


concrete

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Silencing the competition: the benefits of concrete acoustic barriers

As traffic densities increase and new roads are built in heavily populated areas, people are beginning to question why they should tolerate increasing traffic noise as a part of their daily life. Concrete acoustic barriers are the perfect answer to these deafening issues, says Chris Munn, Project Manager at CCANZ.

Until recently, communities have grudgingly accepted that increased noise pollution was unavoidable. However, they are slowly beginning to realise that they do have protection under legislation such as the Resource Management Act. Some communities have even taken action and succeeded in imposing noise limits upon road owners.

The most notable example of this was the dispute over the performance of an acoustic barrier made of steel materials adjacent to the Auckland Regional Council Botanical Gardens on State Highway 1. Court proceedings found that the performance of the barrier was inadequate and the barrier was ordered to be removed.

There have been similar cases of poor performance in timber systems. A timber acoustic barrier constructed on SH 1 north of Auckland, bypassing Albany, was tested after completion and found to fail the minimum noise requirements stipulated in the Resource Consent conditions.

The use of timber acoustic barriers is a real concern in the long term as performance characteristics are marginal, they often rapidly erode (as the timber deteriorates through warpage of the sheets or boards), and it is likely that the timber will shrink, which opens up gaps between the boards. This leaves a clear pathway for sound to travel through and under the wall itself.

How acoustic barriers work

Sound resonates from a source due to expanding pressure waves (similar to the visual effect seen after a stone is thrown into a pond). Sound energy can be reduced by placing a barrier directly between the source and receiver. However, as the pressure waves reach the top of the barrier, they are redirected downwards and some sound will occur. Sufficiently dense and continuous materials limit the amount of sound that can pass directly through the wall. That makes concrete and masonry ideal materials for use as acoustic barriers because their mass will always meet this requirement.

The simplest barriers are constructed from solid materials which reflect the sound waves directed towards them. This may not be a problem if there are no noise sensitive receivers on the noisy side of the barrier, but often there may be houses on both sides of the road. In this case, providing a reflective

Concrete Acoustic Barrier - Wave Wall.

barrier to protect people on one side may just increase noise for people on the other. In this situation, sound-absorbing barriers should be used. These are either made of or faced with porous materials that disperse and weaken the sound waves as they pass through cavities in the lining material. (Had this type of barrier been used on the road adjacent to the ARC Botanical Gardens, the aforementioned court case may have been avoided).

Key tips for effective acoustic barriers

Concrete acoustic barriers offer a well-proven, durable and aesthetically appropriate solution to increasing traffic noise. Despite the strength of the material, however, care still needs to be exercised in designing and placing an acoustic barrier in order to ensure satisfactory performance.

Recommendations include:

- Height and length - the taller the barrier, the more sound waves will be dispersed. The length of the barrier also needs to be extended far enough beyond the area being protected to ensure that its performance is not compromised by noise diffracting around the ends of the barrier

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WHAT'S INSIDE

ccanz
Cement & Concrete Association of New Zealand

Upfront...

Patrick McGuire, CEO.

Welcome back to the beginning of a new year. We hope you are feeling refreshed and revived after a relaxing Christmas and holiday break.

2006 is already shaping up to be a busy year for the Cement and Concrete Association of New Zealand (CCANZ). As always, growth and development are top of the agenda.

Our major priorities this year are to raise CCANZ's profile within the industry, the media and government, and also continue to proactively identify opportunities to comment on significant issues when they arise. We believe that it is important to make our stance and opinion on these issues known via key media and industry politicians.

One of the major opportunities to be explored is the role cement and concrete can play in the sustainable development of New Zealand's roading infrastructure. To ensure maximum performance and ongoing growth in the roading industry, sustainable development is essential, and New Zealand needs to look at materials such as cement and concrete to achieve this.

In this issue of Concrete magazine, we outline some of the important considerations for the sustainable development of New Zealand's roading infrastructure. The advantages offered by concrete road barriers are featured, along with the international interest in concrete road safety barriers, and their possible use in New Zealand.

Cement stabilisation is a technique that is increasingly being used on New Zealand roads. We discuss the benefits of this technique in the prevention of premature road failure and preservation of aggregate resources. New Zealand's first 100% recycled road was also recently built in Christchurch. We take a look at its development and how it is an example of a New Zealand company working towards sustainable outcomes in the roading industry.

Throughout 2006, CCANZ will continue to advance concrete as the first choice in sustainable solutions, and promote the message that key decision makers cannot afford to ignore concrete's economic and environmental benefits.

A person who will be crucial to this promotion is our new Information and Communications Manager, Adam Leach. We are delighted to welcome Adam to our team, and acknowledge the commitment he has already shown to the role.

In other news, the PCA (Portland Cement Association) has been reactivated as a vehicle to provide greater input from the cement companies in technical development. This can only enhance the industry.

We look forward to working closely with you all over the next 12 months to grow the industry and make for a safer and more sustainable roading infrastructure.

Continued from page 1

- Location - on level ground it is generally best practice to locate the barrier as close to the source as possible. For example, where roads are in cuttings, placing the barrier further away at the top of the slope is usually the best solution
- Aesthetics - the design of the barrier must reflect its context and since barriers are always used in a man-made environment, the use of manufactured materials is generally more appropriate than natural materials. The colour, shape, texture and use of patterns is best done in conjunction with an urban designer or a landscape architect. This professional can also advise on greening options such as the use of climbing plants
- Durability and sustainability issues - overseas, acoustic barriers are expected to last for 40 years or more without major maintenance[1]. Barriers located close to the road need to be designed to suffer only superficial damage when hit by loose debris. Barriers being installed in the USA are now designed to act as crash barriers as well as acoustic barriers, resulting in substantial cost savings to the roading authorities and better sustainability
- Additionally, once the barrier has fulfilled its service requirements it can be fully recycled and reused in construction. Materials containing toxic preservatives are now being avoided in Europe because of concerns over the safe disposal or re-use of these materials.

With concrete's inherent advantages of strength, long-term durability and versatility, concrete acoustic barriers offer many advantages to roading authorities and the communities where they are used.

1 The Highways Agency (1995). Design manual for roads and bridges, Volume 10 Environmental Design, Section 5, Part 2, sub section 7. HMSO, London.

Example of Concrete Acoustic Barrier.

The key reasons for using concrete barriers include:

- Excellent durability with a design life of at least 40 years
- Minimal maintenance requirements
- Ability to contain traffic on the hard shoulder and act as safety barriers
- Flexibility in design, profile, colour or size and ability to withstand fires and vandalism
- They do not warp, shrink, or open up to allow noise through
- Take up less space than earth bunds
- Can match up with over-bridge parapets in a seamless manner
- Are plant friendly, contain no preservatives and need no repeat treatment
- Provide elements of architectural interest.

News...

Concrete architect receives highest recognition

Japanese architect Tadao Ando has been awarded the prestigious International Union of Architects (UIA) Medal - the architecture world's Nobel Prize - for his use of concrete.

Ando's international reputation has been built firmly upon the prominent use of concrete in his projects. More than any other living architect, Ando has utilised concrete in designs that have been described as graceful and beautiful.

Ando became an architect following a brief career as a boxer, inspired by a fascination with concrete buildings, especially those designed by Le Corbusier.

The UIA Medal is awarded during an Architect's lifetime in recognition of the contributions made to humanity, society and the promotion of the art of architecture throughout a career. It is the highest recognition an architect can receive from his peers.

Cape Palliser's 'Concrete Caravan'

The concrete caravan located at Cape Palliser. Image courtesy of Simon Devitt.

A bach made almost entirely of concrete, which resembles a caravan parked on the beach, has been built to withstand the gale force winds that are inevitable at Cape Palliser.

Owners Ann and Noel Gray approached architect Evzen Novak with a request to design a concrete bach that would eliminate the rattling they found a problem in their timber framed cottage as a result of the constant blustery winds that batter the site.

The house is made up of both external and internal concrete panels, containing an insulation layer of polystyrene, plywood floor and ceiling, a membrane roof, and aluminium windows.

Both the architect and the owners of the bach are very pleased with the material for the specified use and environmental factors. Both would willingly use concrete again for its ease of use and many advantages. Using concrete also made logistics easier by reducing the amount of materials that needed to be transported to the remote location.

Australian Concrete Conference and Exhibition 2006

The Institute of Quarrying Australia and Cement Concrete & Aggregates Australia are joining forces to hold a combined Construction Materials Industry Conference and Trade Exhibition in Melbourne. The conference theme is Partnering the Future, and will reflect developments in the construction materials industry. For more information on the conference and how to register visit www.iceaustralia.com/cmic2006.

Concrete Step Barrier wins high praise

A Britpave cast in-situ concrete step barrier has won the Concrete Centre's 2005 Sustainability Award. Judges praised the step barrier as a worthy and highly transferable solution.

Responding to the Highway Agency's raised containment levels across the UK's motorway network, Britpave's concrete step barrier is designed to save lives, money, and journey time, as well as protect the environment. It employs streamlined construction methods and recycled aggregates in a sustainable solution to social, environmental and economic considerations.

People...

New Information & Communications Manager at CCANZ

Adam Leach.

CCANZ is pleased to welcome Adam Leach to the team as the new Information and Communications Manager.

Adam, formerly a librarian at Hutt City Libraries, has more than 11 years' experience in library and information management, and said he had been attracted by the range and complexity of responsibilities the role offered. "The opportunity to work for CCANZ, which is dedicated to providing specialist industry information within a competitive environment, really appealed to me. I'm looking forward to continuing to develop the high level of service currently offered to all CCANZ members," he said.

Adam started in his new role at CCANZ in January.

Concrete road barriers key to safety on roads

With increasing traffic flows worldwide, road safety barriers are a global issue of great importance. New Zealand engineers need to look at overseas examples and give more thought to using concrete to construct barriers, says Chris Munn, Project Manager at CCANZ.

There is increasing interest in the types of road barriers being developed on New Zealand roads. Currently, engineers appear to be relying on initial installation costs when making the decision on what type to build. But they need to consider longer term safety performance and life cycle cost factors, which are key benefits of building with concrete.

The benefits of concrete road barriers make them a suitable and affordable alternative to the wire median barriers currently installed throughout New Zealand. Concrete road barriers can easily meet the performance criteria required for New Zealand's roading infrastructure, as evidenced by recent developments from overseas.

In the United Kingdom, a new Highways Agency Policy for motorways is now in force, following a review that compares the performance and maintenance needs of concrete barriers with steel barriers. This was announced in Interim Advice Note 60/05, issued in January 2005. The Note says: "The evidence indicates that where the AADT exceeds 25,000 vehicles/day there are significant benefits from a maintenance viewpoint in using rigid concrete rather than deformable steel barriers on busy motorways and dual carriageways."

Historically, the type of concrete safety barrier constructed was a Vertical Concrete Barrier (VCB). However, in order to meet the latest standard, BS EN 1317, any barrier now constructed will be a Concrete Step Barrier (CSB).

Developed in Holland, the concrete step barrier has proven successful in preventing dangerous motorway accidents where the central barriers have failed to restrain a crashing vehicle that crosses over into the face of oncoming traffic. They are designed to minimise injury by redirecting the vehicle along the direction of the flow of traffic.

The advantages of CSB are:

- Containment: In crash tests, CSB contained a 13 tonne coach
- Impact severity: The profile of CSB was designed to safely control the direction of a crashing vehicle along the line of the barrier, which results in an impact severity rating that meets the requirements of BS EN 1317.

CSB is designed to achieve an essentially maintenance-free serviceable life of not less than 50 years. The benefits of CSB are considerable:

- Cost-effective solution – the average scheme costs of installing concrete barriers were assessed as only 0.2% greater than steel safety barriers. Furthermore, initial costs will be offset by the reduction in maintenance costs and associated traffic management costs (source: Interim Advice Note 60/05, UK Highways Agency)

An example of an effective concrete step barrier in the UK. Image courtesy of Britpave.

- Whole Life Cost analysis carried out by the UK Highways Agency concluded that rigid concrete safety barriers, with a containment performance class of H2, have the greatest benefit in terms of cost and safety
- Unlike other barrier systems, CSB does not have to be replaced or repaired if a vehicle has collided with it
- Reduced traffic jams because repair work that would cause motorway lane closures is not needed
- Significant health and safety benefits for road maintenance and traffic management teams
- Whole life costs are reduced because there is no need for maintenance and associated traffic management
- Concrete barriers require less working width in the central reserve than other barrier systems, allowing motorway lanes to be increased in number without major planning and traffic disruption.

When deciding what type of road barriers to use, New Zealand engineers should take a good look at overseas examples and consider all the benefits, and the service life performance, of concrete step barriers. Ensuring safety on New Zealand roads comes down to more than just the initial costs.

* Some text supplied from Britpave

Cement stabilisation and the sustainability of New Zealand roads

Cement stabilisation was first used on New Zealand roads over 60 years ago. Since then techniques have evolved considerably. The use of cement stabilisation has also increased significantly during that time - by more than 70% between 2002 and 2005 alone. This can be attributed in part as a response to recent government sustainability and environmental objectives, says Alan Kirby, Project Manager at CCANZ.

This increase in use and evolution of techniques has come as a result of Land Transport New Zealand, Transit New Zealand and local Road Controlling Authorities attempting to find solutions for increasing traffic volumes and axle loadings that contribute to premature pavement failures. It is also a cost-effective solution that conserves valuable premium aggregate through recycling or by using marginal aggregate.

A cement stabilisation technique was used in the recently completed project by Hiway Stabilizers New Zealand Limited for Transfield Services, on SH16 in the Rodney District. The method was chosen instead of opting for an expensive 300mm deep premium quality aggregate overlay, due to tight budget and geometric constraints. The alternative stabilised design consisted of a 75 mm deep marginal aggregate overlay and a 250 mm deep cement stabilised basecourse.

The basecourse was stabilised with 7% cement spread (see Fig. 1) in two even passes, and mixed insitu using a Komatsu GS360-2 hoe equipped with water injection to ensure the mix was at optimum moisture content for compaction. The basecourse layer was compacted using an 18 tonne vibrating roller and then trafficked by heavy construction plant following stabilisation. This process is known as "micro-cracking" and is used to induce fine cracks to protect against reflective cracking.

Fig. 1: Cement spreading prior to mixing

Fulton Hogan Limited has also just finished the longest section of recycling of a New Zealand State Highway, for Transit New Zealand, using the latest Dustless Cement Stabilisation technique. The East Coast Recycling Contract which runs from Hicks Bay to Poverty Bay on SH35, involved cement stabilising 188,200m^2 of various full-width sections of road, and was completed well ahead of schedule.

Fig. 2: The recycling train consisting of the WR 2500 SK pushing the powder tanker and the water tanker, which are all coupled together by push bars. The cement and water are transferred from the supply tankers to the recycler through flexible hoses.

The Dustless Cement Stabilisation technique adopted for the project used a recently acquired WR 2500 SK stabiliser/recycling machine manufactured by Wirtgen GmbH of Germany. The recycler is fitted with an integrated spreading device directly in front of the milling and mixing drum.

The dustless process involves a cement truck and water tanker connected to the front of the WR 2500 SK by push bars that are then pushed along, as shown in Fig. 2. This ensures continuous and simultaneous cement spreading and water injection for optimum moisture content, where the quantity of the cement and added water are regulated by a microprocessor.

Pavement investigations determined that the sections of road were to be stabilised with cement added at between 2% and 3%, and to a depth of, generally, 200 mm.

Fulton Hogan Limited also completed a contract for Gisborne District Council involving the stabilisation of 34,000m^2 of city street roads with 2% cement to a depth of 200mm. The importance of utilising a dustless technique in a sensitive urban environment was crucial to the success of the project.

Cement stabilisation is a technique that has evolved through 60 years of use into a highly used method throughout New Zealand. These recently completed projects illustrate its value when considering economic, environmental and sustainability issues, which have become increasingly challenging.

The Cement and Concrete Association of New Zealand would like to thank Tim Dorrian of Hiway Stabilizers New Zealand Limited and Thorsten Fröbel of Fulton Hogan Limited for their contribution to this article.

New Zealand's first recycled road

Concrete has proved its sustainability and impressive technical properties with its use in New Zealand's first 100% recycled road in Christchurch.

Internationally, recycled roading materials are widely used. Previously regarded as waste products, the new international trend indicates that certain recycled materials, particularly crushed concrete basecourse, are cost-effective and can outperform natural materials. However, the use of recycled materials in New Zealand projects is not common, with the industry using less than 1% in roading projects.

In late 2003, Fulton Hogan recognised the new trend and undertook a survey to determine the quantities of material being dumped in their landfills that were potentially recyclable in roading projects. The results indicated that significant quantities of material could be recycled, prompting Fulton Hogan to look for future projects to promote the use of recycled roading materials.

Fulton Hogan approached engineering staff at the Christchurch City Council to support the initiative and to help showcase the attributes of recycled materials in New Zealand. The prime objective was to minimise environmental impacts and encourage sustainable outcomes in the roading industry. A 300 metre long stretch on Golf Links Road in Christchurch was chosen to be the site for New Zealand's first "green" road, using 100% recycled materials.

Golf Links Road presented a challenge for construction, as it was a busy section of road behind a shopping mall with high numbers of heavy service vehicles. Using recycled materials on this road would provide a true test of their constructability and durability.

After extensive research, crushed concrete and recycled asphalt were chosen as the most appropriate materials to use in construction of the road – both readily available and commonly used in other parts of the world. The road was completed in June 2005 and is made up of 3,000 cubic metres of concrete, including a sub-base of AP65 crushed concrete, and a base of AP40 crushed concrete. The top layer was made of recycled asphalt (RAP) with material from the millings from other job sites that was reheated and constituted into 15mm asphalt.

One of the major challenges the Fulton Hogan team faced was ensuring that the concrete was substantially free from contamination by other building products such as plastic, brick and timber. To comply with Transit New Zealand's M/4 specifications, the crushed concrete could contain no more than 3% brick, and 1% timber and plastic.

The Golf Links Road project offered significant benefits, both environmentally and economically. It proves recycling can deliver both a huge reduction in dumping of used concrete and asphalt, as the materials can be used repeatedly as roads are replaced, and significant cost savings. The use of recycled materials also saves on non-renewable natural resources, such as quarry aggregate and petroleum-based bitumen. The environmental 'side effects' of producing these materials is in turn minimised.

Golf Links Road, New Zealand's first recycled road in development.

Golf Links Road complete.

Recycled materials also offer performance benefits, because the residual cement content of the crushed concrete means it has higher strength and performs better than natural aggregate. In addition, the extra water required for compaction of crushed concrete means it is well suited to winter construction, when the weather is detrimental to other materials.

When comparing the cost of materials used only, the use of recycled materials in the Christchurch market had an additional cost of $15,200 more than the conventional use of natural materials. However, this comparison does not take into account a whole of life consideration for the disposal of the materials involved. Total savings from not dumping concrete material are significant and in this case were estimated at between $42,000 - $189,000.

An increase in the use of recycled materials is likely to become essential to the industry as it moves towards achieving sustainable outcomes. The Golf Links Road project shows that the use of recycled crushed concrete and reclaimed asphalt product offer excellent technical properties of a high strength solution, with the additional benefits of cost reduction, higher performance, and a material that is perfect for use over the winter months.

The Cement and Concrete Association of New Zealand would like to thank Greg Slaughter of Fulton Hogan Limited for his contribution to this article.

Cook's Clinic...

Jargon of the concrete industry

Every industry has its own technical terms and jargon, and the concrete industry is no exception. To test your knowledge, we have pulled together some of the most common terms. The answers are presented in lay terms; for a technically precise definition refer to ACI 116 - Cement and Concrete Terminology.

Admixture vs. Additive

An admixture is a material other than water, aggregate, cement or fibres, which is added to a batch of concrete. Typical examples are air entraining, water reducing, accelerating or retarding admixtures.

Additive is normally reserved for materials used by cement manufacturers to modify the properties of cement. Examples include limestone or gypsum.

Entrained air vs. Entrapped air

Entrained air is made up of microscopic air bubbles that are intentionally incorporated into the concrete, normally to improve its freeze/thaw resistance.

Entrapped air is made up of bubbles, of 1mm diameter or larger, which are accidentally incorporated into the concrete, usually due to inadequate compaction.

The presence of air reduces the strength of concrete. However, because entrained air is deliberately incorporated into the mix, the mix designer will have compensated for its presence. This is not the case with entrapped air.

Consolidation vs. Vibration

Consolidation (or compaction) is the process of inducing a closer spacing arrangement of the solid particles when placing concrete. It can be achieved by various methods including vibration, rodding, tamping, or centrifugation. Therefore, vibration is one method of consolidating concrete.

Floating vs. Trowelling

The purpose of floating a concrete surface is to create a relatively even but open texture. Floating:

- Embeds large aggregates beneath the surface
- Removes slight imperfections to produce a surface closer to the true plane
- Compacts the surface
- Closes minor surface cracks which may appear as the surface dries.

A bull float is a large float on a long handle which is used prior to the appearance of the bleed water. Hand floats are typically made of wood or magnesium and do not have sharp edges, which would close the surface of the concrete. Power floating occurs after the bleed water has evaporated from the surface, and is done using blades with turned-up edges to prevent them closing the concrete surface.

Trowelling occurs some time after floating and creates a hard, dense, closed finish to the concrete surface. Steel blades are used for hand trowelling. The blades on a power trowelling machine are thinner than a float blade and have sharp edges to close the concrete surface.

Placing vs. Pouring

Placing involves the deposition, distribution and consolidation of concrete in the place where it is to harden. This process is often inappropriately referred to as pouring. However, pouring only refers to the deposition phase. Always refer to placing rather than pouring concrete.

Prestress vs. Post-tensioned vs. Pretension concrete

Prestressed concrete is hardened concrete that is in a state of compression prior to the application of the service loads. Subsets of this generic term are post-tensioned and pretensioned concrete, which indicate how the compressive force is applied to the concrete.

With pretensioning, the tendons are tensioned before the concrete is placed and hardened. An example of this would be most of the preparatory flooring systems such as Hollowcore slabs. In post-tensioning, ducts are typically provided in the concrete and the tendons are tensioned after the concrete has hardened. Examples would be post-tensioned slabs on grade.

Concrete vs. Cement

It may appear obvious, but there are enough American movies talking about cement paths to indicate that some confusion does exist. Cement is the fine, normally grey powder that, when mixed with water, reacts and in time goes hard. Concrete is a mixture of cement, aggregates, water and admixtures, and typically comes out the back of a ready mix truck.

Reinforcing Grade vs. Class

Grade refers to the strength of the reinforcing bar, typically 300 or 500MPa. Class refers to the ductility (stretchability) of the bar. The most ductile and commonly used bar in New Zealand is Class E (Earthquake).

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2006 DIARY:

March

16	PCNZ Executive Meeting, Auckland

May

18	NZCMA Executive Meeting, Wellington
	PCNZ Executive Meeting, Venue TBC
25	CCANZ Board Meeting, Wellington
	NZRMCA Council Meeting, Wellington

July

20	PCNZ Executive Meeting, Venue TBC

August

10	CCANZ Board Meeting, Wellington
	NZRMCA Council Meeting, Wellington
17	NZCMA Executive Meeting, Wellington

Precast Yard Site Visits, 2006 — PCNZ

Following on from last year's very successful visits to the precast yards of Busck Prestressed Concrete and Stahlton Prestressed Concrete, Wilco Precast Ltd and Stresscrete are planning visits of their precasting facilities at Papakura early in the New Year. The yard visits will cover all aspects of precast concrete manufacture, from the production of shop drawings to the finished product, and staff from major Auckland contractors and suppliers are expected to attend. Further precast yard visits will be held later this year to accommodate specifiers (Engineering and Architecture) and Project Managers. Specifiers or contractors interested in participating in site visits should contact Ross Cato at Precast NZ on (09) 638-9416.

Self-Compacting Concrete Examples on Society Website — NZCS

The Concrete Society website, www.concretesociety.org.nz, now features examples where self-compacting concrete (SCC) has been successfully used in New Zealand.

Each example is included in one of four categories: Civil & Structural Engineering, Architectural Finishes, Recast Products and Repair & Remedial, and will provide details of the project and team.

If you have a project involving SCC you would like to feature, contact the Society office for more details, concrete@bluepacificevents.com

2006 NZ Concrete Industry Conference, 22 – 24 September — NZCS

The New Zealand Concrete Industry Conference will be held at the Christchurch Convention Centre, Christchurch from 22 – 24 September. This combined conference will once again be jointly organised by the Cement and Concrete Association of New Zealand, the New Zealand Concrete Masonry Association, New Zealand Concrete Society, New Zealand Ready Mixed Concrete Association and Precast New Zealand Inc.

A 'call for papers' has been circulated to industry and can be seen at www.concretesociety.org.nz

Fastening Seminars — NZCS

One of the world's leading experts in fastening, Professor Eligehausen from Germany's Stuttgart University, will be in New Zealand in March.

He will deliver a series of seminars on fasteners to concrete. Tentative plans are for half-day events in Auckland, Wellington and Christchurch, followed by a full-day session in Christchurch.

Dates are as follows: Auckland: 17 March; Wellington: 20 March; and Christchurch: 21 March (half-day) & 22 March (full-day)

Seminar brochures and registration forms will be circulated to industry shortly.

Student Prize Winners — NZCS

Each year the NZCS awards prizes to students demonstrating outstanding ability at the country's two Schools of Engineering (Canterbury and Auckland) and its two Schools of Architecture (Victoria and Auckland). Winning students receive a cheque for $300 and a year's complimentary student membership of the Society.

The following have been recommended by the Heads of the departments to receive these awards for 2005, based on the results of work during the academic year: Canterbury University/School of Engineering: Brendon Bradley; University of Auckland/School of Engineering: Steven Drury; School of Architecture: conjoint winners Sabino Choi and Saju Abraham; and School of Architecture, Victoria University: Lyn Wilson.

This is the final year for the Concrete Prizes in their current form. The Council is going through a review process, with a view to launch new enhanced Concrete Prizes for the 2006 academic year.

Next Council meeting — NZRMCA

The next meeting of the Council is on 21 February in Wellington. If there are any issues you wish the Council to consider, please notify your local regional chairman.

On-site wash water — NZRMCA

The technical committee of the NZRMCA has nearly completed a document providing clear and pragmatic advice on how to manage wash water on site. The target audience for this publication is Placers, Builders and Contractors. A companion document is being produced to provide generic advice for concrete truck drivers.

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