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THE MAGAZINE OF THE BUILDING OFFICIALS' INSTITUTE OF NEW ZEALAND

DECEMBER 2006



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CONTRACTORS

Advertising
Noeline Strange
Phone: (09) 528 8009 or 027 207 6511
Email: n.strange@xtra.co.nz

Design & Print
Inkspot Print
Steve Swift
Phone: 0800 821 871
Email: inkspot.print@xtra.co.nz

Editorial
Elizabeth Stone
Phone: 027 278 7330
Email: scottstone@xtra.co.nz

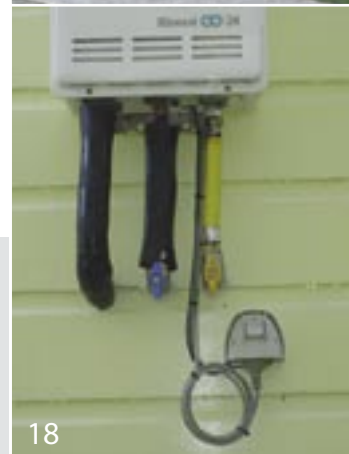
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Events Division Ltd
Liz Alexander / Ainsley Button
Phone: (04) 473 6210
Email: liz@eventsdivision.co.nz

**Building Officials Institute
of New Zealand**
P O Box 11-424, Manners Street, Wellington
Level 11, Grand Arcade, 16 Willis St, Wellington
Phone (04) 473 6002, Fax (04) 473 6004
Email: office@boinz.org.nz

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PROCESSING CONSENTS CONSISTENTLY

With the variety of materials on the market and the numerous manufacturing guides associated with these, relying on "word of mouth" to establish the reliability of a product or on the "promotional literature" written about it is a real concern.

In this situation, processors can be faced with making decisions about products based on what a salesperson or designer has told them about the product. While a personal recommendation about a product is sometimes reassuring this can lead to problems for Councils. Processing consent applications requires an in depth knowledge of new products so that when designers incorporate these products into their plans, processors can appraise them accurately. However, it seems that the lack of any independent test to fall back on to verify information about a product is putting processors in the unenviable position of being unable to justify refusing a consent. This causes problems when other Councils faced with the same product, say a type of cladding, decide not to issue a consent for that product. Councils are then criticised for a lack of consistency.

In recent months I have had reason to refuse building consents for buildings where the cladding has been an Alternative Solution. We have scrutinised these consents closely and had peer reviews before coming to the conclusion to refuse the applications. The designers have been most upset with this (rightly so) because they say that neighbouring councils have approved these products in less severe climatic conditions. This is not a situation that anyone involved in building controls needs or wants but it is a problem that could be solved if all new products brought into the market were subject to independent tests by someone in this country.

Instead of having a reliable test to fall back on, quite often Councils are presented with additional information that is not relevant to the building consent application being processed. I have seen a 60 page presentation folder incorporated in a building consent application providing information such as:

- 1) Letters or building consent certificates from other Councils showing the product as being approved.
- 2) Producer statements that do not cover all aspects of the product, e.g., may be suitable in certain circumstances or for meeting only parts of the Building Code.
- 3) Photographs of the product being used elsewhere.
- 4) Referring to New Zealand standards that are NOT relevant to the product.
- 5) Providing BRANZ Appraisal certificates for products that are used in association with the product (in other words a smokescreen to divert you away from the real issue).

Having been bombarded with all this information Councils have to "sort the wheat from the chaff".

Looking at this issue from its widest perspective, it therefore seems timely for the building industry to establish clear guidelines for processors dealing with applications for consents that incorporate new products. And, the processors need to be involved in this task so that they have a good working knowledge of the information that they are expected to work with in relation to a particular product. Some processors believe that the salesperson or designer knows more than they do and, not wanting to look as though they don't know what they are talking about, they are bullied into giving approval. They feel they are expected to have this knowledge and therefore do not ask questions. I have observed this first hand.

Until product certification is dealt with adequately my advice to them is to stay focused on the question "Does it meet the functional requirements of the relevant parts of the Building Code? If in any doubt or you don't understand something, then don't approve the application. DON'T be pressurised!

Perhaps it is also time to consider making information in manufacturing guides more accessible to the end user by presenting technical information clearly rather than in a "promotional" way. This is true of policy statements too. What is the obsession that policy makers seem to indulge in for writing jargon (at length) rather than in clear and simple language? The building industry, namely manufacturers and policy writers, therefore need to examine how readable their documents are and the level of understanding required by users of them.

Michael Jowett
Senior Building Officer
Western Bay of Plenty District Council

PROFILE AND BRANCH UPDATE

BOINZ MEMBER AND BRANCH SECRETARY

Alister Arcus



My trade background goes back 26 years, starting as an apprentice carpenter and obtaining a Trade Certificate and Advanced Trade while on the tools in jobs that ranged from joinery/cabinet making to housing and light commercial projects.

At Hamilton City Council as a building inspector I have made a wide range of inspections from residential, industrial and commercial construction since 1991 and since then I have completed a Certificate in Building, and also a Diploma in Business Studies from WINTEC. This has helped me to manage a diverse team of professionals, who process all the building consents for the Hamilton City area, and report to management. In recent years the consent process has been re-engineered to provide a "one stop shop" service to our customers and to speed up processing times; this includes processing most of the larger commercial/industrial consents for customers, looking after the IQP registration for the Waikato area and continued improvements in our computer technology and processes. Our management aim is to provide world class best practice, and while we may not be there yet, we are moving in the right direction towards achieving this.

Branch news

My role as secretary for the Waikato/Bay of Plenty branch has been an interesting one with its diverse range of councils, such as those covering large provincial cities such as Rotorua and Tauranga, down to smaller councils such as Kawarau and Ootiki. Each area has its own challenges. Ootiki DC have real concerns from large numbers of substandard housing to a number of multi-million dollar resort developments, which stretches the small team that works there. In these situations, larger neighbours such as Whakatane DC help out with resourcing of staff and experience. We as a group also assist where needed such as when there were floods in the Bay of Plenty and the larger councils were asked to provide staff to assist.

Our area is quite large geographically, with a boundary from East to West coast, and when we organise training days, we may need to travel up to 4 hours to get to meetings. Getting people to attend these meetings and Executive meetings can be a real challenge as we are all busy. Email has been a wonderful tool allowing the facilitation of communication between all BOINZ members.

Flexibility reaps rewards

Both the Waikato and Bay of Plenty councils have set up regional clusters in the last couple of years to provide consistent service to customers and cope with the new Building Act. One of the first successes of this Waikato cluster was to agree to

Continued on page 3

Staff Change at BOINZ

The time has come for me to say a big farewell to the Building Officials Institute and to all of you whom I have met over the past two years.

My family and I are transferring to Melbourne, Australia in the New Year to seek a new opportunity over in the West Island which we are very excited about.

In my time as Len's Personal Assistant I have been lucky enough to have been part of an exciting time of growth and change for the Institute. I have thoroughly enjoyed my time over these past two years working alongside Len and I am certainly grateful for the opportunities of personal growth while working at the National Office.

I sincerely want to wish the Institute all the very best with all the positive initiatives that have been implemented to date and wish you all

every success for the future.

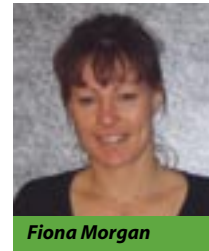
A big welcome on board to Juanita Adams, who is Len's new Personal Assistant.

Fiona Morgan

I have recently commenced working for Building Officials Institute as Personal Assistant to Len and will attempt to fill the large shoes left by Fiona. My background is in office management and I have held a variety of roles, the most recent being three years with the New Zealand Qualifications Authority. Earlier this year my husband and I had a baby boy and after the shock of sleepless nights wore off I sought part time work.

I am committed to helping the Institute fulfill its goals and I see my primary focus to support Len as he seeks to strengthen the relationship between the Institute and industry. I look

BOINZ STAFF



Fiona Morgan




Juanita Adams

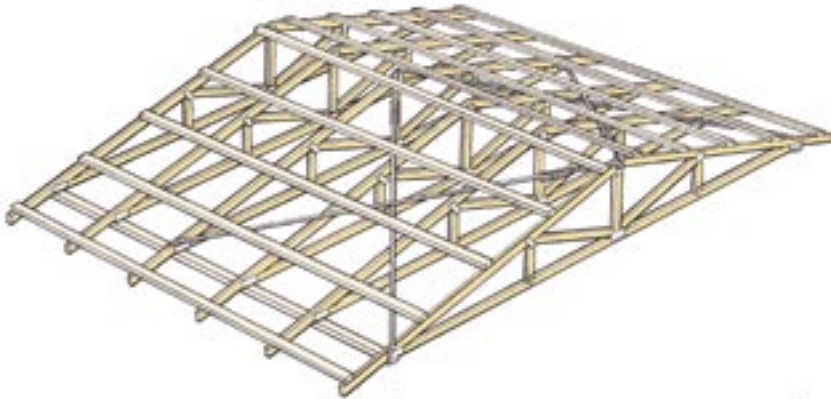
forward to working with the Building Officials staff and members of the building sector and welcome the opportunity to learn develop my knowledge base. Feel free to contact me if you have any queries for Len or the Institute and I will assist wherever possible.

Juanita Adams

PA/Training Academy Manager




08/2006



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Continued from page 2

a new application form that is identical, in look, for all five councils. Customers can now pick up applications from any of the council offices, as well, in limited circumstances, lodge consents at another council office and courier these to the parent council. Future ideas include job swapping, targeting assistance to smaller TAs or those who struggle with workload, and assistance with larger projects in smaller areas. These initiatives have been managed by a newly created position of Waikato Building Consents Manager, funded by the "Tight Five" (five Waikato Councils who make up the cluster). This is just the beginning, and it is good to see this happening all over New Zealand.

Looking to the future

Ian Mayes, Eco advisor for Hamilton has provided the following comments on a new service at HCC:

Hamilton City has signed up to an initiative to have an eco advisor in house to advise the Hamilton area. The position of Eco Design Advisor (EDA) at HCC is part of a 10-month trial, set up in conjunction with The Foundation for Research, Science & Technology, BRANZ and the Ministry for the Environment. Also taking part are Waitakere and Kapiti Coast councils. The basic role of the EDA is to provide free, easily accessible and independent information on a range of environmental design issues to both home owners and designers/trades people. The EDA will be available to give advice on a very broad range of sustainable building issues, from small changes like upgrading insulation levels, right through to options on earth building. One of the messages that I want to get across is that an "eco house" doesn't have to mean a straw bale house with chooks running through it. It can simply mean rotating your floor plan to get maximum solar gain. So I hope this gives you some idea of what an EDA is about.

Practical aspects of commercial green buildings

by Ian Cassels, Commercial Building Developer and Managing Director of The Wellington Company

The Wellington Company's refurbishment of the ex-Hoyts Cinema Complex in Wellington to house the Department of Conservation is the first office building in New Zealand to earn a five green star rating (equivalent) as assessed using the Australian Green Building Council rating system¹.

As the world progressively runs out of cheap energy its focus will increasingly centre on green buildings – particularly as governments absorb the subject and become increasingly motivated by it.

There is a popular idea, which suits the vested interests of consultants and their demand for new ventures, that groups of new buildings situated in new office "parks" will deliver the sought after energy return.

For simple reasons this will not work. The total energy use of a building over its intended life span depends upon a number of contributors – high in the batting order is the energy required to construct the building AND the energy required to transport workers to the site each day (with the latter being considerably more significant). And not just to the site but probably (in the case of an office park) also to and from the site to town each day.

Our building – the Mid City Podium Building in Manners Street (Wellington) is an example of a refurbished building (the concrete structure remains and is incorporated into the new building = little excavation and demolition) which satisfies those requirements. It is located within a superb city infrastructure that supports the site with a workforce that often takes the train or walks. Instead of going off-site the daytime staff excursions (dentist, gym, coffee, supermarket, childcare, after work social gatherings) can be catered for and all add value to the workplace. The result is a virtuous low energy circle².

The idea that our desired energy outcomes could be delivered through vast amounts of new building could mean having to leave existing stock empty and, as usual, in our little economy major rebuilds have hidden oncosts. The point worth repeating is that the neighbourhood of the proposed new project is at least as important as the various elements of the building and that together they can represent the creation of a business asset which is sustainable and

valuable.

There are a number of green building initiatives that are feasible and practical for existing buildings which often involve analysis of energy consumption – and the improvements can be considerable. Wellington, as with much of New Zealand, has a temperate climate and is therefore a winner from a climate standpoint. Compared with many other countries, the lack of freezing winters and overheated summers means that air-conditioning considerations are a minor skirmish rather than an all out war. In addition roof water collection for non potable water, sun shading, solar energy and insulation are all worth a look. In Wellington, for example, many existing buildings are set up with roof header tanks (it used to be requirement to maintain water supplies in the event of supply failure) that feed toilet flushing valves and it is often a cheap and effective process to isolate those tanks, feed them from roof water and top up with mains supply³.

For the green building initiatives to offer effective return they need to focus on the total energy effect and they need to offer treatment for existing building stock.

¹A former member of the Australian working party that developed the Australian Building Greenhouse Rating System (BGRS), Steve Hennessey said in an article published in The Dominion Post on 4 February that the BGRS "looks at energy use in a building and uses a rating system to compare it with other buildings in a similar location. A 3-star building is one that uses current best practice while a 5-star building is exceptional".

²According to the 4 February article quoting Mr Hennessey "The BGRS does not recognise these attributes. But a new rating system called Neighbours – to be launched in March 2006 – measures these and other attributes such as water use, refrigerant use, stormwater and use of toxic materials".

³In the 4 February article, Mr Hennessey also stated "that in Australia "building owners are concerned if they don't upgrade they may not be able to lease their space". He also stated that "one bolt-in lighting device can reduce energy consumption by 30% [and that] this can also be achieved by delamping – removing excessive or overly powerful bulbs". He said that "today's air-conditioning chillers are one-third more efficient than chillers built 25 years ago".

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A view from the East Coast, North Island

By Rod Jarvis, Board member, East Coast

The East Coast region of BOINZ runs from the top of the East Coast (East Cape area) down to Central Hawke's Bay (Waipawa Area). We have 45 members in our region and regularly get 30 to our branch meetings which are held approximately every 6 weeks on a rotating system involving Waipawa, Hastings, Napier and Wairoa. This means quite a bit of travel for members to get together. We also try to get up to Gisborne for a weekend meeting but this has not happened for awhile.

In Napier, where I live and work, we have nine inspectors; four in building and four in plumbing and drainage and a senior inspector, who is mainly office bound.

We work a 4-day roster. One day in the central processing area checking plans, anything from garden sheds to apartment blocks, and everything in between but only in our disciplines of building and plumbing and drainage. The next day it's out on inspections (nice on our sunny Hawke's Bay days) again doing anything from a bathroom alteration to a new building and averaging about 10-12 inspections a day, covering an area about 15-20 km from boundary to boundary.

As part of our drainage inspection the drainage inspectors draw up an as built plan of the drainage system. The following day it is into the office for the day to do the paper work from the day before: entering inspections into the computer system, writing letters, issuing CCCs, plus the phone and counter enquires and, if possible, draw a good copy of the drainage plan and scan it into the computer system. The fourth day is a "floater" day when you help out where ever necessary, usually on inspections or processing plans; at the moment this tends to be on the road helping do inspections as we offer a 4-hour service for inspections (except for finals we require 24 hours so we can get all the paper work together, etc to take with us).

The plumbing and drainage inspectors tend to do most of the finals on new houses and alterations as there tends to be more plumbing and drainage items that have not been checked off at this point, e.g. hot water cylinders, and a building inspector or the senior inspector is only a phone call away.

This system works very well for us. One of the advantages of this system is that we have a peer review system in place, for example, the chances of the same inspector doing all the inspections is remote therefore a constant review is always taking place.

As is the case in many areas, over the last couple of years we have had upturn in larger developments, especially apartment blocks. A quick add up in the office and, we came up with approximately 260 apartment units being consented in the last 5-6 years. Some of these are finished, others are still under construction. Over and above this we have one developer who is buying up some of the older motel units, closing the motel down and turning these into apartment units. So, sorry anyone who has had trouble getting accommodation for the Mission concert or Art Deco weekend, you may be better off trying to get one of the apartments than a motel.

Due to the need to stage these consents and the amendments that seem to follow these developments, we have assigned a building inspector and a plumbing and drainage inspector to each of these projects. They become the first point of call for the trades people and the project managers. This has proved to be very valuable, as at the end of each consent they know what fire collars, timber walls, and drains have been inspected as well as any areas of concern that they had noted throughout the job. This has made the issuing of the CCC a little bit easier at a time when the pressure is on for everyone, as very large sums of money are at stake and the stress levels rise trying to get the project finished.

Codewords - the latest Building Code thrusts

The recent edition of Codewords reminded us of our opportunity to be involved in the impending reviews of the Building Code.

Reading *Codewords*, it appears once again, that the trust of the new Code will be "Performance Based". That's interesting. Can I dwell on this for a moment please? Performance-based codes were thrust upon us in the early nineties. Those sceptics amongst us may see them as a trendy way of delivering a document and asking for a solution, without anybody really having to make a decision on anything specific. And the public like performance-based - when it suits them, as amongst other things, it makes them believe they aren't being over-governed.

So we all joined in and played out the rest of the nineties happily under the illusion that everybody in the chain were competently delivering to the consumer a fine product based around performance criteria. We thought this meant the guy next to us was taking responsibility for everything he did. As it turned out, we were all wrong! Nobody took any responsibility for anything they did! And we found out the last man standing was the Territorial Authority!

And we have moved on. Currently, we are trying to operate under an evolved Code.

It's still supposed to be a *Performance-based* Code. Some of us still try to embrace the "Performance" notion; others can't seem to be able to get past the documented Acceptable Solution. And when this happens, it's **not** a performance-based Code anymore. In my opinion, we are no better off than we were in 1990. Even after all this pain. So what was the point? As was pointed out to me recently, are today's houses any better than those built in 1990? Ah..., no?

It seems to many that the industry is operating in a climate of fear. And we've created so much fear that, to some of us, for safety's sake, an *Acceptable Solution* seems to be the only way of achieving a purpose. Knowledge is the key to making a performance-based Code really work. A well-informed industry is essential. Everybody in the chain must have knowledge of their core discipline at least. And given that it's unreasonable to expect us to know about everything, we must also have the ability to tap-into our co-worker's knowledge as well. Then the fear dissipates. Reason and logic return! Your Institute is currently devising good strategies and developing courses that will allow you to be knowledgeable and confident in your role.

A climate of fear is not conducive of fostering

a climate of innovation. And everywhere I turn in New Zealand, I seem to get the innovation line thrust at me. Being seen to be innovative is really important to us as a country. So as we develop this new Building Code, I believe that we must not take away this road to innovation. But equally, we can't recreate the mess that was the first performance-based Code. This can only happen if everybody gets involved.

Look through the document proposed.

Here's an example. There's lots of talk about **adjacent buildings**. Really, as if we did not have enough issues dealing with the building we are trying to consent and build, we now want to have to deal with the building (or buildings, and read "owners and/or their solicitors") next door? Is it more appropriate for the civil courts to deal with this if and when there's an issue? We'll never get Building Consent out in 20 days!

So I urge you to review the document available from the DBH website. It talks about making the code easier to use. But it will only do this if you guys, the guys that will have to use it, tell the writer (who is probably an "academic"), what is easy to read, in your opinion.

Peter Downey is Managing Director of Hydraulic Services Consultants Limited, a plumbing design consultancy, and is based in Auckland. He can be contacted on peter@hsc.co.nz.

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Building up consensus: the key to effective building controls management

Building sector compliance documents represent significant investment in intellectual property, money and effort from industry experts over a long period of time and they underpin the building environment in New Zealand. These documents include Standards governed by SNZ, and the Building Code, guidance notes, acceptable and alternative solutions and verification methods developed by the Department of Building and Housing.

The work of the DBH and Standards in producing building compliance documents is closely linked in a number of ways. For example, under the Building Act 2004, the DBH is required to comprehensively review the current Building Code and the review needs to ensure that the new Code and relevant Standards remain aligned. The two organisations are further linked where Standards specifications or codes of practice are frequently cited in acceptable/alternative solutions or verification methods that are currently developed by the DBH to meet the performance requirements of the Building Code.

These documents give designers and builders guidance on the safety, sanitary, and amenity provisions that the Building Act requires buildings to satisfy. Compliance documents are also essential tools for a number of different building controls groups, namely building inspectors and processing officers in TAs and their counterparts in private firms, including private certifiers interacting with TAs, who work together to ensure compliance.

The effectiveness and availability of these documents is therefore paramount. Building controls officials rely on the merits of those documents from day 1, for reviewing site plans and applications for consents, and issuing notices to fix and the like up until the TA finally issues a Code of Compliance. Therefore, every decision regarding building controls policy needs to recognise: 1) that building officials are the only industry professionals who: a) represent the public interest under the Building Act and b) are present at every building site to see that what is done in practice complies with the Act and the Building Code along with other compliance documents, and 2) that while

policy makers and designers sit at their desks, building officials are in the frontline, processing, reviewing specifications, and monitoring each stage of the inspections process.

To help these groups, especially building officials, and because there are so many compliance documents, it is important that 1) these documents give accurate quality advice (that is created in consultation with the industry) and that 2) access to that advice is efficient and cost effective. Steps have already been taken down this track.

Straight Up reported in the December issue that the DBH and Standards run a combined consultation process for developing Standards; a Standard can be now be cited in DBH compliance documents as soon as it is published whereas before, its predecessor, the BIA, undertook a separate evaluation and consultation process following publication of a Standard. Is there further scope to improve the consultation process in other areas and thus the quality of compliance documents generally?

As stated, the DBH uses Standards as a means of compliance to shape its internally developed documents and this is working successfully. However, Standards are produced after an industry-wide consultation process or is supposed to, whereas not all the documents that are developed by the DBH have this level of industry involvement. Should all documents currently developed separately by the DBH be required to have industry-wide involvement? And furthermore, should one body be given responsibility for the development of these? Should the DBH be a participant in the processes of developing compliance documents rather than a developer of solutions? If all compliance documents were reviewed and maintained by one body and regulated by the DBH then consistency between all compliance documents could be enabled.

For example, unlike DBH internally developed documents, an SNZ development committee is representative of all parties involved in implementation of a Standard. The challenge with this is that committee representation is often difficult as those asking to be volunteers on standards committees cannot always dedicate the time to participate and it could be said, that the failure of standards is due to the lack of funding from Government to create a balanced consultative process.

Also, it may be said that industry acceptance currently gives Standards an advantage over prescriptive regulations or DBH developed technical specifications. In this way the chances of a Standard having provisions that are impractical to implement are reduced and the sector consensus process ensures less likelihood of a legal challenge to the appropriateness of Standards based acceptable solutions. Membership of committees also ensures the robustness of the decision making process through SNZ's role in ISO and IEC, through its contacts with other national standards bodies, and through the formal process of developing joint SNZ and Australia standards.

By taking this approach, "Standards define materials methods, processes and practices that provide a basis for determining consistent minimum levels of quality, performance, safety and reliability" according to SNZ. With networks already in place for developing Standards, could SNZ manage the development of other compliance documents and rulings, alongside its current process for reviewing Standards, we think not. However, perhaps, some consequential savings in time and expenditure could be realised and therefore resulting in a form of rationalisation of the way compliance documents are currently developed.

The question therefore is: what do users think; and secondly: what would users of these documents like to see done in this area that would benefit them? For example, do you think all compliance documents should include input from the wider-interest sector industry groups and how do you think building controls policy could be developed and the quality of that process be monitored?

One possibility might see the DBH or a single industry body, such as SNZ, convene all interested groups with a brief to develop documents with a broader focus, issue regular updates on it, and produce an online manual, database or such like that links all compliance documents to a generic list? For example, SNZ could develop compliance documents and the DBH could regulate their application. Left unchecked and allowed to multiply is it possible that the usefulness of a myriad of documentation could be jeopardised by loopholes or by simply becoming overlooked or duplicated? Have not alternative solutions been found wanting and leaky buildings demonstrated the results?



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Research funded by Building Research, and performed by BRANZ Ltd, has confirmed that plastic building products are affected by sunlight because of the nature of their chemical composition, the impurities (metal-based additives) they contain, and through high temperature injection moulding and extrusion processes involved in producing them. BRANZ has found that these effects are

often accompanied by extensive deterioration in the mechanical properties of these materials (such as tensile strength, impact strength and elongation) all of which are important parameters in the performance of a building product.

BRANZ has been testing the relationship between climatic variations and the rate of degradation of polyvinylchloride (PVC), low density polyethylene (PE) and polypropylene (PP) sheets since 2002. Samples have been monitored at exposure sites in Kaitaia, Paraparaumu, BRANZ at Judgeford and Invercargill. The programme was expanded in 2005 adding acrylic (PMMA), polycarbonate (PC), polyester (PET) and glass-filled composite sheets to the existing sites. Additionally, five new exposure sites were established at Cromwell, Christchurch, Westport, Rotorua and Auckland.

The results from testing of replicated samples at the first four sites have revealed that clear PP showed the most rapid decline in surface

colour and mechanical properties at all the sites. The clear PP sheet had undergone extensive micro-cracking and had lost all mechanical strength after 3 years of exposure. In contrast, the black polyethylene samples exhibited no change in colour during the first 4 years of exposure. The samples had fine surface micro-cracks, but mechanical properties were unaffected because the material contains carbon black which acts as a UV stabiliser.

BRANZ says that information from these trials will help the useful lifetime of building products to be predicted with greater accuracy, as well as enable plans to be made for maintenance and replacement of key building components based upon knowledge of material formulation and an understanding of New Zealand's climate.

Based on an article by N. Marston "Effects of UV radiation on building materials" in "UV radiation and its effects - an update 2002" ISBN 1-877264-20-2.



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CARTERS

Brace with Care

During the recent GIB® Essentials Roadshow "bracing" proved to be the hot topic. The following insights are offered in response to questions raised and to increase wider understanding of this important building industry issue.

THE P21 TEST AND ANALYSIS PROCEDURE – NOT A FAIL PROOF SCIENCE

Wind and Earthquake exert horizontal forces on buildings. To resist these forces, Timber Framed Buildings constructed to NZS 3604 must incorporate wall bracing elements tested in accordance with BRANZ Technical Paper (P21).

In the P21 test, a panel is fixed to a foundation beam and repeatedly pushed and pulled at top plate level. Loads achieved at predetermined deflections are recorded. In most cases peak loads are used to determine the Bracing Unit (BU) rating for Wind (W). Residual peak loads after repeated cycles determine the BU rating for Earthquake (EQ). P21 requires that 3 nominally identical specimens are tested. This gives 6 peak loads and 6 residual peak loads. The average is taken to determine BU ratings for W and EQ respectively. BU ratings are thus based on "mean ultimate" load resistance. Interestingly, by definition, this means that at least 1 (and possibly 2) out of 3 specimens is expected to fail at the published BU rating.

Example:

- Panel 1 achieved +/- 6 kN push and pull
 - Panel 2 achieved +/- 7 kN push and pull
 - Panel 3 achieved +/- 9 kN push and pull
- The average of the 6 results is 7.3 kN and 2 out of the 3 panels failed to achieve this load.

This concept is foreign to structural engineers used to working with "characteristic" values determined from a group of test results, statistically analysed assuming a maximum allowable probability of failure (usually 5%). The resulting characteristic strength is then multiplied by reduction factors to determine safe design stresses.

THE ASSUMED BRACING REDUNDANCIES IN NZS 3604 ARE ERODING

P21 was introduced in 1979, intended for use with NZS 3604 and based on the assumption that "redundancies" in light timber framed buildings justify using "mean ultimate" loads. These redundancies include; walls not counted as bracing elements, wall areas under and over windows and doors, load sharing due to taped and stopped gypsum plasterboard wall and ceilings joints, claddings not counted as part of the bracing system, etc.

Since 1979 building design and available bracing systems have evolved. House plans now have larger internal open spaces and more glass to enjoy the views New Zealand has to offer. Houses built for a view are inevitably placed on exposed sites, many have cladding systems that provide little contribution to bracing (EIFS systems and drained cavities), and often most available wall areas are used for bracing. The assumed NZS 3604 redundancies are eroding.

BUT, BRACING RATINGS ARE INCREASING!

In contrast, proprietary BU ratings on offer over recent years have been increasing. In 1984 the maximum available rating was about 80 BU/m. Ratings up to 150 BU/m are

now common place. Some suppliers even promote ratings closer to 200 BU/m.

CAN NZS 3604 FLOOR SYSTEMS RESIST HIGH BRACING RATINGS?

Let's do some simple engineering;

- 20 BU equates to approximately 1 kilo Newton (kN)
- 1 kN equates to approximately 1 All Black or 100 kg, so
- 150 BU/m equates to 7.5 kN/m

For a 2400 mm high wall, to provide 150 BU/m at the top, it must be held down with a force equivalent to $2.4 \times 7.5 \text{ kN} = 18 \text{ kN}$. It is assumed that NZS3604 construction provides a degree of restraint against uplift due to gravity forces, wall continuity, walls at right angles, load-sharing, etc. This inherent restraint is arguably about 6kN which leaves 12kN to be resisted by hold-down straps and bolts pulling on NZS3604 floors at one end of the panel. At the other end the panel is pushing down. The downward force is arguably greater because gravity is working in the same direction. For 200 BU/m the resultant net uplift force is 18 kN. The entire All Black team (including players off the bench) must now hang off the end of a bracing panel to hold it down! Generating high BU ratings in a laboratory is easy. For example, in the test rig a panel is often bolted down to structural steel I-beams which are able to resist any uplift force a bracing element generates. But can NZS 3604 floor systems resist the same forces?

The NZS3604 bracing philosophy is based on even distribution of bracing using moderately rated panels. Accepting "mean ultimate failure", averaging effects, and relying on redundancies very much underlies this premise. Using few highly rated panels with resulting excessive load concentrations is beyond the capacity of NZS 3604 floor systems and does not agree with the original load-sharing philosophy.

If highly rated bracing panels (over 150 BU/m) are used a specific engineering approach should be adopted. In this instance a design based on 1 or 2 failures out of three tested specimens is unlikely to be acceptable.

A PRUDENT APPROACH TO BRACING

Earlier this year Winstone Wallboards introduced "GIB® Bracing Systems, 2006". These new systems offer increased simplicity, flexibility and transparency and have been derived using a prudent and conservative approach. Being a little conservative with respect to NZS 3604 bracing is also prudent and responsible recognising the differences between specimen construction in the laboratory and common building practice.

Tested GIB® Bracing Systems BU ratings have been rounded down to be conservative and to ensure a logical progression of ratings. They are published in 5 BU increments. Ratings have also been capped at 150 BU/m to

limit point loads to 12kN to protect NZS 3604 floor systems. A research project is currently underway with the aim to better quantify the limits of BU ratings and NZS 3604 floor systems. Recommendations to Standards New Zealand are expected to be formulated early next year.

A FLEXIBLE APPROACH TO BRACING

A flexible approach has also been adopted in designing the published "GIB® Bracing Systems, 2006" GIB® Bracing Systems BU ratings allow for nail or screw fixing and horizontal or vertical fixing. The published BU ratings have been determined for the worst case scenario (GIB® Nails for GIB® Standard plasterboard and GIB Braceline® Screws for GIB Braceline® systems).

We do not believe it is appropriate for the designer to make the fastener choice or board orientation choice whilst the builder may have a different preference.

DOES NZS3604 ENSURE THAT AN EVEN DISTRIBUTION OF BRACING ELEMENTS IS ACHIEVED?

Finally a word of warning to designers and building officials about distribution of bracing elements. NZS 3604 has simple guidelines intended to ensure that even distribution of bracing is achieved. These rules can be quite inadequate. Take a 9 metre wide by 15 metre long rectangular building with 5 bracing lines in the across direction (external walls A and E, and internal bracing lines B, C and D), as illustrated below. The bracing demand is 1200 BUs.

NZS3604 requires a minimum of 10 BU/m for external walls and 70 BU for internal walls.

This means that our building could have 90BU on one of the external walls, 3 x 70 BU on the internal lines and 900 BU on the remaining external wall. The design would comply with the distribution rules of NZS 3604, but surely not with the intent.

AN ALTERNATIVE APPROACH TO EVEN DISTRIBUTION OF BRACING ELEMENTS

Designers must ensure that adequate distribution is achieved and the following alternative approach is proposed.

Divide the BU demand by the number of bracing lines and ensure that each line has at least 75% (suggested) of that number of BUs.

Following our example this means that each bracing line in the across direction has at least $(1200/5) \times 75\% = 180 \text{ BUs}$. A much better distribution is achieved.

YOUR FEEDBACK IS ENCOURAGED

Winstone Wallboards welcomes your feedback and dialogue on these issues. We can be contacted by phoning the GIB Helpline on 0800 100 442 or e-mail Hans Gerlich, Technical Manager Building Systems, on hansg@gib.co.nz. Winstone Wallboards Ltd.

37 Felix Street, PO Box 12256, Penrose, Auckland, New Zealand. Phone 64-9-633-0100. Fax 64-9-633-0101.

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Do electrical workers, builders, architects, building officials and consent processors have anything in common?



Straight and narrow...Ruler shows width of boundary gap, house built 2006.

Four government-funded bodies, the Electrical Workers' Licensing Group (EWLG), the Licensed Building Practitioners Group (LBPG), the NZ Registered Architects Board and the Plumbers, Gasfitters and Drainlayers Registration Board provide interesting comparisons to the current predicament of building inspection workers carrying out building controls work and processing consents.

EWLG transferred from the Ministry of Economic Development into the DBH on 1 September. This group certifies the competency of (and provides registration and complaints assessment services to the Electrical Workers Registration Board) for about 38 000 electrical and electronic workers in New Zealand. The DBH also oversees the boards that licence engineers and associate engineers. *Electron*, Issue 28, EWLG.

The Licensed Building Practitioners Board is also administered by the DBH. "It is made up of building industry specialists with expertise in design, construction, inspection services, the law, dispute resolution, education and training.

The board will approve the rules for standards and assessment processes, hear appeals against licensing decisions and hear complaints against, and discipline, licensed building practitioners. An estimated 28 000 workers will need to be licensed. *Codewords*, May 2006, DBH.

And a new board has just been established to "govern the registration, continuing training and discipline of architects under the Registered Architects Act 2005, and to protect the good name of architects and differentiate between registered architects and any other professionals in the architecture and design fields." *The Dominion Post*, 22 July 2006.



What might have been... Straight Up-and built-to-last (but taxpayer funded) – a retaining wall opposite the General Assembly Building, Parliament Grounds, Wellington.

There is much at stake for building controls workers too – can they afford not to be represented by a similar authority and the public protected in this area also?

And therein lies the point of difference – there is no support group to certify the competency of and deal with complaints about building controls, though BCAs must apply to become accredited by IANZ, announced in August this year by the DBH. Councils must fund the cost of training their staff to the levels required under accreditation and then deal with any complaints in addition to their day to day work. And how many building officials and processing officers are there? The Energy Efficiency and Conservation Authority recently commissioned a survey of building officials but can't release the information because it was intended to be used only for the purposes of the survey.

Keith Langham, BOINZ board member, pointed out in the September issue of *Straight Up* that he would like to see the DBH "take over all building control with maybe 2 or 3 processing teams and councils being service centres and providing PIMS and inspections and with the possibility of independent inspectors." A good compromise?

There appear to be many conflicting demands and pressures in this sector and some lines need to be more clearly drawn. Building controls officials and processing officers have traditionally been categorised as a public service oriented occupational grouping. But now some of this work is contracted out to private firms. In addition, the role of the building official and the work involved in processing consents has become more complex and as the population grows demands on limited space and the purpose for which it is used will become increasingly contested in years to come.

An example of the kinds of pressures on building officials became apparent following the July/August landslide in Oriental Bay, described by some as Wellington's "riviera", when two recently completed apartment buildings were inundated by debris when a huge bank behind the buildings collapsed. These buildings were still unoccupied at the time of going to press.

The council inspectors, engineer, architect and developer have been roundly called upon to account for their part while efforts are made to figure out the best way of safely removing tons of earth inaccessible to diggers and at whose great expense. In the fall out (or rather down) no one has suggested that the buildings have been built too close to the boundary, or that city boundary limits should change, after all, Old Wellington has its share of 100-year-old plus cheek-by-jowl inner city charmers perched on an amphitheatre of hillsides. Picture 1 shows just how close to the boundary it is possible to build nowadays in inner city Wellington and only a little more space than this was evident in pictures of the landslide at Oriental Bay. The question is whether more should have been done to stabilise the bank before construction – for example, should retaining such as in Picture 2 have been a requirement for this development.

In defending their decisions in this type of case, building inspectors find themselves being criticised for decisions that were made back when consents were approved and for being on the side of developers, which is a potentially litigious and politically unenviable situation for them to be in.

Perhaps the time has come for building controls and consents processing arrangements to come of age in New Zealand and graduate to the level of support given to the electrical and construction industries whereby training in building controls is given on the job in BCAs and competency and registration is assessed independently. A good start might be acknowledging that this group exists by making a head count of just how many people are employed in the building controls sector.

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“Design is a more a process of logic than intuition”

The effects of over-exposure to UVR are higher in New Zealand and Australia than anywhere else in the world and cause diseases of not only the skin, but also the eyes.

An Australian study has led researchers to comment that local government authorities are uniquely placed to regulate how we use, manage and develop land so that the design and regulation of outdoor spaces provide appropriate levels of protection against solar UV radiation.

They have found that if environmental solar protection is to be effective it must combine a number of different elements, such as shade in the right place at the right time, at least 94% protection from direct and indirect (reflectivity) UVR, and summer and winter comfort. For example, a roof over an outdoor café might be sheeted with poly-carbonate, providing excellent direct UVR protection throughout the year, but no cooling in summer. By adding deciduous trees on the northern side, replacing smooth concrete paths with coarse brick paving and side screening on the western side, the space would be cool in summer, warm in winter and experience lower indirect UVR levels.

By making a “shade audit” of a particular site (to establish usage patterns at the site, the quantity, quality and usability of existing shade, the need for additional shade and protection and its preferred location and type

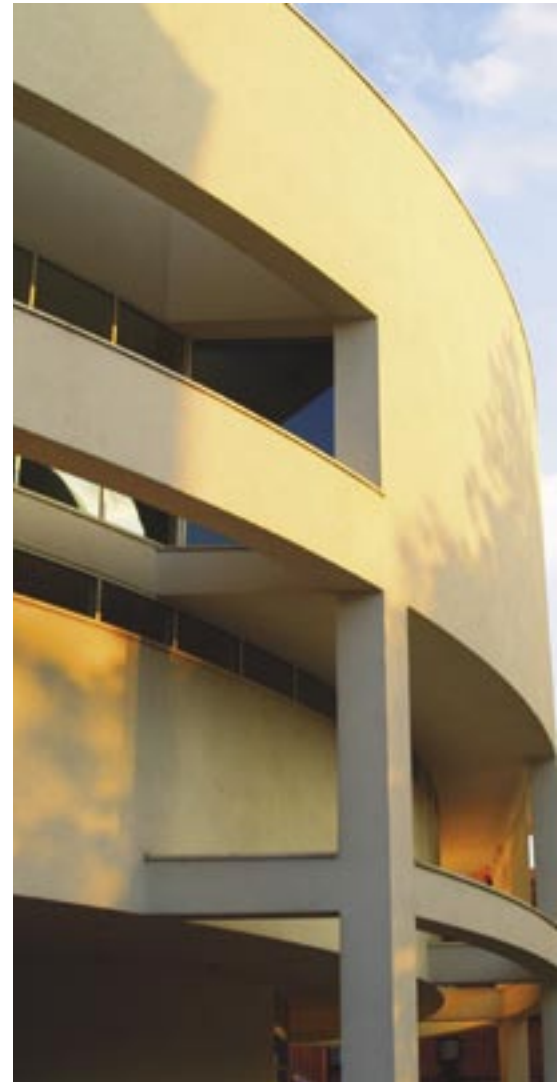
in summer and winter conditions) effective solar protection can be achieved and comfort levels at the site enhanced.

In their study the researchers state that in Australia councils are obliged to assess development applications with regard to design amenity, safety and environmental impact which is also a requirement of the built environment in New Zealand. The researchers say that in this role councils should require applicants to address the issue of solar protection at the design stage and submit a shade audit with their application thereby significantly influencing the quality of shade provision.

In summary therefore, an effective shade planning tool would enable users to:

- Create effective solar protective shade
- Find True North
- Plan climate responsive UV protective shade
- Model different shade at their site
- Assess solar risks associated with their site and how to reduce them and
- Connect with local businesses that can assist.

Source: Based on articles “Designing sun safe environments” and “Shade – the missing piece in the skin cancer protection puzzle” by J Greenwood. Published in “UV radiation and its effects – an update 2002” ISBN 1-877264-07-5 and “UV radiation and its effects – an update 2006” ISBN 1-877264-20-2.



Solar water heating update

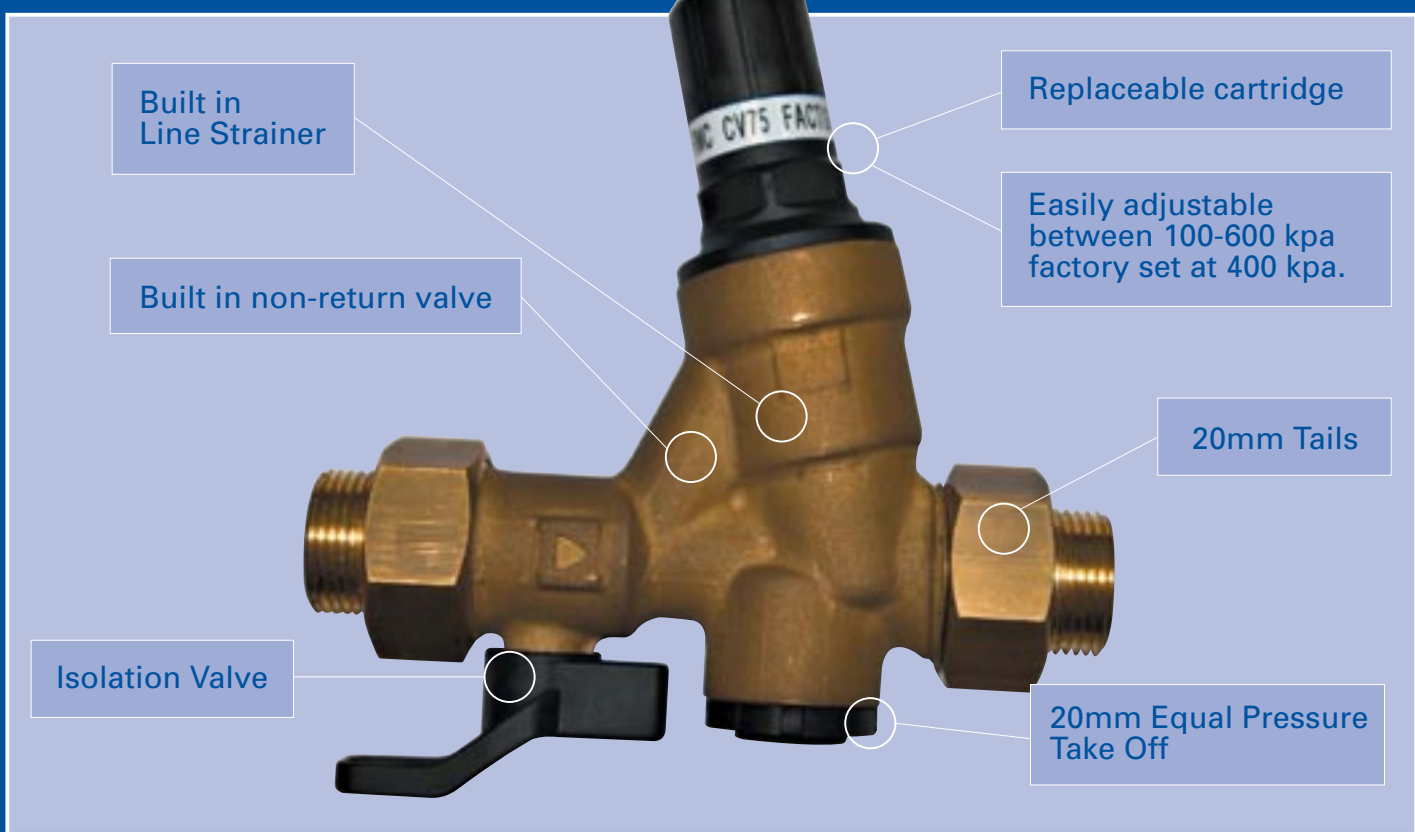
- The solar water heating industry has developed a Code of Practice (www.solarindustries.org.nz) representing best practice.
- The Department of Building and Housing is currently drafting an acceptable solution (AS2) for installation of solar water heaters to clause G12 of the Building Code.
- AS/NZS 3500.4 is being reviewed to reflect modern installation requirements.
- The Standard (AS/NZS 2712) for solar water heating system manufacture is being reviewed to clarify requirements for packaged and customised systems.
- 60% of the NZ market uses systems where the existing hot water container (not on the roof) is connected to a collector panel on the roof, with a pump to circulate the heat transfer fluid through the system.
- Installations where there is only a collector on the roof (without a container) do not require structural strengthening in the roof. Structural issues may arise if they choose a packaged close coupled system where the container is on the roof.
- All systems should use a ‘time based controller’ to control when the electric booster comes on. This increases the efficiency and performance of the system.

*Joseph Mayhew
Advisor Renewable Energy
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The NOW home - a residential green building example

The Waitakere NOW Home may look like just another mid-range family home – but it's not. It is a live research project, part of a larger exploration by Beacon Pathway Ltd to find affordable, attractive ways to make New Zealand's homes healthier, more resource efficient, and more cost-effective to build and run.

Completed in August 2005, the \$220,000 home will be monitored over 2 years to test the effectiveness of the design.

The design aims to make the best possible use of the specific building site. It is not intended to be simply reproduced elsewhere. Rather, Beacon hopes it will encourage people to consider using similar features and materials when designing and retrofitting their own homes, taking into account their particular needs, priorities, location and budget. All products and materials used in the home are readily available.



Photograph: Craig Robertson Photography for Beacon Pathway Ltd.

The NOW Home is designed to maximise solar heat gain, and so to maintain comfortable, even indoor temperatures for all but 10 days of the year, without the need for any additional heating or cooling. An uncovered, coloured, polished concrete floor provides thermal mass to capture and store the sun's heat. High levels of insulation and double glazing minimise heat loss.

Passive ventilation circulates fresh air to ensure a healthier indoor environment without the need to open windows. A solar panel provides most of the home's hot water needs. Rainwater, collected from the roof, supplements Council water supply. Low-energy appliances and low-water plumbing fittings and appliances are installed.

The home has now been occupied for about 6 months. While it has been life as usual for the young family living in the home, Beacon's scientists have been busy behind the scenes, monitoring the family's energy and water consumption, as well as internal moisture and temperature levels.

Data collected in the past 4 months suggests that each year the three-bedroom home will use about 30% less energy and 25% less water than similar-sized homes in the area. Internal temperatures have been comfortable and consistent, and relative humidity low. The efficiencies have translated into lower power



Photograph: Craig Robertson Photography for Beacon Pathway Ltd.

and water bills, and consequently considerable savings for the tenants.

Importantly, the design achieves this without sacrificing aesthetic appeal. The family have given it an overwhelming vote of confidence for its layout and ambience, saying "it's the best home we've ever lived in."

Beacon Pathway is a collaborative research consortium, bringing together private industry and the public sector around the shared goal of improving New Zealand's residential built environment. It is funded by the Foundation for Research, Science and Technology and five organisations with a significant stake in the residential sector: Building Research, Fletcher

Building, New Zealand Steel, Scion and Waitakere City Council.

The consortium is delighted with the early monitoring results. "These early figures show we were on track in our design," says Beacon General Manager Nick Collins.

"Our findings from the Waitakere NOW Home, and other NOW Home projects around the country, will enable us to gather and share reliable information about best practice design and construction with home occupiers and the industry," he says.

For further information about Beacon and the NOW Home, visit: www.beaconpathway.co.nz www.nowhome.co.nz

SPECIFICATION LIST FOR THE WAITAKERE NOW HOME.

System	Selected material
Floor	Concrete slab on ground
Insulation of the slab	25mm EPS, with 25 mm EPS around the perimeter protected by fibre-cement sheet
Framing	Kiln dried timber framing H1.2 borc treated radiata pine
Exterior cladding	Timber weatherboard radiata pine H3.2 bevel back
Window joinery	Double-glazed aluminium frames
Roof cladding	Concrete Tiles
Guttering and fascia	Pre-painted steel
Soffits	Fibre cement panel
Building wrap	Polyester
Downpipes	Polypropylene
Insulation	Fibreglass batts
	R3.0 (90mm) in walls (Code minimum is R1.5)
	R5.0 (190mm) in ceilings (Code minimum is R1.9)
Rainwater tank	Rotational moulded plastic, 13 500 litre
Solar hot water heating system	Roof-mounted solar panels with 340 litre mains pressure cylinder
Water piping	Polypropylene
Plumbing fixtures/fittings	6/3 dual flush toilets. Taps and shower head with flow and temperature limiters.
	No in-sink waste disposal unit.
Internal linings	Plasterboard
Mouldings/ architraves	Finger-jointed radiata pine
Light fittings	Surface mounted light fittings, with energy efficient light bulbs
Floor finishes	Coloured concrete in living spaces with water-based resin finish
Floor finishes in bedrooms	Fitted wool carpet
Wall finishes	Low-VOC paint
Driveway	Solid concrete vehicle tracks, with loose gravel between (exposed aggregate concrete with shell chip)
Fencing	Galvanised wire fencing panels
Paths and terrace	Gravel and shell with heart macrocarpa edging

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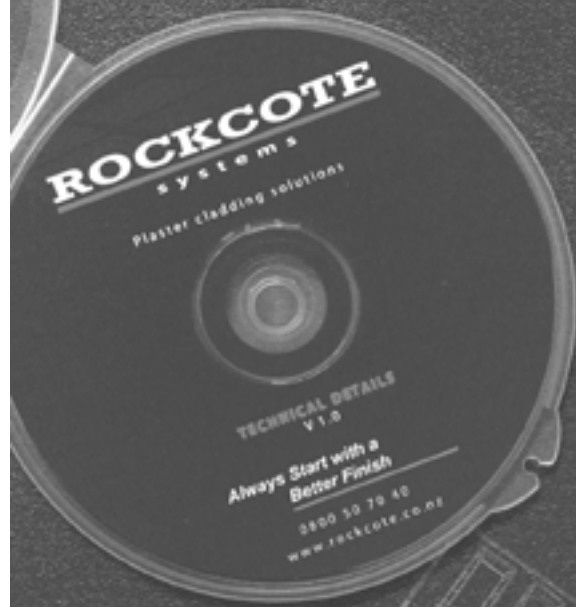
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If they are recounting them put them in auditing.

If they have messed up the whole place with the bricks, put them in engineering.

If they are arranging the bricks in some strange order put them in planning.

If they are throwing the bricks at each other put them in operations.

If they are sleeping put them in security.

If they have broken the bricks into pieces, put them in information technology.

If they are sitting idle, put them in human resources.

If they say they have tried different combinations, yet not a brick has been moved, put them in sales.

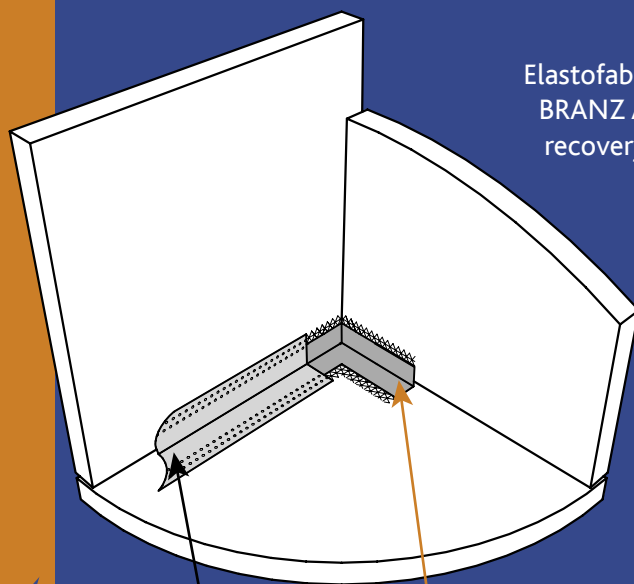
If they have already left for the day put them in marketing.

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