



# NZRMCA NEWS

ISSUE 3 APRIL 2013

CONCRETE TRUCK  
PHOTO COMPETITION  
FINDS A SPECTACULAR  
WINNER – SEE INSIDE



THE NEW ZEALAND  
READY MIXED  
CONCRETE  
ASSOCIATION INC.

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## MESSAGE FROM THE PRESIDENT



Kia Ora readymixers,

The first three sunny months of 2013 have already passed us by, and while the best summer in many years poses some challenges in terms of placing concrete, I know we will miss it when it's gone.

A quick look at the various economic indicators, particularly ready mix volumes, suggests that construction activity across the country is picking up. Concrete production in the December 2012 quarter was up on the previous quarter as well as the same quarter from 2011.

It is interesting to note that concrete volumes are becoming a mainstream metaphor for progress, with business commentators the NZ Institute of Economic Research (NZIER) and the Earthquake Recovery Minister Gerry Brownlee both quoting them recently to demonstrate growth.

The Minister, when quizzed about development in the Christchurch CBD, responded "With 930 full or partial demolitions completed in the central city, 2013 will be the first big year of pouring concrete as we shift from demolition to construction."

The recent combined North Island meeting in Taupo was once again well attended, and is proving to be an excellent way of getting members together to discuss common issues, and at the same time enjoying each other's company.

The NZRMCA Council will meet next in May, and one of many agenda items will be the 2013-14 Business Plan. I anticipate the template will remain relatively unaltered, with initiatives grouped under the strategic themes of Training & Education, Membership Support, Quality and the Christchurch Recovery.

Council will however, continue to ensure the Plan remains relevant and practical, with an overall emphasis on delivering value to members. The on-going monitoring of New Zealand Standards will again form a vital part of the Plan, as will maintaining strong and productive relationships with aligned industry associations and Government agencies.

The 2013 NZ Concrete Conference falls under the Membership Support theme, and is scheduled for 3-5 October in Queenstown. The NZRMCA will again manage two concurrent sessions dedicated to ready mix centric papers. In fact, Council is currently busy identifying and approaching prospective speakers for a quality line-up.

To ensure optimum attendance at the NZRMCA AGM it will take place during the last slot of the second NZRMCA session on 4 October. I urge all those ready mixers planning on going to the Conference to come along and participate in the decision making process.

One issue of business at the AGM, will be addressing any Association rule changes ("remits") that have been tabled. Last year, as listed in the box below, a number of crucial remits were sanctioned.

This latest issue of the newsletter brings you up-to-speed on the issue of imported cement, and the steps the NZRMCA is undertaking to ensure members are provided with appropriate guidance. The new NZRMCA website is also covered, along with two recently completed safety alerts on the subjects of cement silo safety and blowback.

Although relieved, I am not at all surprised that the Royal Commission of Enquiry into the collapse of the CTV building found no evidence of under strength concrete in critical columns, as had been claimed. I would like to thank Rob Gaimster and the CCANZ team for the work undertaken in presenting the case for concrete. Their task was time consuming, complex and of immense value to all sectors of our industry.

Finally, I would like to congratulate the winning and highly commended entries into our concrete truck photo competition. Both Higgins Concrete and Allied Concrete supplied outstanding images that capture just how challenging the delivery of ready mixed concrete can be, and just how committed our industry is to exceeding the customer's expectation – literally going the extra distance.

Jeff Burgess

### 2012 NZRMCA REMITS

- Introduce requirements for compressive strength testing and a declaration as to NZS 3104 and/or NZS 3122 (cement certification) compliance on application for Full Membership by a person whose plants will not be subject to the Plant Audit Scheme.
- Introduce an annual requirement for Full Members who have a plant or plants not subject to the Plant Audit Scheme to provide compressive strength testing results and declarations as to NZS 3104 and/or NZS 3122 (cement certification) compliance.
- Provide for termination of Membership if these annual requirements are not met.



## AROUND THE REGIONS

### COMBINED NORTH ISLAND

By John Stewart

Encouraged by the success of last year's event, a combined North Island meeting was held at the Suncourt Hotel and Conference Centre in Taupo. Once again attendance was excellent, with around 60 people present at the meeting.

The guest speaker was Dr Gill Jolly, Head of Department - Volcanology, at GNS Science. Dr Jolly gave a fascinating presentation on New Zealand's three distinct types of volcanoes - volcanic fields, cone volcanoes and caldera volcanoes.

The GNS base in Taupo is not there by coincidence, with most of New Zealand volcanism in the last 1.6 million years occurring in the Taupo Volcanic Zone (TVZ). The zone extends from White Island to Ruapehu, and includes three frequently active cone volcanoes (Ruapehu, Tongariro/Ngauruhoe, White Island), and two of the most productive calderas in the world (Okataina and Taupo).

The focus of Dr Jolly's attention was the recent unrest and volcanic gas emissions from Mount Tongariro, which were still clearly visible on the day of the NZRMCA meeting.

NZRMCA President Jeff Burgess brought the group up-to-date with progress on current issues, while Adam Leach gave the CCANZ update. Adam highlighted the Base Isolation and Concrete Specification seminars CCANZ will be involved with over coming months, as well as announcing the appointment of Dr Alistair Russell to the position of Manager - Structural Performance & Engineering Systems.



*Dr Gill Jolly of GNS Science*



*NZRMCA President Jeff Burgess presents the Northland region Chairman Maurie Hooper with his Certificate of Appreciation*

A particular highlight of proceedings was the presentation of a Certificate of Appreciation to Maurie Hooper, current Chairman of the Northland region. Cameron Greig, Northland Secretary, paid tribute to Maurie's contribution to the NZRMCA and wider ready mixed concrete industry.

Juggling his NZRMCA responsibilities with the demands of managing a successful concrete business and a busy family life, Maurie has been tireless in his efforts to offer assistance where ever he can.

Along with fellow Northlander, the late Bob Bruce, Maurie has been a stalwart of the NZRMCA for decades, providing direction and energy that ensures this geographically challenging region continues to function effectively and deliver value to members.

Widely acknowledged as an expert in his professional fields, as well as a true gentleman, the dedication and commitment Maurie exhibits in all his undertakings was clearly evident in the kind words of Wharehine Contractors' Steve Dodd (relayed by Cameron).

This newsletter will feature a more detailed look at Maurie's career later this year.

After the conclusion of formalities, the collective throng made its way down to the lake and boarded the Chris Jolly Outdoors cruise cat for a barbeque and trout fishing dinner cruise. Rumour has it that the fish were defenceless when faced with the skilled anglers on board. However, no evidence of the "catch" can be produced to substantiate such a claim.

### CEMENT SILO SAFETY

Over recent months the NZRMCA has been fortunate to have had Laurie Porter of Holcim (New Zealand) Limited visit the majority of regions and deliver his presentation on the importance of cement silo safety.

The well received presentation was based on Laurie's 2012 NZ Concrete Conference paper *New Zealand Silo: Equipment and Industry Safety Standards*, which he co-authored with John McLachlan of Skookums Technology Ltd and Grant Honeycombe of Golden Bay Cement.

Such has been the response to Laurie's key messages that the NZRMCA has condensed them into a "Safety Alert" (see page 6) for distribution across the industry. In addition, the South Island NZRMCA road show, scheduled for later in 2013, will include a segment on cement silo safety presented by Laurie.



*Laurie Porter of Holcim (New Zealand) Limited*

### NEW CENTRAL NORTH ISLAND CHAIRMAN

Paul Donoghue of Firth Industries has taken over responsibilities as the Central North Island region Chairman. Paul replaces Jason Savage of Holcim (New Zealand) Limited who recently stood down.

The NZRMCA would like to acknowledge Jason's contribution over the past few years, and wish him all the very best in his future endeavours.

Paul will chair the next Central North Island region meeting scheduled for 23 May in Hamilton.



*Paul Donoghue of Firth Industries is the new Central North Island region Chairman*

## CEMENT FROM OTHER THAN TRADITIONAL SOURCES

With the availability of cement from non-traditional sources increasing, the NZRMCA has sought to advise members on the compliance requirements of NZS 3104 *Specification for Concrete Production*.

Essentially, imported cement must match the performance of local cements, which are themselves controlled by NZS 3122 *Specification for Portland and Blended Cements (General and Special Purpose)*.

Where ready mixed concrete plants are using imported cement there is a requirement to implement shipment assurance testing or supply testing information that provides an assurance that NZS 3122 is being complied with.

In late 2012 the NZRMCA distributed to members *ATIC-SPEC Section SP43 Cementitious Materials for Concrete* from the Australian Technical Infrastructure Committee (ATIC) as guidance around testing.

Since that time the Plant Audit Scheme (PAS) has been amended so that there is now a requirement to report annually that shipment assurance testing or supply testing information is being obtained. This applies to both imported and local cement.

The PAS Annual Report form has been altered to reflect this change. An update to the PAS Handbook section *G9 - Cement Compliance with NZS 3104* is currently being completed, and will be distributed shortly.

NZRMCA members should also be aware that at the 2012 AGM a remit was passed that requires full member applicants, and those members not covered by the PAS, to declare annually that their cement complies with NZS 3122 – see page 2.



Image: PCA

## NZRMCA UPGRADES WEBSITE

At the beginning of 2013 the NZRMCA launched its new website. Still found at [www.nzrmca.org.nz](http://www.nzrmca.org.nz), this online repository of all things ready mixed concrete in New Zealand is key to the Association's communication strategy.

The design of the website now complements the revised newsletter, as well as having a more efficient structure and an increased amount of New Zealand and overseas content.

NZRMCA Executive Officer Adam Leach outlines the background to the project. "During 2012 the Council decided that a more proactive approach to member communications was required to raise awareness of the valuable initiatives the Association was under taking on behalf of the industry," says Adam.

"Along with the NZRMCA newsletter and better representation at regional meetings, the website forms the axis of information sharing tools used by the Association to alert members of new industry developments, best practice and regulatory responsibilities."

NZRMCA President Jeff Burgess is extremely pleased with the outcome. "Not only have we refreshed the look and feel of our website, but the ease with which it can now be updated will ensure more timely and relevant information is shared with industry," comments Jeff.

"Council is very aware of need to demonstrate value to members, as well as meeting the Association's core objectives of facilitating quality assurance / control, standards development, training, education and research, along with the general promotion of concrete. The new website will make these tasks much simpler."





## NZRMCA SAFETY ALERT

The NZRMCA takes the issue of health and safety extremely seriously. Following on from the recent driver training DVD and truck driver hand signals initiatives, the Association has issued two brief safety alerts covering cement silo maintenance and blow back from line pumps.

### CEMENT SILO SAFETY

As a follow-up to Laurie Porter's, of Holcim (New Zealand) Limited, series of presentations around the regions, the NZRMCA have developed this safety alert to address the use of pneumatic pressure systems in the delivery and storage of cementitious product to sites.

The main areas of concern identified are:

- All gravity silos must have a working alarm system, and its operation must be checked weekly. For non-self-test systems the Bin-Dicator must be checked monthly.
- All gravity silos must have an over pressure valve that is maintained monthly.
- All gravity silo filters must be working and have a minimum surface area of 24m<sup>2</sup>. The filter's operation must be checked weekly and inspected and serviced three monthly.
- Six monthly inspections of plant and equipment.
- Ensure maintenance and alarm activation records.
- Annual certification of pressure silos and air receivers (by third party inspectors).
- Two yearly site audits by cement supply company.
- Full training for anyone operating any equipment including pressure vessels.
- Do not tamper with any safety device, including high level alarm systems, pressure vessel safety valves and silo over pressure valves.

A preventative maintenance program and fault report template are also included with the Safety Alert.

### BLOWBACK

This NZRMCA Safety Alert addresses the issue of concrete blowback into the truck mixer or bowl, which can be an inherently dangerous procedure unless carefully controlled.

Blowback uses high air pressure to move residual concrete from the line or boom pump back into the truck mixer or bowl. Air pressure will cause anything inside the pipe to act as a high velocity projectile.

Blowback differs from 'pumping' residual concrete back into the truck mixer or bowl. However, excessive pumping pressure may also create similar problems.

The safety alert identifies three main risks:

- Risk 1 High air pressure and pipe movement during blowback can cause pipe joints to fail and break apart.
- Risk 2 Concrete in the pipe subjected to air pressure during blowback can rebound and exit the truck mixer or bowl causing property damage or injuring bystanders.
- Risk 3 Climbing a concrete truck ladder while carrying a line pump pipe is potentially dangerous.

In response to these risks the NZRMCA:

- Strongly advises against the practice of blowback from line pumps
- Blowback from boom pumps should only be carried out with appropriate health and safety measures in place

Risk reduction measures, and on-going actions are also identified to assist with all round health and safety in this area.



**NZRMCA SAFETY ALERT**  
**CEMENT SILO SAFETY**

MARCH 2013

#### HAZARD IDENTIFIED

This NZRMCA Safety Alert addresses the use of pneumatic pressure systems in the delivery and storage of cementitious product to sites.

The main areas of concern are listed below. A preventative maintenance program and rudimentary fault report template are also included.

- All gravity silos must have a working alarm system, and its operation must be checked weekly. For non-self-test systems the Bin-Dicator must be checked monthly.
- All gravity silos must have an over pressure valve that is maintained monthly.
- All gravity silo filters must be working and have a minimum surface area of 24m<sup>2</sup>. The filter's operation must be checked weekly and inspected and serviced three monthly.
- Six monthly inspections of plant and equipment.
- Ensure maintenance and alarm activation records.
- Annual certification of pressure silos and air receivers (by third party inspectors).
- Two yearly site audits by cement supply company.
- Full training for anyone operating any equipment including pressure vessels.
- Do not tamper with any safety device, including high level alarm systems, pressure vessel safety valves and silo over pressure valves.

#### MINIMUM SILO DESIGN REQUIREMENTS



**Inspection Hatch**  
(Mounted within 400mm of high level indicator with guarding to prevent entry to the silo)

**High Level Alarm**  
(Mounted approx 1m down from silo roof depending on the silo size)

**Safety Chains**  
(All ladders on the silo roof that can be removed inside a 3m non-hinged hatch equipped with 100mm chain fitted to ensure item cannot fall to the ground)

**Access Stairs/ Ladders**  
(Must have lockable gate to prevent unauthorised access)

**Silo Filter**  
(min 24m<sup>2</sup>)

**Pressure relief valve**  
- Operates on 1 psi / 7 kPa  
- Not a mechanical overfill protection device

**Fill line**  
100 mb

**Silo Design**  
- Max pressure 2 psi / 14 kPa (NOT A PRESSURE VESSEL)

**Blow In Pressure**  
- 120 kPa max blow in pressure with 24m<sup>2</sup> filter  
- 90 kPa max blow in pressure if filter < 24m<sup>2</sup>

**Site Identification**  
- Labelled with product code & silo number

**Out of Hours Deliveries**  
- Delivered to be kept in filler bin  
- After hours compressor and filler start

**Spring to close on air or power failure**

**Siren & flashing light**  
Must be in full view during tanker operation

**Control panel**  
near fill point

**Fill point with cap**  
(100mm small hole to allow breathing)

**Fill hose restraint hook**







**NZRMCA SAFETY ALERT**  
**BLOWBACK**

MARCH 2013

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Blowback uses high air pressure to move residual concrete from the line or boom pump back into the truck mixer or bowl. Air pressure will cause anything inside the pipe to act as a high velocity projectile.

Blowback differs from 'pumping' residual concrete back into the truck mixer or bowl. However, excessive pumping pressure may also create similar problems.

**RISK 1** High air pressure and pipe movement during blowback can cause pipe joints to fail and break apart.

**RISK 2** Concrete in the pipe subjected to air pressure during blowback can rebound and exit the truck mixer or bowl causing property damage or injuring bystanders.

**RISK 3** Climbing a concrete truck ladder while carrying a line pump pipe is potentially dangerous.

**THE NZRMCA STRONGLY ADVISES AGAINST THE PRACTICE OF BLOWBACK FROM LINE PUMPS**

**BLOWBACK FROM BOOM PUMPS SHOULD ONLY BE CARRIED OUT WITH APPROPRIATE HEALTH AND SAFETY MEASURES IN PLACE**

#### RISK REDUCTION MEASURES

- The pump operator must inform the truck driver when blowback (and pump back) from a boom pump has commenced and ceases. The same applies for pumping back into the truck mixer or bowl from a line pump.
- All lines must be securely fitted.
- A suitable work platform must be provided by the pump operator prior to pumping back into the truck mixer or bowl from a line pump.
- When using high air pressure to clean the pipe, a release valve and catch basket are to be used to secure debris and sponge bung.

#### ONGOING ACTIONS

- Inform people working in the vicinity of blowback (and pump back) risks.
- Make this an agenda item at any safety meetings.

Some ready mix concrete suppliers do not permit blowback (or pumping back) into their trucks. Permission must be sought for such practices to be put into place.



The NZRMCA strongly advises against the practice of pressure blowback from line pumps into the truck mixer or bowl.

**DISCLAIMER**

The New Zealand Ready Mixed Concrete Association (NZRMCA) has developed this alert in the interests of promoting safety awareness. It is not, however, a comprehensive safety publication. Various health and safety (H&S) laws, regulations and standards may apply to the hazard procedure or matter described in this publication. NZRMCA has not conducted a review of operations with site and following this publication may not ensure your compliance with them. It is your responsibility to be aware of and to comply with all applicable H&S Laws. This publication is not a substitute for proper professional advice.

Based on CCAA Industry Safety Flag 03



**BE AWARE. BE ALERT**

These NZRMCA Safety Alerts can be downloaded from the Safety Alert section of the NZRMCA website – [www.nzrmca.org.nz](http://www.nzrmca.org.nz)

## CONCRETE PUMPING HEALTH AND SAFETY GUIDELINES

Pumping concrete is an efficient method of moving and placing concrete. This process is used in the manufacture of pre-cast and tilt-up panels, concrete formwork, slab construction, concrete paving and concrete spraying.

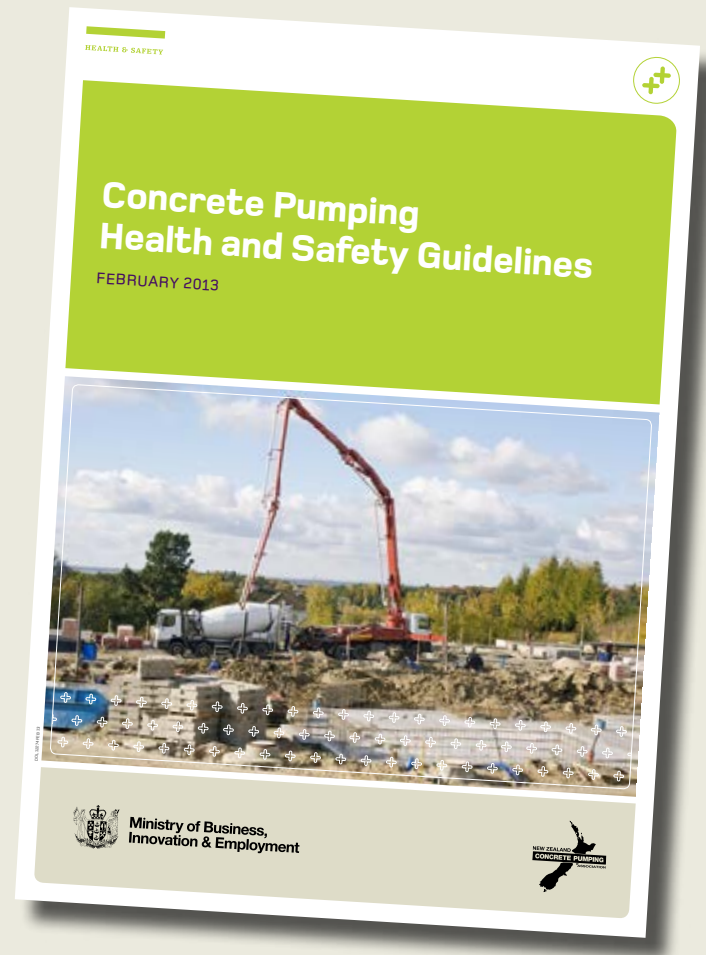
These guidelines provide practical advice about the safe operation and maintenance of concrete pumping equipment and the environment this equipment is used in.

They are based on the current knowledge of construction methods within the industry and were prepared by a committee of representatives from the Concrete Pumping Association of New Zealand (CPANZ) and the Ministry of Business, Innovation and Employment (MBIE) with input from a public consultation process.

The guidelines include the following topics:

- managing site hazards such as noise, wet cement, manual handling, carbon monoxide and electricity
- safe work planning and preparation, including principal-contractor liaison
- concrete pumping equipment set-up
- concrete pumping operation
- maintenance and inspection

The guidelines can be downloaded from the MBIE Labour Information website – [www.dol.govt.nz](http://www.dol.govt.nz)



## THE BENDOMETER IS BACK

The Cement & Concrete Association of New Zealand (CCANZ) and the Pacific Steel Group have reissued the Bendometer to assist best practice in the bending of steel reinforcing.

The Bendometer is endorsed by building and housing of the Ministry of Business, Innovation and Employment (MBIE).

During use the appropriate disc should be selected by matching the width of one of the notches to the diameter of the bar to be checked.

The inside diameter of each bend in the bar should be equal to or greater than the diameter of the selected disc.

Any bend with an inside diameter less than the diameter of the selected disc, does not comply with New Zealand Standards.

Note: The Bendometer is intended for use on main bars only, not for stirrups and ties.

The Bendometer is freely available by contacting CCANZ on 04 499 8820 or by emailing [admin@ccanz.org.nz](mailto:admin@ccanz.org.nz).



**Ministry of Business,  
Innovation & Employment**



**Building & Housing**



## ROYAL COMMISSION – CTV BUILDING HEARING FINDINGS RELEASED

The Canterbury Earthquakes Royal Commission recently completed its hearing into the collapse of the CTV Building during the February 2011 earthquake.

On 29 November 2012 Part Three of the Commission's final report was delivered to the Government, which then released it to the public on 10 December 2012.

The release of the Commission's report into the collapse of the CTV Building was of particular interest to the New Zealand ready mixed concrete industry as questions had been raised about the quality of concrete used to construct the building.

### BACKGROUND

In early 2011 the Minister of Building and Construction instructed the former Department of Building and Housing (DBH) to conduct a technical investigation into the four relatively modern multi-story buildings in the central business district that suffered serious structural failures - including the CTV building.

The DBH investigation produced the *CTV Building Collapse Investigation* and the *CTV Building Site Examination and Materials Tests* reports. The former identified nine factors that contributed (or may have contributed) to the failure, one of which was "low concrete strengths in critical columns".

### CONCRETE INDUSTRY RESPONSE

The Cement & Concrete Association of New Zealand (CCANZ) communicated to the Commission its concerns about the concrete core testing methodology and result interpretation used to arrive at this conclusion.

In August 2012 CCANZ CEO, Rob Gaimster, appeared before the Commission as part of a panel discussion dedicated to the issue of concrete strength.

This was just one of the many tasks undertaken by CCANZ during what was essentially a 1-year work programme.

### COMMISSION'S FINAL REPORT

Part Three of the Commission's final report was delivered on 29 November 2012 and was released by the Government on 10 December 2012. The Commission found no reason to believe that below strength concrete was present in the CTV building.

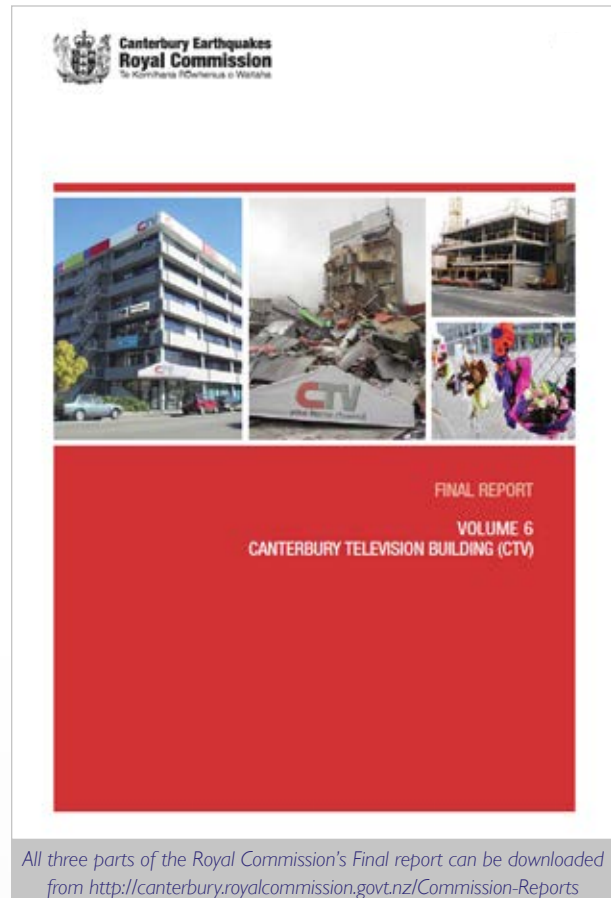
Taking into account all of the evidence we heard on the issue we are of the view that the concrete was likely to have been at or above the strength specified by the designer and that there is no reliable evidence to suggest the concrete was understrength in any columns.

*Canterbury Earthquakes Royal Commission, Final Report, Part 3, Volume 6: Canterbury Television Building (CTV), 2012, p 99.*

Notwithstanding the conclusions of the Hyland/Smith technical investigation report (prepared for the former Department of Building and Housing) that the strength of the concrete in the columns was insufficient, we have concluded that the concrete was likely to have been at or above the strength specified by the designer. No reliable evidence has been given to suggest the concrete was under-strength in any columns.

*Canterbury Earthquakes Royal Commission, Final Report, Part 3, Volume 6: Canterbury Television Building (CTV), 2012, p 303.*

The concrete industry is acutely aware that the Commission has had a long and difficult job to make sense of the many hours of expert reports and evidence placed before them.



In particular, we should acknowledge the time the Commission spent understanding the concerns our industry, and other experts, had about the quality of the concrete core testing in the technical investigation.

New Zealand should be re-assured by the fact that in our Plant Audit Scheme we have a world-class mechanism that helps to ensure the production of ready mixed concrete complies with NZS 3104 *Specification for Concrete Production* and in turn the Building Code.

The concrete industry acknowledges the Commission's report is an important step in helping families, friends and colleagues come to terms with their loss.

The collapse of the CTV building is a tragedy within a tragedy, and it is imperative that the construction industry learn important lessons from the Christchurch earthquakes.

The government will issue a "full and comprehensive response" by mid-2013.

### NZRMCA SUPPORT FOR CCANZ

*A key component of the NZRMCA 2012-13 Business Plan is supporting CCANZ projects.*

*CCANZ's ongoing representation of the wider concrete industry in response to the Royal Commission's enquiry into the collapse of the CTV building forms part of their "Monitor the Legislative and Regulatory Environment" project.*

*A summary of the specific CCANZ projects supported by the NZRMCA will appear in the next issue of this newsletter.*



WINNER

# CONCRETE TRUCK PHOTO COMPETITION



## WINNER

### HIGGINS CONCRETE – WELLINGTON HARBOUR

In May 2012 Higgins Concrete Wellington supplied 18m<sup>3</sup> of concrete to Utility Construction for a wind turbine foundation located on Somes/Matiu Island in Wellington Harbour. On a picture perfect day, four 4.5m<sup>3</sup> concrete trucks, loaded at Higgins' Glover Street plant, boarded the barge at Eastbourne. Upon arrival at Somes/Matiu Island, the trucks travelled up from the beach to the island's highest point, discharged into the foundation block, then made their way back down to the barge. The job complete - all trucks were delivered home safe and sound, much to the relief of Higgins Manager, Scott Ferguson.

HIGHLY  
COMMENDED





Image (and front cover): HELIPRO



## HIGHLY COMMENDED

### ALLIED CONCRETE – MOUNT HUTT

In 2006 Allied Concrete supplied 600m<sup>3</sup> of concrete for the pylons of the Summit Six Chair Lift on Mt Hutt (2080m above sea level). Due to the steepness of the terrain only 6 wheeled Sterling trucks were used, each carrying a maximum of 3m<sup>3</sup> - anymore and the concrete poured out the back. Larger trucks from the Ashburton fleet hauled their loads to the ski area base at 1620m where the concrete was transferred to the shuttle trucks. The Sterling trucks' low down torque helped attack the 460m climb, which took 40 minutes to negotiate and included several three point turns.





## BRIDGING THE GAP WITH FIRTH INDUSTRIES

With geography as steep and rugged as New Zealand's, bridges have played a significant role in our country's development. Across urban and rural settings, or rail and road applications, we boast some truly magnificent bridges.

Grafton Bridge in central Auckland, the Fairfield Bridge in Hamilton, the Opawa Bridge in Blenheim and the Kopuawhara Viaduct are classic examples of bridges from the early 20th century. The north and south Rangitikei Viaducts, the new Hapuawhenua Viaduct, and the Otira Viaduct are notable contemporary structures from the late 20th century.

Concrete is the common construction material across all these bridges – a trend maintained with the assistance of Firth Industries in two recent projects, both of which posed many logistical challenges.

### TRANSALPINE RAILWAY BRIDGE 27

Restricted access and harsh working conditions were only some of the issues faced by the teams at Firth and MacMillan Drilling, the sub-contractor appointed by Downer, for repairs to Bridge 27 on the Midland Line of the TransAlpine Railway between Springfield and Craighburn.

#### HISTORY

The bridge was originally constructed at the beginning of the 20th century, and formed the last link in the railway between the east and west coasts of New Zealand.

Six of the original mass piers were constructed in concrete, with the remaining two piers and abutments in timber. The replacement of the timber elements with new concrete piles and pile caps was non-negotiable in terms of ensuring the long-term stability of Bridge 27.

#### PILING CONTRACTOR COMMENT

"The conditions were pretty tough as we were subjected to heavy frosts and snow during the six months of repair work," says Jaron

McMillan, Company Director of McMillan Drilling. "We were required to permanently case piles (4 x 1200mm in diameter and 4 x 1050mm in diameter) with casing depths to 14m. This also involved using temporary driven UC piles with steel truss supports, to hold the viaduct in position while the permanent concrete pile caps and bridge piers were poured."

Adding to the project's difficulties was the remote location of the bridge. "The site is extremely isolated, about a two hour drive from our Darfield plant in Christchurch," says Dominic Sutton, Chief Operating Officer - Southern for Firth. "We were also required to pump the concrete over 100m across a live rail line as there was no vehicle access to the south side of the bridge."

In order to meet the clients pour rate requirements Firth also brought concrete from its Greymouth plant. This was the first time the company had supplied a single project from plants located on either side of a mountain range.

#### A COMPLETE TEAM EFFORT

"A key characteristic required of the concrete on this job was that it had to have early high strength," explains David Jackaway, Contract Manager for Downer. "The site required a concrete strength of 40MPa and the concrete had to achieve a minimum strength of 30MPa before departure."

Independent concrete testing carried out by Telarc/IANZ accredited Downer Laboratory in Christchurch, showed the concrete achieved the required strength. The tests also demonstrated that the strength was developed very quickly, with a minimum seven day result of 41MPa and a maximum 28 day strength result of 60.5MPa.

"Firth did a good job as the site provided many challenges for concrete work, including the cart distance from the Darfield plant, difficult access conditions, pumping over 100m across the bridge and the cold weather," adds David. "The concrete was generally of a high quality and together we achieved an excellent end product."





## KOPU BRIDGE

In mid-2009 Firth Industries were awarded the concrete supply for the new Kopu Bridge near Thames. Involvement with this estimated \$47 million dollar project required the upgrade of a small rural plant to ensure the production of consistently high quality concrete.

### BRIDGE STATS

The project is a new 580m long two lane bridge over the Thames estuary, adjacent to the old single lane bridge. The bridge itself consists of piles up to 50m deep, which support 15 pile caps and piers. A steel beam arrangement has been adopted, with a 200mm thick 12.8m wide concrete deck slab. The span has two lanes for vehicles and a separated pedestrian and cycle way. The main single span of the bridge is 42.8m long, and sits approximately 6.5m above mean sea level to allow for the passage of boats.

### THE CONCRETE PLANT AND FLEET

The Firth Industries plant at near-by Thames is over 25 years old, and was designed to cope with the demands required of a small rural plant. This new project however, required larger volumes of high specification concrete that the existing plant could not supply without significant modification.

As such, alterations were made to the plant, including electrical upgrades and a larger capacity cement weigh hopper. A water weigh hopper replaced the old flow meter; and a new electronic batch card system was introduced to ensure accurate moisture control.

The ability to comfortably service up to seven trucks from the wider Firth fleet called for further plant alterations.

### TESTING REQUIREMENTS

Project specification required an onsite testing regime. This meant that during the initial months of supply, Firth had to test each truck load of concrete both at the yard and onsite. Once client confidence in

comparable results had been established the regime reverted to yard testing. However, one test per 50m<sup>3</sup> still had to be conducted onsite. This meant that testing staff had to be drawn from other Firth plants, while training was also provided to HEB staff.

### EXCEEDING EXPECTATIONS

As many pours were out over the estuary on the temporary staging (and in the dark on occasions), all drivers had to undergo an extensive site safety induction to address the significant hazards present.

The large pours were all around the 130m<sup>3</sup>, taking about 5 hours to complete. Typically, the first concrete was on site ready for pumping at 5:00 am.

Although there was always a truck waiting for the previous truck to discharge, pour times on the deck slabs were extended due to the long wait as each truck reversed slowly out along the staging.

The barriers on the east side of the bridge were cast in-situ. These have Wai etching and Waka designs cast into them. Firth worked closely with HEB to achieve the required finish and early age strength so that moulds could be used every day.

Concrete was sent to site at 50mm slump, and patterns added to achieve the desired workability. The intricate patterns required a highly workable consistency, whilst maintaining strength to allow quick turnaround of forms.

### A JOB WELL DONE

For the duration of this project the Firth Thames staff had a very close working relationship with HEB Structures, ensuring the concrete was on time and to specification, with all the required additional testing completed to the client's satisfaction. These efforts have helped deliver Kopu Bridge six months ahead of schedule and \$6 million dollars under budget.



*Christchurch Ready Mix Concrete's concrete division operates 35 mixer trucks which generate a production capacity of more than 200 cubic metres per hour.*

## LONG HISTORY OF QUALITY AND LOYAL SERVICE

In 2012 Christchurch Ready Mix Concrete Ltd (CRMC) celebrated its 50th anniversary but its foundations were laid as long ago as 1927. That was when a business dynasty, which has been perpetuated to the present day by the Grant family, had its beginnings in the form of a small carrying business operated by R G Grant.

As time went by Grant expanded his fleet from one small truck that had been converted from a cut-down Chevrolet car to four Bedford trucks, and worked around the clock from a depot on the East Belt of Rangiora.

Soon Grant had embraced two other carrying businesses and increased his line-up of vehicles to nine.

Then followed amalgamation with three more carriers, encouraging Grant to form Transport North Canterbury in July 1939.

In the tight economic environment of World War II and the accompanying fuel and tyre shortages, other owner-drivers found security by joining the expanding company whose fleet had now swollen to 28 trucks and which now had depots from the Waimakariri River to the Kowai River.

Transport North Canterbury would become a significant employer with depots throughout North Canterbury and the West Coast, providing work for more than 250 people and being remembered favourably as an employer.

RG Grant's three sons, Roy, Bob and Roly, and daughter Norma all worked within Transport North Canterbury.

In 1962 CRMC was formed, and in 1973, the privately owned company became a listed company under the name of Transport North Canterbury Holdings Ltd.

CRMC re-emerged when, after a successful takeover bid by Australian interests, the company's name was changed to Transpac.

However, it was agreed to release CRMC and its quarry sites from the takeover deal.

CRMC thus returned to private ownership in 1985, with Bob and Roly taking over CRMC along with quarry assets at North End Sand Supply.

Reflecting the esteem in which it is held as an employer, CRMC is notable for the long service record for many of its staff.

The average years' service of the six employees who retired from the company during the last five years was 39 years. Today, 18 per cent of employees have more than 20 years' service with CRMC. Seven have been employed for more than 30 years and one for more than 40 years.

Those who have exceeded 40 years' service with the company include the late Roly Grant, the late Bob Grant, Gary Terrell, Alan Amer, Peter Balkenende and Craig Lowe while Richard Bartlett, Tony Brown, Reg Edwards, Phil Hawkins and Rob Kimber are approaching that milestone.

The business, which now employs more than 130 staff, remains entirely locally owned by the estate of R L (Bob) Grant.

The company gratefully acknowledges the support of its loyal and long-serving customer base, some of whom have been doing business with CRMC for more than 50 years.





Christchurch Ready Mix Concrete's engineering team assemble new concrete mixer trucks for the company's concrete division as well as for external customers.



The development of "ready mixed" concrete in the early 1960s delivered a valuable solution for the construction industry.

## ALWAYS READY ALL OVER CANTERBURY

Christchurch Ready Mix Concrete Ltd (CRMC) is a business of many parts. Several divisions, each of which has a particular focus, work in tandem to meet the diverse needs of the company's multiple clients.

The concrete division has three manufacturing plants, two in Belfast and one in Hornby. Another, which will service North Canterbury, is being developed.

Forty mixer trucks, including eight mini-mixers, carry the workload in this division, which has production capacity of more than 200 cubic metres per hour.

CRMC has three land-based quarries in Amberley, Woodend and Yaldhurst as well as three sand and aggregate manufacturing plants at Belfast, Woodend and Amberley. The company also holds resource consents to extract from the Waipara, Ashley, Waimakariri and Selwyn rivers.

Recent additions to its operation include a mobile crushing plant that increases the crushing capacity and allows crushing closer to the delivery point.

The Amberley and Woodend quarries produce a large range of specialist sands while the Yaldhurst quarry is also consented for a clean-fill operation.

The company's small civil contracting team undertakes small- to medium-sized construction projects such as subdivisions, car parks, driveways, building site preparation, horse arenas, retaining walls and earthquake works throughout Canterbury.

The demand for civil services has always complemented the business and, with the events of the past two years, is in strong demand.

Tradesmen and DIY customers value the company's trade yards at Hornby, Belfast and Woodend. Sand, cement, brick ties, additives, tooling and much more can be bought from the same site. The Woodend facility also has supplies for both landscapers and home gardeners.

With more than 200 mobile and fixed plant items, maintenance of the company's equipment is largely completed internally by a team of five mechanics, two greasing technicians and three plant engineers. It builds and fabricates new plant items when improvements or upgrades are required.

The company is supported by a team of six administrative staff which includes two full time human resources personnel.

## SOLID FOUNDATIONS ENABLE GROWTH

A business trip to the United States provided the inspiration for the innovative product that would launch Christchurch Ready Mix Concrete Ltd (CRMC).

Roy Grant, the son of R G Grant, who founded the parent company, Transport North Canterbury, was introduced to the concept of ready mix concrete delivered in trucks on a visit to the United States in the early 1960s.

On his return he developed the process and, in November 1962, CRMC was incorporated.

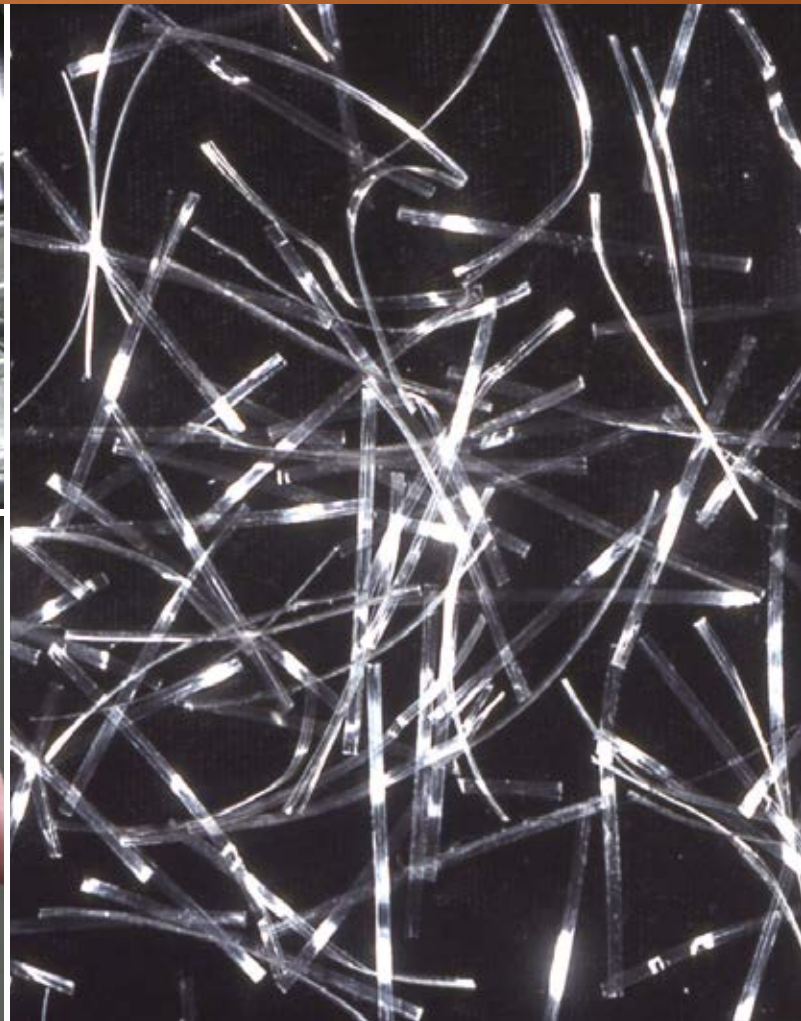
A few months later, the first loads of concrete were batched from the Empire Rd, Belfast, site which is still the company's main operating base today.

Initially, the site had a small concrete plant and two trucks. The business continued to flourish and the small plant was eventually upgraded and expanded.

By the early 1970s, the truck fleet had grown to 16 and the company had diversified into aggregate and sand extraction from the Waimakariri River and also developed a civil contracting division.

Another company, Masonry Services, was bought out in 1977 and amalgamated under the CRMC brand, giving CRMC a base in the southwest of the city. The branch was eventually closed, land assets sold and mobile assets amalgamated with the Belfast operations.

The former Transport North Canterbury company also had three smaller concrete plants in Rangiora, Cheviot and Culverden which it retained when taken over by TRANSPAC and, soon after, were sold to other companies.



## FIBRES IN CONCRETE – WHAT, WHEN & WHY?

CCANZ *Information Bulletin 39 Fibre Reinforced Concrete* is an excellent resource for those wishing to address confusion around the appropriate use of fibres in concrete.

The use of fibres to reinforce and enhance the properties of construction materials goes back at least 3,500 years, when straw was used to reinforce sun-baked bricks in Mesopotamia.

Cement-bound products have been reinforced by various types of fibre at least since the beginning of the last century, and steel and synthetic fibres have been used to improve the properties of concrete for the past 30 or 40 years.

Fibres also improve the properties of many natural as well as engineered materials, e.g. motor vehicle tyres are made from fibre-reinforced rubber.

*IB 39 Fibre Reinforced Concrete* outlines:

- The different types of fibre commonly available on the New Zealand market
- How fibres can be used to enhance the properties of concrete
- The properties of concrete made using fibres
- The manufacture and testing of fibre reinforced concrete (FRC)
- Typical applications of FRC

IB 39 takes a look at the use of discontinuous fibres in conventionally mixed concrete, but not in cement. In other words, it focuses on fibres added during the batching and mixing of concrete but excludes, for example, glass fibre reinforced cement (or concrete) – GRC, asbestos

cement, and other specialised materials such as ultra-high performance fibre reinforced (or 'ductile') concrete.

Some synthetic fibres not commonly used in New Zealand, e.g. aramid, carbon, polyester, are also excluded.

In compiling IB 39 CCANZ sought input from a range of parties interested in advancing the use of fibre reinforced concrete in New Zealand. This included fibre manufacturers and suppliers, design engineers, testing professionals, and concrete engineers and specialists.

While every effort has been made to ensure accuracy, it was not possible to verify all claims made relating to proprietary or specialist products. As such, IB 39 seeks to provide generic information arrived at through consensus.

Users of IB 39 should seek independent verification or test results to satisfy themselves that their own specific requirements will be met in areas such as fibre type, fibre dosage, concrete properties, crack control, joint spacing and fire resistance.

It must always be remembered that no two fibres are the same and that comparisons of performance should only be made on a particular concrete dosed with a specific mass or volume of a particular fibre against a specific mass or volume of a different fibre used in the same concrete.

*Copies of IB 39 Fibre Reinforced Concrete are freely available from the Publications section of the CCANZ website – [www.ccanz.org.nz](http://www.ccanz.org.nz)*

*Images. (left, top and bottom) Maccaferri New Zealand Limited, (right) W.R. Grace & Co.*





## MARATHON CONCRETE POUR AT PORT BOTANY

It took great planning and an incredible feat of engineering for Boral to deliver 2500m<sup>3</sup> of concrete in one of the biggest elevated continuous pours in NSW history. Five boom pumps were required to deliver 2500m<sup>3</sup> over the 18 hour continuous pour.

Boulderstone is the managing contractor on Port Botany's Grade Separation works.

The project involves a large elevated bridge / roundabout that will streamline traffic access to Port Botany's T3 and Brotherson Docks.

Spanning more than 75m, the new roundabout required a continuous pour of concrete to ensure the optimal post tensioning sequence of the support girders. This would also minimise the number of construction joints for high durability.

Geoff McDonnell, the Sydney Metro Concrete operations manager, carefully planned delivery of the pour for several weeks. When it took place on a weekend in March this year it involved more than 60 concrete trucks and 18 testers working over two shifts to deliver the concrete via five boom pumps over an 18 hour period.

Delivery was planned from both the Boral Botany and St Peter's plants, with backup from Artarmon.

As the post tensioned bridge comprised a 400mm deck and 2200mm deep girder, Boral utilised its technical knowledge to design a low heat,

high durability, high workability (160mm slump, small aggregate) mix to achieve Sydney Ports Corporation's wet and hardened concrete requirements.

The project required significant logistics to ensure around 400 loads of concrete performed satisfactorily, requiring individual slump tests and approximately 400 test cylinders.

Boral Concrete collaborated with Boral Quarries, Cement and Logistics to ensure the success of the project with supply of 4000t coarse/fine aggregates, and 1200t cement.

Boulderstone was pleased with Boral's service, with the Site Supervisor remarking that there was not one concrete placer complaint received for concrete workability on the day or night.

When the project is finished later this year, there will be three access ramps and four bridge spans linked to the roundabout providing access to tenants north of Port Botany.

Previously, Boulderstone and Boral had successfully delivered 95,000m<sup>3</sup> to the adjacent new Hutchison Ports Terminal sea wall.

*By Julie Adamo - Regional sales manager NSW/ACT, Boral Construction Materials  
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## KEY DATES

### NZRMCA NATIONAL COUNCIL MEETINGS

MEETING	DATE	TIME	VENUE
Council	Wednesday, 15 May	9:30 am – 3:00 pm	CCANZ, Wellington
Council	Wednesday, 14 August	9:30 am – 3:00 pm	CCANZ, Wellington

### NZRMCA REGIONAL MEETINGS (check local notices for precise times)

MEETING	DATE	VENUE
Northland	Thursday, 23 May	Whangarei
Auckland	Wednesday, 8 May	TBA
Central North Island	Thursday, 23 May	Te Rapa RFC

## FUN (CONCRETE) FACT

### CAPE REINGA LIGHTHOUSE



*Commissioned in 1941 the Cape Reinga Lighthouse was the last of only three concrete lighthouses built in New Zealand*

Sitting at New Zealand's most northern tip, where Maori spirits are said to depart for Hawai-iki, the Cape Reinga Lighthouse punches well above its weight in the iconic structure stakes. Dunedin may have its railway station, Wellington the Beehive and Auckland the Sky Tower, but none (literally) shine as bright as the Far North's concrete lighthouse.

As it stands today, the Cape Reinga lighthouse replaced another lighthouse on nearby Motuopao Island, which sits off Cape Maria Van Diemen. The main connection to the notoriously difficult to access

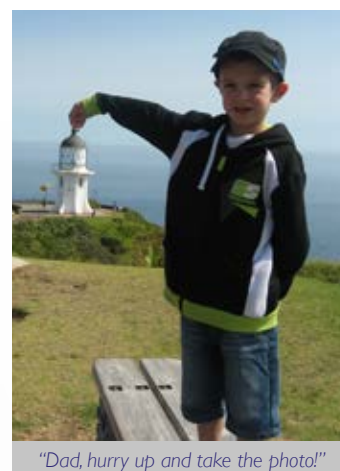
lighthouse was a flying fox, and in 1933 after an assistant lighthouse keeper's wife was swept off the rocks, the decision was made to build a new tower on the mainland at Cape Reinga.

Completed in 1941, the lighthouse at Cape Reinga was the last of New Zealand's 34 lighthouses to be built, and one of only three, along with Mokohinau (1883) and Barring Head (1931), constructed from reinforced concrete.

The new light had little use during its first years due to the wartime blackout restrictions. Threat of an invasion however, was very real as war raged in Europe. During World War One a German ship was seen anchored at nearby Twilight Bay, and only months earlier the passenger ship Wimmem was sunk by a mine off the cape, killing 26 people.

The lighthouse was originally powered by diesel-generated electricity, but today power for the rotating beacon illuminated by a 50 watt tungsten halogen bulb is supplied from battery banks charged by solar panels. The light is monitored remotely from Maritime New Zealand's Wellington office.

With the road now sealed all the way to Cape Reinga public access to the lighthouse is easy. So next time you are in the Far North, take the opportunity to visit this magical spot with its breath taking views, and experience a bit of New Zealand's concrete history. You will be one of approximately 10,000 people to do so each year.



*"Dad, hurry up and take the photo!"*



**Antipodean Challenges and Engineering Responses: Designing, Building and Equipping New Zealand's Lighthouses by Helen Beaglehole.** Read about the Cape Reinga Lighthouse, and other (though not necessarily concrete) lighthouses in this interesting study from *The International Journal for the History of Engineering & Technology*, available from the CCANZ library. Email [library@ccanz.org.nz](mailto:library@ccanz.org.nz) for a copy.