

# Durable and sustainable

A stunning house is taking shape behind the dunes at Waikanae, on the Kapiti Coast.

Nathan Rooney of SPACE Architecture Studio, Mana, says the brief was for a durable home that would nestle into its location and maximise the view.

In tandem with this, Rooney was keen to explore an energy efficient design. He says that building in concrete satisfied both requirements perfectly, providing a comfortable home that demonstrates responsible energy use.

The result is a 325sqm, single-storey home, constructed from self-compacting concrete (SCC), cast in-situ. Its 235mm external walls are made of a sandwich construction, in which SCC lies either side of an insulating 50mm polystyrene layer.

The centerpiece is a 13.4m internal S-shaped concrete wall that runs the length of the entrance corridor, delivering concrete mass right into the heart of the building.

Rooney, Certified Builder Michael Craig and Jeff Collins, Allied Concrete Regional Manager for the lower North Island, all joined in early discussion on the project to assess the best concrete design and mix.

Jeff Collins says SCC was the ideal choice because of its high 'flowability' which lends itself to complicated framework and shapes, the lack of need for vibration, and for the quality of the finish on the exposed concrete.

The Paraparaumu Allied team, where the concrete was batched, had little direct experience in SCC, but were able to call on Allied's extensive company-wide knowledge and expertise.

Allied Wellington has been pouring over

500m<sup>3</sup> of SCC annually for several years. After poring over the plans, its technical department designed an appropriate 30MPa SCC mix. Initial pours were laid under the on-site supervision of a Wellington staff member experienced in using SCC.

"My heart was in my mouth for the first few pours," Collins confesses, "since the mix had to be exactly right. It produced an excellent result, with a superb finish on the exposed product."

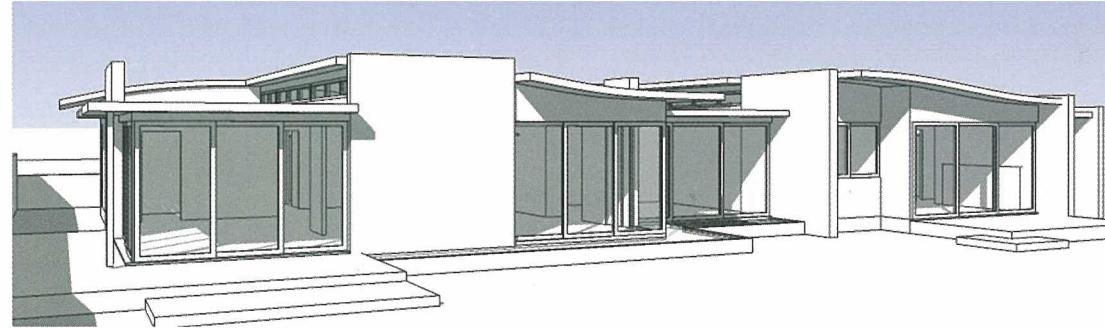
Builder Mike Craig had to come up with a highly innovative boxing method to hold the polystyrene in place while SCC was poured either side of it.

"Holes were drilled through the last 15mm of Nirvana pins, part of the Reid system. Threading wire through these holes allowed wire mesh reinforcing to be tied to plastic chairs. These were made rigid on each side, which kept the polystyrene firmly in place during pours."

Including the curved internal wall, nine panels completed the structure, with no two being the same. The largest panel, at 3.6m tall, was constructed in four pours. The use of aggregate of maximum 8mm diameter provides a decorative finish to the 160sqm of exposed concrete.

Collins says "Mike's a brilliant builder, with great ideas. It's been an excellent outcome for the client, and we'll have significant confidence using SCC in the future."

Rooney says the Waikanae home utilises multiple 'green' elements. Concrete provides thermal mass, with solar gain coming from extensive use of double-glazed, argon-filled, high-performance glass. High-glazing louvre



windows allow passive cooling and ventilation, and low-energy light bulbs are used throughout. The house features solar water heating, boosted by gas, which also fuels the underfloor heating. Rainwater will be captured for toilet flushing and irrigation.

"In the last two years there's been a real groundswell of public awareness with what's available," says Rooney. "People are interested in 'lifestyle payback' in terms of comfort, rather than just financial payback. There's a palpable increase in residential projects where clients want to create responsible buildings."

Rooney believes that concrete solves a lot of issues. "It's durable and low maintenance. It has fantastic thermal properties, good acoustics, excellent fire performance, longevity, ease of finishing, and provides lifestyle payback."

"These are all properties that don't decrease over time. It's an honest, flexible product that's very adaptable."

**Top:** This Waikanae home features many environmental sustainable design principles, notably the use of concrete to provide thermal mass.

**Above:** The 13.4m 'S'-shaped wall echoes the building's roof contours. Builder Michael Craig is a member of the Certified Builders Association of New Zealand. Its members are trade-qualified builders who must adhere to strict guidelines for achieving the highest possible standards in both workmanship and business practices.