UNSW Village

Environmental Living

Environmentally sustainable design lies at the core of this project, one of the largest of its kind in the country and a far cry from the dark, poky lodgings often associated with student housing.

Comprising 19 buildings ranging from one to nine storeys, with various accommodation styles to house over 1000 students, the University of New South Wales Village project was an ambitious one.

Sustainable principles and passive solar design have influenced all aspects of the design, spanning choice of materials, orientation and a host of other features.

Integral to the project's success has been the intelligent and innovative treatment of its extensive precast elements, which helped deliver thermal efficiency, a flexible scope for future reconfiguration, speed of construction and a reduction of occupational health and safety issues as the project unfolded.

Precast Manufacturer
Hanson Precast

Architect
Architectus

Engineer
Robert Bird Group

Builder
Watpac

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Sandwich panel design

With thermal efficiency high on the project's priority list, an innovative approach was required to ensure the precast components of the design would deliver.

"The original design always included precast," says Kerry Clare, director of Architectus, the project's architects.

"As architects, we are familiar with, and like to use, off-form concrete, however our concern in this case was that thermally, it doesn't perform well in a single skin application."

The solution was use of insulated, double skin, Thermomass sandwich panels which, according to Kerry, delivered much higher thermal performance.

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making precast easy

"Sandwich wall panels which were typically 260mm thick were supplied, although 280mm and 310mm panels were also supplied," explains Chris Parsons, Manager for Hanson Precast, which was contracted to make and supply the precast components.

"The sandwich panels were manufactured 'inside out' with the structural layer poured first, the 50mm insulation placed and then the 60mm external concrete skin. The three layers were held together with non-conductive connectors or ties." The ties enable the layers to move independently of each other, allowing for thermal expansion and contraction of the external skin without affecting the structural integrity of the element.

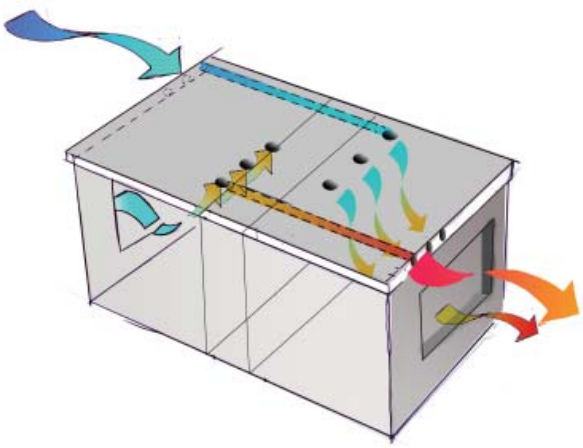
All in all, 3100 wall panels – totalling 30,000 square metres – were constructed for the project, including 1200 of the sandwich panels.

Cooling with hollowcore floors

Also delivering on the thermal performance front were the 17,500 square metres of precast hollowcore flooring planks, which were topped with 70mm of in situ concrete.

To provide free-flowing ventilation, an energy efficient hollowcore cooling system was devised.

Selected 1200mm wide hollowcore floor planks had three vertical 70 millimetre diameter holes drilled into their cores. The tops of the holes were plugged and topped with the topping layer of concrete. The permanently opened holes on the underside of the floor planks and the open external ends of the planks allowed for the automatic transfer of air with a fixed louvre fitted at th plank ends to protect against rain ingress.



Energy efficient cooling using hollowcore - crossflow ventilation to double-loaded bedrooms via the hollowcore slab.

According to Chris Arkins, Director of ESD consulting firm Steensen Varming, "ventilating the slab in this way allowed absorbed heat to be purged overnight, enabling it to absorb heat during the day and provide passive cooling to the spaces. The key outcome achieved was to allow cross ventilation to the bedrooms without compromising privacy."

Flexibility and timing the key

The relatively lightweight flooring and wall panels were prefabricated off site and brought in during the day, delivering significant savings to site costs, personnel and a reduction in associated WH&S risks. And use of precast panel construction will also enable relatively simple reconfiguration of the site should it be needed in the future.

That's not to say the logistics of the job weren't considerable.

Three Favco cranes were positioned on the site to provide sufficient lifting capacity and coverage. On any one day two cranes were used to erect the panels.

At the peak of the project the average number of precast elements erected each day was either 30 wall panels or 70 floor planks or a combination. This was maintained for approximately six months. And a typical day involved up to 15 semi trailer loads being unloaded – all deliveries that were critical to the project's success.

And certainly success is the word to describe this project – within a month of its opening for the 2010 academic year, it was fully occupied – truly the place to be on the UNSW campus.