


concrete

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Success and the challenge of building in Antarctica

A relatively straightforward building project takes on a Mission Impossible quality when the location is one of the world's harshest and most remote locations. Anthony Leighs, Managing Director of Leighs Construction, describes the challenge of construction at Scott Base, Antarctica.

Scott Base was originally constructed for New Zealand's participation in the International Geophysical Year and Commonwealth Transantarctic Expedition, and was officially opened on January 20, 1957. Although Scott Base was initially designed for a life of only a few years, the value of the Antarctic research was soon recognised and a base rebuilding programme began in 1976.

The rebuilding was almost complete by 2003, with one exception - the key storage space from which field logistics were operated. This meant that staff were working in temperatures as low as minus 45 degrees in an uninsulated aircraft hanger that was subject to constant icing and spindrift. Therefore, Antarctica New Zealand began looking for a company which would develop the largest single construction project at Scott Base since 1959 - a two-storey, 1800 square metre warm store. This dedicated heated field centre would house facilities for:

- Cargo receipt and issue
- Field party preparation and field waste handling
- General storage
- Refrigerated stores including a -30 degree freezer
- A drying room for field gear such as sleeping kits
- Offices and a briefing and training room
- A fitness centre
- Field equipment maintenance and storage areas

In early 2003, Antarctica New Zealand launched a search to find a construction contractor to manage the project. Antarctica New Zealand short-listed four contractors and Canterbury-based Leighs Construction was selected to become the first private company to construct a building on site, and to bring Scott Base up to par as an international research facility. The project would involve creating the building in kitset form, containerising it and shipping it to the ice for construction.

Construction begins at Scott Base, Antarctica.

The team from Leighs Construction visited the site for familiarisation in October 2003. Blessed with clear, crisp weather, the team returned home with a sense of confidence they could complete the project on time and within budget.

The two-storey building was to feature 105 precast concrete foundations anchored to the rock substrate with ice, a structural steel frame, and a 200mm thick precast concrete slab floor. The construction of the building involved 675 tonnes of precast concrete along with 110 tonnes of structural steel, 3000m^2 of insulated panel and 4500m^2 of plywood wall linings.

The brief required Leighs Construction to complete a trial assembly in Christchurch which needed client sign off. The team then had to containerise the precast concrete, building structure and materials and ship them to the Antarctic continent on the only annual supply ship that travels between California, Lyttelton and McMurdo Station.

The manufacturing of steel and precast concrete began in August 2003. Precast concrete members were ideally suited to the warm stores project, as mass concrete has excellent thermal characteristics, enhancing the structure's energy efficiency. The mix supplied for the precast units needed to take into account the harsh Antarctic climate. The key requirement was that the mix possessed a higher than normal (6%) amount of air entrainment. This was to ensure that a sufficient number of air voids existed to provide room for the expansion of any moisture in concrete as it freezes.

By early December 2004, the team had completed procurement and loaded 125 containers and flat racks ready for shipping. When the Antarctic container ship arrives in New Zealand each year, it has all the United States Antarctic Programme's (USAP)

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ccanz
Cement & Concrete Association of New Zealand

Upfront...

Patrick McGuire, CEO.

2005 has been a very successful and busy year for the Cement and Concrete Association of New Zealand (CCANZ).

This year's achievements were celebrated and the value of our work reinforced at the annual New Zealand Concrete Industry Conference and CCANZ AGM, held at Sky City in Auckland. This was a stimulating and interesting experience that emphasised the positive work of association members and the wider industry and outlined our future direction.

This year, CCANZ has actively worked to evaluate the consequences of the Building Act and Building Code for the concrete sector. The Association has acted as the voice for the industry in putting forward a collective view, in the form of submissions, to Government agencies and in particular the Department of Building and Housing. This work has proved vital in ensuring the Government is aware of our industry and the fact that concrete is the very foundation of the building and construction process. CCANZ has also worked hard to communicate regularly with members and to assist in the development and training of people within the industry.

One of the major industry issues CCANZ will be addressing in the New Year is the sustainability of concrete in the built environment. Not only is this issue becoming a hotly debated topic worldwide but it is rapidly becoming a significant component of the "triple bottom line" approach, increasingly being adopted in purchasing decisions made by both national and local government. Our industry needs to realign the perceptions of those New Zealanders who believe timber is the sustainable material of choice.

An exciting development this year was the appointment of the new CCANZ Chairman, Andrew Moss. Andrew is currently Marketing Manager of Golden Bay Cement, and has 12 years experience in the industry, working in a variety of business and marketing development, logistical and customer management roles. Andrew also has prior knowledge of the association as he served as a CCANZ board member for two years. The CCANZ team is very excited about having Andrew on board and the enthusiastic leadership and youthful vision he will bring to the Association over the next year will certainly build on the solid foundation laid by outgoing Chairman, Rex Williams.

CCANZ's Information and Communications Manager, Nancy Bakker is leaving us shortly to take up a position with the Registered Master Builders Federation. I would like to personally acknowledge the contribution Nancy has made to CCANZ, particularly in the development and maintenance of our website and as the editor of Concrete magazine and our e-newsletter, Grey Matters. We hope she will be just as successful in her new role.

On behalf of all at CCANZ I would like to thank you for your ongoing support throughout the year. We wish you and your family a safe, happy and fulfilling Christmas and holiday period and look forward to working with you in 2006.

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cargo aboard and is heavily laden. Placing additional large loads on the ship required precise loading from the team.

At the end of 2004, the ship arrived at Scott Base in the wake of two giant icebreakers. The building materials were unloaded by USAP staff who ferried the material 3km between McMurdo Station and Scott Base over a hill.

The client had planned for the Leighs Construction team to set the foundation when building began in October 2004. However, the team convinced the client to allow them to survey the site and set the foundations immediately after ship offload in January 2004. This provided an enormous boost in speeding up the timeline.

The team returned to Antarctica in October 2004 to complete the project. The weather had been mild during the familiarisation period in 2003, so the team was shocked when they encountered -30 degree weather upon arrival. It took them several weeks to acclimatise and for the temperature, and their spirits, to lift.

The construction of the building involved the erection of the structural steel ground frames, which received the precast concrete ground level floor slab and the underfloor insulation panels. The upper structural elements were erected three bays at a time, with column and rafter units pre-bolted to the ground.

Antarctica New Zealand's zero footprint policy banned all

Aerial photo of Scott Base (Hillary Field Centre in the bottom right).

building waste, oil or chemical spills, including no spillage of polystyrene ball packing. The challenge was overcome using old-fashioned Kiwi ingenuity. Cutting of the insulated panels was conducted in a container designed to capture all the polystyrene beads.

Goal-setting techniques were instigated to keep everyone on track. In January 2005, the team returned home to Christchurch, having experienced a unique period of personal and professional growth during their time at Scott Base. The project was completed 22 days ahead of schedule with no health or safety incidents. The client was delighted with the finished result, and cited the team's ability to adapt to the bleak physical and social environment as key to the success of the Antarctica project.

2005 Concrete Award Winners

The 2005 New Zealand Concrete Society Awards were held at the conference dinner on 23 September. The following projects won their categories for demonstrating superior versatility in their use of concrete:

The Concrete Award:

Overall excellence in the use of concrete -

Alan Reay Consultants, Canam Construction Limited, Warren & Mahoney:

Trusts Stadium, Waitakere City
This building shows concrete working structurally. The stadium is constructed from large precast concrete panels in irregular shapes and sizes to create a complex jigsaw for energy efficiency, with thermal mass heating and cooling, and integral fire protection, and was produced working to a tight client budget.

The Monte Craven Architectural Building Award:

Buildings displaying functional suitability and aesthetic appeal -

Wilco Precast:

Diocesan School Centennial Building, Auckland
This is a striking curved concrete building constructed on a restricted site, with protected trees on one side and other buildings close by. The building has been built of very high quality precast concrete that sits well with the existing buildings. The judges were particularly impressed with the finish of the curved façade. Its design required tight tolerances for fitting elements together and demanded a particularly high standard of workmanship.

Highly Commended – *Works Infrastructure*

Clandeboye Dryer

The Infrastructure Award:

For projects such as bridges, tunnels, wharves and utility structures, and plant -

Firth Industries:

T-Roff Beans, Central Motorway junction bridges and viaducts, Auckland
Auckland's Central Motorway Junction project has been the first to use the T-Roff (or super T beams). These are the longest precast bridge beams designed in New Zealand since the 1966 I beam and are a cost-effective solution for large-span bridges. The T-Roff is visually attractive, durable and allows for real advances in simplifying construction.

The Residential Award:

Three Dee Construction:

Ovtcharenko Residence, Remuera, Auckland
This residence is built almost entirely of concrete. The walls are a newly developed composite system of concrete/polystyrene/concrete; prestressed concrete floor beams are used, as well as a concrete slab on ground level.

Concrete is sprayed on the interior and exterior on site, making an insulated panel that is cost effective and surmounts transportation issues.

The Landscaping Award:

W. Stevenson & Sons:

Fale Pasifika, University of Auckland
The landscaping for the Malae at UNITEC's Fale Pasifika uses concrete paving to represent the Pacific Ocean and the migration of its inhabitants.

Highly Commended – *Freeflow Alliance*

Grafton Gully

The Technology Award:

For significant advances in research, technical publications, new pieces of equipment, design innovations or educational activities -

Allied Concrete

Remote temperature matched curing equipment
Allied's equipment allows remote matched curing of concrete cylinders, removing the necessity for temperature measuring equipment on site, and saves time.

Highly Commended – *Leighs Construction*

Antartica Field Centre

Highly Commended - *Stevensons Limited*

Form Block

NZRMCA Awards

Also presented at the Concrete industries were the NZ Ready Mixed Concrete Associations awards. The winners were-

The NZRMCA Extra Distance Award.
This award is for projects with uncompromising commitment to customer satisfaction. Cossey's tunnel upgrade won, submitted by Allied Concrete, involving the relining of an existing tunnel with contractor McConnell Dowell Constructors Ltd. Extra Distance was demonstrated by Allied Concrete Ltd through consultation and development of a previously untried task, use of concrete technicians on site and training of on site staff.

The NZRMCA Technical Excellence Award.
Awarded to the Wellington Hospital New Oncology project, submitted by Allied Concrete Ltd for innovative technical solutions. This project involves the construction of walls up to 1.2 metres while avoiding cracking due to heat of hydration. Allied Concrete and the contractor, Mainzeal, developed a solution using Allied's remote temperature matched curing data logger system.

The Plant Audit Committee Zone Awards.
This award requires an unerring commitment to quality over a rolling three year period. Each plant is assessed on three annual reports, and loses points for each error or failure to comply. The winners were: Zone 1, Firth Industries, Hornby; Zone 2, Allied Concrete, Paraparaumu; Zone 3, Firth Industries, Henderson; Zone 4, Firth Industries, Mt Maunganui.

Design and Construction of New Zealand's first Reactive Powder Concrete Bridge

An economic solution rather than a replacement for conventional concrete – Auckland Regional Transport Network Limited discovered that Reactive Powder Concrete may be set to revolutionise the design and construction methods around the world, say Dr. Mark Rebentrost and Brian Cavill of VSL Australia.

Reactive powder concrete (RPC), produced in Australia by VSL Australia and initially developed by the parent company Bouygues, under the trade name of Ductal, is a cementitious material that consists of cement, sand, silica, fume, silica flour, superplastiser, water and high strength steel fibres. Production of Ductal began in Australia in 2003. Current productions of reactive powder concrete achieve design compressive strengths of 160MPa with a modulus of flexural tensile rupture of 24MPa. Shrinkage strain of the material is less than 500 microns after 56 days and can be reduced to zero with the heat treatment.

The first New Zealand project using reactive powder concrete, involving Auckland Regional Transport Network Limited (ARTNL), has just been completed, and its success looks set to create a precedent for more projects to be designed and constructed with the material. ARTNL is redeveloping some of their rail stations and a series of new footbridges are being built to provide ramp access for pedestrians to cross the railway tracks.

ARTNL chose Holmes Consulting to work as the consultants on the project and Kalmar Projects as the head contractor. After a lot of research, Kalmar Projects saw the use of reactive powder concrete as providing the perfect opportunity to reduce the weight of the conforming reinforced superstructure and make the structure architecturally more appealing.

The first bridge in this project has just been completed in Papatoetoe and the use of reactive powder concrete in its design has provided excellent results. Weight savings are significant in reducing the design earthquake actions imposed by the New Zealand design code, meaning that the lighter superstructure has enabled cost savings to be made in the substructure and in the erection.

The 175 metre long bridge consists of 10 simply supported spans, with the majority of the spans 20 metres long. The bridge spans are formed using two precast segmental beams that also provide the deck, resulting in an aesthetically pleasing and a highly efficient structural solution. All necessary bending and shear strength is provided by the extraordinary mechanical strength of reactive powder concrete and post-tensioning.

Production of the Papatoetoe bridge beams commenced in Melbourne in December 2004 and over a period of 10 weeks, a total of eight two-part segmentally cast spans and two single spans were cast. The casting of each bridge element began with the batching of the constituent reactive powder concrete materials in a special shear mixer. The material was then discharged into a kibble for accurate and controlled placement into the formwork. To achieve the required architectural shape and surface finish, a specially designed steel formwork was utilised.

The two smallest spans, both less than 10 metres were cast as a single element. The larger elements were match cast in two segments to allow for the later transportation on standard 40-foot containers.

VSL Australia has used reactive powder concrete in the design and construction of other projects throughout the world including:

- Panels to cover the large weir exposed to constant salt water spray
- RPC formwork panels for the M7 road project in Sydney
- Bridge shims for a project in Hong Kong
- Large set of RPC blast protection panels for an overseas establishment.

Reactive power concrete is a ductile material that possesses high ultra compressive strength, tensile strength and durability together with high fatigue performance. While it may have these advantages and be seen as an alternative that provides greater architectural freedom and a superior structural performance, Dr. Mark Rebentrost and Brian Cavill believe that reactive powder concrete is more of an economic solution than a replacement for concrete's conventional uses.

The recently completed Ductal Bridge in Papatoetoe, illustrating excellence in design, structure and architectural appeal.

Concrete structures facing shift in design paradigm

With increasing demand for service life performance, there is a greater need for designers to focus on high performance structures, rather than high performance concrete, says Dr. Steen Rostam, Chief Engineer COWI A/S Denmark.

Demand has increased over recent years for concrete structures to be designed to satisfy a specified design life; from 100-to-120 years and in some cases as much as 200 and 300 years. Concrete's reputation for longevity is unmatched – the great Pantheon temple, commissioned by the Emperor Hadrian, featuring a great dome built from unreinforced concrete, has been standing in Rome since 126 AD.

But using high performance concrete is not enough. The increased focus on the service life performance of concrete structures requires a shift in the concrete design paradigm towards a multidisciplinary approach. Designers must now master all properties – structural, materials, construction and maintenance – when building concrete structures.

In turn, designers must make the owner aware that all structures, regardless of building material, will age and deteriorate with time and ensure that the owners, at the beginning of the project, clarify the required service life and the acceptance criteria for the design. The design basis needs to take into account both long-term durability factors and an agreed maintenance strategy. Current codes and standards are not adequate as design basis.

The operational way for designing for durability is to define this as a service life requirement. Designing for a specified service life requires knowledge of the parameters determining the ageing and deterioration of concrete structures. Designers need to combine their knowledge of design, construction, materials and deterioration mechanisms into an integrated solution. It is not the initial properties of the materials or components alone that define performance, but the condition throughout the life of the structure in its environment as a whole.

One of the most important decisions to be taken by designers of high performance structures is to determine the exposure conditions of individual components of the structure. It is important to remember that the environmental classifications indicated in codes and standards throughout the world can only be taken as a first guideline towards the general level of aggressiveness for the individual structure. Temperature levels within the individual environments are a decisive factor regarding the rate of deterioration of concrete structures. The likelihood of chemical reactions and reinforcement corrosion is increased with higher temperatures.

Developing high performance structures instead of just using high performance concrete is a completely different challenge. The fact that the Pantheon's concrete dome is entirely made from unreinforced concrete means that it contains no corrodible properties.

One of the major problems over the past few decades has been an increased focus on refining the properties of concrete to protect the steel reinforcement against corrosion. This has led to the development of more

The unreinforced concrete dome of the Pantheon, Rome.

expensive types of concrete containing a mixture of chemical and mineral additives. But these are more sensitive to early age cracking (drying shrinkage and thermal cracking) and load induced cracking due to increased brittleness. One consequence of this is that despite high performance concrete mixes, inferior quality structures are still being built rather than high performance and durable structures.

It has only been in recent years that designers have begun to see the potential of adopting steel reinforcements that are non-corroding. Progress in this area has been very promising. Today many large structures in corrosive environments with long service life requirements have adopted this now state-of-the-art technology, with stainless steel reinforcement, just used locally in the exposed zones, being the preferred solution. And this development, including adopting the life cycle costing, is supporting the ongoing drive towards developing long-lasting, durable structures, which will enhance the industry's efforts towards creating a sustainable built environment.

We must continue to focus on developing an integrated approach that covers all aspects of design properties, and includes the time factor as a key design issue, to ensure that our concrete structures can stand the test of time so ably demonstrated by the industry's pioneers in Rome two millennia ago.

Innovators in concrete construction

New Zealand's concrete industry has always been at the forefront of innovation and design. Paul Wymer, from BBR Contech, takes a look at New Zealand's proud history in concrete construction.

When the first barrels of cement arrived in New Zealand around 1840, New Zealanders were quick to embrace the material's benefits, and over the years we have positioned ourselves as pioneers in the international field of concrete construction.

In the 19th Century, early settlers in New Zealand pioneered the use of the material by using reinforced concrete in well-known structures such as the New Zealand Railways Workshop Water Tower, built in Addington – considered to be one of the world's first structures to be built in reinforced concrete. In what would be described as true 'Kiwi ingenuity', the designer used several tonnes of scrap steel as the reinforcement.

During the early 1900s, reinforced concrete was used in the construction of many New Zealand structures, most notably it's bridges, such as the George Street Bridge in Dunedin and the Grafton Bridge in Auckland. At that time, Grafton Bridge was heralded as having the largest reinforced concrete arch span in the world (98m). The fact that it still stands today is testament to the skill of the engineers of that time. Since then, reinforced concrete has been used extensively throughout New Zealand in the construction of dams, power stations, buildings, industrial facilities, churches, wharves, grandstands and domestic housing.

In 1926, French engineer Eugene Freyssinet started work with prestressed concrete, and it was only a matter of time before New Zealand began using this technique as well. The Hutt Estuary Bridge, completed in 1954, was hailed as the first major prestressed concrete bridge to be designed and constructed in New Zealand. Its construction employed a post-tensioned, prestressing system never used before in New Zealand.

Innovators in the concrete industry in New Zealand faced further challenges with the construction of the penstock pipes at the Benmore Power Station. The station's configuration required penstocks larger than those used on any other power station in New Zealand - 5.3 metres in diameter, 130 metres long, and lay on a rock spur at a 35 degree slope. The Benmore penstocks were the first in the world to be constructed using post-tensioned prestressed concrete – a testament to the courage and capability of a team of enterprising New Zealanders. Along with Grafton Bridge in Auckland, it features in the American Concrete Institute's *Concrete: A Pictorial Celebration*, published to commemorate ACI's centennial and intended to instill pride in all who are part of the international concrete industry.

Throughout the 1970s and 1980s, New Zealand continued to be a leader in concrete construction. Leading Engineers such as Professor Robert Park and Professor Tom Paulay from the University of Canterbury's Civil Engineering Department are among those credited for facilitating the start of a golden age in New Zealand engineering. They were the world leading innovators in the field of seismic engineering of reinforced concrete structures, and they made a notable contribution to the field of seismic design. Innovative projects like the Thorndon Overbridge in Wellington, which remains one of the largest prestressed concrete roading structures ever built in New Zealand, provides an excellent example of the readiness of New Zealanders to experiment with concrete.

Sky Tower in Auckland.

The essence of everything that is concrete – strength, durability, form, performance, and beauty – was captured in the concept and construction of Auckland's Sky Tower in 1996. This single structure combines precast concrete, prestressing, large post-tensioned components, a jump formed cast insitu shaft, and some carefully detailed architectural finishes. The Sky Tower is a symbol of New Zealand's tradition as innovators in the field of concrete construction.

Lessons from our recent past have demonstrated that New Zealanders are a motivated and passionate group who can achieve great outcomes. If we continue to listen, develop and lead, New Zealand will maintain its position as a world-leading innovator in the built environment.

People...

New Deputy Chairman for Building Research Board

Graham Coe

Graham Coe was appointed as the Deputy Chairman on the Building Research Board in August 2005 and provides support to both the chairman and the CEO.

Graham is looking forward to serving on the Building Research Board as Deputy Chairman because he regards the building and construction industry as an exciting and constantly evolving field.

Nancy Bakker moves on to RMBF

After five years at CCANZ, Nancy Bakker, Information and Communications Manager is moving on to begin a new role as Marketing Communications Manager at the Registered Master Builders Federation.

CCANZ would like to congratulate Nancy on her new role and thank her for the invaluable contribution and dedication she has made to the Association.

CEO of Golden Bay Cement Moves On

Ross Harper

Ross Harper has resigned as General Manager of Golden Bay Cement Ltd, to take up the role of General Manager of Blue Circle Southern Cement, N.S.W., (a subsidiary of Boral Limited).

Ross has worked with Golden Bay Cement Ltd over the last six years and ushered the company through a major growth phase. CCANZ would like to offer their thanks and congratulations to Ross, for his unstinting involvement with the Association - from his roles as chairman, vice chairman and close friend to all staff, both past and present.

James MacKechnie

CCANZ would like to congratulate Fellow James MacKechnie for being voted by his students as the best lecturer for 2005 at the University of Canterbury. James lectures in engineering mechanics, materials, reinforced concrete and design.

Cook's Clinic... Concrete Quality Control

Concrete quality is an important aspect of the building and design process. NZS3104 (concrete production) and NZS3109 (concrete construction) are the standards which define good practice for concrete quality. The rewrite of NZS3104 in 2003 and amendment 1 of NZS3109 changed some of the terminology associated with specifying concrete. In this article we examine these standards and how to specify concrete for performance.

Prior to 2003, most designers would specify that concrete in the project should come from either a high or special graded plant. NZS3109 prior to amendment No 1, outlined three Production Grades (Ordinary, High, and Special) with a Graded Plant requiring independent audit of the records. The revision of NZS3104 and NZS3109 in 2003 introduced some new concepts. The term graded plant disappeared to be replaced with audited plant. NZS 3104 also introduces three specification methods for concrete:

Normal concrete- specified where the designer's primary concern is compressive strength in the range of 17.5MPa to 50MPa,

Special concrete- specified where the required strength is outside the 17.5 to 50MPa range, or some special property other than strength is required.

Prescribed concrete- specified where the concrete is not tested, and in the range of 17.5 MPa to 25 MPa. Production follows the mix quantities listed in Part 3.

Normal concrete as the name implies is the most commonly specified concrete. A typical specification would state:

1. Concrete construction shall be in accordance with NZS3109.
2. Concrete production shall be in accordance with NZS3104 for Normal concrete.
3. Concrete shall be supplied from an audited plant.
4. The specified compressive strength of the concrete at 28 days shall be N## MPa (a number between 17.5 and 50), when tested in accordance with NZS3112:Part 2.
5. The mix shall have adequate workability, (alternatively the slump could be specified).
6. The maximum nominal aggregate size shall be ##mm (typically 19mm but may be determined by the need to pass between reinforcement).

The New Zealand Ready Mixed Concrete Association operates a Plant Auditing scheme which is independent of the Association and run by five or more professional engineers including representatives from IPENZ and the Concrete Society. A list of Plant Auditing listings can be found on the CCANZ website www.cca.org.nz.

If a special feature such as low shrinkage, enhanced durability, or even a particular w/c ratio special concrete should be specified. Guidance on specifying concrete for performance (TR10) can be downloaded for free from www.cca.org.nz.

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2005 DIARY:

December
6 CCANZ Board Meeting, Wellington

CCANZ will be closed from 23 December 2005 and will reopen 4 January 2006.

New Zealand Master Placers Association creating interest — NZMCPA

The New Zealand Master Placers Association is going very well with many new members coming on board. Plans for next year's conference are underway, and the venue will be announced in the next issue of Concrete. The NZMCPA would like to wish everyone a Merry Christmas and a happy and safe New Year.

NZCS Sandy Cormack Award 2005 — NZCS

Sue Freitag and Sheldon Bruce of Opus International's Central Laboratories have been awarded the Sandy Cormack Award for 2005 for their case study on the Durability of Concrete in Wastewater Reticulation and Treatment facilities.

NZCS Presents Honorary Membership — NZCS

Past President and lifetime friend to the Society, Nigel Priestley was presented an honorary membership to the NZCS at the Industry Conference Awards Evening. Nigel was one of three professors from Canterbury University who led the world in seismic engineering. He was also a significant contributor to University of California's research findings on the seismic behaviour of buildings and bridges.

NZCS Annual Report Available — NZCS

Immediate Past President Andrew Dallas submitted the NZCS Annual Report at the 2005 AGM, which is now available on the website www.concretesociety.org.nz.

New President and Councillors for 2005/2006 Council — NZCS

Paul Wymer was elected as the new NZCS President and Tim Jones and Jeff Matthews were elected to the NZCS Council at the recent 2005 AGM. Gratitude was expressed for the contributions of Peter Smith who has recently stepped down.

The council for 2005/6 is: Paul Wymer, Chris Munn, Andrew Dallas, Sheldon Bruce, Tim Jones, Jeff Matthews, Stefano Pampanin, Warren South, with co-opted members Patrick McGuire, John Sinclair, Len McSaveney, and Allan Bluett.

Award for contribution to Plant Audit committee — NZRMCA

At the conference dinner for the 2005 Concrete Industry Conference, David Brathwaite was honoured with a special award for his contribution to the Plant Auditing Committee. David was appointed a member of the NZRMCA Plant Auditing Committee in April 1993 and was chairman between March 1995 and December 1999. He resigned in April 2005 but remains as an auditing engineer.

Regional chairs elected — NZRMCA

The following have been elected as the regional chairs for the NZRMCA-

Karl Campbell, Central North Island; Scott Ferguson, Southern North Island; Brett Haldane, Central and Northern South Island; Graham Payne, Auckland; Maurie Hooper, Northland.

New President and Councillors for 2005/06 — NZRMCA

At the AGM of the NZRMCA on the 23 September, Rob Green took up the position of President of the Ready Mixed Concrete Association replacing David Peterson. Rob thanked David for his contribution to the Association and wished him well for his new role with Stresscrete.

The Council for 2005/06 is: Rob Green, Chris Badger, Karl Campbell, Peter Carnahan, Brett Haldane, Maurie Hooper, Des Krammer, Don McDonald, Kevin Mischewski, Graham Payne, Bary Williams. The executive officer is Dene Cook, Secretary Cathy Castle, and Chair of the Auditing Committee is David Barnard.

New Detailing Guide — NZCMA

A guidance document for the detailing of openings for residential houses is nearing completion. This document is a joint project with the NZCMA, BRANZ, and Department of Building and Housing.

PCNZ Promotional Brochure — PCNZ

Precast NZ have recently published a brochure which sets out the objectives and activities of the industry association. It also includes a centre piece which explains the best way in which to gain value from your sub contractor precaster. It is intended for distribution to contractors, educational institutes and at Precast NZ sponsored seminars.

PCNZ Sponsorship — PCNZ

Precast NZ was pleased to sponsor Morton Gjerde travel to the Advanced Structural Theory course at Auckland University to lecture on architectural precast concrete to post graduate engineering students.

The course was conducted by Nicholas Brooke of the University of Auckland.

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