ISSUE 21

SCOPE

NZ METAL ROOFING MANUFACTURERS INC.

Below is a brief introduction to the 2009 executive of The NZ Metal Roofing Manufacturers Inc.
It is intended that Scope be representative of the industry and therefore material of interest is welcomed from all sectors of the building industry be it design, research, manufacture or construction.

Darrell Back, President
NZ Metal Roofing Manufacturers Inc.
Managing Director of the Steelform Group of Companies.

Gregg Somerville: Vice President
Marketing Manager for Dimond.

Immediate past President
Tony Barbarich: Director of Business Development for Metalcraft Industries.

Executive Members:
Dave Hall: Manager of Freeman Roofing

Stuart Hayman: Technical Development Manager AHI Roofing Ltd.

Philip Meyers: Consultant.

Warren Oliver: Managing Director of Franklin Long Roofing.

Gregg Somerville: Marketing Manager for Dimond.

Troy Smith: Marketing Manager for Gerard Roofs.

Rod Newbold: Commercial Manager Steel and Tube Roofing Products.

If you would like to submit material please contact any member of the executive or the publisher.

Visit our website at:

www.metalroofing.org.nz

SCOPE

CONTENT ISSUE 21

NZ METAL ROOFING MANUFACTURERS INC.

Scope is the official publication of
The NZ Metal Roofing Manufacturers Inc.
Executive Officer: Peter Atkinson
Private Bag 92 066, Auckland.
DDI Ph: 09 367 0934,
Ph: 09 367 0913
Managing Editors: Christine Wilkinson, Warren Oliver, Troy Smith, Dave Hall, Tim Rutt.
Published by ICG Limited.
57 Glendhu Road, Glenfield, Auckland.
Telephone: 09 444 2424.
e-mail: conceptart@xtra.co.nz

GREENVILLE HOUSE ON DENERAU ISLAND

Paula and Ross Greenville operated a very successful boutique accommodation facility adjacent to the golf course in Mount Maunganui for a number of years. This luxury accommodation catered for overseas visitors who were particularly interested in golf.
In 2004 a change in lifestyle was in order. Paula and Ross decided that they would construct a new home for themselves in a warmer location and again, adjacent to a golf course. This was to be located on a site on Denerau Island in Fiji.

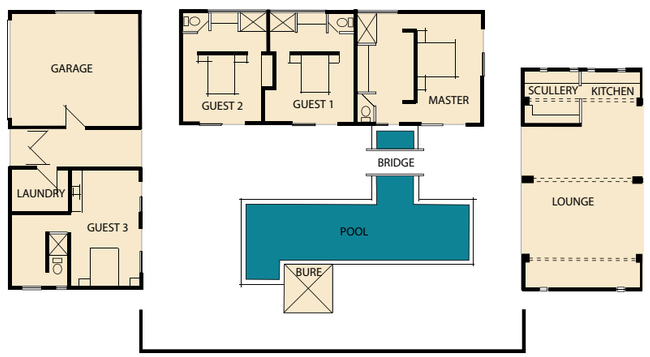
The 1,000 square metre sites are located with a street access at one end and a waterway access at the other end. The Greenville site has a view north to a section of the golf course which runs along the opposite side of the waterway. The best of all worlds !
Details of the site and the local planning limitations were forwarded to their Architect friend, Garry Glasgow and a meeting was arranged to discuss the proposal. Garry had a fair idea of what the Greenville brief would be, and prepared a preliminary scheme for a house prior to the meeting. He later discovered that a requirement which was originally considered to be important was for a short walking distance from the car to the kitchen. This was the one aspect the plan did not achieve. The predominant site planning arrangement existing on Denerau Island generally locates the swimming pool in the yard which is adjacent to the waterway.
Garry argued against this model and proposed that the pool should be located within the building complex to provide a greater degree of privacy and intimacy for the users of the pool. Local building rules do not restrict convenient access to swimming pools, as is the case in New Zealand.

Some of the desirable and important requirements in tropical buildings include:

- Structures with substantial provision for natural ventilation.
- Structures which resist tropical wind forces,
- Structures which cater for tropical rainfall volumes,

The house is designed as a series of three separated rectangular pavilions which surround a central courtyard with swimming pool. The pavilions all contain a single room width to allow for ease of natural cross ventilation.

The pavilion adjacent to the street contains a double garage and a large guest room separated by a two metre wide entrance tunnel. The kitchen, dining and living are located in the pavilion adjacent to the waterway and the pavilion along the west boundary contains three separate bedroom suites.
The three pavilions are linked with a wide verandah which also surrounds the three sides of the swimming pool.
All rooms open to the pool and this allows for a tropical early morning swim to become a very natural and convenient start to any day.



All pavilions have door and window openings on each side of the building to facilitate cross ventilation. The main living pavilion has sets of double sliding doors facing to the central courtyard on one side and facing out to the waterway on the opposite side. There is a folding awning above the doors facing to the waterway. When the doors are open on both sides of the living pavilion this allows for a view from the swimming pool across the waterway to a tee on the golf course, which does suit the owners very well.

The high roofs and the louvred gable-end aid the building ventilation. It has been found that the natural breezes which are present at any time are channelled through the two metre wide gaps which exist between the pavilions and through the two metre wide entrance tunnel to provide welcome cooling to the central courtyard. The building complex contains no glass in any of the exterior joinery frames.

Doors and windows are all sliding units, and each contain a set of aluminium louvres in place of the conventional glass. The joinery frames in the bedrooms also contain roll-down mosquito curtains. This

allows for the angle of the louvres to be adjusted to suit the occupants requirement for light and ventilation while also preventing access for insects. The bedrooms have been provided with air-conditioning units, but these have been found to be unnecessary for the majority of the year.

A roof material which provides adequate wind strength and protection from the marine atmosphere are important considerations in tropical design. A Colorsteel® metal roof provides these properties and also contributes bracing to the roof planes.
The high rainfall volumes which occur in the tropics make the use of simple roof forms which shed water a natural choice. Gutter blockages caused by leaf fall do not provide a serious problem when all pavilions have Colorsteel roofs with a 45 degree pitch which discharge to gutters which are located at the perimeter of the building.
The structure consists of a reinforced concrete floor slabs and concrete masonry walls, with a timber framed roof structure.
The roof structure is designed to cater for tropical wind pressures with a greater accent on tie down fixings than is the case in New Zealand conditions.
Specifically designed steel brackets connect each rafter to the top of the concrete walls. Patent galvanised steel angle cleats connect every purlin to the rafters.
The screw fixings for the Colorsteel roof are located at every rib on every purlin crossing to ensure a secure fixing.

The owners have constructed several houses in Auckland and in Mount Maunganui. Building in Fiji presents some interesting issues as there is no “building code” as we are accustomed to in New Zealand. ”In fact,” Garry says, “the control on quality is dependant on the insurance companies who insist on engineering reports and architectural qualifications to comply with their building criteria. For this reason more detailed construction supervision was required than is the case within New Zealand. ”
Ross supervised local tradesmen to carry out the construction of this house and after much concentrated work this has resulted in a new house of which they are very proud. Owners, Paula and Ross, have hosted many enjoyable functions around the pool including a recent 60th birthday party.

GLASGOW ARCHITECTS:

The principal, Garry Glasgow was an Architect at the Lion Breweries Architects department, designing hotel and accommodation facilities, bars and restaurants, prior to forming this practice in 1986. The practice which originally specialised in bar and restaurant design, is conversant with a great variety of building types.
Glasgow Architects has completed works including the design of upgraded facilities for a major hospital, design of commercial buildings, retail buildings, factory buildings, office buildings, horse studs and thoroughbred training facilities, as well as a wide variety of residential work.

Clients: Paula and Ross Greenville. Sovereign Quays, Denerau Island Fiji.

Designer: Gary Glasgow Glasgow Architects, Auckland Telephone: 09 360 4477. Email: gjglasgow@xtra.co.nz

Interior Design: Paula Greenville.

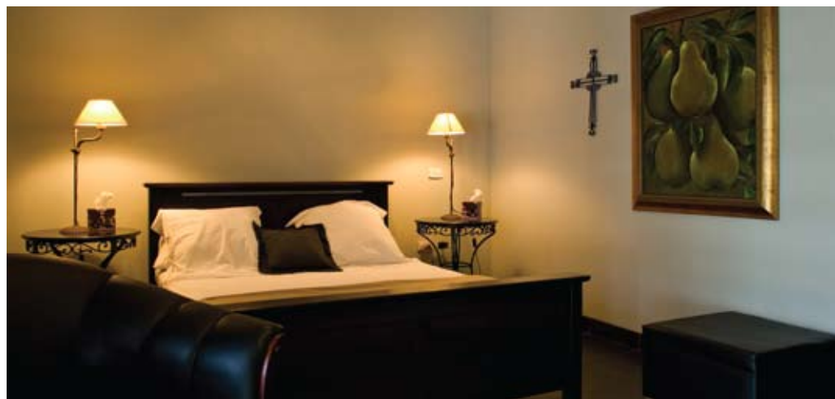
Builder: Ross Greenville.

Aluminium Joinery: Louvretec Products Ltd. Auckland Telephone: 09 415 4949 Email: info@louvretec.com

Roofing Manufacturer: Bluescope Lysaght (Fiji) Limited. Velovelo Navutu Lautoka, Fiji. Telephone: 679 666 1588 Email: sales@bluescopesteel.com.fj

Roof Framing: N Z Radiata Pine treated to H3.2

Photography: Meg Back Tokman Imagez Photography Fiji. Telephone: 678 672 5107



NZ POST AUCKLAND MAIL CENTRE

By Graham Hepburn

Changes to the way people are using the postal service were part of the reason NZ Post undertook a review of its operations.
The advent of email, the rise in internet shopping and the growth of courier services have radically altered the landscape.
Coupled with the company's desire for greater use of automated mail processing, it soon became apparent that NZ Post needed to upgrade and expand their mail sorting centres.

The company decided to upgrade three premises and build three new mail processing centres at Hamilton, Christchurch and Auckland.

The new mail centres would provide the company with purpose-designed premises, capable of housing new and more efficient mail sorting machines that could process up to 70 per cent of mail – as opposed to the 30 per cent automation the old machines were achieving. The decision was made to bring in six new sorting machines from Japan, with three going to the Auckland site.

The Auckland Mail Centre at Highbrook Estate in East Tamaki was the biggest project at 15,700sq m and with a processing hall of 8000sq m, about the size of two football fields.

Created with sustainability in mind by architects Warren and Mahoney, the Auckland Mail Centre was finished in June and shares a similar plan to its sister buildings, which vary only in size.

Warren and Mahoney director Peter Marshall says using the same model for all three centres created efficiencies for everyone involved.
"In essence, we saw that the form of the building was dictated by the need to find a cost-effective solution to New Zealand Post's needs within a tight timeframe. The function of the three buildings was the same, so in planning terms the same model was appropriate."

Time was of the essence due to the impending arrival from Japan of the new mail sorting equipment and installation teams.

Principal project manager David McLernon, from Octa Associates, says working with the same plan for three different buildings is "not the norm", but worked effectively for NZ Post.

"They wanted the same national design with a single architect and, where possible, national subcontractors as well."
In accordance with Warren and Mahoney's principles, the buildings were designed along sustainable lines, aiming for a four-star green rating.
Warren and Mahoney used an in-house matrix to analyse sustainable features according to cost, practicality, appropriateness, benefits and philosophical fit.
Marshall says while many sustainable elements can be introduced with little cost, achieving a high green rating can add up to five percent to the cost of a building. Although that cost can be regarded as an investment in the future. "In another generation, a building will depreciate more quickly if a good green rating is not in place."

Prominent acrylic panels at the entrances outline the building's sustainable features, which include unpainted Zincalume® cladding for the roof and Colorcote ® ZR8™ wall cladding.

The centre has an area where mail trucks drop off mail, which is then transferred to a staging area and taken by trolley into the large sorting hall. Offices occupy a mezzanine level. A draped curved Zincalume® roof gives a clean, modern profile.
A break-out area was created on the opposite side of the building from the cafeteria, to enable workers on that side to relax without having to trek across the vast floor.

To allow for more natural light in the processing hall – and a view outside during the day – one entire wall of each building is glass.
Inside, lights are zoned, with sensors, timers and switches to ensure lights only come on when needed.

Cheerful blocks of bright blue, green and orange help break up the large space.
"Getting the right colours was very important to the client," Marshall says. "Blue is associated with the process leaders area, and picks up the colour off the sorting machine, green is associated with relaxation in the cafeteria and breakout area, and orange signifies administration."
Post-tensioned concrete ensures a crack-free floor, critical in a facility where trolleys must be able to move smoothly. A perforated metal acoustic ceiling absorbs sound.

Other elements that contribute to sustainability and low maintenance include the use of solar water heating, low energy equipment such as dishwashers, fridges and light fittings, Environmental Choice paint systems, linoleum instead of vinyl wherever possible, and recyclable carpet tiles.
The buildings are not only sustainable but are also 'maintenance friendly' to allow NZ Post to concentrate time and money on their core business.

Warren and Mahoney

Established in 1958 as a partnership, Warren and Mahoney has grown over the years to become one of New Zealand's leading architectural practices. In that time the company has won many awards for its new buildings as well as refurbishments for large commercial and government organisations. Warren and Mahoney has become New Zealand's first accredited CarboNZero architects and has developed a plan that involves monitoring carbon emissions, lowering them where possible and encouraging staff to think about ways to reduce the company's carbon footprint. The firm is a founding member of the New Zealand Green Building Council (NZGBC) and has, over the last 10 years, become increasingly focused on environmentally sustainable design, developing protocols that cover materials, waste management and energy efficiency. Two recent projects involving Warren and Mahoney – the Meridian Energy building in Wellington, and the BNZ building in Auckland - became the first buildings in New Zealand to be awarded a 5 Star Green Star rating by the NZGBC.

Designers: Warren and Mahoney, Christchurch
Telephone: 03 961 5926
www.wam.co.nz

Construction: Haydn & Rollett,
Telephone: 09 444 7379

Roofing Manufacturer:
Roofing Industries, Auckland
Telephone: 09 414 4585
External profile: Maxispan® Zincalume®
Wall Cladding Manufacturer:
Roofing Industries, Auckland
Telephone: 09 414 4585
External Horizontal Profile: Multirib™ Colorcote® ZR8™ Pre-painted in Gull grey and Grey Flannel
Internal Vertical Profile: Ribline® Colorcote® ZR8™
www.roof.co.nz

Roofing and Cladding installers:
Steel Roofing Ltd.
Telephone: 09 415 8060

When New Zealand Post signed the Warren and Mahoney protocol, they committed to taking on, as a minimum, 12 significant items associated with environmental sustainability: As a result the three new buildings included many, if not all, of the following features:

1) Modelling of building to determine benefits/paybacks of insulation levels.
2) Horizontal shading of windows to office areas.
3) Maximising natural light to the processing hall with glazed wall, while taking into account low afternoon sun.
4) Roof lights to the staging and interchange area
5) Fast acting doors to the staging area.
6) Low energy light fittings
7) Zoning of lights, with sensors, timers, and separate switching as appropriate.
8) Natural ventilation wherever possible
9) Low energy equipment such as dishwashers, fridges
10) Solar water heating
11) AAA rated plumbing fittings
12) Rainwater harvesting for "grey water"
13) Permeable paving to selected carpark areas.
14) Recyclable carpet
15) Linoleum in lieu of vinyl wherever possible.
16) Sustainably sourced timber
17) Environmental Choice paint systems
18) Zincalume® unpainted roof
19) Ceiling tiles with high recycled content.
20) NZ manufactured hardware
21) Waste separation to kitchens; recycling
22) Rain gardens and drainage swales wherever possible
23) Bike stands for staff

THE ENCHANTING VILLA

By Graham Hepburn

The 3 acre site overlooks a gully with well established NZ native trees and ferns which Tony is passionate about preserving and regenerating. The building platform is excavated below the road level providing privacy and level areas surrounding the home

Computer aided design is a wonderful tool when it comes to building your dream home.
That's what Tony and Jackie Krzyzewski found when they began playing around with ideas for the home they wanted to build on a section they bought in Whitford about three years ago.
Their original idea was to create a traditional villa but then Tony, with the aid of 3D modeling, came up with a Plan B – a much more grand English colonial-style home.
Excitement was high about the new design – until the Krzyzewski's had it costed.

The site was excavated and the formal garden designed and planted by Jackie some three years before the building was completed. A huge undertaking for which Tony provided the "muscle power" moving hundreds of meters of mulch to improve the soil.

"It was going to be a $2 million build," says Jackie. "That's when we said, 'Well, what's wrong with our original plan of building a villa?'"
However, there was a problem that needed resolving first.
"One of the things I didn't like about villas was they always seemed to have a dead side of the house," says Jackie. "I wanted it to be pretty from every side so we ended up with five bay windows to get it the way we wanted it to look."
On top of that, a portico was also incorporated into the corner of the verandah that wraps around the living room.

The formal garden centre piece, an Italian marble statue and fountain, was one of the may treasures Tony and Jackie have "found" on their travels.

Tony, who works with computer systems, says the design took him about two weeks to work through and then he had a major breakthrough.
"I woke up one morning and I said, 'I know how to do this house now', and by eight in the morning I had a 3D model – it just all fell into place."

A natural choice for the roofing was corrugate with the Krzyzewski's opting for Colorcote® ZR8™ in Ironsand to tie in with the classic colours of the rest of the home.
Tony used computer modelling to "drape the roof" and the measurements were bang-on.
"Unless you get the roof right the house won't work," says Tony.
"It had to be corrugated iron and we wanted to get the roof all in proportion with the rest of the house so we opted for a steeper pitch of roof to give it some presence."
That steep pitch in combination with the home's 12 m width means that there's plenty of headroom if any subsequent owners wanted to add another level below the roofline.
The storeroom off the hallway has been designed so that it could be replaced by a staircase if someone did want to go up.

To maintain the classic villa look, the Krzyzewski's have used brick chimneys – from the roof up anyway – that shroud the metals flues of the gas fires.

Tony says the proportions of the rooms were "heavily defined by the bay windows because they're a builder's standard bay".
And then there was the matter of juggling the layout of the home.
"Because the house is 12m from back to front the biggest problem was trying to work out how to use the internal spaces," says Tony.
"So we created a service core that doesn't need natural light but all the other rooms have French doors or windows."

That service core comprises a study, walk-in wardrobe and storage room. The study backs on to the lounge and the couple has cleverly tucked all the audio visual gear and connections in the study that feed the likes of the flat screen TV and sound system, keeping the living spaces uncluttered.

The home has a 3m stud, with stained glass, decorative plaster coving, ceiling roses and mouldings throughout.

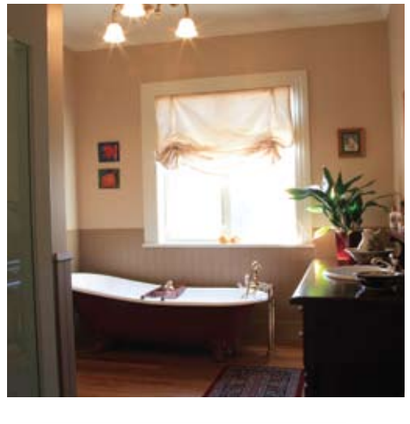
"We kept on adding layer upon layer of detail to the house and the house kept sucking it up," says Tony. "What you'd normally do is only have fancy stuff in the living room - then we thought we'd stretch it to the rest of the house."

The vestibule has tessellated tiles and archways inviting you down the two wide hallways – one that goes straight ahead past the kitchen to the master suite at the rear, while the other heads off to the right to a wing with the other two bedrooms. Tony says the home was also built in a traditional manner. "Everything was cut by hand the old-fashioned way," he says. "There was no pre-framing apart from the roof trusses."

One of the apprentices spent weeks cutting scriber boards for the weatherboards, and even the cat door in the internal-access garage has been custom-made, complete with architraving.

"The best compliment we received was when another builder visited the site and asked us how the restoration was coming along!" says Tony.

The only concession the couple made to modernity was having aluminium joinery installed for ease of maintenance. But even



that has been specified to match the proportions and style of its wooden counterpart to maintain the traditional villa look.

While the home also has CAT5 and video cabling to every room, you would never know as all the sockets are contained in old-fashioned-looking fittings.

The couple has sourced period furniture and reproduction fittings as part of their determination to make the home look traditional inside and out right down to the paint scheme. A container load of furniture and fittings – including the fireplaces – came from Australia where there is a huge demand for those character items because the Aussies love doing up their Federation homes. Jackie spent endless hours on the computer manipulating the placement of furniture within the floorplan to make sure there was a place for everything and everything was in its place.

This attention to detail is obvious in the living room and particularly in the opulent separate dining room, with its period furniture and a rich red and gold colour scheme.

Tony, who is the chef of the household, took command of the kitchen layout and fittings. A large pantry, island bench with pot hanger above it, granite bench tops and a hulking Rangemaster stove are features of the kitchen, which has wide rural views even as you labour over the dishes in the butler's sink. The home took 11 months to build but by the time that Jackie and Tony were ready to move in they had the garden pretty much complete. They had started landscaping the garden three years earlier, not long after they bought the section and when the house was finished they had turf laid and the house looked as though it had always been there. While Jackie and Tony swear they would never take on a build like this again, they still have the 3D sketches of that English colonial home sitting on the computer at home.

Designers:
Tony and Jackie Krzyzewski

Builder: Villa Homes
Telephone 0800 120 124

Manufacturer: Dimond
Telephone: 0800 346 663
Profile: Dimond Colorcote® ZR8™
Colour: Ironsand

Roofing installer:
Advance Roofing
Telephone: 09 818 5001

VALLEY DRAINAGE

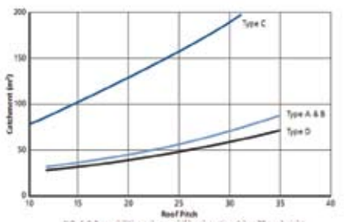
The Capacity Mystery solved

By Stuart Hayman
& Stuart Thomson.

Stuart Hayman has been involved with metal roofing for many years and until recently was Technical Development Manager for AHI Roofing Ltd. He is now a Roofing Consultant and is Chairman of the Technical Committee of NZMRM.

Readers of version 2 of the NZMRM Code of Practice will have noticed a new graph 8.4.5.1.showing the catchment increasing with the pitch for three valley types, which is believed to be logical. The COP recommends using these values instead of the two listed in E2/AS1.

With the pitch of the roof known the maximum catchment is determined from the graph.
The graph 8.4.5.1. has been calculated by allowing for 10mm freeboard and roof cladding interference.

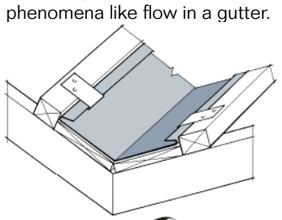


N.B. A & B capabilities only equal if hook section A has 20mm height
Type C recommended when roof pitch s <12°

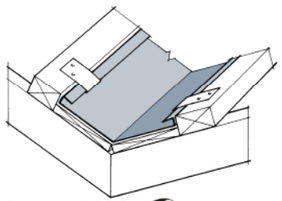
So how and why did this come about?

For decades NZ roof installers have used valley gutters to drain the intersection of two adjacent sloping roof planes on roofs of 12° or more without any concern about the catchment being drained. This has been reasonable because cases of valley gutter flooding have only occurred when blocked by debris. The assumption has been made that the slope of the gutter allowed water to run away more quickly than it could accumulate and empirical tests have shown virtually no limit to capacity up to a rainfall of 100mm/hr.

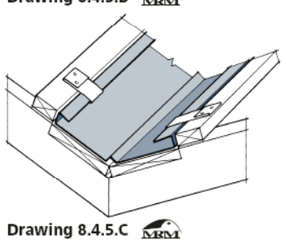
Empirical testing means the combination of science, observation, measurement and guesswork which typifies engineering research into very complex real-life, real-time phenomena like flow in a gutter.



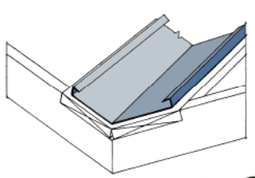
Drawing 8.4.5.A



Drawing 8.4.5.B



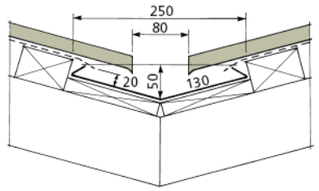
Drawing 8.4.5.C

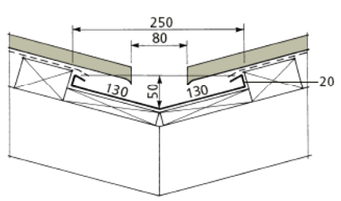


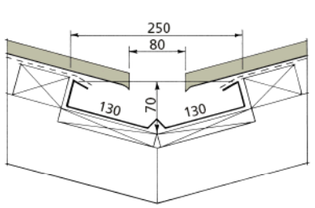
Drawing 8.4.5.D Metal tile

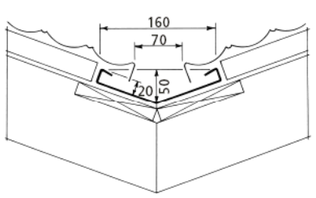
When E2/AS1 was published in 2004 the Roofing Industry was surprised and alarmed to discover that conservative limits had been placed on the catchment area permitted above valley gutters, with no consideration given to different roof pitch or capacities.

Table 8 of E2/AS1 quotes the maximum catchment area for the two commonly used valley gutter widths -160 mm for metal tiles and 250 mm for metal cladding and concrete tiles, to be only 16 m² and 25 m² respectively, regardless of roof cladding type or pitch, or gutter profile.
This erroneously implies that the width of the gutter is the determining capacity factor instead of the cross-section. Metal tiles have always used a narrower gutter because they are turned down into the valley, reducing the possibility of side splash.









However E2AS1 has a "let-out" comment which says "Gutters for lower pitched roofs or for catchment areas other than those shown … shall be specifically designed. Additional information may be found in the NZMRM COP

From section 8.4.5.of the COP

So, why is this? Where does this information come from?

The answer is that it is the end of a bit of detective work as Stuart Thomson would say, however, this one is definitely a "Cold Case", going back over 60 years, and the answers have been sitting there for anyone to discover.

The chronological history is very interesting.

■ 1939, F.E.Camps takes a scientific/engineering look at water flow in flat box gutters and finds them a very complex system.
He derives empirical equations describing the flow in and capacity of box gutters with less than a 1° slope, vertical sides and a flat bottom.

■ 1968, Messrs Martin and Tilley publish work previously done on the same topic for CSIRO in Australia. They worked on flat box gutters with a slope of 0-3° having discovered that Camps' equations didn't work over about 1°.

■ They also worked on sloping valley gutters, and set up a small sloping test roof to measure the flow rate and water height in the gutter for different slopes, shapes and inflows A picture of the test rig is appended.

■ 1995 Simon Beecham et al did similar work at Sydney University and used computers to attempt a more accurate model of the real situation in drains and gutters.
They confirmed the Martin and Tilley work – i.e. flow in sloping gutters is a factor of slope and gutter shape and size

■ 2005 E2/AS1 was published including the restrictions on valley catchment. Investigation showed that the basis had been AS 3500.3:2003. As a result copies of the Martin and Tilley report and Simon Beecham's work were obtained from Australian sources and the investigation began.

■ 2007. NZMRM COP adds a catchment graph 8.4.5.1.based on the work of Martin and Tilley report and Simon Beecham's work and recalculated for New Zealand by Stuart Hayman. To have arrived at the conclusions published in the COP considerable research and investigation was necessary and is available for those interested.

AS/NZS 3500.3:1998, and possibly earlier versions, included an example of a valley with 12° pitch and gave widths for different rainfalls which appears to have remained unchanged for 40 years.

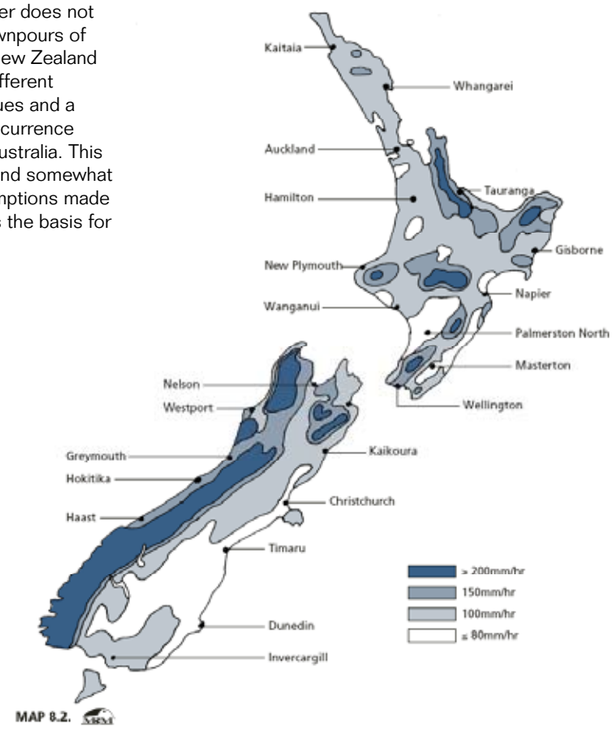
Although AS 3500 is an Australian Standard (with some parts joint with New Zealand), it has become the default document for New Zealand design.
New Zealand however does not have the tropical downpours of Australia and so in New Zealand Standards we use different maximum rainfall values and a different Average Recurrence Interval (ARI) from Australia. This confuses the issue and somewhat invalidates the assumptions made by using AS 3500 as the basis for NZ gutter design.

COP 8.2.
When calculating roof drainage where significant inconvenience or injury to people or damage to property, including building contents is unlikely the Average Recurrence Interval (ARI) used must be 10 years. e.g. due to an overflow of external eaves gutters.

When calculating roof drainage where significant inconvenience or injury to people or damage to property, including building contents is likely the Average Recurrence Interval (ARI) used must be 50 years. e.g. due to an overflow of internal gutters.

This has led to the historically rather confusing use of a safety factor of 2 by using 200mm/hr instead of 100mm/hr as in New Zealand the maximum rainfall for internal gutters.

The basis for establishing the gutter size used in the COP was on cubic capacity using the Martin and Tilley work not on width although a recommendation is made that the box gutter proportion of width to height be 4:1.



MAP 8.2.

Using the design methodology adopted in the COP section 8 for roof drainage, factors are applied to catchment, pitch and cross-sectional area.

A valley gutter is defined in the COP as: A gutter at the internal intersection of two sloping planes of roof cladding where the roof pitch is 12° or greater.

The aim of previous researchers was to determine the input levels at which the water level in the gutter exceeded some safe level (freeboard) and risked overflowing the sides.
For a flat gutter this is determined by the type of outlet but with valley gutters the outlet is always an open weir which is almost impossible to flood.

As may be imagined, the flow pattern along a valley gutter with sloping sides and inflow increasing along its length is very complex and in pre-computer days researchers struggled to derive any scientific equations from this work.
The Martin and Tilley equations use the rainfall, gutter cross-section, width and slope to determine the carrying capacity which enables calculation of catchment over quite a wide range of pitches by inputting these factors.
Although this allows graphs to be generated for a specific gutter shape and fixed rainfall it does not allow production of a simple catch-all formula.

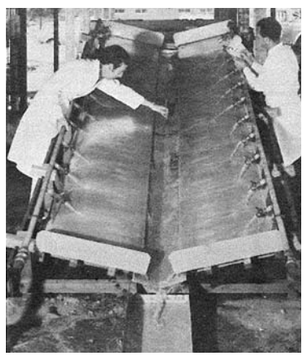
The E2/AS1 figures more or less comply with the AS 3500.3 Section 3.6 but are at the extreme conservative end of the range and do not allow for the different shape of NZ valley gutters or for any of the other four variables.
The COP published graph is still considered conservative.

A given valley gutter shape changes profile as the roof pitch increases which increases the carrying capacity.
However the secret is now out and the COP provides you a calculated reason not to use the limitations in E2/AS1. This does not decrease the validity of the cautions in E2/AS1 about change of direction in the plan view, or changing valley pitch along its length. Either of these significantly increases the risk of overflow and requires special gutter design if this is to be avoided.

The COP provides one example with the bifurcated gutter over a porch, 8.4.5.2. but other modifications can be designed to be used in other non-standard circumstances.

What doesn't make sense is the obscurity of this knowledge and information surrounding valley gutters. AS 3500 and E2/AS1 provide copious graphs and information about sizes and flows and distribution for eave gutters, downpipes and rainfall – yet only a single reference for valley gutters. All this information has been present for decades and using the equations is not difficult and produces usable graphs with some calculation. Generating multiple graphs as are provided in AS 3500 for external gutters would not be difficult.

Even if the data and equations need checking or updating it would not be difficult or particularly expensive. Some of us would love to do it, so who would like to pay for a research project into this topic?



The original picture from the Martin and Tilley report shows one of the investigators measuring the height of water in the valley gutter on the test rig.

DURABILITY

By Graham Hepburn

You only need to look about you for evidence of New Zealand's long and unbroken love affair with metal roofing.
Alongside weather board villas from the early 1900s with their corrugated iron roofs you'll often see modern townhouses with standing seam roofs or brick homes topped with metal tiles. Corrugated iron has also become popular as a cladding with people who are after a certain look.

The reason for this is not only metal roofing's versatility but also its durability.

That's evident in some of this country's oldest buildings such as some farm buildings in Matanaka in Otago which still have their "patent galvanized tinned iron" roofs that went on in 1843.
The Camphouse on the slopes of Mt Taranaki is another example. It was built in the 1850s and shifted to its present site at the end of the North Egmont Road in the 1890s. While the roof has blown off a couple of times, the original galvanized iron walls remain and are in excellent condition.

Left: Cottages in South Street, Nelson built around 1863
Below: Farm buildings in Matanaka, Otago built in 1843 are one of the oldest examples of galvanised corrugated iron roofing.

And since these buildings were erected, technological advances have improved the durability of metal roofing, especially in the last 30 years. This significant improvement in durability is what makes metal roofing a sustainable option – as it will not have to be replaced for generations.

One of the major breakthroughs was the advent of longrun roofing in the 1960s, meaning roofs could be made from cut-to-length sheets rather than having shorter length sheets lapped together, which invited corrosion problems and made them harder to maintain.
Advances in durability also came on several other fronts: most notably the move from zinc-coated (galvanized) steel to a combination of zinc and aluminium (Zincalume®) that gives the steel a greater lifespan than before.
Manufacturers also began making long-run roofing from high strength steel coil, which is about twice as tough as the softer steels that were previously used in roofing and cladding.

At about the same time as these developments, manufacturers were also investigating colour-coating steel coil which could then be turned into ready-painted steel rollformed into a range of shapes
Improvements in paint technology mean products such as ColorCote®, made by Pacific Coilcoaters, COLORSTEEL®, made by New Zealand Steel, and Gerard Roofs made by AHI Roofing, provide robust cladding and roofing that will cope with the harshest environments.

Just as the bodies and chassis of cars have benefited from improvements in paint technology and the substrate itself, so have roof metal roofs.

Cars were once prone to rusting out before their time but now the bodies of modern cars outlast the other parts. So it is with metal roofs: while they might have a nominal 15-year guarantee, for example, they are manufactured to such a standard that they should easily exceed those expectations.

The improved lifespan of metal roofing and cladding has also been helped by a better understanding of design and knowledge of the materials themselves. It's important to distinguish between the right style of product for a roof and what will work best as cladding – they are often two different things.
Because metal roofing and cladding benefits from regular washing by rain, it's always best to resist using metal wall cladding – unless it's aluminium - where it won't get rinsed down from time to time. While it's fashionable to run the lines of corrugated iron horizontally when used as cladding, orienting them vertically – although maybe not so aesthetically pleasing - natural rain washing which helps the material last longer.
There's also a need to make sure you're using the right product for the environment – especially in tough conditions such as coastal situations or ones where there's geothermal activity. Being aware of any extreme conditions and choosing the correct product to withstand them is essential to the longevity of the roof.
Getting the best out of your metal roof also depends on using it in combination with the right materials and fixings according to the correct specifications and industry practice.

Architect: Jonathan Hawksworth.
Photographer: Brent Parsons

Durability is also enhanced by regular maintenance such as washing and keeping paintwork in good condition – the same sort of thing people wouldn't give a second thought to when looking after their cars.

With technology, design and good maintenance there's no reason the metal roofs and claddings of today couldn't be around for generations to come.

Historic photographs were provided by Stuart Thomson, author of "Wrinkly Tin". The story of Corrugated Iron in New Zealand. Copies of this insightful history can be purchased directly from Stuart Thomson: swthomson@clear.net.nz

INNOVATION BENEFITS WHANGAREI GIRLS' HIGH SCHOOL'S FACILITIES

Because many schools were built prior to the current building standards the New Zealand Ministry of Education, in 1998, undertook a nationwide structural survey of all school buildings throughout the country. The result of the survey identified high priority work which was to be completed by 2001 and would further allow education Boards of Trustees to rectify any other building defects, which failed to meet their requirements, in each school's 10 year property plan. The purpose of the survey was to identify specific structural defects that could potentially cause death or serious injury during wind or earthquake or every day loadings. As well as buildings, site structures such as retaining walls were also checked.

Geoff King, of Designgroup Architects H+K Ltd in Whangarei, has had a 15 year association with the board of Whangarei Girls' High School and has an extensive appreciation of the history of the school and the future requirements. In 2002 the Ministry's survey identified remedial seismic work required to strengthen the school buildings and allocated approximately 1.1 million dollars to complete the work. Working closely with the school and engineers, Duffill Watts and King Ltd, the conclusion reached was that the majority of structural work to strengthen the walls was required in order to support the heavy clay tile roof. By removing the clay roof and replacing it with a metal roof (considered lightweight under the building code) the strengthening required was reduced to selective areas. This solution had the benefit of significantly reducing the cost of the work required.

The School wanted to retain the aesthetic appeal of the original building and to achieve this

Architects H + K chose Gerard Roof's Tuffcoat Tile in Marseille Clay. The lightweight nature of the tile solved the weight issues and provided the aesthetic appeal. In addition to this the horizontal fixing of the tile provides additional integrity and security in high wind applications.

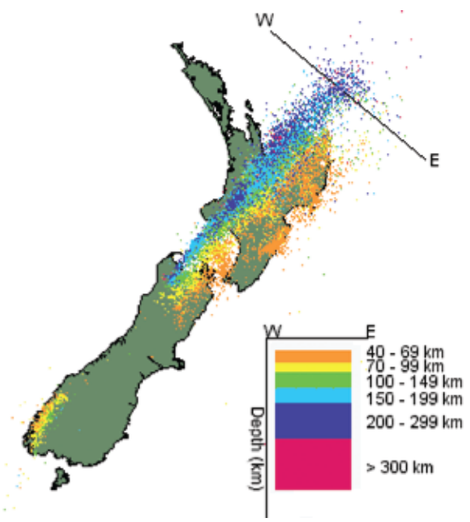
This innovative approach and collaboration between architects and engineers resulted in a saving of over 500,000 dollars that the school was then able to use in an extension to their existing gymnasium.

Whangarei Girls' High is, by any standard, a very large building complex first built in 1920. The majority of the buildings are two stories with parts being three storied. Because the school has been built in various stages over the years some aspects connecting the building were also able to be resolved improving undercover foot traffic between levels and buildings. As an apprentice builder Ian Douglas (formerly from Douglas Roofing) worked on these buildings and during the re-roofing project was able to find both his name and the date which he had carved into rafter some fifty years before.

The roof area covers 2800 square meters requiring 5800 Gerard Tuffocat tiles which were supplied and fixed by Douglas roofing Whangarei. The new Gerard roof weighs 12.76 tons compared to the estimated weight of clay tiles removed at 70 tons. This represents a weight saving of approximately 57 tons reducing the need for major structural change. Removing the clay tiles and replacing them was a huge task which was done in stages over a ten week period to ensure that the function of the school was disrupted as little as possible. The clay tiles that were removed were loaded into trucks using a Geda rubbish chute. The roof height ranges between 8 and 12 meters which required 2000 face metres of edge protection scaffolding including loading platforms and the Geda chute. These were all supplied and erected by Northland Scaffolding.

Earthquakes.

New Zealand lies on the boundary between the Pacific and Australian tectonic plates which basically follow the country's mountainous areas, diagonally from east to west. The eastern areas of this divide generally experience shallower earthquakes than the western areas as indicated in figure 1. It is estimated that between 100 and 200 earthquakes are significant enough to be felt each year. Most earthquakes which cause damage are of a magnitude of 6+ and we generally experience one of these per year. A magnitude of 7 occurs about every 10 years and a magnitude of 8 about once a century. The largest known earthquake in New Zealand was the Wairarapa earthquake in 1855 which was an estimated magnitude of 8.2. The biggest New Zealand earthquake since instrumental recording began was the 1931 magnitude 7.8 Hawke's Bay earthquake with a death toll of 256. New Zealand is fortunate that whilst experiencing earthquakes in a similar Richter scale range to other countries we have not suffered similar loss of life. Much of this comes down to three factors. The standards of our buildings and building code, the low density of our population and for want of a better expression, "luck".



Wind.

The “wind uplift” performance of roofing products is becoming an increasingly important factor in New Zealand as more and more people build on sites that take full advantage of our undulating topography and coastal environment. All Gerard roofs feature interlocking tiles secured in place with a unique horizontal fastening system. The result is a very strong roof with superior wind resistance, which allows specification in very high wind zones. High winds blowing over a roof cause a difference in air pressure between the inside and outside of the roof. The stronger the wind, the higher the pressure differential. This results in “wind uplift” perpendicular to the roof which is the primary cause of failure in roofs with vertical fastenings. In this instance the clay tiles were fitted with vertical fastenings.

Designgroup Architects H+K Ltd.

Architects H+K is a member of Designgroup New Zealand Ltd, an association of architectural practices located throughout New Zealand. Members have the ability to call on a range of specialist services and extended resources available to benefit their clients.

Designgroup architects h+k offer specialist and personal service in the fields of architecture and resource management. The 10 team members have extensive knowledge in areas of healthcare, education, commercial, residential, interior design, town planning and project management and have a commitment to excellence in design and project delivery.

Over the last 22 years they have established a reputation of providing sound architectural services to a wide range of clients that includes Government departments, state owned enterprises, local authorities, hospital boards, school boards and other industrial and commercial organisations, while also providing an extensive service in residential architecture.

Designer:
Designgroup Architects H+ K Ltd
Whangarei
Telephone: 09 438 8426
michelle@ahk.co.nz
www.ahk.co.nz

Engineer:
Duffill Watts and King Ltd,
Telephone: 09 630 4882

Roofing Manufacturer:
Gerard Roofs
Profile: Gerard Tuffcoat
Colour: Marseille Clay
Telephone: 0800 104 868

Roof Installer
Douglas Roofing
Whanagrei
Telephone: 09-438 8485

SCOPE NEWS AND VIEWS

Greg Goodall wins iPhone

Architectural designer, Greg Goodall, at a well maintained Colorsteel Motueka beach front house constructed in 2004. Greg was the lucky winner of our questionnaire draw for the new iPhone GSP. The Marketing committee for The MRM thank all those who took the time to complete the questionnaire which has given an insight into future Scope content and confirmed a significant swing toward the use and acceptance of the MRM Code of Practice (COP).

For those who still do not have a copy of the COP we remind you that it can be down loaded free of charge from the MRM website. www.metalroofing.org.nz

Auckland Motorway:

The development and upgrade of the Grafton Gully Interchange and Newmarket Flyover, in 2003, was an extensive project undertaken by Fletcher Construction .

The central theme of the concrete block work was the harbour view of Rangitoto Island. Metalcraft Roofing along with Taranaki Engineering were involved in the construction and installation of motorway screens to the Newmarket off ramp.

The project specified Corrugate 0.90 ARX, using three different colours, French Grey, Transformer

Grey and Gull Grey. The 5 meter sheets of Corrugate profile were used to fit the motorway curve both horizontally and vertically.
ARX was chosen because of its durability and the PVF2 paint system used to coat the aluminium. All cutting was carried out at Metalcraft Roofing in East Tamaki, with the finished sheets transferred to site on a nightly basis. The requirement for no off cuts or sheet tailings on site was essential.

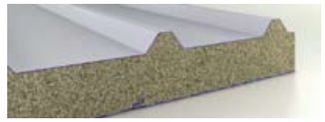
Due to the nature of the project and the requirement for the motorway to be open during installation work was undertaken at night. The weather was a major factor, with not only clear skies but also low wind required given the location of the installation and the potential for catastrophe should something go wrong.

The finished product is a unique application of Corrugate profile roofing resulting in a truly unique feature wall to the Auckland Motorway system.

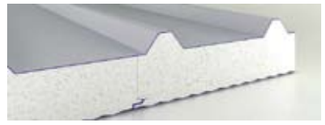
Metalcraft Insulated Panel Systems offer a comprehensive range of insulated panels

The application of insulated panel is becoming more prevalent within the New Zealand construction market. Metecno NZ Ltd trading as Metalcraft Insulated Panel Systems specializes in the manufacture, supply and installation of insulated panels. Their range offers a number of insulated panel solutions for a variety of end use applications - from Industrial and Commercial Cool stores to Agricultural and Architectural buildings.

MetecnoSpan panel system incorporating a trapezoidal external roofing product manufactured in 1000mm cover panels for roof systems with a minimum pitch of 3 degrees. Unlike single skin metal roof profiles, the strength of panel construction permits exceptional spans requiring fewer structural supports.



ThermoSpan FR consists of a 0.59mm profiled roofing sheet bonded to a Phenolic Polystyrene, PPS core, with a ceiling panel sheet bonded to the underside.



ThermoSpan EPS consists of a 0.59mm profiled roofing sheet bonded to an EPS core with a ceiling panel sheet bonded to the underside. ThermoSpan EPS does have fire retardant properties but is not fire rated.

Flameguard™ panels consist of a core of mineral wool fibreboard with steel faces either side. The metal faces of the panels have interlocking tongue and groove joints on the long edges. The mineral wool core is made from basalt and other naturally occurring rocks which are melted and spun into fibreboard. Mineral Wool is classified as a non combustible building material, is chemically inert and has a melting point in excess of 1000 degrees celsius.

Ardmore Water Treatment Plant Pump House is an example of the use of this innovative product.

The pump house is clad and roofed in ThermoSpan FR. A 75mm thick panel was used on the roof and a 50mm panel installed to the walls. ThermoSpan FR has a Polyphen core, which has excellent fire resistant qualities and given the size of the pump house installation was extremely quick . The finished product gives the appearance of a standard single skin roof and cladding combination whilst providing the excellent insulating and fire resistant properties associated with the Polyphen core.

In addition to the products shown Metalcraft Insulated Panel Systems have a compatible range of insulated internal and ceiling panels. *For full details please visit the website at: http://www.metalcraftpanels.co.nz/ or call on (09) 262 0267.*

BUILDING A LANDMARK

The residential building industry has seen some tough times over recent years with many home owners and suppliers being left in a dilemma. It is within this climate of uncertainty that Landmark Homes have been able to build a reputation for stability, trust, value and excellence in the mid to top end of the residential building market.

appeal. The muted tones of the Linea weatherboards contrasts with the texture and colour or the Gerard Senator Shingles. The combination and style is specifically intended to give a timeless appeal which will not date and is suited to both urban and rural locations. Whilst Landmark use a variety of roofing materials in their designs the profile and texture of Gerard Senator shingle compliments the aesthetics of the “Akaroa” design. The use of lightweight Gerard Senator Shingles has several other benefits. First is the National distribution network and the range of profiles and textures offered. Second is the 50 year warranty offered by Gerard and the back up of their installer guarantee. And last but not least is the design flexibility and freedom offered by

As a group, Landmark Homes have a national network for preferred suppliers and a variety of local and national architects and designers who contribute to their design and build portfolio. The “Akaroa” design show home, at Karaka, illustrates the high standards that can be achieved and at price that represents exceptionally good value in the New Zealand market.

The 628 square meter site dictates the overall concept of this home designed to show potential home owners what can be achieved on a relatively small land area. The site slopes slightly towards the road giving elevation and imposing street

using lightweight roofing materials which allow greater spans, such as those in the family area, without having to use valued resources to provide additional structural support to the roof.

The sweep of the drive is generous allowing plenty of parking for guests and easy access to the double garage. Residents of the home can enter directly through the garage or the front entrance. The front entry is designed to welcome guests but also to provides privacy to the family area when answering the door. The kitchen, forming part of the open plan family area, is directly adjacent to the entry with a view of the driveway and a short distance from the car parking for convenience when bringing in family provisions. The island buffet bench increases work space in the "state of the art" kitchen and provides a handy area for breakfast and a chat while meals are being prepared. For more leisurely comfort there is a window seat opposite the kitchen which captures morning and afternoon sun.

The family area combines an informal lounge the kitchen and dinning area. The windows and french doors providing plenty of sunlight making it a warm and inviting place for family and to entertain friends. The spacious and warmth of the area is inviting. The flow of the heated tiled floor connects these traffic areas with an optional inset carpet area defining the family lounge. The central feature of the informal lounge is a two way fireplace which provides heat and ambiance to this and the formal lounge beyond.

The formal lounge and the study open directly off the family area eliminating extensive hallways. The inclusion of the study /computer area is specifically positioned to include, rather than exclude, anyone working or surfing the net. Something that families of today use constantly which has been recognised by the designer and this handy location enables parents to keep a watch full, but discrete, eye on the kids or to just stay in touch with the family when working.

A quiet space behind the family room is set aside as a formal lounge and alternative TV viewing option. This area opens onto the exterior deck adjoining the dinning room making it ideal for indoor door/ Outdoor living during summer months.

To the left of the entry is access to the two double bedrooms, separate bathroom, utility area and garage.

Directly off the family room is the central stairway to the master bedroom, the ensuite and walk in wardrobe. The location of the master bedroom is a private space away from the rest of the home but, being directly above, still within reasonable contact with children's rooms and family life. The Master Suite is best described as being divided in two. By any standard this is an impressive space which has been well thought out and extremely functional. Reasonable to say it provides the wardrobe space most women dream of... but seldom get.

The overall impression in this family home is one of space, light and comfort. The design is well considered and the attention to details has been thorough.

This is to the credit of Harry Harris, Director of Landmark homes Counties, who says "Every home I check personally, I'm something of a perfectionist and we have worked hard to build a reputation for excellence and value in the market. Our reputation and integrity is our most valued asset particularly in today's building market. Building quality homes is my passion and we only use the best tradesman with proven experience and workmanship. One of Landmark's features, and perhaps the most important difference, is that the company stands by a guarantee to design and build to meet the agreed budget. Landmark Homes also offer a Seven Year Masterbuild Guarantee on every home they build, anywhere in New Zealand."

Whilst the company offers a range of about 40 "ready to build" building options all plans can be customised to suit individual tastes and budgets. The designs are presented in a free "Landmark Homes" book or can be found on the internet together with the nationwide network. They also offer a design service from a variety of architects with whom they have established well defined working relationships.

Design: Landmark Homes.
Landmark Homes have offices and show homes throughout NZ.
Details available on their website

Contact: Harry Harris
Telephone: 09 237 1124
Email:harry.harris@landmarkhomes.co.nz
www.landmarkhomes.co.nz

Roofing Manufacturer:
Gerard Roofs
Profile: Gerard Senator Shingles
Colour: Eclipse textured finish
Telephone: 0800 104 868
www.gerardroofs.co.nz

Roof Installer
Harvey Roofing Centre Auckland
Branch Manager – Alan Wilson
Telephone 0275 789 021

NORTHLAND CRICKET SPIRE PAVILION WHANGAREI

By Graham Hepburn

When Northland Cricket relocated to a new home ground five years ago, it paid tribute to the game's past with the design of its headquarters but had a firm eye on the future.

The move to a new ground was spurred by a review of the district plan by Whangarei District Council that identified Cobham Oval as prime land for commercial development. The council asked the Northland Cricket Association (NCA) if they would consider relocating to reclaimed land adjacent to Okara Park, the home of Northland rugby.

NCA chief executive officer Gary Bell says they seized the opportunity to create a first class ground from scratch at the new Cobham Oval and wanted to build an "iconic" headquarters.
"We wanted something special that symbolises cricket," says Bell of the ground's pavilion, which is modelled on The Pavilion at Lord's cricket ground, the spiritual home of the game, in London.

"It would have been easier to build something that didn't have as much character; we would have got more bang for our buck," says Bell. "But now we've got an iconic building in Northland and no one else around has got anything to rival it."
The building also reflects the long history of the NCA, which has been administering cricket from Warkworth to Kaitaia since 1927.

Just like The Pavilion at Lord's, the Cobham Oval building has two towers with a "Long Room" in the middle. The scorers sit in the righthand tower with a view of the scoreboard, while commentators sit in the lefthand tower which looks almost straight down the wicket.

"We've had former international players John Wright and Glenn Turner here and they are just blown away by the Spire Pavilion," says Bell. "You walk out into the middle and look back at the pavilion and it is just outstanding."

Below : As well as catering to the club the facilities provide the residents of the Whangarei area with a venue for many social events, weddings and conferences.

the build-up to the cup. The ultimate prize would be a pool game in the cup itself.

But to host international teams that means having the ground certified by the ICC and to do that Cobham Oval will need to provide larger changing rooms to cater for the bigger international squads.

Bell says the new changing rooms will be built adjacent to the Spire Pavilion and take the form of something similar in style to a large Queensland homestead with wide verandahs.
"It will have a rolled verandah out the front and look more like a Queenslander," says Bell. "The players will enjoy and appreciate the environment we are creating"

The NCA is also making progress on increasing the ground's capacity by forming embankments and providing an area for corporate tents.

Cobham Oval hosted 21 days of first class cricket in the past season but that is just the beginning for a ground that is being geared to create the perfect atmosphere for international cricket.

The classical lines of the building are complemented by the HiRib500 profile of the COLORSTEEL® Endura, roof which also tops off the towers. The dark roof also provides a nice contrast to the building's mostly cream-coloured exterior.

While the design might look effortless and elegant, it presented considerable challenges for Ian Butt of HB Architects, based in Whangarei. Because the concrete building is sited on reclaimed land that had been occupied by a sawmill and a dump, it is lifted to provide an airspace to allow ventilation for escaping methane gases.
The foundations are 25m deep piers and the cricket pitch was excavated to a depth of 6m and filled with clay.

The Spire Pavilion has two reception areas, a commercial kitchen, players facilities and lounge, incorporating a viewing deck, media, commentators and umpire areas.

The ground floor is occupied by changing rooms, a player's dining room, kitchen and offices for Northland Cricket Association.
The first floor lounge seats up to 150 people and can cater for conferences, weddings, community groups and trade shows.
Cobham Oval also has a modern indoor training and coaching facility in the Mark Cromie Holden Indoor Center adjacent to the pavilion, and high quality outdoor coaching and practice facilities.

While NCA is rightly proud of the Spire Pavilion, the signature building is just part of the plan to host internationals in the future – and the NCA has targeted the 2015 Cricket World Cup as well as hoping to one day bring test cricket to the ground. With New Zealand sharing hosting rights in 2015, Bell says the NCA is hopeful of attracting some of the international teams to Cobham Oval to practice or play "friendlies" in

Ian Butt, HB Architects

Ian has worked as an architectural designer in Whangarei for 24 years, employing up to seven staff. His experience takes in design, documentation and project observation of residential, multi-unit housing, commercial and industrial projects. He is a director of HB Architecture, which was formed in 2007 and aims to produce elegant architecture using proven building techniques and cutting edge technology. HB Architecture tries to combine function and aesthetic value to produce enduring architecture that is in harmony with nature and ecological principles.

Designer: Ian Butt
HB Architects. Whangarei
Telephone: 09 438 9545

Builders: Hill Construction Ltd,
Telephone: 09 438 6137

Roofing Manufacturer:
Steel & Tube Roofing Products
Profile: HiRib500 COLORSTEEL® Endura 'Grey Friars'.

Roof installers: Card Roofing
Telephone 09 430 3320

For further information on Metal Roofing or Cladding or details of any of the articles which appear in this publication please contact any of the members listed below.

Members of the NZ Metal Roofing Manufacturers Inc.

A Ellery & Sons Ltd
PO Box 178
Greymouth
Telephone: 03 768 5029
Contact: Clark Ellery

AZKO Roofing Limited
41 Shakespeare Road
Christchurch
Telephone: 03 365 9808
Contact: Maurice O'Flaherty

Brockelsby Roofing Products Ltd
49 Rutherford Street
LOWER HUTT
Telephone: 04 566 1971
Contact: Malcolm Smith

B J Moss Ltd
PO Box 1007
Gisborne
Telephone: 06 867 1219
Contact: Roger Moss

B R Roofing & Walling Co Ltd
Ford Road
Onekawa, Napier
Telephone: 06 843 6968
Contact: Phillip Fendall

Besalon Industries Ltd
PO Box 58325
Greenmount, Auckland
Telephone: 09 278 3610
Contact: George Ling

Calder Stewart Industries Limited
PO Box 1400
Invercargill
Telephone: 03 214 5544
Contact: John D'Arcy

Continuous Spouting New Zealand Ltd
PO Box 151
Takanini, Auckland
Telephone 09 268 1555
Contact: Richard Mabin

Contour Roofing Nelson Ltd
PO Box 9015
Annesbrook, Nelson
Telephone: 03 546 4260
Contact: Dave Freeman

Dan Cosgrove Ltd
PO Box 211
Timaru
Telephone: 03 688 4169
Contact: Brian Cosgrove

Dimond
PO Box 22201
Otahuhu, Auckland
Telephone: 09 526 8885
Contact: Gregg Somerville

Franklin Long Roofing Ltd
PO Box 151
Pukekohe, Auckland
Telephone: 09 238 9249
Contact: Warren Oliver

Freeman Roofing Nelson
Roofline Marlborough Blenheim
Canterbury Long Run Roofing Timaru
Canterbury Long Run Roofing
Ashburton
P.O. Box 2317
Stoke, Nelson
Telephone: 03 5443108
Contact: David Hall

Gerard Roofs
PO Box 18071
Glen Innes, Auckland
Telephone: 09 978 9043
Contact: Grant Williams

Gutterzone NZ Ltd
PO Box 22400 Khandallah,
Wellington 6035
Telephone: 04 232 2368
Contact: Will Lewis

HB Longrun Ltd
PO Box 3056
Napier
Telephone: 06 843 6159
Contact: Chris Patheyjohns

Marshall Industries Ltd
PO Box 846
Invercargill
Telephone: 03 218 2579
Contact: Peter Marshall

Megami Metal Roofing Systems Auckland Ltd
PO Box 113
Takanini, Auckland
Telephone: 09 268 8959
Contact: David Moselen

Metalcraft Industries Limited
PO Box 51286
Pakuranga, Auckland
Telephone: 09 274 0408
Contact: Tony Barbarich

Metal Design Solutions
PO Box 33
Drury, Auckland
Telephone: 09 294 9134
Contact: Jan Alberts

Metrotile (NZ) Ltd
PO Box 72-062
Takanini, Auckland
Telephone: 09 299 9498
Contact: Harry Boxall

N S Irwin Ltd
PO Box 27029
Mt Roskill, Auckland
Telephone: 09 620 8149
Contact: Gary Irwin

Roof Manufacturers Limited
PO Box 319
Tauranga
Telephone: 07 578 2650
Contact: Gordon Taylor

Roofing Industries Ltd
233 Bush Road
Albany, Auckland
Telephone: 09 414 4585
Contact: Paul Ross

Roofline Products Ltd
PO Box 16302,
Christchurch
Telephone: 03 349 8439
Contact: Colin Megaw

Silbery Long Run Ltd
69 Montgomery Crescent
Upper Hutt
Telephone: 04 526 9343
Contact: Angie Silbery-Dee

Steel and Tube Roofing Products
PO Box 259 019
East Tamaki, Auckland
Telephone: 09 273 7628
Contact: Rod Newbold

Stratco (NZ) Ltd
PO Box 8494
Christchurch
Telephone: 03 338 9063
Contact: Mark Moore

Taranaki Steelformers Ltd
Wanganui Steelformers
King Country Longrun
PO Box 36
Stratford
Telephone: 06 765 5191
Contact: Darrell Back

The Architectural Roofing Company
PO Box 8052
Hornby, Christchurch
Telephone: 03-3445991
Contact: Bruce Gibson

SCOPE
Scope is the official publication of the N.Z. Metal Roofing Manufacturers Inc..
http://www.metalroofing.org.nz