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Geotechnical Society Inc.

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NZ Geomechanics News

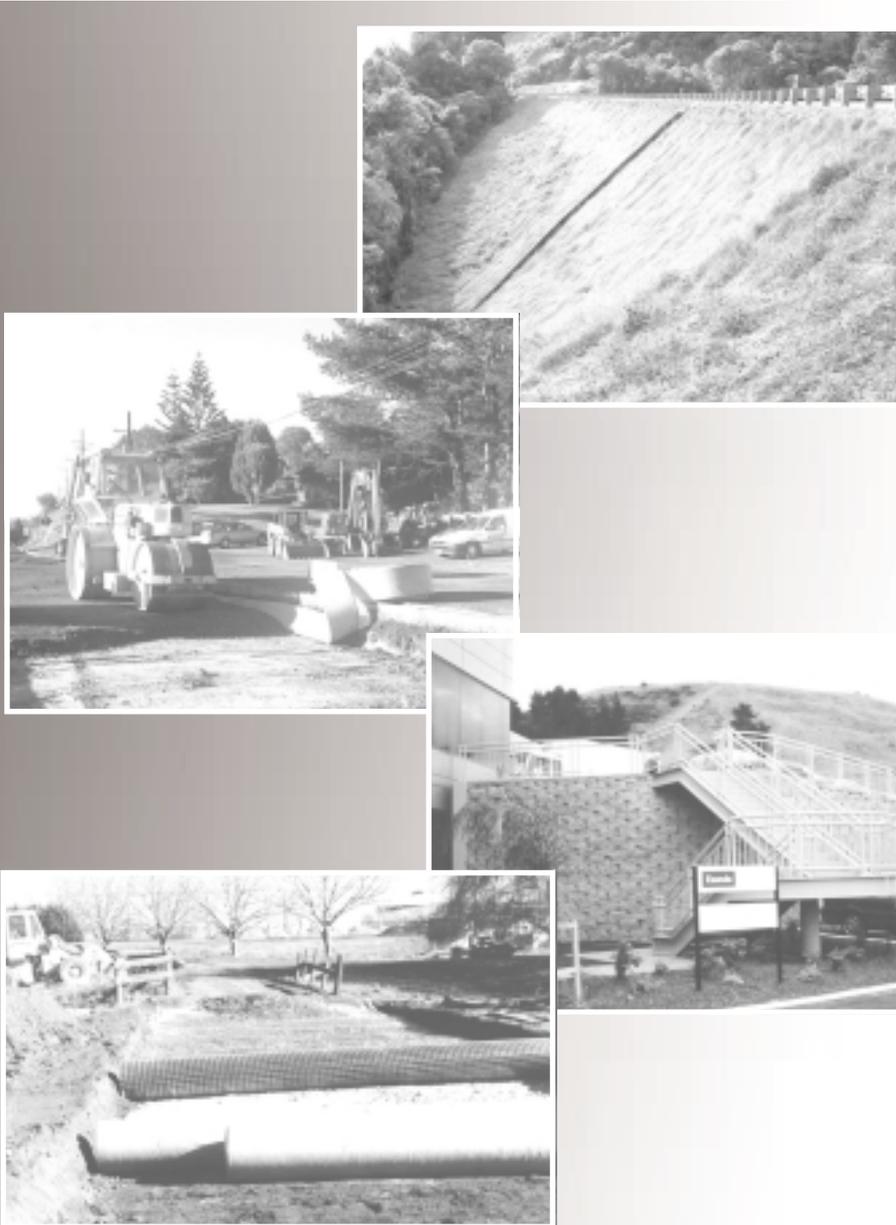
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NEW ZEALAND GEOMECHANICS NEWS

DECEMBER 2003, ISSUE 66

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Cover photo: Damage to the Paekakariki Hill culvert caused by the 3 October storm event. A large volume of gravel has been carried down from the head of the gully above but was trapped behind fence and gate just above the road. Only water appears to have crossed the road and washed out the edge of the road fill and the culvert.

Photo Credit: G.T. Hancox, Geological & Nuclear Sciences

CHAIRMAN'S CORNER

It is hard to believe 6 months have passed since writing my last column, but passed they have and Christmas will soon be upon us! With those festive tidings in mind, a very warm welcome to this December issue of the Geomechanics News.

The June issue followed the successful 2003 Geotechnical Symposium in Tauranga, and as the December issue goes to print the organizing of the 9th Australia New Zealand Geomechanics Conference is moving to full speed ahead. The 9th ANZ will be held in Auckland from 8–11 February 2004, and promises to be a spectacular event. The conference venue has moved to the new Hilton Hotel on Auckland's spectacular waterfront, and the conference dinner will be an occasion to remember. The organizing committee of Geoffrey Farquhar, Phil Kelsey and myself has been ably supported by Debbie Fellows and the University Conference Company, and the final preparations are now being made.

Some of the highlights include Professor Geoff Martin making the keynote address, together with Dr Laurie Wesley and Professor Ted Brown presenting the NZ Geomechanics Lecture and the John Jaeger Memorial Lecture respectively. Congratulations to Laurie on being awarded the Geomechanics Lecture. Approximately 130 papers have now been accepted, and as many of these as possible will be presented during the conference. In addition there will be several 'Hot Topics' workshop sessions, chaired by leading ANZ practitioners and researchers, as well as those member of the ISSMGE Board able to attend the conference as well as their Board meeting later in the same week. So while a number of papers have already been received from New Zealanders, the whole

organizing committee warmly welcomes you to attend the conference, and to reply to the registration brochure sent to you. The ANZ conference only comes to New Zealand every 12 years, and it will be a conference to remember.

Also on conferences, the next ANZ Young Professionals conference has made its first announcement, and will be held in Brisbane in July 2004. Abstracts are due by December 2003, so hopefully your planning of papers is well under way.

Finally, we are delighted to enclose with this issue your very own Christmas present from the NZGS of all existing issues of the Geomechanics News dating back to 1970 scanned onto a CD. This CD has followed the example of the Australian Geomechanics Society, and has been put together by our Secretary Debbie Fellows, and a team of clever editors, graphic designer and computer whizz's. It couldn't have been possible without donations of issue sets from John Galloway, John Blakeley and Ken Orams.

So enjoy reading the back issues of the Geomechanics News over the summer break, and a very Happy Christmas from all on the NZGS Management Committee.

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Chairman

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EDITORIAL

A Dynamic Place To Live

Recently, I survived a fearsome easterly storm (albeit with a little bit of seepage in around the aluminium windows of my house), witnessed flooding and inundation from a storm at Paekakariki and the effects of a large earthquake in the relatively unpopulated area in the Fiordland National park, which generated over 200 landslides. I also went to the Ports and Coasts conference in Auckland, where the power of the sea was to the fore. A dynamic natural environment in which we live, methinks.

Having survived the leaky building syndrome with little apparent damage, I was interested in the Geotechnical Society's submission on the Building Bill to repeal the 1991 Building Act (see submission in this issue by Paddy Luxford)). As indicated in the submission, subsidence is clearly an omission from the bill.

While my house is relatively solid, it was built in 1979 with some less than adequate workmanship (e.g. windows only flashed along the top – hence the water intake blown in around the sides), and I wonder how many other corners were cut. What of the inspection process? While I am not a fan of over-regulation and bureaucracy, I believe that building inspection has been both under-valued and under-resourced. Part of this stems from the onus placed on city and district councils who seem to not want to spend valuable rates on such mundane regulatory matters. But have they considered the cost of not doing so? My hope for the Building Bill is that it doesn't greatly increase the cost of compliance and that we are all prepared to pay for proper inspection and quality advice.

The storm at Paekakariki was spectacular in bringing down debris from surrounding catchments. The Belvedere Motel was inundated by material that went through a 1 m diameter culvert; a material with a consistency of 'sloppy

concrete' as one commentator put it. This issue features some of the washouts from this event provided via Graham Hancox and the Kapiti Coast District Council.

The M 7.1 Earthquake in Fiordland on the 22 August should be a reminder of the seismic forces we can expect in New Zealand from time to time. Fortunately, the epicentre location meant that there was little at risk from such a hazard. A brief summary of the event is given in Grant Dellow's *Wet Weather and an Earthquake = Landslides* report.

The Ports and Coasts conference in Auckland again brought my attention to the dynamic environment. The presentations I attended were a mixture of numerical modelling, effectiveness of coastal protection structures, new techniques for monitoring change and how to live with the processes rather than fight them.

It is New Zealand's relatively dynamic environment that we as geotechnical professionals apply our craft, experience and knowledge to facilitate the design and construction of infrastructure. This is also the backdrop to the 9th Australia New Zealand Conference on Geomechanics *To the eNZ of the earth* to be held in Auckland in February 2004. This is a great opportunity to see how others have designed for this dynamic environment, but also to experience how our overseas colleagues design, taking into account sometimes different environmental factors. The ISSMGE is to have a board meeting at this conference and delegates will be coming from all over the world. See you there!

Phil Glassey
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EDITORIAL POLICY

NZ Geomechanics News is a biannual newsletter issued to members of the NZ Geotechnical Society Inc. It is designed to keep members in touch with matters of interest within the Geo-Professions both locally and internationally. The statements made or opinions expressed do not necessarily reflect the views of the New Zealand Geotechnical Society Inc.

The editorial team is happy to receive submissions of any sort for future editions of *NZ Geomechanics News*. The following comments are offered to assist potential contributors. Technical contributions can include any of the following:

- Technical papers which may, but need not necessarily be, of a standard which would be required by international journals and conferences.
- technical notes
- comments on papers published in *NZ Geomechanics News*
- descriptions of geotechnical projects of special interest.

General articles for publication may include:

- letters to the NZ Geotechnical Society
- letters to the Editor
- articles and news of personalities

- news of current projects
- industry news.

Submission of text material in camera-ready format is not necessary. However, typed copy in Microsoft Word is encouraged, particularly via email to the Editor or on floppy disk or CD. We can receive and handle file types of almost any format. Contact us if you have a query about format or content.

Diagrams and tables should be of a size and quality appropriate for direct reproduction. Photographs should be good contrast black and white gloss prints or high resolution digital images in jpeg format.

NZ Geomechanics News is a newsletter for Society members and articles and papers are not necessarily refereed. Authors and other contributors must be responsible for the integrity of their material and for permission to publish. Letters to the Editor about articles and papers submitted by members will be forwarded to the contributing member for a right of reply.

Persons interested in applying for membership of the Society are invited to complete the application form in the back of the newsletter. Members of the Society are required to affiliate to at least one International Society and the rates are included with the membership information details.

REPORT FROM THE SECRETARY

Here in my little corner of the Society, it has been a very busy few months co-ordinating the review of all the papers for the ANZ Geomechanics Conference which will be held in February 2004.

I am continuing to up date the Society web page as and when time permits. The *What's On*, *Society News* and *Branch Activities* and *Conference Diary* are regularly updated. The employment opportunity section continues to be popular with employers and several companies are using this advertising avenue repeatedly. If you have a situation vacant you wish to advertise simply send me a word or PDF file and I will do the rest. It only costs \$50 plus GST per month. I will continue to send out emails about what is new on the web page. If you have suggestions for additions to the web page or have some membership queries please email me.

Society membership is currently flourishing with a total of 483 members.

New Members

It is a pleasure to welcome the following new members into the Society since the last issue of *NZ Geomechanics News*:

Jonathon Devine	John Morris
Hseuh Lyn Kueh	James Muirson
Thomas Newell	Paul Wopereis

Resignations

Graham Hancox has resigned from the Society.

Subscriptions

Your subscription invoices for the 2003/2004-year have now been sent out. Please don't file them in the pay sometime later file. PLEASE PAY YOUR SUBSCRIPTIONS PROMPTLY. Thank you.

Congratulations

The 2004 Geomechanics Lecture will be given by Dr Laurie Wesley. It is to be titled *Geotechnical Engineering in and out of the Ivory Tower*. The lecture will be given first at the ANZ conference in Feb 2004 and then will tour the branches later in the year.

Debbie Fellows

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LETTERS TO THE EDITOR

Guidelines for Classification and Description of Soils and Rocks

I am perplexed by the comments on responses to the proposed revision, and the change in title, to the *Guidelines for the field description of soils and rocks in engineering use (1988)* as discussed on page 26 of NZ Geomechanics News, Issue 65, June 2003. We once had a method for field description, and the 'revision' seems to have abandoned any suggestion of field description.

Besides the change in title, the omission of the second sentence of the introduction to Description of Soils (Part 2 of the 1988 guidelines) is a mistake. To ignore the important aspect of *in situ* soil description means that we might as well just use the Unified Soil Classification System. In fact, given the 'revised' title, there is no need for anything other than the Unified System. However, the second sentence in the introduction to description of soils says: "The description of soils *in situ* requires the introduction of additional terms while retaining important features of the USBR method such as the unified symbol". That is the whole point of the 1988 "*Guidelines for the FIELD (my stress) description of soils and rocks in engineering use*". The proposed revision flies in the face of the original concept, which is reflected in its title.

The definition of 'classification' in the article is odd. Usually in soil mechanics, the word has a very specific meaning relating to laboratory test results. So is a field 'classification' seen as something different? In the sense of the title of this draft revised document, we are supposed to adopt a very loose definition of the word? This will lead to confusion. The title almost implies that the Unified Classification is being revised here. It would be better to remove 'classification' from the title, and stick to 'description', especially 'field description', given that the primary intended use of the guidelines was as a field tool.

Does it matter whether something is a silty sandy gravel, or a sandy silty gravel? I think not, and in future I will refuse to change my initial field assessment on the basis of later laboratory results. What is more important is whether the gravel clasts are rounded, angular, or a mix of both; weathered, unweathered, or a mix of both. This can be vital for determining the origin of the soil, which will have an important bearing on application of geotechnical engineering practice at a site.

Should I expect the slavish use of the Unified System tell me these details? In my experience, the degree of roundness of gravel clasts and whether or not they are in contact is almost never recorded in practice, even though the USBR classification chart includes this aspect as "information required for describing soils". I have also seen too many descriptions of bedrock as 'gravel' because of disturbance in drilling. Such an erroneous description is something that the Unified System would seem to encourage, if taken in isolation. Colour is another vital aspect of a material that should not be ignored. It is ridiculous to make colour an optional item in a description, (is it so hard to state a colour?) because colour can provide vital clues about current and former groundwater levels and can also aid geological correlations, the correctness of which may be important to a project.

In summary, the new 'revision' seems to have lost sight of the fact that we need is a consistent system for the field description of rock and soil materials to provide additional vital information to a site investigation other than what the Unified System provides.

Nick Perrin

Geological and Nuclear Sciences, Lower Hutt

WANTED – Book Reviewers

NZ Geotechnical Society has a number of recently published books available for review. These books have been supplied free to the Society, by the publishers, for review purposes. We are looking for eager volunteers to review the following books:

- **A short course in Geotechnical Site Investigation** (Simons, Menzies, Matthews) 2002.
- **A short course in Foundation Engineering** (Simons, Menzies) 2000. Thomas Telford.
- **A short course in Soil and Rock Slope Engineering** (Simons, Menzies, Matthews), 2001. Thomas Telford

The reviews are to be succinct and critical appraisals of the books in the order of 1 or 2 A4 pages in length. Reviews will be forwarded to the publishers. Upon completion of the review the book reviewers can keep the book – now there is a good incentive for you!

If you are interested please contact:

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INTERNATIONAL SOCIETY REPORTS

ISSMGE – Vice President's Report, April 2003

Board Meetings

A Board Meeting was held in Prague ahead of the Mid-Term Council Meeting at the European Regional Conference. The next Board Meeting will be held in Auckland immediately after the ANZ conference in February.

Mid Term Council Meeting

This event was very interesting and a number of issues have risen that both the NZGS and AGS will have to address prior to February. These include:

- The ISSMGE constitution on voting procedures.
- The Member Society subscriptions.
- Cooperation between the International Society's and a joint Secretariat.

These three issues will likely overshadow and impact on the progress being made in the various Task Forces (IT, Education, Conference Format, Professional Practice and Industry Liaison). These should not be ignored, but for the time being they are less important than resolving the above issues.

Constitution, Subscriptions and Voting Policy

As reported previously, there are problems associated with the current method of calculating subscription rates and there are some perceived problems with the voting policy at Council. The International Society currently recovers a membership fee from member societies around the globe that mostly reflect geo-political boundaries (New Zealand, Australia, Japan, Bolivia etc). The cost of membership to each member society is based on a complicated formula that incorporates the countries economic indicators and the number of individual members the society declares.

The direct consequence of this formula is that small member societies with low individual memberships effectively pay significantly more per member than larger member societies. When the International Society was established it was written into the statutes that the richer, more affluent member societies should carry the bulk of the financial burden of administration. However,

individual members in Tunisia and Costa Rica currently pay up to five times more than individual members in the USA or Canada.

A motion was drafted for the Council Meeting in Prague that addressed the problem associated with subscriptions. The Board's motion was relatively simple in that it was proposed to establish a uniform fee per individual member. Council rejected the motion after a successful challenge by five of the fifteen or so larger member societies that would end up with a net increase in their fees to the International Society (USA, Canada, Brazil, UK and Australia).

The bases of their argument would appear to be that if the larger member societies are to contribute more fees to the International Society then they should also be afforded more influence in the management and administration of the Society by strengthening the value of their vote at Council. At the moment every member society, regardless of the size of its individual membership and financial contribution, is afforded equal rights at Council.

The Board is now faced with a potential stalemate, the subscription fee cannot change until voting policy is 'fair' and voting policy is unlikely to change until the subscription fees are 'fair'.

Co-operation with the ISRM and IAEG.

This issue was also discussed at Council and it has the potential to impact on the operation and function of all three international societies. The proposal is to establish an umbrella, or parent, Federation of International Geotechnical Societies. The form, structure, cost and implications are being reviewed by a group of Board Members from each society – including Harry Poulos.

J Grant Murray

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ISRM – Vice President's Report, September 2003

ISRM Council and Board Meeting in Sandton, 11th September 2003

I took over the role as VP for Australasia from Chris Haberfield at the 10th ISRM Congress held at Sandton, Johannesburg, South Africa on September 8–12, 2003. Chris Haberfield has made a report to the AGS, on the activities of the Society up to Congress. These are just additional comments on the direction of the new Board and events since Congress.

The main items the new Board discussed were focussed on the phasing out of the printed News Journal which is a major cost item on the budget. There will be much more emphasis on electronic communication together with a substantial upgrade of the web site. The intention is to make abstracts of ISRM conferences available on the web in a searchable form. The ISRM Directory will not be printed and distributed to members. It is intended to publish this on the web site if the legal issues can be resolved.

Commissions

The commissions on Geophysics and Natural Stone have been extended while those on Swelling Rock and Fragmentation have been discontinued. There are proposals for new commissions on Case Studies from China, Maintenance from Lisbon and Mine Closure from Poland.

ISRM meetings

- Nov 30 to Dec 2 Kyoto, Japan is the 2004 ISRM International Symposium.
- The 53rd Geomechanics Colloquy, to be held in Salzburg hosted by the ISRM National Group Austria, in October 2004 has been approved as an ISRM Regional Symposium.
- May 18–20 Brno, Czech Republic is the 2005 ISRM International Symposium.
- Lisbon was confirmed as the venue for the 11th ISRM Congress in 2007.

As an initiative of the new Board, each VP has been asked to identify potential growth areas and any problems in their region. This is essentially a SWOT analysis (strengths, weaknesses, opportunities and threats). For the Australasian region there was mention of the need to embrace the Strata Control groups in WA and on the east coast (NSW/Queensland) into the Society. I would welcome any thoughts from members on where you see the Society developing and also any ideas about how the Society can better serve its members in the region.

John St George

ISRM VP for Australasia

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IEAG – Vice President's Report, September 2003

Introduction

This is the IAEG Australasian Region report for the second half of 2003. The report is by Vice President (VP), Dr Fred Baynes for submission to the Australian Geomechanics Society and the New Zealand Geotechnical Society. The report for the first half of 2003 was not produced due to my being overseas in remote locations for prolonged periods.

IAEG Issues

The newly elected President Niek Rengers requested the Executive to comment by email on a range of issues during the first part of 2003 in preparation for our Executive meeting in September. I attended the Executive meeting on 13 September and the Council Meeting on 14 September 2003 in Istanbul, Turkey. At those meeting a whole range of issues were discussed, the following being the more important:

- There has been discussions between the IAEG, ISSMGE and ISRM concerning the sister societies forming an umbrella society – possibly to be called Federation of International Ground Engineering Societies. Three IAEG representatives were nominated to participate in ongoing discussions and the IAEG position was endorsed by Council.
- The Bulletin continues to improve in terms of technical content and timely delivery. However it is still not part of the citation index but it might eventually be included if contains sufficient numbers of important good quality papers that are cited elsewhere.
- The IAEG website needs to be upgraded and financial support for action this was agreed.
- There has been a useful report produced by the Joint European Working Group of IAEG, ISRM and ISSMGE relating to Professional Tasks Responsibilities and Co-operation in Ground Engineering.
- Planning continues for the IAEG Congress in Nottingham, UK, for 2006
- The Executive feels that a review of the technical commissions and working groups is necessary. Such a review may also be related to definition of the 'core values' of the IAEG prompted by Sir John Knill's Hands Cloos lecture. I am to lead a task force charged with reviewing the workings of Technical Commissions and relating them to core values.

Australasian Region Issues

Activities to Date

- The members of the Australasian IAEG Group steering committee and those nominated representatives from each Australian State and New Zealand major centre that were asked to contribute in 2000 have not been active.
- I attended the International 9th IAEG Congress in Durban when I was elected as Regional VP, attended the Council meeting as Australia representative and a subsequent Executive meeting as Regional VP.
- Sir John Knill's Hans Cloos lecture was published in the Australian Geomechanics Journal. I chaired and reported a discussion of core values at the Durban IAEG Congress which will be published in the Bulletin.
- I produced a short paper on Responsibilities of Engineering Geologists which was published in the Tauranga Symposium; a modified shorter version was published in the AEG newsletter in USA.
- Registration issues continue to be an agenda item Australia although most practitioners do not seem to be too concerned about it. I have attempted to pursue this issue but achieved little. A report on the importance of this issue in New Zealand is suggested.
- The 16th NZ Geotechnical Society Symposium in Tauranga in March 2003 included workshops on soil and rock description and engineering geology.

Planned Activities

- The New Zealand Geotechnical Society is considering nominating for the IAEG Congress in 2010.
- A geology for engineers training course is to be held in Adelaide, Australia in April 2004
- A survey of teaching at an under-graduate and post-graduate level in Tertiary Institutions throughout Australia and New Zealand is planned to find out what courses are available for engineering geology and geology for engineers is throughout the region.
- Planned succession for the Australasian Group VP is to be addressed.

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CONFERENCE REPORTS

ISRM Council Meeting

7 September, Johannesburg, South Africa

Reported by: Stuart Read

Geological & Nuclear Sciences, Lower Hutt

The 2003 International Society for Rock Mechanics (ISRM) Council meeting was held in conjunction with 10th International Congress in Johannesburg. Thirty of 46 National Groups attended, including New Zealand (John St George and Stuart Read) and Australia (Chris Haberfield).

Apart from the ongoing operation of the Society, the greatest significance of the meeting is the four-yearly is the changeover of the Board. Following his election in 2001, Prof Nielan van der Merwe (South Africa) commences his term as President for the 2003–2007 period, replacing Prof Marc Panet (France) who chaired the Council meeting as a final duty. The following regional vice-presidents for 2003–2007 were elected:

Africa	Mr Martin Pretorius (South Africa)
Asia	Prof Zhao Jian (Singapore)
Australasia	Dr John St George (New Zealand – last kiwi was Prof Mick Pender in 1991–1995)
Europe	Dr Claus Erichsen (Germany)
North America	Dr François Heuzé (USA)
South America	Dr Eda Freitas de Quadros (Brazil – first woman Vice President to be elected).

Consideration of up to 3 Vice-Presidents-at-large is for the new Board. Dr Luís Lamas (Portugal) has taken over the post of Secretary-General since May 2003, and Dr Delgado Rodrigues who had performed the role since 1990 was thanked, including a African-flavour gift. Profiles of the new Board plus other Society personalities are included in ISRM News Journal 8(1) circulated recently.

Other items from the Council meeting included:

- 1 Membership numbers in recent years are reasonably consistent (5,000 world-wide) after declines in late 1990s, but active promotion of the Society is needed to preserve or increase this level.
- 2 Communication with Society members will be more electronic. The website, www.isrm.net, will be enhanced including becoming more interactive. News Journal 8(1), which is the last to be circulated in hard copy, is the first volume to be available on the website (pdf format). The ISRM Directory (4 yearly

membership list – last in 2000 in hard copy format) is discontinued and the next issue will be in electronic form after legal issues are resolved.

- 3 Interaction between the three international societies (ISRM, International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE), International Society for Engineering Geology and the Environment (IAEG)) continues, including consideration of a confederation of geotechnical societies.
- 4 Future Council and Board meetings were confirmed as; 2004, Kyoto, Japan in late November, and 2005, Brno, Czech Republic in May. Lisbon, Portugal is the venue of the 11th Congress in July 2007.
- 5 A proposal to change the name of the Society to the International Society for Rock Mechanics and Rock Engineering (ISRME) was defeated.
- 6 The Rocha Medal 2004, selected by the Board, has been awarded to Dr Giovanni Grasselli (Italy) for his PhD thesis *Shear strength of rock joints based on quantified surface description*.
- 7 Technical Commissions remain active (see also website) and reports from three current ones were presented:
 - Application of Geophysics to Rock Engineering – current emphasis on standardisation of methods,
 - Testing Methods – current emphasis on stress measurement, and
 - Landslides and Engineered Slopes, joint with ISSMGE & IAEG and overlapping with International Commission on Landslides (ICL) which is getting underway.

The meeting marked the end of Chris Haberfield's term as Australasian Vice-President on the Board. Chris has actively promoted the Australasian viewpoint, and such enthusiasm and effort is appreciated as we are a small region in comparison to the others. He also played a leading role in the staging of GeoEng2000, a highly successful conference of the three societies (ISRM, ISSMGE and IAEG) in Melbourne in November 2000 and which was attended by a large kiwi contingent (see Geomechanics News 61). A report on the activities of the new Board is given separately by John St George.

10th International ISRM Congress

8–12 September 2003, Sandton, Johannesburg, South Africa

Reported by: Stuart Read

Geological & Nuclear Sciences, Lower Hutt

The theme of the 10th congress of the International Society for Rock Mechanics (ISRM) held in South Africa in September was *Technology Roadmap for Rock Mechanics*. The two volume printed proceedings contain 240 papers from 33 countries (1 New Zealand, 13 Australia,) and the congress was attended by 300 delegates from 34 countries (2 New Zealand, 5 Australia).

South Africa is a world leader in rock mechanics, being largely practiced in surface and subsurface hard rock mining, as well for coal extraction and infrastructure civil engineering (e.g. dams). Johannesburg is a city dependant on mining that has grown rapidly since the discovery of gold in 1886. It is therefore not too surprising that South Africans contributed the largest number of papers (21) as well as congress registrations (35) and a high level of the sponsorship (>60%).

The South Africans ran the event differently from previous congresses. While 6 keynote-type addresses in the plenary sessions remained along with full presentations of 27 selected papers (1 New Zealand, 1 Australia), gone were general reporters for each congress theme. In their place to encourage greater author participation conference theme topics were addressed in concurrent mini-symposia during which short, 5 minute, presentations of 15–20 selected papers were interspersed with panel discussions. Posters, which were first tried at the last congress in Paris in 1999, were also invited in particular for the 95 papers not selected for presentation. Field trips to deep mines extracting gold from the Witwatersrand reef provided a contrast to the sessions. There were also 4-day post-congress tours to mines north (Bushveld igneous complex) and east (Palaborwa & Middleburg) of Johannesburg.

The keynote addresses covered a range of themes. To start things off Clem Sunter (South Africa – co-author of the book *Mind of a Fox*) gave an illuminating address on the value of scenario planning and dealing with uncertainty. This included insights on HIV/Aids in Southern Africa and the significant impact on the workplace together with comments on some of the social e.g. ABC guidelines – Abstain, Be faithful, if not use a Condom, or company policy (treatment assistance) counter measures. Charles Fairhurst (USA) gave the Leopold Muller award address on rock mechanics for radioactive waste disposal and the varying approaches around the world.

Other keynote topics included open cast mining

(Steffen, South Africa) and how high and how steep will pits become as depths approach 1 km and are slope failures acceptable to a certain level; an introduction to uncertainty in rock engineering – both deterministic and probabilistic (Einstein, USA), and design and construction of large underground caverns for emergency storage of items such as food (Lee, Korea). Linzer (South Africa) presented her Rocha medal PhD thesis on modelling solutions to locate deep mine induced seismicity.

The 3 hour mini symposia or workshops were run in the following concurrent sessions:

- Rock mass classification; Mine closure; Tunnelling
- Large underground openings; Rock fracture and rock mass failure; Slope stability
- Numerical modelling; Seismicity; Risk and other mining aspects.

Each session addressed specific topics such as: do classifications provide realistic values for rock mass deformability? Are support procedures available for all ground conditions? Do Mohr-based failure criteria correctly predict strength? Cohesion – can we rely on it? Two-dimensional versus three dimensional modelling? Do we understand wave propagation in fractured rock masses?

Although the format of individual sessions developed during the congress, they all provided opportunities for paper presentation, questions and answers, and discussion. Those that I attended had a mix of industry and university driven papers, complemented by a good number of case histories (e.g. shallow large openings in Singapore are feasible because of high horizontal stresses). They also illustrated large budgets available in some research organisations for both major and minor items (e.g. 10 m long models of underground openings in China), solutions for innovative technology (e.g. storing compressed air in Japan for electricity generation). As expected computer modelling and simulation received their share of attention (but if you have a hammer, should one always be looking to use a nail, when say a screw might be better?).

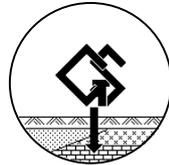
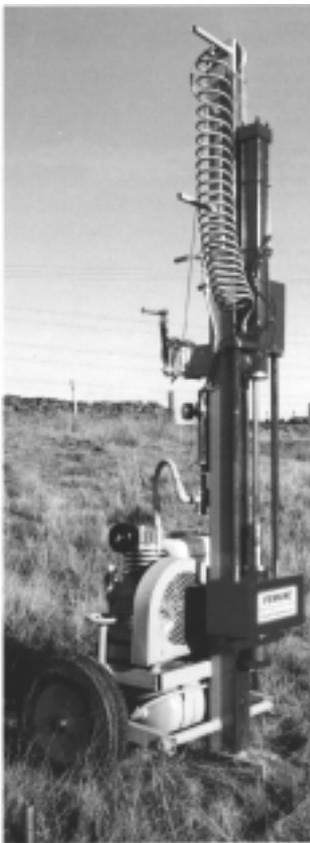
The mid-session field trips highlighted deep gold mine development near Johannesburg in the Witwatersrand basin. Mining is commonly at depths of 2500–3500 m where ground temperatures are >40 °C and the extensive gold-bearing reef (a conglomerate) is about 1 m thick. Mining at these depths (see Vierra & Budavari, South Africa) is resulting in modifications to traditional mining

techniques such as breast stoping, advance drilling to reduce mine-induced seismicity, hydraulic backfilling, and cooling using iced water rather than air.

Technically there was something for everybody, though numerically-based modelling was the dominant topic. The challenges in rock mechanics remain as: getting representative data, characterising rock mass performance, reliability of modelling for design analysis, predicting behaviour and monitoring. These have not changed since the 1970s though design is evolving to include probabilistic risk as well as deterministic. In his summary Wagner (Austria) felt that the conference had preserved a technology theme, but that areas missing were rock excavation, petroleum reservoir engineering, and the use of geophysics. He also felt that classification still needs a lot of attention, and that fundamental

research needs greater promotion. Interdisciplinary activities benefit this and there must also be an increase in the awareness of the importance of rock engineering science for society.

It is a challenge to successfully run an international conference, particularly when changes to a traditional format are introduced. Activities were conveniently close to each other e.g. posters and sponsors booths adjacent to the catering facilities and main auditorium, while little touches such as lion cub displays and praise singers reflected a local flavour. Sure numbers were down on Paris in 1999; times and location influence such things. However, the changes in format with greater author participation more than compensated, so that in my opinion it proved a successful venture. We can all look forward to the next congress in Lisbon, Portugal in 2007.



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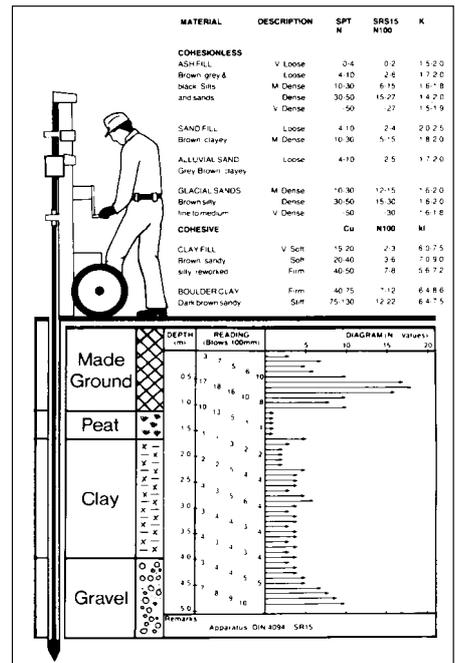
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Soft Soil Workshop

15–17 September 2003, Noordwijkerhout, Netherlands

Reported by: Sergei Terzaghi
Sinclair Knight Merz

The European training network set up a collaboration between 5 European universities (TU Graz, University of Stuttgart, NTNU Trondheim, Helsinki University, and University of Glasgow) entitled *Soft Clay Modelling for Engineering Practice*. This workshop was the 'final' output from this collaboration, open to the wider community, and specifically sought input from consultants and contractors to broaden the scope. In the event we ended up with about one day on theory, half a day on lab work and verification, half a day on analysis, and the final day on practical aspects including case studies.

The workshop was held in a complex specifically set up to be a conference/training centre, and indeed during the time that I was there held concurrently a number of other groups. The first two days had four 1.5 hour sessions, and the final day had three with what appeared to be generous coffee and lunch breaks. This left plenty of time for socializing after dinner in the bars. However, the coffee breaks did not end up being so generous due to the amount of debate.

A development that the collaboration had been focussing on was the impact of structure and of anisotropy on the modelling of soft clay soils. Many of the theoretical and lab papers were the results of this effort. This was of much interest to me as the results fitted very nicely to some issues that I had been grappling with for some time. Essentially, the group had set-up two different modelling approaches to handle structure and anisotropy, and then tested the models against each other and a number of real clays.

One approach was a mathematical based approach using critical state soil mechanics, the second approach used a rather different hyperbolic soil model and applied it to a number of planes at each point. Each approach gave similar results. Interestingly, a number of the other papers

from outside the collaboration gave quite different ideas on how to approach the same problem. However, some quite important lessons came out of this, which sparked considerable debate.

One of the important lessons is that the e -log p plot, even for soft clays, is not the best plot to use for determining the pre-consolidation pressure. In fact, one of the papers illustrated that really you needed to use two different plots, a linear plot and a tangent modulus plot (p vs m_v), to get the best results.

The collaboration also showed that anisotropy on its own is not enough to model the soils that exhibit the anisotropy. One needs to include the effects of stress axis rotation from the anisotropic axis as well as the effects of the developed structure (bonding and fabric). They showed that it is possible to pre-consolidate a soil simply by rotating the stress axes (though this may be a theoretical application), and equally to fail a soil by rotating in a different fashion.

Ignoring the structure leads to underestimating the stiffness of the soil even during 'virgin' loading. However this led to some debate because, whilst the collaboration had considered aging in the form of creep (secondary compression), they had considered the effects of the development of structure. This debate then led to severe time overruns, an impromptu paper and a lot of discussion about the visco-plastic behaviour of soils, which appears to be present even at the incremental stress level behaviours of some soils.

The practical papers resulted in some debate on how to design, or not design, structures using various techniques and it was also interesting to see the methods adopted in various countries for analysing ground improvements.

All in all, a very worthwhile conference, particularly given the relatively small and diverse nature of the participants.



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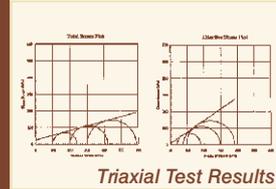
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2nd International Young Geotechnical Engineers Conference Report

7–10 September 2003, University 'Ovidius' Constantza, Mamaia, Romania

Reported by: Steven Price
Riley Consultants Ltd

If you like cabbages and potatoes then Romania is the place for you. On the plane flight into Bucharest (the capital) looking out the window, over a rather large Romanian woman and her husband, there were cabbage fields as far as the eye could see. I'm sure one field had a sign declaring it only for the young geotechnical engineers!

On landing I was quickly whisked through passport control (the lady got tired of repeatedly asking me after I told her for the fifteenth time I didn't know where I was staying) and then customs (the guy waved me through and didn't bother looking in my bags). From there an Israeli, a Dutchman, a Canadian and his wife (no this isn't a bad joke), along with myself were driven to our overnight accommodation, a student hostel. Broken windows were the first sign that this wasn't the Sheraton. The rooms were small, dark and insect friendly. A Japanese fellow flatly refused to stay and moved to the nearest Hilton! I enjoyed the eastern European style 'roughing it'.

The following day 75 young geotechnical 'engineers' were packed into buses to be taken to the holiday resort of Mamaia on the Black Sea. On the way we were shown a construction site in Bucharest with a recently completed 5 storey deep basement adjacent to existing buildings with deflections with established tolerances. Impressive stuff

considering the deep alluvial sediments. From there we were transported across the flat plains of southern Romania. An interesting lecture was given on the on again/off again motorway between Bucharest and the Black Sea port of Constantza. We stopped to view some amazing bridges crossing a river (name unknown). Somehow the Romanians had turned a two lane highway and railway track into a spaghetti junction, all suspended in the air!

The 2nd International Young Geotechnical Engineers Conference started the following day at the Ovidius University, Mamaia. Although the organisers claimed there were 3 geologists at the conference, I never met the other two, despite talking to anyone who walked past. It is a humbling experience to hear people from many different countries communicating in English, whilst I stand there and realise I know only a few words of French and Mandarin.

The conference was a well regimented affair with delegates bused to the conference in the morning, bused back to the hotel and then bused to evening dinner typically lasting until midnight (once a Canadian and myself missed the evening bus and experienced the local cabs, they didn't know English until you discussed the price. I wanted to discuss the unbraked, non seat-belted car).



Left: Bucharest Site – Construction site with 5 storey deep basement. Young engineers milling around.



Right: Part of the Constantza port where scrap metal is loaded.

A series of guest lecturers provided interesting speeches, particularly one on the high-speed rail line from the Chunnel to London. The 15 minute talks by young 'engineers' were divided into 3 parallel groups, so unfortunately you couldn't hear them all. The standard was very high. Some struggled with the English language, others were so quiet they needed a megaphone, but still the topics were interesting, such as continental slope stability and dealing with piping beneath a dam foundation. My speech went well, though some of the humour I think was over the heads of many non-native English speakers. A Canadian lecturer is intending to use some aspects of my speech/overheads to highlight the importance of understanding engineering geology to his students. That makes it feel all-worthwhile.

At night-time the organisers would take us to various restaurants to experience a slice of Romania (typically a piece of cabbage). From traditional Romanian dancing, to ballet, to the finest restaurant by the sea. Afterwards, as beer was cheaper than water, some infrequent visits to the local establishments were made. But only for the purpose of networking with our international peers of course.

A visit was made to Constantza harbour. This thing is big. I'll never see the Ports of Auckland in the same way.

One regret of the conference was the lack of personal time to explore the Romanian towns and countryside. Some people, like our Australian counterpart, stayed on after but unfortunately experienced a storm that had come across from Italy. I personally spent a night in another student hostel in Bucharest, better than the first, then flew to Germany to let loose on the Autobahns.

Right: Skoda Girls: How they sell cars in Romania. If only it would catch on in New Zealand.

The conference was an amazing event; a place to meet people of your own age from a variety of different countries and backgrounds. It was also an opportunity to meet professors and senior staff from universities and consultancies throughout Europe. An experience that one shall never forget.

I would personally like to thank the New Zealand Geotechnical Society, EQC and Riley Consultants Ltd for the opportunity to attend this conference.



NZSOLD Symposium, Dams – Consents and Current Practice

26 August 2003, Wellington

Reported by: Stuart Read and Peter Mulvihill

Geological & Nuclear Sciences, Lower Hutt and Pioneer Generation, Alexandra

The New Zealand Society on Large Dams (NZSOLD) symposium on 26 August 2003 continued a series of one-day symposia from 1997 and 2003. The themes of the symposia have a broader base than purely technical items to include a wider spectrum of dam-related issues. This is intentional to provide value not only for Society members but also other parties with an interest in dams and dam safety assurance eg. regional authorities.

Water is a resource needed for electricity generation, domestic consumption, irrigation or industrial use and demands for it is gaining wider attention. The 2003 theme arose from the resource consent process being faced by major dam owners and regional authorities, plus provide an update on recent activities in the dam industry, including legislation. Twelve papers, each prepared on an invitational basis, plus a keynote address, were presented to an audience of 115 delegates representing dam owners, regulatory authorities, planners and technical advisors.

The keynote address, which was given by Prof Angela Arthington, a river ecologist from Griffith University, Brisbane, provided a well presented educational opportunity on ecological aspects of river systems and impacts of dams. She outlined four guiding principles that link hydrology and aquatic biodiversity (flow regime determines habitat, species respond to flow regime, viability of species is related to pattern maintenance, change aids exotic species). Illustration of the impacts of altered flow regimes using these principles included several case histories from New Zealand and Australia eg. Wivenhoe Dam, a multi-purpose dam constructed following the Brisbane flood in the 1970s.

The rest of the morning satisfied the technical folk with four recent case histories – treatment of soft soil foundations using wick drains during construction of the 18m high Wilsons earthfill embankment dam in Northland (Weston *et al.*), environmental issues related to drawdown of the reservoir for the Cosseys Dam remedial works (McQuarrie *et al.*), grouting high pressure seepage at Arapuni while maintaining full reservoir level and protecting underdrainage systems (Amos *et al.*), and current tailings dam embankment practice in New Zealand, primarily designing them as zoned waste rock embankments (Matuschka).

Dam safety related legislation was a topic at the 1993,

1997 (keynote address), and 2000 symposia. The hardy perennial has been revived and is included in the current revision of the Building Act 1991 (now at Select Committee stage) sponsored by the Ministry of Economic Development (MED). After perspectives from NZSOLD (Mulvihill) and regional councils (Jones), MED representatives (Mumford & Townsend) accepted the invitation to outline the envisaged shape of the legislation relating to dams. This produced the most lively discussion session of the symposium, illustrating its significance to the dam industry.

Experiences of dam owners (Scarlett) and regulators (Crequer) in the Mighty River Power consent renewals then illustrated the huge effort needed in the process. It is clear that we are moving into a new regime with greater environmental and economic attention rather than technical. This was also illustrated in the consent process for Project Aqua on the Waitaki River – a new project (Campbell), and some of the adjustments required for dealing with several councils when assets are spread around New Zealand as is the case for TrustPower (Lilley).

The final two papers had a Canterbury flavour focussing on real events and future demands. The Opuha dam overtopping during construction in February 1997 illustrated the emergency management lessons that come from dealing with an actual event (Lees & Thomson), while there is a necessity for water storage if future irrigation needs are to be met without constraints (Bright).

Overall the symposium achieved the Society's aims with an appropriate collection of papers presented to illustrate current industry-wide trends and promote best practice. A difference from previous symposia was that the discussion sessions (apart from legislation) were less lively. This may beg the question of whether the venue was too comfortable and/or the catering too sumptuous, but these like the numbers attending were similar to previous years. As noted earlier topics for the symposium papers were agreed on an invitational basis. Calls for papers are made for the combined NZSOLD/ANCOLD (Australian Committee on Large Dams) conferences, which are also held every 3 years. The next conference will be held in Melbourne in October 2004 (watch the NZSOLD webpage www.ipenz.org.nz/nzsold – call for papers likely around April).

THE 9TH AUSTRALIA NEW ZEALAND CONFERENCE ON GEOMECHANICS



8–11 February 2004
Auckland
Hilton Hotel

Register now for the premier event on Australasia's geotechnical calendar. While held every 4 years, it is held in New Zealand only every 12 years, bringing together geotechnical practitioners involved in soil mechanics, rock mechanics and engineering geology. The conference is promoted by the Australian Geomechanics Society and the New Zealand Geotechnical Society

Theme

"to the eNZ of the earth"

The conference theme aims to generate discussion on what makes geotechnical practice within New Zealand and Australia different to other parts of the world. This uniqueness is in part historic due to both countries being young nations and in part location as a result of their position on or adjacent to a tectonic plate boundary.

The theme also encourages contributions to consider the influences of the 'Electronic Age' on geotechnical practice.

Subject areas

A total of 131 papers have been received for the conference. Conference sessions will be held for:

- Foundations
- Slope Stability
- Site Investigations and Engineering Geology
- Laboratory Testing
- Retaining Walls, Anchors and Excavations
- Embankments and Ground Improvement
- Rock Mechanics and Mining
- Roading, Pavements and Rail
- Tunnelling and Subsidence
- Environmental Geotechnics and Hydrogeology
- Modelling
- Geosynthetics

Keynote speakers

- **Conference Keynote Address by Professor Geoff Martin of the University of Southern California**, international expert on liquefaction related ground stability, ground improvement and the seismic design of foundations and earth structures
- **The John Jaeger Memorial Address by Emeritus Professor ET (Ted) Brown AC FEng FTSE**, co-author of two well-known books on underground excavations, *Underground Excavations in Rock*, with Evert Hoek and *Rock Mechanics for Underground Mining* with Barry Brady, and author of the recently published book *Block Caving Geomechanics*.
- **The New Zealand Geotechnical Society 2004 Geomechanics Lecture by Dr Laurie Wesley of the University of Auckland**, whose special research interest has been the properties of volcanic and residual soils, in particular tropical red clays, allophone clays, and pumiceous sands, reinforced earth, landfills, groundwater and seepage.

Hot Topics

Hot topics is a special new feature at the ANZ conference and is your chance to pick the brains of 2 to 3 experts in a particular area of geotechnical engineering (e.g. liquefaction, numerical modelling, landslide risk assessment etc) and ask them questions. The experts will provide a brief introduction to a 'Hot Topic' and the floor will be opened for questions and discussion.

Post-conference Tours

Rotorua Technical Tour (Tour 1)

This two-day tour to Rotorua and Taupo in the centre of the North Island is the perfect way to combine learning about volcanic geology, sightseeing, cultural activities, good food and company. Travel by coach on Thursday to Rotorua, while receiving a lesson in the geology of the North Island on the way. Walk through the Waimangu Valley where you will experience geothermal activity at close quarters. End the day by swimming in thermal pools before heading out for an encounter with Maori culture and food. Rise on Friday morning to visit volcanic geomorphology and active faults. Enjoy lunch at a prawn farm that utilises the discharge cooling water from NZ's largest geothermal power plant. Then sit back and enjoy the ride back to Auckland.

Auckland Technical Tour (Tour 2)

Burn off post conference fatigue with a brisk walk cruise the harbour of the City of Sails, climb Rangitoto, learn volcanic geology first hand on the way, get spectacular views while enjoying the morning tea you carried to the top, return to the boat and cruise to Waiheke Island where you will taste wine, tour a vineyard, and taste local cuisine at an iconic restaurant. Finish the day by enjoying a leisurely cruise back to Auckland.

Social Events

Opening Ceremony & Reception

Sunday 8 February

This is the official opening of the Conference with a Powhiri. Meet with old friends and new while enjoying drinks and canapés in the conference centre of the Hilton Hotel Auckland.

Happy Hour

Monday 9 February

Join together for drinks and further viewing of posters

Conference Dinner (Pacific Party)

Tuesday 10 February

The Conference Dinner is to be held at one of Auckland's spectacular catering venues. Enjoy a sumptuous dinner and fine wines with friends and colleagues, while being entertained by a variety of performers.

Exhibition Facilities

An area will be available for displays over the three days of the conference. Corporate sponsorship opportunities are also being offered. Contact the Conference Manager for details.

Fees

Delegate Type	Up to 15 Jan 2004	From 16 Jan 2004
Full delegate	\$690	\$790
Student delegate*	\$500	\$600
Day delegate	\$230	\$330
Tour 1	\$500	NA
Tour 2	\$200	NA

* Sponsorship is available for NZ students (see registration form for details)

Enquiries

All enquiries should be addressed to the:
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Email: b.williams@auckland.ac.nz

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ISRM Regional Symposium EUROCK 2004 & 53rd GEOMECHANICS COLLOQUY



October 7-9, 2004
Salzburg, Austria

First Announcement & Call for Papers

Invitation

The Austrian Society for Geomechanics has the pleasure to invite you to the ISRM Regional Symposium EUROCK 2004 in conjunction with the 53rd Geomechanics Colloquy.

The International Society of Rock Mechanics (ISRM) was founded in Salzburg in 1962 as a result of the enlargement of the so-called "Salzburger Kreis", formed around Prof. Leopold Müller. The Geomechanics Colloquy in Salzburg since its initiation in 1951 has always been a perfect meeting place for researchers and practitioners. The success of this concept not only shows in the continuous meetings over more than 50 years, but also in the attendance of regularly over 650 participants.

Aims and Scope

It can be observed in many countries around the world, that geotechnical engineering is often oversimplified. It is quite true, that experience is an important factor in rock engineering projects, but a sound engineering approach always should accompany design and construction. During the conference several topics related to design, construction, monitoring, and maintenance will be addressed.

Symposium Venue

The Symposium will be held at the Salzburg Convention Centre, which is located very close to the center of the city. Salzburg itself is famous for its unique scenery and atmosphere.

For more information on the city visit following web site:
www.salzburg.info

Important Dates

Submission of abstracts	January 15 th , 2004
Acceptance of abstracts	February 15 th , 2004
Submission of papers	May 15 th , 2004
Deadline for registration	September 1 st , 2004

Correspondence

Submit abstracts to: eurock2004@tugraz.at

All other correspondence related to the Symposium shall be addressed to:

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E-mail: salzburg@oegg.at

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Proposed Sessions

The Symposium will cover following themes

Consistent Methods for the Geomechanical Design of Underground Structures (A)

The principles of the Austrian Guideline for geomechanical design of underground structures will be outlined and first experiences with its application discussed. Contributions with examples of the application of consistent design methods for underground structures are welcome.

Support Methods ahead of the Tunnel Face - Function and Applications (A)

Jet grouting, spiling and pipe umbrellas are widely used practices for the support ahead of the face. In spite of its wide application, design methods are still not developed to an acceptable level. The function of such methods shall be discussed and successful / less successful applications demonstrated by case histories.

Geotechnical Monitoring of Engineering Structures (A)

Short term and long term monitoring, data evaluation and interpretation, alarm levels and criteria. The focus will be on long-term monitoring.

Rehabilitation and Upgrading of Underground Structures (A)

Many tunnels, galleries and covers have come into age. Natural aging processes, increased traffic volume, and revised safety standards require reassessment of stability, repairs, and reshaping. Methods of assessment, analysis, and construction will be discussed.

Determination of Rock Mass Properties (B)

This topic is an "evergreen", but it appears that there is ample room for improvement. Empirical, experimental, and numerical approaches shall be discussed and reviewed with respect to their applicability.

Rock Excavation (B)

Optimization of cutting and blasting techniques, influence of rock and rock mass parameters on performance, vibration and induced damage are topics of this session.

Numerical Modelling – Continuum versus Discontinuum Models (B)

Presently no satisfying criteria exist which model is appropriate under which circumstances. Case studies and back analyses, as well as theoretical aspects are discussed.

Languages

Conference languages will be German and English. Simultaneous translation is provided in the plenary sessions (A). In the parallel sessions (B) the official language is English, no translation will be provided.

Technical Visits

Technical visits to important rock engineering sites and tunnels will be organized on October 9th.

Accompanying persons program

A program will be organized for accompanying persons.

Organization

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Tarcisio B. CELESTINO
Richard WIDMANN
Heinz KONIETZKY
Chris HABERFIELD
Marek KWASNIEWSKI
František KLEPSATEL
Jakob UKAR

Registration Information

Registration before August 15th, 2004

OeGG & ISRM members	€ 200.-
Regular participants	€ 260.-
Students	free

Late registration

OeGG & ISRM members	€ 240.-
Regular participants	€ 300.-
Students	free

Registration fee covers the Symposium participation and the proceedings.

Technical Exhibition

Exhibition facilities are available at the symposium venue. Due to strong interest, interested companies are advised to book early.

Notice

Austrian Tunnel Day

The 4th Austrian Tunnel Day will be held on October 6th also in the Salzburg Convention Centre. The conference is organized by the Austrian ITA national committee and focuses on practical aspects of tunnelling and site reports. The Tunnel Day can be booked in conjunction with the EUROCK 2004 / Geomechanics Colloquy. A detailed program will be available early in 2004.

STANDARDS, LAW & INDUSTRY NEWS

National Network of Technological Societies

The NNTS is an organisation formed by the Institution of Professional Engineers (IPENZ – ENGINEERS NEW ZEALAND) and the Royal Society of New Zealand (RSNZ) to support collaboration between technology-based learned societies. NNTS works to facilitate the sharing of knowledge and skills.

Members of the NNTS are not-for-profit organisations, membership-based and democratically governed. They must be representative of technologists involved in their area of interest nationally. Member organisations operate in areas of interest on the spectrum from applied science to engineering, and they fill learned-society roles. The learned-society, public policy and media contributions of member organisations are peer-reviewed by individual members.

A key purpose of the NNTS is to disseminate the views of New Zealand's technological 'community of expertise' on issues of the day. There is a growing list on the NNTS website of experts who are willing to provide informed comment on technological issues.

The NNTS website allows members to register issues on which they think other Network members may be able to make useful contributions. On the site at the moment are statements relating to IEC 61508 Safety Standard Ratification, and public-private partnerships. Other members of the Network can endorse or oppose the statement during a review period; then the statement is moved to the public area of the site, so anyone interested can read the statement and the responses of other Network members.

The NNTS also promotes the co-operation and sharing of best practice among Chief Executives or Executive Officers of member organisations. Some likely areas for co-operation are development and operation of codes of ethics, publishing, advertising of events; other possibilities are a national Technology events calendar and sharing of administrative service experiences such as database developments.

Find out more about the NNTS by visiting www.nnts.org.nz.

National Network of Technological Societies (NNTS)

NNTS exists for the following purposes:

- Facilitating the presentation of the informed views of New Zealand's technological 'community of expertise' on issues of the day (by creating mechanisms for endorsement of non-aligned and learned contributions on technological issues affecting the wider community when they are presented to Government, the media, community leaders and the general public).
- Development of wide-ranging expertise listings as a resource for those in the community seeking informed comment on technological issues.
- Sharing of best practice and cooperation amongst Chief Executives/Executive Officers of member organisations e.g. development and operation of codes of ethics, shared publishing possibilities, wider advertising of meetings/seminars/conferences etc.
- Possibly developing a national Technology Events calendar, sharing administrative service experiences e.g. database developments.

**NZGS is now a member – so check out the website
www.nnts.org.nz**

NZGS Legislative Submission – Building Bill to Repeal Building Act 1991

The following is the submission sent to the parliament select committee on behalf of the Geotechnical Society regarding the Building Bill to repeal the Building Act 1991.

Introduction

- This submission is from the **New Zealand Geotechnical Society**, a specialist division of the Institution of Professional Engineers New Zealand (IPENZ). It is focused entirely on the impact of **natural hazards**. While there are other issues within the draft Bill which are of concern to many of our members, we have left those issues to be addressed by other learned Societies such as IPENZ, the Association of Consulting Engineers, and the New Zealand Society on Large Dams. The Society supports those kindred submissions.
- The Chairman of NZ Geotechnical Society (J Marsh) and the Chairman of the Working Party set up by the NZ Geotechnical Society (N Luxford) **wish to appear before the ‘Select Committee’** to speak to this submission. The most appropriate contact for parties dealing with this submission is through the Chairman of the Working Party:
Mr N.S. (Paddy) Luxford
C/- Babbage Consultants Ltd (Auckland).
Ph (09) 379 9980
Fax (09) 377 1170
- The **New Zealand Geotechnical Society**, (NZGS), is the society which represents more than 460 design professionals consisting of Geotechnical Engineers, Engineering Geologists and Technicians who daily deal with the assessment of **natural hazards** in their everyday working lives. These professionals are employed by a mixture of Professional Consultants, Territorial Authorities and Legal Practices and thus represent the major cross section of individuals dealing with natural hazards who will need to implement the legislative changes which the Bill will have on the public at large. As a group we have previously provided two submissions to the Department of Internal Affairs, one dated 18 December 2000 which set out most of the concerns which occur in current 1991 Building Act and a second dated 15 October 2001 which provided suggested solutions to overcome most of these concerns.

Summary

NZGS is pleased to see that many of the suggestions made by them have been adopted in the current Bill. In particular:

- the extent of the effects of natural hazards applying to the building works rather than the entire allotment,

- the removal of the archaic terms alluvion and avulsion,
- the clarification of specific sub-items within each specific category of natural hazard based on the definition of the hazards provided by NZGS,
- the quasi-removal of the prior provisions of s36(2) of the 1991 Act,
- where a waiver is to be granted for a particular natural hazard, the actual hazard for which the waiver is granted is to be noted as part of the waiver which is registered on the property title.

However, NZGS would be **extremely concerned** if any group endeavoured to remove insurance cover for any structure constructed in accordance with a Building Consent issued subject to one or more waivers. As a group we consider it vital that insurance cover can be obtained for the risk associated with the granting of waivers, but acknowledge that increased premiums may be necessary in some instances.

Within the draft Bill there appear to be several modifications made where NZGS consider specific wording suggested should be improved and these are discussed at length within the body of this submission.

However, there are a number of suggestions made by NZGS to the Department of Internal Affairs and the Ministry of Economic Development that have either been overlooked or not taken up, which it also considers to be vital to the successful implementation and satisfactory performance of the this part of the Bill. NZGS wishes to focus on the reasons behind their position on these issues when they appear before the Select Committee. These are summarised as follows:

- the removal of the natural hazard of subsidence,
- the lack of the inclusion of a time scale associated with the assessment of a natural hazard,
- no means of transference of the knowledge of the risk associated with an identified natural hazard to a future land (and building) owner other than where a waiver is issued.

All of the submissions made by the NZGS are with a view to having clarity of issues associated with natural hazards defined so as to minimise risk from such issues to the general public.

Background Data

The NZGS is very pleased that many of the changes it has suggested to overcome many of the concerns which have arisen with the current legislation, have been adopted in the draft version of this Bill. We attach for background reading for the Select Committee copies of our prior

submissions. The submission of 18 December 2000 outlines many of the known concerns with the current Act and the submission of 15 October 2001 addresses the suggested changes to the current Act made by the NZGS and in our opinion is essential background data.

Specific Details of Concern Associated with the Drafted Sections of the Bill

In this section we have quoted the actual page and section reference, a suggested amendment, and a reason and further comment. [see table on page 28].

Clarity of Definition

The current draft of this Bill has picked up all of the specific types of natural hazards which the Society considers appropriate to building development (except those associated with Subsidence). Our discussions with those who drafted these changes indicate that the removal of the term 'Subsidence' and the sub classes of settlement, liquefaction and shrinkage were a genuine oversight and we have assumed that these will definitely be returned to the final Bill.

However, an expanded definition of each of these hazards as provided in the attached document is in the opinion of the Society very important as members continually find that parties interpreting this part of the prior Act hold differences as to the legal meaning of many of the hazards identified on a site.

We therefore believe it is important that either the Act (or the Building Regulations) must contain an expanded definition of the meaning of each of the hazards identified in the Bill.

Material Damage

The concept of 'material damage' will align this Act with the equivalent section of the Resource Management Act. Without the addition of this term the Bill will in our opinion become unworkable as it will prevent Building Consent approval being given without a waiver.

All land is subject to natural hazards. It is only when the degree of the effect of the natural hazard is sufficiently severe to result in **material damage** to a building, that the hazard is of significance. The simplest specific examples where the current drafting of the Bill would preclude granting of a consent under s159 would be any site on which a building undergoes settlement (more than 90% of all land in New Zealand) or shrinkage (more than 60% of all land in New Zealand). The Building Regulations also recognised that inundation of a building could occur when a flood event exceeds a 2% AEP event, but it should still be required that such a flood event does not cause material damage to the building structure.

Clearly minor land slippage which does not result in material damage to a building may be an issue with a landowner because of loss of amenity of an allotment, but

should in our opinion not impact a Building Consent.

We suggest that a definition of material damage should be provided in the Bill (or at least in the Building Regulations) and propose the following definition:

'Material damage' is any displacement of a building or its elements or cracking of individual elements within a building that is other than aesthetic and has been caused by a natural hazard.

NZGS is happy the Bill as drafted will allow the continuation of some development by way of a waiver where there might be some risk of material damage to building work from a natural hazard under reasonably foreseeable conditions, providing the safety of the occupants is still assured. This concept is not new and has been the design concept to accommodate the natural hazard of earthquake, where it is accepted within our society that under a severe event the protection of the safety of the public is endeavoured to be maintained by designing to prevent collapse of a building, but recognising that after such a severe event, the structure may need to be reconstructed.

We are pleased to see the removal of s36(2) type approvals because of the unfair stigma that has resulted from this current process and are pleased to see that this has been replaced by a waiver. We believe this will be appropriate in such circumstances. However, just as insurance is available to deal with the risk associated with earthquake damage, we consider it vital that similar insurance coverage be available to accommodate damage to building work for which a waiver has been granted. We acknowledge however, that an increase in the insurance premium payable for such cover might be applicable.

We note that historically the greatest risk to the safety of society from those hazards that the Bill classifies as 'natural' arises from 'falling debris'. To the best of our knowledge, in the past 50 years this is the only natural hazard that has resulted in the occupant of a building being killed. For this reason we consider that Territorial Authorities should have specific rights to condemn a building as being dangerous where an adequately assessed natural hazard classified as 'falling debris' is considered to impose an unacceptable risk to the continuing occupation of a building.

Time Scale

The NZGS considers it vital that a time scale is introduced into the Bill for which a natural hazard is to be assessed if reasonableness is to occur in the law produced. Ideally society would like to think that consented building work is protected from the effects of natural hazards forever. However, human ability to foresee into the future is not good at the best of time and society needs to recognise the limitations of any consent granted.

Professionals have assessed historical flood records and predicted flood levels based on such records for many years. Analytical techniques have been available for about 50 years to undertake such futuristic predictions. However, unforeseen climatic changes are proving that many of these earlier flood level predictions are now unreliable and even those made with allowance for potential climatic changes are not proving to be robust.

The ability to assess the degree of stability of a parcel of land in its present state has been significantly refined over the last 30 years, but our ability to predict how that land might perform in the future is subjective. This arises because land stability is not only affected by weathering changes to the strength of the soil and variations in groundwater levels, but also by erosive forces, climate changes and the influence of human activity. These influences which cannot be reliably predicted can have a significant impact on the future performance of the stability.

Thus while the profession through the NZGS acknowledges the desire to provide an indefinite assessment of a natural hazard, this is not technically possible. We thus suggest that any assessment undertaken be appropriate for a minimum of 50 years (consistent with the minimum durability requirements of the Bill). This time gives society a reasonable degree of security recognising that after such time it would not be unreasonable for modifications to be undertaken to building work to protect the work against any changes which might then be occurring. Implementation of such a time scale would allow a rational review of the hazards on which an original consent was based and the publication of variations to conditions where appropriate. A consenting authority following such advice could then reasonably require a building owner to reassess the impact of a particular hazard on their development.

Risk Transfer

All building work is at some risk from natural hazards. The assessment of natural hazards and the impact they will have on building work is an 'inexact science' and at best an assessment endeavours to quantify the risk of impact of

the hazard on the building work at an acceptable level. However, what is acceptable has not as yet been defined by society and can vary from person to person and Territorial Authority to Territorial Authority. For this reason the NZGS believes the best means of addressing the impact of natural hazards on building work is allowing the quantification of the risk to transfer with the ownership of the allotment. They have previously provided a suggested means by which legislation could be prepared to enable such to occur.

NZGS considers the potential impact of a natural hazard on the future financial well being of a allotment owner is so great it has and continues to advocate that where a building consent is issued which makes reliance on an assessment of a hazard, the record of this assessment must be kept by a territorial authority, and the existence of this assessment should be recorded on the property title. The reason for this is to ensure that the risk associated with the natural hazard will have a degree of certainty of being able to be transferred with the ownership of the allotment. Thus philosophically, the NZGS is at difference with the current drafting of the Bill, as this is not provided for within the current form.

However, as a minimum, we consider it essential that the Bill be modified to ensure that the Territorial Authority maintain on each property file a record of any assessment of a natural hazard on which it has placed reliance in issuing a building consent and that the right to access this information by interested parties is maintained at all times.

Oral Presentations

It is our intention that we will concentrate largely on giving background data on items 6, 7 and 8 during our presentation to the select committee and we would welcome any questions from them to clarify our reasons for the concerns we now raise.

Yours faithfully

N S (Paddy) Luxford
Chairman of Working Party of NZGS

Page/Section	Suggested Amendment	Reason	Additional Comments
15	Add (e) subsidence, including settlement, liquefaction, and shrinkage.	This forms an important class of 'natural hazards which affect the performance of buildings and the safety of the occupants.	The terms erosion, falling debris, inundation, slippage and subsidence should be expanded to include definitions as suggested by the NZGS in their submission to the DIA of 15 October 2001 so as to avoid alternative interpretations.
41 s51(2)(b)	Add (viii) any professional report assessing a natural hazard that is relevant to a building consent	The only place where a library of such records can and must be retained is in the records of a Territorial Authority	S 51(3) sets out clearly why it is important for such records on natural hazards to be retained.
50 s72(2)(b)	Add (viii) any professional report assessing a natural hazard that is relevant to the building consent	Any report relied on by a Building Consent Authority must be handed to the Territorial Authority for record keeping.	
86 s159(1)(a)	Add that will result in material damage to the building work, or	All land is subject to natural hazards and therefore as drafted all consents must be refused under s159(1)	This addition raises the need to define 'material damage' in Subpart 2 'Interpretation'. NZGS has suggested such a definition in their prior submission to the DIA.
86 s159(2)(a)	Add for a period of more than 50 years, or	It is not possible to predict the effect of a natural hazard with any reliability for more than about 50 years. (With climatic changes even the assessment of flood levels are being upgraded).	The concept of a time scale is important in any assessment of a natural hazard or for example, cliff top property will not be able to be developed. Fifty years is a reasonable time after which upgrading the assessment to address changes to the risk from a natural hazard would be reasonable.
110 s205(1)	c) if an assessment of the natural hazard of 'falling debris' made by suitably qualified professionals independent of a territorial authority considers continued occupancy of a building is unsafe.	(Falling debris is the natural hazard most likely to affect the safety of occupants of a building.	The only deaths of people inside buildings arising from a natural hazard that we can recall since the implementation of the Building Act have arisen from falling debris and thus we consider this particular hazard justifies particular consideration to raise the awareness of this issue to all parties involved in the consent, assessment and occupation regime.

Soil and Rock Description – Comments on Present and Proposed Guidelines

The 2003 draft revision of the 1988 soil and rock description guidelines circulated to members in March this year and discussed at the Society Symposium in Tauranga heralded changes through the respective titles of the two documents:

- 1988: Guidelines for the field description of soils and rocks in engineering use
- 2003: Field description of soils and rocks. Guidelines for the classification and field description of soils and rocks for engineering purposes.

The introduction of the 2003 draft indicated that changes should be made where clearly justified, result in guidelines that are clear and uncomplicated, while conforming to international practice and reflecting properties of engineering significance. In the event the 2003 revision significantly changed the guideline framework in the case of soils, but pretty much preserved the status quo for rocks. The changes for soils included:

- a) Priority to classification rather than description
- b) Abandonment, or making optional, of descriptive terms related to *in situ* conditions

This note provides commentary on the 2003 draft revision based on a) my involvement with the 1988 document committee, b) what has happened in international practice in the last 15 years, and c) the notes from the 2003 'revision' committee in *NZ Geomechanics News*, June 2003, Issue 65 (GM65), that were in response to members' comments including those at the Society Symposium seminar. The intent of the note is to look at fundamental issues in particular for soils (eg. classification) and overall framework, rather the detail of some individual sections within the documents (eg. *scala* correlations, weathering).

The changes for soils are best examined on two points a) intent ie. description v classification and b) international practice since 1988. The 1988 guidelines had the following two sentence introductory statement:

"The guidelines for soil description method are largely based on the method originally given in the USBR *Earth Manual*, which was primarily designed for the classification of construction (ie. remoulded or excavated) materials. The description of soils *in situ* requires the introduction of additional terms while retaining important features of the USBR method such as the unified symbol."

In the 1988 guidelines the second of these two sentences was considered the more important, yet it is completely omitted from the committee comments in GM65. One may ask why – is engineering performance based solely on classification of remoulded materials? One could argue yes for embankments, but could one for foundations without an appreciation of *in situ* ground structure? Is the intent of the person in the field to describe (as in 1988) or to classify (as in 2003)? Can you classify without describing? Whatever your viewpoint may be draws a pretty strong line in the sand.

The next step is to look at international practice. In the 1988 guidelines the references include three principal site investigation standards or guidelines – USBR *Earth Manual* (2nd Ed, 1974), American Standard ASTM D2488 (1969), and British Standard BS 5390 (1981), but exclude Australian Standard AS1726 (1981). Since 1988 all four of these documents have been revised, in 1998, 2000, 1999, and 1993 respectively. Apart from Australia, all three have a fundamental change of splitting of visual/manual descriptive (field) procedures from classification (laboratory) procedures.

In the USA this translates into the lack of a soil classification chart as part of the visual/manual description of soils (USBR 5005-86 and ASTM D2488-00), and treating the Unified Soil Classification System (USCS) with the unified soil symbol as a laboratory procedure (USBR 5000-86 and ASTM D2487-00). Section 42 of BS5930 (1988) goes as far to state that the field description should stand as the record of the undisturbed nature of the soil, thereby indirectly supporting the primary intention of the NZGS 1988 document. BS5930 does not recommend a classification stating that classification can provide additional useful information as to how the disturbed material behaves when used as a construction material.

The lack of the unified soil classification chart for the identification and description of soils in the updated USBR method was recognised in the introduction to NZGS 2003 draft revision. So why is classification a fundamental platform of change in the 2003 draft document? Apart from stating that the separation of description (*in situ* properties) from classification (composition and intrinsic properties) is logical, the greatest reason seems to be that sometimes only disturbed samples are available or relevant. Sounds more like the tail wagging the dog rather than reducing the subjective nature of descriptions from site investigations.

In GM65 it was stated that we should follow the practice of the Australians. This could ask a rhetorical question of

why did we change our Society name from Geomechanics to Geotechnical in 1990 while they have retained Geomechanics in Australia. However, more importantly, AS1726 (1993) states that the soil description method (Section A2.1) is based on mass characteristics as assessed in the field and material characteristics assessed from disturbed samples. It then states that soil classification places a soil into a number of groups whose characteristics are independent of the particular condition in which a soil occurs is treated separately and useful as a guide for construction material. The order of description (Section A2.3) is given as:

Composition of soil (disturbed or undisturbed state) - which should include:

- Classification group symbol (a mixture of field and laboratory characteristics)
- Soil name (use block letters)
- Plasticity or particle characteristics and colour of soil
- Secondary soil components and other minor soil components
- Conditions of soil
- Moisture condition and consistency (undisturbed state only)
- Structure of soil
- Zoning, defects, cementing
- Additional observations (such as soil origin)

This listing, apart from the order of terms, is little different from the NZGS 1988 approach that included a soil name plus a unified soil symbol at end of the description, rather than the beginning. The order from AS1725 given above is given in GM65 as:

- Classification – symbol or soil name (colour is gone)
- Condition of soil – moisture condition and consistency
- Structure of soil – zoning, defects etc
- Additional observations (such as soil origin)

The order in GM65 is not a direct translation of the order in AS1726. The differences (symbol/name etc v classification) basically encapsulates the nub of the soil description / classification discussions.

- On one hand soil name is derived from particle size distribution characteristics for coarse-grained soils and behavioural characteristics for fine-grained soils. That was the platform of the 1988 document and is the platform of the current visual/manual descriptive methods in England (with Europe) and the USA. All of these consider *in situ* characteristics an integral or equal component, while in the case of Australia (like the 1998 guidelines), the classification group symbol is an additional item.
- On the other hand classification is the basic means of assigning soil groups, which are given names in a

system also based on particle size distribution and behavioural characteristics. This is the platform of the 2003 document (and as modified from AS1726 in GM65). This approach considers *in situ* characteristics as less important or as a maximum of a secondary nature.

Given the demise of the unified soil symbol from the most recent international soil description practice, accompanied by acknowledgement of the importance of *in situ* characteristics, the most logical conclusion is that classification should not form part of soil description. Classification seems to have been introduced for no good reason (except under the guise of possibly changing the order of terms to describe a soil, so that if was not 'out of the air' it was certainly from Casagrande's work on airfields). The GM65 comments also have the title of *Classification and Description of Soils and Rocks* rather than *Field Description of Soils and Rocks*. Is this a further classification shift as there is an additional criterion that the guidelines should cover both field and laboratory description (does that mean classification? or are laboratory samples sometimes undisturbed?).

GM65 also comments on differences between descriptions of soils and rocks, stating that there is no good reason for treating soils and rocks in the same manner, as was the approach in the 1988 guidelines. The implication that soil properties have no relationship to geological origin is fallacious. Fine-grained soils are different from coarse-grained soils because of different depositional environments and subsequent loading histories. Simply relying on classification from remoulding does not give a full picture of engineering properties for use in design. Which brings up a final point – if the basis for soils in the 2003 revision is classification then why don't rocks receive similar treatment. Rock classification systems (eg Rock Mass Rating, Geological Strength Index) are used by geotechnical engineers as part of defining rock mass properties and use in design.

The 1988 guidelines were intended to provide a method to describe the spectrum of rocks and soils in a consistent manner in the field for engineering geologists and geotechnical engineers. The revised document of 2003 and in particular the comments in GM65 have a divisive flavour (ie. soils for soils engineers, rocks for geologists) that is a backward step for the geotechnical fraternity and the inclusion of the title classification in the title is inappropriate, against the original intention of the 1988 guidelines and in the case of soils a fatal flaw considering current international practice.

Stuart Read

Geological & Nuclear Sciences, Lower Hutt

REVIEWS

In-Situ Characterization of Soils

This is a Balkema publication, and is a collection of nine discrete papers on the general subject of site investigation and *in-situ* testing. It is of a relatively small size, approximately 50 mm shorter in both width and height compared to an A4 sheet, and has a total number of 291 pages. It is printed in India on relatively good quality paper. Due to the nature of such a compilation, it is in the first instance a little disjointed compared to a text book, and reads more like a journal, however it does have a useful topic index at the end of the book.

Site investigation, *in situ* testing and laboratory testing are topics close to the heart of all geotechnical engineers. Some things change with time (e.g. mechanical 'Dutch Cones' c.f. electric friction-piezocone penetrometers) and some don't change very much at all (e.g. Standard Penetration Tests). However, the test of any book of this ilk is an evaluation of the amount of useful new information that it may contain, together with the textbook tried and true *in-situ* testing methods etc, and guidance on 'putting it all together' to characterise soils. As this book is, as already stated, a compilation, its review is best dealt with on a paper-by-paper basis.

1st Paper: *In-Situ* Characterization of Soils, Sharma V.M.

This paper is very poorly-structured (e.g. there is a heading titled *Economic Justification for Using Geophysics* between a description of several geophysical methods (in a low level of detail) and a more detailed (but still inadequate) section on *Seismic Response of Different Soils*. This paper provides an introduction to geophysics (seismic refraction, electrical resistivity, down-hole and cross-hole seismic, electrical resistivity and gamma radiation). Neither typical seismic velocities for varying materials, their relevance, nor an explanation of why seismic velocity is required to increase with depth in order for seismic refraction to be valid are provided. There is no reference to Ground Penetrating Radar, which is a common technique now in the developed world.

A reasonable amount of detail is described on drilling (although beware of statutory obligations with respect to *carte-blanche* invitations to physically go down holes of up to 1200 mm diameter for the purpose of collection of samples and visual inspection) and a little less on sampling methods. A few diagrams or photographs would have been useful here, particularly as the text is quite tortuous and torturous, as in the description of rotary drilling: "The

bit cuts, chips and grinds away material which is then lifted from the hole by circulating drilling fluid." This compares extremely unfavourably with the description of rotary drilling provided in *Foundation Engineering Handbook*, edited by Fang. The Standard Penetration Test is described in detail. Similarly, the Cone Penetration Test (CPT) is reasonably described, but it couldn't be regarded as definitive.

What this paper fails to do is to address the subject of its title. It describes a variety of *in-situ* tests, and geophysical techniques, but it doesn't provide any advice on how to model soils based on *in-situ* testing results. It doesn't mention engineering judgement, or reason, or simplification or the implications of errors.

2nd Paper: Characterization of Strength of *In-Situ* Soils, Ting W.H.

In contrast to the previous paper, this deals with derivation of parameters and application into a model. It explains the various models i.e. elastic, elasto-plastic and Cam-clay. There is a section on practical approach, statistical methods and lo and behold... Engineering Judgement! This is a worthy paper to read, and is recommended. It is, in fact, a rose amongst a few thorns. The reference list is less than 2 pages, and about 20% of the citations belong to the author. The most recent references are from 2000.

3rd Paper: The Use of *In-Situ* Tests for Foundation Design, Lehane M.

This is a brief paper (about 15 pp including just over 1 page of references) that categorises *in-situ* tests into 'Qualitative Tests' (e.g. SPT); 'Miniature Load Tests' (e.g. CPT); and 'Soil Parameter Measurement' (including Pressuremeter, Vane and CPT). It includes a case history of bearing capacity and consolidation. It is a 'light-weight' paper that doesn't really add to the value of the book.

4th Paper: *In-Situ* Characterisation of Coarse-Grained Weathered Soils

Laterite sites typically have a hard crust overlying softer silts. This phenomenon may also be found in New Zealand. Unfortunately, this is an atrocious paper. It includes a figure that is probably the worst published in the 21st century, and would rank with some of the worst of all time. It shows a map, which looks like a poor quality facsimile transmission. Sadly, the quality of illustrations throughout this book is generally extremely lacklustre. In contrast, the best illustration is also contained in this paper. It shows, at good resolution, a

monochrome photograph of a wet hole in the ground. Naturally, the reader is thrilled to bits. This paper is very site-specific to the so-called laterite belt of southern India. If one was to carry out work in the vicinity of Zaheerabad or Bidar then one should read it for background purposes.

5th Paper: Ground Investigations and Parameter Assessment for Different Geological Deposits in Sweden, Bergdahl *et al.* This paper describes the current state of the art of site investigation in Sweden. It indicates a remarkable similarity in many respects to the current state of the art of site investigation in New Zealand, with the exception that the Marchetti Dilatometer is not commonly used in New Zealand. It includes a chart for inferring soil type from CPT results. Without direct comparison to similar charts produced in New Zealand, it seems to be reasonable, and simple. It only attempts differentiation between sand, silt and clay/organic soil. Reiterating, this is a simple chart, and one that might well work. The paper includes a reference list extending to almost 4 pages, the most recent citation in which is from 2001. The authors' own citations would represent about 25% of the total. One is left wondering whether Larson's 1989 paper entitled *Dilatometerförsök – En in-situ metod för bestämning av lagerföljd och egenskaper i jord – Utförande och utvärdering* might have an English translation.

6th Paper: *In-Situ* Tests for Dynamic Properties of Soils, Puri V.K. and Prakash S. Again, we have a paper that is probably below par. For such a critical analytical area, it compares poorly with the information provided in *Foundation Engineering Handbook* in terms of both the quality of the information provided, and the type of information provided. For instance, it fails to mention the Ultrasonic Pulse Test amongst the appropriate laboratory tests.

7th Paper: AMAP'sols Static Penetration in Dense Sandy Gravel, Sandstone and Hard Claystone (CPT Revel in Gravel),

Sanglerat G. *et al.*

This paper is faithful to its title. It describes a static-dynamic penetrometer that was developed in France in 1992 for the purpose of testing the soils that a static-thrust CPT would be unlikely to penetrate. The quality of the photographs in this paper are of very low resolution, and the figures are typeset very unprofessionally.

8th Paper: *In-Situ* Characterization of Creep Parameters by Instrumentations, Justo J.L. *et al.* There may be a few dams in the Marlborough region, and perhaps elsewhere in New Zealand, that will be built in the next few years with rock fill. On the face of it, this paper would appear to be relevant to these structures.

9th Paper: Soft Ground Improvement by Vertical Drains, Buddhima Indraratna *et al.*

One might ask what this paper is doing in this book. There is, in fact, a section on this paper entitled *Soft Clay Modelling*, including Cam clay and Modified Cam clay. There is also a section on *Salient Aspects of Numerical Modelling*. The quality of the figures in this paper are better than most of those elsewhere in this book. Logically, however, this paper belongs in a journal or similar book on 'Ground Improvement', not 'Soil Characterisation'.

Reviewer's Conclusion:

It is frustrating that the book is not organised into sections containing relevant papers: say, a section on site investigation methods (including drilling, test pit excavation, sampling etc), a section on *in-situ* testing, a section on laboratory testing and a section on data analysis and model synthesis. It would be even better if the editors had made a valuable contribution to the book by thorough editing.

Ultimately, the book is disappointing. It is one to be borrowed from a library if one of the papers within is required for reading.

Reviewed By: Bruce Grayson,
Connell Wagner Ltd, Auckland

In-Situ Characterization of Soils

Editors:	Saxena K.R. & Sharma V.M.
Publisher:	A.A. Balkema
Date published:	January 2003
Page extent:	306 pages
ISBN:	90 5809 244 5
Web shopping at:	http://balkema.jcn.nl/ima/balkema/index.html
Price:	\$US140.80 / EUR 128 Hardback

TBM Tunnelling in Jointed and Faulted Rock

Nick Barton is the primary developer of the Rock Tunnelling Quality or Q Index, which for nearly 30 years has been used in the dimensioning of rock tunnels and the design of cavern support. In this book, Barton has taken the Q Index and modified it specifically for use in the design of Tunnel Boring Machine (TBM) excavations. The resultant QTBM is an attempt to predict TBM productivity and utilisation rates based on machine specifications, rock mass characteristics and cutter efficiency.

The book is essentially a step-by-step description of the development of the QTBM, although it also provides useful information on basic TBM designs, logging methods and tunnel reinforcement. At 170 pages it is a relatively thin volume, however it is packed with a large amount of information. An unusual characteristic of the book is the very short chapter lengths, which are typically 1 to 3 pages.

The development of the QTBM came from a desire by the author to use existing rock mass characterisation methods to be able to better predict the performance of TBMs. Barton recognised that several modifications were required to be made to the Q parameters in order for TBM performance, and particularly penetration rate, to be reliably predicted. The primary difference between the standard Q index and QTBM is that the rock discontinuity parameters reflects the orientation of the tunnel as well as the tendency for joints to either assist or hinder the cutting process. The author describes the development of the QTBM parameters as being a process

of trial and error using case records.

In an attempt to account for the variables that are recognised as having an impact on TBM performance, the QTBM incorporates eleven different input parameters, and many of these are a function of several variables. Being empirically based, the QTBM has essentially been back analysed from the performance of TBMs on some 145 different projects. Whilst this has as given the QTBM a practical like with real world performance, it is highly questionable whether an engineer planning a TBM excavation would have sufficient data to make a meaningful use of the QTBM, especially as the output can vary over several orders of magnitude.

The worked example in the back of the book demonstrates how complex the process of deriving QTBM really is and how dependant it is on a good supply of rock mass and TBM parameters. The complex nature of rock mass behaviour has previously made mathematically based attempts at rock modelling cumbersome and somewhat suspect in their results. The development of the Hoek-Brown rock mass failure criterion, is an example of this, where after many years of development, the criterion became more observational in approach and easier to use. It will be interesting to follow the development of the QTBM and see whether the same process occurs.

Reviewed by: Kevin J. Hind
URS New Zealand Ltd, Auckland

TBM Tunnelling in Jointed and Faulted Rock

Author:	Nick Barton
Publisher:	A.A. Balkema
Date published:	January 2000
Page extent:	306 pages
ISBN:	90 5809 3417
Web shopping at:	http://balkema.jcn.nl/ima/balkema/index.html
Price:	\$US44.30 / EUR 38.50

Slide 5.0, Rocscience Inc

I first came across an early version of this software package several years ago when I was assigned the task of finding a replacement 2D slope stability package for a previous employer. My objective was to find a package that was technically sound, easy to use, cost effective, efficient and provided high quality output, with Slide being the eventual winner.

I consider this package to be the most comprehensive slope stability analysis package that I am aware of currently available on the market for the windows operating system. The package includes most commonly used analytical methods (i.e. Bishop, Janbu, Spencer, etc) as well as sensitivity, probabilistic and back analysis capabilities and can be used to model both soil and rock slopes. With a built-in, steady-state, unsaturated, groundwater analysis capability, using the finite-element method, pore pressures can be seamlessly integrated into slope stability analysis. If desired groundwater analysis can be undertaken independently of stability analysis.

Slope models are created using the 'Model' interface, an easy to use CAD based graphical interface. The same Model interface is used for both Slope Stability and/or Groundwater Analysis. Problems may be scanned and overlain onscreen so that they can be traced over, draw on screen freehand, defined by typing coordinates into a dialogue box at the base of the screen, or by defining line types that Slide recognises within AutoCAD drawings and imported via the dxf file type. Slide is also capable of reading Slope/W and XStable files. Seismic loads, point loads as well as uniform, triangular or trapezoidal distributed loads may be applied to problems. Circular, non-circular and composite slip surfaces may be defined manually or alternately utilising one of automated search functions. A comprehensive range of support options are available including grouted tiebacks, soil nails, geotextiles and piles. The creation of meshes for undertaking groundwater analysis is fully automated.

The Modelling Interface

Both slope stability and groundwater analysis results are displayed in the graphical 'Interpret' interface that has

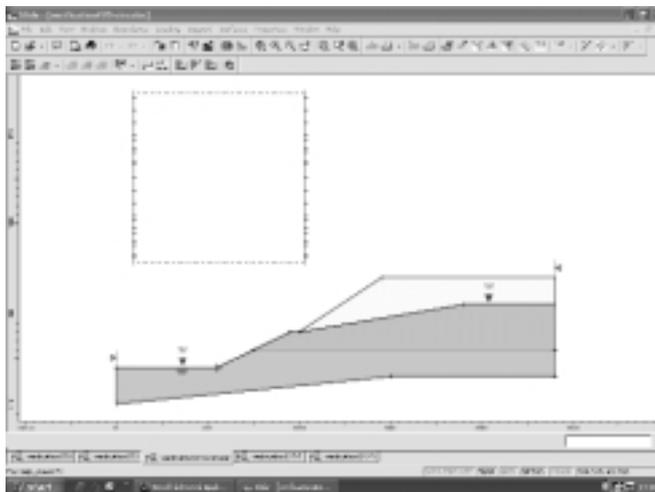


Figure 1. Example of slope stability model using Slide 5.0

diverse set of tools that can be used to annotate results with text, arrows, lines, dimensions and angles. Results may be exported to the JPEG, Windows Bitmap, Windows enhanced metafile and Windows metafile file types.

So what makes slide better than the alternative packages available? The modelling interface is very easy to use. The way in which problems are inputted is straightforward and can be quickly and easily created and edited with the extensive range of modelling and editing tools, meaning modelling time is kept to a minimum. For example on average it would take me approximately half the time to input and analyse a problem in Slide than another leading package commonly used, with this efficiency improving with increased model complexity. In terms of features it offers more than any other package that I have come across, at a cost of only US\$1495 making it one of the cheaper packages available. The only limitation I consider the package to have is the inability to undertake transient groundwater seepage analysis, however the software vendors has recently indicated to me that this functionality will be included with the release of the next major version.

Reviewed By: Michael Laws
Connell Wagner Ltd, Auckland

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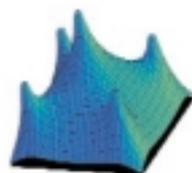
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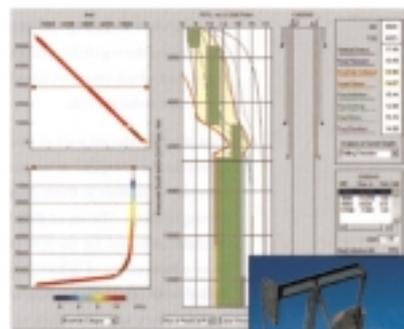


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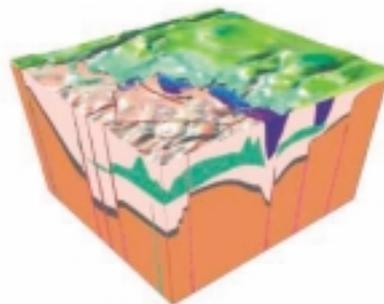
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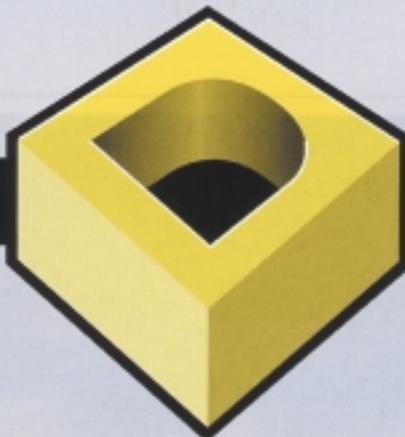
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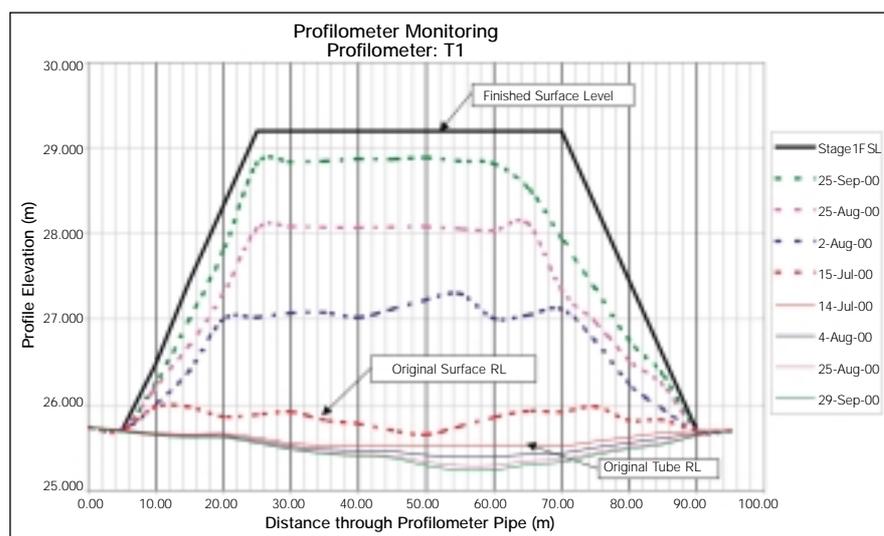
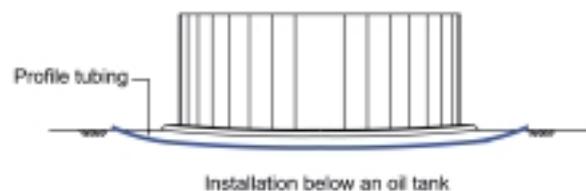
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PROJECT NEWS

Landslides, Gully Erosion, and Debris Flood Effects During the 3rd October 2003 Paekakariki Floods

Graham Hancox, Geological & Nuclear Sciences, Lower Hutt

The rainstorm that hit Paekakariki on Friday 3 October 2003 affected many parts of the Wellington region causing flooding and slips that closed roads, with the Kapiti Coast being one of the worst affected areas. Rainfall appears to have been much heavier in the Paekakariki area, where it was probably well in excess of 100 mm in 24 hours, causing severe flooding and extensive landsliding, gully erosion and debris flood damage on the steep coastal hills. The area of greatest ground damage coincides with the area of maximum rainfall accumulation indicated by radar imagery. This shows that the heaviest rainfall occurred in a narrow band about 10 km wide and extending from just south of Kapiti Island and directly across Paekakariki towards Upper Hutt (Figure 1). Data provided by NIWA suggests that the average return interval of rainfall in the

most damaged area (>82 mm in 4 hours) is estimated from nearby rain gauges to be greater than 125 years. In other areas where there was less rainfall the landsliding and flood damage was generally minor.

The areas most affected by landslides and debris floods were around the junction of the Paekakariki Hill road with State Highway 1, and across the hills ~2 km south of Paekakariki, especially in the Fly-by-Wire gully above the BP Service Station and Belvedere Motel, and the Hill Road gully ~700 m to the south (Figure 2). About 3000 m³ of gravel from the flooded Fly-by-Wire gully was deposited around the Belvedere Motel buildings and across SH 1 at the bottom of the Paekakariki Hill Road (Figures 3 and 4). All of the flood water and gravel was passed through the culvert under the hill road, which was not affected at this site. Based on

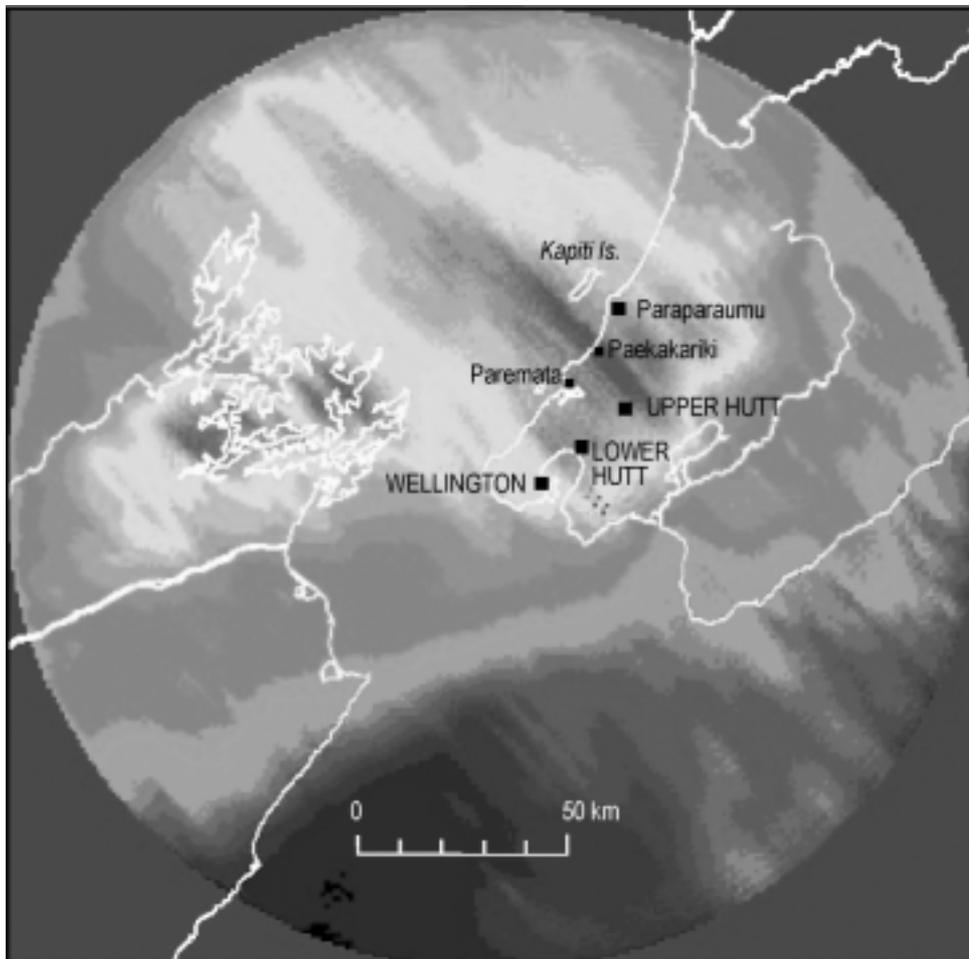


Figure 1. Radar-derived rainfall accumulation image for Friday 3 October 2003, showing total rainfall over the Wellington region for the period 6:45 am to 10:00 pm. Darker shades represent the heaviest rain and lighter shades the lightest. The band of heaviest rainfall coincides with the severe landsliding and flood damage observed in the Paekakariki area (Image supplied by John Crouch, MetService)

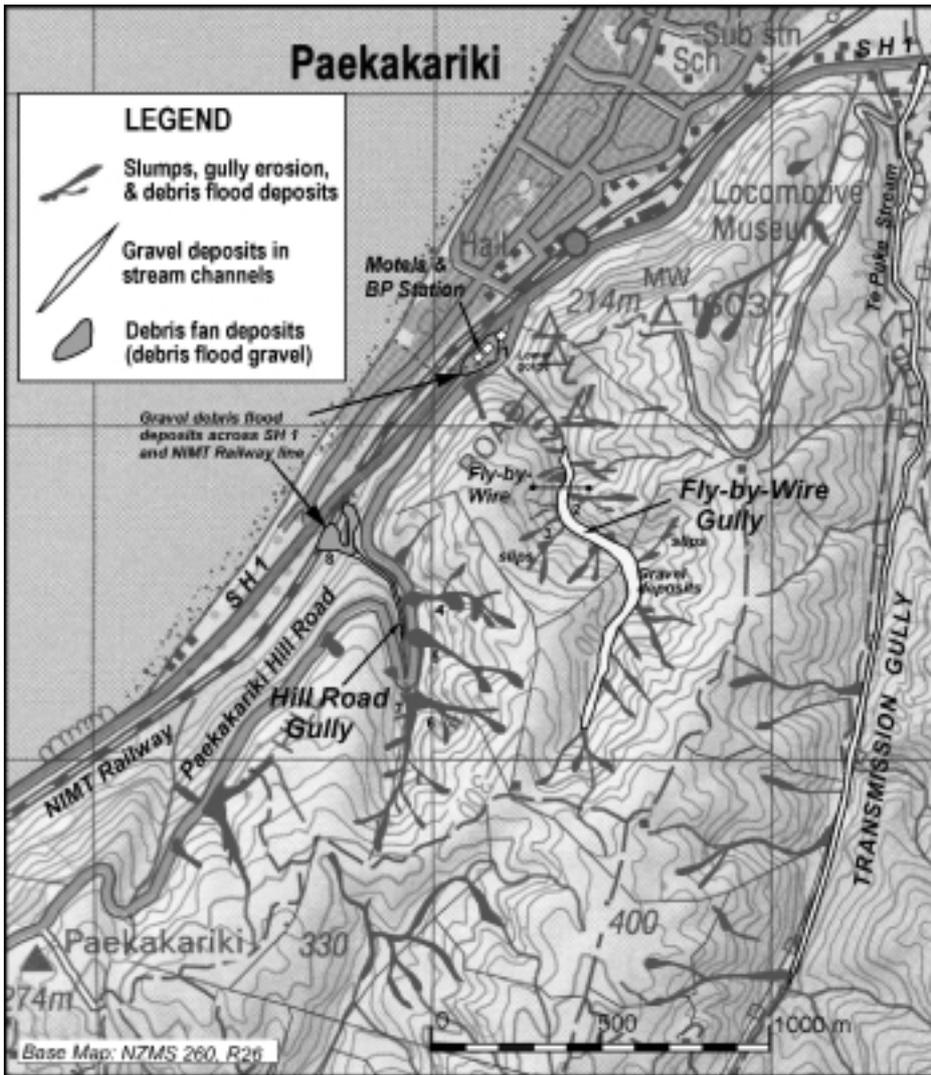


Figure 2. Map of the Paekakariki area showing the main landslides, gully erosion features and debris flood deposits resulting from the flood of 3 October 2003. The main areas affected were the Fly-by-Wire gully and Hill Road gullies to the south of Paekakariki (main damage sites numbered 1-8). The former caused significant damage to the motel and another building sited on a debris fan at the bottom of the Paekakariki Hill Road (site 1). Sites 4-7 were the most damaged parts of the hill road. The total cost for road repairs has been estimated at around \$400,000-500,000, and the road is not expected to reopen until early November 2003.



Figure 3. Aerial photo taken on Wednesday 8 October 2003 showing the gravel (g) from the Fly-by-Wire gully (fg) deposited around the Belvedere Motel (M) and Showroom (S, formerly the 1906 Restaurant) at the bottom of the Paekakariki Hill Road (HR), and across SH 1. A new stream channel (sc) was dug the day after the flood. The hill road and vegetation at the gully exit was unaffected by the flood, showing that all the debris passed through the culvert (c) below the road. The BP Service Station (BP) was flooded but was largely unaffected by gravel inundation. A small shallow soil flow slide (sf) spilled debris on to the hill road ~70 m south of the gully exit.



Figure 4. View of the debris flood gravel deposited around the Belvedere Motel and buried cars from the gully exit on the Paekakariki Hill Road. SH 1 is visible in the distance (top right).



Figure 5. Aerial view of damage Sites 5 (left) and 6/7 (top) on the lower Paekakariki Hill Road on Wednesday 8 October after remedial work had begun. It shows two gullies (sites 5-7) where debris control fences could be effective in preventing, or at least reducing such damage in the future.

the lack of damage to buildings the gravel was deposited gradually as a debris flood over several hours, not as a single debris flow. The buildings on the east side of SH 1 at the bottom of the Paekakariki Hill Road are built on an old debris fan formed at the gully exit. This makes it potentially a dangerous site for future flooding, debris floods, and possibly debris flows which can cause much more damage.

The upper part of the Fly-by-Wire gully was severely damaged by numerous shallow slumps and deep erosion gullies (Figure 2). Geomorphic evidence suggests that locally the flood was a very rare event with a return period of more than 100 years, possibly several hundred years. A large amount of soil and gravel from steep slopes and gullies was transported down the stream and deposited on the debris fan around the motel buildings and across SH 1. However, much of the gravel was also deposited in the stream channel and will continue to be transported downstream during future floods. This problem could be minimised by erecting steel catch fences in the upper reaches of the stream, and/or by constructing a stream bypass with a debris fence and accumulation area at the culvert entrance just above the motel site.

Damage to the northern end of the Paekakariki Hill

Road was the result of flood water and gravel deposition as a debris flood, rather than debris flow (Figure 5). Damage to road cuts on the hill road was generally minor, with only a few small rock and soil falls observed north of the summit. Gravel trapped behind fences and gates above the road suggests that this material accumulated slowly. Most of the silt and sand was carried away in flood water, which flowed over the road and washed out road edge fills and severely undermined the road in several places. This mechanism suggests that steel catch fences above the road and culvert entrances could be used to trap gravel during floods, while allowing water to pass through culverts. The control of debris in the head of gullies would potentially reduce gravel inundation problems for the Paekakariki Hill Road, and for SH 1 and the NIMT railway line.

Reference:

Hancox, G.T., 2003. *Preliminary report on landslides, gully erosion, and debris flood effects in the Paekakariki area as a result of the 3 October 2003 flood*. Geological & Nuclear Sciences client report 2003/120,19 p, 20 October 2003. Report prepared for and made available by courtesy of the Kapiti Coast District Council.

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Wet Weather and an Earthquake = Landslides

Grant Dellow, Geological & Nuclear Sciences, Lower Hutt

The wet weather during winter and spring this year, and a shallow, large magnitude earthquake in Fiordland have caused a large number of landslides throughout New Zealand. The significant landslide generating events that occurred during this period are briefly described below.

Rainstorm 8–10 June 2003, west coast of the North Island

Landslides were reported on the west coast of the North Island from Auckland, Hamilton, Taranaki and Wellington. Rain in the northern half of the North Island over 8–9 June caused minor slips in Auckland and Hamilton. Heavy rain overnight on 9–10 June in the Wellington to Taranaki region caused many minor slips, closing a number of roads. A slip of about 80 cubic metres came down behind two houses in Newlands, Wellington.

Rainstorm 28–29 June 2003, Tasman District and Nelson City

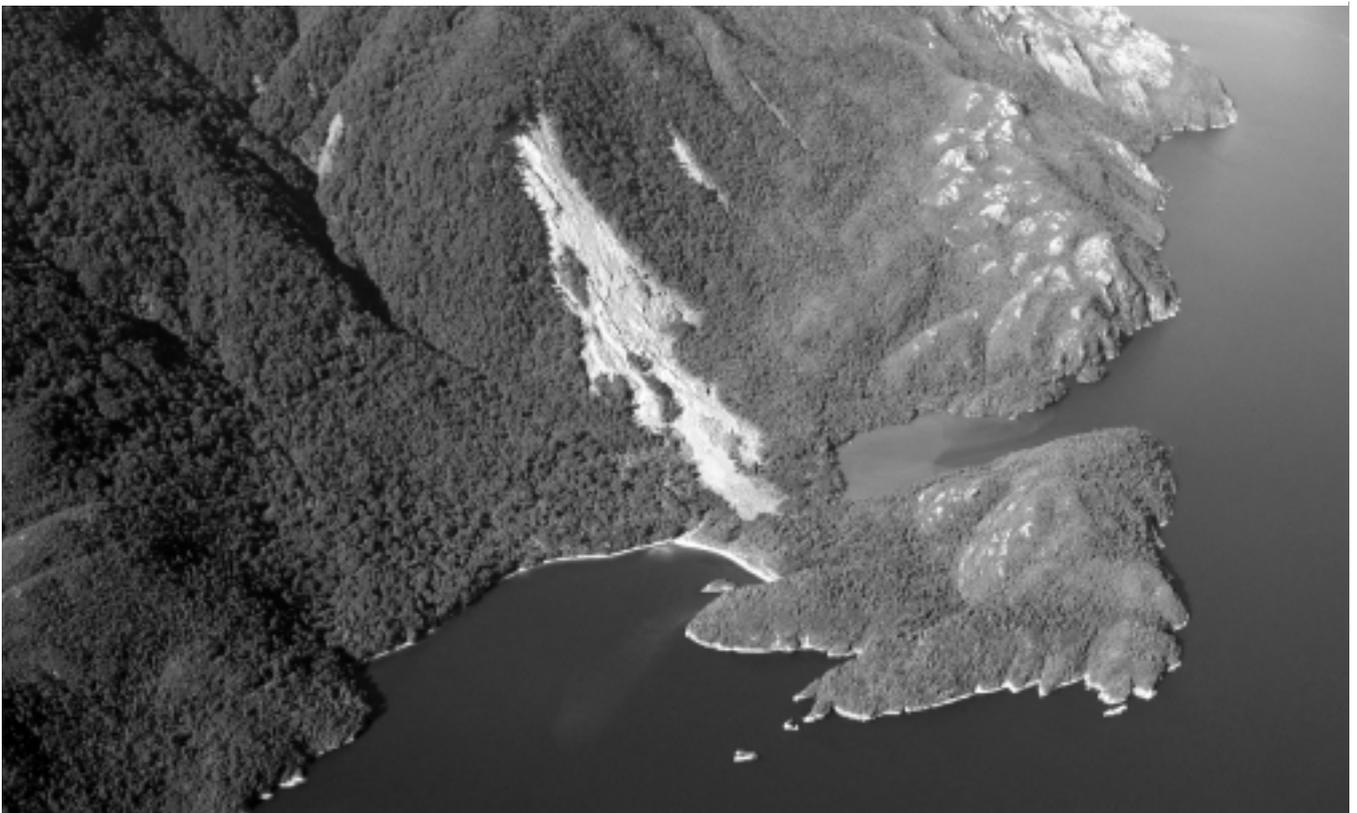
Heavy rain in the Tasman District and Nelson City over the weekend caused problems with flooding, minor slips and rockfalls throughout the region. The heaviest rainfall over the two days was recorded in the Takaka and Upper

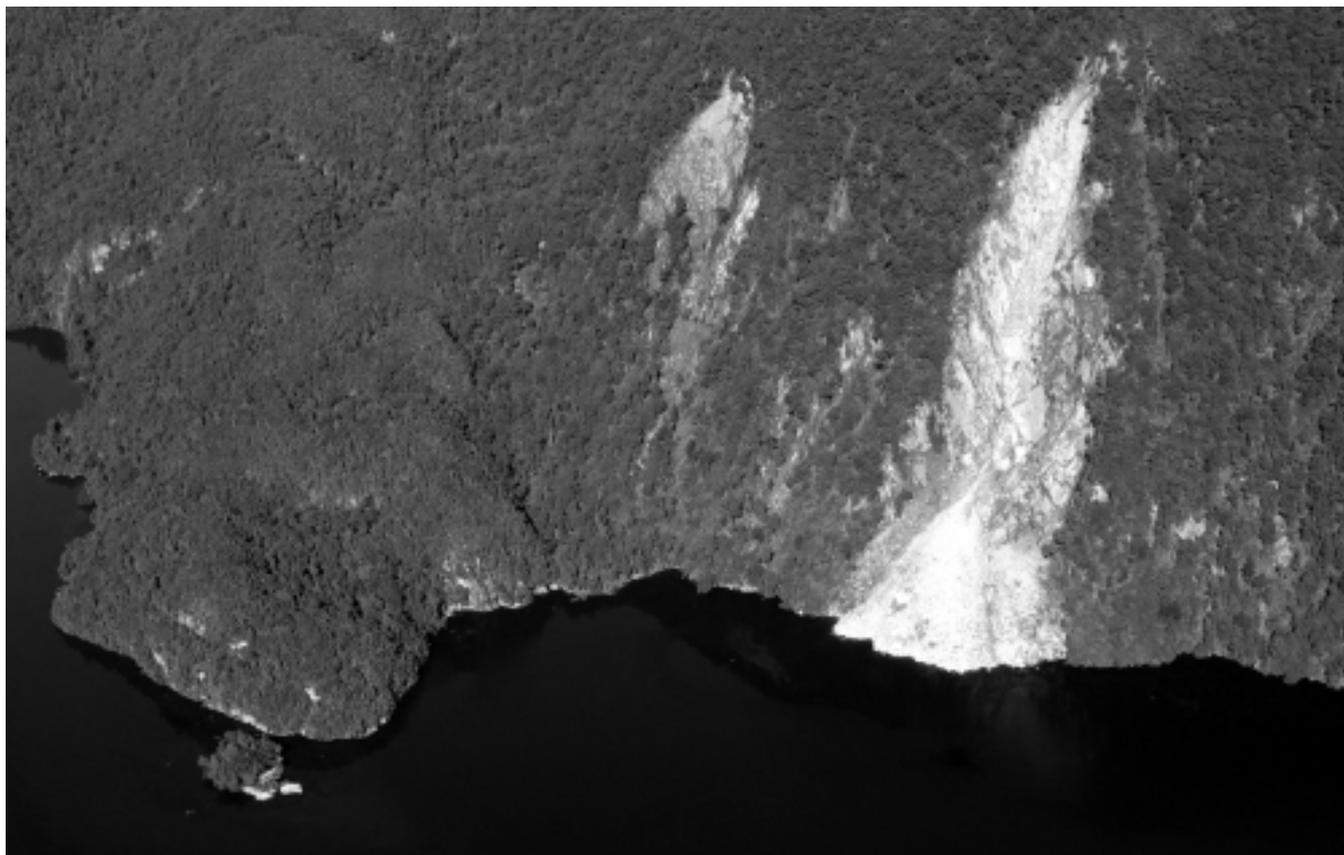
Takaka areas of Golden Bay with over 200 mm recorded in the space of 48 hours. Minor slips were reported on the Takaka Hill road and on SH 60 at Bird's Cutting. In the Richmond/Brightwater/Mapua area the rainfall was more concentrated with 115–155 mm reported over 24 hours (73 mm in 3 hours between Richmond and Brightwater; 52 mm in 4 hours at Mapua). Landslides in this area occurred on Aniseed Valley Road and on new cut slopes at the Nelson water treatment plant. The rain also caused very minor rockfalls along Rocks Rd (SH 6) in Nelson and a slip with blocked SH 60 near Ruby Bay (Mapua). Minor slips were also reported on SH 6 over the Whangamoia and Rai saddles.

Earthquake 22 August 2003, Fiordland

A shallow (12 km), magnitude 7.1 earthquake occurred at 12:12 am on 22 August with an epicentre location just offshore from Secretary Island in Fiordland. Because an earthquake of this magnitude could be expected to generate landslides with a volume greater than one million cubic metres, GeoNet organised a landslide reconnaissance in conjunction with the deployment of additional seismographs and strong motion instruments

Below: Landslide in Deas Cove, Thompson Sound resulting from the 22 August M7.1 earthquake. A DoC hut is located within 50 m of the toe of the slide.





Above: This landslide in Charles Sound caused a tsunami which left a 2 m plus tide mark on the island in the left foreground.

to monitor the aftershock sequence. Those involved in the landslide reconnaissance included Mo Turnbull and Simon Cox (GNS, Dunedin), Graham Hancox (GNS, Wellington) and Professor Mike Crozier from Victoria University (Wellington). Over 200 individual landslides have so far been identified. These include a landslide in the Gold Arm of Charles Sound that generated a tsunami and a large landslide above Deas Cove in Thompson Sound where the debris came to within 50 metres of a DOC hut. The landslide magnitude/ density relationships have been used to develop isoseismals for this earthquake. Minor liquefaction effects were observed around the shoreline of Lake Te Anau and along the banks of the Waiau River.

Rainstorm 23–24 August 2003, Hastings District and Napier City

Heavy rain in the Hastings District and Napier City over the weekend of 23–24 August caused problems with flooding, minor slips and rock falls throughout the district. The heaviest rainfall over the two days was recorded in the main axial ranges with 480 mm at Ngahere and 450 mm at Te Koau. 10–50 km further east over 300 mm reported from as far afield as Wakarara (330 mm), Patoka (350 mm) (both east of main ranges in foothills) and Kahuranaki (325 mm) in the coastal ranges. Hastings recorded 106 mm and Napier 71 mm. Many slips and

dropouts were reported on country roads and on farms from Waipukurau, Wakarara and Kahuranaki. To the north (Wairoa District Council) 92 mm was reported from Wairoa and 110 mm reported from Ruakuturi (further north). To the south Waipukurau reported 91 mm with 160mm further south from Hatuma near Waipukurau (Central Hawke's Bay District).

On SH 5 between Bay View and the Mohaka River in northern Hawke's Bay, 3000 cubic metres of debris tumbled onto SH 5 in a series of slips from Bay View to the Mohaka Bridge. Several of the larger slips containing nearly 300 cubic metres each, covered the roadway. Near the Titokura Summit on SH 5 a major slip of 300 cubic metres near the summit blocked the road. Soccer ball sized rocks caused problems on SH 50 near Maraekakaho. Slips and rock falls were reported through the entire length of the Matahorua Gorge on SH 2 and a slip also blocked most of the roadway at White's Pine Bush on SH 2 north of Napier and had to be cleared before the road could be re-opened. At the Tangoio soil conservation area, slips were reported on tracks inside the erosion prone area.

Rainstorm 10–11 September 2003, Wairarapa to Hawke's Bay

Slips, dropouts and washed out culverts were reported from the north and west of Hastings District. A small slip partially blocked SH 2 on the eastern side of the Rimutaka

Hill. A small slip blocked SH 2 for 3 hours at the Mohaka Viaduct. On SH 2 between Waipawa and Pakipaki in the central Hawke's Bay small slips onto road shoulders, partially blocking roads were reported. From Bay View to Te Hauroto in the Hawke's Bay small slips occurred onto road shoulders, partially blocking some roads. On SH 50 between Maraekakaho and Tikokino in the central Hawke's Bay small slips fell onto road shoulders, partially blocking some roads. In the Tukituki Hills, near Havelock North, 40 pine trees and a fence line were destroyed by a small debris flow. On the Breakwater Road below Bluff Hill in Napier, one lane was blocked for 3 hours after a slip.

Rainstorm 28 September, Wellington to Taranaki

Rain over the southern half of the North Island on 28 September caused numerous small landslides in the Wellington and Taranaki regions. On SH 2 near Mt Bruce in the Wairarapa traffic was delayed by small slips and also on SH 2 on the eastern side of the Rimutaka Hill. On Blue Mountains Rd in Upper Hutt one lane partially blocked by a very small rock fall of 1.5 cubic metres. On SH 1 in the northern Rangitikei-Taihape area the road shoulder was closed by small slips. Near Taumaranui, the road

shoulder was also closed by small slips. At Burgess Hill near New Plymouth in Taranaki SH 3 was partially blocked by a small slip.

Rainstorm 3–4 October, Wellington region

A localised high intensity rainstorm caused extensive landsliding near Paekakariki. Flood mobilisation of landslide debris resulted in extensive aggradation of debris fans near Paekakariki, partially burying a motel and covering the tracks of the North Island main trunk railway. The northern end of the Paekakariki Hill Road was also extensively damaged. Landslides were also reported on SH 58 near Haywards, SH 2 over the Rimutakas, on the Akatarawa Rd and on the Paekakariki Hill Road, effectively isolating Wellington from the rest of the North Island.

Rainstorm 13–14 October, North Island

Widespread rain over the entire North Island caused landslides in Northland, Coromandel, Bay of Plenty, East Cape and Wellington City. The greatest density of landslides was in the Wellington City area where numerous roads were partially blocked including the Miramar Cutting and the Takarau Gorge between Makara and Johnsonville.

Below: The carpark and playground at the Belvedere Motel, Paekakariki following the 3 October storm



Welded Gabions for Decorative Landscaping

Moninder Bindra, Permathene

Herceg Architecture & Design Ltd. has creatively applied Permathene welded wire Gabions in their designs. Over the past few years gabions are being used in new and revolutionary ways, including being used as a signboard stand, an applique design on a fireplace, retaining walls around the BeesOnLine Ltd building, and a large wall around a coastal residential property which offered both privacy and a weather screen. Gabion has a lot of great aesthetic design possibilities. They can be used effectively and economically in parks along highways and around bridge approaches to create walkways, rock gardens, patios and terraces. Gabions beautify the banks of lakes and ponds and accent trees and other plantings. In fact, their application to decorative landscaping is limited only by the ingenuity of the landscaper or the architect. Gabions can be vegetated offering a new technique in bio-engineering for strength and beauty.

Permathene gabions are easily handled and installed on site. Permathene engineering staff gave technical support to the contractor on site at the start of the project. Gabion construction is simple and does not require skilled labour. Gabion installations are more economical than rigid or semi-rigid structures.

Terrafirma has successfully completed the gabion project with ease. In one area the architect used the gabion

baskets stacked 4.0 m high x 0.457 m wide x 13.60 m length cladded to 240 mm thick block support wall. Using 12 mm x 125 mm galvanised dynabolt with square galvanised washers at 1m centres, they provided attractive and natural building blocks for decorative landscaping. Spiral connectors and dimensional accuracy eliminate time consuming hand tying of baskets hence welded mesh assemble in $\frac{1}{2}$ to $\frac{1}{3}$ the time of twisted mesh. Any size or shape can be constructed from a single roll of mesh with no effect on structural quality or corrosion resistance.

Terrafirma were pleased with the support they got from Permathene technical staff. In addition to welded gabions, Versicell Interlocking Modules were also supplied for the same job. Versicell modules were used on the roof garden area of the building. Versicell modules are lightweight and offer efficient drainage solution for roof garden applications. They have high compressive strength and are easy to install on site.

Permathene is the exclusive distributor of Welded Gabions manufactured in USA for New Zealand, Australia and the Pacific Islands. For additional information regarding the use of welded gabions, contact Moninder (Witty) Bindra, Civil Engineering Division, ph 09 829 0741 or e-mail info@permathene.com.

Below: Welded Gabion Wall



South American Sojourn

Paul Horrey, Golder Associates (NZ) Limited

Peru was one of those mysterious sounding places I'd always wanted to visit, so when the call came for a short assignment it didn't take long to say yes. First to Lima, the chaotic and eternally misty Capital, and the joys of a 4 am arrival in a foreign country. After a few hours rest and afternoon introductions to the friendly folk at the local Golder office, another early start saw myself and Bernardo, also an engineering geologist, back at the airport. Once the weeks worth of gold had been safely offloaded from the small mining company plane, we strapped ourselves in and headed north toward the mountains. Our track took us right past Nevado Huascarán, Peru's highest peak, and the scene of the devastating landslide which wiped out the town of Yungay and 20,000 people following an earthquake in 1970. The path of the landslide running from high on the mountains flanks to the now uninhabited lower valley was a somber reminder of the young and dynamic nature of the landscape of the Andean Cordillera.

Landing at precipitous Chagual airstrip in the Marañón Valley (where a missed approach is not a viable option), we made our way up-river by road to around 2800 m, arriving at a small mining town in the tributary Parcoyo Valley a dusty 3 hours later. Amongst spectacular scenery that appears as high as it is long, gold rich quartz veins in the granodiorite rock have spurred a fervent underground mining industry.

Our project required an investigation of the stability of a terrace remnant high on steep slopes above the river. The only flat land for miles around, the mining company wished to use the site for a new mining camp, process plant and heap leach pad. The miners appreciated the value of a good understanding of the geology of the site. Some years previously a tailings repository had been built on a similar-looking terrace some distance down the valley. This terrace failed as the facility was nearing completion, but fortunately before it received any tailings (Golder was not involved!).

Several days of field mapping and nights spent going cross-eyed over aerial photographs confirmed the geology at the site under investigation to be favourable. The terrace was the remnant of several huge debris flows which had choked the main valley at a time of greater sediment supply. Subsequent sculpting by both depositional and erosional river processes resulted in the landform seen today.

From the 24 hour clamour of the mining town the return trip took us back to the northern city of Trujillo, and then by commercial airliner along Peru's arid north coast to Lima. A further week of report writing left evenings free to explore some of Lima's stark contrasts (and excellent restaurants), before the two-day flights back to a very peaceful and flat-looking New Zealand.

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SPECIAL INTERESTS

Effect of Vertical Shaping on the Displacement of Earth Retaining Structures

P. Brabhakaran, G.J. Fairless & H.E. Chapman. Opus International Consultants, Wellington

Research funded by the Earthquake Commission (EQC) was carried out to assess the effect of vertical ground motions on the seismic displacement performance of retaining walls. In near-fault areas, vertical shaking can be significant. The research included a literature review and numerical analyses of a Reinforced Earth wall. The model analyses were carried out for a wall with an aspect ratio (the ratio of reinforcement length to height of wall) of one. Four different near-fault earthquake time histories from California were used in the analyses and were modified to vary the intensity of earthquake shaking. The study was effective in assessing the displacement performance of walls and the parameters that have a significant influence on wall displacement behaviour when there is significant vertical ground shaking.

The effects of vertical earthquake shaking have not been seriously considered until recently. Recent papers highlight the importance of vertical shaking to the assessment and design of retaining walls. These recent studies have involved pseudo-static analyses. No model studies, either physical or numerical, have been carried out to verify the effects of vertical shaking or to assess parameters that might be important.

The authors' project was the first model study of the influence of vertical shaking on seismic displacement and was carried out using the finite-difference numerical program FLAC, incorporating both vertical and horizontal shaking. The analyses confirmed the vulnerability of the upper strips to pullout during earthquake shaking, a factor that has long been recognised in the practical design of reinforced earth structures.

Calculated outward displacement of this robust wall was less than 25 mm for a modest energy of shaking associated with the four earthquakes chosen, and up to 200 mm for more intense shaking, both horizontal and vertical. The maximum calculated displacement (other than at the top where reinforcement pullout occurred) with horizontal shaking alone was only 23 mm.

The study showed that peak ground acceleration was a poor predictor of seismic displacement. The sum of the power spectral density, which reflects the earthquake energy content, was found to better relate to the displacements in these different earthquakes.

Vertical shaking had a significant effect on the displacement of the wall. The calculated displacements varied significantly depending on the earthquake input, with vertical shaking than with horizontal shaking alone. The magnitude of the displacements was found to depend on both the energy content of horizontal and vertical earthquake shaking and the frequency content. This may be due to the relationship between the frequency content of the earthquake and the natural response frequency of the retaining structure and indicates that the frequency content of the earthquake and resonance effects can be important.

The authors postulate that the vertical shaking could modify the flexibility of the retaining wall, and hence its natural period. Where this shifts the period of the structure to a frequency similar to a frequency of ground shaking with significant energy content, resonance effects and hence greater displacements can result.

Currently design is based on pseudo-static methods using horizontal peak ground accelerations. The study shows the importance of the energy and frequency content of both horizontal and vertical shaking to the seismic displacement performance of flexible retaining structures. This is important to the design of retaining systems that support other structures, particularly in near-field areas where vertical shaking can be strong.

Further research is recommended to assess the performance of different wall systems under earthquakes with different characteristics, and to develop appropriate design parameters and methods for situations where vertical shaking is important.

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Numerical Modelling in Geotechnics, Part VII

Sergei Terzaghi, Sinclair Knight Merz

I have talked about a number of topics over the last columns usually backed up with some practical examples. This time I want to diverge from this a little, in part to reflect on some items that I learned about in a recent conference I attended (report elsewhere in the Journal), and although these issues are important, I am currently not able to show the effects.

When we set up a numerical model (of any description, simple hand calculation or computer) we usually make a number of assumptions about the soil. It is often worthwhile examining these assumptions and just checking that they are sufficiently valid for the problem in hand. Some of the usual assumptions include an elastic (usually linear) Mohr-Coulomb yield point and isotropic behaviour (where the soil behaves the same in all directions, under all loading conditions). We also assume that shear behaviour and volumetric behaviour are uncoupled, that groundwater flow is Darcian and time effects are unimportant.

Some of the issues relating to elasticity and linearity have been looked at in previous columns, and I will provide further commentaries in the future. Research by Gudehus (1972), and more recently Costanzo *et al.* (2003) suggests that soil is incrementally non-linear and behaves very differently depending on the stress direction. This relates directly to anisotropy of both strength and stiffness.

Theoretically, it is easy to decompose any stress state into hydrostatic stress components (an equal all around mean stress) and deviatoric stress components (shear component). It is also relatively easy to measure these in terms of p and q (or other so-called stress invariants). Whilst this is sufficient for isotropic soils a third invariant, the lode angle, is required for anisotropic soils. The lode angle represents the direction of the principal stress axes (C.F. Scott, 1980, R.F. Scott, 1981).

It is fairly easy to infer that changes in mean stress induce volumetric strain, whereas changes in deviatoric stress induce both shear strain, and in the presence of dilation, volumetric strain. It can also be concluded that the usual geotechnical assumptions that settlement behaviour can be considered separately from shear behaviour is acceptable provided we are still in a more or less elastic region of soil behaviour.

However, these rules are not necessarily valid once we are on a yield surface for either volumetric behaviour or shear behaviour as the direction of the resulting stress change is dictated by the 'real plastic flow rule' (this is a topic for future discussion) rather than by elastic behaviour.

Take for example the virgin consolidation line, by definition it is a yield surface for volumetric behaviour, whilst the Mohr-Coulomb line is a yield surface for shear

behaviour, defining transitions between elastic and plastic behaviour (as compared to failure). In effect shear may also exhibit an unload-reload behaviour similar to the virgin loading behaviour during consolidation.

Whilst we are examining this topic, it is useful to look at the standard tests used to try and determine the various stiffness parameters used in analysis. A quick consideration of the oedometer and standard triaxial tests reveals that both tests include a combination of both hydrostatic (equal all-round mean stress) and deviatoric stress increase. The tests results will therefore exhibit both volumetric and shear behaviours. This can lead to inconsistencies if one is not conscious of the effects. A routine example of this could be the typical analysis for the immediate settlement of footing on a cohesive formation. For this undrained loading condition an E value or some other compressive rule of thumb factor is usually adopted. Because the loading is undrained with no volumetric strain, all the immediate settlement must be the result of shear strain. However, shear modulus is not directly measured in any of the routine tests that provide characteristic compression properties.

Anisotropy makes the situation worse. There are several aspects to anisotropy, the variation in strength/stiffness in different directions and the associated fabric or structure that is, in part, responsible for this anisotropy. Loading the soil may change the direction of the lode angle (the direction of principal stress axes), which may in turn induce unanticipated behaviour. For example, the apparent pre-consolidation pressure may change (thereby inducing stiffer behaviour), or failure may occur because the loading is occurring along a direction of weakness.

These behaviours can be seen in extreme cases by simply rotating the stress field. It is often overlooked or misunderstood that the real reason for applying the vane correction factors to shear strengths of a soft clay formation under an embankment is simply because of anisotropy. Building an embankment on soft clays induces loading along directions of weakness, whereas the vane tests in a direction of strength. Conversely, no correction factors would be necessary when doing a deep excavation in the same soil since it would appear to be loading the soil in the same direction of strength as the test.

Structure within the soil makes interpretation of routine test data even more difficult. For example, in a consolidation e - $\log p$ curve the presence of structure induces additional curvature onto the apparent virgin consolidation. Without taking this into account the interpretation of this would suggest that at lower stress levels the material will settle a lot more than reality. Also, the presence of structure makes it difficult to actually

determine the real pre-consolidation pressure. Current research suggests that the use of two different curves, in particular a linear $e - p$ plot and also an $m_v - p$ plot used together will be more appropriate (Koskinen *et al.*, 2003).

Look again at the interpretation of laboratory tests and field data with some of these results in mind. The oedometer test imposes zero lateral strain (assuming a perfect fit between sample and ring) whilst increasing the vertical loading. In theory, this will induce loading up a normal consolidation, or k_o , line (there will be an increase in both mean and deviatoric stress) but with no change in lode angle. A k_o cell does this better, and may well be more realistic since it allows one to measure the lateral pressures.

A triaxial cell in contrast, assuming conventional test procedures, consolidates a sample under isotropic cell pressures (thereby getting a very good idea of the volumetric behaviour), and then increases the axial, or deviatoric, pressure until failure. This leads to very significant rotation of the lode angle of the applied stress state in the sample compared to the *in situ* stress state of the natural soil. Thus influencing and affecting the reported stiffness compared to the *in situ* material. Compare these tests to the shear vane, pressuremeter and dilatometer which typically measure the horizontal strength/stiffness and contrast with the CPT

cone that primarily measures failure in vertical strength.

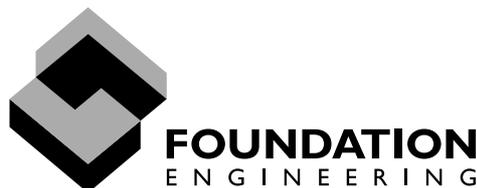
Time dependent behaviour adds a whole new dimension to all of this, as the results of these tests may vary according to the rate. And that's a whole new topic, food for thought!!

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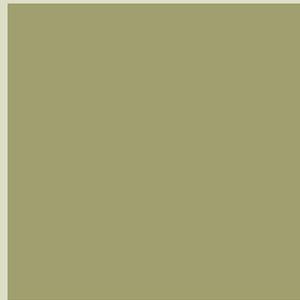
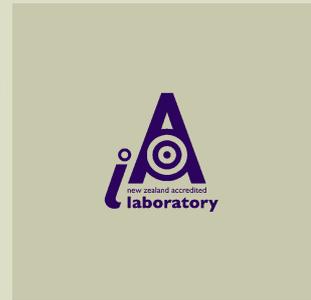
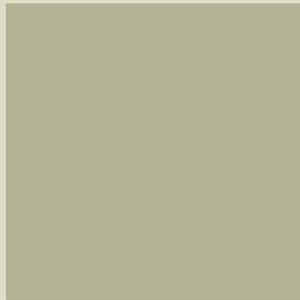


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NZ Geotechnical Society 2003 Photo Competition

The year 2003 theme is:

“Habits of the species geotechnicalus”

Show us the things that geotechnical engineers, engineering geologists, and technicians in the profession get up to!! Photos of you or your colleagues doing what they do best... working hard!!

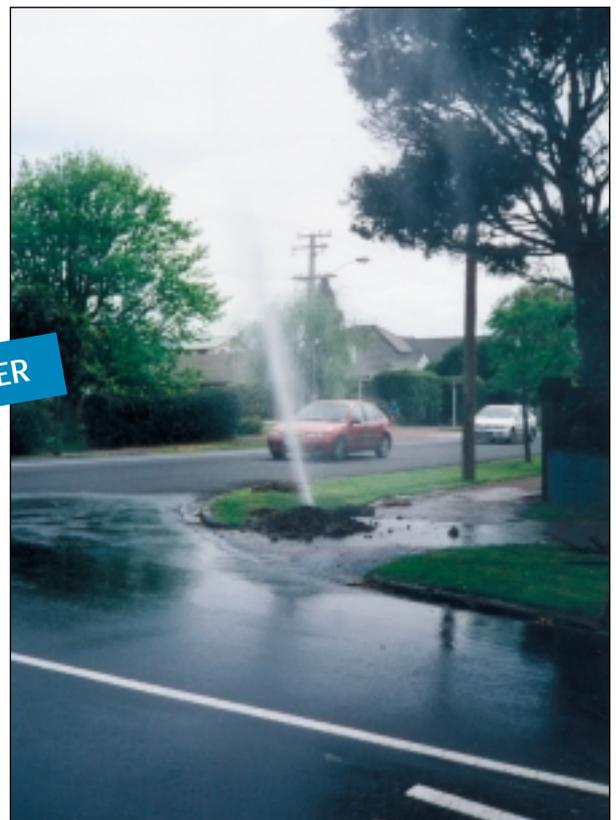


LEFT: Unlike the non-engineered fill found during the bulk earthworks, the missing link was observed during the borehole investigation phase.

Dave Dravitzki – Fraser Thomas

LEFT AND BELOW: Cause and effect of a keen but slightly over-exuberant subsurface investigation.

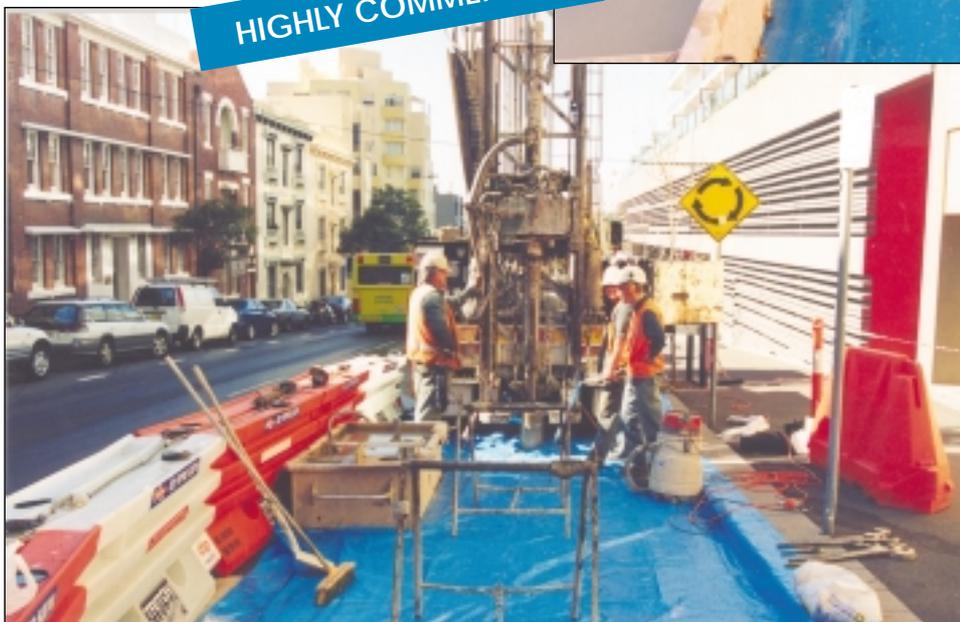
Dave Dravitzki – Fraser Thomas





LEFT: "Slip.....? I don't see no slip! I might just put a borehole down here and make the rest up in the car."
Dave Dravitzki
- Fraser Thomas

RIGHT AND BELOW: The Cleanest Drilling site you'll ever see. Note the Vacuum cleaner.
Michael Laws, Connell Wagner Ltd



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LEFT: Meritec, in conjunction with Transit, have developed a unique solution to the problem of getting CPT rigs to sites. CPT operator George Probe said that the signs have saved his company thousands of dollars in travel costs. However, Mr Probe expressed concern at the number of campervans apparently blocking the entries to sites. Transit are investigating this unusual campervan activity.

John Underhill, Meritec Ltd

RIGHT: Planned Construction?
Anonymous



HIGHLY COMMENDED

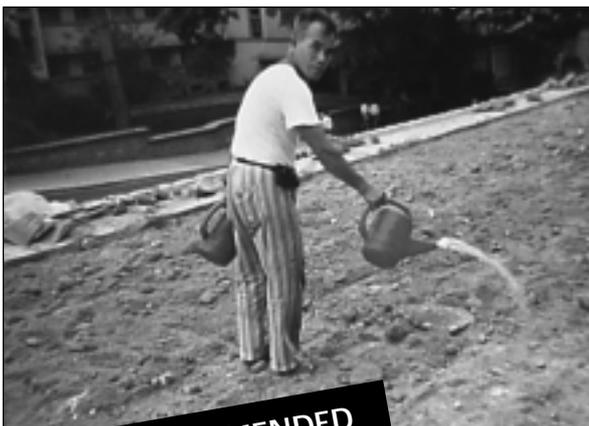


LEFT: Homage to Menard – George Mullenger and Pierre Foray, at the Three Channel Flatsite, in pursuit of liquefiable sand, Buller Gorge.

John Berrill,
University of Canterbury



ABOVE: A hell of a way to start a Friday morning.
Glen Guy, Tonkin & Taylor Ltd



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LEFT: Quality control engineer adjusts moisture content in backfill. Jeff Bryant



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To nominate a delegate, submit a completed registration slip (which can be downloaded from the conference web site) with an abstract of 200 words or less to the contact address below. Nomination of all delegates must be supported by a senior mentor.

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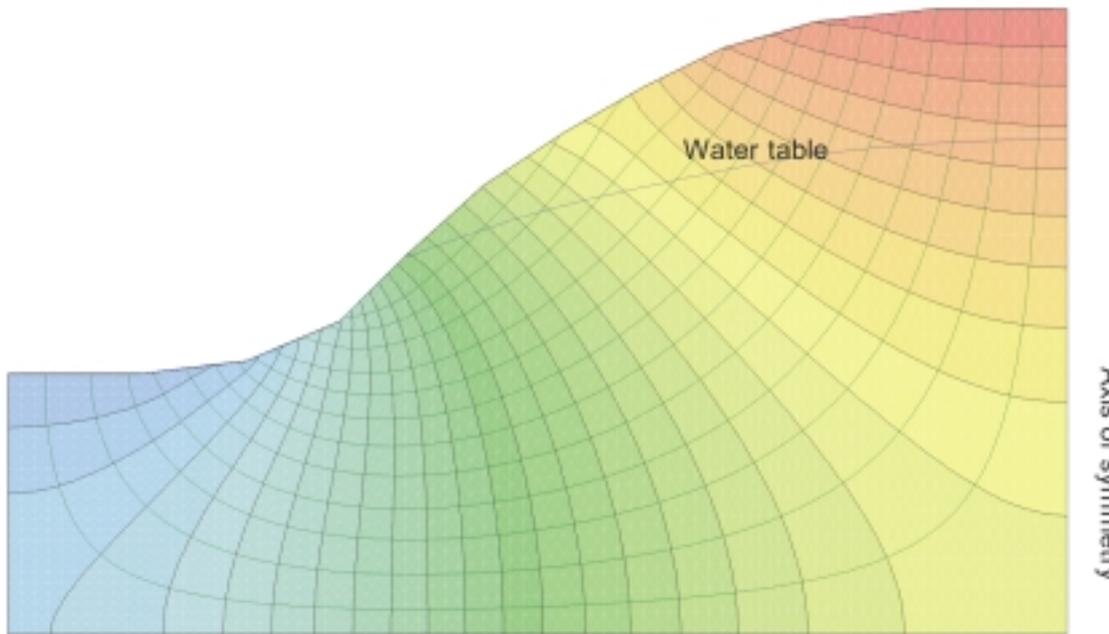


Coffey



LAURIE'S BRAIN TEASER

The diagram shows a seepage flow net, obviously generated by a computer programme.



What is wrong with this flow net, if anything? If nothing is wrong with it, what does it represent?
(To view and print this diagram in colour, please see the NZ Geotechnical Society webpage – www.nzgeotechnical.org.nz)

Answer at the 9th Australia New Zealand Conference on Geomechanics (Auckland 8 – 11 Feb 2004).

COMPANY PROFILES

Hawthorn Geddes Engineers and Architects Ltd

Hawthorn Geddes Engineers and Architects Ltd is a multi-disciplinary consultancy based in Northland covering civil structural and geotechnical engineering and architecture. The firm is in the small to medium category of engineering business with a steady staffing level of 19, 3 dedicated to a client's site.

The geotechnical section consists of two society members Peter Geddes Director and Rostyn Lomax, staff engineer with two other dedicated staff and assistance in environmental and stormwater work from our other civil engineers. Main work areas include:

- Geotechnical appraisals of subdivisions and building proposals,
- Infrastructure design for industry and subdivisions specialising in stormwater treatment design.,
- RMA evidence for subdivisions and marinas,
- Heavy industrial design including buildings structures and infrastructure,
- Commercial building design. including light weight integrated concrete panel steel roof structures,
- Cost effective educational buildings.

The current geotechnical issue in Northland is still the application of the Building Act section 36 to predominantly domestic house sites. There is increasing clarity as to how the various territorial bodies will apply the law but as coastal values rise we have noticed a trend for considerably larger houses on increasingly more marginal sites. The most difficult (and common) situation is where the consent issue affecting the proposal is not located on that land. For example, active slips on sections above the property being investigated. In other words it is often inappropriate or impossible to alleviate the issue on the property for which a consent is being sought. This raises ethical issues in relation to responsibilities to inform neighbours territorial authorities etc, while avoiding compromising our client's right to seek legal remedies. What are other practices doing? Will the Building Act Amendment help?

Our business aim is to provide appropriate solutions for our client's projects. Being a multi-disciplinary company is often thought to bring its own constraints. We have found however, that we are frequently able to combine the resolution of geotechnical issues into the architectural form of a building that allows an integrated and more cost effective overall solution. Members will know how hard this can be to achieve with independent designers.

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Maunsell is a multi-discipline engineering organisation employing 1900 staff in the Australasian region and 300 in NZ.

Maunsell's geotechnical group comprises engineering geologists and geotechnical engineers, and was an early provider of engineering geological services in NZ, a strength that it retains today. Geotechnical engineering has always been central our multi-discipline firm which is reflected in part by the current and previous managing directors both being geotechnical engineers.

The group provides geotechnical services in the transportation, power & energy, facilities and environmental sectors. Staff work mainly on NZ projects but also on international projects.

Challenges our geotechnical staff have faced in the past year include:

- Stabilising transmission towers on razor back ridges
- Supervising construction in the jungles of Lao PDR
- Assessing settlements beneath embankments
- Seismic stability of underwater retaining walls
- Installing an earth dam chimney drain
- Mitigating Mt Ruapehu lahar hazard
- Monitoring slow moving landslides
- Assessing the risk of rock falls

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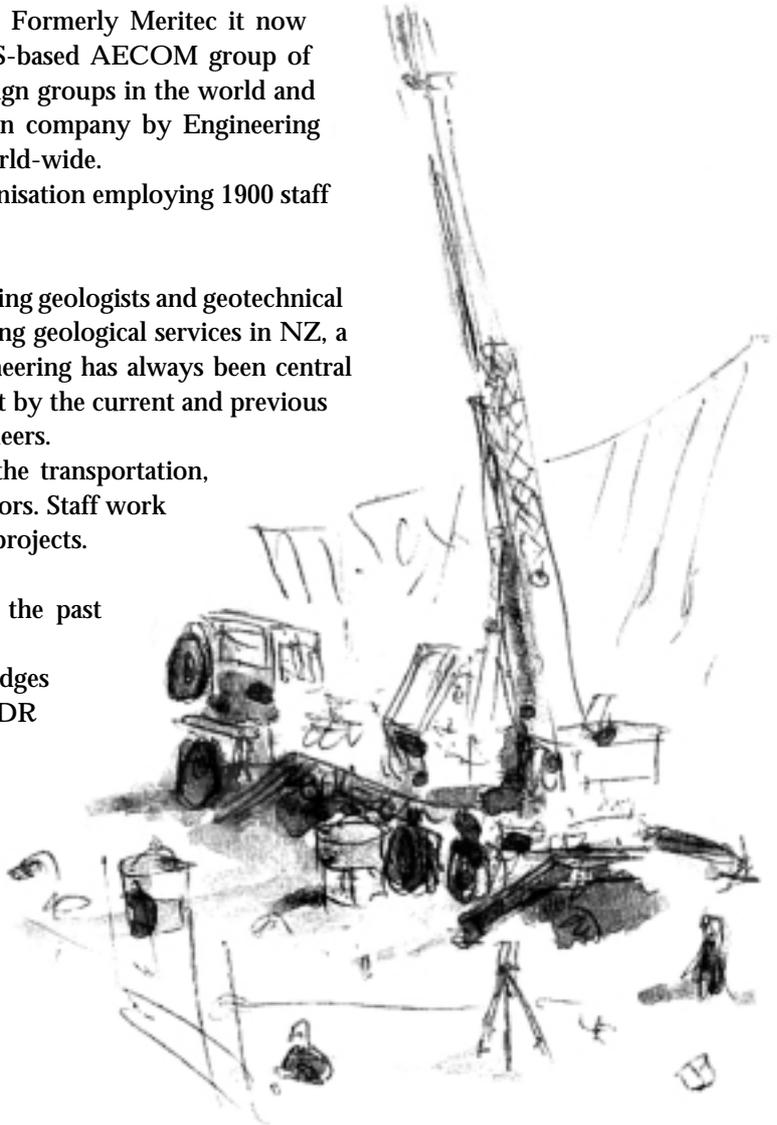
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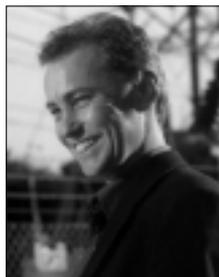
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MEMBER PROFILE



Tim McMorran

Occupation

Associate Engineering Geologist, URS, Christchurch
Field Manager, Geotechnical investigations Project Aqua.

In The Beginning

After a typically indecisive start to his career, which included a Forestry intermediate, followed by interesting but false starts in botany and chemistry, Tim settled comfortably into geology gaining a Masters degree in Engineering Geology from the University of Canterbury. During his Masters thesis he studied the structure and paleoseismicity of the Hope Fault near to Hanmer. This satisfied his interest in those areas of geology and kindled his enthusiasm for South Island high country.

Shortly after graduating, Tim met John Braybrooke, Principal Engineering Geologist with Douglas Partners and a fellow Kiwi, who offered him a job in Sydney. With new wife Karen, Tim settled in Sydney and spent three enjoyable years supervising drilling and logging vast quantities of core before returning to Christchurch. In 1994, soon after returning, Tim joined the fledgling Woodward-Clyde Christchurch office, which after numerous mergers, amalgamations and name changes, became the Christchurch URS office. URS provides Tim an enjoyable work environment, a mix of work projects with enough challenges to keep an engineering geologist interested and busy, and fulfils the lingering need for a pay cheque every fortnight.

Work Experiences

In his nearly ten years with URS, civil, mining and environmental engineering projects have been keeping Tim occupied. Memorable projects have included the Matahina Dam Strengthening Project, which returned Tim to the seismic hazard work of his university salad days. The project included paleoseismic studies, design of remedial measures and construction supervision, during which Tim was geologist on the spot. Following the hazard quantification phase with construction of a world class remedial solution was very satisfying, particularly

when the postulated hazard was realised by exposing several active faults within the dam foundation excavation.

In the Roxburgh Gorge landslides are almost as plentiful as rabbit warrens. Many are large and present a potentially serious risk to the Roxburgh Dam reservoir. Tim has enjoyed many weeks spent mapping the landslides and implementing of a monitoring programme which has addressed the risk for the first time, indicating which of the landslides present negligible risk and which need to be more closely monitored. Tim has gained knowledge of schist landslides under the guidance of mentor Don Macfarlane. The mapping usually coincides with the drying off of the wild thyme in the gorge, which wreaks havoc with Tim's sinuses, though tramping through the thyme adds a more fragrant note to the smell of his boots. And no, Tim says it isn't true that most of the goats in the gorge know him personally, though they occasionally attempt to share his lunch.

During the slope failure risk assessment project on SH 73, Tim and colleagues Gordon Ashby and Matt Howard were able to apply some of the risk assessment methodology developed by Gordon Ashby. This was the first time that such an ambitious quantitative risk assessment has been undertaken on the highway, and it was particularly satisfying for Tim to continue some of the pioneering work started by mentor and father-in-law, the late Brian Paterson.

Outside work

Tim is an enthusiastic founding member of the URS trout bothering team, which meets annually at a secret high country locality. He enjoys cryptic crosswords, barbecues, beer and malt whiskey, though seldom simultaneously. More active pursuits include running around the Port Hills and an occasional half marathon. It's all a great way to see the country!

THE BOB WALLACE COLUMN

I mostly enjoy my work. I take great pleasure in providing what I think are sound, rigorous effective solutions for ground engineering problems. Most of the time the best jobs involve the simple application of basic engineering principles – what we do is not rocket science but when it's done well there are tremendous benefits for our clients and society.

Although there are some characters in the geotechnical business that like to encourage the reputation that our profession is a Black Art, I firmly believe that this does us more harm than good. There is no need to perpetuate the myth that a good Geotechnical Engineer must rely on experience and gut feel. Our business is not 25% science and 75% judgement – it is a legitimate Engineering Science. Experience is important, but without a sound grasp of mechanics, properties of materials and maths an experienced practitioner can be an embarrassment.

In most cases, these embarrassments are well hidden and never exposed, but they do exist. You would think that it should be difficult for someone who does not seem to understand the fundamentals to operate successfully in our business. Unfortunately, that is not the case. All too often they prosper and maintain a reputation for providing 'good' service whilst their clients remain ignorant of their incompetence.

One of the reasons these dodgy practitioners remain safe, secure and free to continue operating is that our discipline is very forgiving. Our mistakes are readily covered up, the margins of safety applied to the loads on our structures are very high and we are usually extremely conservative in our selection of material properties. Occasionally, problems do occur. A foundation settles more than expected, a slope fails, a retaining wall leans or a pile/anchor yields. More often than not this is a consequence of a genuinely unforeseeable circumstance – a natural defect, an unusual increase in groundwater or an unexpected load.

This is great news for the incompetent because it means that there is a ready excuse or, at the very least, there is enough uncertainty to provide sufficient ammunition to

muddy the waters of any forensic investigation.

Another reason that the incompetent survive is because we have never become codified. Unlike structural engineering there are very few documented procedures that are prescribed activities in executing a geotechnical design. There are guidelines and recommendations on best practice but there is often a wide selection to choose from in any one situation and they are always open to interpretation, misuse or abuse by the 'experienced' practitioner.

This is perhaps what upsets me the most in my job. There have been occasions when it would appear that an Experienced Engineer has made a bad judgement call and when called to task blatantly misrepresent fundamental geological or geotechnical principles in order to justify a patently erroneous position. I find this deeply disturbing because it is so unnecessary. We do our whole profession a disservice every time we use bluff and bluster to try and cover-up a mistake or a simple oversight.

I also believe that our own best intentions help perpetuate our problems. Where attempts have been made to document guidelines or recommendations for routine activities, all too often it fosters malpractice and a slack approach to proper Geotechnical Engineering. Examples include reliance on the Hiley Formula for pile design and certification, dependence on the Scala for foundation design verification and any number of proprietary design tools from suppliers of geotechnical engineering products or well meaning colleagues in other professional societies.

I commonly see Experienced Engineers use poor methods and inappropriate theory without thinking simply because it was what they did last time and it 'worked'. I know I said that what we do is generally not rocket science and that pragmatic solutions are often the best but that is not an excuse for being slack in analysis and applying poor judgement. These same Experienced Engineers will be very quick to decry the status of our profession – is it any wonder? It's often the pot calling the kettle black.

Without demonstrably sound, rigorous thinking and honest endeavour we don't stand a chance.

EVENTS DIARY

Links are available from the NZ Geotechnical Society website – www.nzgeotechsoc.org.nz

2004

JANUARY 21–23 2004, Singapore

6th International Conference on Deep Foundation Practice (PILETALK 2004)

For more information contact:

The Conference Director

Ci Premier Pte Ltd

150 Orchard Road #07-14

Orchard Plaza, Singapore 238841

Tel: 065 6733 2922 Fax: 065 6235 3530

Email: CIPREMIERE@SINGNET.COM.SG

Web: www.cipremier.com

FEBRUARY 9–11 2004, Auckland, NZ

To the eNZ of the Earth – 9th ANZ

Conference on Geomechanics

Conference theme aims to generate discussion on what makes geotechnical practice within NZ and Australia difference to other parts of the world.

Topics include:

- Slope instability and remedial measures
- Foundation performance and assessment
- Dams, Roads, tunnels and mines
- Laboratory testing
- Earthquake Engineering
- Contractual and risk issues
- Case histories and failures
- Environmental Geotechnics
- Engineering Geology
- Numerical modelling

Register now!

<http://www.cce.auckland.ac.nz/geomech04>

MARCH 22–23 2004, Kuala Lumpur, Malaysia

5th International Conference on Ground Improvement Techniques

Conference themes:

- Mechanical and chemical stabilisation of soils
- Accelerating the consolidation of clayey soils and electro osmosis
- Soil reinforcement and earth reinforcement
- Modification of marine soils and related topics
- Grouting techniques and thermal stabilisation of soils
- Evaluation of ground improvement and theoretical methods
- Densification of granular soils
- Dynamic compaction and micropiles
- Deep compaction, blasting heavy compaction,

vibroflotation

- Innovative techniques in ground improvement
- Environmental aspects
- Deep soil mixing
- Soil improvement by precompression

For more information contact:

The Conference Director

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150 Orchard Road #07-14

Orchard Plaza

Singapore 238841

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Web: www.cipremier.com

MARCH 24–25 2004, Kuala Lumpur, Malaysia

4th International Conference on Landslides, Slope Sustainability and the Safety of Infra-structures

Conference Themes:

- Geological and geotechnical site investigations
- Design shear strength parameters and their measurements limit
- Equilibrium and deformation slope stability analysis
- Back analysis of slope failures
- Landslide hazard and risk assessment
- Landslide inventory and hazard zonation
- Landslide Stabilisation and remedial measures
- Observational methods: instrumentation and monitoring
- Effects of rainfall and groundwater
- Effects of seismicity
- Slope instability of landfills and waste materials
- Slope instability in coastal areas
- Slope instability in urban area
- Slope instability in special materials: residual soils, shales, loess, soft sensitive clays

For more information contact:

The Conference Director

Ci Premier Pte Ltd

150 Orchard Road #07-14

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MARCH 29–30 2004, London, UK

A.W. Skempton Memorial Conference

Topics Include:

- Influence of Geology on Civil Engineering
- Soil Behaviour, Characterisation and Modelling
- Slopes and Embankments
- Foundations
- Ground Performance and Building Response

Web: www.skemptonconference.com**APRIL 13–17 2004, New York, USA**

5th International Conference on Case Histories on Geotechnical Engineering

Topics Include:

- Geotechnical Aspects of Italy 2002 and Alaska, 2002, Earthquakes including: Liquefaction, Ground Motion and Amplification, Comparison with other recent Earthquakes, Failure of Ground, Damage to Geotechnical Structures and similar topics
- Mitigation and Design for Liquefaction including: Analysis and Design of Laterally Loaded Large Diameter Piles and Pile Groups using Advanced Calibrated Computer Models in As-IS and Liquefied Conditions, Earthquake drains for Mitigation of Liquefaction, Load tests for piles for Liquefied and Improved Soil Ground Conditions, Lateral Load Testing of Pile Groups, Calibration Studies of the DSSI problem from Recent Earthquakes in Seismological-geotechnical-structural hand shake in the performance based design conditions of Ground Deformations Related to Soil Liquefaction and similar topics.

<http://www.umn.edu/~eqconf/5thCHConf>**MAY 3–5, 2004, Hong Kong**

4th Asian Symposium on Engineering Geology and the Environment

Engineering Geology for Sustainable Development in Mountainous Areas

Sub-themes:

- Natural and man-made geo-engineering/environmental hazards: regional perspectives
- Mechanisms of instabilities in mountainous terrains
- Remote sensing and GIS in land-use planning and hazard prediction
- Origin, measurement and analysis of *in situ* stresses
- Engineering geology for infra-structural development: case histories
- Geo-environmental impacts of natural resource exploitation and engineering projects

<http://www.hku.hk/earthsci>**MAY 4–7, 2004, Liege, Belgium**

EurEnGeo 2004 – First European Regional Conference of the IAEG

Conference themes:

- Professional Practices,
- Engineering Geological Methods
- Case Studies of Infrastructure Projects
- Hazardous Geological Processes in Civil Engineering (Workshop)
- New developments in Risk Evaluation (Workshop)

Submission of abstracts

<http://www.EurEnGeo2004.org>**MAY 19–22, 2004, Beirut, Lebanon**

International Conference of Geotechnical Engineering – Beirut 2004

Conference themes:-

- Contribution of Geology
- Slope stability
- Deep excavations and retaining walls
- Soils improvement
- Foundations
- Dikes and Dams
- Soils identification
- Natural risks
- Environmental geotechnics
- Case Studies

Web: www.ul.edu.lb/activite/icge/geobeyrouth2004.polytech-lille.fr**JUNE 5–9, 2004 Houston, Texas, USA
Gulf Rocks 04**

Rock Mechanics Across Borders & Disciplines

Conference themes:

- Constitutive Behaviour
- Drilling and Hole Stability
- Environments / Geohazards
- Faults / Fractures / Fractured Rock Behaviour
- Flow Through Porous Media
- Foundations and Slope Stability
- Geotechnical Engineering / Structures
- In situ Stress, and Geologic Modelling
- Mining / Tunnelling / Excavations
- Pore Pressure and Pressure Seals
- Property Characterization & Prediction
- Reservoir Geomechanics
- Risk and Uncertainty Management
- Rock Physics, Dynamics and Seismicity
- Underground Storage, and Sequestration
- Well Completions and Integrity

Web: www.GulfRocks04.com

JUNE 22–26, 2004, Calgary, Alberta, Canada
Geo-Engineering for Resource Development

Conference themes:

- Hydrogeology and Geo-engineering practice
- Risk analysis in geotechnical design and construction
- Advances in engineering geophysics
- Advances in geo-engineering application of satellite technology
- Advances in data integration and numerical modelling

Call for Abstracts: Jan. 30, 2003

Web: <http://www.geoerd.com>

JUNE 28–JULY 2, 2004, Rio de Janeiro, Brazil
IX International Symposium on Landslides – ISL' 2004

Conference Themes:-

- Advances in Geomorphological Mapping and development of geological and geotechnical models in landslide hazard assessment
- Advances in Rock and Mine Slopes design
- Advances in Field Instrumentation and Laboratory investigations
- Pre-failure mechanics of landslides in soil and rock, including creep, softening, progressive failure and sliding in contractive soil.
- Post failure mechanics of landslides, particularly earth and debris flow
- Advances in stabilization methods and risk reduction measures such as catch fences and debris dams
- Mechanisms of slow active landslides
- Also includes short courses and international field school.

Web: <http://www.abms.com.br/>

AUGUST 2004, Santiago, Chile

MASSMIN 2004

Conference themes reflect the main concerns and issues affecting the future of the world mining industry:

- Mine Design Fundamentals
- Mine Planning
- Mine Operation
- Applied Geomechanics in mining
- Mass Mining Methods – Case Stories
- Research and Technological Innovation
- Transition from Open Pit to Underground Mining

Contact person:

Chairman: Dr. Antonio Karzulovic

Email: akarzulovic@akl.cl

SEPTEMBER 9–10, 2004 Paris, France
International Symposium on Ground Movement

Conference Themes:

- Ground Mass improvement techniques:
- Dynamic Compaction
- Vibroflotation
- deep compaction
- consolidation and preloading of fine grained and organic soils
- vertical drains
- vacuum loading
- electro-consolidation
- Injection of granular and fine grained soils
- Stone columns
- Jet grouting
- Lime/cement treated soil columns
- Ground Freezing
- Standards
- Education.

Submission of abstracts: 15 Feb 2004

Acceptance of abstracts: 30 April , 2004

Submission of full papers: 30 June 2004

For information: bourgain@mail.enpc.fr

SEPTEMBER 13–17, 2004, Thessaloniki, Greece
International conference on Eco-Engineering:

The use of vegetation to improve slope stability

Conference Themes:

- Vegetation and eco-engineering
- Interactions of vegetation and structures
- Soil reinforcement by roots
- Hydrology and land use
- Soil erosion
- Geotechnical methods and applications
- Slope degradation and forest dynamics
- Applications of land restoration
- Modelling of slope stability
- Decision support systems
- Riverbank and coastline protection measures
- Plant growth versus engineering stability
- Benefits and liabilities in slope protection & erosion control

Call for Abstracts: 1 January 2004

For further information, please contact:

Sanna Dupuy (conference administration)

Laboratoire de Rhéologie du Bois de Bordeaux

(Mixed unit : CNRS/INRA/Université Bordeaux I)

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Email: ecoconf@lrbb3.pierroton.inra.fr

<http://lrbb3.pierroton.inra.fr>

<http://www.ecoslopes.com>

SEPTEMBER 20–22, 2004, Porto, Portugal
2nd International Conference on
Geotechnical Site Characterization
– Sponsored by ISSMGE and endorsed by the ASCE
Geo-Institute and the ISRM, and will be scientifically
led by the members of Technical Committees of the
ISSMGE TC16 – for *In Situ* Testing – and TC10 – for
Geophysical Methods.

Web: <http://www.fe.up.pt/ISC-2>

OCTOBER 18–20 2004, Nanjing, China
4th International Conference on Dam
Engineering

For more information contact:

The Conference Director
Ci Premier Pte Ltd
150 Orchard Road #07-14
Orchard Plaza
Singapore 238841
Tel: 065 6733 2922
Fax: 065 6235 3530
Email: CIPREMIERE@SINGNET.COM.SG
Web: www.cipremier.com

OCTOBER 21–23 2004, Nanjing, China
International Conference on Soil Nailing
and Slope Stability

For more information contact:

The Conference Director
Ci Premier Pte Ltd
150 Orchard Road #07-14
Orchard Plaza
Singapore 238841
Tel: 065 6733 2922
Fax: 065 6235 3530
Email: CIPREMIERE@SINGNET.COM.SG
Web: www.cipremier.com

2005

MAY 23–25, 2005 Stockholm, Sweden
International conference on Deep Mixing
Best Practice and Recent Advances

Conference Themes:

- Infrastructure
- Offshore/near shore
- Environment
- Earthquakes and vibrations
- and eco-engineering

Submission of abstracts: 31 Jan 2004
Acceptance of abstracts: 29 Feb, 2004
Submission of full papers: 15 Oct 2004
For information: www.deepmixing05.se

NEW ZEALAND GEOTECHNICAL SOCIETY INC.

Management Committee Address List 2003

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St George, J (John)	ISRM Australasian Vice President	Dpt Civil and Environmental Engineering University of Auckland Private Bag 92019 Auckland	09 373 7599 x88195 Work 09 373 7462 Fax

* Elected members of committee

+ Appointed position

• Co-opted position

NEW ZEALAND GEOTECHNICAL SOCIETY INC.

Objectives

- a) To advance the study and application of soil mechanics, rock mechanics and engineering geology among engineers and scientists
- b) To advance the practice and application of these disciplines in engineering
- c) To implement the statutes of the respective international societies in so far as they are applicable in New Zealand.

Membership

Engineers, scientists, technicians, contractors, students and others who are interested in the practice and application of soil mechanics, rock mechanics and engineering geology.

Members are required to affiliate to at least one of the International Societies.
Students are encouraged to affiliate to at least one of the International Societies.

Annual Subscription

Subscriptions are paid on an annual basis with the start of the Society's financial year being 1st October. A **50% discount is offered to members joining the Society for the first time**. This offer excludes the IAEG bulletin option and student membership. No reduction of the first year's subscription is made for joining the Society part way through the financial year.

A \$30 per year service centre will apply to all non IPENZ members.

Basic membership subscriptions (inclusive of GST)
which include the magazine *NZ Geomechanics News*, are:

Members	\$67.50
Students	\$28.10

Affiliation fees for International Societies

– Members must affiliate to one of the International Societies
are in addition to the basic membership fee:

International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE)	\$24.00
International Society for Rock Mechanics (ISRM)	\$33.00
International Association of Engineering Geology & the Environment (IAEG)	\$21.00
(with bulletin)	\$70.00

All correspondence should be addressed to the Secretary. The postal address is:

NZ Geotechnical Society Inc.
P O Box 12 241
WELLINGTON

The Secretary
NZ Geotechnical Society Inc.
The Institution of Professional Engineers New Zealand (Inc)
P O Box 12 241
WELLINGTON

NEW ZEALAND GEOTECHNICAL SOCIETY INC.
APPLICATION FOR MEMBERSHIP
(A Technical Group of the Institution of Professional Engineers New Zealand (Inc))

Full Name (Underline Family Name) _____
Postal Address _____
Phone No: _____ Fax No: _____ Email: _____
Date of Birth _____
Academic Qualifications _____
Professional Memberships _____ Year Elected _____
Present Employer _____
Occupation _____
Experience in Geomechanics _____

Student Members:

Tertiary Institution _____
Supervisor _____ Supervisor's signature _____

Note that the Society's rules require that in the case of student members "the application must also be countersigned by the student's Supervisor of Studies who thereby certifies that the applicant is indeed a bona-fide full time student of that Tertiary Institution"; Applications will not be considered without this information.

AFFILIATION TO INTERNATIONAL SOCIETIES:

All full members are required to be affiliated to at least one Society, and student members are encouraged to affiliate to at least one Society. Applicants are to indicate below the Society/ies to which they wish to affiliate.

I wish to affiliate to:

International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE)	Yes/No
International Society for Rock Mechanics (ISRM)	Yes/No
International Association of Engineering Geology & the Environment (IAEG)	Yes/No
(with Bulletin)	Yes/No

DECLARATION:

If admitted to membership, I agree to abide by the rules of the New Zealand Geotechnical Society Inc.

Signed _____ Date _____

ANNUAL SUBSCRIPTION:

Due on notification of acceptance for membership, thereafter on 1st of October. Please do not send subscriptions with this application form. You will be notified and invoiced on acceptance into the Society.

PRIVACY CONDITIONS:

Under the provisions of the Privacy Act 1993, an applicant's authorisation is required for use of their personal information for Society administrative purposes and membership lists. I agree to the above use of this information:

Signed _____ Date _____

(FOR OFFICE USE ONLY)

Received by the Society _____
Recommended by the Management Committee of the Society _____

NEW ZEALAND GEOTECHNICAL SOCIETY INC. PUBLICATIONS

Publication Name	List Price Members	List Price Non-Members
New Zealand Geomechanics Society Conferences: Proceedings of the New Zealand Geotechnical Society Symposium – <i>Geotechnics on the Volcanic Edge</i> Tauranga 2003	\$50	\$70
Proceedings of the New Zealand Geotechnical Society Symposium – <i>Engineering and Development in Hazardous Terrain</i> Christchurch 2001	\$50	\$70
Proceedings of the New Zealand Geotechnical Society Symposium – <i>Roading Geotechnics 98</i> Auckland 1998	\$40	\$70
Proceedings of Technical Groups, Vol 22, Issue 1G <i>Geotechnical Issues in Land Development</i> Hamilton 1996	\$20	\$35
Proceedings of the Auckland Symposium – <i>Groundwater and Seepage</i> May 1990	\$10	\$45
Australia – New Zealand Conferences on Geomechanics: <i>Proceedings of the 6th Australia – NZ Conference on Geomechanics</i> Christchurch, February 1992	\$50	\$100
<i>Proceedings of the 3rd Australia – NZ Conference on Geomechanics</i> Wellington, May 1980	\$10	\$30
Other Publications: <i>Proceedings of the 2nd Australia – NZ Young Geotechnical Professionals Conference, Auckland, December 1995</i>	\$25	\$40
<i>Shear Vane Guidelines</i>	\$15	\$20
<i>Guidelines for the Field Description of Soils and Rocks in Engineering Use</i>	\$10	\$13
<i>Stability of House Sites and Foundations – Advice to Prospective House and Section Owners</i>	\$1	\$1
Back Issues of NZ Geomechanics News (depending on availability)	50c	50c

Prices do not include GST or postage & handling

Orders to:

Debbie Fellows
Management Secretary
PO Box 60-213, Titirangi, Auckland
Email: dfellows@xtra.co.nz

ADVERTISING

NZ Geomechanics News is published twice a year and distributed to the Society's 500 members throughout New Zealand and overseas.

The magazine is issued to society members who comprise professional geotechnical and civil engineers and engineering geologists from a wide range of consulting, contracting and university organisations, as well as those involved in laboratory and instrumentation services.

Advertisement Location	Single Issue	Advert. Size (mm)
Black & White		
Back Cover	\$300	210 wide x 297 high
Inside Cover (Front or Back)	\$250	210 wide x 297 high
Full Page Internal	\$225	185 wide x 265 high
Half Page Internal	\$175	90 wide x 265 high
Quarter Page Internal	\$150	185 wide x 130 high 90 wide x 130 high
Colour		
Full Page Internal	\$400	210 wide x 297 high
A3 Centrefold	\$750	420 wide x 297 high
Inserts Insert to be posted with magazine – \$200/flyer Maximum size single A4 page Special price given on request for other types and sizes		
Note 1. All rates exclude GST 2. Space is subject to availability 3. 3 mm bleed 4. Advertiser to provide all flyers		

If you are interested in advertising in the next issue of *NZ Geomechanics News* please contact:

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