

An insulation and structural cornerstone

We're perched uncomfortably above a tectonic plate minefield. But that knowledge didn't lessen the shock of the 7.1 magnitude earthquake that tore through Canterbury, leaving a mass of destruction in its wake.

An estimated 100,000 homes were damaged in the quake and subsequent aftershocks - nearly half of Canterbury's dwellings. But Cornerstone Building system inventor and developer Mary Ginn says homes built using the Cornerstone Building system performed exceptionally well.

"As we've been checking off the homes which have been built using the 'Cornerstone Building system', even the homeowners who were more challenged with regard to engineering requirements, have proved the laboratory test results carried out at BRANZ.

"All those contacted were glad they made the choice to go with the Cornerstone Structural Insulated Panel system (SIP). One client in the Lakes subdivision in Kaiapoi had ground displacement, and was obviously hit quite hard, but he was very happy the Cornerstone Building system, clad in corrugated iron, had no movement. Brick over Cornerstone has remained intact in Prebbleton, Kaianga and St Albans - areas which were hit quite hard.

"Our Cornerstone Licencee in Timaru, Peter Mc Kirdy, who does not live in a Cornerstone home, has cracks in his floor and plastered walls, but when checking on all the Timaru homeowners found no damage and happy clients to the many homes he has built in the area," Ginn says.

"Another licencee, Richard Murray experienced the quake in his Cornerstone barn and was amazed at the flexibility of the structure, as he was awoken in the upper floor area which was swaying."

So why does the system perform so well?

"The system is a polystyrene formwork housing reinforced concrete columns and a continuous bond beam. When the wet concrete is poured into the cavities of the 200mm thick minimum polystyrene wall, it adheres to the polystyrene packaging which work together as a flexible wall, but not as flexible as timber frame.

"Just as we have polystyrene for helmets to protect from head damage, the polystyrene



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protects the concrete structure, allowing it to have some flexibility in high winds and earthquake. Of course the thickness of the polystyrene also serves up an R value of 5.75 for the 250mm thick wall."

Multiple Benefits

But standing up to earthquake damage is not the only benefit of building with the Cornerstone system. Recent reports found more than one million homes are not adequately insulated and the cost of un-insulated houses is high.

Yet, building an energy efficient building often costs no more than building an inefficient one.

Good passive design with high insulation, orientated to the sun is the key. Healthy choices are important in the design stage, choosing products that don't rot or break down or allow water to penetrate such as UPVC windows, where the corners are welded.

Options such as claddings, which are the raincoat of the structure, need to be considered thoroughly; that they will perform, the maintenance required and the implications.

The Cornerstone Building system is an example where the cost is sometimes even cheaper than standard options, with the added benefits of less energy requirements in set up and ongoing use and stronger in earthquakes and high wind conditions.

The Cornerstone Building System is an SIP building system also known as Insulated Concrete Form (ICF). It's a construction type quickly forging a name as a preferred building system for both now, and the future due to its insulating properties and structural strength.

Most new buildings are insulated only to the minimum levels required by the Building Code and one of the key areas lacking are the walls themselves.

Many recognise windows as requiring double glazing, but the remaining and largest part of the wall area (70 percent) end up ignored. In winter a lot of our damp and draughty homes cannot be kept above the World Health Standard recommended minimum temperature of 16 degrees celcius.

The Cornerstone Building system not only ticks all the boxes for its structural strength, but has the highest insulation rating with an R value of 4.3 (m2degC/W) for the 200mm wall and 5.75 for the 250mm wall - more than double the insulating value required to meet Building Code requirements. Space heating equates to about 26-30 percent of the average electricity bill, making a huge impact on the individual carbon footprint.

Crafted from 90 percent polystyrene and 10 percent reinforced concrete, there is nothing to rot or break down. Polystyrene itself is made from 98 percent air and just two percent matter from of the waste or by-product of oil. But even if oil was to run out, polystyrene can be made from orange peel or the polymar from wood waste, options being seriously considered .

It may have once been hard to convince people that polystyrene was the best system to build their biggest investment. Today there are homes, schools, motels and many more buildings saving time, money and energy with the Cornerstone Building system.

Cornerstone Building System Ltd
Head office PO Box 21 080, Edgware
Christchurch
T (03) 381 6612
0800 4 CORNERSTONE
E cornerstonebuildingsystem@gmail.com
www.4-cornerstone.com

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39 Latimer Square
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