

concrete

VOLUME 54 ISSUE 4 DECEMBER 2010/JANUARY 2011



Top Marks for A+ Home

A CONCEPT DESIGN FOR AFFORDABLE, COMFORTABLE AND ENERGY EFFICIENT LIVING

Prefabricated Living

IMPROVED QUALITY WITH REDUCED COSTS AND TIMEFRAMES

Powered Through Passive Design

WAIKATO HOUSE ACHIEVES 60% REDUCTION IN ENERGY CONSUMPTION



UPFRONT

Once again another twelve months have passed in what seems a flash, and as with recent years those twelve months have been extremely challenging for the building and construction sector. 2010 saw the fallout from the global financial crisis continue to cast a shadow across all areas of business confidence, which was literally shaken further by the September Canterbury Earthquake.

Anticipating such a challenging operating environment the 2009-10 and 2010-11 CCANZ Business Plans focused the organisation's efforts and resources on the most important industry issues. Key amongst these areas of concern is the advancement of concrete within the residential market.

One vehicle adopted by CCANZ to achieve this objective was the recent release of *Designing Comfortable Homes* (2nd ed.). The guide's easy to read explanation of how appropriate combinations of glass, concrete's thermal mass and insulation, as part of an overall passive solar design, can enhance the comfort and energy efficiency of New Zealand homes has proven very popular.

CCANZ has also developed the draft document *CCANZ S 01 Standard for Weathertight Concrete and Concrete Masonry Construction*, which covers the weathertightness of the building envelope for three concrete (or concrete masonry) based wall construction systems, a concrete ground floor system and a concrete roof or deck system.

The Department of Building and Housing (DBH) is proposing to cite the published version of CCANZ-S 01 as a new Acceptable Solution (AS) for Building Code clause E2 (External Moisture), with their consultation period ending 04 February 2011.

The provision of a concrete specific AS for the weathertightness clause (E2) of the Building Code would be tremendous as it would alleviate Building Consent Authority uncertainty and allow new homes to make use of highly durable, low maintenance concrete and concrete masonry systems.

Within the residential space CCANZ has also developed the *A+ Home* – see pages 6-9. The conceptual model demonstrates that through design efficiencies, such as the simple inclusion of two thermal mass concrete masonry walls, an affordable, comfortable and strong residential dwelling can easily be delivered.

The residential theme of this issue of *Concrete* magazine is also evident in articles which cover New Zealand's concrete housing heritage and the importance of prefabrication. The joint winners of the Excellence in Residential Concrete Construction category at the 2010 Concrete³ Sustainability Awards also feature, along with the UK *Code for Sustainable Homes* and contemporary concrete residential architecture from Europe.

New Zealand is at a tipping point in terms of residential construction. We face as a nation, serious issues of housing affordability, suburban sprawl, rising electricity costs, unacceptable levels of asthma, not to mention leaky homes. These issues have combined to create an urgent need to reassess how we design residential dwellings and what materials we construct them from.

Concrete's durability, thermal mass, fire resistance and acoustic insulation properties offer an immediate and flexible answer, one which enables residential construction to be accessible, high density, energy efficient, comfortable and healthy, as well as durable and low maintenance.

Throughout 2011 the residential concrete answer will be one CCANZ continues to provide in response to these issues, which if not addressed will remain to hamper future generations.

Rob Gaimster
CCANZ, CEO



concrete MAGAZINE

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concrete is published quarterly
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ISSN: 1174-8540

ISSN: 1179-9374 (online)

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NEWS

CCANZ ANNUAL REPORT

The 2009-10 CCANZ Annual Report was presented at the 2010 Annual General Meeting held recently in Wellington, and is now available on the CCANZ website.

Reporting against the strategic plan, the document outlines achievements within the following areas - Baseline Activity, Communications, and Projects.

The fulfilment of the CCANZ work programme during the 2009-10 year required a positive, resilient and above all innovative approach. The need to work smarter, as well as harder, ensured CCANZ fulfilled its representative role and in so doing continued to assist the entire industry to counter the recession, as well as position itself to take advantage of the eventual upturn.

DRAFT CCANZ WEATHERTIGHT STANDARD

CCANZ intends to publish a standard for weathertight concrete and concrete masonry construction: CCANZ-S 01.

The Department of Building and Housing (DBH) is proposing to cite the published version of this standard (CCANZ-S 01) as a new Acceptable Solution for Building Code clause E2 (External Moisture).

The draft standard is available from the CCANZ website to enable informed consultation on DBH's proposal to cite the new standard. The final version is not expected to differ in substance, although there may be minor editorial changes.

To read DBH's E2 (External Moisture) proposals and make a submission please go to www.dbh.govt.nz/current-consultations.

The Department's consultation on the proposed new Acceptable Solution closes on 4 February 2011.

CONCRETE SMARTER

North Shore City Council (NSCC) is partnering with Mitre 10 MEGA, Glenfield to trial in-store promotions to reduce concrete stormwater pollution. Currently in the pilot phase the project is aimed at changing the behaviours of trade and DIY users of bagged concrete products.

Mitre 10 MEGA staff are wearing Concrete Smarter badges and prompting customers that purchase bags of cement or concrete to wash their tools on the grass and to use sandbags to divert concrete wash water away from stormwater drains. Staff are also providing customers with a Council brochure on correct practices.

Additional Concrete Smarter in-store promotions include posters, floor stickers and a digital display in the concrete aisle, along with stickers on bags of cement and concrete products and trowels to remind and encourage users of concrete to do the right thing. The Atlas Concrete store in Takapuna is also using similar in-store initiatives.

View some of the Concrete Smarter in-store initiatives at the NSCC website - www.northshorecity.govt.nz



ROCKCOTE

s y s t e m s

The Hanning residence, Christchurch, (below) was announced Rockcote National House of the Year 2010.



Merry Christmas

We would like to thank you for your continued support over the year, and wish everyone a very Merry Christmas.

Take care over the holidays and we'll see you in the New Year.



www.rockcote.co.nz
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BUZZ FROM THE BEEHIVE

NEW ZEALAND HOUSING REPORT

The Department of Building and Housing (DBH) released its annual report for 2009/2010 with a number of key findings.

Housing demand in New Zealand is expected to grow by more than 20,000 households every year, with the majority of demand occurring in Auckland.

Home-ownership rates are declining as the ratio of house prices to income continues to put home ownership out of the reach of many.

New housing construction rates are below population growth rates and behind the forecasts for the period. Current regulations were highlighted as a possible barrier to the future release of new residential land supply.

More information and a copy of the annual report is available at www.dbh.govt.nz/annual-report-2009-2010-overview

HOUSING AFFORDABILITY

Gateway Housing Assistance was launched by Phil Heatley on October 11. The programme seeks to help first-time home buyers by allowing them to defer payment on land when buying or building a house for up to 10 years.

So far there have been 30 sections on Crown or Housing New Zealand land designated for the scheme with the Government targeting community housing organisations such as Habitat for Humanity to develop those first plots.

More information is available at www.hnzc.co.nz/gateway

NEW DWELLINGS STATISTICS

Statistics New Zealand figures released during October show the seasonally adjusted number of new dwellings (excluding apartments) consented during September fell by 2.6 percent – the third consecutive drop and continuing a downward trend which began in March.

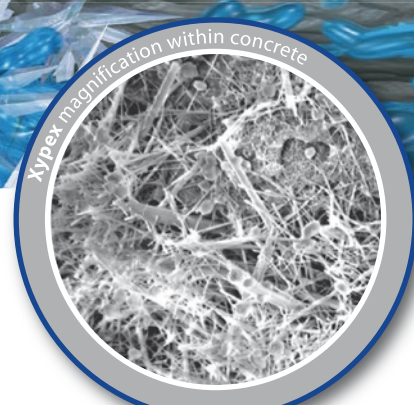
The value of residential consents in September was 6.2 percent (\$30 million) below September 2009. The value of non-residential consents was up 42 percent (\$108 million).

The full dwellings statistics are available at http://www.stats.govt.nz/browse_for_stats/population/estimates_and_projections/dwelling-and-household-estimates.aspx

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Concrete solutions

“When a project isn’t focused on the needs of the people, then what?”



Aziza Chaoui, Architect, Fez, Morocco: Winner of the Global Holcim Awards Gold 2009.

Develop new perspectives for our future: 3rd International Holcim Awards competition for projects in sustainable construction. Prize money totals USD 2 million.

www.holcimawards.org



In partnership with the Swiss Federal Institute of Technology (ETH Zurich), Switzerland; the Massachusetts Institute of Technology, Cambridge, USA; Tongji University, Shanghai, China; Universidad Iberoamericana, Mexico City; and the Ecole Supérieure d'Architecture de Casablanca, Morocco. The universities lead the independent juries in five regions of the world. Entries at www.holcimawards.org close March 23, 2011.

The Holcim Awards competition is an initiative of the Holcim Foundation for Sustainable Construction. Based in Switzerland, the foundation is supported by Holcim Ltd and its Group companies and affiliates in more than 70 countries. Holcim is one of the world's leading suppliers of cement and aggregates as well as further activities such as ready-mix concrete and asphalt including services.



THE A⁺ HOME - DESIGNED FOR AFFORDABILITY & COMFORT

THE A⁺ HOME HAS BEEN CREATED BY CCANZ ARCHITECT (EU) RALF KESSEL TO DEMONSTRATE THAT THROUGH DESIGN EFFICIENCIES AN AFFORDABLE, COMFORTABLE AND STRONG RESIDENTIAL DWELLING CAN BE DELIVERED TO MEET NEW ZEALAND'S GROWING DEMAND FOR REASONABLY PRICED HOUSING.

The 120m² net area house is set on a typical 550m² sized plot. The living/ kitchen area is the heart of the home, the space where people come together to dine, talk and play. Three generously sized bedrooms and two bathrooms combine with a small study and laundry/ garage unit to easily cater for the day-to-day demands of a busy family.

The house design is based on a conventional New Zealand model, consisting of a concrete ground slab, with insulated timber frame walls, and an insulated timber roof.

The main distinguishing feature of the A⁺ Home is two concrete masonry walls that define the living room area. Accounting for only a small percentage of the A⁺ Home's estimated cost per m², the thermal mass properties of the masonry walls ensure energy and in turn financial savings, as well as a moderate internal temperature that is comfortable and healthy.

THERMAL MASS EXPLAINED

By taking advantage of concrete's thermal mass, in combination with an appropriate level of insulation and glazing, the masonry walls regulate internal temperatures to provide a healthy and energy efficient living environment throughout the year.

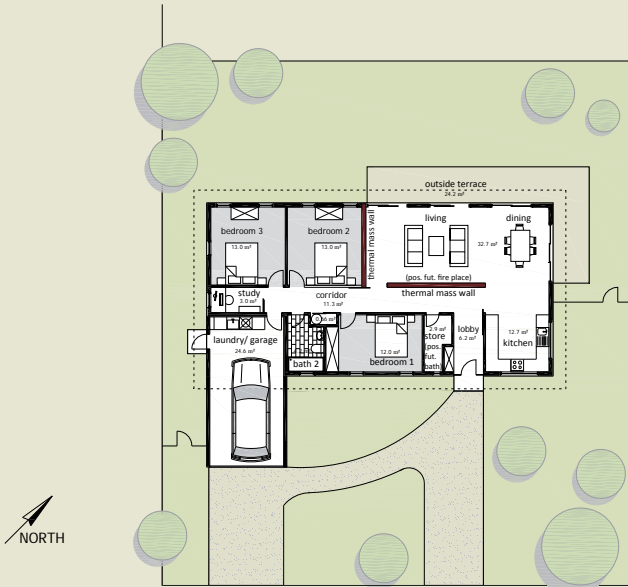
These benefits are achieved by orientating the living room area to the north so that during winter, when the sun is at its lowest angle, the masonry walls directly absorb the sun's energy. As the sun goes down towards evening, the accumulated heat is gradually released back into the house to maintain a constant temperature.

During summer the reverse takes place. In combination with shading to prevent the high-angled sun from directly entering the house, the masonry walls absorb excess heat to balance the internal temperature. At night, opened windows purge the masonry walls of heat build up, enabling them to cool and become ready to again absorb excess heat the following day.

ROOM SCHEDULE

ROOM SCHEDULE / INCL. GARAGE	
Living and dining area	32.7m ²
Kitchen	12.7m ²
Bedroom 1	12m ²
Bedroom 2	13m ²
Bedroom 3	13m ²
Bath	4.2m ²
Study	3m ²
Store	2.9m ²
Entrance lobby	6.2m ²
Corridor	11.3m ²
Laundry/ Garage	24.6m ²
TOTAL	135.6m²
HOUSE AREA WITHOUT GARAGE AS ABOVE, EXCEPT:	
Laundry	9m ²
TOTAL	120m²

The A⁺ Home can be fitted with a second bath which would replace the 2.9m² Store room and would contain 1 toilet, 1 sink and a shower.



A+ Home with garage



A+ Home without garage



BUILDING MATERIALS & COST ESTIMATES

The building costs for the A+ Home, with its two concrete masonry walls, are outlined below.

The A+ Home's floor and roof construction consist of a concrete floor slab and an insulated timber roof with metal decking.

A+ HOME

- All external walls made of traditional timber frame (90mm studs)
- Internal GIB lining
- External vertical battened Hardies cladding, including wall insulation, trim and satin finish
- Two internal walls defining the living room area made of 200mm concrete masonry

Estimated cost per m²: NZ\$ 1,421

For the purposes of comparison, costs for a full timber option, a full concrete masonry option and a steel frame option were also calculated using the same concrete floor slab and insulated timber roof with metal decking template.

TIMBER OPTION, AS A+ HOME EXCEPT:

- All internal walls made of traditional timber frame (90mm studs)
- Estimated cost per m²: NZ\$ 1,409

CONCRETE MASONRY OPTION, AS A+ HOME EXCEPT:

- All external walls made of 150mm concrete masonry including external polystyrene insulation
 - Internal walls of 100mm concrete masonry, painted
- Estimated cost per m²: NZ\$ 1,445

STEEL FRAME OPTION, AS A+ HOME EXCEPT:

- All internal & external walls made of C 90 steel framing
- Estimated cost per m²: NZ\$ 1,425

The cost estimates per m² clearly indicate that the A+ Home is competitive with the full timber option. It is also interesting to note that a full masonry option, with its range of benefits, also compares favourably in terms of cost.

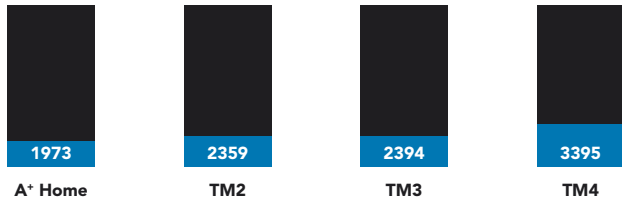
The estimated costs were supplied by Rawlinsons NZ based on 300 built units, and include 15% GST per m².

A+ Home	Timber	Concrete	Steel frame
\$1,421	\$1,409	\$1,445	\$1,425

THERMAL MODELLING (TM) DATA

AUCKLAND

Heating energy consumption in kWh pa

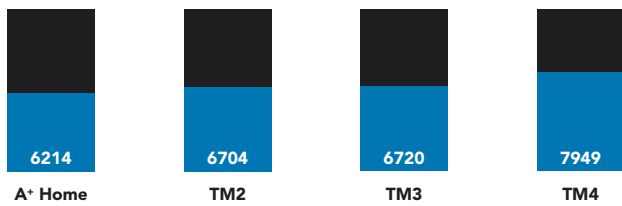


Overheating in hours pa (hours exceeding 26°C, living room shaded by sliding sun shutters)

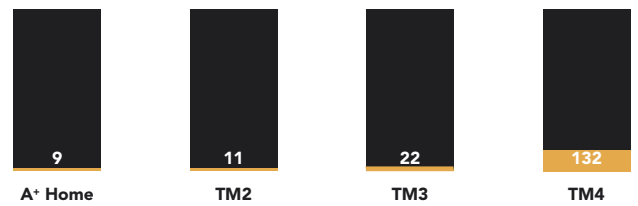


WELLINGTON

Heating energy consumption in kWh pa

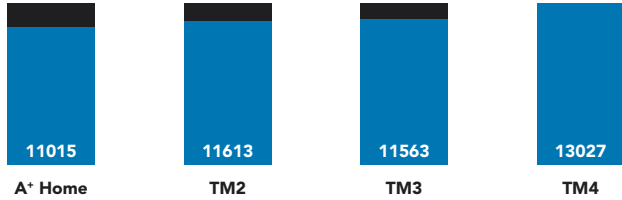


Overheating in hours pa (hours exceeding 26°C, living room shaded by sliding sun shutters)



CHRISTCHURCH

Heating energy consumption in kWh pa



Overheating in hours pa (hours exceeding 26°C, living room shaded by sliding sun shutters)

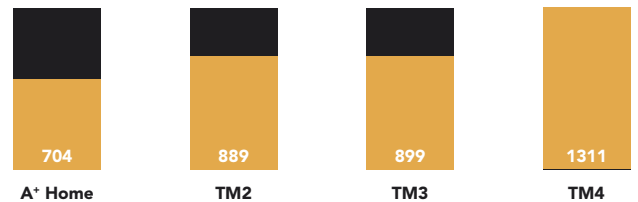


A+ HOME: EXPOSED CONCRETE SLAB / THERMAL MASS WALLS IN THE LIVING ROOM AREA
TM2: EXPOSED CONCRETE SLAB / NO THERMAL MASS WALLS
TM3: CARPET ON CONCRETE SLAB / THERMAL MASS WALLS IN THE LIVING ROOM AREA
TM4: CARPET ON CONCRETE SLAB / NO THERMAL MASS WALLS

SECOND OVERHEATING ASSUMPTION
 The following graphs show overheating (in hours) when no sun screens or sun shutters are installed

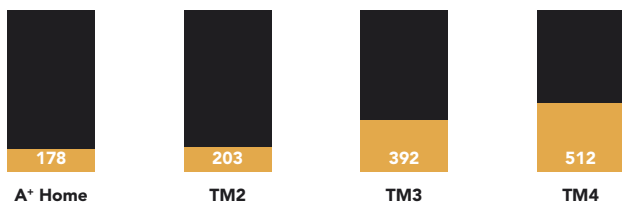
AUCKLAND

Overheating in hours pa (hours exceeding 26°C, no sun shutters or sun protection)



WELLINGTON

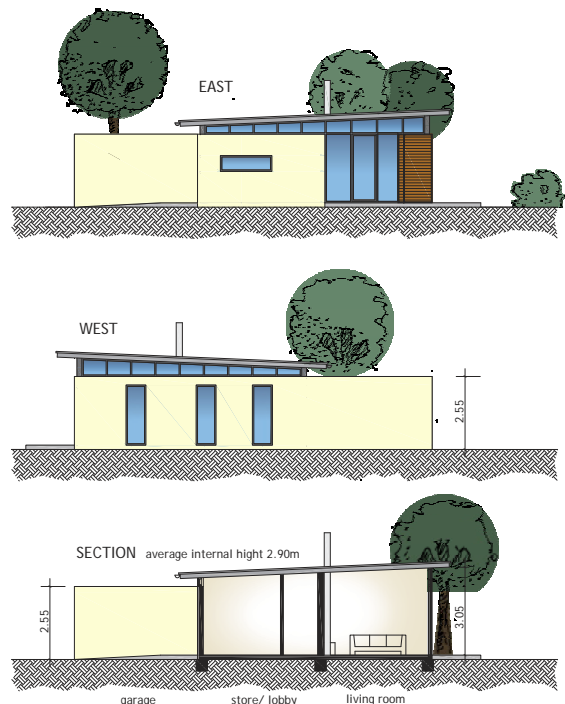
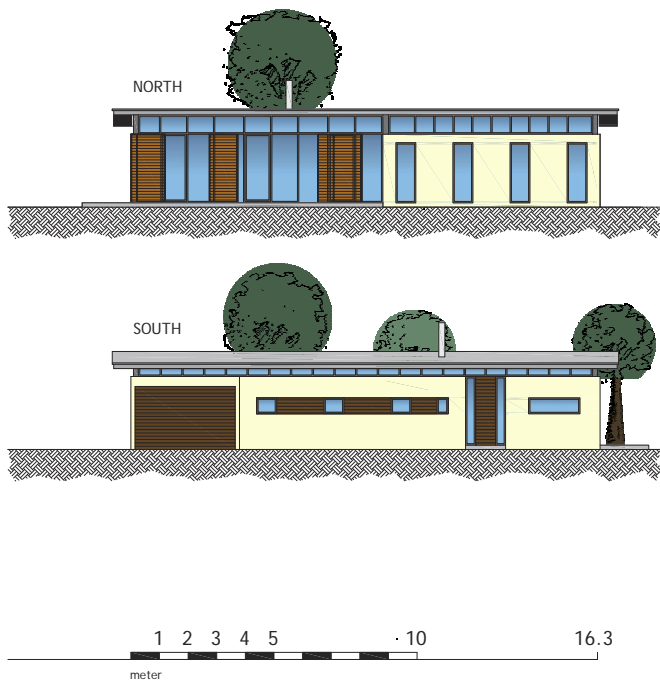
Overheating in hours pa (hours exceeding 26°C, no sun shutters or sun protection)



CHRISTCHURCH

Overheating in hours pa (hours exceeding 26°C, no sun shutters or sun protection)





ENERGY CONSUMPTION & OVERHEATING

Thermal Modelling (TM) was conducted to demonstrate the A+ Home's energy efficiency. The A+ Home is constructed in accordance with NZS 4218:2009, and all insulation complies with the NZ Building Code.

The graphs on page 8 show the heating energy required and the summer overheating for four different TM scenarios.

1. A+ Home: exposed concrete slab / thermal mass walls in the living room area
2. TM2: exposed concrete slab / no thermal mass walls
3. TM3: carpet on concrete slab / thermal mass walls in the living room area
4. TM4: carpet on concrete slab / no thermal mass walls

For each of these thermal mass scenarios the following heating and cooling assumptions were made:

HEATING (H)

18°C minimum for the day time (7:00am till 23:00pm) and 16°C minimum for the night time (23:00pm till 7:00am) as per NZS 4218:2009

COOLING (C)

Natural ventilation up to 10 ach at a cooling temperature of 24°C – no air conditioning, external sliding sun shutters.

The thermal modelling clearly demonstrates that across the different temperature variations of Auckland, Wellington and Christchurch the greater the amount of exposed concrete the less energy required for heating, and the less overheating hours occur.

SUMMARY

Building cost estimates show that the A+ Home, with its two concrete masonry walls, is an affordable housing option for New Zealand.

Thermal modelling illustrates that by using the thermal mass of concrete masonry, in conjunction with appropriate levels of glazing and insulation, the A+ Home harnesses the sun's solar energy to help reduce energy demands (heating and cooling) throughout the year.

By lessening internal temperature fluctuations, concrete masonry's thermal mass also helps reduce the potential for mould, fungi and dust mites, to create a healthy living environment, particularly for the elderly, very young or those with a respiratory or asthmatic condition.

Furthermore, the maintenance costs associated with the A+ Home's concrete masonry are lower compared to alternative lightweight materials. It does not need to be painted, and will not rot, making it essentially maintenance free.

Concrete masonry is also inherently fire resistant. It does not burn – assisting to preserve life and minimise damage in a fire event.

Designed around concrete masonry's range of benefits, the A+ Home is not only an affordable building option, but one that offers an energy efficient, comfortable and safe living environment for all families to enjoy.

Over the coming months CCANZ plans to develop the A+ Home concept. Those wishing to discuss the A+ Home further should contact Ralf Kessel on (04) 915 0380 or ralf@ccanz.org.nz.



01

KIWI PREFAB

PRE-BUILT SOLUTIONS FOR NEW ZEALAND

PAMELA BELL FOR PREFABNZ

THERE IS A CLEAR NEED FOR A RADICAL PARADIGM SHIFT TO IMPROVE BUILDING QUALITY IN A SUSTAINABLE WAY BY DECREASING DEFECTS, COSTS AND TIMEFRAMES. PREFABRICATION, ALSO KNOWN AS PREFAB OR OFFSITE, IS ONE WAY TO ADDRESS THIS. HERE IS A QUICK LOOK AT THE STORY OF PREFAB IN NZ, AND THE START OF A COLLABORATIVE ADVENTURE CALLED PREFABNZ.



02



03



04

WHAT IS PREFABNZ?

PrefabNZ began earlier this year when design and construction representatives from Kaitia to Wanaka met at Victoria University of Wellington to discuss the outcomes of a two-year research project into prefab in New Zealand. The 140-strong group unanimously decided that there was the need for a prefab industry hub to connect, catalyse, inform, inspire and promote prefabricated building solutions. The result is PrefabNZ, a self-sustaining non-profit incorporated society representing the interests of a wide range of materials and stakeholders in the design and construction sector: from clients through to designers, specifiers, manufacturers, contractors and government.

It became clear that many people did not know what was happening in this area – what technologies and products were available, how to specify and use them, how to find potential collaborative partners to bring products to market, and how to explain prefab to the wider public and user groups. As US prefab architect Michelle Kaufmann comments, “collaboration is where real change is happening”. Informing and networking in the prefab space is acutely important right now.

PrefabNZ’s mission is to double the uptake of prefabrication in New Zealand by 2020 – BRANZ has measured this as 17% today by overall cost of the prefabricated components of residential and non-residential buildings. PrefabNZ is responding to industry feedback and needs by focusing on three areas, as:

- a catalyst for prefab collaborative events
- a front-door-portal website for prefab information and
- a facilitator of opportunities for prefab innovation through specific research and projects.

PrefabNZ is driven by industry membership and partnerships. BRANZ is contributing to the three-year start-up period and other key partners are coming onboard this quest for improved efficiency and productivity in the design and construction sector. The timing is right to build on prefab’s current profile, to join forces, create collaborations and market ourselves to the world.

BUT WHAT IS PREFAB?

Prefabrication simply refers to a way of making part of a building somewhere other than the final building site. The process at site becomes one of assembly, rather than construction. Importantly, prefabrication is a system or process, rather than a product or thing. It describes a way, approach, or philosophy of construction rather than a limited aesthetic outcome.

In the past, prefab was held up as an answer to affordability. In fact, prefab can potentially offer a better quality built product

due to construction taking place indoors in a factory-controlled environment. Clients, specifiers and manufacturers can all benefit from the resulting predictable quality, costs and timeframes – no more budget blow-outs, time over-runs or extended defects-liability periods. Sounds good!

Other potential benefits include the clever minimisation of material waste, reduced transport to site and safer working conditions, all of which contribute to a more sustainable building practice. But there have been considerable historical challenges, which mean that traditional construction methods remain the norm today. The biggest barrier to prefab so far has been the confusion, misperceptions and misunderstandings that surround it.

The really interesting aspect to prefab is that it is where a huge amount of innovation, experimentation, research and development takes place. At the turn of the twentieth century, Henry Ford released the Model T car, utilising factory-line technologies. Around the same time, the prolific inventor, Thomas Edison, developed the ‘Single-pour’ concrete system [08]. The entire building was poured through the chimney, right through to the bath-tub and in one case, a piano! Several hundred buildings were created and many are still in use today.

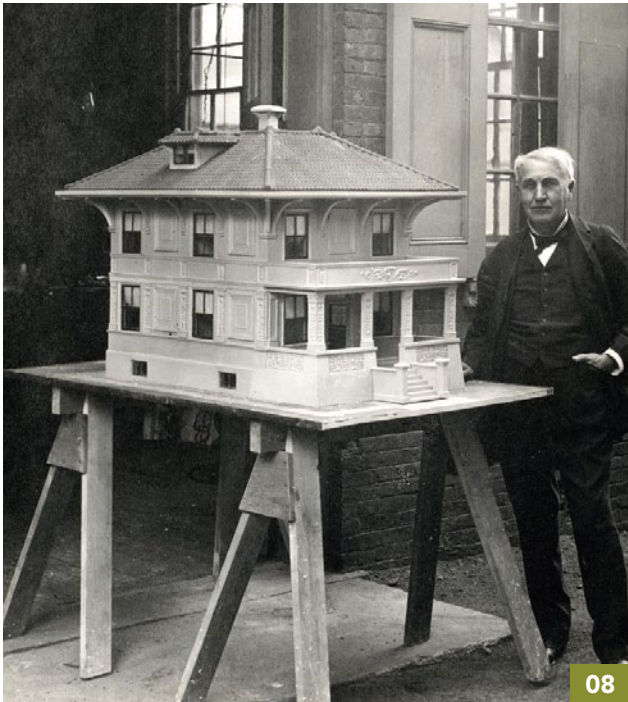
New Zealand’s own history begins with colonisation and timber kitsets imported from England in the 1830s. By the end of the 1870s New Zealand was exporting similar kitsets to the gold-rush locations in California. This kiwi spirit of entrepreneurship has been growing ever since, with the input of European migrants in the 1950s, to create built solutions for housing hydro-scheme workers, through to today’s myriad of housing businesses, modular bathrooms for multi-unit accommodation projects, and an array of commercial component suppliers.

Today, prefab is looking set to become a more popular choice for clients, designers and contractors as it becomes better understood and is available in high-quality built exemplars. As we emerge from economic recession, the building industry is looking more closely at consolidation, efficiencies and increasing productivity as a way to capitalise on the forecast housing shortage.

TYPES OF PREFAB

Prefab falls roughly into five groups or types of construction. From smallest to largest, they are: component, panel, module, hybrid and complete buildings. Our social, historical and architectural landscape is littered with examples of transportable housing as baches, studios and agricultural worker dwellings. At the other end of the scale, components such as pre-nailed trusses and wall frames are used in nearly every newly built house today.





Component-based prefabrication includes stick and sub-assembly parts. Sticks are pre-cut, pre-sized or pre-shaped puzzle-type pieces brought to site. Sub-assemblies are multi-material parts such as windows and doors, fixtures and fittings, and structural members such as pre-nailed roof trusses and wall frames. Component-based construction is commonly known as kitset housing.

Panelised or non-volumetric prefabrication comprises manufactured wall, roof and foundation panels, either with or without integrated services. A New Zealand example is Litecrete concrete panel houses [01 & 10]. While panelised elements can be stacked in a flat-pack for efficient transportation to site, they require more work for assembly at site than modular units.

Modular, sectional or volumetric prefabrication refers to a three-dimensional structural unit which is combined with other units at site to create a whole building. The unit is also known as a volume, module, or section, while non-structural units are called cores and pods. The units usually include a high degree of services, internal finishes and fit-out, so it is an approach that can be taken for kitchens, bathrooms and plant rooms.

Hybrid or semi-volumetric prefab is a mixture of systems such as service modules together with cladding panels. These systems combine the benefits of several systems, while allowing for more design flexibility and client choice. These methods are not widely used in New Zealand yet, so we look to Europe for leading examples.

Box-form or complete building prefabrication is commonly known as portable or transportable. The entire building is constructed in a factory or yard and then moved to site where it is attached to permanent foundations [02].

WHAT ABOUT CONCRETE + PREFAB?

A quick look overseas shows that concrete has the prefab potential to turn up in a myriad of guises. Obvious applications are for multi-level construction floor slabs, internal walls and claddings. Commercial applications are for structural components, stair-cases

and service cores. But less obvious are some creative applications of concrete components as seen overseas. In Madrid, Spain, it took a full year to engineer the Hemeroscopium House by architect Anton Garcia [09]. By comparison, it took just one week to assemble this dwelling on site.

In Sonoma County, California, American architects Anderson & Anderson designed their Orchard House to incorporate the orchard's geometry in the location of each insitu concrete column [03 & 04]. These uprights work together with prefabricated infill construction of structural insulated timber panels (SIPs) and steel truss components. Cost- and material-saving strategies were considered at each step of the design/build process.

What is often seen as a harsh utilitarian material is almost delicate as it is applied here by Pennsylvanian architects JMS [05]. The concrete blocks' rhythmic openings allow light and air to pass through the permeable boundaries of this building. The openings allow insertion of furniture, stair treads and air circulation. Great for warmer climates!

Closer to home it is great to see some of the potential for pre-cast insulated concrete panels being used in residential applications. Nelson's Irving Smith Jack Architects designed this family home overlooking Tasman Bay [06 & 07]. It is a durable, cost-efficient and thermally sustainable house solution which has received a commendation at the 2009 NZ Concrete Society Awards.

Auckland's Sumich Architects have designed a modern pre-cast concrete and steel house for a challenging triangular site. For the interior and exterior, the concrete panels have a shuttered timber finish which adds a layer of texture and detailing.

In the near future, a wider range of custom-designed options will be available via technology that transfers architectural designs directly from the computer to the factory floor. This concept is referred to as mass-customisation or design for manufacture (DfMa), and is a contemporary update on the mid-twentieth-century concept of mass-production and cookie-cutter designs.

Prefab represents a 'holy grail' to many people. It points to better quality, quicker time-frames and lower costs. The increasing involvement of architects with prefab technologies looks set to grow the availability of beautifully designed, high-quality buildings, developed on time and within budget. Potentially, this will enable better management of material waste, create safer working environments and lead to happier clients – the essence of 'green modern prefab'. Watch this space.

PrefabNZ – info@prefabnz.co.nz

- 01 Sinclair House, Whitianga, NZ. Image courtesy of Litecrete (NZ) Ltd.
- 02 Koastline Beach House, New Plymouth, NZ. Image courtesy of Studio Pacific Architecture/Koastline Beach Houses.
- 03 Kinmont-Hupert Orchard House, California, USA. Image courtesy of Anderson Anderson Architecture.
- 04 Kinmont-Hupert Orchard House, California, USA. Image courtesy of Anderson Architecture.
- 05 Concrete block home. Image courtesy of JMS Architects..
- 06 Tilt panel House, Nelson, NZ. Image courtesy of Irving Smith Jack Architects.
- 07 Tilt panel House, Nelson, NZ. Image courtesy of Irving Smith Jack Architects.
- 08 Thomas Edison with study model of single-pour concrete house, 1906-08. Image courtesy of Thomas Edison Papers, Rutgers University.
- 09 Hermoscopium House, Madrid, Spain. Images courtesy of Ensemble Studio. Débora Mesa.
- 10 Sinclair House, Whitianga, NZ. Images courtesy of Litecrete (NZ) Ltd.





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Right: Star Flats, Petone,
Wellington

Far Right: McLean Flats,
The Terrace, Wellington

Right Below: Dixon Street
Flats, Wellington

Main image on facing
page: Centennial Flats,
Berhampore, Wellington



NEW ZEALAND'S CONCRETE HERITAGE IN HOUSING

MORTEN GJERDE – CONCRETE ENTHUSIAST AND SENIOR LECTURER IN THE VICTORIA UNIVERSITY SCHOOL OF ARCHITECTURE

HOUSES PROVIDE WONDERFUL OPPORTUNITIES FOR EXPLORATION AND EXPRESSION OF DESIGN IDEAS AND THIS HAS LED TO A SENSE OF FASCINATION FOR DOMESTIC ARCHITECTURE BY DESIGNERS AND THE PUBLIC ALIKE. MANY ARCHITECTS CUT THEIR PROFESSIONAL TEETH ON HOUSE PROJECTS BEFORE PROGRESSING TOWARD MORE COMPLEX AND PUBLIC TYPES OF CONSTRUCTION. ARGUABLY, NEW ZEALAND'S ARCHITECTURAL REPUTATION HAS BEEN ESTABLISHED IN THE REALM OF HOUSES AND HOUSING. INDEED, RENOWNED ARCHITECTURAL HISTORIAN SIR NIKOLAUS PEVSNER SINGLES OUT DOMESTIC DESIGNS FROM THE MODERN ERA AS OFFERING THE BEST EXAMPLES OF NEW ZEALAND ARCHITECTURE.

Since the late 1990s there has been a discernable push by many New Zealand designers to incorporate and expose concrete in the houses they design. Surpassing trends seen overseas, in NZ concrete is ground and polished in floor slabs and benchtops and left exposed as blockwork, sandwich panels or cast-in-situ formats.

Not only does it look good, it also has potential to stabilise indoor temperatures and limit unwanted acoustic interference between spaces. Yet interest in domestic applications for concrete is not new and one has only to look back to New Zealand's modern design period, stretching from the 1930s to 1970s, to appreciate how passions for this local, indigenous building material were established. Throughout this period of architectural history houses and concrete played central roles. The relationships between concrete, houses and modernism were driven along three distinct motivations; technological, social and nationalistic.

Although individual buildings constructed earlier can be cited, it was not really until the reconstruction following the great Napier earthquake of 1931 that modernism took hold in New Zealand. The quake exposed weaknesses in our building design and control methods and led to the establishment of the Standards Institution [now Standards New Zealand]. Architectural historians Paul Walker and Justine Clark suggest that modernity is not just an issue of style but one of technology and that the shift that took place after the earthquake was a shift from the pre-modern to the modern.

Several reinforced concrete houses designed by William Gummer a decade or so before the quake survived intact. Although not built in the modern idiom, these houses provided technical guidance for the reconstruction effort until appropriate standards could be written and disseminated. The style that was adopted for





the majority of new buildings, a stripped version of the Art Deco style, was well suited to concrete. The concentration of Art Deco commercial and residential buildings throughout the region has become internationally significant. It appears that the opportunity to rebuild Napier following analysis of the structural performance of concrete buildings had shifted New Zealand into the modern era.

The country's second wave of modernism revolved around a social agenda. This clearly reflected the true roots of the movement; modernism had intended to solve social problems by planning more efficient and egalitarian environments. It was in the area of houses and housing that social planning agendas were being tested in Europe. The concrete Centennial Flats, constructed in 1939, represent the NZ Labour Government's first step toward higher density living. Built by the Department of Housing Construction to accommodate 50 families on a city fringe site, it was a clear departure from the norm and ideal of the detached single family dwelling. Considerable criticism was levelled at the DHC, which had adopted a strategy extending well beyond housing people more efficiently. At the time there were shortages of skilled labour and dried timber. The Department's Chief Architect Gordon Wilson had worked with Gummer in Napier who, as noted, had developed expertise in the use of reinforced concrete construction. That background gave Wilson the confidence to recommend diversification in the materials of construction to overcome the acute shortages. A project of this scale could easily have been constructed in timber, allowing for a plaster render to achieve the stripped modernist aesthetic. However, the building was constructed in reinforced concrete, with flat roofs and lack of ornament, proclaiming that the new European architecture – International Style – had indeed reached New Zealand. The project was successful at every level; social, constructionally and economically. It would also lead to more ambitious high density housing projects.

Europeans who immigrated to New Zealand in the time leading up to the Second World War also influenced design outcomes. Architect Ernst Plischke was a devoted follower of the International

Style and this was brought to bear on his designs for the Dixon Street Flats, which were unprecedented in terms of scale, planning and aesthetics in this country. The McLean Flats, also in Wellington, were constructed in the period 1943 – 44. Here Plischke worked with Frederick Neumann, who had arrived in 1938 to take a drafting position with the DCH. Like Plischke, Neumann wrote and spoke extensively about architecture. Neumann spoke passionately of the need for New Zealand architects to interrelate engineering with architecture and to consider materials carefully. Referring to the two indigenous materials, Neumann felt that architects were wasting timber and not making adequate use of concrete. Neumann went on to design the 'Star Flats' from the mid 1950s through to the mid 1960s. These medium density blocks were built extensively throughout the country and are regarded as his most important housing legacy. While concrete figured prominently in these projects, here it was seen as a means to an end, in terms of architectural expression. The task of reflecting New Zealand culture and conditions in architecture was left to the architects who would follow in the late 1950s and 1960s.

It was not until the third phase of modernism, characterised by professional confidence and a search for local identity, that modernity could be linked to the New Zealand condition. The 1950s were witness to discourse around architectural expression appropriate to New Zealand conditions; specific to the cultural and social characteristics, the environmental conditions and constructed of local materials. Alongside timber, concrete remained a preferred material.

The main formats for use were the concrete masonry unit and off the form cast in situ concrete. While precast concrete was beginning to be developed by the early 1960s, applications were focussed on commercial structures, where the scale of repetition made its use feasible. At the domestic scale, as with the work carried out by the European influenced designers, concrete work was mainly cast in place. Architects experimented with concrete surface textures and combinations of materials to enrich their designs. In an international context, this form of expression was akin to Scandinavian practices. The link to northern European

Sir Miles Warren at 65 Cambridge Terrace, Christchurch

Dorset Street Flats, Christchurch

65 Cambridge Terrace, Christchurch



Image courtesy Mattarnold1.

work is quite clear and has been acknowledged by architects such as Sir Miles Warren.

Warren is the most significant architect working during this period. His South Island roots have had a strong influence on his architectural style, particularly during the seminal period when modern architecture became regionally distinct. He first made a mark with the Dorset Street Flats, eight modest dwellings grouped into two walk up forms. The structural system consists of concrete masonry walls, a cast in situ concrete floor system and lightweight roof. Here Warren foreshadows the language of detailing that would punctuate his career and influence so many others. Every junction, every opportunity is used to express the nature of the materials and method /process of building. The concrete floor and beam support structure are left unfinished, set off from the concrete masonry walls that are painted white to derive maximum effect from the intense New Zealand light. The combination of concrete 'brut' and painted concrete masonry became the hallmark of the work of Warren & Mahoney for some 25 years. Concrete masonry offered opportunity to imbue wall surfaces with scale and texture while accommodating the structural requirements for this seismically active area. The 20cm x20cm x 40cm module of the concrete block influenced virtually every dimension and detail, horizontal and vertical.

The Grigg House saw the introduction of the steeply pitched roof, inspired by the houses Warren visited in Denmark. The taller forms were appropriate to the social and geographic conditions of Canterbury, where he worked. The class and social structure of Canterbury is well developed, recalling its strong links to England. The affluent clients were drawn to the more substantial appearance created by these roof forms. These forms also seem appropriate to punctuate the building against the broad, relentless plains of the region.

The undisputed highlight of concrete residential scale buildings realised during this period is the townhouse completed for the architect himself in 1965. Built at 65 Cambridge Terrace in Christchurch, the four storey building is a visual concert in board formed natural finished concrete, painted concrete masonry,

native timber (painted externally) and large areas of glass. A three storey mass seemingly floats above a concrete floor structure cantilevered out from the hidden concrete masonry walls. The relationship between vertical supports, cantilevered structure and the glazing suggests that the mass above is carried by the glass. But Warren is also generous, revealing for all to see the structural solution as part of the architecture. Nothing is covered over; this is truly a rational but at the same time expressive building.

The architect developed the detailing approach evident in the work that precedes it, particularly in the Dorset Street Flats. However, the details are even more exaggerated, and at the same time, refined. The larger-than-life forms, structural sensibility and detailing manner that celebrate each and every coming together can also be traced to the commercial work carried out by the practice, particularly the competition winning entry for the Christchurch Town Hall. According to Warren, construction had to be dry and preferably prefabricated [although neither was a particular feature of the project at 65 Cambridge Terrace], each material exposed and each separate part articulated. The materials should be used au natural, and a whole new system of bringing parts together was devised based on junctions without architraves and recessed detailing. This building and many others like it synthesised the maturing of architectural practice in New Zealand. Finally, more than 100 years after colonial settlement, architects had developed an architectural language unique to this place.

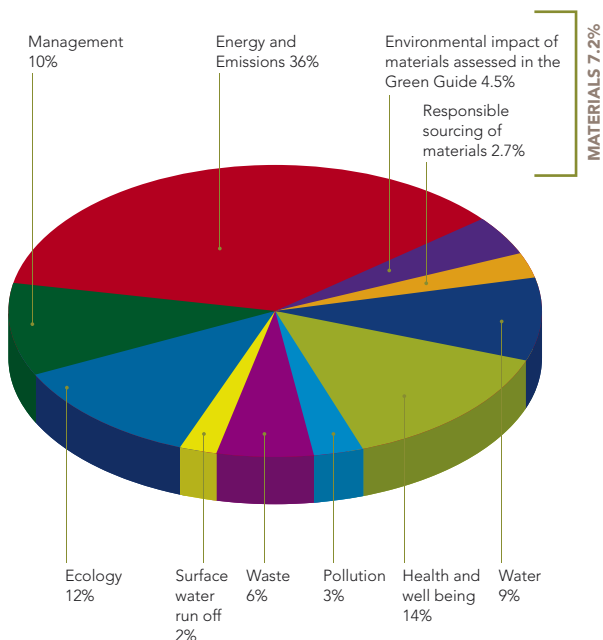
Modernism, particularly as explored and developed during the period 1930 to 1970, has been significant in New Zealand's architectural history and remains a strong influence on the work of architects practicing today. The role concrete has played in its development has been significant, not only in New Zealand but also elsewhere. However, the manner in which concrete has been used locally is unique and has perhaps even greater relevance to today's practice, where tectonics and clear expression of materials and connections is celebrated. Concrete, along with timber, was and remains a favoured material; able to be formed expressively, sourced locally and one with which most designers have had hands-on experience.

THE UK DRIVE FOR SUSTAINABLE HOMES

DEREK CHISHOLM – CONCRETE CONSULTANT WITH SOLID CONCRETE SOLUTIONS LIMITED

THE CODE FOR SUSTAINABLE HOMES (CSSH) IS A UK GOVERNMENT INITIATIVE TO IMPROVE THE SUSTAINABILITY OF NEW HOMES. IT IS DESIGNED TO SET A FUTURE DIRECTION FOR RESIDENTIAL DESIGN AND CONSTRUCTION DRIVING A STEP BY STEP CHANGE. THE CODE FORMS PART OF THE UK GOVERNMENT'S ZERO CARBON AGENDA AND ALL NEW HOMES BUILT FROM 2016 ONWARDS ARE EXPECTED TO ATTAIN CODE LEVEL 6, THE HIGHEST OF FOUR LEVELS AND EQUIVALENT TO ZERO CARBON STATUS. UK HAS A HIGH IMMIGRATION RATE, MOSTLY IMMIGRANTS FROM EUROPE, WHICH WILL PUSH THE DEMAND FOR NEW HOUSING. 27% OF UK'S CARBON EMISSIONS CURRENTLY COME FROM DWELLINGS, AND IT IS PROJECTED THAT BY 2050, ONE THIRD OF UK HOMES WILL HAVE BEEN BUILT SINCE THE INTRODUCTION OF THE CODE.

Figure 1: Weighting in each Environmental Impact Category



UK's current energy consumption is not sustainable long-term, and the CSSH is one initiative contributing towards the government's carbon emission reduction targets (from 1990 levels) of 34% by 2020 and 80% by 2050. Other salient factors are renewable energy levels in the UK at less than 2%, are amongst the lowest in Europe, and half of Britain's gas is being supplied from overseas, mostly Russia, where security and cost of supply is an ongoing issue.

The CSSH sets four achievement levels of sustainability for new housing, each level sets mandatory requirements for energy performance and water usage together with tradable requirements for other aspects of sustainable performance. Energy usage, the largest category, is based on CO₂ emissions and accounts for 36.4 of the 100 points available. For the mandatory energy requirement, the code levels 3 to 6 each represent reductions in carbon emissions compared with the baseline Building Regulations Part L1 (2006) - 25% for code level 3, 44% for code level 4 and 100% for code level 5, with code level 6 being rated 'zero carbon.'

ATTAINMENT OF CODE LEVELS

The achievement of a rating under the CSSH is based on a registration, monitoring during construction, assessment and certification system. The weightings of the nine environmental categories for which points are awarded is given in Figure 1. The total of only 7.2 percent available for the house's building fabric reflects the current ratio of embodied environmental impacts to the impact of the total building. The scores for each category are converted through a weighting system into points and the summation of the points from each category will identify which code level has been reached.

Whilst an assessment against the CSSH is compulsory for all new dwellings, a minimum code compliance is only required for publicly funded dwellings, currently code level 4. The requirement to achieve points in each category is detailed and can be found in the technical guide to the CSSH available at www.planningportal.gov.uk/uploads/code_for_sustainable_homes_techguide.pdf

The code is regularly being updated and it is expected that mandatory requirements for both publicly funded and private dwellings will increase in the future.

The UK Concrete Centre has produced a number of publications on optimising points under the code for sustainable homes available at www.concretecentre.com/PDF/MB_Energy_Feb08.pdf

CODE LEVEL FIVE HOUSING COMPLEX

In order to establish that a low-cost social housing complex could be designed to achieve code level five, the UK Concrete Centre commissioned the A2Dominion Group, a leading housing supplier, to carry out a detailed design of a two storey apartment. The key findings follow.

The specification of conventional concrete and masonry construction presented no particular thermal performance limitations at code level 5, notwithstanding the need for larger cavities and enhanced measures to minimise cold bridging.

Many of the newer systems and technologies associated with code level 5/6 performance were discounted early on as they did not fit well with the particular needs for social housing i.e. for simple, durable, cost-effective solutions with a low maintenance requirement.

The specified concrete and masonry construction elements attracted good scores in the BRE Green Guide, which is used to assess the environmental performance of materials within the CSSH.

Most suppliers of concrete and masonry products operate environmental management schemes compliant with ISO 14001 (or equivalent). This attracts points in the 'Responsible Sourcing' category of the Code. Further points can be scored by specifying materials from suppliers compliant with the new standard for responsible sourcing of construction products. (BES 6001)

The scores for each category in Figure 1 as a percentage of the maximum scores available are given in Figure 2. A summary of the key design information including the estimation of the code points for each environmental category is given in figure 3. The total estimated code points of 86.5 falls within the code level 5 range of 84 – 90.

Figure 2: CSSH % category scores

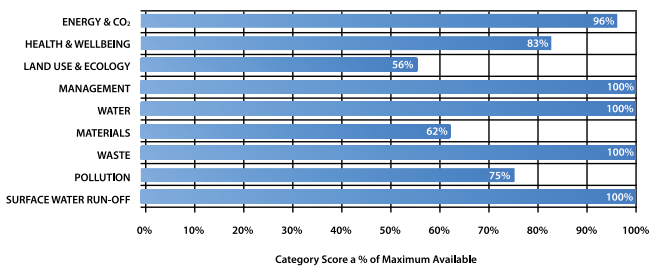


Figure 3: Summary of key design information

House type	Three-bedroom, five-person, end or mid-terrace
Code level	5
Floor area	85m ²
Air tightness	2m ³ /(h.m ²)
Heat loss parameter	0.81
Cold bridging y-value	0.04
Ground floor	Beam and block, 0.12W/m ² K
Walls	Brick and block, 0.15W/m ² K
Roof	Timber trussed, concrete tiles, 0.12W/m ² K
Windows	UPVC, triple glazed, 0.8W/m ² K
Upper floor	Beam and block
Internal walls	Block
Ventilation	MVHR
Heat source	Class 5 condensing boiler
Heat distribution	Wet, underfloor
Renewables	Photovoltaic panles, 27m ³
Water consumption	≤80l/p/day
Home office	Yes
Lifetime Homes	Yes
Secured by design	Yes
Estimated code points:	
1. Energy	35.14 out of 36.4
2. Water	9 out of 9
3. Materials	4.5 out of 7.2
4. Surface water run-off	2.2 out of 2.2
5. Waste	6.4 out of 6.4
6. Pollution	2.1 out of 2.8
7. Health and well-being	10.5 out of 14
8. Management	10 out of 10
9. Land use and ecology	6.67 out of 12
Total estimated code points	86.51 out of 100

Since this design was carried out, thermal mass has been introduced as a new requirement to enhance energy performance. For the calculation of the Dwelling Emission Rate as part of the Energy/CO₂ category, the Standard Assessment Procedure (SAP 2009) for calculating fabric energy efficiency takes into account the way in which thermal mass can store and release beneficial heat gains from the winter sun and domestic appliances etc., helping to reduce the fuel used by the heating system. The extent to which it can do this depends on:

- Overall level of dwelling insulation and air tightness – thermal mass will be more effective at higher levels
- Boiler and heating controls – high efficiency systems will maximize the benefits of thermal mass
- Window size and orientation – glazing on south elevations should be optimized (north elevations in NZ)

A new measure for calculating energy efficiency has been introduced based on the k value, the heat capacity of floors and walls per square metre in kj/m²K. In addition to the thermal mass of the external walls and ground floors, SAP will also take into account internal partitions, party walls and upper floors. The surface area for each construction element is multiplied by its k value and then the total for all elements is divided by the dwelling's floor area to give the Thermal Mass Parameter (TMP). The difference in k values for heavyweight walls verses lightweight walls is considerable, around 9 kj/m²K for a timber frame wall compared with 190 kj/m²K for a dense concrete block wall with a plaster finish.

When the revised SAP method is applied to a typical semi-detached house with equal North South glazing, the transition from a low mass house to a high mass house can give a 40% reduction in space heating emissions and a 6% reduction in total CO₂ emissions. The method also calculates the dwelling's cooling energy requirement.

Air leakage from the uncontrolled movement of air through joints and gaps in the building fabric can be a significant source of heat loss, particularly in well insulated homes. Air tightness has been introduced into the UK as an important criterion to limit heat loss. It is measured on site by sealing all the doors and windows and measuring the rate at which a fan has to work to maintain a small vacuum inside the house. Air tightness is measured in units of m³/(h.m²) at 50 Pa as the volume of air replaced every hour per square metre of floor at this pressure difference.

Concrete masonry homes in the UK can achieve low air tightness values of less than 2 m³/(h.m²) by applying a parging coat of plaster on the inside of the perimeter blockwork, creating a primary air barrier, followed up by plasterboard dry lining. In comparison dry lining without a parging coat can only achieve air tightness values of around 5 and long term retention of air tightness may be compromised by movement and cracking of the plasterboard.

This design exercise showed that concrete and masonry construction in the UK could produce cost-effective, locally and responsibly sourced solutions to the higher levels of the Code for Sustainable Homes. This could all be achieved, whilst at the same time addressing the needs of the public sector for long-term, durable and flexible construction solutions.



COMFORTABLE & ENERGY EFFICIENT IN CHRISTCHURCH

NESTLED IN THE CLIFTON HILLS OVERLOOKING CHRISTCHURCH, TEEAR HOUSE EMBODIES THE MANY YEARS OF EXPERIENCE BUCK + ASSOCIATES, ARCHITECTS HAVE ACCUMULATED DESIGNING HOUSES THAT STRIVE TO BE SELF-SUSTAINING IN THEIR ABILITY TO MAINTAIN COMFORTABLE AND HEALTHY INTERNAL CLIMATES.

Designed to take full advantage of solar gain for passive space and water heating Tear House achieves an affordable balance between thermal mass, glazing and insulation.

The house is an all concrete structure, with the interior arranged to maximise surface areas exposed to solar effects and penetration. The concrete has a solid plaster internally and externally, and extruded polystyrene insulation. Other features include a Butynol membrane roof covering, predominantly tiled floors, and double



glazing in thermally-efficient (PVC) frames. Sto plaster systems were used inside and out (over a block veneer).

Monitoring of similar houses has demonstrated that regardless of external conditions the internal temperatures only fluctuate within the range of $\pm 1^{\circ}\text{C}$ daily in terms of base levels. It is anticipated that Tear House will have a minimum unheated (winter) base temperature of no lower than 17°C in any room.

Buck + Associates, Architects founder Roger Buck believes that in the pursuit of optimal passive design it is impossible to 'over-mass' given an appropriate floor plan and orientation. "Our experience and research have shown that thermal mass, or a thermal mass equivalent, is essential if uniform temperatures throughout a dwelling are to be achieved passively by minimising the effects of daily and seasonal external temperature swings and solar variability."

The strong commitment to passive solar design exhibited by the Tear House accompanies an overall approach to sustainable

building practices. This is evident in the durable products selected, which provide minimal maintenance requirements over a long life. The high levels of mass also ensure enhanced fire resistance and acoustic insulation. With the addition of a relatively modest net-metered photovoltaic system, Tear House could potentially be a net energy exporter.

From an aesthetic perspective Tear House is stylish and contemporary, integrating effortlessly with the surrounding natural environment.

"This project demonstrates achievable connections between thermal mass, glazing, and insulation, and the benefits of long-life, low maintenance homes," says Buck. "In terms of basic principles, it offers a potentially valuable template for housing in New Zealand."

Buck + Associates, Architects won the joint Excellence in Residential Concrete Construction Award at the 2010 Concrete³ Sustainability Awards.

Buck + Associates, Architects - www.buckarchitects.co.nz



POWERED TOWARDS SUSTAINABLE LIVING



FOLLOWING A BRIEF FOR A FAMILY HOME WHICH SOUGHT TO CONSERVE ENERGY THROUGH PASSIVE SOLAR DESIGN, POWERED LIVING (NORTH ISLAND) LTD LOOKED TO INTEGRATE CONCRETE'S THERMAL MASS WITH APPROPRIATE LEVELS OF GLAZING, NATURAL VENTILATION AND INSULATION.

Situated in the Waikato, the 240m² three bedroom home was completed in early 2008 on a modest budget. Findings from a year's worth of data collection (2009-2010) have been extremely encouraging, revealing that the house consumed a mere 3050kWh of power compared to the New Zealand annual average of between 8000 – 10000 kWh. Furthermore, during that time the internal temperature did not drop below 17°C degrees. By the end of 2010 it is anticipated that the house will be energy neutral as a result of a 3.3 kW Photovoltaic system which is currently being installed.

Working with the primary design objective of optimum energy efficiency, the house designers endeavoured to maximize heat transfer from the northern public building block to the southern, more private building block. Essentially, the northern block is a double glazed glass box which traps and stores the sun's heat in the concrete floors (R3.4) and internal masonry walls. When the temperature drops in the evening the heat is transferred to the southern (cooler) building block by a natural process of thermal conduction and air convection. The southern block is a timber box with thickly insulated timber walls (R3.6) and minimal window openings to reduce heat loss.

The house is oriented due north to enhance solar gain and take full advantage of the low angled sun during the colder winter months, which heats the exposed internal concrete elements. Throughout summer the house cools itself through natural ventilation provided

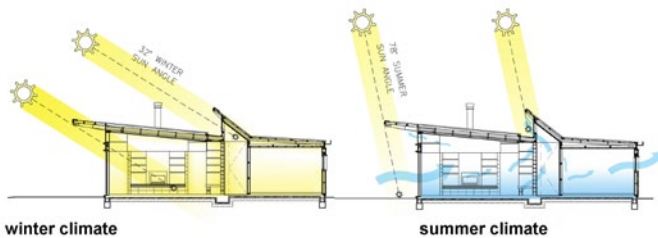
by a central clerestory. During winter negative air pressures are created within the clerestory by southwesterly winds which assist continual air ventilation through the sleeping areas, and across the entire house.

Along with its main emphasis on passive solar design, the house demonstrates other sustainable building features, such as rainwater collection, passive water heating, along with on-site waste water treatment and use of chemical free timbers and paints.

Duncan Firth of Powered Living (North Island) Ltd believes that the house is a realistic attempt to achieve an affordable, energy efficient house with off the shelf technologies and materials. "With around a 60% reduction in energy consumption compared to similar sized homes Powered Living (North Island) has demonstrated that passive solar design offers a genuine mechanism to create a naturally comfortable and healthy living environment for the whole family to enjoy, one which also saves you money."

Powered Living (North Island) Ltd won the joint Excellence in Residential Concrete Construction Award at the 2010 Concrete Sustainability Awards.

Powered Living (North Island) Ltd – www.poweredliving.co.nz



Images (including cover) by Frances Oliver

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FUNKY & FUNCTIONAL CONCRETE APARTMENTS

SITUATED IN FAVORITEN, THE 10TH DISTRICT OF VIENNA, THE RÜDIGER LAINER + PARTNER DESIGNED RESIDENTIAL APARTMENT COMPLEX OFFERS CONTEMPORARY AND PURPOSEFUL LIVING SPACES THAT SHOUT THEIR PRESENCE THROUGH DISTINCTIVE USE OF SHAPE AND COLOUR.

Standing on a 10,000m² site, and containing 250 units plus a day care centre, the complex consists of four wings, each with six to eleven storeys. Individual apartments range in size from 55 to 120m², and offer a flexible floor plan that allows each space to be easily customised.

Driven by a design aesthetic that was the deliberate antithesis of the classic Vienna façade - uniform and rigid - the architects strove to capture maximum light. Through astute use of patios, roof terraces or (exaggerated) balconies, each unit provides a private 'outdoors' space within the built-up urban environment.

To facilitate optimum use all year round the balconies are glazed on three sides. The protection afforded from the wind, rain and noise is achieved without compromising the uninterrupted view through the use of vertical 'seams'. On occasions when the elements cooperate, the front glazing can be folded back to completely open up the balcony.

The precast panels of the balconies have been used to soften the sharp protrusions through a wave shape, and are also given texture through formliners that replicate a bamboo and rough stone finish.

By integrating the exterior balcony space as private, the architects have enhanced the living environment to create a genuine sense of outdoor privacy rare amongst the cramped city streets.

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Images courtesy of Michael Hierner and Hubert Dimko

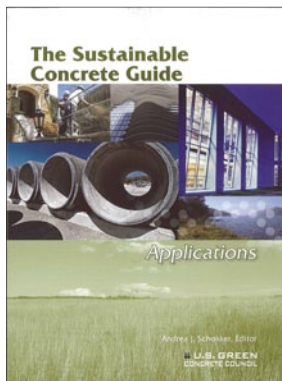


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THE SUSTAINABLE CONCRETE GUIDE - APPLICATIONS EDITED BY ANDREA J. SCHOKKER



A companion resource to *The Sustainable Concrete Guide – Strategies and Examples*, *The Sustainable Concrete Guide – Applications* provides readers with specific sustainable benefits of concrete's various applications to assist in

selecting/specifying concrete materials and products. Also included are tips and case studies on specifying concrete materials, constructing for sustainability, integrating into sustainable structures, and navigating "green" codes and standards.

THE USE OF CONCRETE IN MARITIME ENGINEERING - A GOOD PRACTICE GUIDE BY SEBASTIEN DUPRAY



Concrete is a highly versatile, cost-effective construction material, offering not only strength and durability, but also a wide range of opportunities in terms of structural type and form, construction techniques and surface aesthetics. It has been, and will continue to be used extensively in the marine environment. With over £700m spent on coastal defences in the UK every year at least 15% of these works include concrete in various forms.

Despite the recognised need for increasing levels of capital expenditure on concrete maritime structures, few technical guides on the design and

maintenance of such structures exist. A need for consolidated guidance was identified by the UK and France, and joint action proposed to address industry requirements.

The Use of Concrete in Maritime Engineering: A Good Practice Guide combines current information and new material authored jointly by HR Wallingford, CETMEF and Halcrow into a guide for use within the maritime engineering industry. This guide aims to distil conclusions from existing research and practical experience, develop good practice guidance on marine concrete materials selection and design, and set out guidance on pre-casting of a variety of elements.

LIBRARY QUIZ

To go in the draw to win a copy of *The Sustainable Concrete Guide - Applications* edited by Andrea J. Schokker answer the following simple question:

Who was the Chief Architect of the New Zealand Department of Housing Construction in 1939?

Email your answer to library@ccanz.org.nz. Entries close Friday 18 February 2010.

Congratulations to Rob Green of Higgins Concrete Limited, who correctly answered the Sept/Oct 2010 Library Quiz to receive a copy of *No Job Too Big: A History of Fletcher Construction Volume 1 1909-1940* by Jack Smith.

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NEWS FROM THE ASSOCIATIONS



ANNUAL GENERAL MEETING REPORT

At the NZ Concrete Society AGM President Dene Cook reflected on a year marked by earthquakes, snow storms, droughts, floods and the continuing recession.

More pleasing aspects of the year were seminars related to key concrete industry documents - the Press Design Handbook and Red Book Section C.

He recalled the 2009 industry conference in Rotorua where an initiative, a Friday afternoon seminar, was such a success it was being repeated this year - on the very topical Darfield earthquake.

He acknowledged progress in the development of industry standards, the organisations which support NZCS by releasing key staff, the Council members who include long-standing industry people and new recruits, and the value of the liaison between the Cement & Concrete Association of New Zealand and the New Zealand Concrete Society.

Other key events during 2009 were Practical Concrete On Site seminars, and a Symposium on Sustainable Concrete and Cement Technologies run in association with the Korean Concrete Institute and spearheaded by NZCS vice-president Jason Ingham.

Dene Cook said the Society's balance sheet remained sound, and he thanked everyone on Council for their efforts in what had been a pretty demanding year.

"The challenges faced by our sector in the face of competing materials and increased competition generally reinforce that our role as the industry's learned society remains crucial to the overall success of the concrete construction industry."

The new Council was elected as follows;

- President: Dene Cook, Firth Industries
- Vice President: Jason Ingham, University of Auckland
- Business Members: James MacKechnie, Allied Concrete; Campbell Robertson, Holcim (New Zealand) Ltd
- Individual Members: Sheldon Bruce, Opus International Consultants; Tim Jones, Hawkins Construction Ltd; Jeff Mathews, Holmes Consulting Group
- Ex Officio: Immediate Past President, Chris Munn, Allied Concrete
- Fib Head of Delegation New Zealand: Len McSaveney, Golden Bay Cement
- Co-opted; Rob Gaimster, CCANZ CEO

The Annual Report is available to view on the NZCS website. Campbell Robertson, who is new to the Council, will be profiled in the next NZCS newsletter.



NEW ZEALAND READY MIXED CONCRETE ASSOCIATION (NZRMCA)

ANNUAL AWARDS

The 2010 NZRMCA Awards were presented at the annual New Zealand Concrete Industry Conference held in Wellington on Thursday 7 October.

- Extra Distance Award - Firth Industries for the Stockton Coal Handling and Processing Plant
- Technical Excellence Award - Firth Industries for the Manukau Harbour Crossing
- Technical Excellence Award (Highly Commended) - Allied Concrete for ALPURT B2 Project
- Plant Audit Scheme Supreme Award - Atlas Concrete's Wiri Plant

As with previous years the judges' task was made extremely difficult by a range of high calibre entries that demonstrated the expertise, determination and passion of those who work in the ready mixed concrete industry. For more information about the 2010 Awards visit the NZRMCA website - www.nzrmca.org.nz

BEWARE. SOME SYNTHETIC FIBRE SUPPLIERS ARE STRETCHING THE FACTS.

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Steel and Synthetic fibres?!

Macro synthetic fibres become effective at crack widths that are wider in comparison to steel fibres at the same volume fraction and it is well documented that they creep under sustained load / stress.

BOSFA supply a range of steel and synthetic fibres to markets throughout Australasia. However, at this stage we are very careful not to market macro synthetic fibres into structural applications (where post crack strengths are used in design) and where tight crack control is required, such as ground supported slabs. Applications that are well suited for macro synthetics would be where crack control, fire and long term performance aren't a design consideration, such as temporary shotcrete linings in mines.

We currently recommend steel fibres for applications such as permanent tunnel linings, pre-cast elements, slab on grade etc, all of which have generic and comprehensive design rules developed specifically for steel fibre reinforced concrete.

It's our view that until the effects of creep are fully understood and specific design rules for macro synthetic are developed, concrete companies, engineers and contractors alike should treat their use in the general applications mentioned above with caution.

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