure can control daily temperature swings to maintain a comfortable interior environment. The trick is to manipulate the building fabric to ensure that the thermal mass is not isolated externally. Utilising the mass of concrete in a frame building as a thermal store is a particularly effective strategy to improve building quality without significant impact on cost.

### Concrete versus Steel?

While steel frame buildings offer apparent advantages with regard to speed of construction compared to concrete structures, these advantages tend to be undermined at fit-out stage through the costs associated with acoustic and fire-rated partitions. Construction firms used to commercial office development tend to overlook the intensity of a residential fitout, with the required interface between structural and architectural elements, when costing and programming jobs. Concrete, however, allows an almost seamless transition between these elements, with its superb fire retarding and acoustic properties.



Precast shear walls combine the requirements of structure and cladding by providing an enclosure that significantly reduces the load required to be taken up by the moment resisting frame.

### Fast and Effective Construction

A mix of concrete and steel structure was used in the construction of Metro Apartments. Cranes were used to put precast three-level columns into position, which were then connected to steel beams. Precast Dycore flooring was laid over the beams and a 65mm topping poured. The system resulted in a very fast floor cycle, combined with the benefits of a structure containing a significant quantity of concrete. Steel beams were used as they could support the structural load without recourse to extra fire protection. In addition they provided a bolted connection to the concrete columns to create the necessary rigidity in the moment resisting frame.

At each end of the apartment floor, precast shear walls elegantly combine the

requirements of structure and cladding by providing an enclosure that significantly reduces the load required to be taken up by the moment resisting frame. This integration is key to the benefits concrete construction will bring to a project. It also demonstrates another of concrete's significant architectural advantages: the ability to cast concrete into any form without concerns about jointing the material. This allows for effective, customised detailing of the interface with window systems, and is especially critical in an apartment development where the provision of off-the-shelf residential-style joinery within a multi-storey building can result in considerable technical difficulties. For example, the jointing of panels can be effectively controlled through the provision of a sealed lap joint, ensuring a

minimal chance of moisture ingress.

The use of Dycore floors at Metro provided excellent acoustic separation, in excess of the Code requirements, without the need for extra acoustic insulation in the suspended ceilings. In addition, the standard product was able to provide the necessary fire rating over large spans.

The sale of apartments on unit titles means there are significant acoustic and fire separation requirements for developers to consider in this kind of development. Concrete enables these requirements to be easily and efficiently met. **C**

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