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SCOPE

NZ METAL ROOFING MANUFACTURERS INC.

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Below is a brief introduction to the 2021 executive of The Metal Roofing Manufacturers Inc. It is intended that Scope be representative of the Metal Roofing and Cladding Industry in both commercial and residential sectors. Your submission of material you consider is of interest is welcomed be it design, research, manufacture or construction.

PROJECTS

ARTICLES

TOGETHER BUT SEPARATE – THE COUNTRY'S FIRST ULTIMATE CAMPUS – TWO HIGH SCHOOLS IN ONE

Two Christchurch high schools, severely damaged in the 2011 Christchurch earthquakes, have been rebuilt in a state of the art combined, ultimate campus in North Brighton – a first of its kind in New Zealand.

Shirley Boys' and Avonside Girls' High School, known as the Orua Paeroa campus, is built around an internal courtyard with shared areas but each school retains its own spaces, colour scheme, signs and identity.

As a result of the damage to the land and school buildings of the existing Shirley Boys' and Avonside Girls' High Schools in 2011, the project brief required a new co-located facility to be provided for the existing school rolls that would also provide shared facilities at a larger scale on the site that was formerly home to the New Brighton Racecourse, Oruapaeroa Pa and most recently the site of the QEII Park and stadium.

The brief to ASC Architects required a design response that was able to provide shared facilities while acknowledging the difference in identity, history and culture of the individual schools. Shirley Boys' and Avonside Girls' High Schools cater to a roll capacity of 1200 students for each school from Year 9 to 13. The schools operate independently with separate staff and uniforms, this being the first time two single sex high schools have occupied the same site.

The multi-million dollar schools are two of five schools built under a public private partnership (PPP) between the Ministry of Education and the ShapeEd consortium. Completed for the start of Term 2 in 2019, the 23,000m2 schools have been designed with an approach to learning that emphasises community, collaboration and connectivity in all aspects of school life. Students from both schools not only share some facilities but compete in inter-school competitions, sports challenges and debates.

The facilities provided create a contemporary learning environment of spaces that are flexible, functional and future focussed, acknowledging that students learn in different ways and that the diversity in learners' needs is likely to change over time. Consideration has also been given to "hard technology", an area where students can undertake large projects like building garden sheds or decks.

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Students from both schools not only share some facilities but compete in inter-school competitions, sports challenges and debates.

Energy consumption over a year is between 25 and 40 per cent lower than in a standard school.

The entrance to the schools, located on Travis Road in North New Brighton, provides a strong presence and a sense of welcoming to the wider community. While the two schools have separate teaching spaces, co-location has allowed for a range of shared facilities at a larger scale including a performing arts theatre with 750 seats, a fully equipped commercial teaching kitchen and three full-sized indoor gymnasiums. The gym and performing arts centre are available for community use.

Matt Every, Associate at ASC Architects says one of the key successes of the project was that through significant design innovations and clever planning by ASC Architects, we were able to provide the schools with the benefits of combined shared areas and deliver efficiencies of scale that each school could not have achieved by itself. This included being able to provide all the future growth building area and an additional full-sized gymnasium – all delivered within the budget of the original build.

The design incorporates a combination of mechanical ventilation, automated natural ventilation and partial cooling. It is structurally designed to Importance Level 3 under NZS1170.0 and 130 per cent of the design seismic load levels required in an Importance Level 2 building. It is also built to the Ministry of Education's Structural and Geotechnical Guidelines which have, in some cases, more onerous design requirements than 11.3 standards.

Energy consumption over a year is between 25 and 40 per cent lower than in a standard school, the campus building energy calculation based on the Green Star Technical Manual. Lighting was a priority and the design encompasses making the most of natural light such as glazing the façade of many sections of the build. Stormwater is located through a detention pond and planted swales prior to mains discharge. Greenery that existed from the grounds of the two old schools was also retrieved – natives from Shirley Boys' and plants from the Old Girls' garden of Avonside Girls'.

An aerial view of the campus shows the complex arrangement of roof structures that enhance the "together but separate" design configuration.
The function of the building required all material

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The external design includes extensive use of profiled metal cladding, chosen for its stability and durability

selections and construction to be hard wearing, streamlined and pragmatic. A warm roof is installed throughout the complex, Graham Hill Roofing tasked with the delivery of this system along with wall cladding throughout the campus including the front entrance feature wall. The way the schools were constructed meant work started in the middle of the complex with roofing and wall cladding being worked outwards as construction progressed. The external design includes extensive use of profiled metal cladding, chosen for its stability and durability, but detailed and specified to add vibrancy to the façade. Colour has an important role to play in achieving this concept.

Of note is Roofing Industries' Eurostyle Eurolok profiled metal cladding provided at the entrance to the schools that is detailed to provide a faceted façade that slopes in different directions with no visible over flashings.

"At times we had 20 workers on site as the roofing and cladding aspects of the campus were performed, starting early in 2018 and completing in 2019"

Zach McKay, Operations Manager for Graham Hill Roofing recalls the target programme for this unique project requiring carefully managed systems in place to deliver what this labour-intensive contract required with its range of buildings – all joined except for the theatre and gymnasium and the prolific choice of colours to give each school its individuality.

"At times we had 20 workers on site as the roofing and cladding aspects of the campus were performed, starting early in 2018 and completing in 2019, the team often grappling with windy conditions and issues of sand blowing, the campus being close to the sea.

"We had a fulltime project manager that we started six weeks before commencement of our contract to review all the documentation and specifically the Ministry of Education guidelines to ensure we aligned ourselves with all the current requirements."

Another factor with the innovative use of metal products was the challenge for manufacturer Roofing Industries delivering product onto the wet and often muddy site. With sheet lengths over 25m, long load transport had to cross the city onto site in winter with limited access points from residential streets at times.

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Architectural Designer

Based in Ponsonby, ASC Architects is one of the country's longest operating practices, having been established in 1953. The practice provides architectural and interior design services for projects throughout New Zealand as members of Designgroup Consortium. The company employs over 50 people with a wide range of skills and expertise and continues to win exciting projects including most recently a New Zealand Commercial Projects Gold Award in the Education Category. ASC Architects also won the New Construction/ Entire New Educational Facility award from the Learning Environments NZ Awards reflecting the scale of its contribution of design expertise in the education sector.

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ASC Architects
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Owner:
Ministry of Education

Developer:
ShapeEd NZ LP

Main Contractor:
CPB Southbase (Joint Venture)

Roofing Manufacturer
Roofing Industries Ltd
12 William Lewis Drive
Sockburn, Christchurch
Email: christchurch@roof.co.nz
Website: www.roof.co.nz

Roofing Material:
0.55BMT ColorCote® MagnaFlow™ ZAM double coated
Profiles:
Eurostyle Eurolok 365
Eurostyle Angle Seam 285 tray (Custom Pan)
0.55BMT Multirib
Colours – Exterior:
ColorCote® Threadbow White, Pioneer Red, Nimbus, Permanent Green, Windsor Grey, Ignite
Colours – Wall Cladding:
ColorCote® Windsor Grey, Threadbow White, Pioneer Red, Lazerite Blue, Permanent Green, Ignite, Scoria, Poppy

Roofing & Wall Cladding Installer:
Graham Hill Roofing Ltd
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Telephone: 03 343 1030
Email: admin@ghroofing.co.nz
Website: www.ghroofing.co.nz

Structural Engineer:
Lewis Bradford

Services Engineer:
Powell Fenwick

Funding & Asset Management:
HRL Morrison & Co

Facilities Management:
Spotless

HARREX HANGAR HOME

When Central Otago District Council announced a hangar development at Alexandra Airport, airplane enthusiast, Gerald Harrex and his wife Suzanne thought this would be a good place to call home. The couple chose the end site next to the road for their hangar and adjoining home, giving them unobstructed views to the mountains - and for Gerald, this elevated site gives him uninterrupted views of the runway where he can watch incoming planes.

The design and construction of the hangar was undertaken by Wide Span Sheds whose portfolio of hangars built around Central Otago, including at the airport, had already caught the eye of Gerald Harrex who engaged the firm before contacting architectural designer Julie-Ann Ross to design a two-bedroom house adjoining the hangar.

Her brief from the client was to provide a home that would maximise the mountain views surrounding the site, one that would handle the extreme weather conditions of Central Otago and a home suitable for a couple but able to accommodate friends and family with space to house the visitor's planes.

Says Julie-Ann Ross of Design Arc Ltd: "My house design snuggles the hangar, however as the house is joined to a light aircraft hangar we needed a 60 minute firewall between the two spaces. Keeping the roof and most of the wall cladding (Metalcraft T-Rib MC760) the same as the hangar (Metalcraft T-Rib) ensured they read as one building.

"The house block is offset to create several courtyard areas that can be utilised in different ways according to wind direction and season."

To capture the mood of the surrounding landscape of local stone and surrounding mountains, Julie-Ann has used Alpine stone (Schist 150) on the columns and ensuite walls, directly linking the home to its location. All rooms have views to the surrounding mountains with circulation space at the rear next to the hangar.

The home has a fully insulated slab and is separated from the hangar slab with 140mm timber framing, R4.0 insulation in the walls and R6.0 in the roof. Windows and doors are thermally broken with argon gas and low E coating – this reduces heat loss in the winter and keeps the home cool in the summer.

A wide north-facing veranda limits direct sunlight in the summer but allows low-lying winter sun into the rooms which comprise a living/dining area, kitchen and master bedroom with ensuite with a large spa bath in behind bi-folding windows. A second bedroom is multi-purpose with a pull-down queen-size bed and wardrobe space comprised of an office desk and a sewing/hobbies table. This room can also become a second living space or media room.

Careful thought has been given to the 'softening' of vertical metal cladding with an alternative sustainable timber cladding that is eco-friendly and virtually maintenance free. Euroclad Selekta (Silver Oak) horizontal boards – a pre-finished composite timber cladding – have been used along the veranda.

A middle courtyard has an retractable louvred roof which can be closed in winter or when it's raining but opened in winter to bring sunlight deep into the house.

Roof and wall cladding

It was important in the selection of roof and wall cladding for the habited area that the profile matched the adjoining hangar and T-Rib from Metalcraft, Christchurch, creating a feeling of the hangar and home being one building. It was the strong vertical lines of the MC760 T-Rib roof and cladding that Julie-Ann chose for the Harrex project.

All windows were picture framed, making them all symmetrical with the aluminium inside the flashing. Three Velux skylights close together were back flashed with a cricket flashing which was a challenging detail as the skylights were on a different pitch to the roof. A fourth skylight was installed in the bathroom.

Outdure Decking is on a Qwickbuild aluminium system, this composite decking containing at least 90 – 95% recycled materials in a mix of HDPE or

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"Being able to park his planes in the hangar and walk inside to his home has been a dream come true for this pilot"

PVC and wood fibre. The boards are splinter free, termite proof, do not leach and are scratch, fade and mould resistant.

“Luckily the site is north facing and on the approach to the Alexander Airport the Harrex home is the first development you see with its cladding blending so well and in keeping with the environment,” says Julie-Ann Ross.

“This hangar home is ideal for the owner who has a genuine passion for planes and flying: being able to park his planes in the hangar and walk inside to his home has been a dream come true for this pilot.”

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Design Arc Limited

The company provides creative architectural solutions, specialising in renovations and new residential builds. Design Arc is committed to providing an excellent client-focused service and Julie-Ann Ross believes every project is unique, its style created from the client’s lifestyle, needs and flair.

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James Dodd
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Email: james.dodd@sheds.co.nz
Roofing/Cladding Manufacturer
Metalcraft Roofing, Christchurch and Cromwell
Profiles
Metalcraft T-Rib MC760
Colour
Sandstone Grey, Ironsand (roller doors)
Roofing Installer
Cohesive Construction/Wide Span Sheds, Central Otago

THE NEW CONSTELLATION BUS STATION

Using a 10m x 3m sheet of building paper and creating a frame to ensure the paper was stretched and flat, they traced a template of the curve to gain the most accurate measure

Changes are happening on the northern busway involving an upgrade to the Constellation Bus Station. It now features pick up and drop off zones in both north and southbound directions with a pedestrian over-bridge for pedestrians to access the northern platform.

The Waka Kotahi New Zealand Transport Agency project is being managed by the Northern Corridor Improvements Alliance as part of the overall $700 million Northern Corridor Improvements project.

Brosnan Construction engaged Metalhartt Roofing for the roofing and cladding aspects of this challenging development and the work is on-going as it heads towards completion.

Sections of the old roofing were removed first to allow builders access to the framework for the extension left and right of the existing station.

The main curve in the roof design of the bus station is not a perfect curve; there are three different radii in the main curve, calling for some novel methods to ensure the most accurate measure of what was required could be supplied to the manufacturer Roofing Industries.

The umbrella of the profiles Eurostyle™ Epic™ saw Eurostyle roll cap in ColorCote® grey flannel specified for the curved roof requiring precise attention to achieve the perfect curve while flatter areas of the roof have been finished with Roofing Industries' Trimrib®.

Brothers Blake and Tyler Orange, joint owners of Metalhartt Roofing devised a way to ensure the most accurate measure possible for the curve. Using a 10m x 3m sheet of building paper and creating a frame to ensure the paper was stretched and flat, they traced a template of the curve to gain the most accurate measure. This was supplied to Roofing Industries Waikato and the curved sheets were produced first time – faultlessly.

The structural curved elements of the Eurostyle Epic profile landed first on the ground where the builders installed framing and plywood and it was at this stage that the curved template was created for the manufacturer. Once this structure, assembled on the ground was craned into position the sheets were then installed.

This positioning of the curved steel structure was loaded into position on Auckland Anniversary weekend when the northern bus lane was closed on

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“The lesson we learned from this exercise was the importance of getting the preparation right”

Sunday evening for Brosnan Construction to crane material to the overbridge and secure the curved steel structure.

“The lesson we learned from this exercise was the importance of getting the preparation right”, says Blake Orange. “This was one continuous radius on the curve forever changing as you go down the sheet – a staggered pattern which we knew had to be 100% accurate for the manufacturer.

“We spent a lot of time making the frame to ensure the building paper would be flat when we traced a template of the curve – it was painstaking but was key to the success of the whole process. Looking at it now the curved structures are architecturally very appealing”.

A challenge for the Metalhartt team and lead installers Nick James and Darryn Jones was the need to abseil down the curves to install the vertical sheets but it was opportune that the company’s Joe O’Flynn had a background in rock climbing and rigging so was able to set up a harness system to allow access to unreachable areas safely.

The size and awkward shape of the curve meant deliveries to site had to be carefully managed: the sheets were craned onto the overbridge for the Metalhartt team to install but this aspect of the contract required some improvisation to ensure safety requirements were met.

Remaining aspects of the northern busway project have included 75m of bus stop shelters installed, and supply and installation of all fascias which are being produced in 3mm powder coated aluminium. The architectural design specifies the fascias to be made in 2m lengths with 5mm negative details at the joins which then required an under flashing for waterproofing.

Several stainless steel downpipes have been fabricated and installed to support the gutters which are now taking on more water due to the addition of new areas to the roof.

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Client:
Northern Corridor Improvements Alliance

Builder:
Brosnan Construction

Roofing Manufacturer
Roofing Industries Ltd
Material: ColorCote®
Profiles: Eurostyle™ Epic™ and Trimrib®
Colour: Grey Flannel

Roof Installation:
Metalhartt Roofing Ltd
Telephone: 0800 114 649
Website: www.metalhartt.nz

A SLEEK MODERN HOME IN RURAL WHANGAREI

A Whangarei couple, brimming with ideas for a home they would build on an elevated, private site near Quarry Gardens, ensured their love of art and native birdlife would be incorporated in the design but also that four totara trees on the build site would be removed and then harvested for inclusion in aspects of their new home.

The brief to architectural designer Matt Andrew was for a contemporary, modern house featuring two distinct inter-connecting blocks made up of a master wing and a guest wing to have Airbnb suite business capability to support the return on investment.

The owners needed “class” with featured rectangular shape and structures with effective utilisation of space but keeping within a reasonable budget. Black box shaped pods with timber accents, three bedrooms each with a private bathroom in the master wing and lots of glass to bring in the rural northerly views from the 2080m2 site in Kensington Heights, Whangarei.

The pods were to be arranged in a way that each living and Airbnb area felt private and the build was to be nestled into its landscape and the contours of the section.

Working closely with owners Jamie Lorton and Andrea Schmuck, architectural designer Matt Andrew of Architecture North Ltd progressed the project through multiple stages before reaching a final design, issues such as ground contour, vegetation and mature trees influencing the views, height restrictions and services all dictating how the design would be achieved.

Says Matt: “On meeting Jamie and Andrea we discussed the fundamental aspects they were looking for in a new home such as how they wanted the house to function. Large openings were used to capture the northern rural views along with

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Metalcraft Roofing's Kahu profile in COLORSTEEL® Endura matte was chosen over traditional corrugate due to its deeper profile and because the owners liked its look

strategic positioning of windows to capture specific site features. The window positioning also provided privacy to the occupants between the spaces.

"Bold lines and cantilevers were used on both levels to provide shelter and maintain architectural aesthetic. Cedar features were used to soften the dark mass of profiled metal. COLORSTEEL® Endura in Kahu Flaxpod matte was chosen as the primary cladding for its economy and low maintenance.

"Glass balustrades complemented the design providing that ultra-modern look but maintaining the connection to the rural outlook without masses of timber or aluminium detracting from the views. The pod layout worked well with the contour of the site and each space captured the rural northerly outlook while maintaining privacy between the spaces.

"Relating the indoor to the outdoor was important for the design: large doors opening from the living, dining and all three bedrooms plus one for the intended Airbnb, onto the decks means occupants can flow seamlessly between these spaces".

An inspired feature of this home relates to a stand of the native conifer totara trees within the building footprint, four of which had to be removed. The durable timber was utilised by Matt, to be milled, dried and included within the design providing timber accents to the interior. Circular openings in the exterior wing walls have been lined with harvested totara timber to conceal the flashings and the interior of the home features totara on the treads of stairs throughout the house and on shelving. 140mm thick timber wall frames were utilised to provide better thermal performance – to help counter the effects of heating from dark colours, and to add depth. Noise reducing gib boardings throughout the downstairs sections of the build has been included to further enhance the privacy of guests in the Airbnb. Garapa timber decking was used on the north facing decks while the cantilevers from the upper floor provide some shade and protection from the elements.

A local fabricator was engaged to manufacture custom rolled stainless steel flashings for durability of the high-risk round openings in the exterior wing walls. Structural steel was concealed within the building structure to provide the strength required to support the cantilevers and to give bracing to the areas where there are high amounts of glazing.

Roofing and Cladding

Metalcraft Roofing's Kahu profile in COLORSTEEL® Endura matte was chosen over traditional corrugate due to its deeper profile and because the owners liked its look – bolder, strong shadow lines - and practicality in dealing with some of the tricky widths at the sliding door openings. The owners also changed the direction of the western red cedar cladding from horizontal to vertical to keep with the lines of the Kahu profile and to maintain the appearance of height over contrasting the different lines of each pod.

Art enthusiasts, Jamie and Andrea have included four accent feature walls in each bedroom site, dining area and front entrance in a Modern Art Green/Blue wallpaper RASCH 490091 chosen to highlight three elements.-

It is close to the colour of the native Tui's that live on the section

The tuis inspired the splashback in the kitchen designed by young Kiwi artist TAMAASA featuring tui, and monarch butterflies

The Lorton's David Bromley artworks including Zippora Seven (butterflies and daisies) with accents of Tui blue-green – also pulling the entire theme together

The home sits below the tree line for most of Kensington so has a very private feel with neighbours on only two sides and both behind the living areas so will not obstruct the views from the front of the house.

Says Jamie Lorton: "There were several key requirements for this build and the architectural designer Matt absolutely nailed those requirements with the design he produced which included all the elements we wanted with only minor adjustments to the original drafts for technical or practical reasons.

"We enjoyed the experience of working with the builder, Bruce McQueen in fact together with Matt from Architecture North we formed a cohesive trio at every stage of the build. The bathrooms are a feature – all three having matching fit-outs featuring Kaleido Nero natural porcelain floor tiles on the shower floors and walls to ceiling height and stylish, polished white tiles to complement. All tapware is brushed nickel finish."

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Architecture North

Architecture North is a boutique architectural studio based in Whangarei, offering an end-to-end design and drafting service to projects of all sizes and budgets. It prides itself on providing quality bespoke and tailored solutions, utilising quality materials to provide robust and quality architecture. Our objective is to make the process as easy and enjoyable as possible for its clients.

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ERSKINE CHAPEL'S ROOF RESTORATION

Restoring one of the finest examples of Gothic architecture in New Zealand was always going to be an interesting challenge. A collaboration between architects, engineers, heritage organisations, and construction contractors achieved exactly that with the chapel at the Erskine College in Island Bay, Wellington.

The college, a Catholic girls' boarding school, was built in 1905 - 1906 by the Society of the Sacred Heart (Sacré Coeur). Although enrolling its first pupils 1907, the chapel wasn't built until the 1930s.

Both the original school building and the later addition of the chapel were designed by renowned Wellington architect John Sydney Swan, known for designing in the traditional Gothic and Classical styles.

Originally known as the Covent of the Sacred Heart at Island Bay, its name was changed to Erskine College in the late 1960s. The school closed its doors in 1985 and since then the buildings have been used extensively for various arts groups and as a venue for high profile events such as the International Festival of the Arts. Its exceptional acoustic quality made it a perfect venue for many notable musical performances.

The chapel was constructed using unreinforced brick masonry walls, timber, steel, and concrete. It features a majestic, vaulted ceiling, an Italian Carrara marble interior (including a marble altar), and lead lighting.

"At any one time we had up to eleven people on harnesses up there. It looked quite spectacular from below."

The chapel is widely regarded as a masterpiece of French Gothic architecture. Heritage New Zealand lists the chapel as a Heritage New Zealand Category 1 Historic Place.

The buildings, including the chapel, were closed for public access due to earthquake concerns.

"We considered the heritage status of the building with every decision. We also worked alongside a heritage architect (Ian Wild) on the decisions before presenting to the council and other interested parties for approval."

"Unfortunately, the main building was in very bad condition. Despite great efforts to save it, the price tag to repair was just not feasible," said architect Tobin Smith. "To get permission to demolish it we had go through a formal hearing process with Heritage New Zealand, the Wellington City Council and a private trust who were all interested in the site."

Smith said the interior of the building is spectacular and they didn't want to damage it. The roof, however, was a clear decision. It was in a bad state, and replacing the roof with a modern, lower maintenance, option "was a good choice".

The engineer advised replacing the roof diaphragm. "We made the decision to take the roof off and replace the roof diaphragm from the topside. That meant we had to re-purlin and roof it from the upper face."

Smith said they were working with "a pretty steep topography". The chapel is three storeys high on the front face and two storeys high on the rear face. "We took the elevation down another storey by building a carpark and a podium in front. A shotcrete wall on the side also limited access. The scaffolding was quite impressive."

Johnson Brothers (Featherston) was employed as the main contractor. Wayne Johnson, managing director, says they decided to do all the strengthening of the building structure from the outside. "The heritage architect didn't mind if you could see there was work done from outside, because that became part of the building's history. They didn't want lose any of the look inside, though."

They started by putting ground beams below the chapel. These steel cages encapsulated the buttresses on the outside of the walls. The steel ran up the walls to gutter level.

"When we got to the roof, we took all the old roofing off and created a plywood diaphragm brace. We first installed the diaphragm, the purlins on top of that, and then the new roof cladding."

You often had to design things on the go. Johnson gives an example of the buttressing steel that go right around the outside of the building. "At one part of the building (the ballroom) three of them went straight through the existing box gutter. We needed to get that to work.

"When we took the roof off, we had to retro-tie the existing timber structure to the concrete bonding. It is a double skinned building with four layers of brick inside and three layers outside, and a two-inch cavity between them. The cavity altered, of course, as it went up the building through different layers of blocks.

"We fitted the diaphragm brace on top of the old sarking, and that tied all the fixings of the existing timber components to the concrete structure."

Even with all the scaffolding, the team had to create harnessing points to work on the high-pitched roof.

"It is a 55° gable roof, and it is 15 m high at spouting height. Considering the pitch, you can add another 9 m to the working height."

Wayne Johnson says, "we created two loading platforms at spouting height, one on each side of the building. The plywood, roofing steel, and purlins were craned up there.

"We also created some anchor points about 300 mm below the ridgeline and at 300 centres apart. We then put a static line through those so we could hook our harnesses on there to work on the roof. Later we made a flashing that went around the anchor points and under the new ridging."

The anchor points are still there and they are rated, so future workers can use it in the same way.

"At any one time we had up to eleven people on harnesses up there. It looked quite spectacular from below."

Despite all the safety measures, working on the roof was not for the faint hearted. "As you can imagine, Island Bay is not the most fun place to be in a gale force nor' westerly. Especially when you are handling 8x4 sheets of plywood and 11 m roofing sheets," said Johnson.

To protect the interior of the chapel and prevent weather ingress they replaced the roof in sections, taking the old cladding off and putting the new cladding on as soon as possible.

"As we put the diaphragm on, we screwed the purlins to the diaphragm at 600 centres. That created a rough 'staircase' as we went up the roof, but you still needed a harness.

"We still used supporting roofing underlay and then screwed it down according to High Zone requirements.

"Putting in a new substrate for the roofing was great. With the old roof it was nailed straight into the sarking."

The new plywood diaphragm was fixed using 65 x 10G stainless steel flooring screws and the 90 x 35 tanalised purlins were screwed in at 600 centres. They were double screwed on each side over the joints, so every sheet of ply became a diaphragm. "We created the diaphragm by screwing through the purlins at 150 centres, tying everything together. Every other one got bugled through to the rafters."

The architect decided from the start on a like-for-like strategy. "We looked at a modern COLORSTEEL® cladding [0.4 mm Scoria Corrugated COLORSTEEL® Endura] that was almost identical

“…it was certainly not an easy roof to replace. There were dormer events and other details around the roof that all had to be incorporated again,”

to the colour painted on the old roof,” said Tobin Smith. “It was a really good match. You could hardly tell the two apart.”

“…it was certainly not an easy roof to replace. There were dormer events and other details around the roof that all had to be incorporated again,” said Smith.

Wayne Johnson agrees. “Every single flashing was measured and made to suit. “

The lower levels had old lead stepped flashings cut into the block. The new roof was 75 mm higher.

“We cut a slit into those walls and then made a three-piece flashing. The main flashing went up and over, like side flashing. The flashing that went into the rebate we cut was sealed in and then a hat piece went over the side flashing. We did that purposely so the URM part of the building could move independently from the roof part. It should give the building some elasticity and at the same time the left-over lead is encapsulated and out of the way.”

Reroofing the Cohen building was standard by comparison. The building is about 9 m x 40 m with a mono-pitched roof at 5°.

“We replaced the beams with new steel girders and top and 8x2 purlins bolted to those, with a tray cladding.”

“The Cohen building had a lot of penetrations, but they were all in a row. For those, we used a standard over-flashing the ran up to the ridge.”

The main building of the college was replaced with a townhouse development.

“We certainly tried to respect the surrounding buildings and other houses in the suburb, especially regarding the scale of the townhouses. When you drive into the development, the dwellings are smaller, but the ones facing into Avon Street is slightly larger in scale to try and bleed the scale back into the development, rather than going for stand-alone-houses,” said Tobin Smith.

There is a combination of the steep gable roofs and the flatter mono-pitched typology to work in with the topography of the site.

“The combination of the gable and mono-pitched roofs help to preserve the outlook from within the development, for example, the dwelling lining the eastern side of the main route coming past are flatter to allow the ones behind them a view over them.”

The townhouses boasts a mixture of 45° gable roofs and 4° mono-pitched roofs to give a flat elevation. Smith said some of those dwellings are three storeys from the street up, albeit it they take up the topography, so they are only two storeys on the back. “When you have a two or three storey dwelling behind it, it is quite nice to keep the roof-form low so they can also have an outlook, rather than forcing those gables everywhere.”

The gable roofs give those dwellings a sense of individual ownership or individuality. The roofs don’t encapsulate all the dwellings, they encapsulate individual dwellings, you get the notion that it is a development of small houses, not a development made up of an apartment type complex.

Metal wall cladding covers concrete walls over lower two floors and then transitions onto timber framing on the upper floor. “In some cases, we had to batten over concrete to fix the cladding and in other instances the cladding sits over a traditional timber construction.”

We clad the block in standing seam cladding. We originally suggested we put them in a timber clad. But they are offset in the planning, and they share an external wall to the boundary. That meant we could use a combustible material. The standing seam cladding gave us the look we wanted, while satisfying the fire requirements.

Developer:
The Wellington Company
50 Manners Street, Te Aro,
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Telephone: +64 04 802 4291

Architect:
Tobin Smith
CoLab (since then merged with Architect’s Creative’s to form Common)
339 St Asaph Street
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Telephone: +64 03 379 0111
Website: common.nz
Email: studio@common.nz

Roofing Manufacturer:
Roofing Industries Ltd.
Central Taranaki & Wellington Regions
Telephone: +64 04 979 8376
Timothy Woods 021 472 691

Chapel:
Product: 0.40mm Scoria Corrugated COLORSTEEL® Endura with matching flashings.
Installers: KT Roofing (Kane Tanatieu)
Main Contractors: Johnston Builders (Featherston) -

Cohen Building (Adjourning to church)
Product: 0.55mm Ebony RT7 COLORSTEEL® Endura with matching flashings.
Installers: KT Roofing (Kane Tanatieu)
Main Contractors: Johnston Brothers (Featherston)

Surrounding Townhouse Development:
Roofing & Cladding Installers: Royal Roofing (Wgtn)
Main Contractor: Contractors - Homestead Construction
Roofing Products: Corrugated to 40° gable rooves and True Oak Corrugate to 5° mono roofs, 160mm Half Round Gutters, folded rainheads, 80mm Ebony downpipes to all. .
Colour: Ebony 0.40mm COLORSTEEL® Endura
Wall Cladding: Spanlok 45 365mm - Black .55mm ColorCote® MagnaFlow™

SUSTAINABLE WATER

Back in Issue 25 in 2010 Graham Hepburn reviewed the importance of water and the sustainable process of harvesting drinking water from metal roofs. We republished a revised version of this in 2019. In light of the "Three Waters" reforms we feel this is again relevant, and now look at this topic again and update the content.

Rainwater Harvesting – of increasing potential value today

Eleven years after the original article and access to potable (and indeed any) water has become even more important in a world in which water supply is becoming a serious issue. Even in rain-rich New Zealand we are increasingly talking about control of water, water rationing, depletion of aquifers, and so on. At the same time we are increasingly suffering from downpours (mostly uncaptured) and flooding, as shown just recently in the South Island.

We are also looking at some limitations to supply of water for urban uses. As this is written, even during what seems like heavy rain, the Hunua Dams, on which Auckland relies heavily, have less than desirable levels of water, at 63% of full against a historical average of 87.5% for this time of year. This is still the case even two years after the drought and reasonable rain since.

Globally, although there is actually a finite non-reducing amount of water, which is not in fact being consumed, there appears in many places to be too little (or sometimes too much) of it for at least some of the time. There is little doubt that water is one of the planet's most valuable commodities and maintaining water supply will become even more important as populations continue to increase, and increasing localised heat and dry spells can compromise local water supplies.

If the planet is going to be subjected to increasing extremes of flooding and drought, then security of good quality water supply will also be increasingly important. Let's look at New Zealand specifically, although quite a lot of this is relevant to other countries.

Potable water

In rural areas with no mains supply there has been little choice but to harvest rainwater from roofs and collect it in tanks, and many rural households prefer this source, as it is cheaper and easier than digging a well or pumping stream/river water. In recent years suburban dwellers and even some water-using businesses have begun to get in on the act. We are now seeing, belatedly, some farmers or farming regions talking about building reservoirs to gather water when it rains for use when it doesn't. Seems common sense and it apparently now happening – in the South Island.

Just harvesting rainwater for uses other than drinking drastically cuts demand on mains supply. It is estimated that in a typical dwelling only 5 litres per person per day is needed for cooking and drinking (potable water) while 150 litres per day is used for bathing, washing dishes and clothes, flushing toilets, in the garden or for washing down cars etc. (grey and black water). If this can be reduced by using rainwater for the non-potable purposes, a huge reduction in demand on the urban systems could result.

Of course there is a limit to how far this can go without affecting the economics of urban water supply and e.g. Watercare Services in Auckland prevent (or attempt to) collection of roof water for any purpose. In addition, the current Drinking Water Standards New Zealand (DWSNZ) do not allow the use of rainwater for potable uses where there is a potable supply available. (Of course this doesn't affect non-potable use, which requires dual systems). Of course in some places the external supply has actually proven not to be of great quality (or complying with DWSNZ), and not everyone wants chlorinated water.

It seems that metering and charging for water use is commercially important in today's world where everything has its price. Apparently, at least in Auckland, the metered amount of supplied

The best roofing material for minimisation of the risks of contaminants is long run metal roofing, painted or unpainted.

water is also used to determine the volume of and charges for waste-water treatment. Measurement of wastewater is significantly more difficult than just metering all water in. So use of rainwater from the roof would not allow this cost to be fully recharged, and since both water supply and wastewater treatment are a business operation this would be unacceptable without a revenue re-structure for these services.

The trend to water collection is partly due to greater environmental awareness but also to the fact that water is becoming an increasingly expensive commodity. The charges for water in urban areas steadily increase year on year. Some Councils have also been encouraging home owners and businesses – sometimes with financial incentives - to collect rainwater for non-potable purposes because this has twin advantages: it helps to reduce stormwater flows, and alleviates some of the pressure on water supply and water infrastructure from a growing population.

Now we have the proposed Three Waters Reform Programme, essentially a central government water regulator/supplier.

From the website https://threewaters.govt.nz/

"The Three Waters Reform Programme is a major, intergenerational project. It aims to ensure that New Zealand's three waters—our drinking water, wastewater and stormwater—infrastructure and services are planned, maintained and delivered so that these networks are affordable and fit for purpose. The current situation does not achieve this for all communities.

Today, on behalf of their communities, 67 different councils own and operate the majority of the drinking water, wastewater and stormwater services across Aotearoa.

Working with councils, the Government proposes to establish four new publicly-owned multi-regional entities that benefit from scale and operational efficiencies and reflect neighbouring catchments and communities of interest. Central to this plan is our ongoing partnership with the local government sector and mana whenua"

In New Zealand currently, i.e. prior to the proposed water reforms, each local authority has the responsibility for funding all water and waste infrastructure. This has become increasingly difficult with tightening regulatory environments both on potable water standards and wastewater discharges. If the true cost of maintaining infrastructure were levied on ratepayers, councillors would lose elections. Therefore, over decades, the investment in water and wastewater infrastructure has been less than necessary in regional New Zealand (and some urban areas). This is a key factor in the proposed water reforms. Essentially one purpose of the reforms is to invest in infrastructure as required for both water and wastewater on an "area" basis, for example, essentially the whole South Island is proposed to be one entity. All those residing in that area would fund the whole area, meaning those with efficient systems due to population density (e.g. Christchurch – although how good is their system post-earthquake?) will pay more and those in say Tekapo will pay less than their own true local cost. As seen by the "protesting" local authorities, this is not palatable for all.

As we have not invested in adequate new infrastructure, one good way to limit cost would seem to be to limit demand, and rainwater harvesting is a cost effective mechanism to achieve this.

In spite of resistance to the proposed programme already being raised across NZ, it seems likely to result in at least some changes. This may or may not allow for a wider use of rainwater for potable use (probably with design requirements to be met – e.g. roof type and storage tank materials). The cost of safe quality water provision for small communities in rural New Zealand without funding change would become cost-prohibitive. Without change providing for either central government funding or area-wide rate base funding, many small communities will be unable to afford to comply with DWSNZ. Therefore,

Collecting water off roofs reduces stormwater problems by attenuating the flood peak.

we can't help but think that changes in the DWSNZ allowing for rainwater to be used as a potable source in smaller communities should be an option.

What we rural dwellers already know is that it is quite possible to collect and store all the water needed (normally), and to process grey and black water onsite – often at a lower cost than fully provided urban services in semi-rural areas.

Although drinking water is the smallest component of water used, currently all water must be to the DWSNZ and this means the roof must provide clean uncontaminated water. The best roofing material for minimisation of the risks of contaminants is long run metal roofing, painted or unpainted.

Reducing demand

Collection and storage of water also helps to conserve this valuable resource and will reduce the need for councils to build more dams or find other water sources. If you are providing and treating your own water, then that also cuts demands on treatment facilities and pumping stations, which in turn means they will need to consume less energy. The individual owner of the storage therefore also uses less water and for those in metered connections this will reduce their water cost.

As New Zealanders have known for decades, catching water off a metal roof for drinking and other household uses is cheap, easy and safe as long as some basic precautions are taken.

Safety of roof water

BRANZ says metal roofs are safe from which to collect rainwater, but a check should be made to ensure there is no lead, chromium or cadmium in the roof and its flashings or in any soldering or paint. Paints used by NZ coil-coaters have been demonstrated to produce no harmful runoff.

The roof and gutters need to be cleaned regularly with diverters in place to make sure contaminants such as bird droppings that are being washed away during cleaning aren't entering the water supply. And a first-flush diverter and debris diverters should be installed – this reduces the risk of contaminants entering the storage. Treating roof water to potable level can be as simple as coarse filtering incoming flow and finer filtering and UV treatment before pumping to the house. (see the illustration). The best roofing material to limit contaminants is long run metal.

Manufacture

Pacific Coil Coaters and New Zealand Steel have tested their painting systems for the potential to release contaminants and have shown that there are no contaminants released of any public health concern. Therefore, excluding other environmental factors, when you use COLORSTEEL® or ColorCote® pre-painted metal roofs for the harvesting of rainwater, you can rest assured that the product you are using will not contaminate the water. Zincalume ® is also good. This is not necessarily true of product not painted in NZ.

Roll-forming of metal for roofing uses no water and the manufacture of the steel coil from which metal roofing is made uses minimal water. As an example, although New Zealand Steel's plant at Glenbrook uses about 1 million tonnes of water a day in the steel making process, this is constantly recycled – cleaned, cooled and recirculated - so that only 1% of it is discharged and what is discharged is clean enough to drink.

Stormwater and Flooding mitigation

In urban environments with their proliferation of impermeable surfaces, stormwater during heavy downpours can and does cause surface flooding and overwhelms sewers (where there is cross-connection between stormwater drains and sewers, as there still is in Auckland, this is worse and more frequent), causing foul-water discharge into waterways.

As climate change continues we will see increasingly irregular but heavy rain falls which will exacerbate this problem.

Collecting water off roofs reduces stormwater problems by attenuating the flood peak, helps to conserve a valuable resource, and will reduce the need for councils to build more dams or find other

Metal is the roofing material that is the best suited material for rainwater collection, and this is recognised by the NZGBC Homestar rating system

water sources. If you are providing your own water, then that also cuts demands on treatment facilities and pumping stations, which in turn means they will need to consume less energy.

In Australian cities all new properties have been required for some years to provide short-term on-site water storage, not to provide drinking water but to prevent overwhelming the stormwater drainage systems. Something we should be looking at in New Zealand? Such urban collected water, while not reducing the need for potable water (and its revenue stream) can also be used for greywater and garden watering.

Sustainability

After the NZ Green Building Council (NZGBC) introduced the Green Star building rating system for commercial and industrial buildings in the 2000s, which does include credit for water processing, it was realised that there is also a need to encourage sustainable homes, and there are schemes for such less complex buildings elsewhere in the world. NZGBC has developed the Homestar system to fill this gap.

After several revisions, in 2021 Homestar Version 5 has been issued. This provides credits for using metal roofing to gather rainwater for much the same reasons as listed above.

Credits particularly relevant to water collection are :-

EF3 - To encourage and recognize water conservation through water efficient fittings and rainwater harvesting.

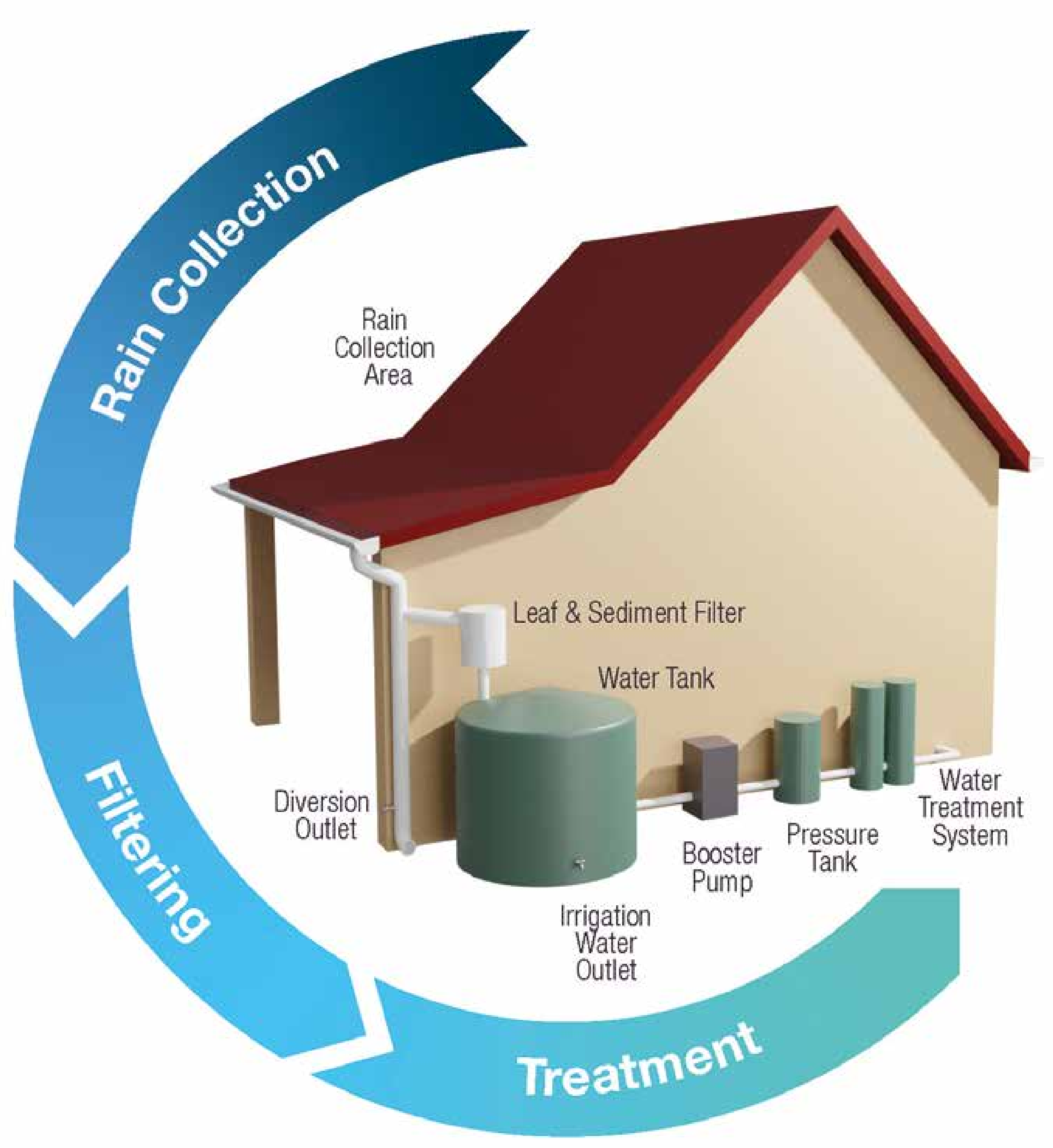
EN3 - Encourage and recognize specification and use of responsibly sourced materials that have lower environmental impacts over their lifetime.

EN5 - Site water and ecology - to encourage whole of site approach that improves the ecological value of the site while reducing stormwater runoff flooding pollution and erosion.

And while not related exclusively to rainwater processing, points for metal roofing can also be gained for EN4 - Construction waste - to encourage and recognize effective strategies that reduce the environmental impact of construction waste.

Overall

Homeowners collecting drinking water and greywater replacement from metal roofs can do so knowing they are risklessly harvesting a renewable resource which can also help with urban supply and stormwater flooding mitigation. Metal is the roofing material that is the best suited material for rainwater collection, and this is recognised by the NZGBC Homestar rating system.



THE ONEMANA SURF CLUB

Created offsite, a new modular building has expanded the capabilities for this Coromandel surf club. Using COLORSTEEL Altimate® cladding, the new club offers a crisp aesthetic that will last for years to come.

Since its formation in 1989, the Onemana Surf Club has operated out of humble headquarters. First, a simple caravan, parked on the beach, offered storage and shelter. Later, a cinder block extension to the public toilets provided a more permanent premises. After many years of planning, fundraising and grant applications, the club now has a brand-new purpose-built clubhouse that will provide the community with a space for events while also extending the surf patrol and training capabilities for the club.

The project was complicated due to the archaeological significance of the area which contains midden suggesting evidence of early Maori activity. Being a council reserve, it would have been difficult to obtain consent for any new building. So, the obvious solution was to build above the existing structure. To further avoid upsetting the archaeological zone, Leisurecom Homes manufactured the building in their factory before transporting it to site. Other than three holes excavated to create some structural legs for the building, the site remained intact.

Having the building recess into the landscape was an important factor when briefing the designer, says club chairperson Nick Mcleay. "We wanted more storage and a better clubroom, and it needed to blend in with the surrounding environment. When we were ready to press start on the building, it was going to have a board and batten exterior, but then several significant grants came our way and we were able to upgrade well beyond our original specs, and that included the cladding. The metal cladding makes it a durable and low maintenance building. If we had gone with board and batten, we would be having to stain it every other year, if not more often."

Altimate™ combines the exceptional corrosive resistance of marine grade aluminum with the proven paint technology of COLORSTEEL®

COLORSTEEL Altimate® in FlaxPod® was chosen for the project's roof and wall cladding. Altimate® combines the exceptional corrosive resistance of marine grade aluminum with the proven paint technology of COLORSTEEL®. The addition of Altimate® to the COLORSTEEL® range now means there's a suitable COLORSTEEL® solution for projects situated in some of the harshest conditions right along New Zealand's coastline.

For designer Jenny Walter, the cladding was also an aesthetic choice. "We used Metalcrafts MC760.It's a nice, cost-effective profile that gives the building the crisp lines that we wanted. By wrapping the whole building in COLORSTEEL®, it gives a nice envelope and the FlaxPod® colour helps it to recess into the landscape. We then have a couple of cedar panels just for contrast."

The building encompasses a kitchen, accessible toilet, control tower, viewing deck and secondary large deck to one side. The form came from the idea of a viewfinder, says Jenny. "You need to be up there and able to see all the beach, so the form of the building focuses the lifeguard's view. It's like a gunner's view, a slot view, of the whole beach to focus your attention."

For the club, having this extra space - and getting out of the ablutions block - has been a dream come true, explains Nick. "The room upstairs can be used for lifeguard training such as First Aid and CPR. It also means we can give back to other surf clubs, who have had our backs for years, and hold events here. We've also been able to open up to community groups, such as the local Onemana ratepayers and community association meetings. Surf school uses it as a competition tower. Community use is what we're trying to promote as a club. Without the community we wouldn't have our new clubhouse."

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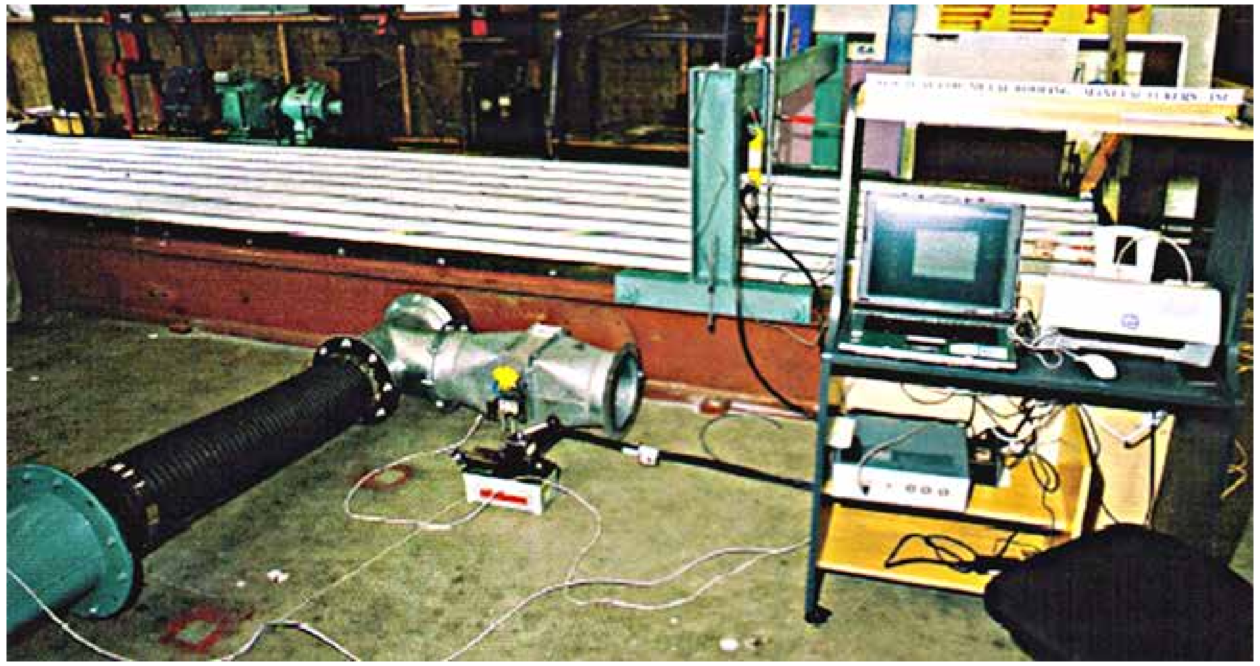
Roofing Installer:
Leisurecom Homes. www.leisurecom.co.nz. kevin@leisurecom.co.nz. Ph 07 823 5951

Roofing/cladding Manufacturer:
COLORSTEEL Altimate® in FlaxPod® with a MC760 Trapezoidal profile.

NZMRM AND WIND LOAD TESTING: PART II



In writing this it was not easy to reconstruct the first 8 or 9 years of life of the NZMRM Test Rig. Although the author was involved during most of its life (as an NZMRM Executive member) this involvement increased from “knowing about it” to more recently managing it and hands on “driving”. So if the earlier details are a bit hazy it is because no-one really kept records, until the last 5 or 6 years. However the basics of the history are correct if some of the dates are not.

This article is a description of the machine and how it has been and is used; its ownership, location and management/manning history; and changes in what it can do based on the changing requirements of the market. Finally a report on its current upgrade, planned to be finished by the time this is published (but held up, as so many things, by Covid-19).

What is it?

As previously stated the NZMRM test “machine”, which we call our Test Rig, has bypassed some of the earlier global methods of sandbags and airbags, gone straight to the “blow-off box”. it is a steel box 15 m long by 2.1 m wide and 330 mm deep. The sides are made of solid steel “C-Beams” as shown. This box has one end closed off and a moveable dam at the other end.

This allows the length of the actual box to vary between 15 m and (in theory) 0 m, in practice about 3 m. Inside this are 4 purlin mounts made of steel which carry the timber purlins into which the test roofing is fixed or attached. This allows for 5 spans, which is what NZMRM have traditionally used, and of course by removing purlins you can have 4, 3, 2 spans or indeed a single span. So this allows purlin spacing maxima of 3.4 m(not quite 3.5 by an original oversight); 4.5 m; 6.4 m or 7.5 m and anything less, depending on how you arrange the spaces – NZMRM use end spans of 2/3 main to allow for roof edge effects and so length required for 5 unequal spans is 4.33 x main span required.

Originally the “box” was formed by the two 15 m side C Beams, and the ends, located directly onto the floor, and screwed down over sealing material. This of course meant it wasn’t very easily relocatable, although it does seem to have moved about quite a bit in this configuration in its early days.

The pressure is generated by a rotary fan driven by a motor whose speed can be varied.

The purlin mounts were originally clamped onto the horizontal rails, and located by lifting and moving manually. We now have these with rollers at each end and they are locked to the rail by car jacks under each end. This significantly reduces the amount of time and effort needed to change spans.

Cyclic testing is where the pressure inside the box fluctuates quite rapidly between full pressure and a reduced pressure, and is supposed to simulate the action of fluctuating wind pressure, specifically as occurs during tropical cyclones (increasing in one direction, dropping off, then decreasing in the opposite direction) but also any other storm or gale wind variation pattern. This effect is produced by a shutter valve at the air inlet location which drops and raises pressure quite quickly. This is not frequently required in New Zealand.

History

The test rig was built around 2000 by A and S Engineering for Roofing Industries to a design by John Yolland and Stuart Thomson (probably based on the requirements of the Australian standards mentioned in Part 1), and was located at the Roofing Industries factory in Takapuna. It seems that in the succeeding 5 years it was “borrowed” by NZMRM members for testing carried out by John and Stuart around Auckland, in spite of the difficulty of relocation. (Easier times!)

In 2005 NZMRM purchased the rig from Roofing Industries, and then had to look for a permanent home for it. Several possibilities were considered, including NZ Steel at Glenbrook, Auckland University and Wintec at Hamilton. It did spend some time at Wintec and was there and used during the RANZ conference in 2005. The rig then visited (in some sequence) Dimond and Calder Stewart in Penrose. Also in this year the control system was originated by Mastec, based on Labview. Many changes to this were to eventuate.

No agreement with Wintec or any other possibility, transpired and it was relocated “temporarily”, still in one piece, to a shed in Great South Road Penrose, rented at the time by Pacific Coil Coaters. It seems to have been there from 2005 to 2008, during which time a number of alternative locations were discussed, again inconclusively. During this time the operation was computer operated by John Yolland, and physically by Ross Simpson and managed by Phil Meyers. A number of generic tests were done to develop Load Span graphs for the Code of Practice, and the rig was quite busy.

In 2008, to make it more portable, it was refashioned by Phil into 3 separate sections, with a floor, levelling screw feet and wheels. This meant it did not need to be attached to the floor and could be loaded onto a normal truck for movement. This also means the quality of the floor is fairly unimportant. This was zinc painted for protection, which has lasted well.

In 2009 the PCC location was closed and we had to look for alternatives. For a while it was used at AHI Roofing, with excursions to Taupo and possibly other places. Ross found a very suitable building in Huntly, on the main road, with access front and rear, which was then rented from Goodman Fielder, who at that time leased the entire block of buildings from the Shands family (an old established Huntly business).

It has been there ever since, and in the last 10 years has tested corrugate and trapezoidal top fixed, tray and clip fixed rib roofing, Australian clip fixed roofing, two lots of garage doors, steel and aluminium and clear roofing, SIPS, metal tiles and several other non-standard products for the major NZ manufacturers, and others. Static and cyclic tests have been performed.

The Testing Outcomes

The requirement is to test wind uplift resistance – Uniformly Distributed Load (UDL); initially only to Serviceability Limit State (per AS 1562.1) as a static single pressure load, and much more recently to Ultimate Limit State. It was also needed to be able to test cyclic wind pressure resistance, initially to more than one protocol but then only to the Low-High-Low programme developed by the Cyclone Testing Station to more accurately predict performance in tropical cyclones in the D regions of Australia, but not used in New Zealand. We have tested to all of these and some quite long programmes to L-H-L. (This does require knowledge of a target set by static testing, and is very time-consuming).

We also test concentrated (point) load to determine the trafficability of roofing. This includes measurement of deflection in up to 6 locations. (This equipment has also been upgraded).

The Method.

This has basically remained the same with improvements to allow for increased pressure. The purlins are mounted at the appropriate spacing. The dam is sealed in placed at the sheet length. Depending on the width of the product sheet and the nature of the profile, the box top is covered with part sheets at each side, and one or two (or more for e.g. narrow tray) full sheets in the middle. The sides are clamped down as well as possible, and the sheets fixed in the normal way for the product and the fastening pattern being tested. The aim is to give at least one sheet fixed more or less as it would be on a roof, unaffected by the box side clamping. At each end the sheets are fixed more densely to avoid end blow-off (which does create an anomaly and is why we observe the central purlins).

Using the computer, the pressure is gradually increased and the product observed for serviceability failure, as defined, round the fasteners. Pressure and observation is recorded manually. If deflection is being measured this is also recorded. Serviceability failure is noted. If Ultimate failure is required then the pressure continues to be increased until the sheets are damaged to the point where no more pressure can be exerted, and the sheets have separated from the purlins in at least one place. This is normally when the sheet blows off over the screws or along an overlap.

Operation and Charging

This rig is owned as a service to NZMRM members and apart from a daily charge, only recovers costs. Operation requires one person to control the system using the computer, and a minimum of one other person to fix the roofing. As lengths increase 2 or 3 people are required to actually handle the sheets, which can be very heavy. The fixing time also decrease proportionately with more people. These people are all charged out at cost.

If the results require certified depreciation to AS/NZS 1170 then a CPEng (Chartered Professional Engineer) is needed to do or verify the results. NZMRM has used one person for this for 10 years.

The Control System

This was developed early on in the piece by Mastec after discussions with John Yolland, and it has been upgraded several times, and recently undergoing a major one to cope with the increased pressures. This has been running on several computers with different (now obsolete) operating systems. One of the pictures shows the original desktop PC. This was stolen and replaced by a laptop of some sort (also stolen). Since then we have uses two pairs of (oldish) laptops, taken away from site and one each kept by different people. We now need a further upgrade (to Windows 10!) to cope with the most recent programme upgrade.

The programme allows control of the power fed to the variable speed drive to control the fan, at the same time recording the pressure inside the box. Several relays connect the test rig and the motor to the computer. It has produced, with varying degrees of success, plots of pressure against time, or against deflection. In practice, and started by John Yolland it has proved better to record what happens as the pressure is increased. This also records the concentrated load and deflection.

The Upgrade

During this time the maximum pressure achievable (subject to leaking) has increased from 6.5 to 7.5 to 8.5 kPa by tweaking the variable speed drive. We have learned to minimise leaking by changing the way the sheets are clamped to the sides and the main leaks now occur from the dam end. We have reinforced the floor underside supports significantly.

In spite of this, ever increasing demand for higher and higher pressures, has required a significant overhaul and upgrade, which is being completed as this is written.

This upgrade includes a new and bigger fan with a more powerful motor and, to cope with the increased pressure, floor thickened with 4 mm Corten and painted with anti-corrosion, anti-slip paint, side clamping improved, end dam completely remade with hinged base to improve sealing, and roller movement along rails, like the purlins. This no longer needs to be lifted over floor joints.

The control system has been updated and again tweaked. The aim is to be able to generate testing pressures up to 15 kPa (which depending on whose calculator you use = 750 or 550 km/hr, really?)

In addition, those who have been there will be pleased to learn we are also improving the interior of the building. Taking the leases back by the Shands family has meant some much needed maintenance (and also higher rent).

The Future

As it enters its 3rd decade completely rebuilt, and with a better understanding of the increased demands for testing, it can continue to provide a service the NZMRM members and their own customers for another decade at least.

SCOPE

NZ METAL ROOFING MANUFACTURERS INC.

Members

Ashburton Long Run Iron
5 McGregor Lane Ashburton 7700
Telephone: 03 3081850
Contact: Eliza Waszczak
www.longruniron.co.nz

Ellerys Roofing Direct Ltd
250 Main South Road
Karoro
Telephone: 03 7686514
Contact: Clark Ellery

B J Moss Ltd
PO Box 1007
Gisborne
Telephone: 06 867 1219
Contact: Roger Moss
www.bjmoss.co.nz

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

Continuous New Zealand Ltd
PO Box 151
Takanini, Auckland
Telephone 09 268 1555
Contact: Peter Mullions
www.continuous.co.nz

Contour Roofing Nelson Ltd
PO Box 9015
Annesbrook, Nelson
Telephone: 03 546 4260
Contact: Dave Freeman
www.contourroofing.co.nz

Dimond Roofing
PO Box 13546
Otahuhu, Auckland 1643
Telephone: 09 622 4625
Contact: Aidan Taylor

Franklin Long Roofing Ltd
PO Box 151
Pukekohe, Auckland
Telephone: 09 238 9249
Contact: Warren Oliver
www.franklinroofing.co.nz

Gerard Roofs
PO Box 18071
Glen Innes, Auckland
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Alan Wilson

Marshall Industries Ltd
PO Box 846
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Telephone: 03 218 2579
Contact: Tom Marshall
www.marshalls.co.nz

Metal Roofing Systems Ltd
PO Box 117
Takanini, Auckland 2245
Telephone: 09 268 8959
Contact: David Moselen
www.megamiroofing.co.nz

Metalcraft Roofing
PO Box 51286
Pakuranga, Auckland
Telephone: 09 274 0408
Contact: Tony Barbarich
www.metalcraftgroup.co.nz

Metal Design Solutions
PO Box 33
Drury, Auckland
Telephone: 09 294 9134
Contact: Jan Alberts
www.metaldesignsolutions.co.nz

Ross Roof Group
PO Box 72-062
Takanini, Auckland
Telephone: 09 299 9498
Contact: Mike Budd
www.metrotile.com

Quin Roofing Ltd
PO Box 1087
Levin, 5540
Telephone: 06 3679480
Contact: Bruce Love
www.quinbuildings.co.nz

Roofing Industries Ltd
PO Box 302 385
North Harbour Post Centre 0751
Telephone: 09 414 4585
Contact: Paul Ross
www.roof.co.nz/

Roofline Canterbury Ltd
PO Box 16302
Hornby, Christchurch 8441
Telephone: 03 349 8439
Contact: Colin Megaw
www.roofline.co.nz

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

Steel & Tube Roofing
PO Box 204216 ,Highbrook,
Manukau 2162, Auckland
Telephone: 0800 333 247
roofing@steelandtube.co.nz
www.steelandtube.co.nz

Stratco (NZ) Ltd
PO Box 8494
Christchurch
Telephone: 03 338 9063
Contact: Andrew Staff
www.stratco.co.nz

Taranaki Steelformers Ltd
Wanganui Steelformers
King Country Longrun
PO Box 36 Stratford
Telephone: 06 765 5191
Contact: Chris Back
chris@steelformers.co.nz
www.steelformers.co.nz