JUNE 2008 issue 75

NZ GEOMECHANICS NEWS

Newsletter of the New Zealand Geotechnical Society Inc.

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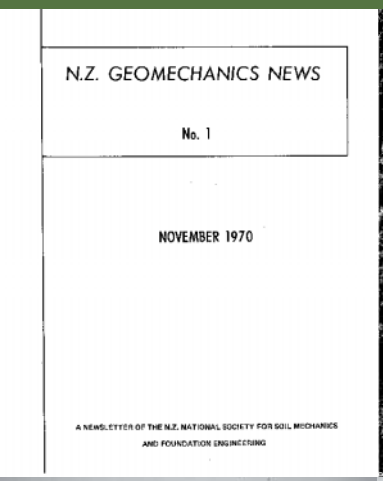
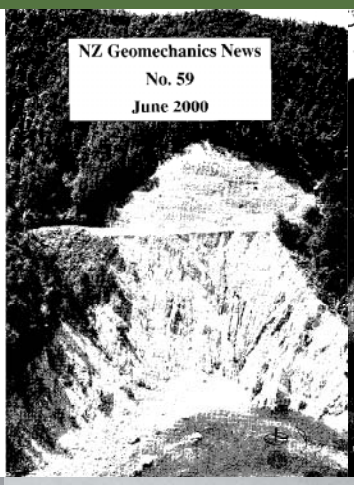
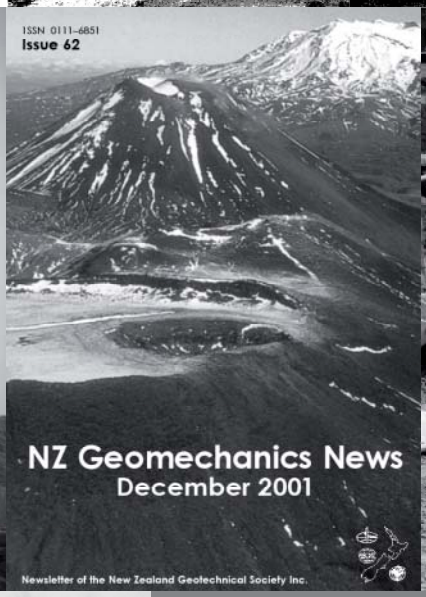
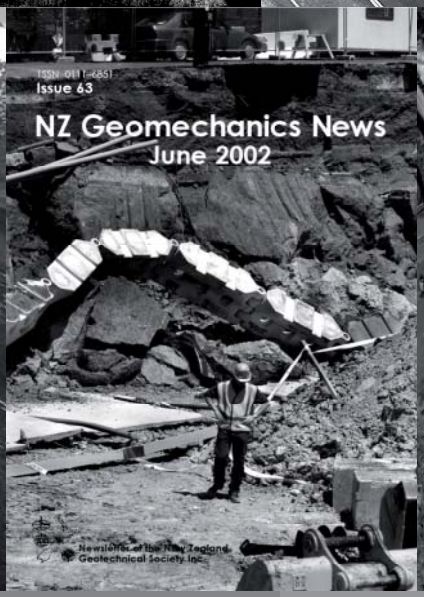
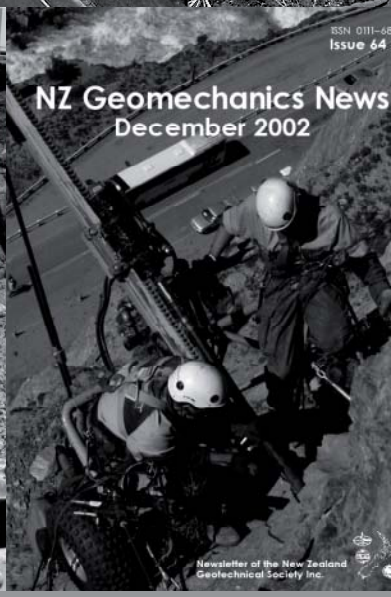
NZGS CELEBRATING 50 YEARS

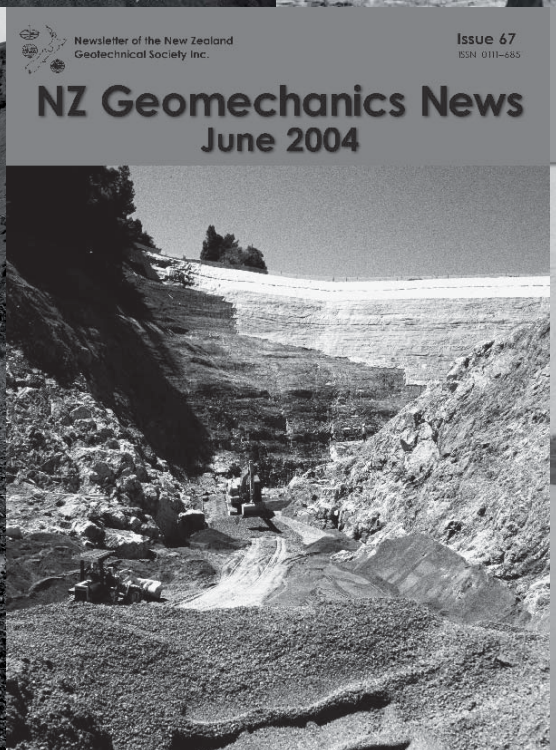












NEW ZEALAND GEOMECHANICS NEWS

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JUNE 2008, ISSUE 75

Cover image: Geomechanics News, through the years
Design: Karryn Muschamp

CHAIRMAN'S CORNER

Welcome to the June issue of the Geomechanics News for 2008

2008 is the 50th anniversary of the New Zealand Geotechnical Society Inc. Fittingly, 2008 has begun with a lot of activity and much more is planned. This issue of Geomechanics News is our 75th issue, and we have chosen to celebrate this by enclosing a commemorative USB and field sheet (extracted from our Field Description of Soil and Rock Guideline) and by reminiscing on these last 50 years.

2008 Committee

Dr CY Chin completed a very full year as Chairman of the Society and I would like to take this opportunity to thank him both on behalf of the society and personally, very very much for his considerable time commitment and his careful, humble and very professional approach to the role. He is continuing to be a strongly supportive immediate past Chair. I would also like to thank Paul Horrey, our treasurer for 2007, who has put us on track to achieving charitable organisation status and Stephen Crawford who continues to provide timely response and active input to the committee. Both Paul and Stephen are resigning from the management committee to meet work objectives. We welcome to the team Richard Young, who has taken on the role of Treasurer.

Kate Williams has accepted reappointment as Editor, continuing her superb work in meeting the challenge of bringing us a magazine that has both a geotechnical community and technical focus. Dr Lis Bowman has agreed to continue in her role as Young Geotechnical Professional's representative; one of her tasks will be to convene the ANZ YGP conference in Wellington later this year. Imrana Azimullah is moving into her 5th year as Management Secretary, undertaking many of the very necessary behind-the-scenes tasks that keep our organisation moving.

At the AGM, changes to the Society's rules were passed to allow an increase in the size of the management committee to 6 elected members, an appointed secretary and up to 3 co-opted members. This will facilitate the sharing of tasks and potentially allow wider regional representation. Nine nominations were received for the four available positions, a welcome indication of a healthy, active Society. On behalf of the Society, I would like to thank all nominees for agreeing to be put forward. The committee that you have chosen to represent you gives the Society wide representation both nationally and technically:

- David Burns (Engineering Geologist, Maunsell, Auckland)
- Professor Michael Davies (Dean of the School of Engineering, University of Auckland)
- Philip Robins (Geotechnical Engineer, Golder Associates, Nelson)
- David Stewart (Engineering Geologist/ Geotechnical Engineer, Opus, Wellington)
- Richard Young (Geotechnical Engineer, Beca, Christchurch)
- Ann Williams (Engineering Geologist, Beca, Auckland).

I am looking forward to our first meeting with the full committee in May.

Ann is Beca's Technical Director in Engineering Geology and Hydrogeology, based in Auckland. In her career she has focussed particularly on investigation and analysis of the interaction of soils, structures and groundwater as part of engineering design and semi-quantitative evaluation of geological hazards and disaster risk management. Ann graduated from the University of Auckland almost 20 years ago, and has worked on projects throughout New Zealand, and in many parts of the Pacific and Southeast Asia. She has written and presented many technical papers. When she is not working, Ann can be found running along Auckland's waterfront, practising yoga or being entertained by her energetic young daughter. She loves to travel to out-of-the-way places and successfully lead the New Zealand Geotechnical Society's bid to bring the 11th IAEG Congress to NZ in 2010.

Regions

Our branch co-ordinators for 2008 are Yan Chan, Rodney Hutchison and Stephen Crawford (Auckland), Sally Hargraves (Waikato – Bay of Plenty), David Stewart (Wellington), and Nick Harwood (Christchurch). We are seeking a new co-ordinator for the Otago region – if you are based in Dunedin, please consider whether you might support the Society and your colleagues in the region, in this way (contact Imrana at nzgs@paradise.net.nz). These are the people that make things happen in your region; please give them and the activities they arrange, your active support.

Events

Following on from presentation of a superb 2007 Rankine Lecture by Dr Antonio Gens in February, we are seeking to co-host with ICE in NZ, the 2008 Rankine Lecture in November.

Last year we saw multiple episodes of flooding in Northland and Coromandel, formation of a seismically induced landslide lake in the Wanaka area, a controlled lahar discharge and an unexpected eruption of Ruapehu, a significant earthquake in Gisborne, and even a noticeable jolt in Auckland – just an ordinary year. Because events like

this are not uncommon in NZ, the committee has invited Dr Sergio Mora-Castro (ex-Inter American Development Bank) to lead a short course in Disaster Risk Management to be held in Auckland and Christchurch in late April/ early May.

Professors Paul Marinos (National Technical University of Athens) and Giovanni Barla (Polito, Italy) are leading short courses in Australia in July and have been invited to give evening presentations in NZ.

The 18th NZ Geotechnical Society Symposium has the theme "Soil Structure Interaction – From Rules of Thumb to Reality" and will be held in Auckland, 4th – 5th September. The committee, convened by Gavin Alexander, are in the midst of editing papers. Professor John Atkinson from the UK has agreed to be a key-note speaker at the Symposium and to return to NZ in November to give presentations to regional branches. The Society will also host the 8th ANZ Young Geotechnical Professionals (YGP) Conference, in Wellington, 5th – 8th November.

Preparations for our hosting of the 11th IAEG Congress in Auckland, September 2010 are beginning in earnest as the organising committee seeks to secure Principal and major sponsors and to agree keynote speakers over the next few months.

It is pleasing that some 9 Abstracts were submitted by our members to be considered for inclusion in the 17th ISSMGE Conference to be held in Alexandria, Egypt in 2009. If all are accepted, we should meet our maximum page allocation.

Vision

The objectives of the Society encompass the promotion of study and research in soil mechanics, rock mechanics, geotechnical engineering and engineering geology; and advancing the practice and application of these fields in NZ. Certainly our initiatives, to host expert-led short courses, a mix of local and international speakers and conferences targeted at the different groups within our membership, meets these.

It is my objective that all existing members of the NZGS will see value in their membership, will regularly visit our webpage (www.nzgeotechsoc.co.nz), will have the opportunity to attend a regularly held meeting in their region and will plan to attend those meetings because of the professional development, networking and social experience that they present. It is my hope that this will result in all geotechnical professionals seeking to become members of the NZGS. It is my view that active interaction with our national and international colleagues will foster innovative thinking and strongly facilitate advances in the practice and application of geotechnical engineering in NZ.

I am keen that the Society considers not only hosting such events, but also actively sponsoring them.

Our young professionals' membership has traditionally been small and support for Society activities by this group, low. As the organising committee of the 2008 YGP conference and the 2010 IAEG Congress demonstrate, there are younger professionals with energy and enthusiasm, keen to be involved and we are working on ways to lead initiatives that result in tangible benefits to the careers and passion for the profession, of our younger colleagues.

I would also like to revisit the issue of development of a suitable registration mechanism for engineering geologists.

Clearly the role of Chair of the Society brings with it the opportunity to progress some of these initiatives with renewed enthusiasm. I look forward to your support to achieve this.

Ann Williams
Chairman, NZGS
Email: Ann.Williams@beca.com

EDITORIAL

Short and Sweet

For those of you that know me… the "short and sweet" will come at no surprise.

Congratulations to the New Zealand Geotechnical Society Inc. and all its members for celebrating 50 years. I hope you all enjoy this 75th Issue of the Geomechanics News and the goodies we have included inside. There are few different features this time with some recollections from some of our older members and some geotechnical history lessons incorporated.

Remember to enter the photo competition and if you have anything to write about for the Geomechanics News we would be grateful to receive it for the next issue.

Thank you to all those that have made the time to assist in reaching the early deadline for material for this June Issue, so that I could take annual leave to cycle parts of Canada while this is being printed.

Enjoy the reading.

Kate Williams
Editor: kwilliams@tonkin.co.nz

THE SECRETARY'S NEWS

This year is not only a very busy year for the Society but also a very special one. This year " The New Zealand Geotechnical Society" is celebrating its 50th anniversary, and for the first time has its first female Chairman. "Congratulations" to Ann Williams. This year will also see the NZGS Geotechnical Symposium taking place in Auckland, September 2008 and the 8th ANZ Young Geotechnical Professionals Geotechnical Conference taking place in Wellington, November 2008.

There are also plans for international speakers giving talks at various branches so please keep a lookout for those Branch Meeting Flyers. This year we will also be calling for nominations for the NZGS Geomechanics Award please keep a lookout for more detailed information on this.

New Members

Membership is flourishing at 658 members and it is a pleasure to welcome the following new members since 1 December 2007 to 31 March 2008.

STUDENTS

A J Greatbatch; M A Hicks; C Hewitt; D C Swinton; B D Drake; S Tjokro; P van der Horst; N M. Sa'don; B A Bradley.

MEMBERS

R A Young; T R Grace; C Price; RFN Polvere; S van Ballegooy; J M Teal; JND Jones; J O Owusu; J K Ward ; S J Williams; P J Hayes ; M T Griffiths; P C Williams; A B Benton ; J P Bennett ; N Kikkawa; S Wallace ; R P Orense ; A K O'Leary ; B Thomas ; J Cahm ; C J Parkes ; P C McClean; B Ni; S Mosconi; K Summerhays; U Pradhan.

Subscriptions

You would have received your subscription invoices for 2008/2009. Please do not file them in the pay sometime later file. **PLEASE PAY YOUR SUBSCRIPTIONS PROMPTLY.** Thank you.

Please do contact me for any assistance you might require or any queries you might have.

Imrana Azimullah
Management Secretary
nzgs@paradise.net.nz

NZ Geotechnical Society
Contact Details
PO Box 12-241, Wellington
Web: www.nzgeotechsoc.org.nz

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. Diagrams and photos should be supplied with the article, but also saved seperately as 300 dpi JPGs. Articles need to be set up so that they can be reproduced in black and white, as colour is limited.

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.

INTERNATIONAL SOCIETY REPORTS

ISSMGE Australasia VP Report: March 2008

Introduction

This report contains a summary of the highlights of ISSMGE-related activities for the latter half of 2007 and early 2008.

- The 8th ANZ Young Geotechnical Professionals (YGP) Conference will be held in Wellington on 5th-8th November 2008 (for ISSMGE, ISRM and IAEG members). The organising committee is led by Dr Elisabeth Bowman, a lecturer in Geotechnical Engineering at Canterbury University.
- The 17th International Conference of ISSMGE will be held in Alexandria, Egypt, from 5-9 October, 2009. The call for Abstracts has now closed and authors of Abstracts accepted for the conference will be notified in the near future. NZ authors have submitted nine abstracts through NZGS.
- The ISSMGE Bulletin has been revamped and is now issued quarterly, so please watch out for it. It can be downloaded from:

http://www.issmge.org/home/page.asp?sid=296&mid=2&CatId=3624

The most recent Council Meeting of ISSMGE was held in Brisbane on 21st October 2007, in conjunction with the 10th ANZ Geomechanics Conference. The full Council Meeting Minutes (and Appendices) have been sent to all Member Societies, but the following is a short summary outlining the main points of discussion and any decisions taken.

- **New Member Societies** representing Cuba, El Salvador, Georgia, Mozambique and Uzbekistan were welcomed to ISSMGE. The total membership was now 18,032 in 81 Member Societies. A CD version of the ISSMGE List of Members had been distributed recently to all Member Societies. A revised CD is planned for the next Council Meeting in Alexandria in 2009; Member Societies should ensure that updated lists of members are submitted to the Secretariat in good time.
- **Geo-Engineering Resources/ Education:** Steps were being taken to make available selected State-of-the-Art reports and keynote lectures presented at previous ICSMGE by the password protected intranet of the ISSMGE website. A new Model Library scheme was being considered. A revision of the Lexicon of Symbols and Definitions was planned. The number of languages would be increased from the present eight and an online database was being investigated.
- **Communications:** The ISSMGE Bulletin has been launched and Member Societies are encouraged to submit articles and other items for publication.
- **ISSMGE International Seminars:** Guidelines for the ISSMGE International Seminars (previously known as Touring Lectures) were proposed and accepted. They will be made available via the ISSMGE website.
- **Guidelines for Young Geotechnical Engineers' conferences:** Guidelines for organizing Young were proposed and accepted. They will be made available via the ISSMGE website.
- **6th International Congress on Environmental Geotechnics:** The 6ICEG will be held in New Delhi, India, in October or November 2011.
- **Young Member Award:** Member Societies were reminded of the Award, which was given to three ISSMGE members and decided on the basis of a paper submitted to the forthcoming ICSMGE or the immediately preceding ISSMGE Regional Conferences.
- **Relationships with Sister Societies ISRM and IAEG:** Council agreed by voting to proceed with the Federation of International Geoengineering Societies as described in the Cooperation Agreement that had been circulated with the Council Meeting papers.
- **Office of the Secretary General:** The President confirmed the reappointment of Professor Neil Taylor as Secretary General to 2011.
- **Budget 2008-2009:** The budget, as circulated with the Council Meeting papers, was approved.
- **Date and Venue of Next Meeting:** The next Council Meeting would be held on Sunday 4th October 2009, at the Bibliotheca Alexandrina, in Alexandria, Egypt.

John Carter
ISSMGE VP Australasia
March 2008

Stephen Crawford
ISSMGE Liaison for
New Zealand

ISRM Australasia VP Report: March 2008

There's been a lot of activity around the ISRM since the previous edition of NZ Geomechanics News. Much of it has been involved with the modernisation programme previously mentioned. Here's a snapshot of some of these activities.

1. NEWS JOURNAL

Over the years, the hard copy ISRM News Journal has been posted to Members once or twice a year. The latest edition is on its way to the printers and it will be posted to you soon (see article 4 below).

Over the years, the News Journal has at times been fairly uninspiring. We aim to change this situation from this edition onwards. Hopefully you'll find it to be chattier and more informative and interesting than before. Each edition will contain a feature on a different Member country and will provide a snapshot of their local Rock Mechanics activities and community. The next edition focuses on mining rock mechanics in Australia. It contains a series of brief articles, provided at extraordinary short notice by some of our colleagues in Oz. Hopefully some of you can be coerced into providing similar articles for future editions; doing so provides you with an excellent opportunity to get your work seen by 5,300 of your fellow Members. It is planned that future editions will contain an even broader perspective of the global Rock Mechanics community and industry.

Drop me an email with any ideas that you have on how the News Journal could be made even more useful for you.

2. DIGITAL NEWSLETTER

One part of the ISRM modernisation programme is focussing on how to communicate better with Members and how to do so in a timelier manner than previously. A result from the discussions has been the production of a regular digital Newsletter. The first Newsletter has been completed and you should have received it from your National Group. This edition was a bit of a trial of the concept and tended to focus on past news. The plan is for future Newsletters to focus more on current issues and upcoming events.

Keep in mind that the Newsletter is there to enable you to communicate with your fellow Members. If you have any appropriate issues or news that you would like to communicate, please email them to me and I'll do my best to get them into the next Newsletter.

3. SURVEY

It is essential that you perceive the ISRM to be of value if you are to remain as a Member. However, unless we know what it is that you want from your Society, we cannot provide it to you. Surprisingly you've never been asked the fairly basic question "What do you want from the ISRM?"; now we are going to do so.

We have prepared a digital survey that you will receive very soon. It contains 22 multiple choice questions. When you receive it, we urge you to take the 10 or so minutes necessary to fill it in. The results are going to be one of the foundations upon which the modernised Society is built. I'll summarise your collated responses in a later edition of NZ Geomechanics News.

4. WHO ARE YOU?

It may seem difficult to believe, but the ISRM doesn't know who you are. It has never been possible for it to get an up-to-date list of the New Zealand and Australian members. This poor state-of-affairs has made it virtually impossible for the ISRM to communicate directly with you.

In Australia; communication required a general email being sent out to all members of the Australian Geomechanics Society, whether ISRM members or not, hoping that the ISRM members will eventually get the message via this circuitous route. I suspect that in New Zealand the situation may be similar; hopefully it's not.
This situation has caused, and unless remedied will continue to cause, all sorts of problems e.g.

- confirming whether or not you're entitled to access the "members only" section of the ISRM website;
- getting potentially useful and interesting "rock" news out to you in a timely manner;
- posting the ISRM hard copy News Journal to you;
- emailing the new digital Newsletter to you; and
- emailing the forthcoming Survey to you.

This situation is not isolated to members of the ISRM; it also applies to those of the IAEG and ISSMGE.

In Australia we're trying to remedy the situation, lets hope we can do so for our New Zealand colleagues.

5. PRIVACY

At the request of several of our members in the region, the ISRM Secretariat has drafted a revised privacy policy statement. The following statement was approved by the Board in January 2008.

To provide services to you, the ISRM may collect certain information such as your address, telephone and fax numbers, electronic mail address, professional affiliation and billing information. The ISRM collects this information only by voluntary disclosure, either directly from you or, in the case of ISRM members, from your National Group. This information is requested in membership forms, purchase forms, or for registration as a member in the

ISRM website. Personal information is collected and used to provide you with:

- membership services, such as the ISRM News Journal, the electronic Newsletter and access to the members' area in the ISRM website;
- materials that you purchase from the ISRM.

The ISRM will only use your personal data for these purposes and they will not be disclosed to any other person or organisation that is not involved in providing you with these services. If you have any questions about the collection, use or disclosure of personal information, please contact the ISRM secretariat at secretariat.isrm@lnec.pt.

6. ISRM SPONSORED EVENTS

- 1 - 2 September 2008, Santa Fé de Bogotá, Colombia – 1st South American Symposium on Rock Excavations: an ISRM Regional Symposium, www.scg.org.co
- 16 - 19 September 2008, Perth, Australia – 1st Southern Hemisphere International Rock Mechanics Symposium (SHIRMS2008): an ISRM Regional Symposium, www.shirms.com
- 21 - 24 September 2008, Dunhuang, China – International Symposium on Conservation of Ancient Sites (ISCAS-2008): an ISRM Regional Symposium, www.dha.ac.cn
- 24 - 26 November 2008, Tehran, Iran – 5th Asian Rock Mechanics Symposium (ARMS 5): the 2008 ISRM International Symposium, www.arms2008.org (See below)
- 19 - 22 May 2009, Hong Kong, China – SINOROCK 2009: the 2009 ISRM International Symposium, www.hku.hk/sinorock/

7. ARMS 5 IN TEHRAN - THE 2008 ISRM INTERNATIONAL SYMPOSIUM

On behalf of the organizing committee and Iranian Society for Rock Mechanics, we have great pleasure to invite you to attend the ISRM International Symposium 2008 (5th Asian Rock Mechanics Symposium, ARMS 5) which will be held in Tehran, 24-26 November 2008.

The objective of this symposium is to provide a forum for the scholars, researchers, professionals, contractors and all those involved and interested to meet to exchange experiences with the latest developments and progress made in Rock Mechanics and in Rock Engineering projects from around the world. The committee assures you that the event will be of the highest standard.

The organizing committee has selected Tehran as the venue due to it being a cultural paradise and a capital city with illustrious historical monuments like Niavaran, the Saadabad Royal Palaces, Azadi and Milad Towers, traditional handicrafts museums and many others. Apart from presentations and discussions, a post conference study tour will be scheduled to visit historical and technical sites at various attractive places around the country.

Accommodations will be arranged in ancient and luxury hotels with Iranian delicacies. It is an honor to serve you in the best possible way to make your stay pleasant and interesting. We will appreciate your positive and favorable response to our invitation.

Dr. Abdolhadi Ghazvinian, Chairman and ISRM Vice President for Asia

Dr. Abbas Majdi, Secretary-General and Symposium Chairman

Tony Meyers
ISRM VP Australasia
March 2008
ISRM@rocktest.com.au

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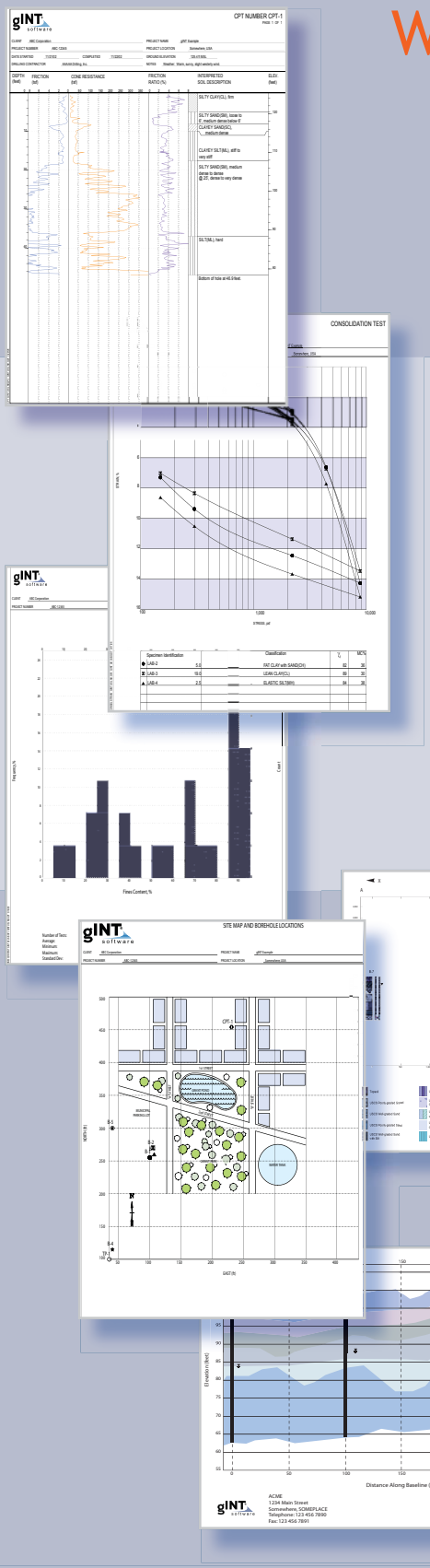

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Detectors

The ability to detect a contaminant is determined by the type of detectors being used. Detectors include:

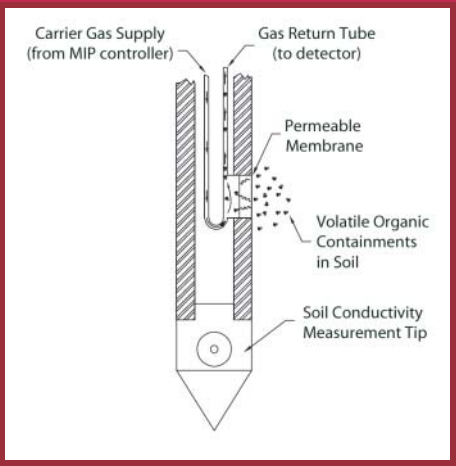
- PID - photo ionization detector used for the detection of aromatic hydrocarbons
- FID – flame ionization detector used for the detection of straight chained hydrocarbons (methane, butane)
- ECD – electron capture detector used for chlorinated (TCE, PCE) contamination detection.

Lithology

Electrical Conductivity is used to define zones of lower conductivity, equivalent to coarser grained, more permeable sediments, which will allow the movement of contaminants in the subsurface. The lithological information gathered with the EC in conjunction with the MIP data can be used to aid the investigator in understanding the movement and location of contamination in the subsurface. This information will also assist in the proper placement of monitor or extraction wells.

Self contained mobile laboratory trailer


HP Gas Chromotograph



Probe diagram and flow path

Features of MIP

- Operates in both saturated or unsaturated materials.
- Detects volatile compounds in gaseous, sorbed, dissolved, or free phase.
- Applicable to both chlorinated and non-chlorinated species.
- Provides simultaneous log of soil electrical conductivity (EC) via the dipole electrode on the probe.

What the MIP can tell you

- Where the contaminant is encountered at depth.
- Where the contaminant is absent at depth (below the detection limit).
- How the concentration of contaminants at this location compares to the concentration at other locations
- Where the contaminant occurs in relation to lithology.

Save Time and Money

- Reducing the number of unnecessary drilled sample holes and monitor wells.
- Reducing the number of samples taken and associated laboratory costs.
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IAEG Australasia VP Report: April 2008

Fred Baynes continues to be very busy in his roles as IAEG President and member of the FIGS executive (Federation of International Geo-engineering Societies). The ISSMGE Council approved the FIGS co-operation agreement at their meeting in Brisbane in October and FIGS has now been officially inaugurated. William van Impe (Past president of ISSMGE) has been elected president. Fred attended the Brisbane meeting as an observer and has spent some time in Paris in January 2008 at FIGS and IAEG meetings. Fred attended the 6th Asian IAEG Regional Conference in Seoul in October and in November he presented papers as President of IAEG (at the request of the Geological Society of London) to conferences in London and Hong Kong.

Recently Fred put some thought into what he wanted to concentrate on while he is IAEG President and he came up with the following:

- Meeting with and getting to know engineering geologists around the world.
- The support and development of teaching and research directed towards engineering geology.
- Improvement in the quality of practice through the initiation of IAEG Commissions in new and interesting aspects of engineering geology, professional training (CPD), encouragement for professional registration, engaging with young professionals, involvement with FIGS.
- Continue to improve the Bulletin and website to support these endeavours.

As always Fred is interested in any suggestions that can help him in his role as President of IAEG (fredb@iinet.net.au).

Ann Williams and I have submitted progress reports to the IAEG working group on young professionals dealing with who they are, what they need and what happens in New Zealand and Australia. The next stage for the working group is to discuss and agree what more IAEG can do and develop a proposal for submission to the IAEG Executive. There has also been discussion about changing the selection process for the Richard Wolters Prize (for members under 40 years old).

Brian Hawkins, editor-in-chief of the IAEG Bulletin, has put out a request for more papers. The publishers have recently agreed to publish diagrams and photographs in colour in the hard copy Bulletin at no extra cost. Short papers or technical notes are also welcome.

IAEG have established several new commissions. Warwick Prebble and Jarg Pettinga (New Zealand) and Phil Flentje (Australia) have offered to contribute to Commission 22 on landscape evolution and engineering geology which is chaired by Jim Griffiths from the UK. Bruce Riddolls is going to chair a new IAEG commission on professional training and development.

Ann Williams has prepared a separate progress report on planning for the 11th IAEG Congress in Auckland in 2010.

An AGS (Australian Geomechanics Society) geology for engineers course was held in Adelaide in April 2008 and an AGS field based course in engineering geology to be based in Wollongong is being planned for next year. The NZGS recently hosted Dr Sergio Mora (an engineering geologist formerly with the Inter-American Development Bank) to lead a course on disaster risk management in Auckland and Christchurch and Dr Kurt Nielsen (of KANmiljo) is planning to lead a course in groundwater in engineering later in the year.

Ann Williams and I plan to attend the next IAEG Executive and Council meetings in Madrid, Spain in September this year. Ann will report on progress on planning for IAEG 2010.

Alan Moon
IAEG VP Australasia
April 2008
email: alan_moon@coffey.com

International Society for Soil Mechanics and Geotechnical Engineering

Société Internationale de Mécanique des Sols et de la Géotechnique

President
Professor Pedro S. Sêco e Pinto
LNEC
Av. do Brasil, 101
1700-066 Lisboa
PORTUGAL
Tel: +351 21 844 3352
Fax: +351 21 844 3021
E-mail: president@issmge.org

9th March 2008

Dear Presidents and Secretaries of Member Societies

Following my policy of keeping you informed about FIGS developments, I should like to bring to your knowledge the following:

For FIGS president election there were 2 candidates Prof. Ricardo Oliveira proposed by IAEG and ISRM and Prof. William Van Impe proposed by ISSMGE. As in January 2008 an e-mail ballot had been held which resulted in a tied vote of 3 votes for each candidate, a second voting took place in February. The six ballot papers for FIGS president election were returned in sealed envelopes. The envelopes were opened on 22 February 2008 and papers counted. The opening and counting was done in a manner agreed by the IAEG, ISRM and ISSMGE and which ensured complete anonymity. The result has been communicated to Dr. Niek Rengers, Acting President of FIGS, and he has asked to circulate the result of the ballot which was as follows:

Ricardo Oliveira - 2 votes
William Van Impe - 3 votes.
There was one ballot paper with no preference expressed (blank paper).

From 26 to 27 February the 3 three Presidents have approved William Van Impe election, following clause 9.2 of FIGS Agreement.

On 28 February Dr. Niek Rengers sent an e.mail to William and all FIGS members with the following statement: "Having been voted as Acting President, it was my main duty to ensure a satisfactory election of the President of FIGS at the earliest opportunity. The postal ballot was conducted to the satisfaction of all and I am pleased that the Presidents of the Sister Societies, in recognising that you secured the majority of votes, have approved your election as the first President of FIGS".

In summary, after all these administrative steps I can inform all ISSMGE Member Societies that the election of William as the first President of FIGS was approved. On this occasion and interpreting the sentiments of all of you I should like to renew again my congratulations to William, to wish him all the success in his role of FIGS President and offer ISSMGE support.

Thank you very much for your kind attention. With best regards

Pedro Sêco e Pinto
ISSMGE President

NZGS BRANCH ACTIVITIES

Auckland Branch Activity Report

Our programme started in full swing in February. Firstly, a site visit was arranged on *19 February* at the Multiplex site, corner of Shortland and Queen St. Secant piles had been installed and excavation underway to expose these piles. Ground conditions were challenging, in very soft marine sediments in high groundwater table. Two site visits were ultimately arranged due to over-subscription. A very special thank you to Nick Wharmby, Brian Perry Civil, subcontractor to Multiplex. The photo below is one of various site photos taken.

On *26 February*, Professor Michael Davies, Dean of Engineering, University of Auckland, gave a talk on the interaction of earthquake induced fault rupture with structures. This was a fascinating talk, supported with thorough field observations, site investigations, and correlation between finite element analyses and laboratory tests (centrifuge tests). The Society's AGM followed after this lecture, very sharply managed by Dr CY Chin.

A lecture was also jointly held with IPENZ. Professor Antonio Gens delivered his Rankine lecture, a brilliant insight to constitutive modelling.

Also, in March, a site visit was carried out at the Northern Gateway site. Our special thanks to Steve Crawford, Tonkin & Taylor for arranging a good presentation and site tour.

The rest of the year is likely to be full and exciting! We will end the year with our usual pre Christmas drinks, presently scheduled in December.

Rodney Hutchison
Auckland Branch Coordinator
KGA Geotechnical Ltd
Work: 09 478 6655
Email: Rodney@kga.co.nz

Rodney Hutchison is Principal with KGA Geotechnical Ltd - a small specialist geotechnical practice on Auckland's North Shore. They provide general geotechnical consulting services to a wide range of clients ranging from Territorial Authorities, other consultants, land developers to individual house builders. He is a geotechnical engineer who studied in London and then worked in Hong Kong and the UK before returning to NZ.

Yan Chan
Auckland Branch Coordinator
Sinclair Knight Merz
Work: 09 985 3673
Email: ychan@skm.co.nz

Yan Chan is Senior Geotechnical Engineer / Team Leader at Sinclair Knight Merz, Auckland. Yan graduated from Auckland University before working in UK and Malaysia, ultimately returning to NZ in 2000. Yan is also a committee member of IPENZ Auckland.

Steve Crawford
Auckland Branch Coordinator
Tonkin & Taylor Ltd
Work: 09 356 7894
Email: scrawford@tonkin.co.nz

Steve is a principal of Tonkin & Taylor Ltd in Auckland and a past chairman of the NZ Geotechnical Society. He has been with T&T for 15 years. His current role is Geotechnical Team Leader on the Northern Gateway Alliance - ALPURT-B2 northern motorway extension project. Steve has been active in Auckland and Tauranga local branch activities and national management for the Society since 1994. He has a Bachelors degree from Auckland University and a Masters degree from Sydney University. Steve has worked as an engineer in NZ, Australia, Cambridge (UK), KL (Malaysia), Hong Kong and Seiyun (South Yemen).

Bay of Plenty/Waikato Branch Activity Report

Tauranga branch have had two meetings so far this year. The first was the 13th Geomechanics Lecture by Dr Do Van Toan which was exceptionally well attended by approx. 30 people, many of whom stayed on for a while after the talk for a catch up and to pick Dr Toan's brain. A highly informative, light hearted and amusing talk with lots of valuable lessons to be learned.

The second meeting was a tour of the Harbour Link project site which also attracted about 30 participants. After initial presentations by both T&T and Brian Perry, we were split into three smaller groups for a tour of the construction progress. A very interesting site at an early stage of construction. I'm sure we'd all like to have another look around once the bridge starts progressing across the water. Thanks for the team at Beca who helped organise the trip.

As always – ideas for meetings, talks or discussion topics always gratefully received.

Sally Hargraves
Bay of Plenty Branch Coordinator
Terrane Consultants Ltd, Tauranga
Work: 07 579 9708
Email: sallyh@terrane.co.nz

Sally is an Engineering Geologist and director of Terrane Consultants Ltd, Tauranga. She studied geology in the UK, and gained her PhD in slope stability modelling before moving to New Zealand. She has spent the last eight years in Tauranga and more recently co-founded Terrane Consultants Ltd, a geotechnical consultancy, which started up in March 2005.

Wellington Branch Activity Report

Talks held:

DATE	PRESENTATION
13 November 2007	NZGS 13th Geomechanics Lecture. Geomechanics view on Heavy Duty Pavements. *Dr Do Van Toan*
27 Feb 2008	Centreport, Wellington, Mitigation of lateral spreading. *Stuart Palmer*
28 March 2008	Risk Management of Rock fall Hazards. *Duncan Wyllie*
16 April 2008	Probabilistic Liquefaction Hazard Mapping based on Surficial Geology. Talk by *Dr Tom Holzer* (Joint meeting with NZSEE)
13 May 2008	Liquefaction Trigger Mechanisms. *Dr Katherine Butterfield.*

Upcoming events planned:

DATE	PRESENTATION
18 June 2008	Monitoring of the Taihape Landslide. *Chris Massey*
Late Oct/ early Nov	Talk by *Prof John Atkinson*, City University, London

David Stewart
Wellington Branch Coordinator
Opus International Consultants Ltd
Work: 04 471 7155
Email: david.stewart@opus.co.nz

David Stewart is a Senior Geotechnical Engineer / Engineering Geologist with Opus International Consultants in Wellington. David initially worked in site investigations in the UK, returning to NZ to work as an engineering geologist in the Otago area – initially with the Cromwell Gorge Landslides project, followed by GNS Dunedin and Macraes Gold Mine. After completing a BE he has spent the last 6 years based in Wellington.

Other events from July onwards will be added – check the Wellington Branch page on the NZ Geotechnical Society website for updates.

Offers or suggestions of other talks or site visits are welcome.

Meetings will normally be held at the Opus offices in the Majestic Centre on the corner of Willis and Boulcott Streets. Refreshments from 5.30pm at the Level 9 boardroom, with talk at 6pm. Contact the branch coordinator for confirmation of details.

DETAILS OF TALKS HELD

The full paper of Dr Toans November lecture was printed in the December issue of the NZ Geomechanics News.

27 February. CentrePort, Wellington, Mitigation of Lateral Spreading. Stuart Palmer, Tonkin and Taylor.

Stuart gave a presentation of the analysis and design process undertaken for development of this Wellington waterfront site, involving old and new reclamation and a new building.

Issues for this project were:

- Hydraulic fill behind an 8 m high mass concrete seawall dating back to the early 1900's.
- Evidence of liquefaction and seawall movement as a consequence of the 1942 'little' shakes.
- The Wellington fault located 800 m away.
- A six storey building proposed located 6 m back from the existing seawall.

Stuart addressed the following:

– Improvement of the seismic stability of the site to protect the proposed building, and
– Methods of analysis employed to assess lateral spreading potential.

The analysis methodology involved: (i) estimating earthquake yield acceleration,
(ii) ground displacement and (iii) considering the impact of this displacement on the new reclamation and new building.

The likely deformation of the wall (and building behind) due to earthquake loadings was analysed using Plaxis and FLAC software as well as empirical methods, with lateral spreading displacement estimated using the Newmark Sliding Block method. In addition to the analysis process, the talk also provided a useful case history of iteratively working through a number of options with the contractor and client to find the best design solution.

28 March. Risk Management of Rockfall Hazards. Duncan Wyllie, - Wyllie and Norrish Rock Engineers, Vancouver, British Columbia, Canada.

We were very fortunate to have Duncan Wyllie present a talk to the Branch while he was briefly in Wellington (as a specialist reviewer on the Transmission Gully project)

The abstract of his talk is given below.

In mountainous terrain, especially in wet, cold climates with seismic activity, many transportation systems and some urban and industrial facilities are subject to rock fall hazards. Limiting damage and injury from rock falls requires a long-term, risk management plan involving the following tasks. First, the sources of rock falls are identified, and an inventory of hazardous sites is prepared.

Second, statistical or subjective methods are used to estimate the frequency of events.

Third, a remedial plan is drawn up for the high risk sites to suit the available budget.

Fourth, decision analysis can be used to determine the appropriate stabilization measure for the site.

Fifth, designs and specifications are prepared for the planned work that are consistent with the required reduction in risk level.

Risk management programs are usually on-going where there are a large number of unstable slopes, and where progressive weathering of the rock results in deteriorating stability with time.

Duncan illustrated his talk with a number of case histories drawing from his wide international experience. He presented a very useful and comprehensive coverage of rock fall risk management, including - rock fall hazard rating systems, rock fall mitigation measures, rock fall probability and risk calculations, and optimising mitigation measures.

Nelson Branch Activity Report

Dr Do Van Toan presented the Geomechanics Lecture on the 13th March at the Nelson Club. The lecture on heavy duty pavement design was well received by a very appreciative audience of eleven. Nothing else scheduled at present but looking forward to accommodating Prof John Atkinson later in the year.

As always – ideas for meetings, talks or discussion topics always gratefully received.

Tim Coote
Nelson Branch Coordinator
Tonkin and Taylor Ltd
Work: 03 5466339
Email: tcoote@tonkin.co.nz

Canterbury Branch Activity Report

Nick Harwood
Canterbury Branch Coordinator
Opus International Consultants Ltd
Work: 03 363 5400
Email: Nick.Harwood@opus.co.nz

Nick is a consulting Geotechnical Engineer who leads the geotechnical group of the Opus Christchurch office, and also oversees the Opus' Christchurch materials testing laboratory. He graduated in 1990 with a BEng (Hons) degree in Engineering Geology & Geotechnics, followed by a MSc in Soil Mechanics & Engineering Seismology from Imperial College in 1994. Nick started out as a graduate working for British Waterways before moving onto Brown & Root (London) and Buro Happold (Bath) before finally escaping to New Zealand in 2002. He has worked for Opus International Consultants for five years with the last two based in Christchurch. He loves living and working in New Zealand, a place that combines sublime scenery and diverse assignments.

2008 is shaping up well with a few events under our belt and several others in the pipeline including site visits. In February we were fortunate to co-host Prof. Gens' Rankine Lecture (Soil-Environment Interactions in Geotechnical Engineering) in partnership with the BGA, ICE and the University of Canterbury. Events of this nature are important not only in terms of knowledge-sharing and networking, but also as a demonstration of the NZGS' goal to welcome and support visiting speakers.

In March another co-hosted event, this time with the ATS and ICE, saw Evan Giles (URS) present a thought-provoking account of the Pike River Coal Access Tunnel; a site located in the depths of the West Coasts' rugged Southern Alps. Several attendees were troubled by the design of the 2.3 km tunnel being based solely on the mapping of three bush-clad mossy stream crossings. "Where are the boreholes!", they cried. The talk was not for the faint-hearted. We have invited Evan back later in the year to discuss the success (or otherwise) of the tunnel meeting the coal seam and the construction of the ventilation shaft.

In April we joined forces with the NZSEE to host Dr. Thomas L. Holzer of the U.S. Geological Survey and his lecture "Probabilistic liquefaction hazard mapping based on surficial geology".

There's so much interesting work going on and a great geotech fraternity in Christchurch/ Canterbury that we're sure of a continued suite of interesting activities. We might have had a site visit to the AMI Stadium ground improvement works by the time this goes to print.

Other events on the cards:

Ageing and pile set up in granular soils.	Dr. Lis Bowman. University of Canterbury.
Mining the Mt Augustus Ridgeline. Solid Energy's Stockton Opencast Mine.	Tim McMorran & Clive Anderson URS.
Christchurch Southern Motorway.	Nick Harwood, Opus.
Lyttleton Oil Berth Upgrade.	Gary Chalmers, Opus & Kevin McManus.
AMI Stadium stone column ground improvement.	Des Andrews, Tonkin & Taylor.

Otago Branch Activity Report

The NZGS is currently seeking a new Otago Branch Coordinator – if you are based in Dunedin and would like to contribute more to your local branch please consider whether you might support the Society and your colleagues in the region in this way. Please contact the Management Secretary if you are interested in making geotechnical activities happen in your region. **Email nzgs@paradise.net.nz**

BOOK REVIEW

Basic Environmental and Engineering Geology – F. G. Bell

It was with some trepidation that I agreed to provide a book review for the present issue of Geomechanics News, particularly once I discovered the author of the book that I would be reviewing. To say that the shadow cast by Fred G Bell over the field of engineering geology is considerable borders on understatement and I felt it looming over me as I approached the task ahead.

The dust jacket informed me that the Author has written 20 books and over 200 papers and a quick check shows that he's been particularly busy over the last few years with no less than 5 titles published in that time.

On picking up the book for the first time it failed to impress. The cover is a washed out pinkish colour that makes the book look dated (despite being brand new), as does the main picture, which is difficult to decipher. The book also suffers from poor copy-editing, the most glaring examples being the descriptive text for the front cover and the misspelling of Geology in the first chapter heading. These are, however deficiencies that could be easily rectified in a second printing, which will surely follow.

Once past the irksome first impression, the book actually holds a wealth of information in each chapter, and the further reading section describes several hundred sources of more in depth information.

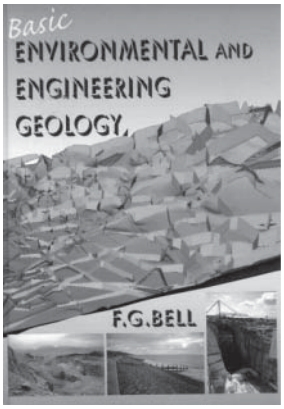
Topics covered include basic geology; geology and planning; natural geohazards; water resources; soil and the environment, mining and the environment; waste, contamination and the environment; land evaluation and site assessment; engineering aspects of soil and rocks; geology and construction materials; and geology and construction.

The geology and planning chapter in particular provides enough information to really illustrate to the student of geology, for example, exactly how some of the information they collect may eventually be used, and for me was probably of most interest in my read through.

While the book is probably pitched about right for the intended target audience, it suffers slightly in places in terms of the order in which information is presented, for example, the concept of dip and strike is not introduced until after a discussion of dipping strata in preceding sections, and geohazards, which are the basis for the geology and planning chapter [chapter 2] are not really described in depth until chapter 3.

Although the book is quite clearly targeted at "advanced undergraduates and post graduates in geology, engineering geology, civil engineering, physical geography and environmental science and planning", enough information is provided to be of use as a starting point for the working professional researching a particular subject area.

Overall the book achieves its intended aims; it provides a robust overview of the basics of two related, but different, fields of geology and geotechnics and while I have some reservations about the way the information is presented in places, it doesn't detract from the overall content of the book, which is first rate.



Author	F.G. Bell
Publisher	Whittles Publishing, Scotland
Year Published	2007
Hardback	342 pp
ISBN	978-1-904445-02-9
Web shopping	www.amazon.com
Price	$130.00 US

Reviewed by: Cameron Lines
Engineering Geologist,
Tonkin and Taylor

STANDARDS, LAW AND INDUSTRY NEWS

Geotechnical Complaints – Learning from our Mistakes

There is a continual need for Members to be reminded of their ethical duties and the sorts of behaviour that attract the disciplinary procedures of IPENZ and the Chartered Professional Engineer's Act. Now that the Board of IPENZ has determined that greater resources should be allocated to matters which deal with Ethics and Discipline these matters will appear as a regular feature in future editions of engineering dimension.

Alongside this, IPENZ has now launched a confidential reporting system. The aim of this is to improve the practice of engineering by publicising lessons that have been learnt, generating feedback and influencing change. Outcomes could range from improving substandard reporting processes and detail in drawings through to improvements in the building of steel and concrete structures, and in civil engineering and geotechnical work.

This confidential reporting facility was developed to provide a totally independent, confidential (not anonymous) reporting system for all individuals employed in or associated with the provision of engineering work. The intention is to highlight any problems or threats to safety that occur in the provision of engineering activities, regardless of engineering discipline.

There are two forms that can to be used to submit a report. Both can be located on and downloaded from the Engineering Practice area of the website http://www.ipenz.org.nz/ipenz/practicesupport/CROMIE/. One is for general engineering issues and the other form for structural safety.

The case below highlights the inherent risks associated with issuing Producer Statements and shows just how careful the engineer needs to be when issuing them. The names and circumstances have been changed to protect the innocent.

Ross Baines was approached by a builder to sign off a timber retaining wall. The wall was already under construction but the builder had not obtained a building consent. Ross was asked to review the design and construction of the wall. Ross asked the builder a number of questions about the design, including the depth of the foundations and the length of the posts being used.

It was easy for Ross to see that the design of the wall was very conservative but Ross was concerned about the stability of the slope it was retaining. In the end he issued a Producer Statement with the qualifying statement "Note slope stability excluded".

Some months later the land above the wall slipped and some material fell over the retaining wall. The wall had not failed, and the Producer Statement which was for the wall was fair, reasonable and not misleading. However, Ross could have been more explicit in the Producer Statement for the qualifications that he placed on such statements.

What lessons are there to learn from this?

It is important to make it very clear when an engineer is not considering aspects of a site that could have a material bearing on the safety of a property, even though it is outside the limits of the brief.

Reported by:
Charles Wilmot
IPENZ DIRECTOR - ENGINEERING

IAEG 2010 Congress Update

The Congress Committee is getting active as they begin preparing for the 2010 Auckland event in earnest. Now that we have established a business plan and budget and booked venues, our key objectives for next few months are to confirm an overarching Principal Sponsor, Day sponsors (there will be four) and key-note speakers. Ann Williams will be attending EuroEngeo in September (Madrid) to present Congress planning progress to the IAEG Executive committee meeting, and to the IAEG Annual Council meeting (a requirement under the society rules). She will also take the opportunity to give short 'advertising' presentations to the Conference delegates.

If your organization is interested in considering the role of Principal or Day sponsor, please contact Tim McMorran (email: tim_mcmorran@urscorp.com; phone: (03) 374-8506) and he will arrange a time to meet with you and discuss this opportunity.

If you will be attending an international conference, please consider whether you might be able to give a short presentation on the upcoming Congress at that event. Contact Debbie Fellows (email: debra_fellows@urscorp.com; phone (09) 355 1310) for a powerpoint presentation and for first notice flyers.

Reported by:
Ann Williams
Co-Convenor IAEG2010
Active Auckland Aotearoa NZ

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Young Geotechnical Professionals Report

The 8th ANZ Young Geotechnical Professionals' Conference (8YGPC) is being held in Wellington at the Copthorne Hotel on 5th-8th November 2008. We have had more than fifty abstract submissions from over twenty companies and universities in Australia and New Zealand. Information packages will soon be sent out to delegates with details of the conference format.

Information on how to submit camera-ready papers for delegates will shortly be available on the website:

http://www.nzgeotechsoc.org.nz/anz-ygp-conference.cfm

Note the strict deadline for papers is: 1st August 2008.

To help defray the costs, a very generous level of financial support has been promised from New Zealand and Australian firms, to the extent that all of the sponsorship packages now have been snapped up. Many thanks to those who contacted us to offer assistance. In addition, the EQC, ISSMGE & NZGS have agreed to provide lead funding for the event.

We welcome the support of the geotechnical community, both financially and for allowing the release of valuable people for a few days professional development and mentoring. Please visit the website regularly as updates and new information are made available.

Organising committee contacts:

Lis Bowman (Chair)
elisabeth.bowman@canterbury.ac.nz

Lucy Coe (Treasurer)
lucy.coe@beca.com

Paul Fletcher (Secretary)
Paul_Fletcher@coffey.com.au

Beverley Curley (Webmistress)
Beverley.Curley@opus.co.nz

Reported by:
Lis Bowman
University of Canterbury

2007 Rankine Lecture – Professor Antonio Gens

Left: (L-R) Tim Warren (NZ ICE Country Representative) Professor Michael Davies (Dean of Engineering, University of Auckland) Professor Antonio Gens (2007 Rankine Lecturer, Technical University of Catalonia, Barcelona) Dr C Y Chin (Immediate Past Chair, NZ Geotechnical Society)

At a joint New Zealand Geotechnical Society/Institution of Civil Engineers presentation, Professor Antonio Gens presented the 2007 Rankine Lecture. This lecture is hosted each year in London by the British Geotechnical Association and is widely viewed as one of the most prestigious invited lectures in geotechnical engineering.

Prof Gens is Professor of Geotechnical Engineering at the Technical University of Catalonia in Barcelona and his research interest lie in the fields of unsaturated soils, numerical analysis of geotechnical and geoenvironmental engineering. He has served in a number of ISSMGE's Technical Committees and he is a core member of TC-5 on Environmental Geotechnics. In 1998 he delivered the BGS Touring Lecture and in 2000 the 8th Prague Geotechnical Lecture. In 2005 he became a member of the Royal Academy of Doctors in Spain. He is the recipient of the Chandra Desai Medal (International Association for Computer Methods and Advances in Geomechanics), the Case History Award (American Rock Mechanics Association) and the Telford Medal (ICE).

ABSTRACT - Geotechnical engineers now face problems increasing in scope and complexity ranging from the collapse of unsaturated soils, foundations on expansive clays, tunnelling in sulphate bearing materials, control of subsidence due to oil or gas extraction, and containment of toxic or hazardous waste. Classical saturated Soil Mechanics is often insufficient to provide the understanding and tools to tackle these issues effectively.

In this lecture, Prof Gens highlighted a number of developments incorporating the effects of new phenomena and new variables on the behaviour of soils. Recent developments in Unsaturated Soil Mechanics were reviewed that clarified the engineering behaviour of unsaturated soils and the effects of suction and moisture changes. Soil behaviour was further explored by considering the effects of high and low temperatures as well as of chemical variables. The resulting generalised view of soil behaviour was then applied in the analysis of field situations. Documented case histories were presented, confirming the relevance of the proposed soil models.

This lecture was presented to both the Auckland and Christchurch local Branch of the Society.

Geotechnical Symposium 2008: Soil-Structure Interaction - From rules of thumb to reality

Planning for this year's Symposium, to be held in Auckland in September, is well advanced. The new Business School, itself the subject of some geotechnical challenges during basement construction, is confirmed as the venue and, after a last minute flurry of submissions, we have a wide selection of papers currently being reviewed. From the Organising Committee's point of view, it is very satisfying to see the Symposium taking shape.

We are very pleased to have Professor John Atkinson from City University, London, confirmed as the Keynote Lecturer, and I'm sure all who heard him when he was last in New Zealand will be looking forward to hearing more from him. He has much to offer us, and his delivery style makes complex issues seem straightforward and understandable, even to practitioners who are a few decades out of university or from a less engineering focussed background. Misko Cubrinovski, from the University of Canterbury, has agreed to be our Invited Speaker on the second day.

Registration is now open on the NZGS website, and we encourage you to get in as soon as you can.

Reported by:
Gavin Alexander,
Convenor
Organising Committee
Yan Chan, CY Chin and Terry McCarthy

New Zealand Geotechnical Society Geotechnical Symposium 2008

3 Sep	Pre-Symposium Workshops – Seismic Design
4-5 Sep	Soil-Structure Interaction – From rules of thumb to reality
6 Sep	Field Trip – Northern Gateway

Endorsed by

IPENZ ENGINEERS NEW ZEALAN

Soil-Structure Interaction – From rules of thumb to reality

This symposium is intended to provide a forum for practitioners to meet and exchange ideas on a wide range of geotechnical engineering and engineering geological issues as they relate to the interaction between geotechnical conditions and structures.

The symposium will extend over two days at the University of Auckland venue with an option for undertaking a field trip on Saturday 6 Sep 2008. Pre-Symposium workshops on seismic design are proposed on Wednesday 3 Sep 2008.

The list of topics includes the following:

- Modelling
- Seismic behaviour
- Deep excavations
- Foundations
- Slopes
- Pavements
- Tunnels
- Case studies.

For information on the symposium, please contact the Convenor, Gavin Alexander (gavin.alexander@beca.com) or visit www.nzgeotechsoc.org.nz/2008-Symposium.cfm.
Online registration is available on this website.

HISTORICAL RECOLLECTIONS

NZ Geomechanics News – How it all began

Background

I was still at secondary school when the fledgling group which eventually became the NZ Geotechnical Society held its first meeting on 24 April 1958, so I can't say that I was there at the beginning.

However I was significantly involved in the subsequent development of the Society over its second decade including my role as founding editor of NZ Geomechanics News.

A brief history of the first twenty years of the Society is given in my paper published in NZ Geomechanics News No. 16, June 1978 partly based on early records of the Society made available to me by Mr N.W. Collins, the second chairman of the Society.

The story begins in 1956 when the Second Australia-NZ Conference on Soil Mechanics and Foundation Engineering was held at Canterbury University College (which organised the event) and it was a very successful conference.

Following on from this, Mr P J (Pip) Alley who was then lecturing at Canterbury University College after formerly being County Engineer for the Waimairi County Council (on the outskirts of Christchurch) and an early pioneer of soil mechanics in NZ, pressed for the formation of a NZ National Committee of the International Society of Soil Mechanics and Foundation Engineering.

Mr Alley, a younger brother of Rewi Alley, was known as Pip to his friends and colleagues and "PJ" to his students and had become an individual member of the International Society and was most concerned that NZ had no voice within that Society and was in effect represented by the Australian National Committee.

At the NZIE (now IPENZ) annual conference in Wellington in February 1958, Mr J W (Jack) Ridley was appointed by the conference to convene a meeting in Wellington with the purpose of forming a NZ National Committee of the International Society.

This meeting was held on 24 April 1958 and a committee was formed which then met on 17 July. Unfortunately only four of the committee could be present, plus the NZIE Secretary, Mr Bedingfield. Mr Ridley was elected chairman and Dr R D (Roy) Northey secretary.

Statutes for the Society were drawn up and the subscription was set at ten shillings per annum, and the International Society and the Australian National Committee were informed that the embryo group was under way.

Mr N W Collins took over as chairman for three years from 1959, when Mr Ridley's duties as Project Engineer at Otematata (the Benmore Power Project) made him unable to continue. The first annual general meeting, held at the NZIE annual conference in Christchurch in February 1959, was well attended and ratified the statutes of the Society.

Mr O T (Trevor) Jones became chairman in early 1962 when the membership stood at 48 and he held the office for five years until the end of 1966. During the ten year period 1962/72 membership grew from 48 to nearly 200.

The first three chairmen had all been senior engineers within the Ministry of Works, a very large central government engineering organisation which clearly seems to have had a mission to oversee the successful establishment of the Society.

My Own Involvement

My own interest began in 1963/64 when I was a postgraduate student at the University of Canterbury, which had become a University in its own right about 1960, having earlier been a College of the University of New Zealand.

I undertook a ME degree by thesis under the supervision of Mr Alley who was by then about 60 years of age and approaching retirement. Despite our age difference we got along well. We not only discussed geotechnical engineering topics very earnestly but many other things as well.

I cannot remember Mr Alley ever talking to me about this recently formed Society which he had pressed hard to establish about five years earlier.

I spent a year of further postgraduate study in the USA on a Fulbright Travel Grant including courses at the University of Illinois taken by Professor Ralph B Peck (of Terzaghi and Peck fame) before returning to NZ in mid-1965. I then worked for three years as a graduate engineer for the Ministry of Works on geological and engineering investigations and initial construction work for the tunnel and approach routes at both ends of the Kaimai Railway Deviation Project.

Soon after returning to NZ I joined the Society as a member and received somewhat irregular communications from it, but it then had no publication or organised meetings to attend (although it was very active in organising the Fifth Australia-NZ Conference on Soil Mechanics and Foundation Engineering held in Auckland in February 1967 which I attended).

Establishment of NZ Geomechanics News

I was appointed as a Lecturer in Civil Engineering at

the University of Canterbury at the beginning of 1969 and about a month later, was sitting in my office at the University when I received a telephone call from the late Ralph Tonkin who was the fourth chairman of the Society (and the first non-Ministry of Works chairman). He asked me if I would like to join the committee of the Society as an NZIE Representative. I was honoured to be asked and accepted with some alacrity.

The committee met in Wellington three times a year and I spent the first year getting to understand its role and trying to figure out how best I could contribute. The committee was now being chaired by Mr J H H (John) Galloway, another senior Ministry of Works engineer, who had taken over from Ralph Tonkin early in 1969.

The area in which I felt I could most contribute was communication between the committee of the Society and its members. Such communications were in my view rather irregular and I conceived the idea of a twice-yearly publication, which would be a combination of news items, including news of Society activities; and technical articles and papers. I proposed the name "New Zealand Geomechanics News", foreshadowing the change of name of the Society itself to the NZ Geomechanics Society, which subsequently occurred in 1972.

During 1970, my second year on the committee, I actively promoted the idea of this "newsletter" and received strong support for it from the committee and was duly appointed editor and produced the first issue in November 1970 and it gives me great personal satisfaction to know that it has been produced every six months, without fail, ever since.

Although it was initially called a newsletter, it was indeed much more than that and it has become increasingly professional in its production, and in its size over the years.

At the beginning of 1971, I moved to Auckland to take up a position with Beca, Carter, Hollings and Ferner Ltd, consulting engineers, for the next decade. In my new location I continued on the committee and in my role as editor.

Handing Over the Editorship

In early 1974, Mr D K (Don) Taylor, took over from John Galloway after his five years as chairman. Up until this time, the Society had not seen its role as being to organise local meetings of interested people, as this was then seen to be more of a responsibility of the local branches of NZIE rather than a Technical Group (but of course around half of the Society's members were not members of NZIE), and it was decided that this policy needed to change. I was appointed to be the first convenor of the Auckland Group of the Society and to organise some local activities. Accordingly I relinquished the role of Editor of NZ Geomechanics News to Dr I M (Ian) Parton after producing the first eight issues.

In 1977, I became the chairman of the Society, taking over from Don Taylor, for three years until 1980. During that time, one of our main activities was organising the Third Australia-New Zealand Geomechanics Conference, which was successfully held in Wellington in May 1980. Ian Parton succeeded me as chairman of the Society earlier in that year.

Moving On

I decided to change the future direction of my career away from geomechanics in early 1981 and left the committee and moved on to other things. However I am still very pleased to see NZ Geomechanics News coming out every six months and I was honoured to be made a Life Member of the Society in 2003.

In my semi-retirement, for the last three years I have edited a quarterly journal called "EnergyWatch" and I have found the same sense of pleasure and satisfaction in editing this publication as I did all those years ago in editing "NZ Geomechanics News".

John Blakeley
Editor, NZ Geomechanics News 1970 - 1974
Chairman, NZ Geomechanics Society 1977 - 1980
Executive Director, NZ Centre for Advanced Engineering 1988 - 2000
President of IPENZ 1997 - 1998

Footnote on Mr P.J. Alley

The name of Mr P J (Pip) Alley was mentioned during the official opening ceremony for the new Civil/Mechanical Engineering Building at the University of Canterbury in the late 1990's.

Mr Alley had lived for many years in Clyde Road directly opposite the farmlands that subsequently became the Ilam Campus of the University of Canterbury.

Apparently it was Mr Alley who in the early 1950's helped to persuade the University's administration that this was a suitable site for a new campus which was becoming necessary because of the constricted space on the town site (now the Christchurch Arts Centre). Accordingly three farms were purchased by the University to provide the site of this new campus, which was first established in 1960 with the relocation there of the School of Engineering along with the School of Fine Arts.

As a BE first professional student in 1960, my class was amongst the first to move on to the new site for our lecturing and drawing classes in late May 1960, although the laboratories remained on the town site until the end of that year.

Early Days as a Geotechnical Engineer Laurie Wesley

When Kate asked me if I would contribute something for this edition, I was reluctant to do so, because I felt I didn't really have much to say. However, after some reflection, I decided that maybe I do have some memories that might be of interest to members, especially those who have worked in Indonesia, and younger members. I am sufficiently grey haired (which is why Kate approached me) that my memories of geotechnical engineering extend back to about 30 years before some of our youngest members were born. So if you like ancient history, and don't mind nostalgia, plus a little name dropping, read on.

After graduation in 1958, and a year in a bridge design office in Sydney, I went to Indonesia in February, 1960, to work for the Public Works Department, under a scheme known as the Volunteer Graduate Scheme (VGS). This was organised by the N.Z University Students Association, and copied the Australian version, which had been operating since 1953, just three years after Indonesia became independent. Indonesia was formerly the Dutch East Indies. The aim of the VGS was to provide much needed graduates for Indonesian government departments. The deal was that our fares to Indonesia were paid by the NZ government, but once in Indonesia we became normal employees of the Indonesian government, on local rates of pay. I worked in the government's "Institute for Soil and Highway Investigations", in Bandung, West Java, which at that time undertook all major site investigations in Indonesia, and provided geotechnical advice.

Indonesia was a very different place in those days to what it is now. It was an exciting and stimulating time to be there, both technically and politically, as some of the following anecdotes will show. The Institute where I worked had been set up by the Dutch during colonial times as part of the adjacent technical university (now ITB – Bandung Institute of Technology). It was still fairly well equipped when I arrived, and had a good team of technicians, but was very short of engineers. It had been staffed by the Dutch engineers, some of whom stayed on in Indonesia for a time after independence, but the last of them left in 1957. As a result, not too long after my arrival, I found myself in charge of the soils section, with engineering staff made up of final year students working part time at the Institute. My boss, fortunately, had a basic knowledge of soil mechanics, especially as it was practiced by the Dutch. He could also speak English, which was a little unusual as most educated Indonesians could speak Dutch, but not English.

Above: Some of my earliest office colleagues, 1960. Gondo, closest to the camera, was later taken away by the army as a communist sympathiser. I never knew what eventually happened to him. Hoedijono, at the right, was my principle language "teacher", and remains a good friend to this day.

My immediate challenges on arrival were to come to grips with the technical situation at the Institute, and to learn Indonesian, since hardly anyone spoke English except my boss. On the technical side, two major items of equipment in use at the Institute were completely foreign to me, as neither existed in New Zealand. One was the Dutch static penetrometer, (today's CPT), and the other was a laboratory device known as a "cell" apparatus - a type of triaxial cell invented by the Dutch. The penetrometer didn't take long to fathom out and I quickly become a fan of the device, especially as it was admirably suited to Indonesia. The Institute had a fleet of 13 of these penetrometers (ten 2 tonne and three 10 tonne machines), on which it relied heavily for site investigations. It also had a rather ancient rotary drilling rig, and plenty of manual drilling gear. Although I wasn't aware of it, the Dutch penetrometer was rapidly establishing itself as a major site investigations tool on the world scene at that time, especially in Europe. Coming to grips with the "cell" apparatus was a bit more difficult, as I will explain shortly.

I need to digress to explain that when I did my degree at Auckland University, the application of the principle of effective stress to the shear strength of clays was still being sorted out, and in our soil mechanics course we learnt about a variety of c and ϕ values, including the Hvorslev parameters (well known at that time), but we did not leave university with a clear understanding of c' and ϕ' as we understand them today. The relationship between effective stress and shear strength was really only established on the world scene in 1960 when Bishop and Bjerrum published their landmark paper in the ASCE conference on the Shear Strength of Cohesive Soils. That paper is one of the most

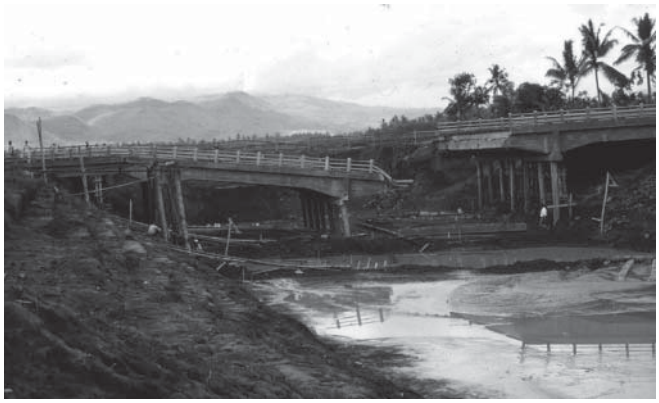
important papers published in the history of soil mechanics, and still well worth reading today.

To continue, partly because of my limited understanding of soil shear strength, and partly because of a design defect in it, I never really understood the cell apparatus until many years later. It was like a primitive K_o cell, but lacked the rigidity to correctly measure K_o, and ended up measuring a stress ratio somewhere between the K_o and the failure state. I learnt some years later that Bishop severely criticised the cell apparatus at an international conference at about that time, and the Dutch in Holland abandoned it a short time later. Because I couldn't understand it, I was reluctant to make use of it. "Fortunately" the rubber membranes that were an essential part of it, had almost all worn out, and new ones were not available in Indonesia, so its use at the Institute faded away.

Above: CPT testing for bridge foundations in South Sumatra, 1961

I will engage in another diversion here and explain a little about the history of the CPT, since the two leading figures in its development had connections with Bandung. It was developed in Holland in the 1930s, primarily for use as a "model" pile. In many parts of Holland, soft clays overlie sand layers, and piles were founded in this sand layer. They derived most of their bearing capacity from end resistance, so the penetrometer was used, very effectively, to give a direct measure of this. At the centre of its original development was an engineer by the name of Buisman. In Craig's *Soil Mechanics*, you will find, on page 327, a settlement prediction method called the Buisman-DeBeer method. That is the same Buisman.

Well, Buisman went to Bandung as a visiting lecturer/ expert in 1939. After the war in Europe broke out, he decided to stay on in the Indies until the war was over. Unfortunately, the war in the Pacific also broke out, and the Indies were over-run by the Japanese. All Dutch nationals, including Buisman, were rounded up and put in internment camps. These camps were harsh, and became harsher as the war progressed, because food and medical supplies ran out. Many people died in the camps, including Buisman. His grave is somewhere in Bandung.



Above: A sad bridge site (or sight?) in East Java, 1961. This was one of my early jobs, but fortunately not as designer. I was only involved to investigate and report on why it collapsed. The investigation was done entirely with the CPT.

The penetrometer was put to use in the Dutch East Indies (as Indonesia then was), at much the same time as in Holland. However, the situation in Indonesia was very different, as the soils were predominantly clays. Skin friction therefore became an important component of their bearing capacity. After the war, in the early 1950s, Begemann, a prominent Dutch engineer, worked at the Institute where I was, and taught at the adjacent university. Begemann set about finding out how to use the penetrometer to determine skin friction values for pile design. He found from experiments that simply measuring the total resistance over the full length of the rods did not give reliable results. The continual movement of the rods during tests had a "smearing" or remoulding effect that resulted in friction values that were too low. So he looked for a way of measuring the local friction and developed the mechanical friction sleeve (or "adhesion jacket") that became a standard feature of the instrument. The development of the friction cone was thus done almost entirely in Bandung. For his work in doing this, Begemann was awarded a doctorate by ITB in Bandung. A copy of Begemann's thesis was still in the library of the Institute during my time there.

Now back to some more nostalgia. One of my early major jobs in Indonesia that I remember well was working with a contingent of Russian engineers who were helping Indonesia build a major sports complex in Jakarta (today's

Senayan complex). This was a Soekarno "show-piece" project to enable Indonesia to host the Asian Games in 1963. The Institute was doing the site investigation work for the Russian team. I travelled to Jakarta fortnightly to help supervise my technicians, and make sure they understood what the Russians wanted, as their site investigation practices were different to what my technicians were used to. Working with the Russians was quite an education - they were all captives of the Communist system, and their every move was controlled by their government. An Indonesian friend of mine, Soemedi, who worked with me on this job, invited one of their interpreters, a young woman who was quite pretty, to go to the local cinema with him. She said she would like to accept the invitation, but explained that unfortunately they were not allowed outside the "enclosure" where they lived except in groups of at least five!!! This was to make sure no one defected.

I was actually very popular with the Russians, who greeted me with open arms whenever I arrived at their office. This was not because of any particular affection for me (although we got on very well together), but because the only time they could communicate with my technicians was when I was there. Their engineers knew no English, and no one at all in their team knew any Indonesian. So we used to go out on site where my technicians were working, and their interpreter (Soemedi's would-be friend) interpreted from Russian to English for me, and then I interpreted from English to Indonesia for my technicians. It was quite a time-consuming process, not helped by the fact that my Indonesian was rather primitive at the time.

An unwritten "code" of the Volunteer Graduate Scheme was that we were to identify with local culture and customs as closely as practical, and this included learning the language. So on arrival I set out with great determination to learn Indonesian, mainly with the help of my colleagues in the office. Indonesian is not a difficult language and after about 6 months I was starting to get a reasonable grasp of it. But I can still recall how, in my early days of picking up the language, I would almost break into a cold sweat whenever I was called to answer a phone call from Jakarta. The phone line was not very good, and with my poor Indonesian, I had great difficulty understanding what was being said at the other end. (I am still very good at saying "Sorry, could you repeat that please" in Indonesian!). Fortunately, the telephone was out of action from time to time – thieves used to pilfer the connecting line to sell the copper. (The locals had various imaginative ways of making a living!!!). This gave me a break from the dreaded phone for a few days, or possibly longer. Repair crews were not renowned for their prompt service.

I will mention in passing, to give readers an idea of what Indonesia was like in the early 60s, that I normally stayed overnight in Jakarta, partly because I liked Jakarta, but primarily because drivers would not leave Jakarta for Bandung, (a 4 hour trip), later than 3pm, which did not give me enough time at the site. There were still remnants of militant Islamic guerrilla groups operating in bush-clad hills near the approaches to Bandung, and drivers were scared to travel through there after dark. The leader of the group, Kartosuwirjo, was caught while we were there, and held prisoner at the corner of the street where we lived, until his trial. He was later executed, one of very few people executed during Soekarno's time as president, and the rebellion he led faded away.

Going to Indonesia without having any previous work experience in the geotechnical field was probably not a particularly sensible thing to do, as there was no one around to consult and seek guidance from, apart from my boss, whose soil mechanics expertise was about as limited as mine. On the other hand, maybe, it was an advantage, as it made me think through technical issues very thoroughly and then make my own decisions, rather than rely on existing, or "standard" practice. Be that as it may, I survived my first period in Bandung pretty well, in the middle of which I came home on leave and married my wife, Barbara, and took her back to Bandung with me. She was very brave – she was only twenty, and as I said, Indonesia was a very foreign country then, not at all like it is today. Being a former Dutch colony, New Zealanders knew almost nothing about the place. We travelled up on an Italian ship and landed at Jakarta's scruffy port of Tanjung Priok. Customs and immigration formalities were handled at a couple of desks set up temporarily when a boat arrived, in a large untidy gudang (warehouse) on the wharf. It was hot, dirty, and a little smelly, and crowds of locals gathered around to watch the customs people fossicking through our luggage, carefully examining my wife's toiletries, underwear etc. We laugh about it now, but it was rather an ordeal at the time. Barbara took on a job in Bandung teaching English to a very large class of Public Works technicians. We returned to New Zealand in late 1963.

We had happy memories of our first stay in Indonesia, and we went back again from 1968 till 1972. I worked at the same Institute, but no longer under the volunteer scheme. I was seconded from the New Zealand government and remained on its payroll. Politically, it was a very different Indonesia. The charismatic and flamboyant Soekarno had been deposed as president, and replaced by a new military strongman, Soeharto. His government emerged from a blood-bath promoted by the army, in which some 500,000 alleged Communists and sympathisers were killed. When I returned to the Institute, colleagues explained, when no one else was around, that two of my former friends were no longer there. They had been taken away by the army as alleged Communists, or left wing activists. Their fate was unknown. One was Gondo, seen in the first photo.

The Soeharto government ushered in a period of rapid progress and economic development, and led to the involvement of many NZ engineers in engineering projects in Indonesia. However, his regime became steadily more oppressive and corrupt as the years passed. By the 1990s, Indonesians were calling it the 3K & N regime – Korupsi Kolusi, Kroniisme and Nepotisme. Readers will know enough Indonesian to translate these!!!. I was back in Bandung giving some lectures at ITB in 1998, and the campus was a sea of garish placards and posters ridiculing the government and calling for its overthrow. In earlier "normal" times, the army would have moved in and destroyed the placards, and arrested the activists responsible, but in 1998 they were afraid such a move would provoke uncontrollable riots. Soeharto was forced to resign a few months later, following a student demonstration/riot in Jakarta during which several students were shot dead by army units.

Above: With Ir Soelastri, an engineer in charge of the soils laboratory, and Hardani, a technician, who became our most competent triaxial operator, 1969.

During my second stay, I spent much less time on routine work, as the staffing position had improved considerably during my 5 years away. My role was one of mentoring, by checking reports and acting as an in-house consultant. I also ran formal training courses for both engineers and technicians, both in Bandung and other parts of Indonesia. I also set up some new laboratory equipment supplied by the New Zealand government, such as the triaxial apparatus as seen in the photo above.

I can't resist telling you one minor story that occurred during my second stay that rather amused me at the time, and still does. In the office one morning, a woman engineer named Indraswari, who I worked with, (Indonesia had woman engineers long before New Zealand) brought one of our site investigation reports to me because a contractor was questioning its recommendations. It stated that piles 16m long would be needed on one of his bridge projects, and he was unable to drive any of them beyond about 11m. I examined the report, and the penetrometer tests clearly showed soft clay down to about 15m. I was completely mystified, and after thinking for a while, I asked Indraswari if she had any possible explanations. Without much hesitation she said she thought we (meaning our technicians) had examined the wrong site!!! Now, as we know, geotechnical engineers have plenty of explanations for inconsistencies in field and laboratory data, but this one was quite novel to me. However, after some reflection, I realised how easily this could happen, though I would never have thought of it had Indraswari not done so. The coastal roads of Java and Sumatra cross over an endless succession of relatively small rivers or creeks, and the villages along the way sometimes know the streams by different names, so our technician asking for directions could easily be led to the wrong site. Fortunately, in this case, the piles were too long, and the contractor wasn't concerned about that, as it didn't affect his costs or contract price. He only wanted assurance that their load carrying capacity would be OK.

One small engineering matter of historical interest that has had a big impact on local consultants that I claim a little credit for is their involvement in geothermal work in Indonesia. Shortly after I went back to Indonesia in 1968, the Aid Division of NZ Foreign Affairs sent a small delegation to Indonesia to evaluate opportunities for NZ assistance. They visited me in Bandung to hear what I had to say. I knew at that time that an American group was looking at a possible geothermal field in Central Java (on the Dieng Plateau), so I suggested that surely this was an area New Zealand should get involved in, because of its expertise in this field. The NZ government, with the help of the private sector here, took up the suggestion, and shortly before I left Indonesia the second time in 1972, two New Zealanders, Jim Healy, a volcanologist, and Ken Seal, a scientist arrived to conduct a survey throughout Indonesia of possible geothermal sites for development. I visited Kamojang, one of the sites near Bandung, with them, and in due course they opted for Kamojang as the preferred site for development. It turned out to be a very good choice and in 1982 the first geothermal power station in Indonesia was commissioned, designed and built with New Zealand expertise.

So much for Indonesian nostalgia, I must move on and talk about other things. The above memories indicate a little of the state of the geotechnical world at the time the NZ Geotechnical Society was born in 1958. The Dutch penetrometer had not reached New Zealand at that time, but I think the first devices arrived shortly after, in the early sixties. Dr Begemann was invited to New Zealand to give a talk on the Dutch penetrometer in 1963. If you look in the February, 1963, issue of N.Z Engineering you will find his paper titled *The Use of the Static Soil Penetrometer in Holland*. I was in Indonesia at the time and don't know the background to his coming, but I believe he was invited

Left: Excavations for the raft foundation of the Kamojang Geothermal Power Station, West Java. I was involved with the site investigation and foundation design while working for Tonkin & Taylor, 1984 (approx).

Right: Professor Bishop (my PhD supervisor) and his wife Myrtle. The photo was taken when I visited them in 1986, some 11 years after completing my PhD.

by the N.Z. Institution of Engineers here, possibly at the instigation of the new Geomechanics Society.

I cannot say much about the early days of the Society, as I was still a student when it was formed, and was then overseas. I am slightly surprised that it was only formed in 1958, as the first Australia-New Zealand Soil Mechanics Conference to be held in New Zealand was in 1956 in Christchurch. Well known names at that time, and in the early days of the Society appear as contributors to that conference – Birrel, Northey, Galloway, Alley, Newland and Allely, and Jones. Of these, I believe only Roy Northey and Trevor Jones are still with us, and in good health. I was delighted to meet Trevor Jones at a meeting in Tauranga a few years ago.

Although I have not had a lot of involvement with the Geotechnical Society, I have done miscellaneous tasks for it from time to time. One of my early "tasks" was a very enjoyable assignment, and telling you about it is where name dropping comes in. The Ministry of Works, who I worked for between my times in Bandung, sent me to do a one year Master's course in Soil Mechanics at Imperial College in 1964-65, and on my way home in August 1965, I attended the Sixth International Conference of the ISSMFE in Montreal. The conference was the first International Conference to be held without Terzaghi present, as he had died a few years previously. The conference opened with a major session devoted to his memory. Many tributes were paid to him, and a presentation was made to his widow, Ruth Terzaghi, who was at the conference.

Because I was the only New Zealander attending this conference, the N.Z. Geomechanics Society asked me to represent NZ at the Council meeting of the ISSMFE, being held in conjunction with the conference. The Council meeting seemed to be made up of nearly all the current big names in the geotechnical world. Casagrande chaired the meeting as the outgoing president, Skempton attended as the immediate past president, and Bjerrum was there as the incoming president. Bishop was the United Kingdom representative. Others I remember were Dr G.D. Aitcheson, representing Australia, and Professor Raul J. Marsal. representing Mexico.

Having done the name dropping, I won't bore you with details of the meeting (I can't remember them anyway), except to mention one minor piece of "skulduggery" that went on before, and during the meeting. Australia had put in a bid to stage the next international conference (in 1969), and before the Montreal conference Australia was the clear front runner. Australia's bid was well prepared and met all constitutional requirements, especially regarding the cut-off date for bids. However, at the last moment, not long before the conference, long after the dead-line had passed, Mexico put in a bid. My understanding, from "gossip" at the conference, was that Casagrande didn't want to travel all the way to Australia, and had good connections with the geotechnical fraternity in Mexico, so was very keen to see the Mexico bid succeed. If I remember correctly, Aitcheson spoke for Australia, and Marsal for Mexico.

Casagrande then wielded his heavy influence and got the meeting to agree to waive the rules about the dead-line, and allow Mexico's bid to go forward. When the vote was taken Mexico won and Australia lost. I naturally voted for Australia, and had indeed been instructed to do so before leaving New Zealand. Another item on the agenda was a proposal by Bishop that the name of the ISSMFE be changed to the International Geotechnical Society, which would have been very sensible. However, Casagrande was opposed to it, saying that American libraries would have difficulty coping with such a name change!!! Casagrande got his way and the name remained the same.

Before closing, I would like to mention that the Volunteer Graduate Scheme was absorbed into Volunteer Service Abroad (VSA) when the latter was created in 1962. Dick Beetham, of IGNS, whom many readers will know, worked in Indonesia a short time after I did, under VSA. He had an interesting job with the government unit responsible for controlling lahar flows, especially those coming from Mt Merapi, Java's most active volcano.

I want to close by paying a tribute to all who have been involved with the NZ Geotechnical Society, especially the Chairpersons, members of the committee, editors of NZ Geomechanics News and organisers of symposiums and conferences. These roles involve a lot of hard work, for which all of us in the geotechnical fraternity owe a large debt of gratitude. The Society can look back on its fifty years of existence with a great deal of pride.

AWARDS

Life Member – Warwick Prebble

Dr Warwick Prebble has been a prominent figure in the New Zealand engineering geological landscape since he cut his professional teeth on the Tongariro Power Scheme in the 1960s. His long-standing contribution to New Zealand geotechnical engineering has been one of excellence, education and indefatigable enthusiasm. His passion for the highly variable landscape and the reasons for its existence have been passed on to countless students and geo-professionals.

Warwick has had significant input in to the shape and location of parts of the Tongariro Power Scheme, identifying the risk and ground conditions from engineering geological mapping and the geologic and geomorphic setting of the central North Island volcanoes. His understanding of the Taupo Volcanic Zone engineering geology had great influence on many other aspects of the project.

Warwick worked for Beca Carter Hollings & Ferner in the 1970's and subsequently had a continuous and illustrious career at Auckland University since the late 1970's. He has tried to retire on several occasions recently but has yet to be replaced. He has made regular contributions to the New Zealand Geotechnical Society since 1992 and was Vice-President of the International Association for Engineering Geology from 1994-1998. Warwick is a past recipient of the New Zealand Geomechanics Award (2002) and presented the 11th New Zealand Geomechanics Lecture in 2001 ("Hazardous Terrain – An Engineering Geological Perspective"). In 2003 he gave the Poulos Lecture of the Australian Geomechanics Society at several centres around Australia.

Left: Warwick at the Business School, Auckland University.

Response from Warwick Prebble

I am very grateful to the New Zealand Geotechnical Society for the considerable recognition it has accorded to my work by giving me the Geomechanics Lecture, Geomechanics Award and now Life Membership. I am very honoured to have received such acclaim. I shall always value these awards and they provide great satisfaction. The support which I have received from individual members and from the Society over many years has been outstanding and of tremendous assistance. It has provided the essential assurance and constructive discussion from which I could continue to develop my research and informed teaching at the University. The links, which the Society provides with industry and the workplace, are invaluable. My work could not have thrived without them.

The expansion and growth of engineering geology at the University has run in parallel with the growth and development of the Society into the large, diverse and active professional body we see today. The excellent conferences, field visits, workshops, working groups, courses and meetings, which the Society runs are stimulating, informative and enjoyable. They have provided very useful proceedings, essential professional guidelines for practitioners and students and continue to be an indispensible source of interaction and professional development. Not only that but the Society also provides the channel for international affiliation and gives us a place in the world forum on geotechnical matters.

May I congratulate the Society for all the hard work and achievements over the last 50 years. It is a real pleasure to see so many former students in key positions throughout the profession and within the Society. To have assisted students to graduation and into the work place is one of the intangible rewards of a University career. It is especially satisfying to see the gender imbalance moving with women graduates taking leading roles in the profession and our Society. The steady growth in the number of geotechnical professionals in employment reinforces the importance of the society to the profession. We are fortunate to have a legacy in New Zealand and Australia where there is a seamless grouping of engineers and geologists in our societies. We have to thank the energy and commitment of successive Chairmen and committees over many years for nurturing this policy of professional collaboration and teamwork.

It has been a great pleasure and a personal privilege to have played a part.

For more about Warwick refer to our December 2007 Issue 74 of Geomechanics News Member Profile page.

Life Member – Laurie Wesley

Dr Laurie Wesley is highly regarded in New Zealand, Southeast Asia and beyond for his insightful and continuous contributions to Soil Mechanics and Geotechnical Engineering. Well known for his early work with Bishop on the development of the triaxial cell testing, Laurie has continued to advance the state of the art in many areas including residual soils, volcanic soils, dam engineering and soils testing. He has made significant contributions to Tonkin & Taylor Consulting Engineers including Geotechnical Practice Manager over the 1970s and 1980s. Following that, Laurie lectured at Auckland University from 1986 to 2006 and has made a significant difference in raising the standard of geotechnical engineering practice in New Zealand.

Over the years Laurie has been involved in many NZGS activities including development and upgrading the NZGS Guidelines on Soil and Rock Description, regular presentations at NZGS and ANZ conferences and symposia. He has also maintained a healthy interest in geotechnical practice including peer review on major roading projects and dam developments. His geotechnical textbook, written in Bahasa Indonesia , was widely used in Indonesia for many years, by both the profession and the universities. Laurie has also been involved in the ISSMGE technical committees. After Laurie's "retirement" from Auckland University in 2006, he has continued to provide training in New Zealand and has provided his significant skills to the University of Santiago, Chile.

Dr Wesley has written numerous academic and technical papers and has published in most of the international geotechnical journals. Laurie is a past recipient of the NZGS Geomechanics Award 1999 and is a past NZ Geomechanics Lecturer (2004).

Above: 7th Ironman and still going strong. Bike leg of last year's ironman triathlon at Taupo. "The ironman is ideal for overpaid and underworked academics – only the former can afford the entry fee ($650), and only the latter can afford the time to train!"

Response from Laurie Wesley

I would like to thank the Geotechnical Society very much for honouring me with this life membership. I don't feel I have played a sufficiently large role in the affairs of the society to deserve this award. Many people have worked much harder to make the Society a success than I have. There is one small matter in the citation that I would like to comment on. The geotechnical text referred to is a basic textbook called "Mekanika Tanah" (Soil Mechanics), which was published after I left in 1975. The story of that book is that I had prepared a lot of written material in Indonesian for giving courses to Public Works Dept staff, and shortly before I was due to leave, a structural engineer friend, Lutfi, came across the material and urged me to put it into book form so that it could be published. With some reluctance I did this, in a hurry, filling in the gaps etc, and gave him the draft before I left, saying he had my blessing to get it published if he could. It was first published in primitive cyclostyled form, and because it sold well it got reformatted into quite an attractive paper-back book, and was widely used for many years, with numerous reprints. Other books have since come on the market and it is no longer in print. I am very grateful to Lutfi, who is still a good friend (We met up and had lunch together in Jakarta last year), for urging me to write the book, as it clearly met a real need at the time, and made my name well know in Indonesian civil engineering circles. I'm hoping to produce a complete re-write of the book as one of my retirement tasks.

PROJECT NEWS

Landslides in 2007 G.D. Dellow, K. Joyce, C.I. Massey, GNS Science

Figure 1: An oblique aerial photograph of landslide damage on the eastern side of Whangaroa Harbour after the July 2007 storm.

GNS Science logged over 100 landslides in 2007 monitoring news media and internet reports. These occurred throughout New Zealand and most were triggered by rainstorms (e.g. Northland), earthquakes (e.g. Fiordland) or volcanic eruption (e.g. Ruapehu). Several landslides, in particular the 11 million cubic-metre debris avalanche on the Young River in the Southern Alps had no discernable triggering event.

Two landslide related fatalities were reported in 2007, reflecting a similar trend to the last ten years. The first fatality in March occurred when a climber was killed by falling rocks in Mt Cook National Park and the second in December when a man was killed by the collapse of a trench excavation in Nelson. Landslide fatalities in New Zealand can be attributed to two very different landslide causes - "natural" landslides and "anthropogenic" landslides. Natural landslides are caused by natural processes (e.g. high intensity rain) and anthropogenic landslides are primarily caused by human modification of the slope (e.g. trench or cut slope excavation). Data collected over the last ten years shows that on average one person per year is killed by natural landslides and one person per year is killed by anthropogenic landslides. The distinction between natural landslides and anthropogenic landslides is important because the former are mostly random, unpredictable events while the latter could often have been prevented if safe work practices had been identified and followed (they frequently occur in the workplace).

The most common trigger of landslides during 2007 was rainstorms, particularly localised high-intensity rainfall. The most significant events were in the Buller District during March and those affecting Northland in March and July. On 17 March a rainstorm caused several landslides in the Buller region closing SH6 near Charleston, SH67, the railway line north of Westport and several local roads. On 28 March a rainstorm affected the east coast of Northland between the Bay of Islands and Whangarei (Whangarei District). Several roads were closed by slips and buildings were destroyed or damaged by landslides over a wide area including four motel units at the Haruru Falls Resort. On 10-11 July a second rainstorm hit the east coast of Northland (further north than the first event), causing major damage between Kaitaia and the Bay of Islands (Far North District). The area around Whangaroa Harbour was badly affected by landslides (Figures 1 and 2). Landslides blocked local roads for several days severely restricting access to some communities and several houses in the area were badly damaged. Other less intense rainstorms causing landslides affected the Raglan area (6 February); Wellington City (2 May); Stoke near Nelson (23 May); Coromandel Peninsula (10-11 July); Stewart Island (30 July); Dunedin and North Otago (31 July); and the Awakino Gorge area (17 October).

Two earthquakes caused shaking strong enough to cause small rock-falls (i.e. Modified Mercalli Intensity 6-7). The first was a magnitude 6.5 earthquake near Raoul Island on January 30, triggering rock-falls along the track to

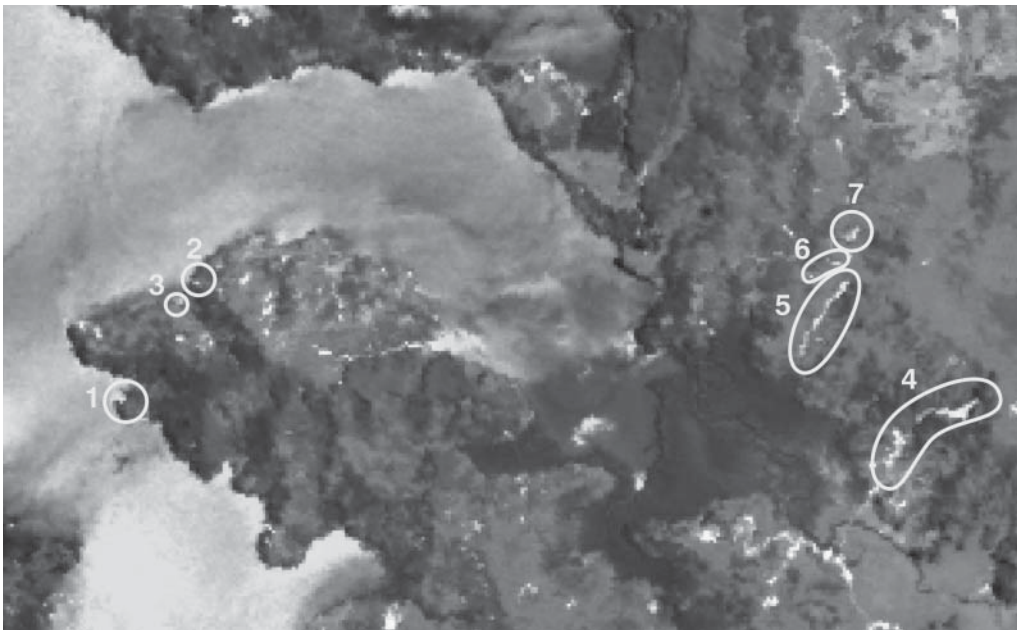


Figure 2 (right): SPOT 5 satellite image of the eastern side of Whangaroa Harbour after the July 2007 storm. Landslides can be seen as bright patches representing the absence of vegetation. Landslides in Figure 1 (numbered circles) can be matched with landslides in this satellite image. (Includes material © CNES 2007, Distribution Spot Image S.A., France, all rights reserved)

Figure 3 (below): Video camera monitoring the Young River landslide dam.

Denham Bay. The second was a magnitude 6.7 earthquake on October 16 near George Sound in Fiordland which triggered a small number of rock-falls along the Milford road. No reports of rock-falls or landslides attributable to the magnitude 6.8 Gisborne earthquake of 20 December were received.

A number of landslide events in 2007 were associated with volcanos or volcanic activity. On 18 March the tephra dam impounding the crater-lake on Mt Ruapehu failed, forming a lahar, which travelled down the Whangaehu River. On 25 September a small phreatic (steam) eruption from Mt Ruapehu's crater generated several small lahars, with debris travelling towards the ski field on the eastern side of the mountain. Luckily the ski-fields were closed for the day and no-one was injured. On 10-12 November a number of small landslides were reported to have occurred from the crater area on White Island. The first and largest of these landslides entered the crater-lake resulting in a small landslide-generated tsunami.

The upgraded GeoNet seismograph network is detecting 2-3 large rock avalanches in the Southern Alps every year. In 2007 the network detected two landslides, the first on 5 March near Mt Cook and the second on 29 August in the Young River west of Makarora at the head of Lake Wanaka. The 11 million m^3 Young River rock avalanche dammed the north branch of the river creating a 2 km long lake. Monitoring of the dam, along with the changes in lake level and river level are being carried out by GeoNet and Otago Regional Council (Figure 3).

GNS Science was involved in responding to the landslides that occurred in New Zealand during 2007 in a variety of ways. This included (but was not limited to):

- Using a terrestrial laser scanner to accurately determine subtle changes in the morphology of the tephra dam on Mt Ruapehu, prior to the March lahar;
- Undertaking a field reconnaissance after the Northland storms of March and July to identify the extent of the areas affected by landslides and how they affected infrastructure and communities;
- Analysing satellite images to locate and measure over 10,000 landslides in the Whangaroa area attributed to the July rainstorm in Northland;
- Accurately mapping the lahar paths down Mt Ruapehu after the September eruption;
- Using a terrestrial laser scanner to assess debris volumes for the Young River debris avalanche and deploying equipment to the site of the Young River debris avalanche to monitor lake levels and dam behaviour.

Nelson Tennis Courts take a "hit"

An innovative approach to improving ground conditions on uncontrolled fill using a Broons BH-1300 "Square" Impact Roller served up fast and cost-effective compaction results on a Council's tennis courts. The eight grass courts at the Paru Paru Road Tennis Centre in Nelson, had been built over an old uncontrolled waste tip which had previously been an old river bed. As is so often the case on such sites, the surface suffered differential settlement over the years. Reconstruction was called for and the job was secured by Fulton Hogan.

Ground improvement on old uncontrolled waste tip sites can be messy work with the potential to expose hazardous or other undesirable materials if the conventional approach to strip and replace with engineered fill is used. Such an approach is time consuming and expensive, particularly if hazardous materials have to be disposed of off-site. The area to be treated on this site was approximately 5,000m^2, so the potential volume of material for removal from site was substantial.

Ground improvement using the Broons BH-1300 Impact Roller unit, owned and operated by Taylors Contracting of Brightwater, with advice provided by Broons personnel from Australia, was chosen due to its ability to produce fast, cost-effective, deep in-situ soil compaction.

After stripping and stockpiling the topsoil for reuse, and removing any undesirable exposed organic materials, the site was uniformly graded in preparation for the Impact Roller. Figures 1(a) and 1(b) illustrate the impact rolling process and typical indentations caused by the 8t "square" module.

Figure 1(a): Impact rolling underway

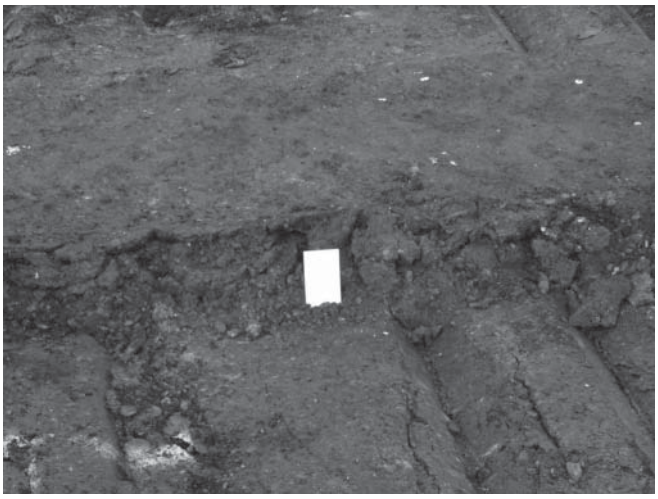


Figure 1 (b): Surface indentations caused by the impact module

Ground vibrations created by compaction equipment have the potential to damage existing structures or underground services located close to the work area. The proximity of squash courts near one corner of the treated area called for vibration monitoring, carried out by Geotechnics Ltd. Peak vibrations remained below levels of concern.

Settlement monitoring was carried out on a 6 m grid across the whole treatment area. After each set of six passes of the Impact Roller, the site was lightly "brushed" with a grader to even out the surface, and new levels were taken, from which average settlements were calculated. This process was repeated until the council engineer supervising the work was satisfied that "effective refusal" had been achieved. This is the point at which additional passes of the Impact Roller are unlikely to achieve any further significant settlement. This is illustrated in Figure 2, which shows the trend of reducing rate of settlement after 12 passes.

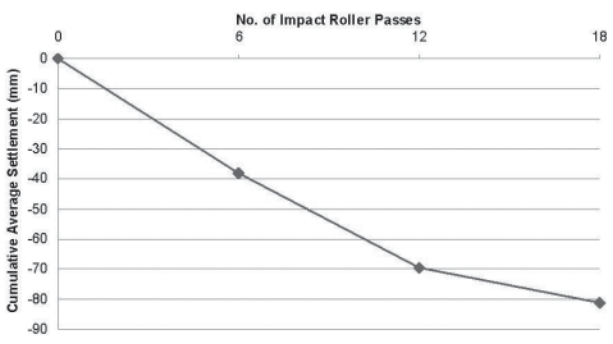


Fig 2: Results of Settlement Monitoring

In order to verify the ground improvement, testing was carried out at several locations using the Dynamic Cone Penetrometer Scala (DCP). The averaged results, shown in Figures 3(a) and 3(b), reflect the improved density and strength of the subgrade.

Figure 3(a): Average DCP Blow Count

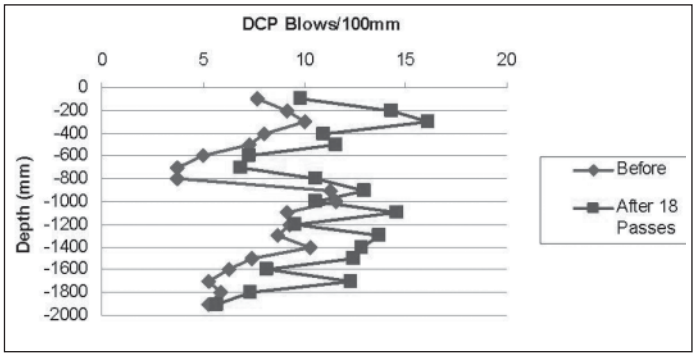
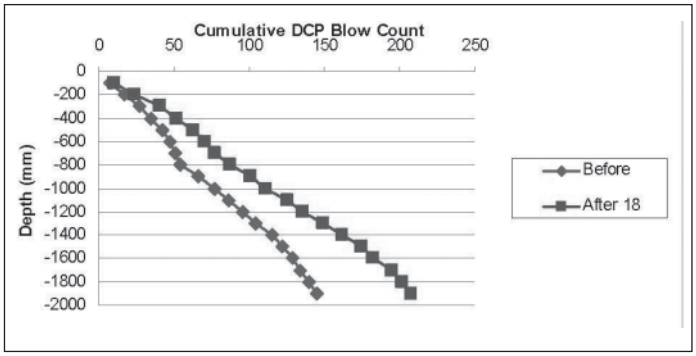


Figure 3(b): Average DCP Blow Count Cumulated with Depth



The Impact Roller has an optimum operating speed of 10 to 12 km/h, so it is highly productive, typically being able to treat about 1,000m^2 with 20 passes per hour. Compared with alternative methods the ground improvement achieved on this site saved the client time and money, and removed the need to dispose of any hazardous materials.

Broons manufacture their Impact Rollers in South Australia and with their machines now having been employed on well over 800 job sites around the world, they bring a wealth of experience in all sorts of ground conditions to any job that they work on.

Reported by: Derek Avalle
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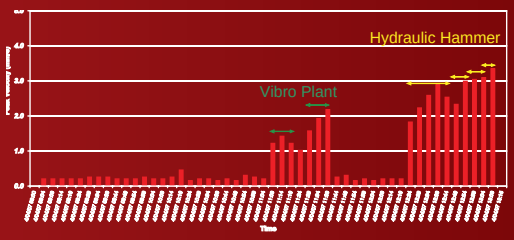

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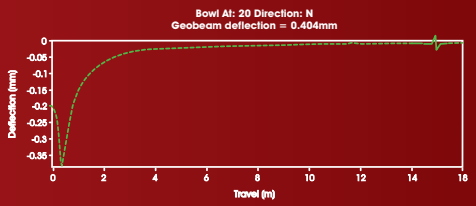

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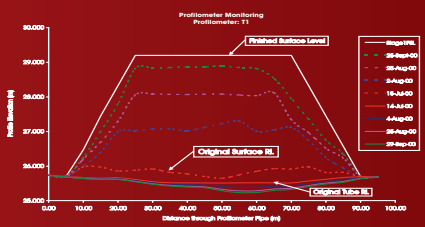
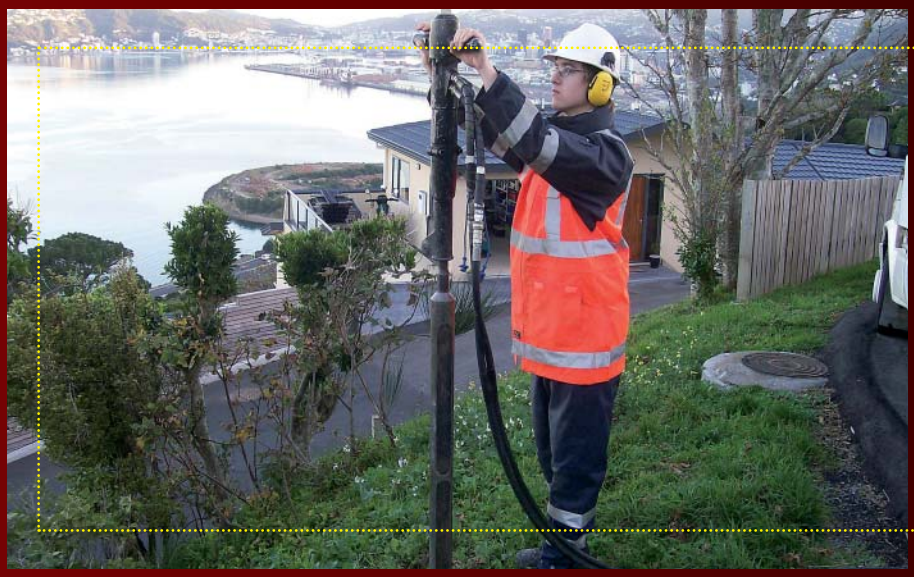


SALES TESTING TRAINING



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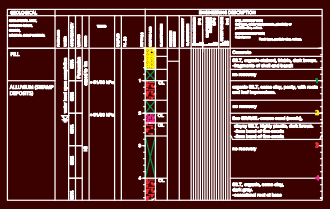

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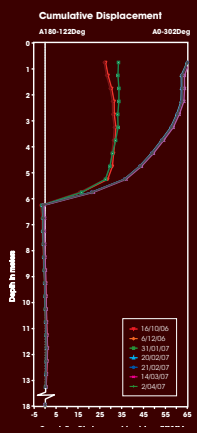

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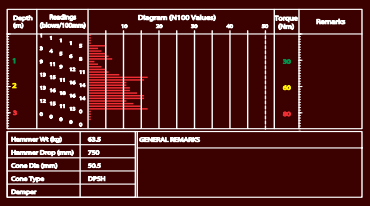

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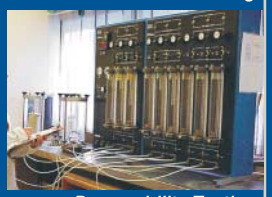
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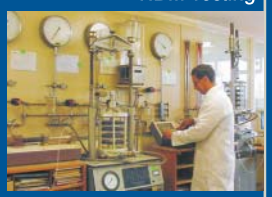
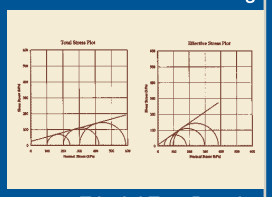

Triaxial Testing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Tauranga Southern Pipeline

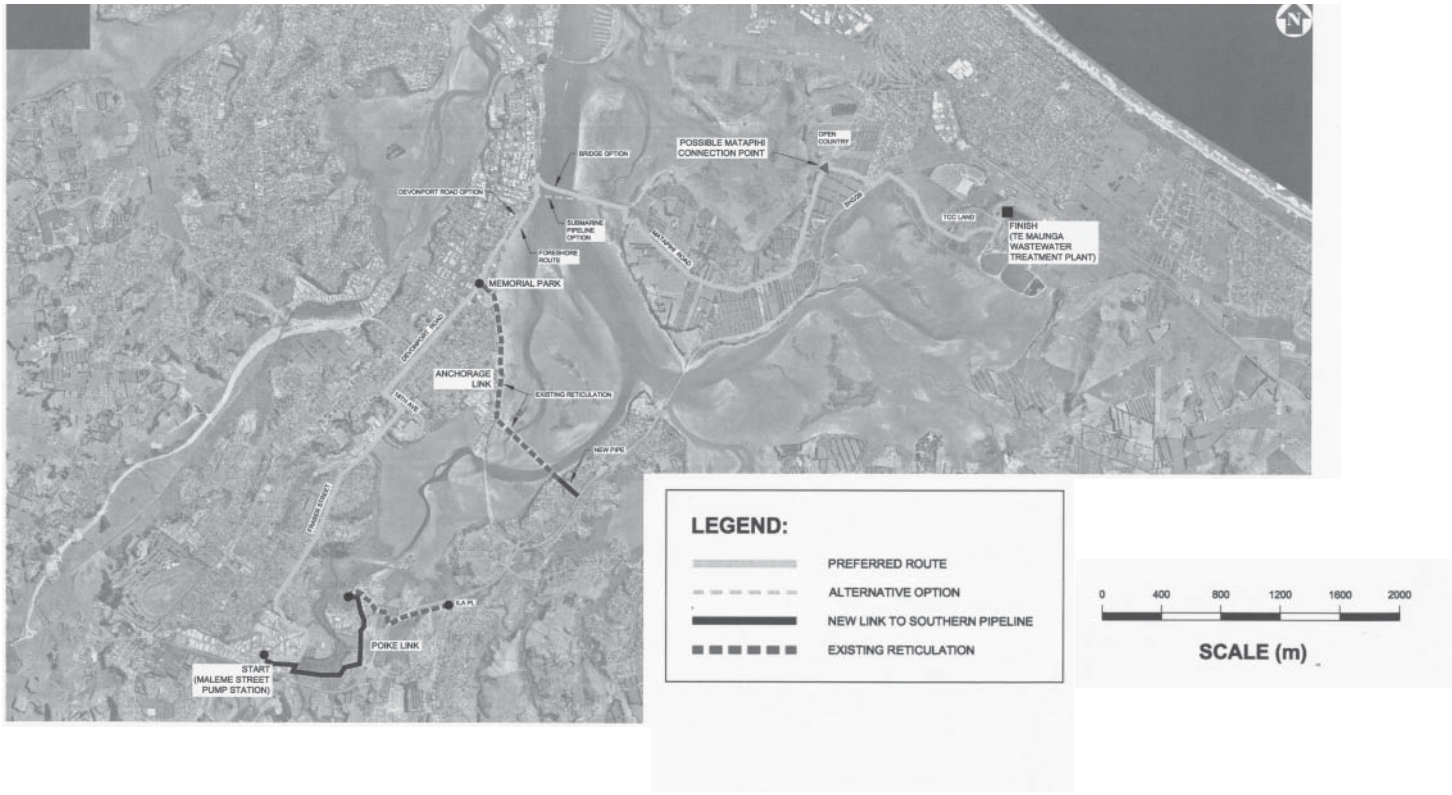


Figure 1: Preferred route for the Southern Pipeline project

The Tauranga Southern Pipeline project is the largest non-roading infrastructure project being undertaken by the Tauranga City Council (TCC). URS New Zealand Ltd are the prime consultants for the project. The estimated NZ$100million project includes a 14.5 km long, 800 mm diameter trunk sewer main through Tauranga, and two major pump stations with large fully buried storage tanks for emergency storage during wet weather. The preferred route from Greerton (refer Figure 1) passes through the Te Papa peninsula (Tauranga City), crosses the harbour parallel to the existing railway bridge, runs along the Matapihi peninsula, and finally via the Bay Park area to the existing Te Maunga wastewater treatment plant.

Resource consent applications for the project have been lodged with Environment Bay of Plenty and Tauranga City Council following an assessment of environmental effects (AEE). Construction of the underground storage tank and wet wells at Maleme Street pump station is programmed to commence in the next few months.

The project is geotechnically challenging in several areas of the pipeline route, for example, proposed integrated reclaimed embankment accommodating both the pipeline and walkway/cycleway along part of the western foreshore of the city harbour, and approximately 1 km of harbour crossing.

The proposed storage tanks and wet wells at the two pump stations will require a 5 m to 9 m deep excavation in the soft estuarine sediments or loose sands underlying the sites, combined with elevated (artesian) groundwater levels. At Maleme Street pump station, 11 m to 13 m thick soft estuarine sediments overlie unwelded Ignimbrite encountered approximately 15 m below ground level. At Memorial Park pump station, investigations indicate 6 m to 8 m of loose sand sediments overlying medium dense sands with inter-fingered silt layers. A 42 m deep CPT at this site indicated that soft estuarine sediments underlie the medium dense sands from 32 m below ground level to at least 42 m below ground. The construction of the existing pump station and associated pipeline network at Memorial Park during 1970's proved to be challenging with sand blow-out at the bottom of the 8 m deep excavation using caisson construction method and subsequent subsidence of the Devonport Road.

The route selection process commenced in mid 2005 and constraints mapping was undertaken for four different routes out of an original 56 identified. These studies included aerial photograph interpretation, desktop study of existing geotechnical information and site walkover assessments of the key areas. Preliminary investigations for route selection process included harbour investigations parallel to the railway bridge by Heavy Dynamic Cone Penetrometer (using mini-rig) testing on a floating barge.

Top: Stage 2 Harbour Investigations on a jack-up barge - July 2006

Above: Preliminary investigations on a floating barge using HDCP testing in December 2005

The investigations near the foreshore and in the harbour at Memorial Park indicated greater than 30 m of soft/loose sediments below an approximately 1 m thick sand crust.

Detailed investigations were then carried out within the harbour to investigate three options:
1) separate pipe and walkway/cycleway bridge;
2) horizontal directional drilling (HDD); and
3) submarine pipeline.

A further opportunity arose in late 2006 to attach the pipeline to an upgraded railway bridge across the harbour. The preferred harbour crossing option is to attach the pipe to the upgraded railway bridge (subject to funding), with a submarine pipeline as a fall-back option.

Detailed investigations in the harbour included logistical challenges, such as obtaining resource consents, establishment of a jack-up barge onsite, 24/7 two-shift drilling operations, noise monitoring and control, consultation with various stakeholders and Tangata Whenua and maintaining a high standard of vigilance for health and safety issues and the monitoring of environmental disturbance e.g., minimising damage to cockles when machines were driven across the harbour at low tide. The boreholes were extended to 70 m

below harbour level within Matua Subgroup soils. Seismic assessment was undertaken to evaluate the longer term seismic risks for various options. This assessment indicated 6 m to 13 m thick layer of liquefiable soils with some intermittent layers at depth.

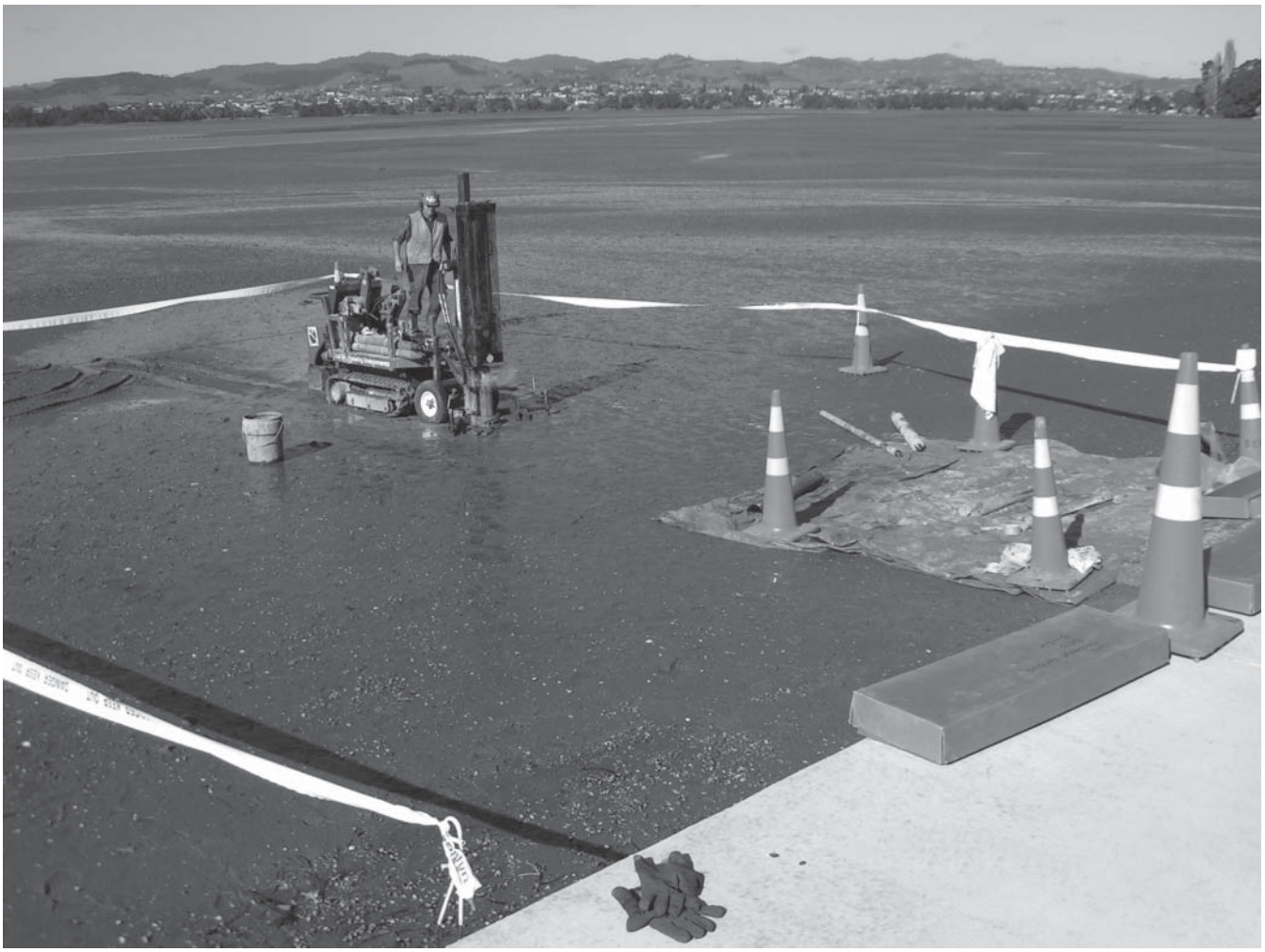
The HDD option and some longer submarine options were rejected due to either potentially high costs, high construction risks or long term seismic risks. For example, the HDD option would need to be some 50 m below seabed so as to drill without casing or some other means of support, and to allow the pulling of the pipe string prior to collapse. The proposed upgrade of 1920's-era railway bridge will include seismic strengthening to meet current standards.

Geotechnical investigations have also been done for sections of the pipeline route from Maleme Street to Memorial Park and along the Matapihi peninsula. Further investigations this year will include the section from Matapihi peninsula to the Te Maunga waste water treatment plant.

Reported by: Prasad Rayudu, Senior Geotechnical Engineer, URS New Zealand Ltd.

Below: Stage 2 Harbour investigations in the mudflats - July 2006

Bottom: Shallow borehole drilling along the western foreshore using mini-rig



TECHNICAL ARTICLES

On the mechanism of rainfall-induced slope failure and its early detection

Rolando P. Orense – University of Auckland

1. Introduction

Landslides induced by heavy rainfall often occur on marginally stable slopes that consist of various types of soil, such as colluvial and residual ones. Because of its frequency and the proximity of various infrastructure developments near landslide-prone areas, rainfall-induced slope instability is considered one of the most significant geo-environmental hazards.

Mitigation of damage caused by rainfall-induced slope failures has been conventionally implemented through *hard-type* approaches, such as slope stabilization methods as in the use of retaining walls, dewatering techniques, anchor piles, etc. Considering the extent of potentially unstable slopes, these methods, although very effective and has been widely used everywhere in the world, may not always be feasible due to financial and environmental constraints. In most cases, they have been implemented using national and/or local government funds in order to mitigate landslides of relatively larger scale, such as the one illustrated in Figure 1.

With the growing population everywhere, residential developments have encroached in hilly areas, thereby increasing the risk of landslides. The resulting slope instabilities are generally of smaller scale and would endanger only a few houses, as in the case shown in Figure 2. Nevertheless, these small-scale landslides during times of heavy rainfall occur frequently, making it difficult to implement measures through conventional engineering methods. In most cases, financial difficulties make it impossible to install retaining walls and other slope stabilization methods.

Soft-type approaches, such as monitoring and alarm systems, offer viable alternatives. In some locations, e.g. in Hong Kong, in San Francisco Bay area and in Japan, warning systems have been established to help minimize the risk. In general, these systems are based on correlations between rainfall intensity and the landslide frequency. Aside from being highly empirical, they are generally applicable to very wide regions, making its implementation difficult for house owners in hilly areas to decide whether to heed or not the warnings, if ever they are issued.

Thus, in establishing accurate warning system which is applicable in local setting, understanding the mechanism and conditions leading to slope failures is of prime importance. Moreover, logic-based procedures to predict their occurrence need to be formulated for an effective site-specific warning system.

In this paper, the mechanism of rainfall-induced slope failures was investigated through laboratory triaxial tests and instrumented model slope experiments. Based on the findings, an innovative sensor was proposed for monitoring localized slope instabilities.

Figure 1: Large-scale collapse of highway embankment in Yamaguchi, Japan (Photo by H. Murata)

Figure 2: Small-scale landslide in Niigata, Japan (Photo by I. Towhata)

2. Laboratory Triaxial Tests

The materials employed in the tests were obtained from Omigawa, Chiba Prefecture (Japan), site of more than 250 landslides associated with the passage of Typhoon No. 25 in September 1971. The materials were generally sandy in nature, and the physical properties are summarized in Table 1.

The change in stress within a soil element in the field as a result of the hydrologic response of soil during rainfall is characterized by pore pressure increase at almost constant shear stress condition, as depicted by the horizontal line

Table 1: Properties of Omigawa sand

Specific gravity, *Gs*	2.67
Mean grain size, D_{50} (mm)	0.49
Fines content (%)	9.4
Coefficient of uniformity, C_U	6.17
Coefficient of gradation, C_C	1.70

in Figure 3. Such field stress path followed by an initially unsaturated soil element can be simulated in the laboratory through constant shear stress drained triaxial tests. In the tests performed and described herein, the normal stress, σ_n' and the shear stress, τ, essentially remained constant during the process of rainwater infiltration. Consequently, the failure of the slope was primarily caused by a reduction in the matric suction.

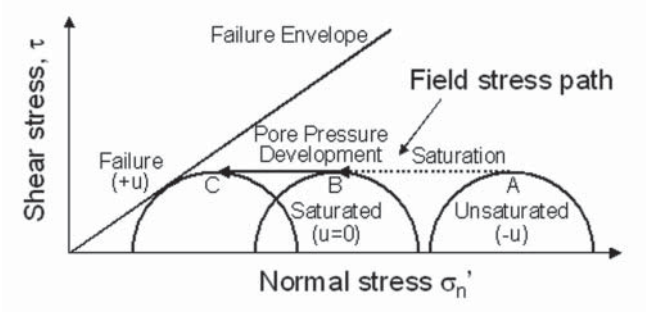


Figure 3: Field stress path in a slope subjected to rainwater infiltration

In the element tests, an automated stress-controlled triaxial test apparatus was employed. It was equipped with a high air-entry value (300 kPa) ceramic disk at the bottom to measure initial suction of the unsaturated specimen. The soil specimen, 155 mm high and 75 mm in diameter, was prepared on top of the saturated ceramic disk by wet tamping method at specified initial relative density, *Dr*, and initial moisture content, *w*. A 12 mm-long pore-water pressure transducer (see Figure 4) was placed at one-third height of the specimen to monitor changes in pore-water pressure, *u*. The specimen was first isotropically consolidated and then the axial stress was increased to a specified level of principal stress ratio ($K=\sigma_1/\sigma_3$) to represent field consolidation state of in-situ soil along a potential failure plane. Because typical depths of failure in actual slopes are quite shallow, testing was conducted at low effective confining pressure (σ_3=15~50 kPa). After full consolidation, water was slowly infiltrated through the bottom ceramic disk until the specimen failed.

During water infiltration, radial and axial deformations of the specimen were continuously monitored using clip gages (see Figure 4) and linear variable displacement transducer (LVDT), respectively, while axial stress was

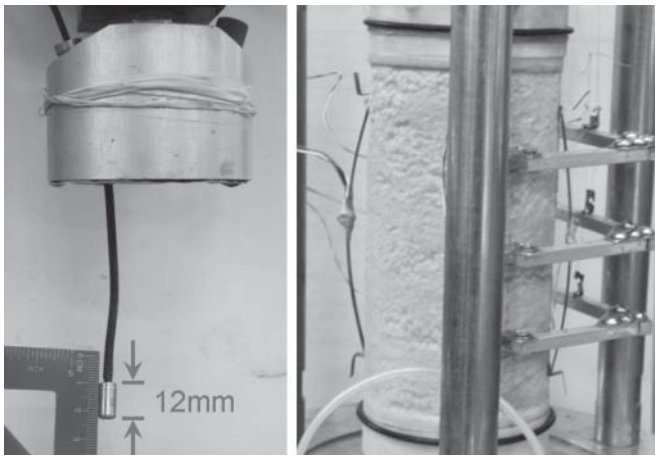


Figure 4: Miniature pore pressure transducer and clip gages used in the experiment.

kept constant by a computer. Moreover, the top cap was vented to the atmosphere, implicitly assuming that pore-air pressure within the specimen remained zero. Furthermore, volume of water entering and leaving the sample was also carefully measured.

In the experimental program, effects of various parameters related to the initial condition of the specimen were investigated. These parameters include initial relative density, *Dr*; initial principal stress ratio, *K*; initial degree of saturation, *Sr*; initial confining pressure, σ_3; and infiltration rate, *Q*. Due to space limitation, only limited test results are discussed here. Other test results are presented elsewhere (Farooq et al., 2004; Orense et al., 2004a).

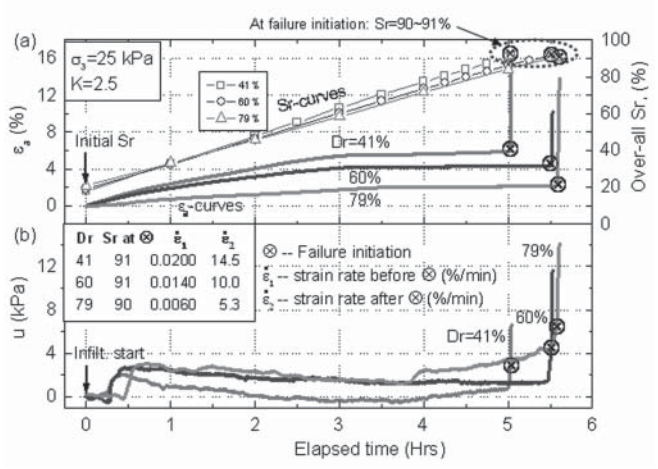


Figure 5: Time histories of: (a) axial strain, ε_a, and over-all degree of saturation, *Sr*; (b) pore water pressure, *u*, showing the effect of varying relative density, *Dr*

Figure 5 shows the results of constant shear stress drained tests on initially unsaturated samples (initial *Sr*=20%) in which initial conditions of *K*=2.5 and σ_3=25 kPa were kept constant, while *Dr* was varied from 41~79%. Values of over-all *Sr* shown in the figure refer to the average within the whole specimen. Notice from Figure 5(a) that there

was continuous but gradual development of axial strain, ε_a, during the initial phase of water infiltration. After a certain time had elapsed, the specimen reached its yield point and axial strain increased suddenly. This point is defined as the failure initiation of the soil specimen. Once failure initiation point was reached, the development of ε_a progressed rapidly and large strains (>10%) were reached in relatively short time. Values of *Sr* when failure was induced were in the range of 90~91% for all specimens.

Strain rates before ($\dot{\varepsilon}_1$) and after ($\dot{\varepsilon}_2$) failure initiation were measured in all specimens, and it was observed that both strain rates increased as *Dr* decreased. This observation implies that loose soil slopes would undergo more rapid deformation than dense ones when subjected to rainfall infiltration.

Figure 5(b) shows the variation of monitored pore-water pressure inside the sample. Note that although there was negative pore-water pressure (soil suction) present within the specimen during the initial phase of water infiltration, it was not read by the miniature transducer as it could measure only positive values. In all tests, there was an increase in pressure of about 2~3 kPa, followed by gradual decrease. Such increase may have been caused by pore-air pressure as the infiltrating water pushed up the entrapped air from the bottom portion of the specimen. Since the top end of the specimen was vented to the atmosphere, the pressure dissipated gradually.

When sufficient level of *Sr* was attained within the specimen, pore-water pressure started to increase and, consequently, failure was initiated within the specimen. It can be surmised from Figure 5 that the sudden increase in pore-water pressure is preceded by the reduction in initial suction within the specimen following the saturation process.

Results considering the effects of initial principal stress ratio *K*, indicative of degree of slope inclination, are shown in Figure 6. In these tests, initial *Dr*=60% and σ_3=25 kPa were kept constant and values of initial *K* were varied from 2.0~3.2. As in previous case, test results showed practically bi-linear deformation time history, i.e., very small axial strains during the initial phase of water infiltration followed by rapid increase once failure initiation point was reached. Moreover, failure was induced in soil specimens at essentially constant *Sr* (=91~93%), irrespective of initial *K*.

Detailed examination of Figure 6 shows that strain rates before ($\dot{\varepsilon}_1$) and after ($\dot{\varepsilon}_2$) failure initiation are greater for higher values of *K*, indicating that more rapid ground movement would be expected for steeper slopes than for mild ones. This observation is consistent with the general idea that slope gradient is a significant factor in establishing the instability state as well as the post-failure initiation condition of slopes.

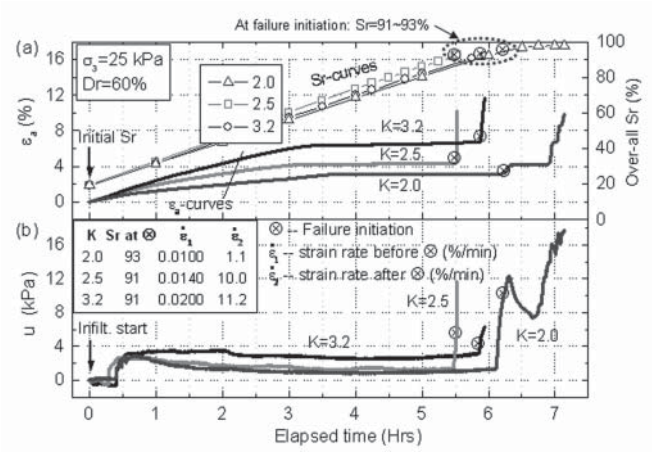


Figure 6: Time histories of: (a) axial strain, ε_a, and over-all degree of saturation, *Sr*; (b) pore water pressure, *u*, showing the effect of principal stress ratio, *K*

3. Instrumented model slopes

To supplement the triaxial test results and to observe general failure pattern of slopes during rainfall, a series of model slope tests was performed. The soil box employed was 220 cm long, 80 cm wide and 100 cm high (see Figure 7). Its walls were made of steel plates, except for the front side which was made of transparent acrylic glass for observing the deformation process. The model slopes were constructed at the center portion of the box by laying out Omigawa sand (initial *w*=10%) in series of horizontal layers, where each layer was tamped equally to achieve a prescribed density. Pore-water pressure meters, soil moisture content transducers (Amplitude Domain Reflectometry or ADR-type) and a shear displacement transducer were installed within the model slope. In addition, pin markers were set on the slope surface as well as on the side adjacent to the acryl glass wall to examine ground displacements using two video cameras set-up at strategic locations.

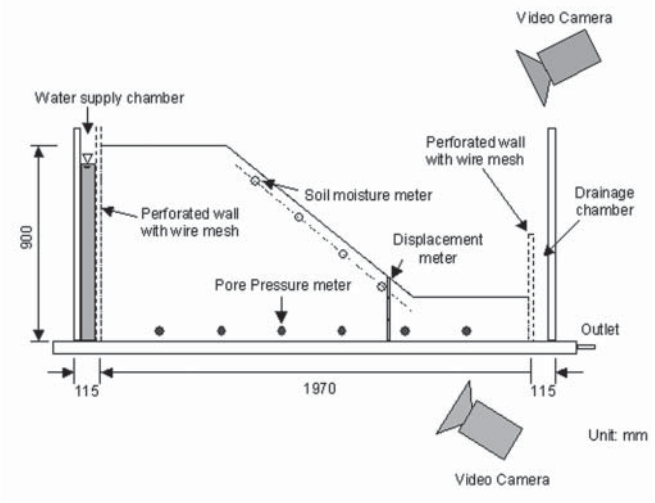


Figure 7: Schematic diagram of the soil box and the sensor locations

In the tests, failure was initiated in the small-scale model slope either through seepage from water supply chamber located upslope (as shown in Figure 7 to simulate percolating water from upslope in natural ground during rainfall) or through seepage by artificial rainfall using hoses and nozzles (see Figure 8). Because of scale effects, it is worthy to mention that the tests were conducted to investigate the general behavior of slopes and were not

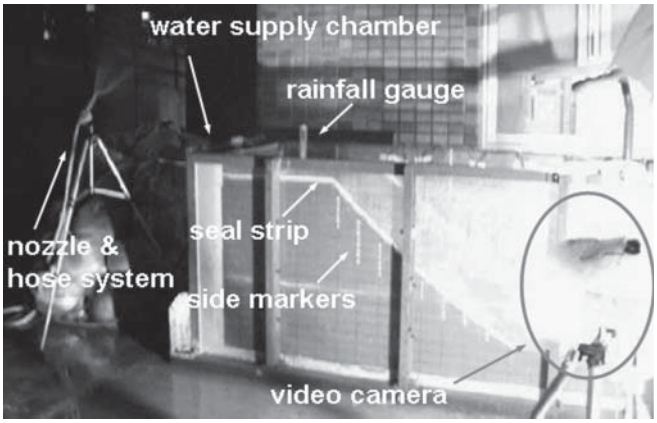


Figure 8: Experimental set-up for the artificial rainfall test

meant to simulate in-situ conditions.

In the model tests, effects of initial relative density, *Dr*, slope inclination, θ, slope model shape and rainfall intensity, *R*, were examined. Again, due to space limitation, only two cases are presented herein. Other test results are discussed in detail by Shimoma et al. (2002) and Orense et al. (2004b).

The model slope used in Case 1 was 70 cm high, with inclination θ=40° and *Dr*=50%. Slope instability was induced by supplying water to the upslope end by maintaining 80 cm height of water in the supply chamber (see Figure 7). With the difference in pressure head between the supply chamber and the rest of the slope,

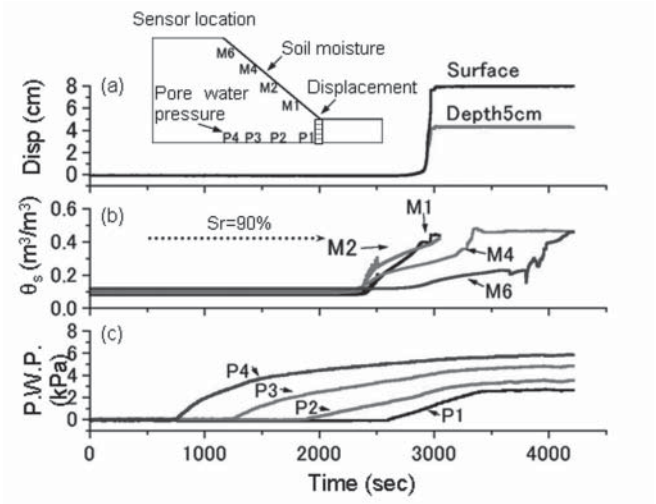


Figure 9: Time histories of: (a) toe displacement; (b) volumetric water content; (c) pore-water pressure at sensor locations (Case 1: seepage test)

water percolated into the ground. Figure 9 shows the monitored time histories of the lateral displacement (as monitored by the shear displacement transducer near the toe of slope and directed parallel to the slope), volumetric water contents, θ_s (defined as the ratio of the volume of water in the soil pores to the total volume) and pore-water pressures (PWP) at the sensor locations. The progress of wetting front (i.e., the boundary between the wetted soil and dry soil that forms during water infiltration) within the slope is indicated by the temporal development of pore-water pressure. The pore pressure readings show gradual increase in pore-water pressure, starting from the left side of the slope, consistent with the movement of the wetting front. When the region where M1 and M2 sensors were located was saturated (corresponding to *Sr*=90%), the ground started to deform in a very rapid manner. The maximum surface displacement near the toe was about 8 cm, while deformation 5 cm below the surface was 4 cm. This indicates that only superficial portion of the slope was involved in the movement. These findings are consistent with those obtained by the video cameras which showed that in the upslope section, a portion about 15-20 cm thick slid down the slope (see Figure 10).

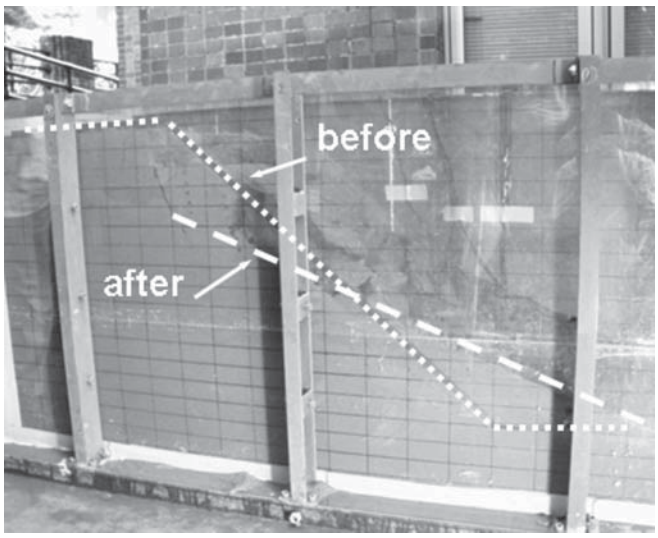


Figure 10: Photo showing the model slope after the test

Case 2 corresponds to a similar slope but with an impermeable base located 30 cm from the slope surface. For this case, instability was induced through seepage by artificial rainfall generated using hoses and nozzles set-up adjacent to the experimental box. Gauges for measuring the rainfall intensity were placed at two locations, one on the top and another at the bottom of the slope, and the accumulated rainwater was measured periodically. The monitored rainfall intensity was about *R*=42~72 mm/hr.

Figure 11 shows the time histories of toe displacement, volumetric moisture contents and pore-water pressures. At about *t*=1000 sec, the infiltrating rainwater reached the soil moisture transducers located 5 cm from the ground surface,

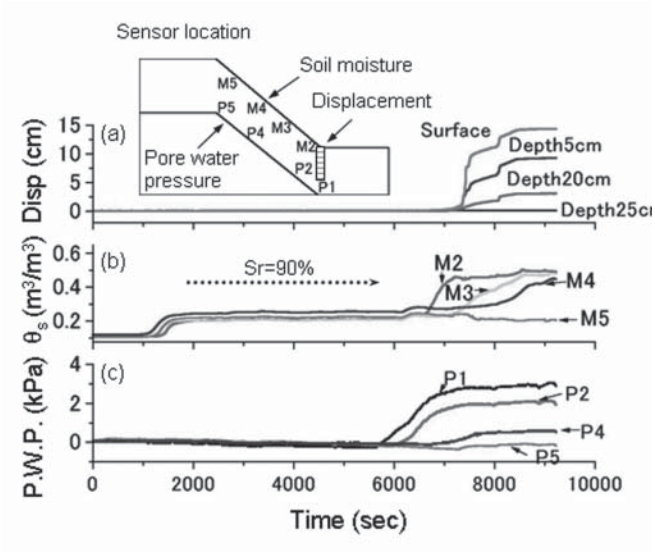


Figure 11: Time histories of: (a) toe displacement; (b) volumetric water content; (c) pore-water pressure at sensor locations (Case 2: rainfall test)

and the soil moisture contents increased simultaneously. However, they remained constant as the wetting front progressed downward toward the impermeable base. As infiltration continued, a water table developed at the base of the slope, and pore-water pressure increased at P1 and P2 (at about t=5600 sec). When the water table approached M2 location, the soil moisture content at this point increased and when it registered θ_s=0.42 (equivalent to Sr=90%), the slope began to move. Displacement of about 15 cm was recorded near the toe of the slope.

It was noticed that prior to the slope movement, a crack began to appear near the top of the slope, as indicated in the top photo of Figure 12. When the soil moisture sensor near the toe (M2) registered θs=0.42, the entire slope suddenly began to move as a whole. Images taken, such as that shown in the lower photo of Figure 12, confirmed that the entire slope underwent about 15 cm movement.

4. Impending slope failure warnings

Both triaxial test results and model slope experiments revealed that there are indicative signs which signify the onset of slope failure during rainfall. Model tests showed that slope failures almost always are initiated when the soil moisture content in a critical region approaches a certain threshold value; in the case of Omigawa sand about θs=0.42-0.43 (corresponding to Sr=90-91%). The triaxial test results showed that the soil specimen deformed slowly (small change in axial strain) during the initial phase of water infiltration. When a critical degree of saturation was reached, failure was initiated, and a rapid increase in axial strain followed. The threshold degree of saturation apparently depends on the type of soil. Farooq et al. (2004) observed that the degree of saturation critical for failure to occur in silty sand (fines content Fc=44%) was 93-95%,

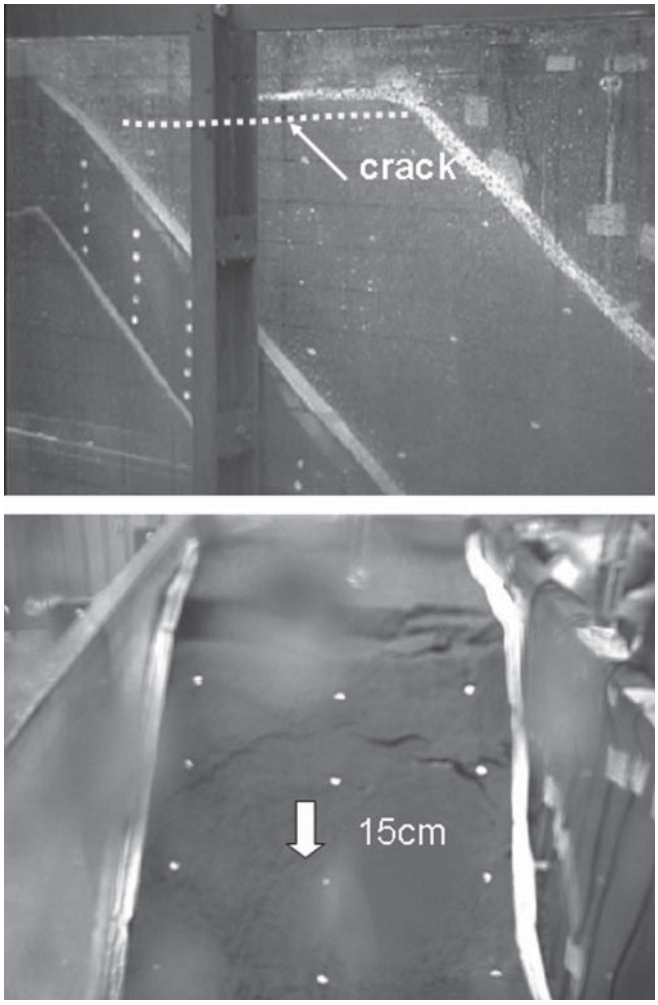


Figure 12: Above photo shows the formation of a crack near the top of the slope prior to failure; bottom photo showing the upslope area undergoing 15 cm displacement

whereas for gravelly soil the threshold was lower, Sr=75-78%.

In the rainfall tests, the rise in soil moisture content was characterized by a two-step process. The first was caused by infiltration of rainwater from the slope surface toward the base of the slope. This did not fully saturate the soil. In fact, the moisture content had a more or less constant value as the wetting front propagated toward the downwards. When it reached the impermeable base, a groundwater table was formed, and rising groundwater induced the second rise in the moisture content, ultimately leading to failure. Detecting when the second increase in moisture content would occur therefore provides a reasonable basis for predicting when a slope failure would take place.

Moreover, the rainfall tests showed that cracks are formed in the upper part of the slope before large-scale deformation occurs. Such tensile cracks formed because of an increase in the weight of the surface soil and a decrease in strength at the slip surface due to increased pore water pressure. This is further magnified by the seepage forces produced by the flow of water near the interface of the

impermeable base.

Summarizing the observations, two possible indicators of impending failure are evident from the test results presented here: (a) when the region, judged to be critical in terms of instability, becomes saturated; and (b) the detection of cracks or small magnitude of movement. By properly selecting the region in which moisture contents and displacements should be monitored, such as in areas where seepage forces may develop as in the toe of the slope, it is possible to predict when slope failures will occur. Thus, careful monitoring of soil moisture contents and slope displacement during rainwater infiltration can provide a basis for designing appropriate warning and alarm systems of slope failures caused by rainfall.

5. Proposed slope instability sensor

Considering the results of the laboratory tests mentioned above, a slope instability sensor is proposed which is geared towards monitoring slope failures in a more localized setting, such as the more frequent small-scale landslides. The principle behind the sensor is based on the idea that if a homeowner could be alerted if and when the slope adjacent to his residence will fail during heavy rainfall, he can immediately evacuate and seek refuge elsewhere, rather than rely on warnings issued by regional and/or prefectural authorities.

However, for the sensor to be applicable on a more localized setting, the sensor must be: (1) affordable to ordinary homeowners; (2) must not encroach areas outside the boundary of ones own lot; and (3) must give information in real-time. Although fibre optic-based monitoring systems are now commercially available in Japan, they are expensive (in range of several thousand NZ dollars) and beyond the reach of ordinary homeowners. Extensometers, which are widely used in slope engineering, require larger areas to be monitored. In some cases, they extend to adjacent lots, making it difficult for homeowners to access the areas to be monitored.

The sensor we had in mind makes use of two precursors to rainfall-induced landslides that have pointed out by the tests: deformation of the ground and saturation of the slope. Note that in most cases of small-scale slides, only the surficial soil up to a depth of about 1m is involved. Deep rotational failures are not often observed and therefore, monitoring of underground deformation is not necessary.

With this in mind, the proposed sensor would contain a tiltmeter (to record angular change in the ground surface) and a soil moisture transducer (to measure the volumetric water content of the soil). The recommended installation point would be near the bottom of the slope. At this point, any lateral displacement of the slope would indicate shear deformation at the bottom of the slope, which can be detected by the tiltmeter. Moreover, model tests have shown that the volumetric water content at the bottom of the slope seems to be the critical in inducing slope failures. When either the inclination OR the volumetric water content has reached a certain threshold value, a warning is issued. This simplified "OR-logic" governs the decision-making process on when warning is to be issued.

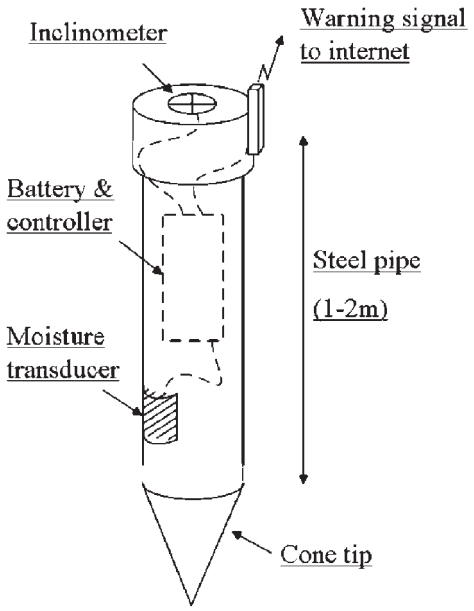


Figure 13: Schematic diagram of the slope instability sensor which can be installed at the bottom of the slope.

The data collected on the inclination of the slope as well as the volumetric water content are transmitted in real-time to a local disaster management center through cellular phones and the internet, which is becoming cheaper in recent times (Wang and Orense, 2004). After interpreting the collected data, emergency warnings are issued automatically to the residents, if necessary.

A schematic diagram of the proposed sensor is shown in Figure 13. All the required components are housed inside a single unit made of steel pipe so as to protect them against environmental impacts. The cone tip provides ease

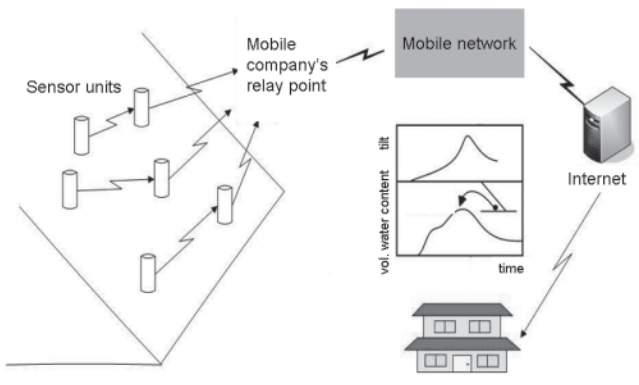


Figure 14: Flow of data collection and processed information

in imbedding the sensor within the slope. All parts of the sensor are operated by a battery which can be replaced periodically. Estimates indicate that such sensor would be in the range of only several hundreds of NZ dollars.

In some cases, the probable size of the slope failure needs to be considered, especially in more advanced level of warning. Whether or not the moving debris will impact existing structures has to be investigated, and therefore, the travel distance of sliding mass needs to be predicted as well. Since the travel distance is more or less related to the volume involved in the landslide, more sensors should be installed at the site in order to grasp the extent and volume of the potential sliding mass. The overall flow of the data collection and transmission is depicted in Figure 14.

Based on the above discussion, a model slope instability sensor has been develop (Fukuda et al., 2007; Seko et al., 2007), as shown Figure 15. Currently, the sensor is being tested and verified both in the laboratory (see Figure 16) and in the field. Results of the tests will be reported in the future once they become available.

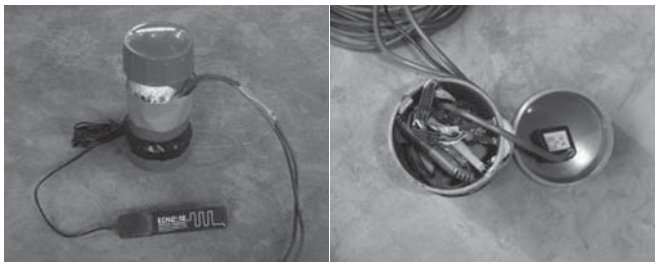


Figure 15: Photo of slope instability sensor

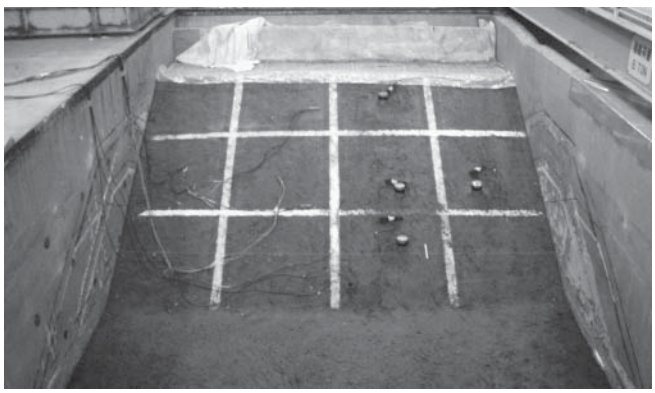


Figure 16: Artificial rainfall test to verify the applicability of slope instability sensors.

6. Concluding remarks

Constant shear stress drained triaxial tests and seepage/rainfall tests on small-scale model slopes were performed to investigate failure initiation in sandy slopes due to rainwater infiltration. Test results showed that failure was induced due to the development of pore-water pressure within the slope. As the soil moisture contents approached saturated values, ground deformations were mobilized. From these results, a slope instability sensor was proposed which can be used to predict the onset of landslides during heavy rainfall. The sensor contained a tiltmeter to measure angular change on the ground surface and a transducer to record the volumetric water content. From the recordings, which can be transmitted through the internet, appropriate warning can be issued to homeowners to minimize damage. It is hoped that this sensor will not only mitigate the damage induced by localized slope failures but also help increase the awareness of the public regarding the landslide hazards in their respective communities.

Acknowledgments

The laboratory triaxial tests and model slope experiments presented herein were performed while the author was a visiting associate professor in the University of Tokyo (Japan) with financial assistance from JR-East Co. Ltd. The slope instability sensor is currently being developed through the joint research collaboration between the University of Tokyo and Chuo Kaihatsu Corporation.

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The use of Temporary Soil Anchors in Service Freeport Mine Irian Jaya, Indonesia

Paul McBarron, Austress Menard, Sydney, Australia

Abstract

Located in the Sudirman Mountains of the Irian Jaya province of Indonesia, the Grasberg complex, owned and operated by Freeport Indonesia, is one of the largest gold and copper mining operations in the world. The rich copper ore was discovered in the area in 1936, and the Grasberg gold-bearing ore was discovered in 1988, this deposit has the largest single gold reserves and the largest single copper reserves of any mine in the world. Freeport mines approximately 78,000 tonne of ore per day.

The ore processing mill is found at approximately 2400 m above sea level whilst the open-cut mine and ore crusher plants are located at approximately 3700 m above sea level. During a major upgrade in 1997 Crusher plant no 6 was installed into one of two dump pockets created by reinforced soil retaining walls, allowing for the construction of a second crusher plant at a later date. Each crusher plant is flanked on three sides by 37 m high vertical retaining walls supporting 470 tonne dump trucks that tip the mined ore into each crusher from three sides simultaneously.

In 2001, despite deterioration of the existing steel facing panels and reinforcing strips Freeport installed Crusher Plant no 7 into the vacant dump pocket wanting to extend the operational life of the crusher plants by a further ten years and increasing the potential truck size to 700 tonne. The reinforced soil wall designer developed a plan to buttress the lower part of the wall and to rebuild the upper 23 metres of retaining wall. Construction was to be staged so that Freeport could maintain continuous production in both crushers and access five out of six truck dump slabs at all times.

To allow the safe demolition and reconstruction of the new walls a temporary retaining wall constructed as a soil anchored piled wall was proposed. This paper considers the requirements of temporary soil anchors to retain the piled wall, their performance and monitoring needs.

Photo 1: Freeport's Grasberg Mine

Design Concept

Remedial Solution

A temporary anchored piled wall 45 meters long and 23 meters high was designed to allow the demolition and rebuilding of the reinforced soil walls 2, 3 and 4 that support the crusher 7 dump slabs, refer figure 1. The anchored piled wall consisted of 273 mm dia grouted steel piles spaced at 750 mm centers, the excavated face between the piles is stablised from erosion by a shotecrete facing, refer figure 2. The wall is retained by 7 rows of soil anchors inclined at alternative angles of 10 and 15 degrees to the horizontal. The anchors were connected to the wall by means of concrete waler at the top of the piled wall and steel walers at 3m vertical centers to the piles wall face. Whilst the top row of anchors had a design working load of 600kN at 3 meters spacing, the remaining 6 rows of anchors were designed to provide working loads of 1200kN at 1.5 meters spacing.

Altogether, a total of 130 anchors were included in the design. The anchors were provided with an adequate free length to ensure that the bond length was located outside of a line drawn at 45 degrees from the toe of the wall, or for the final row of anchors a minimum free length of 5 meters was respected.

Total anchor lengths ranged from 18 to 32 meters. Bond length of the anchors were to be installed in a mixture of granular fill and mine tailings with assumed friction angle of 40 degrees.

The wall had an expected design life of 12 months.

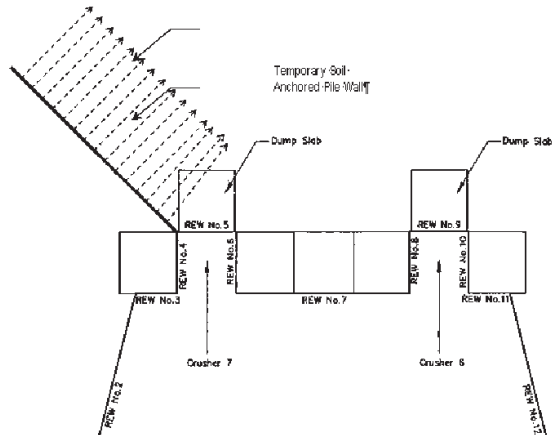

Figure 1: Simplified plan view of Crusher Plant Wall layout

SBMA Concept

Due to the variable nature of the fill material and the relatively high anchor capacities, the soil anchor system, the Single Bore Multiple Anchors (SBMA) was proposed. This soil anchor system relies on the succession of small successive bond lengths rather than one unique longer bond length and has proven its effectiveness in numerous projects worldwide.

In consideration of the 12 month design life of the wall structure and the anchor founding conditions being highly aggressive due to acid ground water percolating the mine fill, the SBMA system provided additional robustness in its construction, the plastic encapsulation of the anchor free and bond lengths was seen as a significant advantage.

For the short term monitoring of the anchor it was considered acceptable to leave all anchors with long stands and uncapped, thus allowing the ability to load check and restress with simple stressing equipment rather than threaded stressing blocks and special lift off jacks. Access systems for high level anchor locations were considered using cherry picker baskets and crane support.

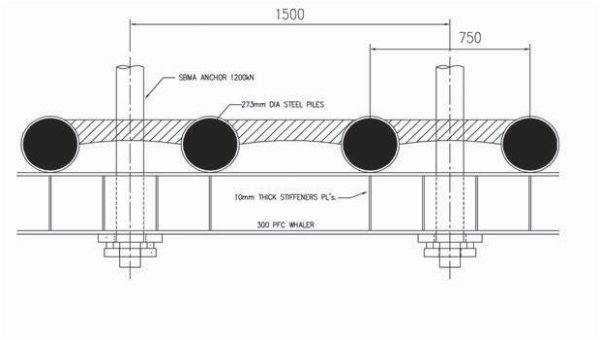

Figure 2: Plan of Piled Wall

The SBMA concept relies on the utilisation of successive short units, each behaving like a normal anchor but with a reduced load. The grout deformation induced by these reduced forces is thus lower which in turns reduces grout bursting and failure of the surrounding stratum. "Debonding" generally occurs progressively from the top of the anchor bond length and is due to the difference in elastic modulus between the grout and the ground. The field of displacement of these two materials being non compatible above a certain load there is therefore a strong benefit in distributing the total anchor load over a number of interfaces along the anchor bond length. Figure 3 illustrates how progressive "debonding" of a long single unit significantly reduces the total efficiency in load transfer or mobilised bond stress. However the succession of several independent short anchor units permits the mobilization of bond stress over the whole anchor bond length, resulting in a higher anchor capacity.

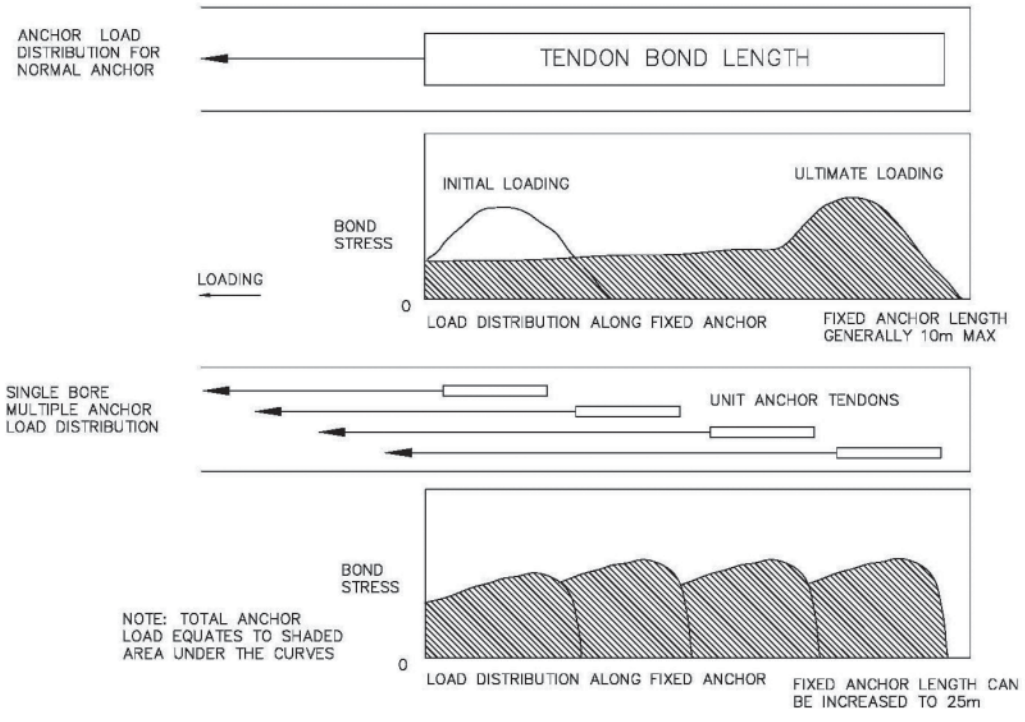

Figure 3: Anchor Load Distribution – Conventional anchor vs SBMA

According to multiple tests in the field and in laboratory evidence suggests that the bond stress varies with the anchor bond length according to the following relationship:

$$\tau = 1.6 * L^{-0.57} * \tau_{ult} \quad \text{(eq 1)}$$

With: L: anchor bond length

τ_{ult}: ultimate bond length of a short fixed anchor (<2.3m)

Photo 2: Piled wall after anchor installation third row

Freeport's Soil Anchor proposal

Design of the production anchors was substantiated by a test anchor program which allowed an accurate estimate of the available bond shear stress at the interface of the grout and the in-situ fill material found in the bond zone. The test anchor program also included proving the drill method and the groutablility of the fill material in the anchor zone

A single anchor unit of 2.5 m length was manufactured with 3 x 15.7 mm dia strands given an ultimate strand capacity of 800 kN, a proving test regime concluded that at a load of 600 kN(.75% GUTS) no failure of the anchor unit was detected.

To accommodate project requirements SBMA anchors manufactured 3 and 6 units of 2.5 meters length which could mobilise working loads of 200 kN per unit, providing the 600 kN and 1200 kN working load production anchors. Each unit were designed with two 15.7 mm strands given an ultimate strand capacity of 560 kN per unit.

The use of post-grouting system (tube-a-manchette) and end of casing grouting techniques to make provision for likely "grout-flow-away" situations as were experienced during the initial grouting trials was recommended for the production anchors. These techniques increase the maximum shear stress than can be mobilized in a given soil or fill.

Anchor installation

Anchor installation commenced in January 2004. The anchors were installed in successive rows with maximum excavation steps of 3.5 meters. Anchors where manufactured on site, a rotary percussive drill formed a 152 mm dia cased hole, anchors where installed through the casing and as the casing was withdrawn the end of casing grouting techniques where effected.

All anchors received a post grouting treatment at 24 hours after primary grouting. Acceptance anchor testing was completed 5 to 8 days after primarily grouting and after the grout strength had attained a minimum 30 MPa compressive strength. After a complete row of anchors at a given level were installed and successfully stressed, the successive excavation to the next anchor bench could occur. Due to the short term nature of the structure, anchor strands which where left long for ease of restressing were protected from surface corrosion with a grease film. The installation of all anchors was completed within a time frame of 4 months.

Photo 3: Piled wall after excavation of fourth bench

Piled wall performance

A maximum allowable wall deflection of 50mm at the top waler beam was to be respected allowing for maximum anchor loads of 1200 kN to 1420 kN and maximum bending moments in the wall of 70 to 142 kNm whilst the maximum axial force was 750 to 980 kN.

During anchor installation, partial excavation phase after benching and at the fully excavated condition, the wall was monitored with survey points on the capping beam and wall face and with inclinometers installed behind the wall. All survey points where recorded and related to the expected design deflections.

After completion of the wall excavation to the final level, the survey points and inclinometers where measured at 2 weekly intervals throughout the 12 month life of the wall.

The wall performed within the acceptable tolerances of the design and consequently, for all 130 anchors, there was no requirement for subsequent load monitoring or restressing after initial anchor lock of load.

Procedures that had been developed for access to all anchor positions and the consequential safe working

methods for jack handling and stressing were never implemented.

The wall was decommissioned in October 2004 after the construction of the replacement reinforced soil wall 2, 3 and 4.

Photo 4: Freeport Mine anchored piled wall to Crusher 7 Dump Slab

Conclusions

Temporary soil anchors used in retaining wall construction require consideration of their performance in terms of their environment and the wall stability criteria. If a detailed control of wall movements combining survey and inclinometers are engaged and the structure performs within the design limits, then the need for load monitoring can be relaxed in the short term. However, methods and procedures that will allow effective accesses to high level anchor positions for load monitoring and restressing should be provided as part of the specialist anchoring works.

The Freeport project environment and the site conditions provided demanding logistical and engineering challenges which allowed established anchoring methods and practices to be adopted in this unique location.

The SBMA anchor system was installed in the three recent projects in Queenstown, New Zealand. In 2004 the Sofitel Hotel project installed 140No 100t SBMA anchors. In 2006 a commercial development in Man Street used 180No 100t SBMA in the retention of the site per metre.

Brownrigg Apartments in Hallenstein Street used 160No SBMA anchors in the site retention. The anchors for the projects were founded in the glacial till deposit typical of the Queenstown region.

Photo 5: Sofitel Site (Duke Street, Queenstown, NZ)

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Acknowledgements

POWER G. A. The Reinforced Earth Company Level 2, 20 George Street Hornsby, NSW 2077, Australia

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OBITURARY

Ralph B. Peck (1912-2008) – In Memoriam

Ralph B. Peck, Professor Emeritus of Foundation Engineering at the University of Illinois at Urbana-Champaign died of congestive heart failure on February 18, 2008, at his home in Albuquerque, New Mexico. He was born in Winnipeg, Canada, to his American parents, Orwin K and Ethel Huyck Peck on June 23, 1912.

Ralph Peck earned a Civil Engineering Degree in 1934 and Doctor of Civil Engineering Degree in 1937, both from Rensselaer Polytechnic Institute in Troy, New York. In 1938-39 he attended the Soil Mechanics course at Harvard University and was a laboratory assistant to Arthur Casagrande. From 1939 to 1942 Peck was an assistant subway engineer for the City of Chicago, representing Karl Terzaghi who was a consultant on the Chicago Subway Project. He joined the University of Illinois in 1942, and was a Professor of Foundation Engineering from 1948 to 1974. Since 1974, Professor Peck was a Professor Emeritus at the University of Illinois, and a consultant in geotechnical engineering. In 1948, together with Karl Terzaghi, Ralph Peck co-authored the most influential text book in geotechnical engineering, /Soil Mechanics in Engineering Practice/. In 1953 with Walt Hanson and Tom Thornburn, Ralph Peck co-authored the widely used text book /Foundation Engineering/.

In 1942, Dr. Peck joined the Civil Engineering Department of the University of Illinois, where he remained as a teacher and mentor until his retirement as Professor Emeritus in 1974. After moving to Albuquerque, Dr. Peck continued his active consulting practice which included jobs in forty-four states in the USA and twenty-eight countries on five continents. His more than one thousand consulting projects include: the rapid transit systems in Chicago, San Francisco, and Washington; the Alaskan Pipeline System; the James Bay Project in Quebec; and the Dead Sea dikes. He authored over 250 technical publications, and served as the President of the International Society of Soil Mechanics and Foundation Engineering from 1969 to 1973. In 1974, he was awarded the National Medal of Science by President Ford. A few of his many honors include the Norman Medal, The Wellington Prize, and the Outstanding Lifetime Achievement Award in Education from the American Society of Engineers. His last project was the Rion-Antirion Bridge in Greece. It received the ASCE's OPAL Outstanding Civil Engineering Award for 2005, and is the only project outside the United States to be so honored. Ralph Peck married Marjorie E. Truby on June 14, 1937. He is survived by his daughter and son-in-law, Nancy Peck (Allen) Young, and son and daughter-in-law, James (Laurie) Peck, and grandchildren, Michael Young and Maia Peck.

To Mrs. Nancy Peck Young and Family

It is a great loss for the entire geotechnical world the physical disappearance of Ralph B. Peck. In this moment of great sadness I convey my condolences and deep sympathy in my personal name and on behalf of the International Society for Soil Mechanics and Geotechnical Engineering to Nancy Peck Young and Family.

Ralph Peck was a man of prodigious energy and fine intellect, an outstanding geotechnical engineer, an extraordinary master, a distinguished citizen and a twinkling light for all of us. A genial thinker, Ralph Peck was one of the bright talents that have enlighten the Geotechnical Engineering road. We are indebted for his outstanding contribution for the advancement of knowledge in soil mechanics and geotechnical engineering and his legacy will maintain for many generations and will always be a source of great inspiration for all geotechnical engineers.

Prof. Ralph B. Peck was a frequent Keynote Speaker at International Conferences of geotechnical engineering and we were always listening to his fascinating lectures with great interest and pleasure, as they were challenging and opening new avenues of research. In the treatment with people, in the devotion and patience in interacting and educating the young generation, in the strength of his character, in the sensitiveness and affability of his behavior, we can discover a Man coated for a special mission.
Ralph Peck has oriented his existence for a great and noble ideal and has always teached us that the correct method to learn science is to pursue the discovery of the scientific truth.

His legacies where the Scientist, the Professor and the Engineer are integrated in one soul, where the beauty and the truth give friendly their hands, totally justify the applause and the debt of gratitude of the current and next generations.

With best regards.
Professor Pedro Seco e Pinto,
The President of ISSMGE

This has been reprinted from an article recently published in the ISSMGE Bulletin: Volume 2, Issue 1, Page 4.

FOREIGN CORRESPONDENT

Ross Kendrick

Wagga Wagga, Australia

Ross Kendrick
Engineering Geologist
Northern Hume Alliance Project

Top: Blasting

When my Boss first mentioned an opportunity to transfer to rural Australia I hardly took him seriously. After all, I had done my compulsory 2 year O.E stint living and working overseas and thought I had got that out of my system. I was well and truly settled in Auckland – I'd got married, bought a house, got a dog and a cat and had a toddler and a newborn baby – the last thing I was looking for was a change of pace… and if unknown to me a small part of my unconscious was, it certainly wasn't small town rural Australia!

But here I am 5 months down the track living in Wagga Wagga, Australia (meaning a place of many crows) – a small town of 60,000 people half way between Melbourne and Sydney, about 5 hours drive from either city. I decided the chance to further my career and earn more money was too good an opportunity to turn down… though my wife didn't initially see it that way! However the potential of saving a lump sum to pay off our standard Auckland mortgage, and the lure of sunny weather did the persuading for me - plus when else would I get to use my kiwi banter and all those 'the dingo stole my baby' jokes!

I am working as part of the Northern Hume Alliance Project on duplication of a stretch of the Hume Highway between Tarcutta and Holbrook. The road is in desperate need of extra lanes to accommodate the many trucks and high volumes of traffic that travels from Melbourne to Sydney. The Alliance setup is new to me in the sense that everyone involved in the contract is liable for the "quality" of the final product. The Alliance Team comprises the RTA (Road Traffic Authority – same as Transit NZ), Leighton Contractors, and three engineering consultants (Coffeys, Maunsell, and Smec). I am employed by Maunsell to provide ongoing geotechnical advice that aids in the road construction, in other words implementing detailed design and providing innovative solutions where the ground conditions change from detailed design.

In my first week at work I was privileged to be on site for a rock blast. I made sure I got a good viewing platform and took loads of photos thinking it was my only chance to see a blast – only to find it happened regularly and are pretty run of the mill!

Settling in Wagga Wagga wasn't too difficult. We found a house to rent in town, that would take a dog, a cat and two

Above: Zone 4 bridge

kids – not as hard as you'd think, and began to assimilate to the Australian culture – jandals became thongs, washing dried in an hour, 2 inch long hairy spiders became the norm and rain was only ever heard in sentences including the words 'we need some.'

Initially I'd had doubts about the size of Wagga Wagga – flying from Sydney the pilot announced that we were starting our descent into Wagga. I looked out the window and saw nothing but brown land – small town Australia here we come! But it hasn't been so bad. Wagga Wagga has everything you need…including the compulsory Aussie pool complex. Every small town seems to have a huge, state of the art complex…'no sorry we don't have petrol stations but have you seen our pool? We have Olympic length lanes!' No wonder they win so many medals!

The 3 codes of football – AFL, NRL and Union – are well represented as we are on the border of Victoria and NSW. This keeps me happy as there's always something to watch on T.V!

The wildlife in Australia has kept my camera busy. There was the huge brown fluffy spider I found on my dog's bed one night, which no one has been able to identify, as well as the poisonous redback spiders that frequently visit my letterbox and garage corners. I regularly pass foxes and snakes on the drive to site, and have played "chicken" with a wedge tailed eagle, which gave me a bit of a scare as its wingspan was wider than my ute, approx 2.5m!

While here in Australia we are making the most of the chance to travel. We have just spent Easter in Sydney and have been to Junee, Gundagai, Holbrook, Goulburn, Albury, Bathurst (did the obligatory lap of Mt Panorama!), Cowra, Young, Cootumundra and Narrandera -where we went to an AFL game between Sydney and Richmond. 8000 people attended the game in a town where only 6000 live!

Moving to Wagga Wagga has been a challenge for myself and my family, but so far so good – a worthwhile experience!

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COMPANY PROFILES

Beca Geotechnical

Above: Goro Nickel Mine Site By permission of Goro Nickel

Founded 90 years ago, the Beca group is one of Asia-Pacific's leading and most respected engineering and related services consultancy firms. From prestigious landmark developments to functional and environmentally sustainable projects, Beca's multi-disciplinary range is broad. And wherever Beca goes, Beca Geotechnical gets involved.

As part of Beca's significant civil engineering resource, the geotechnical team provides a comprehensive range of traditional geotechnical engineering, geology, hazards and hydrogeological services. A substantial increase in both groundwater supply projects and groundwater effects assessment for large infrastructure projects has resulted in one of the most highly regarded hydrogeology groups in New Zealand. A thriving team of 35 specialists, Beca Geotechnical is predominantly based in Auckland, with smaller teams in Tauranga, Christchurch and Wellington, and is supported by the IANZ registered in-house soil testing laboratory, Geotest.

Global experience

Winning work in their own right, Beca's geotechnical people also take advantage of the many opportunities resulting from the size and diversity of their parent company's project portfolio – a list which takes geotechnical staff to every corner of New Zealand, destinations throughout the Pacific, Australia, Indonesia, Singapore, China and the Middle East. Sooner or later, clients realise they need geotechnical advice.

Goro Nickel Mine Engineering

Beca's senior geotechnical engineers are working closely with other specialist consultants and Goro Nickel's mining department in New Caledonia as it plans the next 30 years of operations at its open pit nickel mine. This goes beyond the assessment of pit slopes, surface and ground water management, to include up to 70 m high berms to separate in-pit tailings storage from mining activities

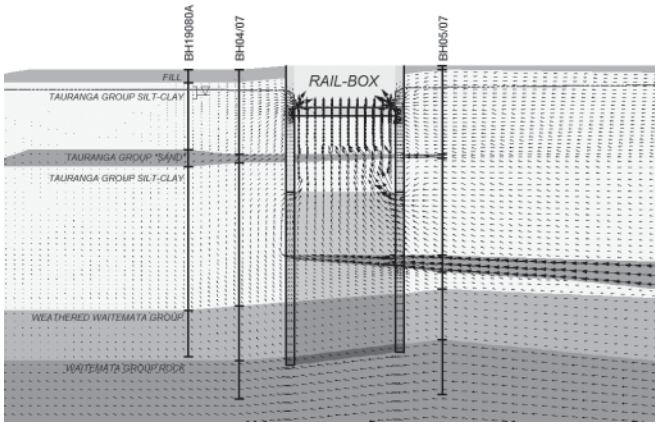
Environment of Collaboration

The collaborative environment of Beca Geotechnical is one of its strongest assets, with staff working closely with each other and with specialists from other disciplines on a variety of complex projects. By nurturing and maintaining personal and professional connections with members of the

wider Beca group, individuals in the geotechnical group generate a substantial volume of work. These relationships, developed over time, result in a rapid appreciation of each other's issues and the development of design solutions which effectively address site constraints.

New Lynn Rail Trench

In close collaboration with the company's civil structures team, Beca Geotechnical has been working on the New Lynn Rail Trench Project, a complicated job involving the geotechnical and groundwater modelling of a 1 km long, 8 m deep, 20 m wide trench through the middle of New Lynn, to be built using diaphragm wall technology whilst still maintaining a live railway line. On completion of design, construction will start with a load test programme on a full scale diaphragm wall panel. The second stage of the project will involve running trains along the top of the northern retaining wall, while the southern wall is built and the trench is excavated.



Above: Groundwater modelling, New Lynn Rail Trench

Project alliances

Preparing a report and moving onto the next job is something Beca's geotechnical team rarely does. Instead, the group regularly contributes members to client and project offices working on larger infrastructure projects. In turn, these alliances provide geotechnical staff at all levels with the opportunity to travel, rub shoulders with contractors and clients, and contribute to successful projects in an integrated team environment.

Manukau Harbour Crossing

Beca is part of the successful alliance with Transit, Fletcher and Higgins which will deliver a second Manukau crossing together with approximately 6 km of approach motorways. Beca's geotechnical team on this project is using historic information from construction of the first bridge together with more recent geotechnical investigations to progress the designs. This has included a full scale pile load test, undertaken using an Osterberg Cell on a 1.8 m diameter pile. This information, combined with the reanalysis of a lateral pile load test undertaken for the original bridge, has allowed Beca geotechnical engineers to refine the design parameters of this critical infrastructure project.

Above: Test pile construction, Manukau Harbour Crossing

Professional fulfilment

With an emphasis on the fundamentals of soil mechanics and geology, Beca Geotechnical strives to provide its people with a stimulating working and learning environment and the opportunity to grow to the best of their ability. Enjoying the mix of site and analytical work, geotechnical team members are well-supported by analytical software, expertise of the company's own senior people and its strategic links with other organisations and international associations. The group is committed to finding good people to join its team and be part of Beca's 2000+ strong and growing multidisciplinary organisation.

Contact Details

Auckland
PO Box 6345, Auckland
1141 New Zealand
Ph: 64 9 300 9000
Contact: Gavin Alexander, Nicola Ridgley
Email: gavin.alexander@beca.com, nicola.ridgley@beca.com

Tauranga
PO Box 903, Tauranga
3140
Ph: 64 7 578 0896
Contact: Nathan McKenzie
Email: nathan.mckenzie@beca.com

Christchurch
PO Box 13-960,
Christchurch 8141
Contact: Richard Young
Email: richard.young@beca.com

Beca
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Terrane Consultants Ltd

Terrane Consultants Ltd was established in March 2005. The co-directors are Tony Cowbourne and Sally Hargraves.

The Terrane name is not an acronym (nor one of those 'modern' bastardised spellings), but a genuine geological term – put simply, a terrane is "*a fragment of the crust of the earth that is geologically unique from its neighbours*". The name was chosen as it reflected the uniqueness of the environment that we live and work in, as well as the niche consultancy services that the company provides.

Any expectations of a steady ramping up of workload after the start-up of the company were scuppered after less than two months by the extreme storm event of 18th May 2005. Terrane set to work assessing landslip-damaged properties in Tauranga, Matata and Whakatane. We also ended up responsible for the overall technical coordination of the landslip response in Tauranga.

Whilst it was a great way to raise the profile of a fledgling business, it did mean the office wasn't fully set up until a few months later, when the first rush had died down.

After the first six month's skew towards landslip assessment and remediation, it was somewhat of a relief to be able to get a more balanced workload, including all the usual and a few more unusual projects:

- Foundation assessment and design for commercial & industrial buildings (coolstores, factories, farm buildings), commercial developments and apartments, etc;
- Specialist geotechnical inputs to large infrastructure projects;
- Subdivision and land development on particularly hazardous terrain – steep slopes, active geothermal areas, fault hazards, settlement-prone ground, etc;
- Residential development on or adjacent to particularly steep slopes or soft, low-lying ground.

The company remains strongly specialist in the type of work undertaken.

Above: Staff training

Above: Debris flow disaster, Matata – 18 May 2005

Hazard assessment and remediation still remains a core area, with staff being involved in landslip and earthquake hazard assessments, right through to the effects of the Gisborne earthquake from last Christmas.

Whilst it hasn't been plain sailing, it has been thoroughly exhilarating and it is great to be going forward with an almost full team of geotechnical engineers and engineering geologists, as well as the invaluable office manager.

An international flavour permeates the office, with staff originating from as far away as Scotland, Holland and the USA. This makes for some trips to the pub to watch the international games!

Having thrown themselves into starting a new company, the directors still throw themselves around – Sally out of airplanes (with over 300 jumps to date) and Tony around a hockey pitch, having recently been selected (again) for NZ Masters team. Let's hope he can come back relatively unscathed this time!

Contact Details

Terrane Consultants Ltd
PO Box 13-607, Tauranga
Ph: 07 579 9708
Email: enquiries@terrane.co.nz
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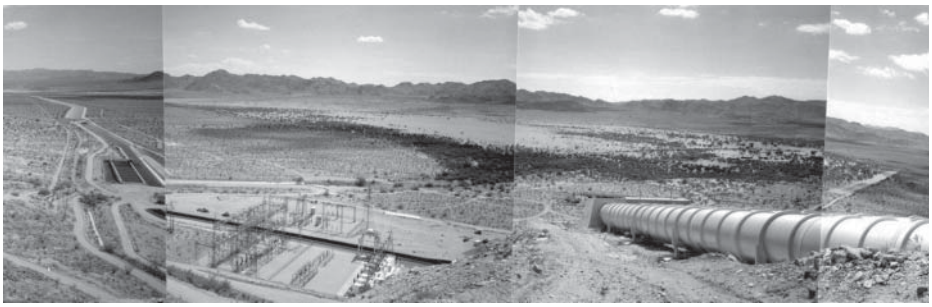
MEMBER PROFILES

Paul Salter

Occupation

Senior Engineering Geologist\Hydrogeologist
URS New Zealand Limited

As an undergraduate student studying zoology the best summer job I ever lucked upon was as a paid diving buddy, assisting post-grad students at Auckland University's Goat Island Marine Lab. Unfortunately, these students also warned me of their bleak job prospects as zoologists, and suggested I tag along for the day with a geology student, Ann Williams, who was up there to look at mass movement in the coastal cliffs. A day spent clambering over house-size rock debris had me pondering the causes and effects of landslides, and swayed me towards a terrestrial career. A few years later I had completed my own thesis, also supervised by Warwick Prebble, on the engineering geology of some 1910-era unlined tunnels in the Waitakere Ranges.



Above: Spilling aqueduct water to artifically recharge aquifer

When I graduated in the early 1990's the job prospects for geologists were only slightly higher than those for zoologists, so I appreciated the opportunity to start with a small geotechnical company, Earthtech Consulting, in Pukekohe – despite having to drive 65km each way to and from work. My principal role was running geotechnical investigations for rural subdivisions and it was my introduction to the hand auger, shear vane, and Scala (pre Scala jack days!). During this time I also developed an interest in groundwater, which eventually led an Auckland University short course on the subject lead by Wayne Russell from Woodward-Clyde Consultants (now URS). Wayne became somewhat of a mentor to me and in 1995 I joined URS.

Working for a large, multi-national, meant working on a wider range of projects and as young geologists we were expected to do environmental as well as geotechnical jobs. This meant drilling and sampling contaminated industrial sites, sniffing hydrocarbon soaked soils with a PID, and sampling oxidation pond sludge at Mangere – all tasks that confirmed my preference for engineering geology and clean groundwater work. The larger geotechnical jobs I worked on at the time included the dewatering of the landslide under the Coeur Gold Waihi tailings dam and the Matahina Dam upgrade. Through these jobs I meet colleagues from overseas URS offices, and in 1998 I transferred to the geotechnical group in Santa Ana, California.

What started as a planned 1 or 2 years in Southern California turned into 6 years, largely because of the interesting nature of the work. LA is a vast, water-starved, metropolis next to an active plate margin – a good location for consultant engineering geologists and hydrogeologists. Some memorable experiences include logging shear surfaces from in a cage down auger shafts at the Getty Villa in Malibu, and trenching and logging the Banning Segment of the San Andreas Fault for a proposed power plant near Palm Springs.

If you've seen the Jack Nicholson movie Chinatown, which is based on historical events, you'll know that water is a big, and controversial, issue in Southern California. Some of the most interesting projects I worked on were related to water supply. Coastal Orange County, where I lived, got 40% of its water from groundwater pumping - a source that's sometimes compromised by land use and suffers from saltwater intrusion. Both these problems provided me work as a hydrogeologist. For example, the County operates long lines of wells that inject expensive potable water into coastal aquifers to prevent seawater intrusion – I worked on a project assessing the potential to inject nitrogen instead of water into these wells to maintain pressure in the seawater barriers.

Most of the remaining water Southern California uses is imported from Northern California or out-of-State via huge aqueduct systems - a very political arrangement. One project I managed looked at the potential to artificially recharge a groundwater basin in the Mojave Desert, next to the Colorado River Aqueduct. The idea being to "bank" surplus aqueduct water in winter, "hold" it for several

years, then "take" it from groundwater storage. After some pretty detailed investigations including geophysical studies, drilling, groundwater modelling and environmental work, we diverted aqueduct water onto a dry lakebed (playa) for a pilot infiltration test – eventually creating a temporary lake several km's across (one unforseen issue was the arrival of migrating ducks, followed by duck hunters!).

In California professional geologists need a State license – an interesting system for a Kiwi to go through. A certain amount of experience, referees, and an 8-hour exam (with a break for lunch) are needed to become a "Professional Geologist". Then, 4-hour specialty exams to call yourself a "Certified Engineering Geologist" or "Certified Hydrogeologist". The requirement for these, at least in part, reflects the litigious nature of working in the US.

Returning to NZ in 2004 confirmed to me the quality of geotechnical engineers and geologists in this country. We also straddle a plate margin and face similar geotechnical problems to California, but have more limited economic resources, which, I think, has encouraged innovation in our engineering and a healthy attitude to overcoming technical obstacles.

My current role is to provide engineering geologic support for civil projects and natural hazard assessments, with some groundwater related work, and as leader of the Geo-Engineering team in URS's Auckland office.

Above: Fault hazard investigation in the desert

Simon Humphreys

Occupation

Construction Manager
Sinclair Knight Merz, Auckland

Where it began

I was first introduced to Geology as an A-Level subject whilst at school in the UK. I then opted to undertake a 4 year Masters Degree at the University of Bristol, from which I graduated from in 2000 with an MSc.

Professional Life

During my final year at University, I worked part time for a small consultancy run by Brian Hawkins. During this time, I was exposed to a number of significant projects such as a 128-hectare housing development for approximately 1000 new houses, new school and other ancillary public recreational facilities. Other projects included working on a rock slope cut above a major arterial road into the city of Bristol and a historic stone mine stabilisation project in Bath, the latter of which had places where the mine roof cover was so thin that you could hear the conversations being held in the cars on the road surface above!

Post graduation I joined Exploration Associates Ltd, a nationwide geotechnical and contaminated site investigation contractor. During my time there, I was responsible for the management of a number of site investigations, the largest of which ran for 7 months at a cost of GB£350,000 and had a total of 25 project staff and contractors. The most difficult aspect of this project involved having to lift a drilling rig over a row of terraced houses lining the banks of a culverted river. The drilling rig then had to be lowered onto scaffolding constructed over the river to enable exploratory holes to be drilled through the riverbed. The paperwork alone to cover the Health and Safety requirements was daunting enough, only surpassed by the scheduling of 5 or 6 diverse groups to ensure a smooth operation between all.

In 2002 I decided it was as good a time as any to pack my bags and broaden my experiences (and leave behind the seemingly never-ending dreary weather). I arrived

in New Zealand and was fortunate enough to secure a position with Maunsell under the leadership of Geoff Farquhar and David Burns. During my time at Maunsell, I was fortunate enough to work on such significant projects as; Project Aqua, SH16 Mt Roskill Extension and SH20 to SH1 Link.

In 2005 I moved to SKM. I joined as an Engineering Geologist within Grant Murray's team, and worked on a number of building and infrastructure projects for a mixture of private, government and major commercial clients. In 2007, I transferred to the Exxon Mobil Project delivery team at SKM as the Construction Manager. This move gave a unique insight into a project as it enabled me to see a project through from geotechnical investigations to presenting expert witness evidence at a Resource Consent hearing and then onto the successful construction and delivery of the site. In my current role I have the responsibility of not only ensuring that each project is delivered to the high standards that the client expects but also that its done so within the tight timeframes and in accordance with their stringent health and safety policy.

Since mid 2006, I have been a member of the NZGS working party, with Rodney Hutchinson, to develop the NZ Electronic Transfer of Geotechnical and Geoenvironmental Data from the already well-established UK AGS format. This is available to download, for free, from the NZGS website.

In Hindsight

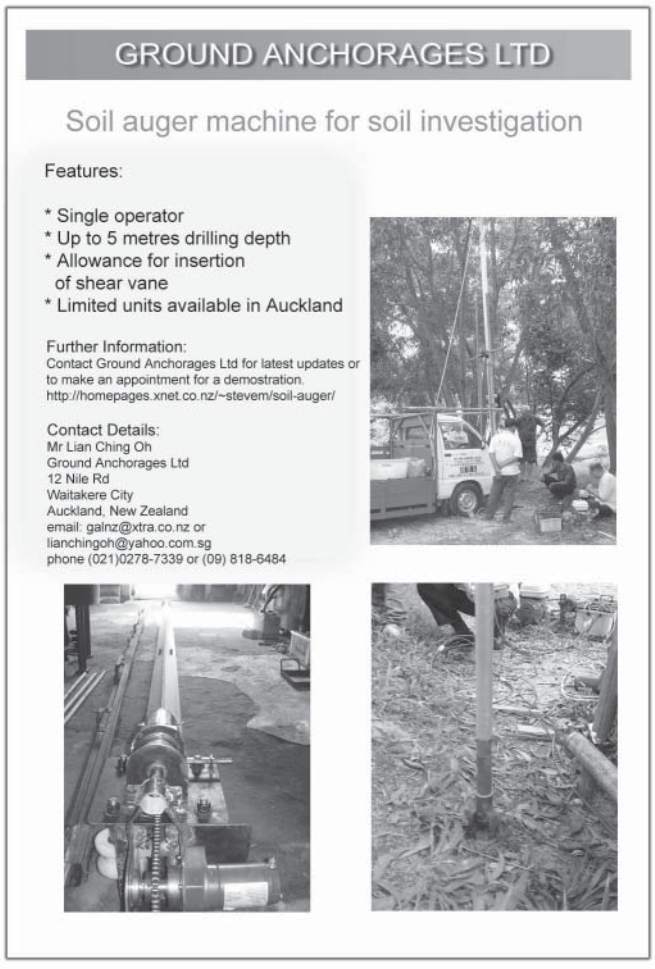
Professionally I have been responsible for the delivery of a wide-ranging scope of projects, each with their own unique challenge and requirements. On a number of occasions, I have been fortunate enough to be given the opportunity to use my initiative to achieve the desired solution, which has resulted in the added satisfaction of being responsible for the completion of the task.

Where to from here?

Having spent much of my time being involved in project management in one form or another, I would like to see my career develop further in this direction. I also intend to maintain an active role in the Geotechnical Data Management area.

Advice

I have been exposed, involved and responsible for a diverse number of projects and found there is sometimes no substitute for putting your hand up to take on a challenge. Initially you may have no idea as to how you are going to complete it, but the challenge of following it through to its successful conclusion can be the most rewarding experience that you can look back upon (and draw from) in the later years of your career. Invariably things will go wrong and it is often during these difficult times that we can learn the most.



NZ Geotechnical Society
PAST PHOTO COMPETITION
WINNERS

THE YEAR 2008 theme is:
"History never repeats"

Show us the things that geotechnical engineers, engineering geologists, and technicans in the profession get up to!!

A perfect chance to win some drinks money for the office. The winning photo will be printed in the December 2008 issue of the *NZ Geomechanics News* and put onto the Society Web Page.

WIN $250

SEND YOUR ENTRY TO:

- The Geomechanics News Editor, P.O. Box 5271, Wellesley Street, Auckland
- email to: kwilliams@tonkin.co.nz (send as jpgs)
- Entries close 31 October 2008
- Clearly mark your entry with your name and provide a caption for your photo

CONDITIONS OF ENTRY:

1. Only amateur photographers may enter.
2. Photos must be taken by the entrant.
3. No computer generated pictures.
4. Any photographs received may be published in subsequent Society publications.
5. Winning entries will be final and no correspondence will be entered into.
6. NZ Geotechnical Society members only may enter.

EVENTS DIARY

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

2008

JUNE 30 – July 4
Xi'an, China
10th International Symposium on Landslides and Engineered Slopes. Chinese National Groups of the IAEG, the ISRM and the ISSMGE
http://www.landslide.iwhr.com/

AUGUST 11 - 16
Washington DC, USA
6th International Conference on Case Histories in Geotechnical Engineering and Symposium in Honor of Professor James K Mitchell
http://www.6icchge2008.org/

SEPTEMBER 4 - 5
Auckland, NZ
New Zealand Geotechnical Society Geotechnical Symposium. The theme will be Soil-structure interaction – From rules of thumb to reality.

See website for more details.
http://www.nzgeotechsoc.org.nz/2008-Symposium.cfm

SEPTEMBER 7 - 10
Edinburgh, Scotland
EurGeo4 – 4th European Geosynthetics Conference will be held at the Edinburgh Conference Centre, Heriot-Watt University, Scotland.

The EurGeo4 conference will debate the subject of Geosynthetics in Civil Engineering Applications within a 3 day event comprising keynote lectures, paper presentations, discussions and poster sessions.

Submission of abstracts is invited for either verbal or poster presentations.
http://www.eurogeo4.org/

SEPTEMBER 15 - 20
Madrid, Spain
Euroengeo 2008 will take place in Madrid and will permit the exchange of ideas and knowledge between specialists and experts in the field of geology applied to engineering.

The papers will be fundamentally based on "The city and its subterranean environment". This however, does not imply any restrictions for other related fields of activity in this second edition of Euroengeo.

Themes include new methods of tunneling in urban areas, solid waste disposal in the vicinity of large urban developments, rehabilitation of historical areas in cities, erosion prone materials, geological risks in cities, education and training in engineering geology.

SEPTEMBER 24
Newcastle, Australia
Pit to Port. Geotechnics of the Hunter Valley Coal Supply Chain, Mini-Symposium

SEPTEMBER 24 - 26
Auckland, NZ
Civil Engineering Testing Conference 2008. "The Road Ahead …"
http://www.cetc2008.org.nz/cetanz/

October 1 - 6
IIT, Bombay, India
12th International Association for Computer Methods and Advances in Geomechanics.
http://www.12iacmag.com/

November 5 - 8
Wellington, NZ
8th Australia – New Zealand Young Geotechnical Professionals Conference will be hosted in Wellington for geotechnical professionals from Australia and New Zealand, who are less than 35 years of age with a maximum of 10 years' experience.
http://www.nzgeotechsoc.org.nz/anz-ygp-conference.cfm

2009

May 19 - 22
Hong Kong
SINOROCK 2009 Symposium, the 2009 ISRM-Sponsored International Symposium on Rock Characterization, Modelling, and Engineering Design Methods.
http://www.hku.hk/sinorock/

JULY 22 - 25
Harbin, China
3rd International Geotechnical Symposium (IGS 2009) on Geotechnical Engineering for Disaster Prevention and Reduction.
http://igs2009.hit.edu.cn/

OCTOBER 5 - 9
Alexandria, Egypt
XVII International conference on soil mechanics and geotechnical engineering.

The Egyptian geotechnical society with great pleasure invites you to Bibliotheca Alexandria in 2009 to attend this international conference.
http://www.2009icsmge-egypt.org/

2010

SEPTEMBER 5 - 10
Auckland, NZ
11th IAEG Congress – Geologically Active
http://www.iaeg2010.com

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Now available for hire

- **Small manoeuvrable rig suitable for restricted access sites**
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- **Can penetrate hard/dense soils or weak rock**
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- **Can operate on sloping ground (up to 30°)**
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- Drilling and dynamic probing over water on purpose built self-propelled aluminum barge
- Transported by trailer and easily launched at standard boat ramps
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- Lightweight and manoeuvrable track-mounted rig can access most sites that larger rigs cannot
- We have a reputation for a 'can-do' attitude when it comes to establishing and operating the rig in difficult site conditions or where access constraints are present

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- Large diameter samples (100mm)
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- Can core through concrete surfaces

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www.soilengineering.co.nz

www.prodrill.co.nz

NEW ZEALAND GEOTECHNICAL SOCIETY INC.

Management Committee Address List 2008

NAME	POSITION	ADDRESS, EMAIL	PHONE, FAX
Williams,(A) Ann ⋆	Chairperson NZ IAEG Representative	Beca Infrastructure Ltd 132 Vincent Street P O Box 6345, Auckland 1141 ann.williams@beca.com	09 300-9172 (DDI) Work 09 300-9300 Fax
Azimullah, I (Imrana) +	Management Secretary	51 Staincross Street Titirangi Auckland nzgs@paradise.net.nz	09 817 4786 Home 09 817 4786 Fax
Young, R (Richard)⋆	Treasurer	Beca Infrastructure Ltd PO Box 13960 Christchurch richard.young@beca.com	03 374 3714 (DDI) Work 03 366 3188
Williams, K (Kate) •	Editor Geomechanics News	Tonkin & Taylor Ltd 105 Carlton Gore Road Newmarket Auckland kwilliams@tonkin.co.nz	09 355 0741 (DDI) Work 09 307 0265 Fax
Bowman, E (Elisabeth) •	YGP Representative	Senior Lecturer Civil Engineering University of Canterbury Private Bag 4800 Christchurch 8140 elisabeth.bowman@canterbury.ac.nz	03 364 2987 (DDI) Work ext 7476
Chin, C Y	Immediate Past Chairman	Maunsell Limited 47 George Street Newmarket Auckland cy.chin@maunsell.com	09 336 5333 Work 09 379 1210 Fax
Carter J (John)	ISSMGE Australasian Vice President	Faculty of Engineering and Environment University of Newcastle Callaghan NSW 2308 johncarter@netspace.net.au	+61 02 492 16025 Work +61 02 492 17062 Fax
Moon A (Alan)	IAEG Australasian Vice President	Coffey Geotechnics Pty Limited 14B Henley Beach Road Mile End SA 5031 South Australia Alan_Moon@coffey.com.au	+61 08 835 21744 Work +61 08 823 40932 Fax
Meyers, T (Tony)	ISRM Australasian Vice President	PO Box 210 Rundle Mall Adelaide SA 5001 tony@rocktest.com.au	+61 08 8376 9096 Work

continued>

• Co-opted position
+ Appointed position
⋆ Elected members of committee

St George, J (John)	NZ ISRM Representative	Department of Civil and Environmental Engineering University of Auckland Private Bag 92019 Auckland j.stgeorge@auckland.ac.nz	09 373 7599 Work ext 88195 09 373 7462 Fax
Robins, P (Philip)*	Committee Member	Golder and Associates (NZ) Ltd Level 1 Concordia House 200 Hardy Street Nelson probins@golder.co.nz	03 548 1707 Work 03 548 1727 Fax
Burns, D (David)*	Committee Member	Maunsell Ltd 47 George Street Newmarket david.burns@maunsell.com	09 336 5374 (DDI) Work 09 379 1201 Fax
Stewart D, (David)*	Committee Member	Opus International Consultants PO Box 12-003 Wellington David.Stewart@Opus.co.nz	04 471 7155 (DDI) Work 04 471 1397 Fax
Professor Davies M, (Michael)*	Committee Member	Dean of Engineering Faculty of Engineering, University of Auckland Private Bag 92019 Auckland New Zealand michael.davies@auckland.ac.nz	09 373 7599 (DDI) Work

NEW ZEALAND GEOTECHNICAL SOCIETY INC.

Objects

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.

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

Members	**$72.00**
Students	**Free**

Affiliation fees for 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 Management 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: ( )** ..... **E-MAIL:** .....

DATE OF BIRTH .....

ACADEMIC QUALIFICATIONS: .....

PROFESSIONAL MEMBERSHIPS: ..... **Year Elected**.....

PRESENT EMPLOYER: .....

OCCUPATION: .....

EXPERIENCE IN GEOMECHANICS: .....

STUDENT MEMBERS: .....

TERTIARY INSTITUTION: ..... **SUPERVISOR:** .....

SUPERVISORS 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 (IAEG)	Yes/No
& the Environment (with Bulletin)	Yes/No

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

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 2008

Publication Name	List Price Members	List Price Non-Members
New Zealand Geomechanics Society Conferences:		
Proceedings of Technical Groups, Vol 22, Issue 1G *Geotechnical Issues in Land Development* Hamilton 1996	$20	$35
Proceedings of the New Zealand Geotechnical Society Symposium – *Roading Geotechnics 98* Auckland 1998	$40	$70
Proceedings of the New Zealand Geotechnical Society Symposium – *Engineering and Development in Hazardous Terrain* Christchurch 2001	$50	$70
Proceedings of the New Zealand Geotechnical Society Symposium – *Geotechnics on the Volcanic Edge* Tauranga 2003	$50	$70
Proceedings of the New Zealand Geotechnical Society Symposium – *Earthquakes and Urban Development* Nelson 2006	$50	$70
Australia – New Zealand Conferences on Geomechanics:		
Proceedings of the 3rd Australia – NZ Conference on Geomechanics Wellington, May 1980 (Vols 1, 2 & 3 per set)	$10	$30
Proceedings of the 2nd Australia – NZ Young Geotechnical Professionals Conference, Auckland, December 1995	$25	$40
Proceedings of the 5th Australia – NZ Young Geotechnical Professionals Conference, Rotorua, March 2002 (spiral bound reprint)	$75	$85
Proceedings of the 6th Australia – NZ Conference on Geomechanics Christchurch, February 1992	$50	$100
Proceedings of the 9th Australia – NZ Conference February 2004 – 'To the enz of the Earth'	$150	$200
Other Publications:		
NZ Geomechanics News Collection 1970–2003 Volumes 1–66 (CDRom)	$25	$40
Shear Vane Guidelines	$15	$20
2005 Guideline for the Field Classification & Description of Soil & Rock	$25	$50
Stability of House Sites and Foundations – Advice to Prospective House and Section Owners	$1	$1
Back Issues of *NZ Geomechanics News*	$5	$5

Prices do not include GST or postage & handling

Orders to: Imrana Azimullah, Management Secretary. Email: nzgs@paradise.net.nz

ADVERTISING INFORMATION

NZ Geomechanics News is published twice a year and distributed to the Society's 650 plus 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		
Full Page Internal	$270	185 wide x 265 high
Half Page Internal	$210	90 wide x 265 high 185 wide x 130 high
Quarter Page Internal	$180	90 wide x 130 high
Colour		
Back Cover	$720	210 wide x 297 high
Inside Cover (Front or Back)	$600	210 wide x 297 high
Full Page Internal	$480	210 wide x 297 high
Half Page	$240	175 wide x 130 high
A3 Centrefold	$900	420 wide x 297 high

Inserts

Insert to be posted with magazine – $240/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. A 3mm bleed is required on all ads that bleed off the page. Bleed must be set up on all files that are supplied.
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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Imrana Azimullah
Email: nzgs@paradise.net.nz