Volume 29 Number 1 March 2011

GEOTECHNICAL NEWS

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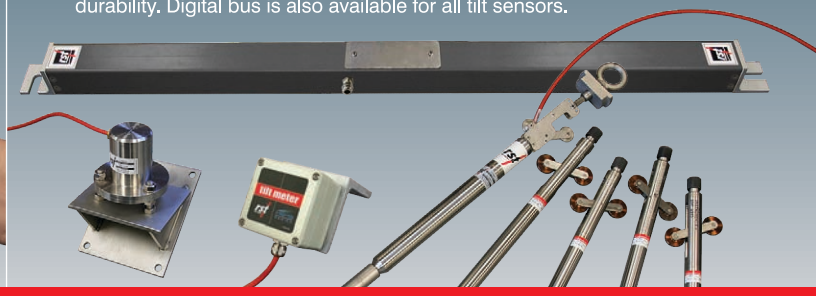

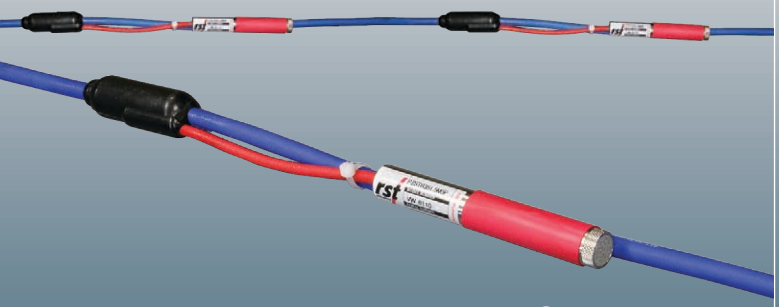

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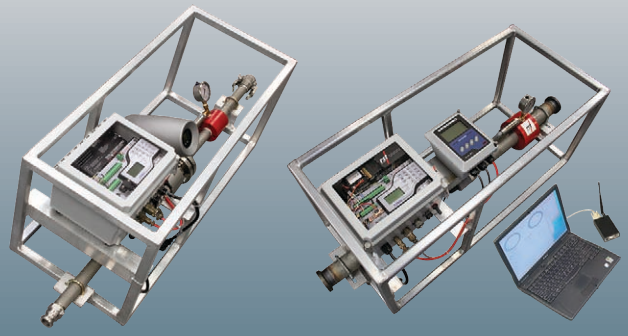

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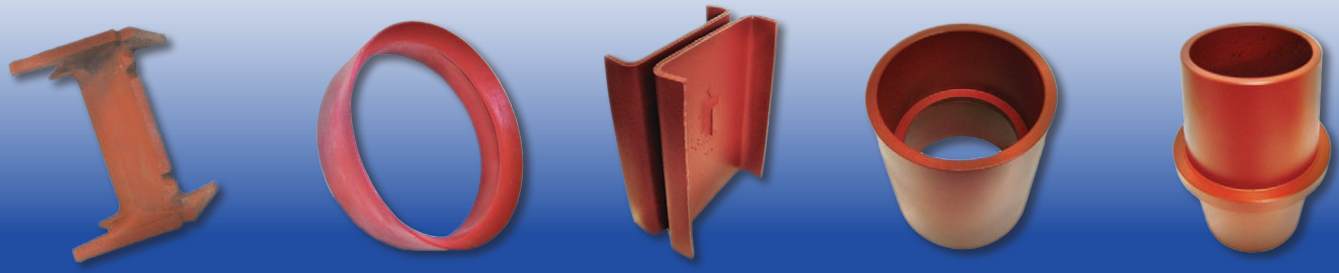

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Geo-Institute News

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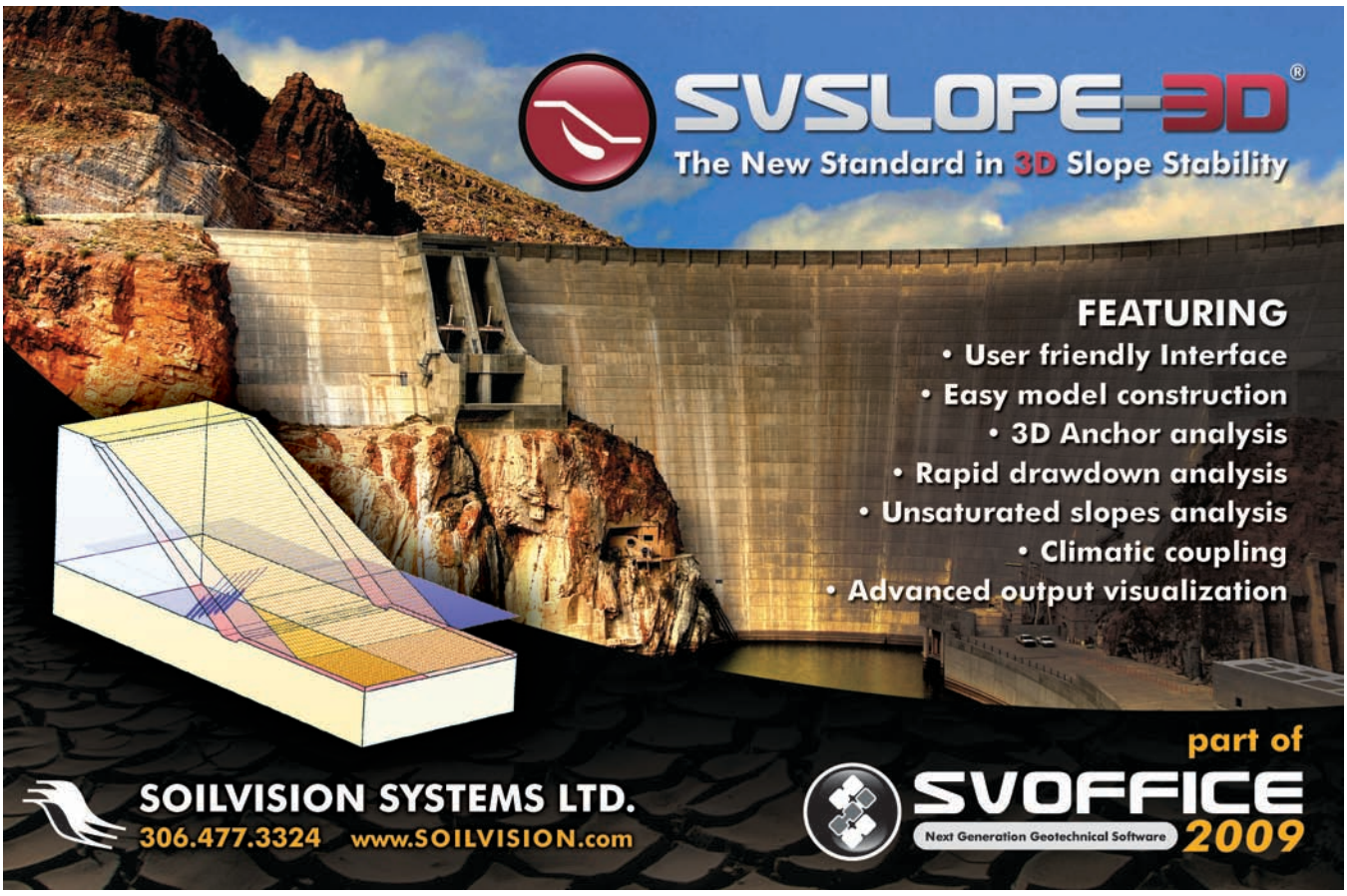

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Professional Development Corner

WEBINARS

An Overview of Geosynthetics and Their Major Applications
Monday, March 7, 2011/ 11:30 am - 1 pm
https://secure.asce.org/ASCE-WebSite/Webinar/ListWebinar-Detail.aspx?ProdId=17549

LRFD Earth Retaining Structures - Fill Walls
Friday, March 11, 2011 / 12-1:30
https://secure.asce.org/ASCE-WebSite/Webinar/ListWebinar-Detail.aspx?ProdId=17554

SEMINARS

Deep Foundations: Design, Construction and Quality Control
March 17-18, 2011
Somerville, MA
https://secure.asce.org/ASCE-WebSite/Webinar/ListSeminar.aspx?CatCode=CED-GEOT#54

Earth Retaining Structures: Selection, Design, Construction and Inspection - Now in an LRFD Design Platform - *Newly Updated!*
March 10-11, 2011
Cincinnati, OH
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Broaden Your International Knowledge

Former G-I President, **Jean-Louis Briaud**, now president of ISSMGE, encourages you to become an ISSMGE member. A $15 membership will help you learn about international geo-professional news and information.

The International Society of Soil Mechanics and Geotechnical Engineering (ISSMGE) promotes the advancement and dissemination of knowledge in the field of geotechnics and its engineering and environmental applications, through conferences, technical committees, and member societies. The Geo-Institute is the U.S. Member Society of ISSMGE

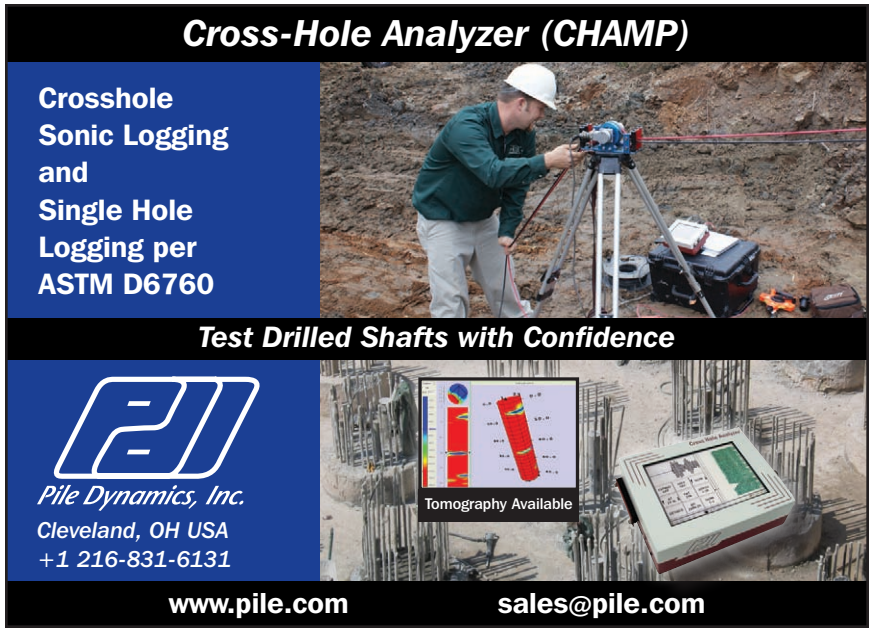
ASCE members: Join by enrolling on your annual ASCE renewal form; logging in to your member account at www.asce.org; or calling 800.548.2723. An ISSMGE membership is already included in a Geo-Institute-only membership.

Learn more about membership in ISSMGE: *www.issmge.org/*

New ! GeoTrends: GPP No.6

The Progress of Geological and Geotechnical Engineering in Colorado at the Cusp of a New Decade.

Proceedings of the 2010 Biennial Geotechnical Seminar, held in Denver, Colorado, November 5, 2010. Sponsored by the Geo-Institute of ASCE; the Colorado Chapter of the Geo-Institute; Rocky Mountain Section of the Association of Environmental and Engineering Geologists; Colorado Association of Geotechnical Engineers. This collection contains 11 papers is a collection of papers that examine past, present, and future geotechnical challenges for Colorado in the areas of earth retention, foundations, dams, pavements, and sustainability. Free Domestic Shipping! **$50** List/ **$37.50** ASCE Mem-



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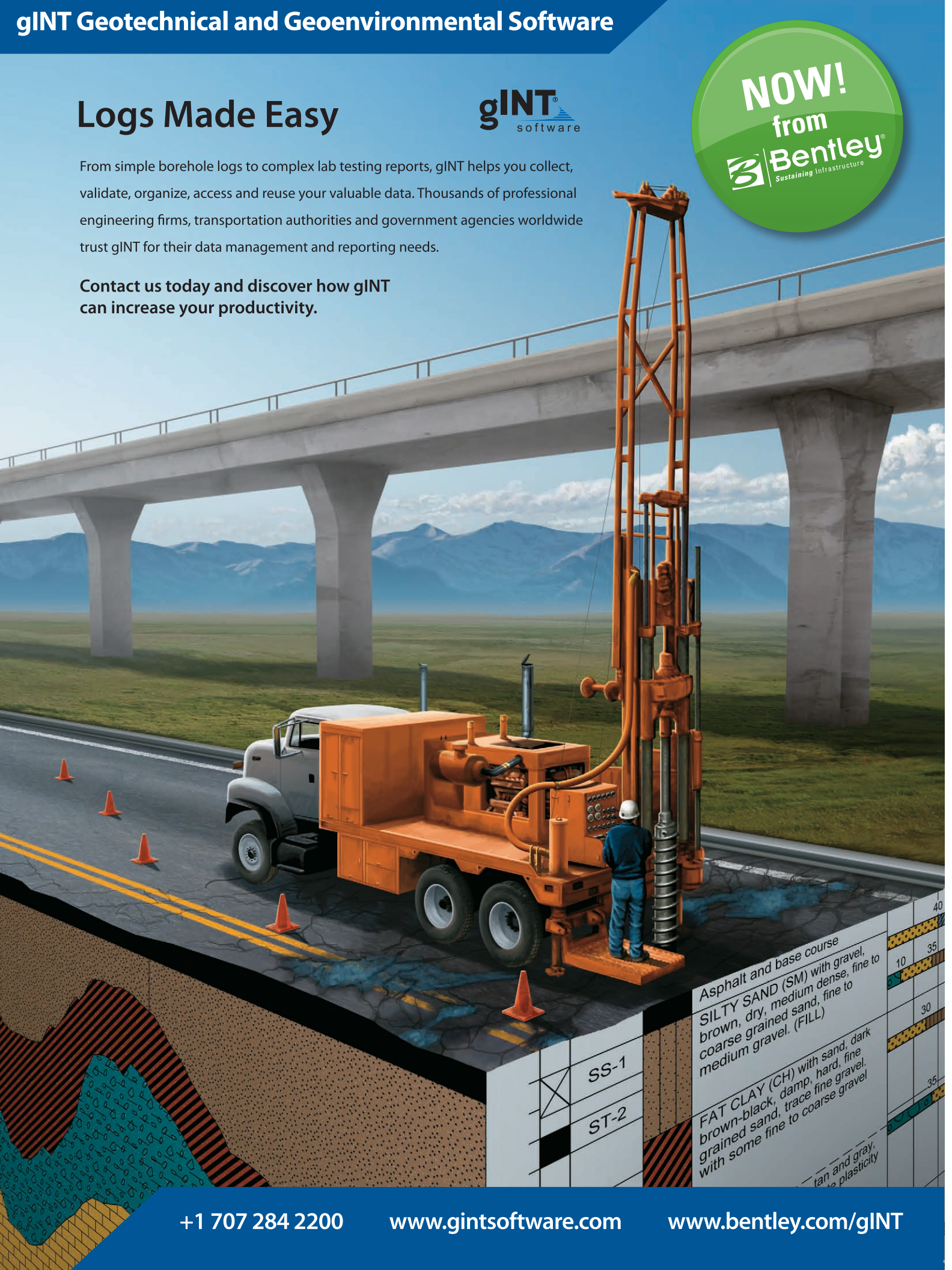

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G-I Upcoming Conferences

Visit ***www.geoinstitute.org/events.html*** for other upcoming events.

Geo-Frontiers 2011
March 13-16, 2011
Sheraton Dallas
Dallas, TX
www.geofrontiers11.com/

Geo-Risk
June 26-28, 2011
Intercontinental Buckhead
Atlanta, GA
www.georisk2011.org

State-of-the-Art and Practice in Geo-Engineering
March 25-29, 2012
Oakland Marriott City Center
Oakland, CA

Students

Geo-Frontiers 2011 Exclusive Student/OM Reception

The exclusive second annual Reception on Sunday, March 13, brings together future employers and employees. Here's your chance to meet potential employers and discuss what's happening in the geo-professional marketplace. This event, organized by the G-I Organizational Member Council is free for students, and two representatives of each G-I Organizational Member firm. Though the deadline for a stipend has already passed, you should complete the Student Information Form to have your information printed in the booklet given to all the G-I's Organizational Members.

Register at: *www.geofrontiers11.com/registration.cfm*

Student Information Form: *http://content.geoinstitute.org/student-questionaire.html*

Richard E Gray.

Members in the News

Gray Receives Achievement Award

Richard E. Gray, Dist.M.ASCE, and Hon.D.GE, received a 2010 Carnegie Mellon University, Alumni Achievement Award for his accomplishments and devotion to the practice of geotechnics, geotechnical engineering, and engineering geology.

His exceptional work has made him one of the world's foremost experts in land subsidence caused by mining operations, disposal of expansive shale and slag, and mine reclamation.

A registered geologist in 14 states, he has worked extensively throughout the country, in addition to consulting on mine subsidence in Alberta, Vancouver Island, and in New Zealand; on steel-mill foundations in Iran; and on mine fires in India.

Over the years, Gray has held a chairmanship or presidency in all three of the United States' engineering geology organizations, and has selflessly given his time to the benefit of local, state, and national levels of such organizations as the Geo-Institute and ASCE.

For his longstanding service, Gray received the Award of Merit from the American Society for Testing and Materials, among a host of other high honors. He co-founded DiGioia Gray & Associates in 2005 and continues to contribute to the field, and helps to educate the next generation of engineering geologists.

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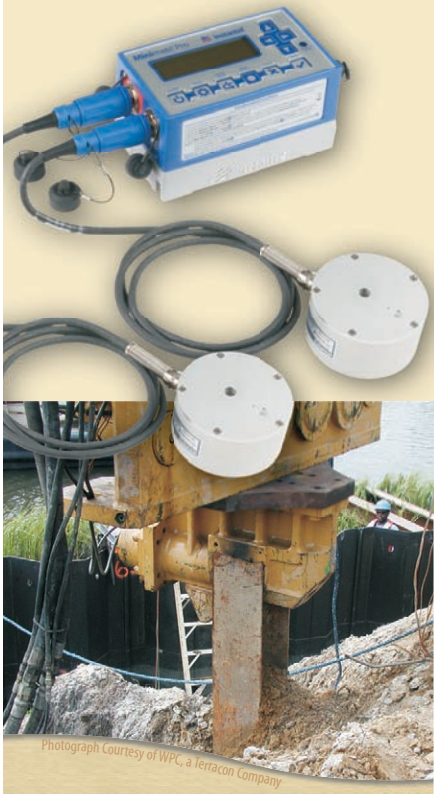

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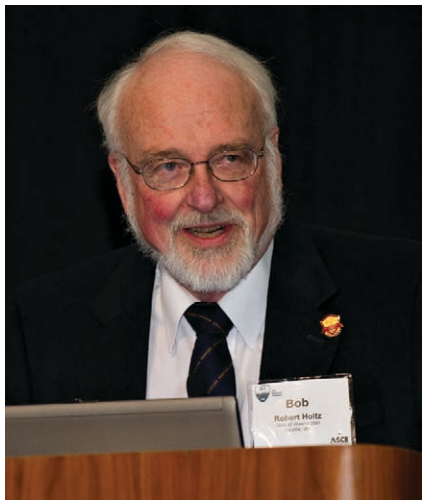
Call For Abstracts for Robert Holtz GSP



Robert Holtz.

This Geotechnical Special Publication (GSP) – Sound Geotechnical Research to Practice will be a collection of papers honoring Professor Robert Holtz's contribution to geotechnical research and practice. The GSP will be edited by Armin W. Stuedlein and Barry R. Christopher in cooperation with the ASCE Seattle Section Geotechnical Group.

For more than 45 years, Professor Bob Holtz, P.E., D.GE., Dist.M.ASCE, has made distinguished contributions to the assessment of fundamental soil behavior, soft ground construction and improvement, geosynthetic and steel reinforced soils, and geotechnical engineering education. Through his tenure at Purdue University and the University of Washington, he has made a national and international impact through service in professional organizations such as ASCE, ASFE, ASTM, Geo-Institute, and TRB, as well as numerous other institutions. He also has made a significant impact to the professional community in the Puget Sound region, helping build the connection between industry and the University of Washington. Selected papers will be presented with release of the Proceedings at GeoCongress 2013. Abstracts are due May 8, 2011. For information: *http://web.engr.oregonstate.edu/~armin/index_files/HoltzGSP*

The G-I Congratulates New ASCE Distinguished Members

John Dunnicliff.

John Dunnicliff, P.E., Dist.M.ASCE (United Kingdom) and **Harry G. Poulos, Ph.D, P.E., Dist.M.ASCE** (Australia), and **Stein Sture, Ph.D.** were formally inducted as ASCE Distinguished Members at the Celebration of Leaders Luncheon on October 21, 2010 as part of the ASCE Annual Conference in Las Vegas.

Dunnicliff was elected for his preeminent leadership in the field of geotechnical instrumentation and monitoring and for his long and distinguished career as a specialty consultant dedicated to the improvement of geotechnical practice.

Poulos was elected for his contributions to research and practice in foundation engineering, and especially for

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Harry Poulos.

his work on pile foundation analysis and design which has been applied to some of the world's tallest structures.

Stein Sture.

Sture was elected for his acknowledged eminence in the fields of fracture mechanics, constitutive modeling of cementitious composites and geomechanics, and non-linear analysis and computational techniques related to granular materials and soil-structure interaction; and for an exemplary career as an educator.

Stanphill Promoted to President

Dean Stanphill.

Dean Stanphill, P.E., G.E., was promoted to President/CEO of GCE Environmental. With offices in Portland OR, Reno NV, and Anaheim CA, GCE is a leader in the biogas conversion to energy industry and has worked on projects worldwide. His role with the firm will continue to include promoting GCE's renewable energy division, as well as its environmental and geotechnical departments. Stanphill also is a member of the Nevada Renewable Energy Coalition and president of the Great Basin Chapter of the Solid Waste Association of North America. Richard Prosser, founder of GCE, will serve as Chairman of the Board of Directors.

Lee Abramson and Jon Stewart Elected ASCE Fellows

Lee W. Abramson, P.E., D.GE, F.ASCE and Jonathan P. Stewart, Ph.D., P.E., F.ASCE were recently elected ASCE Fellows – the Society's second-highest membership grade, exceeded only by distinguished members.

Abramson, currently pursuing a doctorate in civil engineering at the Colorado School of Mines, is an executive vice president for Hatch Mott MacDonald. He has held numerous positions in the public works consulting and architectural and engineering fields throughout the past 30 years and has had numerous supervisory responsibilities for more than 150 engineers, designers, and technicians. The author of numerous articles and books, he also has assisted in the preparation of tunneling, slope stability, ground improvement, microtunneling, and tunnel rehabilitation manuals and seminars.

Stewart is a professor of civil engineering and vice-chairman for graduate studies in the civil and environmental engineering department at the University of California at Los Angeles. His research interests are in geotechnical earthquake engineering, with emphasis on seismic soil-structure interaction, the engineering characterization of earthquake ground motions, seismic compression of unsaturated soils, and ground failure in saturated soils with marginal plasticity. The results of the work done by his research group are widely used in engineering practice. Stewart has been the editor in chief of *ASCE's Journal of Geotechnical and Geoenvironmental Engineering* since 2007, and has won numerous awards including ASCE's Arthur Casagrande Award and Walter L. Huber Civil Engineering Research Prize.

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CGS NEWS

Message from the President

Bryan Watts, President of Canadian Geotechnical Society.

Dear Colleagues,

This is my first message to the members of the Canadian Geotechnical Society in my new role as President for the 2011/2012 term. First I would like to thank the immediate Past President, Michel Aubertin, and his Executive Committee (EC), for their accomplishments and hard work during this past term. This EC was responsible for the roll-out of the new CGS website, the near completion of French translation of the Canadian Foundation Engineering Manual and many other initiatives. Following in their footsteps are these new EC members:

- **Dr. John Sobkowicz** as Vice President, Technical. John is a Principal with Thurber Engineering in Calgary and replaces Dr. Doug Stead in this role.
- **Dr. Jean-Marie Konrad** as Vice President, Communications. Jean-Marie is a Professor of Civil Engineering at the University of Laval in Quebec City and replaces Dr. Stéphanie Perret in this role.
- **Mr. Peter Gaffran**, as Vice President, Finance. Peter is a Dam Safety Engineer for BC Hydro for the Lower Columbia and replaces Mr. Don Lewycky who served two terms in this role and made substantial improvements to our CGS accounting systems.
- **Ms. Marcia MacLellan**, as the Representative for Local Sections. Marcia is a Senior Geotechnical Engineer and Associate with Klohn Crippen Berger in Calgary. She takes over from Dr. Marolo Alfaro.
- **Dr. Chris Hawkes**, as the Representative for Technical Divisions. Chris is an Associate Professor of Civil and Geological Engineering at the University of Saskatchewan in Saskatoon. He takes over from Dr. Jitendra Sharma.

We look forward to continuing the efforts of the past EC while building on the traditions and successes of the CGS. We are ably assisted in our endeavours by our Secretary-General, **Dr. Vic Sowa** and our Administrator, **Mr. Wayne Gibson.**

The mission of the CGS is "**To initiate and pursue efforts leading to the technical competence and excellence of Canadian geotechnical and geosciences professionals"**. This mission is as meaningful now as it was when written. For those interested, the administrative manual of the CGS is included in the members section on our website and is useful reading for those interested in our affairs – few societies have such a comprehensive outline of their organization. As further example, Dr. Vic Sowa presented me with a daily planner of duties and schedule for the coming year, just in case my memory needed a reminder!!

Looking back, the 2010 CGS Annual Conference in Calgary and the 2009 Conference in Halifax were both very successful. Looking forward, the CGS will host the 14th Pan-American Conference on Soil Mechanics and Geotechnical Engineering, the 64th Canadian Geotechnical Conference and the 5th Pan-American Conference on Teaching and Learning of Geotechnical Engineering at the Sheraton Centre Hotel in Toronto, Ontario from October 2 to 6, 2011. This is the first joint conference with the International Society for Soil Mechanics and Geotechnical Engineering since a similar conference in Vancouver in 1982. All members of the CGS are urged to attend this important conference.

From May 15 to 17, the 5th Canadian Conference on Geotechnique and Natural Hazards is being held in Kelowna and from September 18 to 21, Slope Stability 2011: the International Symposium on Rock Slope Stability in Open Pit Mining and Civil Engineering is taking place in Vancouver. Look to the Calendar of Events on our CGS website www.cgs.ca for more information on these conferences, both of which are supported by the CGS. Kelowna is a great place to be in May, right next to Lake Okanagan, and if you did not visit Vancouver during the 2010 Olympics, the Olympic flame statue will still be there in September when you attend the Slope Stability conference.

All of the above events originated from the hard work of CGS members. These events are part of the continuing practice and teaching of geotechnical engineering, which continues to grow and prosper in Canada. Canadians are leaders in many aspects of geotechnique and continue to develop new techniques and ideas. One of our great strengths is the development of young geotechnical talent through advanced education and transfer of experience. Key to this is the mentoring of young engineers – to that end CGS embraces and fosters mentoring of young geotechnical professionals. If this is important to you, then being a member of the CGS should be as well!

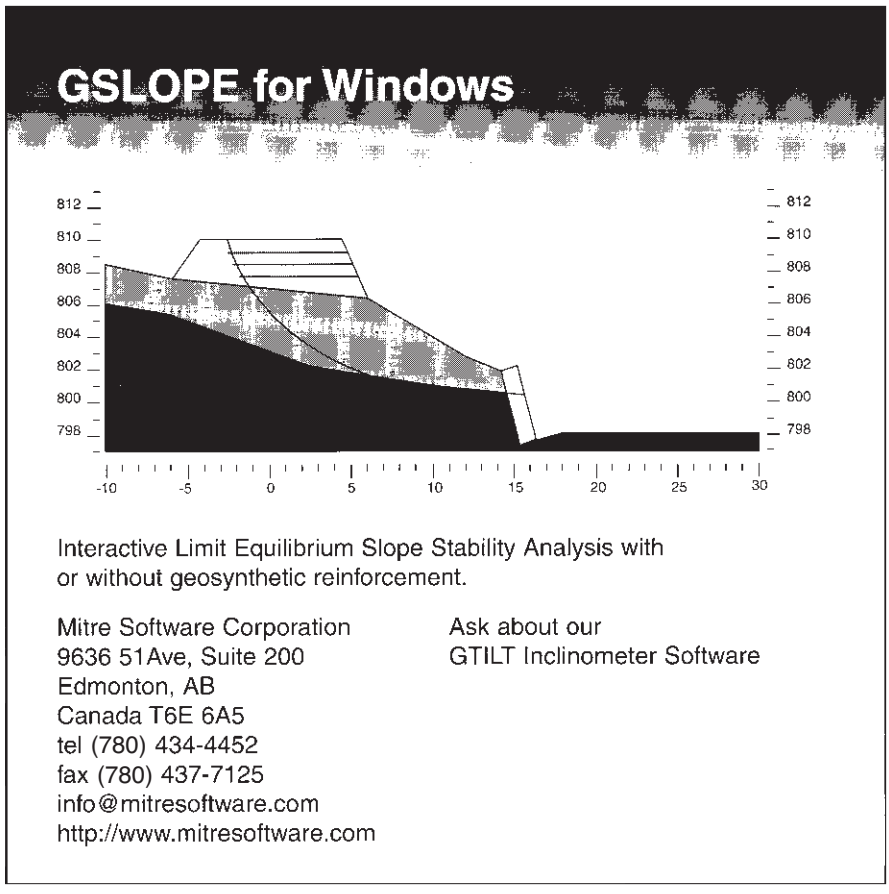
My two initiatives for this two-year term are to a start an Oil Sands Geotechnique Committee and to expand strategic planning in the CGS. Strategic planning will be pursued at length over the next two years. The Oil Sands initiative may become part of a larger mining initiative, one of which will come to fruition in 2011. For those interested in the Oil Sands, seven distinguished scientists from the Royal Society of Canada just published a report on the present environmental status of that area. This interesting reading is available from the Royal Society of Canada website, www.rsc.ca.

Being a volunteer President of this distinguished learned society carries with it the triple responsibilities of honouring those geotechnical engineers who have built this society, addressing the needs of our current membership who inevitably seek value for their annual dues, and gauging the future so that our society continues to be relevant to our members. These are our challenges over the next two years!

Le Message du président

Chers collègues,

Ceci est mon premier message pour les membres de la Société Canadienne de Géotechnique (SCG) dans mon nouveau rôle de Président pour la durée de 2011/2012. D'abord, je tiens à remercier le Président sortant, Michel Aubertin, et son Comite exécutif (CE), pour leurs réalisations et leur travail acharné au cours de cette dernière péri-



ode. Ce CE était responsable pour la mise en place du nouveau site Web de la SCG, l'achèvement de la traduction française du CGEM, et de nombreuses autres initiatives. Sur leurs traces, les nouveaux membres du CE sont:

- Dr. John Sobkowicz comme Vice Président, Technique. John est un Principal avec Thurber Engineering à Calgary et remplace Dr. Doug Stead.
- Dr. Jean-Marie Konrad comme Vice Président, Communications. Jean-Marie est un professeur de Génie Civil à l'Université Laval dans la ville de Québec et remplace Dr. Stéphanie Perret.
- M. Peter Gaffran, comme Vice Président, Finance. Peter est un ingénieur de sécurité des barrages pour BC Hydro (Lower Columbia) et remplace M. Don Lewycky qui a servi deux mandats à ce poste et qui a apporté des améliorations substantielles aux systèmes de comptabilité de la SGC.
- Mme. Marcia MacLellan, en tant que Représentante des Sections Locales. Marcia est une ingénieure en géotechnique et associée avec Klohn Crippen Berger à Calgary. Elle succède au Dr. Marolo Alfaro.
- Dr. Chris Hawkes, comme Représentant pour les Divisions Techniques. Chris est un professeur agrégé de Génie Civil et Génie Géologique à l'Université de Saskatchewan à Saskatoon. Il succède au Dr. Jitendra Sharma.

Nous sommes impatients de poursuivre les efforts de l'ancien CE tout en nous appuyant sur les traditions et les réussites de la SCG. Nous sommes bien secondés dans nos efforts par notre Secrétaire Général, Dr. Vic Sowa et notre Administrateur, M. Wayne Gibson.

La mission de la SCG est "d'initier et de poursuivre les efforts menant à la compétence technique et l'excellence des professionnels canadiens de géosciences et de géotechnique". Cette mission est aussi valable aujourd'hui qu'elle l'était lors de sa conception. Pour plus de détails, veuillez consulter le manuel de procédures administratives de la SCG inclus dans notre site Web. Peu de sociétés ont un tel aperçu global de leur organisation. Dr. Vic Sowa m'a présenté un planificateur quotidien des tâches du Président et le calendrier de l'année à venir, juste au cas où ma mémoire aurait besoin d'un rappel!!

En regardant nos activités récentes, la Conférence Annuelle de la SCG 2010 à Calgary et la conférence 2009 à Halifax ont été de grands succès. En regardant vers le futur, la SCG sera l'hôte de la 14e conférence panaméricaine sur la mécanique des sols et l'ingénierie géotechnique (CPMSIG), de la 64e conférence canadienne de géotechnique (CCG) et de la 5e conférence panaméricaine sur l'enseignement et l'apprentissage en ingénierie géotechnique (CPEAIG) à l'hôtel Sheraton Centre à Toronto, Ontario du 2 au 6 octobre, 2011. Il s'agit de la première conférence conjointe avec la Société internationale de Mécanique des Sols

et de Géotechnique depuis une conférence similaire à Vancouver en 1982. Tous les membres de la SCG sont invités à participer à cette importante conférence.

A partir du 15 mai jusqu'au 17 mai, la "5e conférence canadienne sur la géotechnique et les risques naturels" se tiendra à Kelowna (CB). Du 18 au 21 Septembre "La stabilité des pentes 2011: Symposium international de stabilité des talus rocheux pour l'exploitation minière à ciel ouvert et en génie civil" se tiendra a Vancouver (CB). Consultez notre site web de la SCG, www.cgs.ca, pour plus d'informations sur ces conférences, qui bénéficient du support de la SCG. Kelowna est un endroit idéal en mai, près du lac Okanagan. Si vous n'avez pas visité Vancouver pendant les jeux Olympiques de 2010, la statue de la flamme olympique sera toujours là en septembre lorsque vous assisterez à la conférence de stabilité des pentes.

Tous les événements ci-dessus proviennent du travail acharné des membres de la SCG. Ces événements font partie de la pratique continue et l'enseignement de l'ingénierie géotechnique qui continue de croître et prospérer au Canada. Les Canadiens sont des leaders dans de nombreux aspects de la géotechnique et continuent à développer de nouvelles techniques et idées. Une de nos grandes forces est le développement des jeunes talents géotechniques par l'enseignement supérieur et le transfert d'expérience. La clé est le mentorat de jeunes ingénieurs. La SCG adopte ce concept et encourage le mentorat de jeunes ingénieurs. Si cela est important pour vous, être un membre de la SCG devrait également l'être!

Mes deux initiatives pour ce mandat de deux ans sont de mettre sur pied un Comité géotechnique pour les sables bitumineux et d'initier la planification stratégique au sein de la SCG. La planification stratégique sera poursuivie au cours des deux prochaines années. L'initiative des sables bitumineux pourra faire partie d'une initiative plus grande d'exploitation minière qui portera ses fruits en 2011. Pour ceux qui s'intéressent aux sables bitumineux, sept scientifiques distingués de la Société royale du Canada ont récemment publié un rapport sur l'état actuel de l'environnement de cette région. Cette lecture intéressante est disponible sur le site Web de la Société royal du Canada.

Être Président bénévole de cette société distinguée vient également avec la triple responsabilité de rendre hommage aux ingénieurs géotechniciens qui ont construit cette société, de répondre au besoin de nos membres actuels qui recherchent inévitablement la valeur de leurs cotisations annuelles, et d'évaluer les besoins futurs afin que notre société continue d'être pertinente pour nos membres. Ce sont nos défis au cours des deux prochaines années!

From the Society

Call For Nominations – CGS President- Elect
Appel de Nominations – President Designé de La SCG

The next President-Elect for the Society will be appointed effective 1 January 2012. The person appointed to this position will become President of the Society for the years 2013 and 2014. It is now time to begin the process leading to this appointment, which will be confirmed at the 64th Canadian Geotechnical Conference in Toronto on October 2-6, 2011.

In accordance with the By-Laws of the Society, a Nominating Committee was formed in 2010 to propose a suitable candidate for President-Elect. The committee consisted of **Michel Aubertin,** (President, Chair), **Dennis Becker,** (Past-President), **Lee Barbour, Murray Grabinsky** and **Paul Chiasson** (General Members of CGS).

The Nominating Committee has provided the name of **Richard J. Bathurst, P.Eng**, as a candidate for the position of President-Elect in 2012, and President in 2013 and 2014. Dr. Bathurst has agreed to be a candidate. In the accompanying paragraphs he provides a short statement that outlines his objectives for the Society.

Richard J. Bathurst.

While Dr. Bathurst is the candidate proposed by the Nominating Committee, other candidates are also welcomed. Any general member of the Society may nominate a candidate for election to the position of President-Elect. Nominations must be received by the Society Secretariat in writing by 15 June, 2011. Through the by-laws of the Society, any such nomination shall have the written support of at least 18 general members and a statement by the candidate expressing willingness to serve as President. Further information can be obtained by CGS members from the Society's Administration Manual available in the Members Section. CGS members can log-in at http://cgs.ca/log-in.php then click Online Member Resources, go to CGS Manuals, and proceed to the Administration Manual link.

If there are no additional candidates, Dr. Bathurst will be elected by acclamation at the Meeting of the Board of Directors of the CGS in Toronto. If additional candidates are nominated, selection will be by mail-in ballot, and, or by electronic ballot, provided to all members of the Society, with submission of ballots no later than midnight on July 15, 2011.

(Provided by Victor Sowa, Secretary General)

President-Elect Objectives Nomination Statement of Richard J. Bathurst

I am honoured to be selected by the Nominating Committee of the Canadian Geotechnical Society (CGS) as our Society's President-Elect in 2012. I accept this nomination and if elected look forward to serving the Society for a two-year term as President commencing January 2013.

I have been a member of the Canadian Geotechnical Society for more than 30 years and an active participant. These activities include Vice-President, Technical (2000-2002), Chair - Geosynthetics Division (1998-2000) and editor of the geosynthetics chapter in the 3rd and 4th editions of the Canadian Foundation Engineering Manual. I have received the A.G. Stermac Award of the CGS on three separate occasions for my service to the Society and the CGS Geosynthetics Division Award in 2002. In addition, I have served on the organizing committee of one of our annual CGS conferences, on the CGS Geotechnical Research Board and am currently Chair of the Task Force on CGS Membership. I have delivered 1-day short courses on geosynthetics at the last three CGS annual conferences. Examples of my volunteer services to other learned societies include Vice President and then President of the International Geosynthetics Society (IGS) (1998-2002), President of the North American Geosynthetics Society (NAGS) (1997-1998), IGS News Editor (1990-1994) and EIC Treasurer (2003-2005).

I started my professional career as a geotechnical engineer with Golder Associates for three years and then moved to the Royal Military College (RMC) in 1980 to teach and complete a Ph.D. at Queen's University in soil mechanics (1985). I am currently a Professor of Civil Engineering at RMC and hold a cross-appointment at Professor rank at Queen's where I am a member of the GeoEngineering Centre at Queen's-RMC. During my academic career my research has focused largely on earth reinforcement technologies. I am currently editor of the journal Geosynthetics International and serve on the editorial board of four other journals.

I have been the recipient of the CGS R.M. Quigley Award for best paper in the Canadian Geotechnical Journal on three occasions and runner-up once, and recipient of the Casimir Gzowski Medal of the Canadian Society for Civil Engineering for the best paper in civil engineering on two occasions and also runner-up once. I have been an invited keynote or special lecturer at conferences on more than 20 occasions and delivered the CGS Cross Country Lecture Tour in 2003. I was elected Fellow of the Engineering Institute of Canada in 2001 and the Canadian Academy of Engineering in 2004. While my professional activities fall largely in the realm of academia, I continue to work with my industry colleagues through consulting and ownership of a small specialized laboratory testing services company.

I believe that my volunteer contributions to the CGS, IGS and NAGS have given me valuable experience to lead our Society for the 2013-2014 period. Fortunately for the next President-Elect, there is every expectation that the CGS will continue to be a healthy, active society with a strong financial footing. Nevertheless there are challenges ahead. The level of activity of the various CGS divisions has been uneven in the past; this needs to be carefully watched by the CGS executive and strategies explored to increase the profile of some divisions. As Chair of the Task Force Membership Committee it is clear that we must not be complacent in our activities to encourage and engage recent graduate engineers to participate in the Society. Many local chapters encourage students through seminars and student paper presentations and the CGS recognizes these students with awards given at the annual CGS conference. However, there is often a gap in awareness of the CGS as these young people move into industry. Our Society needs to do a better job to maintain the attention of these young people. A strategy to do this is to tap senior engineers in these companies to encourage these young people to participate in local Society activities and to promote our discipline through membership and subscription to the Canadian Geotechnical Journal.

One strength of our Society is the strong history of collaboration and collegiality between academics and practitioners. My experience with other societies is that broad representation has not always been the case. Nevertheless, I believe more can be done. For example, there is a wealth of experience by our geotechnical contractors and consultants that is not communicated in the journal literature where it can be used by others. On the other hand, there are many new academics looking for data from practical case studies that can assist them to advance the state-of-practice and at the same time develop a publication record. If elected, I would like to explore the possibility of a young academic mentoring program with our contractors and consultants.

The Canadian Geotechnical Society will continue to meet challenges in the future. If elected, I look forward to leading the CGS in meeting these challenges and ensuring the continued success of our Society.

Richard J. Bathurst, P.Eng., Ph.D., FEIC, FCAE

Appel de Nominations – President Designe de la SCG

Le prochain président élu de la Société entrera en fonction le 1er janvier 2012. La personne désignée pour ce poste deviendra Président de la Société pour les années 2013 et 2014. Le temps est venu de démarrer le processus menant à cette nomination qui sera dévoilée lors de la 64ème Conférence canadienne de géotechnique qui se tiendra à Toronto du 2 au 6 octobre 2011.

Conformément aux statuts de la Société, un comité de nomination a été formé en 2010 afin de proposer un candidat au poste de Président élu. Le comité était composé de **Michel Aubertin,** (Président), **Dennis Becker,** (ancien Président de la SCG), **Lee Barbour, Murray Grabinsky** et **Paul Chiasson** (membres de la SCG).

Le comité de nomination a soumis le nom de **Richard J. Bathurst, P.Eng,** comme candidat au poste de Président élu en 2012 puis de Président

Join us in Toronto this October

2011 Pan-Am CGS Geotechnical Conference

October 2-6 octobre 2011, Toronto, Ontario, Canada

www.panam-cgc2011.ca

64th Canadian Geotechnical Conference and 14th Pan-American Conference on Soil Mechanics & Geotechnical Engineering

64e conférence géotechnique canadienne et 14e conférence panaméricaine sur la mécanique des sols & l'ingénierie géotechnique

Be sure to visit us in Toronto this October when CGS will join with ISSMGE to host the 2011 Pan-Am CGS Geotechnical Conference. The Technical Committee has accepted over 800 abstracts and is on track to be the largest CGS conference ever.

"Geo-Innovation Addressing Global Challenges" is the theme of this integrated conference. In addition, the 5th Pan-American Conference on Teaching and Learning of Geotechnical Engineering will be held on Sunday, October 2, 2011 and will explore teaching and learning methods, as well as the implementation of industrial practice sessions into the classroom.

2011 PAN-AM CGS CONFERENCE PROGRAM HIGHLIGHTS WILL INCLUDE:

R M Hardy Address presented by Dr. K Y Lo (University of Western Ontario)

Casagrande Lecture by Dr. Kerry Rowe (Queen's University)

750+ delegates and more than 400 technical and special presentations over three days!

Local Colour Night at the Royal Ontario Museum and the 4th annual CGS Gala Awards Banquet

Technical Themes

- Retaining walls
- Ground improvement/ remediation
- Geoengineering for development & education
- Geoenvironmental engineering
- Climate change & geohazards
- Mining & rock mechanics
- Buried structures & subsurface systems
- Behaviour of unsaturated soils
- Earthquake engineering & geophysics
- Geotechnics for energy exploitation
- Laboratory testing/ In situ testing
- Shallow foundations
- Deep foundations
- Embankments and dams
- Hydrogeology and seepage
- Transportation geotechnics
- Permafrost engineering
- Mine waste disposal
- Landslides
- Probability and reliability-based design

TECHNICAL TOURS (Thursday, October 6)

Tour 1 – Niagara Region Geotechnical Highlights

Tour 2 – Metro Toronto Geotechnical Highlights

The conference will be held at the Sheraton Centre Toronto in downtown Toronto, Ontario.

Please see the conference web site at **www.panam-cgc2011.ca** for detailed conference information and to register online.

Online delegate registration is now available – be sure to register early to take advantage of advance pricing discounts!

SOCIAL PROGRAM HIGHLIGHTS

Opening Icebreaker/Trade Show Reception
Local Colour Night in support of the Canadian Foundation for Geotechnique at the ROM
Gala Awards Banquet on October 4th

Platinum Sponsors:

ConeTec · Rapid Impact Piers Ltd · EBS · GEOPAC · coffey geotechnics · BGC · GEO-SLOPE INTERNATIONAL · Golder Associates · Marine + Earth MEG Geosciences · Reinforced Earth · Stantec

en 2013 et 2014. Dr. Bathurst a accepté cette candidature. Dans les paragraphes qui suivent, il présente une courte déclaration donnant un bref aperçu de ses objectifs pour la Société.

Dr. Bathurst étant le candidat proposé par le comité de nomination, d'autres candidats sont naturellement les bienvenus. Tout membre de la Société peut présenter un candidat au poste de Président élu. Les nominations doivent être soumises au secrétariat de la SCG par écrit et ce, avant le 15 juin 2011. Conformément aux statuts de la Société, toute nomination doit être appuyée par une lettre de soutien d'au moins 18 membres et une déclaration exprimant son consentement à agir comme Président doit être rédigée par le candidat. Pour plus d'informations, vous pouvez consulter le manuel d'administration.

Si aucune autre candidature n'est soumise, Dr. Bathurst sera élu par acclamation lors de la réunion du conseil d'administration de la SCG, à Toronto. Si d'autres candidats sont proposés, la sélection sera effectuée au moyen d'un vote par correspondance et/ou d'un vote électronique, soumis à tous les membres de la Société. La soumission des votes devra se faire au plus tard à minuit le 15 juillet 2011.

(Préparé par Victor Sowa, Secrétaire général; vérifié par le Vice-président, communications)

Objectifs du président désigné: Déclaration de nomination de Richard J. Bathurst

Je suis honoré d'avoir été sélectionné par le comité de nomination de la Société canadienne de géotechnique (SCG) à titre de président désigné de la Société en 2012. J'accepte cette nomination et, si je suis élu, je me réjouirai de pouvoir être au service de la Société pour un mandat de président d'une durée de deux années à compter de janvier 2013.

Je suis membre de la Société canadienne de géotechnique depuis plus de 30 ans et j'y participe activement. J'ai été, entre autres, vice-président technique (2000-2002), président de la Division de la géosynthétique (1998-2000) et rédacteur du chapitre sur la géosynthétique des 3e et 4e éditions du *Manuel canadien d'ingénierie des fondations*. J'ai reçu le prix A.G. Stermac de la SCG à trois reprises, pour les services que j'ai rendus à la Société, et le prix de la Division de la géosynthétique de la SCG en 2002. De plus, j'ai siégé au comité d'organisation de l'une des conférences annuelles de la SCG, au Conseil de recherche géotechnique de la SCG. Je fais présentement partie du groupe de travail spécial sur les adhésions à la SCG. J'ai donné des cours intensifs d'une journée sur la géosynthétique lors des trois dernières conférences annuelles de la SCG. Voici des exemples de mon bénévolat au sein d'autres sociétés savantes : j'ai été vice-président, puis président, de l'International Geosynthetics Society (IGS) (1998-2002); président de la North American Geosynthetics Society (NAGS) (1997-1998); rédacteur de la revue IGS News (1990-1994); et trésorier de l'ICI (2003-2005).

J'ai débuté ma carrière professionnelle en tant qu'ingénieur géotechnique chez Golder Associates pendant trois ans. J'ai déménagé par la suite au Collège militaire royal (CMR) en 1980 pour y enseigner, ainsi que faire mon doctorat en mécanique des sols à l'Université Queen (1985). À l'heure actuelle, je suis professeur de génie civil au CMR et suis conjointement nommé au rang de professeur à Queen's, où je suis membre du Centre géotechnique de l'Université Queen et du CMR. Durant ma carrière universitaire, mes recherches ont principalement porté sur les technologies de renforcement du sol. Je suis actuellement le rédacteur de la revue Geosynthetics International et siège au comité de rédaction de quatre autres revues.

J'ai été récipiendaire du prix R.M. Quigley décerné par la SCG pour le meilleur article publié dans la Revue de géotechnique canadienne à trois reprises et au deuxième rang pour ce prix une fois. J'ai également obtenu la Médaille Casimir Gzowski de la Société canadienne de génie civil, attribuée pour le meilleur article en génie civil à deux reprises et également au deuxième rang pour cette médaille une fois. J'ai été invité à titre de conférencier d'honneur ou de conférencier spécialiste plus de 20 fois et ai prononcé des conférences dans le cadre de la Tournée de conférences pancanadiennes de la SCG en 2003. J'ai été élu membre de l'Institut canadien des ingénieurs en 2001 et de l'Académie canadienne du génie. Même si mes activités professionnelles se déroulent principalement dans le milieu universitaire, je continue à travailler avec mes collègues œuvrant dans l'industrie, comme consultant et comme propriétaire d'une petite entreprise offrant des services spécialisés de tests en laboratoire.

Je crois que mes contributions à titre bénévole à la SCG, à l'IGS et à la NAGS m'ont donné une précieuse expérience pour être à la tête de notre Société pour la période allant de 2013 à 2014. Heureusement pour le prochain président désigné, il y a tout lieu de croire que la SCG continuera d'être une société dynamique et active, dotée d'une bonne position financière. Néanmoins, il y a des défis à relever. Le niveau d'activité des diverses divisions de la SCG a été inégal dans le passé; il faut que cette question soit examinée de près par les membres du comité exécutif de la SCG et qu'on étudie des stratégies pour redorer le blason de certaines de ces divisions. En tant que président du groupe de travail spécial sur les adhésions, il me semble évident que nous ne devons pas être trop confiants en nos activité pour encourager et inciter les diplômés récents en génie à participer à notre Société. De nombreuses sections locales encouragent les étudiants au moyen de séminaires et de présentations d'articles rédigés par des étudiants, et la SCG reconnaît ces étudiants en leur décernant des prix lors de sa conférence annuelle. Toutefois, il y a souvent des lacunes en matière de sensibilisation à la SCG lorsque ces jeunes personnes font leur entrée dans l'industrie. Notre Société doit mieux retenir leur attention. Pour y parvenir, l'une des stratégies est de demander aux ingénieurs plus âgés travaillant dans les mêmes entreprises d'encourager ces jeunes personnes à participer aux activités locales de la Société et de promouvoir notre discipline, grâce à des adhésions ainsi que des abonnements à

la Revue de géotechnique canadienne.

L'une des forces de notre Société est sa longue tradition de collaboration et de collégialité entre les universitaires et les praticiens. Selon mon expérience avec d'autres sociétés, la vaste représentation n'a pas toujours été l'une de ses forces. Néanmoins, je crois qu'on peut en faire davantage. Par exemple, il existe un vaste bassin d'expérience parmi nos entrepreneurs et nos consultants en géotechnique qui n'est pas communiquée dans les revues savantes où elle pourrait servir à d'autres personnes. D'un autre côté, beaucoup d'universitaires qui commencent sont à la recherche de données tirées d'études de cas qui peuvent les aider à faire avancer l'état actuel de pratique et à se constituer une liste de publications. Si je suis élu, j'aimerais étudier la possibilité d'un programme de mentorat de jeunes universitaires jumelés à des entrepreneurs et à des consultants.

La Société canadienne de géotechnique continuera à relever des défis ultérieurement. Si je suis élu, je sera ravi de guider la SCG par rapport à ces défis et d'assurer le succès continu de notre Société.

Richard J. Bathurst, P.Eng., Ph.D., FEIC, FCAE

Call for Nominations for CGS Awards

Nominations for CGS Awards are to be submitted to The Canadian Geotechnical Society Secretariat, (8828 Pigott Road, Richmond, BC, V7A 2C4, Canada; Fax: (604) 277-7529, *e-mail: cgs@cgs.ca*) by not later than June 1, except where noted. Nominations must include the C.V. of the nominee, reasons why the individual merits the award, and any other pertinent information on the nominee. Letters from other Society members supporting the nomination add strength to the nomination.

Details for all Awards listed below can be obtained from the Society's Awards and Honours Manual, which is available to CGS members in the Members Section. CGS members can log-in at http://cgs.ca/login.php, then proceed to Online Member Resources, find CGS Manuals, and proceed to the Awards and Honours Manual. Information can also be obtained from Section Directors, Division Chairs, and the Secretariat. Funding for the Society's awards is provided by generous support from the independent charitable body, The Canadian Foundation for Geotechnique.

Members are invited and encouraged to submit nominations for the following CGS Awards:

R.F. Legget Medal - the Highest CGS Honour

Awarded to an individual for outstanding life-long contributions to geotechnique.

R.M. Quigley Award

Awarded to an individual(s) for the best paper published in the Canadian Geotechnical Journal within the year preceding the year in which the prize is awarded. Nominations are made by the Associate Editors of the Canadian Geotechnical Journal.

G. Geoffrey Meyerhof Award

Awarded to an individual for outstanding and exceptional contributions to the art and science of foundation engineering.

Thomas Roy Award

The award is presented to honour an outstanding contribution to the field of Engineering Geology in Canada.

Roger J.E. Brown Award

The award is presented:

a) to an individual (preferably Canadian) for publishing the best paper on permafrost science or engineering in
- Canadian Geotechnical Journal, or
- Canadian Journal of Earth Sciences, or
- Proceedings of National or International Permafrost Conferences, or

b) to honour an individual for his/her excellence in the field of permafrost.

John A. Franklin Award

The award recognizes an individual (or individuals) who have made an outstanding technical contribution in the fields of rock mechanics or rock engineering in Canada and/or internationally. Awarded every second year. To be awarded in 2011.

Geosynthetics Award

The award was presented for the first time in the 2000 to recognize an individual or individuals who have made an outstanding technical contribution to the use of geosynthetics in Canada and/or internationally. Awarded every second year. Not to be awarded in 2011.

Geoenvironmental Award

The award was presented for the first time in 2000 to recognize an individual or individuals who have made an outstanding technical contribution to the practice of multidisciplinary geoenvironmental engineering in Canada and/or internationally. Awarded every second year. Not to awarded in 2011.

Robert N. Farvolden Award

Following some years as the Hydrogeology Division Award, the Robert N. Farvolden Award was presented for the first time in 2002. The Hydrogeology Division selects the winner of the award, which recognizes outstanding contributions to groundwater science and engineering in Canada. The Awards Committee of the Hydrogeology Division commonly asks for input from the International Association of Hydrogeologists, Canadian National Committee, (IAH-CNC). Nominations on or before **April 1.**

CGS Graduate Student Award

For the best paper authored or co-authored and presented by a geotechnical graduate student at an accredited Canadian University. The winning paper each year is presented by the student at the annual Canadian Geotechnical Conference. All submissions and accompanying documentation must be received by the Chair of the Student Awards Sub-Committee on or before May 21 of the competition year. The contact information for the Chair is: - Nicholas Vlachopoulos, Dept. of Civil Engineering, Royal Military

College of Canada, Box 17000 Station Forces, Kingston, ON, K7K 7B4, Tel: 613-541-6000, Ext 6398; Email: vlachopoulos-n@rmc.ca

CGS Undergraduate Student Awards

There are two undergraduate student awards that endeavour to increase student awareness of the Society and their involvement in it.

a) **The Undergraduate Student Report**, I**ndividual Submission Award** was established in 1987 with the main purpose of recognizing and rewarding excellence in the preparation of a geotechnical report by an individual full time undergraduate student in an accredited engineering program or a geoscience program in a Canadian University.

b) **The Undergraduate Student Report, Group Submission Award** was added in 1990 to recognize and reward excellence of a report prepared by one or more undergraduate students in an accredited engineering program or a geoscience program in a Canadian University.

All submissions and accompanying documentation must be received by the Chair of the Student Awards Sub-Committee **on or before May 21** of the competition year. The contact information for the Chair is: - Nicholas Vlachopoulos, Dept. of Civil Engineering, Royal Military College of Canada, Box 17000 Station Forces, Kingston, ON, K7K 7B4, Tel: 613-541-6000, Ext 6398; Email: vlachopoulos-n@rmc.ca

A.G. Stermac Awards for Service to the Canadian Geotechnical Society

Before 1999, these awards were known as the CGS Service Plaques. A.G. Stermac Awards are presented to members of the Society who have contributed specific or special, worthy and significant service(s) to the Society. All submissions must reach the Society's Secretariat not later than **June 1**.

Schuster Medal

Nominations are now being accepted for the **Schuster Medal,** a joint award from the **Association of Environmental & Engineering Geologists** and the **Canadian Geotechnical Society** that recognizes excellence in geohazards research in North America.

All nominees for the Schuster Medal must meet at least two of the following criteria:

- Professional excellence in geohazards research with relevance to North America
- Significant contribution to public education regarding geohazards
- International recognition for a professional career in geohazards
- Influential geohazards research or development of methods or techniques
- Teacher of students who work on geohazards issues

The first Schuster Medal was awarded to the namesake of the award, Robert L. Schuster, on June 7, 2007, at the 1st North American Landslide Conference held in Vail, Colorado.

An awards committee containing representatives from the Association of Environmental & Engineering Geologists and the Canadian Geotechnical Society will select future candidates. The award will be presented at the annual or special topical meetings of either society, as deemed appropriate by the awards committee.

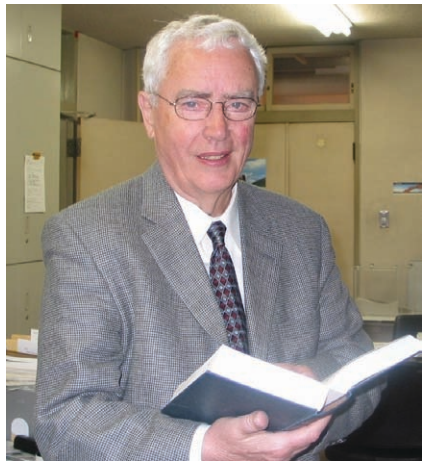
Nominations are due April 15 and should be sent to Becky Roland at AEG Headquarters. She will forward all nominations to the selection committee.

AEG
PO Box 460518
Denver, CO 80246
(303) 757-2926
broland@aegweb.org

Recent Awards

Several CGS members were recently recognized for their contributions and received various awards from the **Engineering Institute of Canada (EIC).**

Dr. W. D. Liam Finn has been awarded the K. Y. Lo Medal for significant engineering contributions at the international level.



Liam Finn.

Dr. W. D. Liam Finn is a gifted educator and researcher dedicated to understanding the behaviour of geological materials during and after earthquake shaking, and to transferring that understanding into engineering practice.

He has promoted Canadian earthquake engineering expertise abroad through his consulting activities in offshore structure foundations and seismic design of tailings dams and water supply dams, with such agencies as Exxon Production Research and the US Army Corps of Engineers.

His international reputation includes teaching and practice in Canada, the USA, Japan, China, and Europe. On faculty at UBC since 1961, he has mentored over 30 Ph.D. students, many from Japan, Sri Lanka, and China. He has also been a prolific author with over 260 refereed Journal Papers, and over 35 refereed Conference Papers.

Following his official retirement, while Anabuki Professor at Kagawa University, in Japan, from 1999 to 2005, he was made an honorary member of the Japanese Geotechnical Society, for efforts in transferring his knowledge and experience to his Japanese students. He has been presented with many awards, including a Churchill Fellowship, Cambridge University, UK; R. M. Quigley Award; G.G. Meyerhof Award; and the President's Prize, Association of Professional Engineers and Geoscientists of British Columbia. He also was the 10th Mallet-Milne Lecturer on Earthquake

Engineering, Institution of Civil Engineers, London, 2005; and member and principal geotechnical investigator for the Canadian National Committee for Earthquake Engineering (CANCEE), now the Standing Committee for Earthquake Engineering Design (SCED) from 1980 to present.

His service to international organizations includes an 8-year tenure on the TC-4 Technical Committee on Earthquake Engineering for the International Society for Soil Mechanics and Geotechnical Engineering, including four as Chairman. He was also Editor in Chief of the international Journal *Soil Dynamics and Earthquake Engineering*. He has also been Chairman, Panelist, or State-of-the-Art speaker at well over a dozen international conferences on Earthquake Engineering, Soil Mechanics, Computational Fluid Mechanics, and Non-linear Analysis.

His pioneering work to develop the Martin-Finn-Seed model for effective stress response of soils in undrained cyclic loading earned him a world-wide reputation in the field of earthquake geotechnique. This model, embedded in the computer model, DESRA, is in continuing use today in engineering practice.

Wayne Savigny

Dr. Wayne Savigny was awarded a Fellowship of the Engineering Institute of Canada (FEIC) *in recognition of excellence in engineering practice and exceptional contributions to the well being of the profession and to the good of the society*.

Dr. Wayne Savigny is a co-founder and Principal of BGC Engineering Inc., a geotechnical consultancy to the mining, oil and gas, energy and transportation industries. He has helped to foster an appreciation for the importance of engineering geology amongst several hundred students and colleagues over the course of his academic and consulting career.

Wayne obtained an undergraduate degree in Geological Engineering at Queen's University in 1971 and later obtained a Ph.D. from the University of Alberta where he studied creep movements affecting ice-rich permafrost soils in slopes along the Mackenzie River Valley. These studies continue to be of importance to the safe design of oil and gas infrastructure on frozen ground. Following graduation, he joined the Geological Survey of Canada and later, Thurber Consultants Ltd. Subsequently, he became Associate Professor, Department of Geological Sciences, University of British Columbia, 1986-1995.

Wayne's consulting assignments focus on the investigation and analysis of geological complexities as they influence engineered development. He helped to develop hazard and risk assessment methodologies that have been used to proactively manage geohazards affecting communities, industrial projects and linear infrastructure across Canada, as well as in Europe, central Asia and South America.

Wayne has contributed to technical and professional associations, including terms as Chairman, Engineering Geology Division, Canadian Geotechnical Society; Vice-President, Western Canada, Tunnelling Association of Canada, and Director, Cordilleran Division, Geological Association of Canada. He is currently an Associate Editor, Canadian Geotechnical Journal.

For his technical contributions, Wayne received the Thomas Roy Award and also the Roger J. E. Brown Award from the Canadian Geotechnical Society. He also undertook the 2005 Fall Cross-Canada Lecture Tour on behalf of the Canadian Geotechnical Society.

Jean Hutchinson

Dr. Jean Hutchinson was awarded a Fellowship of the Engineering Institute of Canada (FEIC) *in recognition of excellence in engineering practice and exceptional contributions to the well being of the profession and to the good of the society*.

Dr. Jean Hutchinson is a Professor of Geological Sciences and Geological Engineering at Queen's University. Every day, Jean promotes geological engineering, advances the state-of-the-art and disseminates engineering science in an outstanding fashion. Throughout her career, she has made excellent contributions in geotechnical engineering, engineering geology and rock mechanics, and her research has had a strong impact on practice. Her publications are key references in her field.

Dr. Hutchinson has participated in many international conferences. Jean is a sought-after lecturer on the international scene because of her expertise in landslide assessment, hazard mapping and risk mitigation. Two major contributions by Professor Hutchinson include: development of a decision support system for managing ground hazards and assessment of ground surface instability.

Jean Hutchinson has always shown a strong commitment to her profession. Jean has been Chair, Rock Mechanics Division, Canadian Geotechnical Society; Secretary and Treasurer, Canadian Rock Mechanics Association; Executive Committee Member, Canadian Landslide Committee; and

also past Associate Editor, Canadian Geotechnical Journal. Her contributions have been recognized with a John A. Franklin Award and A. G. Stermac Award from the Canadian Geotechnical Society.

Jean Hutchinson's dedication, resourcefulness and enthusiasm to teaching are also exceptional. Her contributions to the formation of young engineers and scientists in Canada and elsewhere are outstanding.

Upcoming Conferences

14th Pan-American Conference on Soil Mechanics and Geotechnical Engineering and 64th Canadian Geotechnical Conference

The Canadian Geotechnical Society and the International Society for Soil Mechanics and Geotechnical Engineering invite you to the 14th Pan-American Conference on Soil Mechanics and Geotechnical Engineering (PCSMGE), the 64th Canadian Geotechnical Conference (CGC) and the 5th Pan-American Conference on Teaching and Learning of Geotechnical Engineering (PCTLGE) at the Sheraton Centre Hotel in Toronto, Ontario, Canada from October 2 to 6, 2011. Details for the conference are located on the website, www.panam-cgc2011.ca.

The technical program for the 2011 Pan-Am CGS Geotechnical Conference will consist of a series of short courses, workshops, technical tours, technical sessions and invited lectures – at present the technical committee is considering the following broad topic areas/themes for author submissions:

- Laboratory & in situ testing
- Laboratory testing
- In situ testing
- Foundation engineering
- Shallow foundations
- Deep foundations
- Retaining walls
- Ground improvement/remediation
- Geoengineering for development & education
- Geoenvironmental engineering
- Climate change & geohazards
- Mining & rock mechanics
- Buried structures & subsurface systems
- Behaviour of unsaturated soils
- Earthquake engineering & geophysics
- Geotechnics for energy exploitation
- Embankments and dams
- Hydrogeology and seepage
- Transportation geotechnics
- Permafrost engineering
- Mine waste disposal
- Landslides
- Probability and reliability based design

5th Canadian Conference on Geotechnique and Natural Hazards, May 15 - 17, 2011 - Kelowna, BC, Canada

The Canadian Geotechnical Society (CGS) is pleased to invite you to the 5th Canadian Conference on Geotechnique and Natural Hazards (GeoHazards 5). Geohazards are more relevant every day as population growth and exploitation of natural resources increases interactions between the earth and human activities. Indeed, the earth itself is being affected by environmental changes induced by human activities.

The GeoHazards conferences are the premiere forum in Canada for the sharing and dissemination of scientific and engineering knowledge related to geohazards. GeoHazards 5 will be held May 15-17, 2011 at the University of British Columbia's Okanagan campus in beautiful Kelowna, British Colubia!

Kelowna is the gateway to the Okanagan. It is a modern city nestled amongst stunning mountains, picturesque lakes, lush wineries and sumptuous orchards. Kelowna's spectacular setting will be the backdrop to what promises to be another fantastic technical conference. Great talks, great food, great wine and great friends; we look forward to seeing you in 2011.

Dr. Dwayne Tannant
Chair, Organizing Committee
chair@geohazards5.ca

Dr. Richard (Rick) Guthrie
Chair, Technical Program
geotech@geohazards5.ca

Canadian Foundation for Geotechnique

Canadian Foundation for Geotechnique 2011 National Graduate Scholarship

The Canadian Foundation for Geotechnique (La foundation canadienne de géotechnique), is pleased to announce the call for nominations for the fourth annual *Canadian Foundation for Geotechnique National Graduate Scholarship*.

The scholarship, valued at $5,000, was established by the Canadian Foundation for Geotechnique in 2007 on the occasion of the 60th Canadian Geotechnical Conference in Ottawa. The scholarship awardees to date have been: Mr Jasmin Raymond, Université Laval, Ste Foy, QU; Marc-Andre Brideau, Simon Fraser University, Burnaby, BC; and Mr Nelson Ferreira, University of Manitoba, Winnipeg, MB. The 2011 scholarship will be presented at the Canadian Geotechnical Conference, in Toronto, ON, in October 2011.

Any Canadian or permanent resident, entering or registered in a Canadian university Master's or Ph.D. program that is directly related to an identified field of geotechnique, is eligible. Programs include geotechnical engineering, geological engineering, mining engineering, geoenvironmental engineering or geoenvironmental geoscience, engineering geology and hydrogeology. Nominees must have a high academic standing. Preference will given to those who have some practical experience and are active, or show leadership, in the geotechnical community.

Nominations are limited to one per academic department and require a letter, accompanied by rationale, written

and signed by the graduate supervisor. Rationale should include evidence of academic standing, research output, contributions to practice, and leadership/activity in the geotechnical community. A nomination package is limited to 5 pages. For award ceremony purposes, the nomination package should also include a digital image (300 dpi) of the nominee.

Nominations for the 2011 Scholarship will be accepted by the Canadian Geotechnical Society's Scholarship Selection Committee Chair, Dr Paul Simms (c/o Carleton University, Department of Civil and Environmental Engineering, 1125 Colonel By Drive, Ottawa ON. K1S 5B6, telephone 613 520 2600 ext. 2079, paul_simms@carleton.ca) up until June 1, 2010. If submitted by email, nominations must be signed by the supervisor and include the words "Canadian Foundation for Geotechnique National Graduate Scholarship" in the subject line.

For further information, refer to the Foundation's website at www.cfg-fcg.ca, or contact Mr Doug VanDine vandine@islandnet.com, tel 250 598 1028.

New Trustees for Canadian Foundation for Geotechnique

The Canadian Foundation for Geotechnique (the Foundation) is pleased to announce the addition of five new Trustees as of January 1, 2011 for a three-year term: Dr David Cruden (Edmonton, AB), Dr Suzanne Lacasse (Oslo, Norway), Mr Bob Patrick (Nanaimo, BC), Dr Brian Taylor (Dartmouth, NS) and Mr Gerald Webb (Ottawa, ON).

These Trustees replace the five retiring Trustees: Mr Michael Bleakney (Ottawa, ON), Dr Jean-Marie Konrad (Ste Foy, QU), Dr Tim Law (Ottawa, ON), Mr MAJ (Fred) Matich (Islington, ON) and Dr Arun Valsangkar (Fredericton, NB). Tim Law and Fred Matich have served as Trustees for more than 10 years. Tim Law has served as both Vice-President and President. Michael Bleakney served as Secretary for his term as a Trustee. The Foundation thanks these gentlemen for their volunteered time and good counsel.

The newly appointed Trustees are likely no strangers to members of the Canadian Geotechnical Society (CGS).

David Cruden, Emeritus Professor, Civil Engineering and Geology, University of Alberta has served as Chair of the CGS's Engineering Geology Division and was the 2009 recipient of the CGS Legget Medal. His specialty is landslides. For the last 20 years, he has been an Associate Editor of the Canadian Geotechnical Journal.

Suzanne Lacasse is Managing Director of the Norwegian Geotechnical Institute (NGI) but maintains a keen interest in research. She has been honoured by numerous international and Canadian organizations, and holds two honorary doctorates. Suzanne is a past CGS Legget Medal recipient and served as CGS President in 2003/2004. Although located in Norway, she rarely misses a CGS Conference.

Bob Patrick is the Principal Engineer with EBA Engineering Consultants in Nanaimo, BC. He has worked extensively throughout western and northern Canada and in New Zealand. Bob has been actively involved with the Association of Professional Engineers and Geoscientists of BC, serving on a number of committees and task forces, and as a Member of Council.

Brian Taylor is a Senior Geotechnical Engineer with Stantec Consulting, formerly Jacques Whitford and Associates, in Halifax. Most of his professional career has been associated with marine geotechnical work related to offshore oil and gas, both off the East Coast of Canada and internationally. Brian assisted with the organization of three CGS conferences (Halifax 1994, 2009, and Calgary 2010).

Gerald Webb is a Senior Geotechnical Consultant with the Ottawa office of Golder Associates. He has extensive geotechnical experience on a wide variety of projects associated with soil, rock and groundwater throughout eastern Ontario. Gerry was the CGS', RM Hardy Lecturer at the Ottawa conference in 2007.

The remaining Trustees are:

- Kevin Biggar (Edmonton, AB)
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The Foundation is a registered charitable organization that works at arm's length from the CGS to recognize and foster excellence in the geotechnical field in Canada. Among other things, it funds some of the CGS' awards, prizes and lectures, and offers a National Graduate Scholarship. In order to fulfill its mission, the Foundation relies on donations and interest-free loans from the geotechnical community – individuals, corporations, and the local sections and technical divisions of the CGS. To learn more about the Foundation and its activities visit www.cfg-fcg.ca.

Editor

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Directeurs, Présidents du Comité, Secrétariat, 2011

Additional information for the various positions shown below is located on the CGS websire at http://www.cgs.ca

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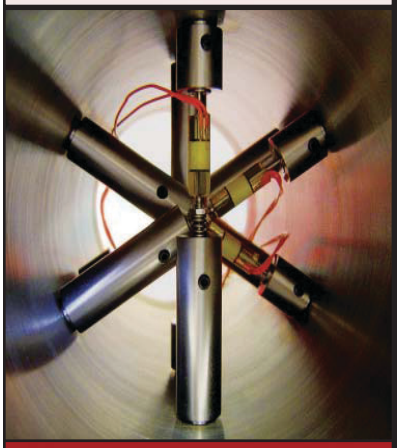

The University of Florida

Geotechnical Instrumentation for Field Measurements

April 3-5, 2011

Doubletree Hotel • Cocoa Beach, Florida

Course Director: John Dunnicliff
Lectures by Users of Instrumentation
Lectures and Displays
by Manufacturers of Instrumentation

COURSE EMPHASIS: The emphasis is on why and how, and will be updated to include web-based monitoring, wireless monitoring, emerging technologies and online sources of information. Prior to the course, registrants may submit questions and requested discussion topics, and a half day has been assigned for responding to these requests.

WHO: Engineers, geologists, and technicians who are involved with performance monitoring of geotechnical features of civil engineering projects. Project managers and other decision-makers who are concerned with management of **RISK** during construction.

WHY: To learn the who, why, and how of successful geotechnical monitoring. To meet and discuss with others in the geotechnical instrumentation community.

WHAT: Practical information by leaders of the geotechnical instrumentation community, respresenting both users and manufacturers:

- John Dunnicliff, Consulting Engineer
- Martin Beth, Sol Data
- Aaron Grosser, Barr Engineering
- Daniele Inaudi, Roctest/Smartec
- Allen Marr, Geocomp
- Justin Nettle, Federal Energy Regulatory Commission
- Tony Simmonds, Geokon
- Robert Taylor, RST Instruments

For full details visit:
www.conferences.dce.ufl.edu/geotech

Geotechnical Instrumentation NEWS

Geotechnical Instrumentation News

John Dunnicliff

Introduction

This is the sixty-fifth episode of GIN. One full article and six one-pagers this time.

Converting Strain Measured in Concrete to Stress

This is a topic that has fascinated and puzzled me for a long time. Unlike for steel, the relationship between strain and stress in concrete is by no means straightforward because so many factors, other than stress change, cause strain. I struggled with guidelines when writing the red book (Sections13.3.9 and 13.4.7) but have never felt that they were adequate. Here's an article by Roberto Acerbis and his colleagues in Italy and Australia, which does a far better job than I did.

Web-based Data Management Software

David Cook's article "Fundamentals of Instrumentation Geotechnical Database Management – Things to Consider" was in the previous GIN (December 2010). As said in my previous column, I sent the article to several firms who supply web-based data management software, inviting each to respond with a one-page "Ours will do this" article. Here are those one-pagers, without any editing by me.

I thought that I'd invited all firms who supply web-based data management software, but I goofed—others have pointed that out. There's an ad on page 33 by SolData, whose "GEOSCOPE" is a fullweb and GIS software hub for geotechnical, structural and environmental real-time data.

Next Instrumentation Course in Florida

Dates are now April 3-5, 2011 at Cocoa Beach. Details are on page 28 and on http://conferences.dce.ufl.edu/geotech.

Next International Symposium on Field Measurements in Geomechanics (FMGM)

As many of you will know, FMGM symposia are organized every four years, the previous one being in Boston in September 2007. They are "the places to be" for folks in our club. The next FMGM will be in Berlin, Germany on September 12-16, 2011. Information is on www.fmgm2011.org.

Closure

Please send contributions to this column, or an article for GIN, to me as an e-mail attachment in MSWord, to john@dunnicliff.eclipse.co.uk, or by mail: Little Leat, Whisselwell, Bovey Tracey, Devon TQ13 9LA, England. Tel. +44-1626-832919.

Wen Lie! (China).

Recommendations for Converting Strain Measured in Concrete to Stress

Roberto Acerbis
Harry Asche
Guido Barbieri
Tiziano Collotta

Introduction

Geotechnical engineering involves uncertainties, arising from simplifications which are necessary during the design phase, primarily due to limited information about the soil properties and behaviour. It is important to monitor the performance of structures during the construction phase, to compare the actual loads and stresses with those anticipated during design. For concrete structures,

strain gauges can be installed inside the structure during casting in order to directly record the strain state during different construction phases. From these measurements, stresses and internal forces can then be derived. To obtain reliable estimates of the forces and stresses, one must use correct assumptions about concrete behaviour as well as a proper conversion procedure. The creep behaviour of concrete, shrinkage and hardening should all be considered to avoid macroscopic errors. This is particularly true with regard to concrete structures which undergo loads only a few days after casting, such as temporary supports, tunnel linings or pier foundations. In the following, a conversion procedure aimed to properly simulate concrete behaviour is described and its application to real monitoring cases is presented. We show the effect of each strain contribution and the errors which could result as a consequence of following too simplified a conversion procedure.

General Description of Strain Gauges and Their Installation Procedure

Strain gauges are the most commonly used instruments for measuring strains, and consequently for determination of stresses in concrete structures. As a possible alternative, fibre optic systems have been developing during the last decade. These are able to provide extensive information, but are considerably more expensive than other methods, and hence are usually only used for special applications. A strain gauge measures, by means of a vibrating wire or resistive sensor, the relative displacement between two supports that are fixed to the structure and orientated parallel to the instrument. The strain gauge has to be installed with its main axis parallel to the direction of the strain (with its consequent stress) to be measured. In order to derive axial force and bending moment of a structural element, strain gauges have to be installed parallel to the longitudinal axis of the structural element and at least two should be installed: one at the extrados and a second at the intrados. In plain concrete structures, strain gauges are embedded within the concrete during casting, whereas in reinforced concrete elements they are usually welded or glued to reinforcement bars (see Figure 1a, 1b). The sensor records the deformation electronically, hence it is possible to connect the instrument to a data acquisition system so as to record data and to undertake real-time monitoring. Strain gauges are usually equipped with a thermal sensor in order to record the surrounding temperature during the readings and to estimate the contribution of thermal strain to the structural element.

During installation, it is important to take some precautions to obtain accurate and reliable results:

- Protect strain gauges by a proper shield to avoid possible damages during concreting due to the concrete flow or concrete vibrators; this can be achieved by placing a polystyrene casing around the gauge, if welded gauges are used, or a steel sheet around the sensor when placing embedded gauges;
- Protect cables by PVC pipes to avoid potential damage during the different construction phases;
- Verify operation of each instrument by taking a first reading before casting, to allow for replacement of malfunctioning strain gauges;
- Perform a data acquisition immediately after wiring so as to verify operation of the data acquisition system.

Conversion Procedure

Assumptions

As previously stated, in order to obtain reliable information about stresses within the structure, a proper conversion procedure should be adopted to obtain stresses from measured strains.

As first step, if the instrument is not thermally self-compensated, as it is the case for vibrating wire gauges, a correction must be applied to the readings. A procedure will usually be described by the instrument manufacturer, in order to compensate readings for the thermal errors in the gauge itself (as opposed to the effect that temperature has on the strain in the concrete or steel). If resistive sensors are used instead, they are usually self-compensated by the Wheatstone bridge system.

Once the total strain (corrected for thermal errors in the gauge itself) is measured, various concrete strain components have to be considered, in addition to instantaneous strain due to stress increments, in order to take into account the complex behaviour of concrete. Thermal (concrete and steel) strain, shrinkage and creep strain should all be considered. Moreover, the effect of variations in the Young's modulus of concrete during the hardening process has to be assessed with regard to the relationship between elastic strain and stresses. A proper estimation of such contributions is critical to understanding the strain behaviour of concrete structures, particularly if the

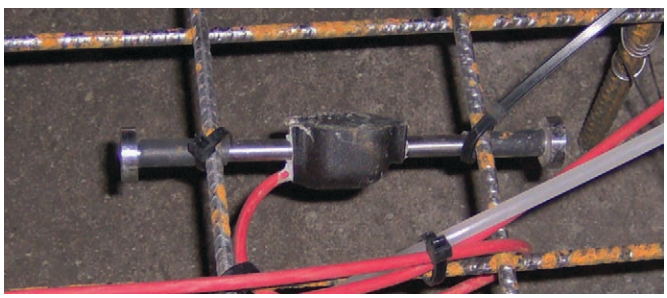

Figure 1a. Strain gage welded to steel bar.

Figure 1b. Strain gage embedded in concrete.

structure undergoes loading immediately after casting (see Collotta *et al* [2010]).

In the following, the proposed conversion procedure is described, based on the following assumptions:

- There is perfect bonding of the steel bars to surrounding concrete;
- The strain distribution is linear within the monitored section (according to traditional beam theory);
- The concrete is linear elastic, but with a tension cut-off (at the average concrete tensile strength);
- The variation of Young's modulus with time, the creep coefficients and the development of shrinkage strain follows the rules proposed in the CEB-FIB Model Code 1990 (Comité Euro-International du Béton [CEB], 1991);
- The monitored cross-section undergoes axial force and bending moment around an axis orthogonal to the virtual line passing through the two strain gauges.

Procedure

In the following formulas, subscript "*i*" means that the quantity is computed at the time of measurement t_i. At all times, correcting for the gauge thermal error, the total strain at time t_i is $\varepsilon_{tot,i}$, being the difference between the measured strain at the gauge and the initial measurement. On the basis of the assumption of a linear strain distribution, the total strain at any given point along the cross-section is derived from the total strain at the two measuring points within the monitored cross-section. Thus the strain can be computed at the extreme fibres of the concrete section as well as at the positions of the reinforcing bars. Assuming perfect bonding, the corrected measured strain is assumed to apply both to the concrete and the steel.

The stress in the steel bars can then be easily derived in each measuring instant by the computed total strain ($\varepsilon^s_{tot,i}$), taking into account the thermal contribution:

$$\sigma_{s,i} = \left(\varepsilon^s_{tot,i} - \left(T_i - T_0\right)\cdot \alpha_s\right)\cdot E_s$$

where T_i and T_0 are respectively the measured temperature at instant t_0 and instant t_i, E_s is the steel Young's modulus (210 GPa) and α_s is the steel thermal coefficient.

As for the computation of concrete stress in any given point in the cross-section, a step-by-step procedure has been adopted (see Ghali A. *et al* [2002]), so as to properly take into account the contribution of shrinkage and creep strains and the effects of Young's modulus variations over time. Knowing the corrected total strain at a certain point on the section, from t_0 to t_i, the concrete stress at the same point in each interval between consecutive measurements is obtained using the following formula, as a function of the total strain at all the previous measuring instants:

$$\Delta\sigma^c_{i-\frac{1}{2}} = \frac{E^c_{i-\frac{1}{2}}}{1+\varphi_{i,i-\frac{1}{2}}}\left(\varepsilon^c_{tot,i} - \varepsilon_{cs,i} - A_{i-1}\right)$$

where $\varepsilon_{cs,i}$ is the shrinkage strain at instant t_i, $\varphi_{i,j}$ is the creep coefficient between instants t_j and t_i and $E_{c,i}$ is the concrete Young's modulus at instant t_i and A_{i-1} is a function of the previous load steps as follows:

$$A_{i-1} = \sum_{j=1}^{i-1}\left(\Delta\sigma^c_j \frac{1+\varphi_{i,j}}{E^c_j}\right)$$

The curves of such quantities versus time can be obtained from National codes, Eurocodes or other relevant codes. In this case, we have adopted the suggestions given by CEB-FIP Model Code 1990 (Comité Euro-International du Béton [CEB], 1991).

Having derived the stresses in the reinforcement and in the concrete section borders for each time of measurement, it is possible to verify whether the concrete section cracks. If it does not, i.e. if it is completely compressed or if the maximum computed stress in the concrete is lower than its tensile resistance, the whole concrete section has to be considered in the calculations. Otherwise, the effective concrete section has to be calculated at each instant by computing at what height the concrete stress reaches its mean tensile resistance. Then, by integrating the forces over the effective section, internal actions (axial force and bending moment), can be derived.

Application to Real Structures

The proposed procedure is applicable in every case where performance monitoring of concrete structures is required. In the following section, the results obtained from two different applications are presented: first, a concrete ring beam support for a shaft excavation; second, the permanent lining of a highway tunnel. Both examples are derived from a large construction site for the development of a new highway route between Bologna and Florence in the central part of Italy.

In the first case, the reinforced concrete ring beam was cast after excavating down to the ring beam location. Further excavation of the shaft transfers the force to the ring beam. To counterbalance the radial thrust acting all over its circumference, a compressive axial force develops; gauges have been installed to compare the actual values of the axial force to the design assumptions and to check for unexpected bending moments due to unsymmetrical thrusts or geometric imperfections. The ring beam is thus loaded just one or two days after casting, when hardening is still taking place.

In the second case (the Buttoli tunnel), the permanent lining is cast all around the tunnel boundary, usually in two or more pours (first, the invert and, then, the crown) in order to sustain part of the soil pressure in the short-term and all of it in the long-term. Moreover it is designed to protect the tunnel inner space from humidity and possible water ingress. The gauges have been installed to measure the actual values of axial force and bending moments acting on the lining both in the short and in the long term. During tunnelling, the excavation continues immediately after the casting of the concrete and therefore the initial loading of the concrete occurs just after the casting.

In order to estimate the axial force and possible bending moments in the annular beam, four instrumented sections are provided, each formed by a two strain gauges, located one at the

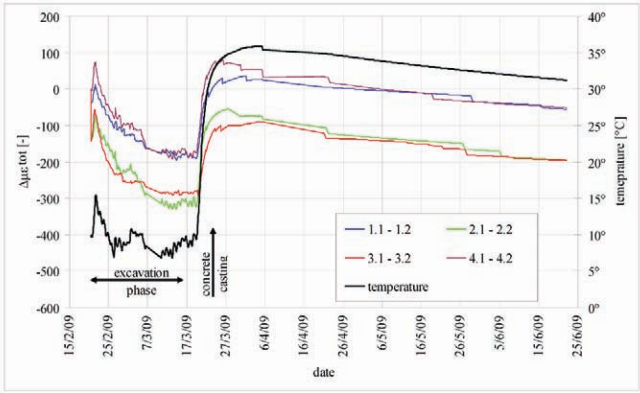

Figure 2a. Ring beam - Measured in strain vs time.

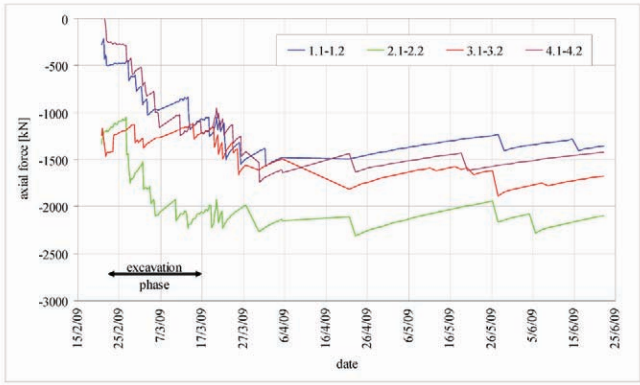

Figure 2b. Ring beam – Computed axial force vs time.

intrados and one at the extrados in circumferential direction. The four sections are equally spaced around the ring circumference. In order to estimate axial force and bending moment in the permanent lining of the Buttoli tunnel, a cross section was provided with five pairs of strain gauges, equally distributed along the lining: a pair for each side, one at the crown and other two intermediate points. The invert was not instrumented. In both the example cases, the strain gauges were welded to steel bars.

In the following figures, the corrected measured total strains, averaged in each instrumented section between extrados and intrados, and the corresponding axial forces, computed by the proposed procedure, are shown for both the ring beam (*Figure 2*a, 2b) and the tunnelling example (*Figure 3*a, 3b). Each curve refers to a pair of strain gauges; as for the tunnelling example, 1.1-1.2 and 5.1-5.2 correspond to the pairs of strain gauges placed on the left and right sides of the tunnel lining, 3.1-3.2 to the one placed at the crown and the remaining ones to the two intermediate points. In the total strain versus time figures, temperature inside the concrete is also plotted. In *Figure 2*a, the effect of the temperature rise due to concrete casting on the strain values is clear, whereas, in a similar way, the effect of seasonal temperature variation on the concrete strain can be seen in *Figure 3*a. The maximum values of axial force derived by the measurements turned out to be in both case studies within the design values: in the first case, the measured value is almost 70 % of the design one, whereas in the second case the maximum measured value is equal to 65% of the design value. Such differences can be explained by precautionary assumptions adopted in the design phase.

The importance of applying the correct conversion procedure is shown in Tables 1 and 2. For each of the two considered examples, the final axial forces computed by the proposed procedure (N1) are compared to the ones derived by disregarding respectively:

- N2: shrinkage and aging (i.e. changing Young's modulus with time);
- N3: creep and aging;
- N4: creep and shrinkage;
- N5: considering concrete as simply an elastic material (i.e. disregarding all time-dependent effects).

As is clear by comparison between N1 and N5, if the conversion procedure is too simplified, the stresses can be overestimated by a factor of nearly six.

Conclusions

In order to obtain reliable estimates of stress by installing strain gauges embedded in concrete structures or welded to reinforcement bars, a proper conversion procedure must be adopted. The proposed procedure takes into account the complex behaviour of concrete by considering the effect of shrinkage, creep strain and hardening. Such a procedure can be easily implemented by an Excel spreadsheet and a Visual Basic routine. As shown by the examples, the proposed procedure leads to results that can be compared to the design estimations, whereas adopting too simplified a

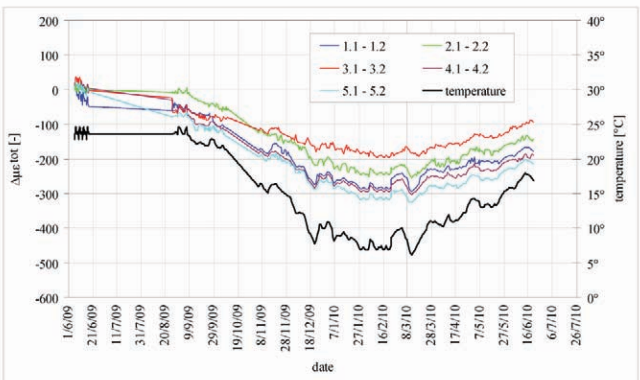

Figure 3a. Tunnel lining – Measured strain vs time.

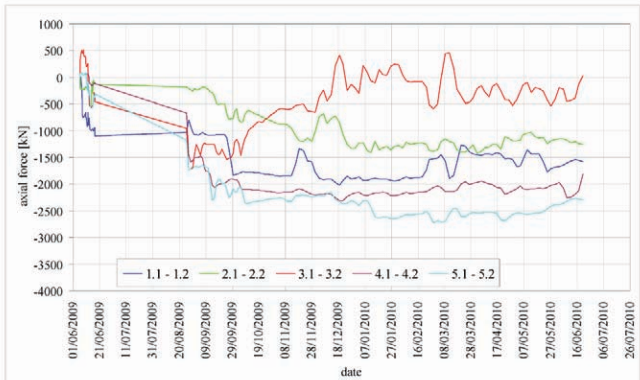

Figure 3b. Tunnel lining – Computed axial force vs time.

Table 1. Ring beam - computed axial forces						
Ring	**N1 [kN]**	N2 [kN]	N3 [kN]	N4 [kN]	N5 [kN]	N5/N1 [-]
III	**1415**	1600	2425	2740	3950	2.8

Table 2. Tunnel lining - computed axial forces						
Sez..	**N1 [kN]**	N2 [kN]	N3 [kN]	N4 [kN]	N5 [kN]	N5/N1 [-]
1.1-1.2	**1650**	1985	3290	3645	3645	2.2
2.1-2.2	**1240**	1580	2170	2585	2585	2.1
3.1-3.2	**190**	515	580	1095	1095	5.7
4.1-4.2	**2100**	2440	3830	4155	4155	2.0
5.1-5.2	**2530**	2865	4634	4925	4925	2.0

procedure which disregards all the effects previously listed can lead to significant overestimation of stresses.

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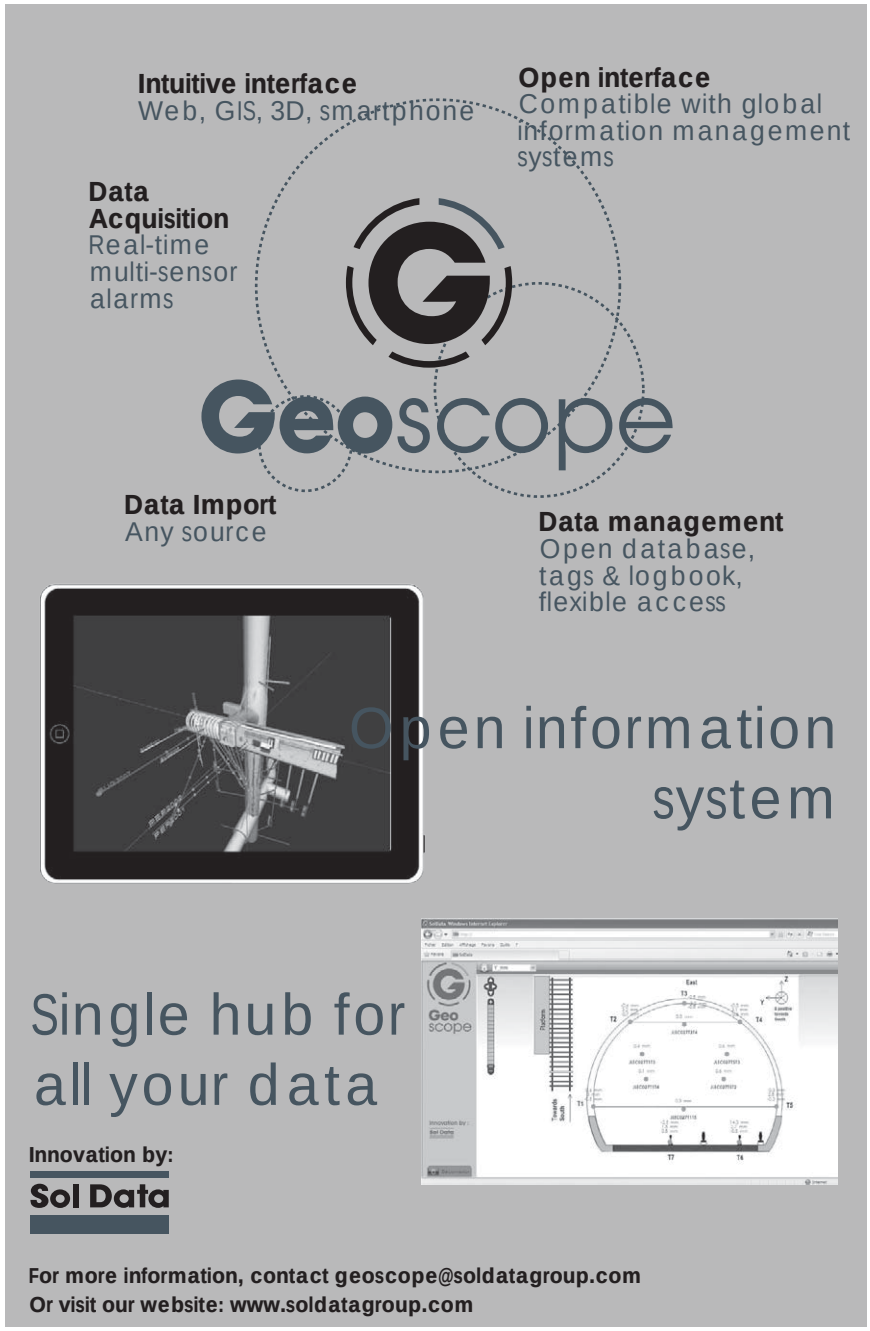

The Web Dissemination of Monitoring Data

Roger Chandler, Keynetix Ltd.

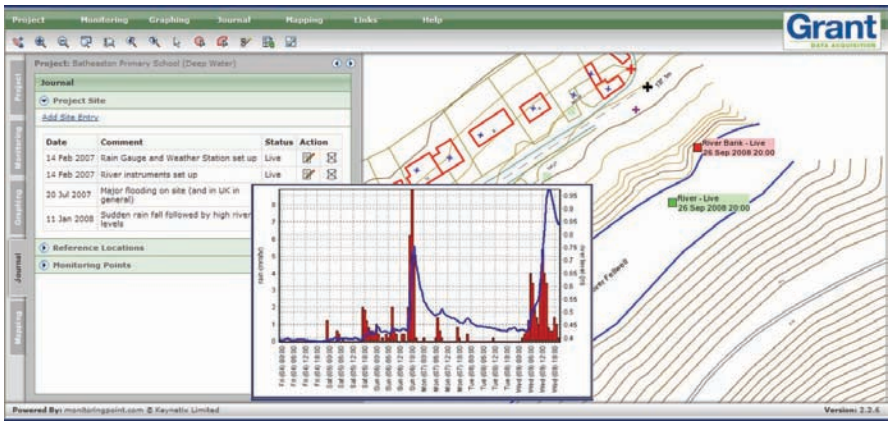

Figure 1. Branded Monitoringpoint.com for Grants showing results from major flood in July 2007.

More monitoring data is being collected electronically than ever before. As a result, a wide range of online and desktop software applications are being provided by instrument manufacturers to help you share data with your clients. Using the manufacturer's system can appear the easiest option but more often than not it's not the best option. This is especially true if you are working for a client who has multiple monitoring contracts.

Your client will have a learning curve before he can effectively use the system you provide. Even if you feel this time is short you must take into account that the client will be using it less than you and will often have long periods between uses and forget how to use certain features. If they have multiple contracts using different systems then this problem is magnified and can result in the client not wanting to use the system simply because they can never remember how to.

The best option for the clients is therefore to have every company working for them to upload their data into the same system. Selecting a system from a certain instrumentation manufacturer can however restrict competition for the monitoring contracts themselves. This is too high a price to pay for a standardisation of web based data; however selecting an independent system can give them these advantages without the restrictions.

This is the reason why Keynetix, a software company well know for it's geotechnical data management system HoleBASE, developed www.monitoringpoint.com in 2002 and why it has proved popular with clients and monitoring contractors. The system uses open data transfer standards from the AGS (Association of Geotechnical and Geoenvironmental specialists) to ensure that it is not tied to any proprietary format. To ensure that data can be created in this format Keynetix supplies software to convert most instrument manufacturer's formats into AGS.

Over the last 15 years I have worked a lot with the specification of UK and US data transfer formats for geotechnical monitoring data, starting with the UK and Hong Kong based AGS 2 format in 1994 all the way to the most recent version of AGS 4 and DIGGS.

If you are working in the UK on a large construction project you will probably be required to produce your monitoring data as AGS data as clients in the UK have had large exposure to this format and understand the benefits of not being tied to any one provider. In other countries this method of data supply is now also starting to see significant take up.

www.monitoringpoint.com offers customers the opportunity to have a portal to the system installed using their own web address and branded with the client's or company's information, thus making it look like a system developed for a project or a company at a small fraction of the cost of writing your own system. It is for this reason that instrument manufacturers such as Grant are now offering a rebranded version of www.monitoringpoint.com to their clients (www.squirrelview.net).

The system is a hosted service that allows projects to be accessed through the www.monitoringpoint.com address or via the client specific branded portal. The system can therefore be operational for a new client or instrument manufacturer within a day with a cost of less than a technician on site for a day. www.monitoringpoint.com is quickly becoming a popular route to market that not only benefits the manufacturers but also allows the clients to have all their data hosted on a single system.

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INSITE Web Based Data Management Software

Angus Maxwell, Maxwell Geosystems Ltd

Maxwell Geosystems have promoted the wider use of Observational Engineering within construction. Our INSITE systems have enabled projects to shorten the processing time from a few hours down to a few minutes and have encouraged engineers to specify more instrumentation and to rely on the results to give feedback on design. This has enabled them to refine designs and to rely on what the constructions are telling them rather than solely of the factor of safety assumed. These methods have improved safety on site and have lead to real savings in time and money.

Speed and Flexibility

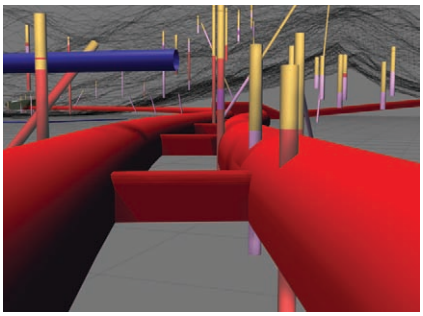

Figure 1. Construction and instrument data in one environment.

INSITE is designed as a dual layer system to optimize web speed. Raw data is held on local servers and is processed on the fly. Processed data is held on the web in simplified forms to enable superfast download and display. This redundancy means the web data can be recreated at any time. Local INSITE SERVER systems pull data from a variety of sources and check the data for integrity and credibility. Local administrators can use built in procedures to audit the data and quarantine any that may require further review. All changes to the data are time and user stamped. Back ups are automatic and in some situations continuous archiving is required where data volumes are large. The current record for one project is 25 million records.

Over 30 instrument types are currently supported and new types are added as required. INSITE can be customized to read structured data from any source visible to the program on local or wide area networks. This means that if you have a format that you like and it is consistent INSITE can be customized to read it. INSITE has over 70 pre-defined file based data input formats. All major data logger types are supported including most ADMS and vibration systems.

Observational Engineering

Instrumentation data is of limited use if the causes of movement are not clear. INSITE integrates setting out details for construction elements and tracks their progress along with other parameters Figure 1. These may be manually entered or drawn from construction logger such as tunnel boring machines. With our optional INSITE TDMS a full suite of construction progress and programme data is fully integrated into the software.

All data is displayed in our own custom GIS environment in both map (XY) and sectional (Chainage, level) views. All views allow full dynamic zooming and easy addition of new layers. The data can also be displayed in Google Earth and displayed as 3D views (contours surfaces) and even animated.

To aid the preparation of reports we have included binders both on the local side and web side to enable automatic production of reports to Excel and PDF.

INSITE Servers send alarms as emails and SMS messages. These are handled by our portal AAA blog which tracks responses. All our web portals are accessible by smart phones to enable responses to alarms to be made on the fly.

Powerful Analysis Options

INSITE is the first monitoring package to offer a dynamic alarm facility in which alarms can be linked to progress, proximity and prediction. This scheme enables actions to be taken ahead of time so that rather than requiring movements to be reversed they can be slowed to bring the construction back into the target zone. INSITE also includes the facility to group instruments into combinations so that a secondary parameter can be defined.

Tested on the Largest Projects

INSITE has been used in Hong Kong, Australia and Singapore. Projects have included embankments on soft clay, deep excavations, soft rock NATM tunnels and on a variety of TBM and Drill and Blast tunnels. INSITE is currently monitoring SE Asia's two largest projects: the Express Rail Link in Hong Kong (HK$67 billion) and the Airport Link in Brisbane (A$5.6 billion).

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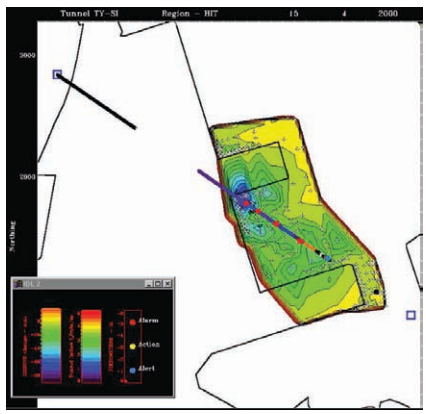

Figure 2. Animation helps bring out relationships in data.

MultiLogger Suite Web-based Data Management

Alex Neuwirt, Canary Systems, Inc.

MultiLogger Software

We've been hard at work for over 13 years now to develop software tools to help our customers in the Geotechnical Engineering discipline manage their collection systems and data. Our software can be described as a "hybrid" system, it consists of Windows® based workstation tools for automatically collecting data, populating a SQL database, configuring the project interface including notifications and outputs, and a web component for viewing the project including alarm status, creating any of the numerous outputs or data presentations, and entering data from the field.

Data Import

Data can be imported automatically or manually from virtually any source, either through the built-in automation (which includes automated program generation) for Campbell Scientific controllers, use of "import folders" for data from other data collectors or manual data entry. Data are validated based on tolerance criteria, this helps avoid alarms based on incorrectly collected or entered data.

Alarms

Four basic types of alarms are supported, calculations to include one or more data or calculated elements can also be configured with alarms for virtually unlimited alarm configuration. For example, the calculation engine includes aggregate and historical functions to reduce data and alarm based on time periods or other criteria.

Notifications

Five types of notifications are supported, alarms being just one type. Other notifications include scheduling electronic delivery of outputs, when new data are available, when specific data elements miss their update interval and when a specific group of data elements miss their update interval.

Outputs

Eight types of data outputs for data or calculations are supported including; Quick Report (columnar reports), Quick Chart (time series charting), Spreadsheet (Excel® worksheets), Instrument Report (statistical reporting), Element Chart (series of multiple elements, e.g. in-place inclinometer), Wind Rose (wind speed and direction), Event Chart (event data captures, e.g. seismic data) and Inclinometer (standard inclinometer surveys). Each output can be extensively configured.

Integrated Web Interface

All of these features are integrated into an intuitive password-protected user interface built on the idea of graphic views of your project and interactive icon placement based on location of instruments. Documents can even be saved into the database and associated with instrument icons to provide for storing information such as calibrations, installation photos or other reference materials associated with the instrumentation. This interface has proven to be an efficient and easy-to-use interface for experts and novices alike.

Summary

We've worked hard to integrate all aspects of geotechnical data collection (whether automated or manual systems) and management into a single, easy-to-use, yet powerful software system with Web interface. This allows personnel responsible for data management and reporting of their projects to focus their time and energy on the information that the instrumentation is intended to provide, not on managing the hardware and software systems. Ultimately this provides for maximizing the value of the instrumentation program and hopefully providing a safer and more meaningful work environment, and thanks to the Internet, one that is always close at hand!

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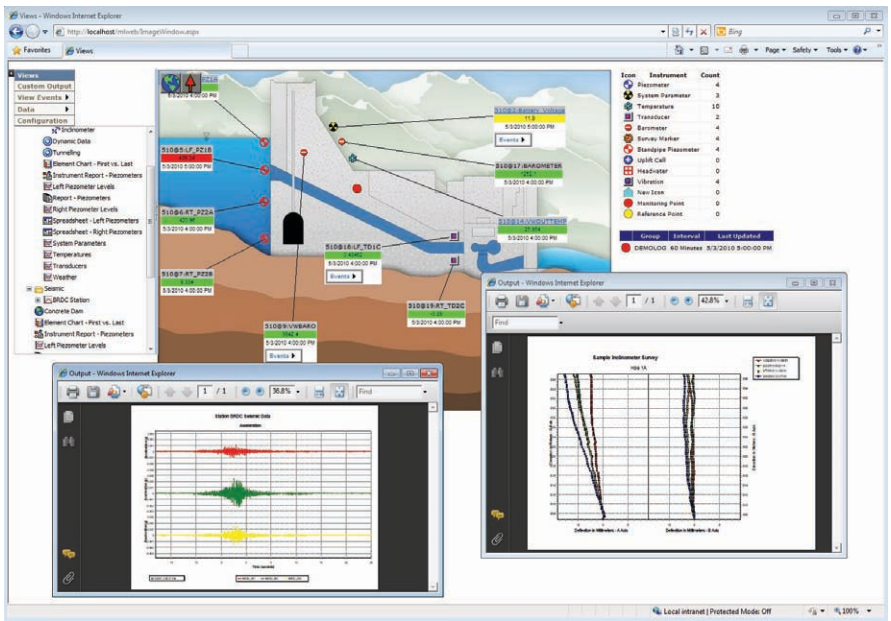

Figure 1. Sample project view with event and inclinometer outputs shown.

iSiteCentral Web-based Data Management Software

Rob Nyren, Allen Marr and Don Jacobs, Geocomp Corporation

Geocomp's *iSiteCentral™* service shown in Figure 1 has been operational since 1998 and provides integrated data collection, reporting and alerting capabilities for a wide variety of sensor inputs, data loggers and applications. The system provides a single data delivery interface for traditional data loggers, robotic total stations, seismographs, cameras and many other non-standard data feeds/sources.

Operations: The *iSiteCentral™* software and hardware reside in Geocomp's offices in Massachusetts. These systems operate continuously to monitor data from sensors all over the world. The data are stored into a secure Microsoft SQL database. Some features include:

- Automatic backups of the database every 30 minutes
- Automatic rollover to second server if primary server fails
- Separate modules for data exchange and data storage to protect integrity of the database
- SQL database structure enables to poll the data from outside the iSiteCentral system
- Extended data records permits storage of information about quality of each data point
- Device pollers handle data upload from most commonly used data loggers; website facilities to enter data manually and via direct spreadsheet upload.

A client version of *iSiteCentral™* is also available for installation at a client's facility. Configuration is based on client's specific needs for redundancy, mirroring and backup.

User Interface and Reporting Tools

All interactions between the customer and *iSiteCentral™* are through password-controlled WEB browser interface that allows clients and users to view and report data whenever he/she desires. *iSiteCentral™* contains reporting elements that permit users to create charts, graphs and tables to meet a specific project needs and requirements. Graphical forms include time history, x-y and multiple y axes. Links to plots, tables and sub-plans can be placed onto images at the website to show users both their location and current readings. The instrument symbols can be color coded to indicate sensors in an alarm state.

Interpretation aids: The *iSiteCentral™* system utilizes the concept of virtual sensors to allow advanced numerical manipulation of measured data. A virtual sensor is built using the data from one or more sensors and mathematical equations that relate the measured data to the quantity desired. Examples range from simple pressure transducer corrections for atmospheric pressures or tilt from deformation monitoring points (see Figure 1) to more complex calculations of bending strain from multiple gages, to linear and non-linear trend calculations that may be used for evaluating rates of change and for predicting future values. A scripting language is used inside *iSiteCentral™* via the website to set up these virtual sensor calculations. This capability also allows users to create complex alerts based on multiple sensor inputs to give automated early warnings and to perform cross-evaluation of data sources in real-time.

Alerting services: The Alarm Service option of *iSiteCentral™* monitors all readings to determine if a sensor reading has exceeded a present alarm value. Each sensor can have multiple alarm levels up to 15. Each alarm level can be programmed to cause *iSiteCentral™* to take specific notification actions. These include sending emails, text messages and synthesized voice messages to "call lists". An alarm acknowledgement feature allows a user to acknowledge receipt and deactivate an alarm via the WEB.

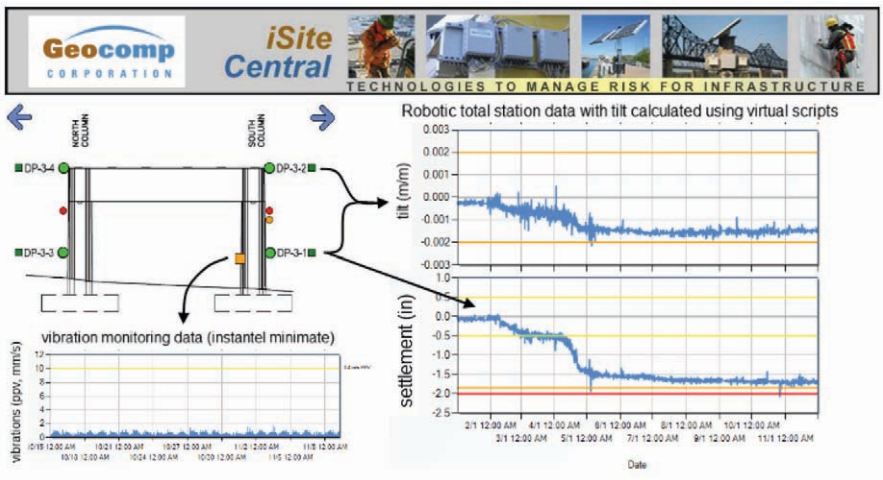

Figure 1.

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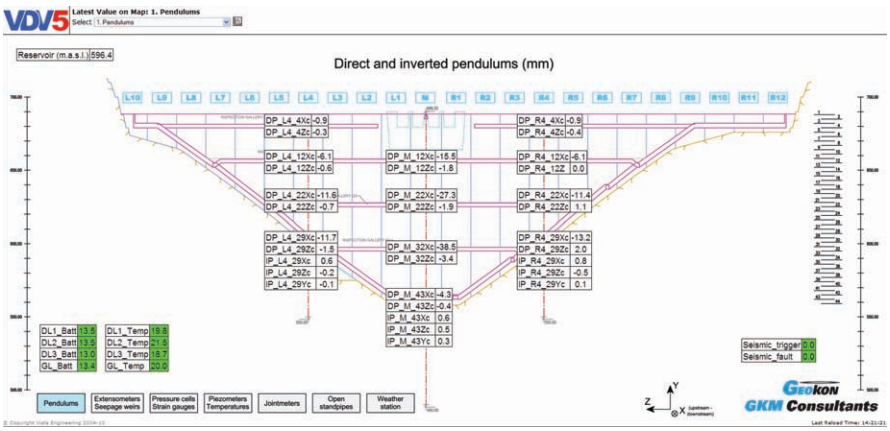
Web-based Data Management Software

Andres Thorarinsson, Vista Data Vision (VDV)



VDV is a comprehensive data handling software for geotechnical projects of any size. Includes data visualization, alarming, real-time displaying, reporting and web access to all data. Run VDV on your own PC for Internal Data Service, and as a Web Service for your staff and clients. VDV has been developed and used since 1991. New VDV version 2011 in Q2.

Data loggers supported: Campbell's Scientific Data Loggers, Geokon's Data Loggers (both via LoggerNet or MultiLogger), other data logger via VDV's File Converter and vendor's Call Engine. Supports Total Stations. Largest system known: 250 data loggers and 5k tags. Response time: 1-2 second average response time to PC Query or Web Query.

Data Interface: Display data as Time series, Displacement graphs, Rate-of-Change, XY-Graphs, Intensity Plots, Histogram, Data Table, "Wind" Rose for any data. Combine data from several locations into single overview. Easy-to-use interface, choose pen colors, thickness, background color, auto and manual Y-scales, linear or log time axis.

Data Handling: Built-in fully licensed MySQL data base capable of storing years of data from hundreds of projects. Alarms in 4 levels with sound/color/email. Validation. Virtual Variables for calculated results. Export of data for Excel. Run your own SQL queries. Reports with tables and graphs. Very fast response time unaffected by size of Data Base.

Web Service: VDV is ready to run Web Service right out of the box, no programming, only needs fixed IP number from a Service Provider. Use VDV as SCADA monitoring and/or as a research tool. Customize web layout. Navigate all graphs. Acknowledge Alarms. Write Notes about sensors and locations. Add Web Cams and Photos to any Project. Manual Input of data. Modify data. Support to Smart phones. Choose language of web service.

Real-time Handling: See latest data on maps in layers with navigation buttons and any picture or artwork as background. Display data as number, cluster of numbers or graphs. Show alarm status by background color. Support Google maps. Easy-to-use interface.

Download fully working version of VDV or participate in web-seminar to learn more.

References: Seattle Department of Transportation, USA; Tsankov Kamak Dam, Bulgaria; Linha 4 Metro, Brazil; US Army Corps of Engineers, USA, Ingula Pump Station/Dam project, South Africa; Desert Research Institute, USA.

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ARGUS Web-based Data Management Software

Hai-Tien Yu, ITM-Soil

Product Overview

ARGUS is named after 'Argus Panoptes' a giant in Greek mythology. He was famous in legend for having 100 eyes that made him a perfect watchman. ARGUS was originally developed in 2004 by Interfels in Germany, becoming an ITM-Soil product when ITM-Soil acquired Interfels in 2007.

ARGUS has been developed for the open-source LAMP system (Linux, Apache, MySQL & PHP). It is 100% web-based software. Users interact with ARGUS using industry standard web-browsers, there is no need to install any software or plug-ins on their PC. Working with ARGUS is platform-independent and can be accomplished in a local network or over the Internet from any location in the world. Multiple users can access the system simultaneously. There is no license to pay for each user.

Since its introduction, ARGUS has been used in many small as well as major projects around the world with a well proven track record including a number of underground projects including the Crossrail project in London and several Subway projects in New York.

ARGUS is under constant development to satisfy new user requirements including GIS (Geographical Information System) functionalities, construction progress information management and is compliant to AGS (The Association of Geotechnical and Geoenvironmental Specialists) data format.

ARGUS Features

In addition to all the standard functions of a web-based instrumentation data management system, such as storage, calculations, graphical presentation (Figure 1), alarm messaging, and reporting, ARGUS also has some unique features as follows:

- Users have the option to purchase ARGUS to run on their own server, or rent web spaces on ITM-Soil secured and fault-tolerant servers.
- Support for multiple languages currently including Dutch, German, English, French, Chinese, Spanish, Swedish and Finnish. Additional new languages can be added as required.
- User definable formula with references to any sensor in the project.
- Support for dual Y-axis allowing you to present two different engineering units in one plot
- Watchdog function to generate an email alarm if "no data received since x minutes'
- 'Virtual sensors' can be created to calculate specific values such as averages, absolute or relative measurements, corrected and uncorrected data etc.
- Automatic generation of PDF reports and distribution via e-mail. Reports can be customized by the user to include sensor plots, sensor values, alarms and other relevant information.
- Built-in functions allowing users to create backups & archives from data and configuration settings in the database to the user's PC.
- Built-in FileManager and LogBook functions for user to input additional project information.
- The latest version incorporates GIS functionalities (Fig 2), TBM (tunnel boring machine) data, multimedia records (videos and photographs) and permission group management.

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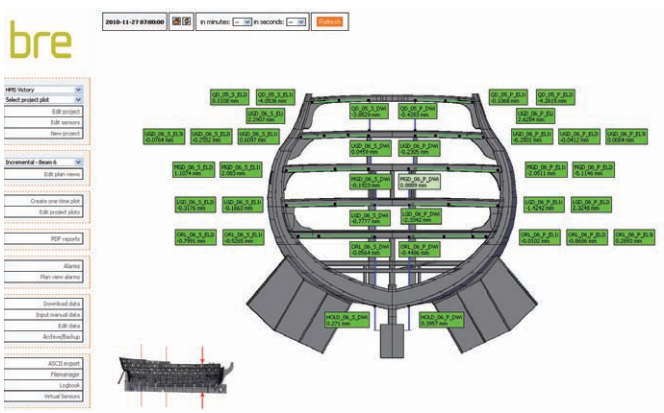

Figure 1. Typical ARGUS project view.

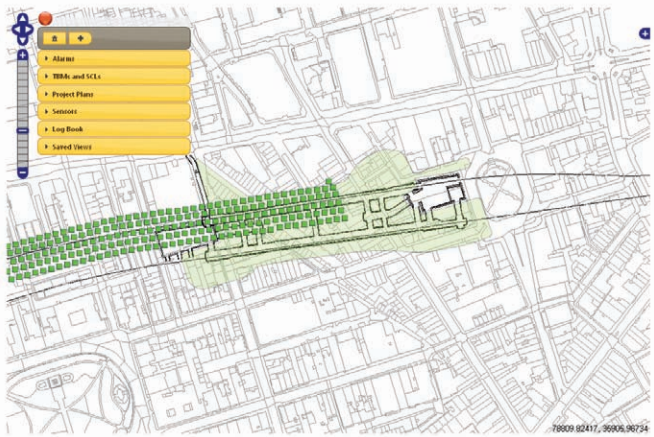

Figure 2. ARGUS with GIS interface.

GeoViewer™ Web-based Data Management Software

Rob Taylor, RST Instruments Ltd

Introduction

GeoViewer is a data viewer originally developed in 2000 to provide flexible console viewing of large data sets from ADAS (automatic data acquisition systems). The program runs on Windows™.

Data Source

Much GeoViewer data originates in data loggers which transmit their data by various logger-specific means to files which are locally or remotely accessible to the GeoViewer server. Because of this file model, any file with a public format which contains time-stamped data may be presented in GeoViewer: spreadsheets, databases, comma-separated text files, GPS and total station data, public weather data etc.

Data Storage

RST suggests that all stored data be as raw as possible, e.g. vibrating wire sensors should be stored in "B units", and that data from multiple sources should be kept separately in original, maximally readable format. In the case of logger data which is constantly appended to a file this is by far the simplest and most reliable approach. Standard file server backup strategies are used.

Historically, such an approach might have strained the resources of available computers, but as time passes, the power of reasonably-priced servers has increased to the point that a server with 200 loggers communicating by dozens of paths, 6,000 sensors, years of hourly data, and dozens of simultaneous web access users gives excellent performance. At the same time, all data is in a format that can be checked against manual readout data and sample calibrated with text file and spreadsheet tools.

Calibration and Computation

With all data storage in raw format, calibration is typically performed on-the-fly using a calibration database. Numerous functions are available: linear, polynomial, transcendental, relational across the entire system (not just within a logger).

Deferred calibration is a powerful maintenance tool: if the calibration of a sensor is found to be incorrect, the appropriate calibration page is edited, and the entire record is automatically updated from the first reading.

Data Presentation

Data presentation is typically as views which are designed for efficient use. They may be:

- mimic views with stoplight (green/yellow/red/blue/grey for ok/warning/alarm/alarm-off/stale data) buttons which "drill down" into other views
- lists with stoplight coloured numeric fields
- time series plots with one or more channels with alarm levels, different sampling rates
- exaggerated profiles for inclinometers, tilt beam etc
- linked files: installation photos, logger programs, calibrations, notes, all one mouse click away from the data

Alarm Functions

Full featured alarms are available for all channels, calculations from channels, communication status etc. The alarms include high/low warn and alarm levels, hysteresis, event triggers, alarm levels computed from data, device outputs, privilege alarm mask. It is suggested that not every channel be alarmed and alarms be implemented incrementally to minimize nuisance alarms.

Data Archive

With the low cost of data storage, archiving may be at job end only, even for the largest construction projects. For permanent installations where data goes on indefinitely, relocating (but retaining) older data may be useful to keep records manageable. Resampling older data may be used to decimate the size of on-line records, e.g. weekly min/max instead of hourly data divides quantity by 84, but permits historical context to be on-screen.

Web Functionality

GeoViewer utilizes Internet communications in numerous ways. Data acquisition may use wired or wireless web communication as a link in a communications chain, local and wide area networks may be used to access data files outside the GeoViewer server, back-up may use offsite resources.

End users may view data securely by remote computer or mobile device, and receive alarms by e-mail, text messages etc. Privileged users can maintain the system from offsite, typically by VPN (virtual private network) remote access. Because of the limited screen size of mobile devices, mobile-friendly views are typically required, with large buttons and reduced clutter.

Business Model

GeoViewer is typically sold as a purchase/annual maintenance product; i.e. the customer owns the product and runs it on his or her server. The purchase cost is based on number of servers running (typically one), and the number of simultaneous advanced viewers. On-and off-site training and assistance are available.

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rtaylor@rstinstruments.com.

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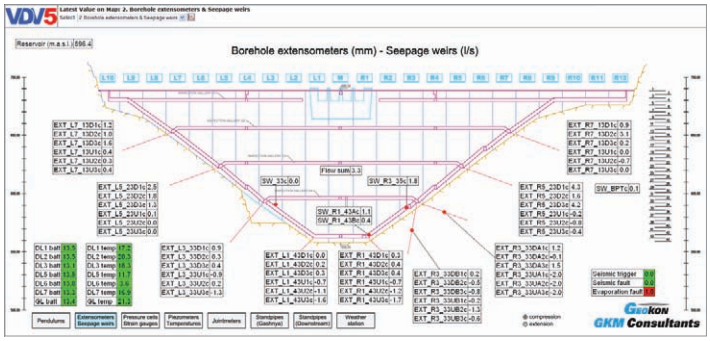

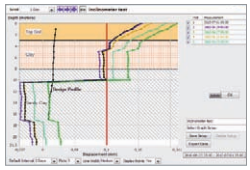

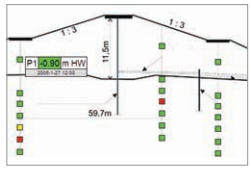

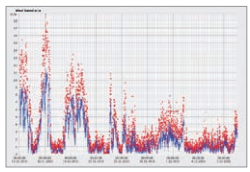

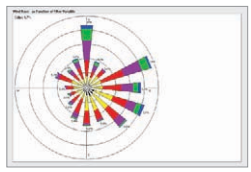

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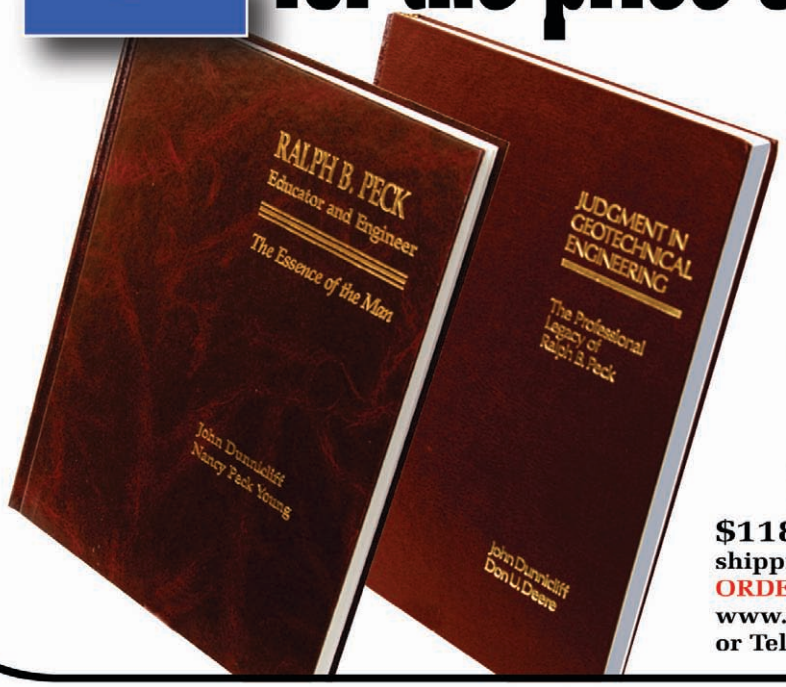

1. Ralph B. Peck Educator & Engineer-The Essence of the Man by John Dunnicliff and Nancy Peck Young

2. Judgment in Geotechnical Engineering - The Professional Legacy of Ralph B. Peck by John Dunnicliff and Don U. Deere.

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ASFE THE GEOPROFESSIONAL BUSINESS ASSOCIATION

ASFE Nominating Committee Announces 2011-12 Slate

ASFE's Nominating Committee has announced its slate of officers and directors for ASFE's 2011-12 fiscal year, beginning May 1, 2011. David R. Gaboury, P.E. *(Terracon)* will automatically assume the ASFE Presidency. Others nominated are:

For President-Elect: David A. Schoenwolf, P.E. *(Haley & Aldrich, Inc.)*;

For Secretary-Treasurer: Kurt R. Fraese, L.G. *(GeoEngineers, Inc.)*;

For Directors: Joel G. Carson *(Kleinfelder Group)*;
Mark K. Kramer, P.E. *(Soil and Materials Engineers, Inc.)*;
Gordon M. Matheson, Ph.D., P.E., P.G. *(Schnabel Engineering)*;
Steven D. Thorne, P.E., D.GE *(GEI Consultants, Inc.)*; and
Woodward L. Vogt, P.E. *(Paradigm Consultants, Inc.)*.

Five of the seven are serving on the 2010-11 Board. The two "newbies" are Joel G. Carson and Woodward L. "Woody" Vogt, P.E., F.ACI, F.ASCE.

Joel is an 18-year veteran of the Kleinfelder Group, serving as a senior vice president and principal. Located in Omaha, NE, Joel manages Kleinfelder's Central Division and is responsible for providing strategic leadership for more than 300 employee-owners across eight states. Joel is a member of the ASFE Business Practice Committee, a past chair of the New Leaders' Committee, and is winding up his term as External Relations Committee chair. Joel has also been active in ASCE, chairing committees in Nebraska and Washington.

Woody began his service to ASFE on the Business Practice Committee, "transferred" to the then-newly formed Construction Materials Engineering and Testing (CoMET) Committee, then chaired the Certification and Accreditation Task Force. President of Paradigm Consultants, Inc. (Houston, TX), Woody is also active on several ACI committees; has just begun his third term as chair of the American Association for Laboratory Accreditation (A2LA) board of directors; is a Texas Council of Engineering Laboratories director; and chairs ASTM Subcommittee ASTM E36.20 - *Certification/ Registration Bodies*.

Mail ballots are being issued to the HQ offices of all ASFE-Member Firms.

Samford Elected to Head Fellows

W. Jerrold "Jerry" Samford, P.G., an environmental compliance specialist with Troutman Sanders LLP, has been elected chair of ASFE's Council of Fellows. The Council is empowered to pursue whatever projects it believes will benefit ASFE in particular and the geoprofessions as a whole.

Before joining Troutman Sanders in April 2006, Mr. Samford served as vice president and principal-in-charge of geoenvironmental services for Virginia Geotechnical Services, P.C. and, in that capacity, served as ASFE's president during the organization's 2001-02 fiscal year. Mr. Samford has extensive experience in the interpretation and application of environmental regulations. With Troutman Sanders, a law firm, he consults on a wide variety of projects involving ecological natural resources, geology, groundwater, environmental investigation, application of standard methodologies, and governmental regulations.

With seven published papers to his credit, Mr. Samford was one of three persons representing ASFE during the EPA-negotiated rulemaking for developing guidelines for the "All Appropriate Inquiry" process for environmental site assessments. He is a past president of the Institute of Brownfield Professionals, a former member of the editorial board of *Geo-Strata* magazine, and serves on the editorial board for the *Environmental and Engineering Geoscience Bulletin* of the Association of Environmental and Engineering Geologists.

ASFE's Council of Fellows comprises some two dozen recognized association leaders. Established in 1975, the Council has been responsible for a variety of innovations, including AS-

FE's Peer Review program. In 1999, *Engineering News-Record* magazine named Peer Review one of the 125 most significant construction industry innovations of the prior 125 years. ASFE was the only association so honored.

We DO Get Respect

How do geoprofessionals demonstrate that their services – "even" CoMET services – are not commodities and that geoprofessionals should be invited to sit at "the table" from project start to finish? First of all, you have to demonstrate your worth to yourself, so you believe in you. Second, you need to tell others what you've told yourself… and one of the best ways of doing that was demonstrated by ASFE-Member Firm **TTL, Inc**. in the October 26 issue of *The Tennessean* (formerly *The Nashville Tennessean*), with circulation of 300,000 and readership of 600,000 or so. Headlined with…

Music City Center contractor
makes sure
concrete is fit for project.
Material must meet rigorous
criteria.

The article (written by Anita Wadhwani) had the following to impart:

> While hundreds of workers labor downtown to erect the concrete frame for the new Music City Center convention center, one man in a South Nashville warehouse stands ready to tear pieces of it apart.
>
> Rich Mote collects foot-long cylinders of solid concrete siphoned from the site. One at a time, in the dusty room he calls his lab, Mote inserts the concrete into a viselike machine capable of inflicting a half a million pounds of pressure. Then he waits until he hears a loud crack — like the sound of a baseball making perfect contact with a wooden bat. "See how it gets busted up," said Mote, an expert in the way concrete crumbles, as he carefully unrolled the broken cylinder from a leather cover used to keep it intact while in the machine. "That's a good break."
>
> Mote is a group leader with TTL, the Nashville geotechnical engineering company that has a $1.5 million contract to do ongoing testing of the Music City Center site and its foundation. The daily testing that goes on at its Antioch warehouse ensures that, for each aspect of the project, the concrete is mixed to contract specifications, which can vary significantly according to the function the concrete provides and the season, according to TTL Vice President and Geotechnical Group Leader Dan Terranova. "Everyone thinks concrete is just a regular commodity," Mote said. "It's not. It's a chemical, and there's lots of chemistry involved. We make sure it's the right thickness, the right density."
>
> **Purposes Differ**
>
> Some concrete is required to have a density that can support 7,000 pounds of weight per square inch. That includes certain beams in the convention center exhibition hall, for example, that have to bear the entire weight of the building. Other concrete mixes serve different purposes.
>
> One of the convention center's signature features is a perfectly smooth concrete showroom floor, uncovered by any carpet or other flooring. That's required to have a weight-bearing capacity of 4,000 pounds per square inch, Terranova said. The concrete for the floor also is mixed for a winter climate, even though pouring began in Nashville's unseasonably warm October. That had to be tested as well, Terranova said.
>
> **Disaster Prevention**
>
> The ongoing testing is critical to avoid a catastrophic building disaster or near-disaster, even years later. In July, for example, the elderly residents of a 15-story condominium in Sarasota, Fla., were given an hour to evacuate their homes after engineers found design flaws in the original 36-year-old concrete pour. Residents haven't been allowed to return yet. Last year, in Houston, a newly built high-rise condominium had to be torn down shortly after it was constructed when it sunk a foot into the ground, a result of geotechnical flaws that Terranova said could have been avoided with proper testing. TTL has been on-site at the $585 million Music City Center, Nashville's most expensive public project, since before ground was broken in March. The company sends samplers, who take cylindrical molds of every concrete pour, which is being laid at a rate of 700 cubic yards per day. Company workers average five cylinder samples for every 50 to 75 yards of concrete poured, Terranova said.
>
> Mote crushes about 40 or 50 samples a day, a total of about 2,300 tests from the site thus far. He crushes them three days, seven days and 28 days after the samples are collected. Until test day, they're stored in a humidity-controlled room in an Antioch warehouse designed to mimic downtown weather conditions. No significant repours have been required at the actual convention center site.

Could you get that kind of coverage? Yes, but only if you try. And when you succeed, you will provide a huge benefit for yourself, your firm, and the geoprofessions. In short, think globally and act locally. When you do, great things can happen.

Professional Practice Q&A

Q I recently became licensed as a professional engineer, meaning I can now put my signature on documents, turning them into instruments of professional service. But what does that signature really mean?

A It means a great deal. Among other things…

- "I abided by the standard of care (even though I cannot be certain about what the standard of care was when I performed the service)."
- "Unless I restrict who can rely on this document, anyone can."
- "If someone who experiences a personal injury alleges that the injury occurred (at least in part) because I failed to abide by the standard of care, I must defend the claim of professional negligence."
- "In many states, if someone who experiences property damage alleges that the damage occurred (at least in part) because I failed to abide by the standard of care, I must defend the claim of professional negligence."
- "In many states, if a contractor that bids too low alleges that the loss occurred because I negligently misrepresented that my inaccurate findings were accurate or that I negligently misrepresented that I abided by the standard of care in developing my inaccurate findings, I must defend the claim of negligent misrepresentation."
- "In all states, if my client alleges that I failed to abide by the standard of care, I must defend a breach of contract claim (even if the damages are purely economic) and possibly a negligence claim as well."
- "I am aware of the severe consequences that occur if I have been or could be accused of having been negligent in preparing the signed instrument of professional service, including the possibility that the firm I work for may be unable or unwilling (in the case of moonlighting) to defend me and, as a consequence, I would have to defend myself (with or without insurance), and may be subject to a judgment that in most states could mean the loss of my home and savings."
- "I am aware that my personal liability could feasibly follow me into the grave and prevent settlement of my estate until the issue is resolved."
- "I have checked and rechecked this document to help prevent any careless errors from sneaking through."
- "I am a professional. My signature puts my reputation on the line."
- "I understand that my signature subjects me to the potential loss of license and livelihood if it can be shown I was intentionally or grossly negligent."

And here's a question you didn't ask: When I send an e-mail or text message about a technical issue, does that convert the message into an instrument of professional service? The answer: Yes.

A Gift from Terra

As many ASFE members know, Terra Insurance Company was created by the same people who created ASFE. At the time, professional liability insurance (PLI) was unavailable to geoprofessionals. They saw in Terra the ability to create a company that could be a long-lasting source of quality insurance, no matter what happened to the market in general. What foresight! Terra is now the nation's second-oldest PLI company and, arguably, its most successful. The success is particularly sweet, because the folks who own Terra are the same people who are the insureds.

To some extent, Terra looks on ASFE as the source of loss-prevention and risk-management programs, services, and materials. By having its owner/insureds use these, Terra enjoys extraordinarily good claims experience. And to further these programs, services, and materials, Terra gives ASFE a handsome allocation each year, allowing ASFE to do some pretty impressive things for all its members, not just Terra owner/insureds. Now, we've just been informed, Terra has decided to increase its support by close to 10% for the 2011 year, a gift for all our members to enjoy and benefit from.

Thank you, Terra!

What Are You Complaining About?

So, how do major geoprofessional careers stack up when it comes to great pay and growth prospects? It doesn't take a degree in rocket science to figure it out. According to *Money* and PayScale.com, the top ten careers are:

1. software architect,
2. physician assistant,
3. management consultant,
4. physical therapist,
5. environmental engineer,
6. civil engineer,
7. database administrator,
8. sales director,
9. certified public accountant, and
10. biomedical engineer.

Complementing these results, a study by *The Wall Street Journal* found that engineering graduates earned an average $56,000 for their first full-time jobs out of college, while communications and English majors, like your editor, earned $34,000. Fort Collins, CO-based career counselor Katy Piotrowski said that the pay advantage of technical-degreed graduates often persists throughout their careers. Ms. Piotrowski said that mid-career liberal arts majors she knows make between $60,000 and $70,000. People with technical degrees make at least $10,000 more, she said.

An engineering grad interviewed by your editor said, "My English skills isn't near as well as your's, but that there's my new Mercedes Bends parked up next to your old Chevy."

You Are Not Going to Believe this Story

Thomas Stanley is the well-know author of several "millionaire" books. His most recent is *Stop Acting Rich…And Start Living Like a Real Millionaire*. In it, he relates University of Georgia Survey Research Institute data showing that engineers outdo physicians and lawyers when it comes to transforming income to wealth. (Stanley defines wealth as having assets of $1 million or more, not including one's home.) Here are some particulars:

- Compared to all millionaires, engineers produced 22% more wealth form every dollar of income.
- Millionaire engineers live in neighborhoods where the median home value is about 12% less than the median home value of millionaires in general.
- Millionaire engineers keep their cars for 5.6 years while all millionaires keep theirs for about 4.3 years.

And now, the coolest factoid of all: *Of the top 200 high-income-producing occupational categories in the United States, geological and mining engineers ranked no. 1 in percentage of millionaires.* FYI, Stanley explains all this by noting that "Engineers in general are a frugal group." Does that mean that geoprofessionals are the most frugal of all?

eBrownbag: No More Streaming Video

Effective January 1, 2011, eBrownbag.com changed from an online, streaming-video format to a DVD-based program. While the eBrownbag website will still be "up," you will no longer be able to use it to view presentations. We will issue to all current ASFE-Member Firms a complimentary set of DVDs, so you will be able to use any or all of the presentations in-house. Barring unforeseen production problems, we will mail the DVDs in January to the point of contact we have listed for each ASFE-Member Firm. If you are not with a current ASFE-Member Firm, visit www.ebrownbag.com to order a set of DVDs. They will be free to ASFE members; $500 for nonmembers.

Suggestions or requests for additional presentations or topics to be covered? Please let ASFE know (info@asfe.org). We'll pass your message along.

What's an ASFE-Member Firm Doing Writing a Kids' Comic Book? Plenty!

NTH Consultants, Ltd. and the city of Pontiac, MI have jointly unveiled a new environmental educational program called *Otto's Great Watershed Rescue*, designed to educate 1st through 8th graders about community watershed management principles. Funded by a grant from the Michigan Department of Natural Resources and Environment, the program examines common sources of watershed pollution and how seemingly small, environmentally friendly behaviors at home can improve the quality of our rivers, lakes, and streams. Working with city personnel, NTH developed a comic book and video game featuring Otto the River Otter and three polluting monsters. The video game, which closely follows the comic book, is available at www.pontiac.mi.us/info/watershedgame.html.

According to Pontiac Mayor Leon B. Jukowski, "Educational outreach is a critical step toward improving environmental stewardship in all our communities, and reaching school-aged children with this message is an important part of their future, too."

Pontiac and NTH plan to spread their environmental message during 2011 by developing a school-focused marketing program and constructing a traveling Otto exhibit that will reach many more of the city's children.

Editorial

The following editorial expresses the viewpoint of the ASFE NewsLog *editor; a viewpoint possibly espoused by no one else. Your comments are encouraged. Address them to info@asfe.org.*

My nearest and dearest friend, Doug Downs, is a geoprofessional. Like so many of his peers, Doug is a well-educated, intelligent, caring person with a good sense of humor and a highly developed sense of integrity. My circle of friends also includes some representatives of geoprofessionals' clients, some of whom find it odd that I talk about geoprofessionals' integrity with such conviction and enthusiasm. "They don't keep their promises," the client representatives have said. "They don't meet their schedules or their budgets."

"But what about the quality of the deliverable?" I ask. "So what if the report comes in a little late or over budget. Doesn't the quality make up for that?"

"I'm in no position to evaluate quality. I'm not a geoprofessional," comes the reply. "What counts to me is keeping your word." Which makes total sense when it comes to a service business, because so much about it is based on trust: We trust the service provider to do what we cannot do, because we don't understand what's involved. And we base our buying decision on what we hope to get; we cannot see it or experience it beforehand. All of which was reinforced by a recent, personal incident.

My truck had been acting up and I took it into my mechanic, Bubba, for repair. "I'll check it out and call you in about a hour," he said.

Bubba called 50 minutes later, told me what was wrong, and said it would cost about $325 to fix. "Suppose I asked you to do it for $275?" I asked. "Wouldn't do it," Bubba said. "I do it right. $325 is what it's gonna' cost."

"Okay," I said. "And when will it be ready?"

"Thursday at four."

"What if I said I wanted it Wednesday by three?"

"I could try to get it done early, but you can count on Thursday at four."

I spoke to Doug about my experience with Bubba. "Why can't you guys do that?" I asked.

"I don't know why," he replied. "We get into that situation and it's like deer in the headlights."

"Do the client representatives pressure you?"

"Sometimes, but usually they just ask about the delivery date and we feel this need to set an almost impossible deadline so we don't lose the commission."

"What about fee?"

"Same thing. We don't like to talk about contingencies, how maybe something extra needs to be put aside in case we run into something unexpected."

"And how often do you encounter the unexpected?"

"About 90 percent of the time."

"So why don't you tell your clients that?"

"I don't know. Maybe I think that, if I tell them that, they won't trust me."

I saw Bubba next on Thursday at four and, sure enough, my truck was ready. He'd also had it washed and vacuumed. "I'm sorry I couldn't get it done any faster," he said. Then came the good news. The problem was a faulty alternator, just as he expected, but he was able to get a rebuilt it instead of a new one, but with the same warranty. The final bill came in at $295, $30 less than the estimate.

"That's great, Bubba, just great." And then I mentioned the schedule/budget problems that seem to plague geoprofessionals and lead people to misconstrue their professionalism. "What's their problem?" I asked.

"Darned if I know," Bubba replied.

"Well, then," I asked. "What's your secret? How do you do deliver on time

or ahead of schedule' on budget or below?"

"Well," Bubba began, "there really ain't no secret to it at all; just common sense. I been doin' this for a while, so when you bring your truck in and I check it out, I get a pretty good feel for what it's gonna' need and the other work I got goin', and I set a schedule I know I can meet. Now, I'll always try to do better'n that if I can, because that always comes as a pleasant surprise, givin' the customer more'n they bargained for."

"Like having my truck washed and vacuumed before you return it to me."

"Sure. It's a sign of respect. Show's I appreciate you and your business."

"And the same with money?"

"Of course. You gotta talk about money. I'm in business. Business is all about money. Ain't nothtin' to be embarrassed about. I sure don't want to tell you less'n it's gonna be,

'cause then you'll think I was tryin' to cheat you."

"What about the unexpected? How do you handle that?"

"Well, you got two kinds of unexpecteds: your expected unexpecteds and your unexpected unexpecteds. The expected unexpecteds I can tell you about up front, and that accounts for about 90% of the unexpecteds. The unexpected unexpecteds take you by

surprise, and I always let you know that that might happen, and if it does, I get on the phone right away."

"Where did you learn that?"

"From my daddy. He told me, 'Son, no matter what you decide to be in life, the one thing you always want to be, no matter what, is a man of your word. One of the best feelings in life is to be trusted, and if you're not a man of your word, you'll never get there. People may have no idea at all of how you do what you do, but if you're a man of your word, they'll trust you to do it right for them.'"

"In other words, keep your promises."

"That, and bein' careful to only promise what you know you can deliver. If you can do better'n that from time to time, people will love you for it. If you break your promises, you just ain't a professional. Tell your friends that."

"I promise I will."

Letter to the Editor

Dear John:

I enjoyed the interview reprint in the September/October 2010 ASFE *NewsLog* and the letter to the editor sent in from the ADSC member. The issues presented are forefront in my mind daily, because I practice predominately in the underworld of design-build retaining-wall construction. For ASFE's and the geoprofessional community's consideration, maybe it would be worthwhile for some action in the arena of geotechnical design-build practices. More and more GC's and owners are finding the market willing to accept their risks in the development of biddable, preliminary designs. I have talked to other civil-engineering professionals about their experiences working on design-build projects with GC's, developers, etc. In line with ASFE's new marching orders, it harms the geoprofessional community when any of us agree to give our engineering work to an owner or contractor in hopes that it will result in a contract later. Here's the pitch I like to give to prospective clients who want my engineering and contracting expertise in order for them to put together a responsible bid: Contractors earn their living by building things. Engineers earn their living by designing things (or analyzing them, evaluating them, etc.). Imagine, Mr. Contractor, being asked to build the shell of a building with no charge to an owner so the owner can decide whether or not it can afford to buy the building. No contractor I know would do that. However, it is not seen as a burden on engineers to provide preliminary designs at no charge so the contractor can prepare a bid. Contractors have estimators who are part of the general operating overhead of the company. There is no partially-completed-buildings department that is also part of the contractor's operating overhead.

Engineers also have estimators who are part of their operating overhead. They are called project managers and principals, and they provide engineering proposals to prospective clients. There should be no preliminary-engineering-for-prospective-design-build-projects department that would fall under the operating overhead of an engineering firm. Contractors seem unwilling to understand the logic behind my little story. It's probably for the same reasons we in ASFE lament the status of geoprofessionals in our society: Some are willing to marginalize and commoditize their services. Some will even perform their services for free in hopes of getting a paying project out of it. What makes that approach even worse: The geoprofessionals involved are rarely part of the sales team proposing the design-build scope, so they don't have an opportunity for personal, professional selling directly to the owner. This is issue has been nagging me for years, so what better time than now for me to jump into the fire with the latest ASFE initiative! Please let me know how I can serve ASFE's efforts "to maximize the [design-build] geoprofessions' importance and value to the marketplace." I'd like to think of it as refining the palate of those shopping for vintage (as in, characterized by excellence, maturity and enduring appeal!) service providers.

Keith R. Moser, P.E.
Geomo Enterprises, Inc.

Client-Focused Contract Negotiations Webinar Now Ready When You Are; CD Available, Too

ASFE's extraordinarily well-received "Client-Focused Contract Negotiations" webinar is now available on-line and/or as a CD. The presentation, led by Terracon Vice President/General Counsel Michael J. Yost, Esq., focuses on tips and tactics to effectively negotiate difficult contract provisions. Address the client's needs and concerns, not your own, Mike says; doing so will put you in a far better position to gain acceptance of the terms that you prefer and that, in reality, are better for the client and the project, too. Originally presented on September 24, 2010, the webinar is neither general nor theoretical. Mike focuses on specific provisions consultants have to deal with every day and provides practical tools you can use to enhance your contract-negotiation skills.

Members can watch the webinar free of charge on-line and/or order a CD free of charge at the ASFE website. Just go to www.asfe.org.

From the Bench

No Viable Claim When Affidavit's Missing

Hage Engineering (Hage) was asked to prepare designs for a New York City townhouse remodeling project. A party wall was damaged during construction and the homeowner's insurance company – Travelers Indemnity Company – covered the homeowner's damages. It then brought a subrogation claim against Hage. Hage asked the trial court for a summary dismissal of the claim and the court obliged. Traveler's appealed to the New York Supreme Court, Appellate Division, First Department. How did it turn out? The court can speak for itself:

> "The court correctly dismissed the complaint as against the Hage defendants. The record makes clear that Hage had no obligations with regard to underpinning. Indeed, pursuant to Hage's agreement with Z One, Hage was not contractually obligated to – and did not – perform any services related to the installation of underpinning, shoring or bracing, or to other stability measures. That fact was further supported by various notations on Hage's drawings and specifications, which made clear that all underpinning, sheeting, shoring or other similar required construction would be the contractor's responsibility, that the contractor was to retain a licensed professional engineer to provide all necessary designs and required inspections, and that the contractor was to provide all measures and precautions necessary to prevent damage and settlement of existing or new construction….In any event, as the motion court found, the record demonstrates that there is no evidence of negligence on Hage's part, since its specifications were not followed, and the settling happened only after there was a deviation from Hage's instructions.
>
> "Moreover, Travelers failed to include an expert's affidavit to support its conclusion that it was Hage's design "first and foremost" that failed. A claim of malpractice against a professional engineer requires expert testimony to establish a viable cause of action…. A claim of professional negligence requires proof that there was a departure from accepted standards of practice, and that the departure was a proximate cause of the injury"….Travelers failed to provide such proof from an expert in opposition to Hage's motion, and this also warranted dismissal of the complaint as against Hage."

Travelers Indemnity Company, etc., et al., Plaintiffs-Respondents-Appellants v. ZeffDesign, et al., Defendants, Z One Design, LLC, Defendant-Appellant, Hage Engineering, et al., Defendants-Respondents

Business 101

It's still tough out there, as you know. And, most regrettably, some or even many of your competitors have fallen by the wayside. When you know or suspect that to be the case, give the company a call. If you receive an automated message telling you that the telephone number has been disconnected, immediately contact the telephone company to purchase the number. In that way, when clients and colleagues of the now-defunct organization call, you will be able to tell them that the company they wanted to reach no longer exists, but

you may be able to be of service. This can be particularly worthwhile in those many cases where, before going out of business, the company had signed up for Yellow Pages advertising, classified ads of one type or another (often prepaid), or for prepaid listings in various types of directories. "We don't want the kind of projects and/or clients they used to deal with," some might say, partly to justify taking no action at all. But how do you know what kind of business might have been ready to walk through their door? And if the opportunities this tactic creates are not to your liking, then at least you will be able to provide referrals to reputable organizations that can serve the clients well, and that will more than likely appreciate your kindness and look for opportunities to reciprocate.

Road Warrior

You have to wonder, don't you, why super-luxury, expensive hotels charge you $15 a day for Internet and don't put a coffee-maker in your room. We can't give you guidance on how to get the Internet for free (legally), but we can offer this tip about the coffee-maker: Call housekeeping and ask for one, to be accompanied by how many and what types of coffee packets, or tea, etc. You can also ask for real cream or half-and-half.

Dr. English

"Dear Dr. English," a loyal reader wrote recently. "I have been told that 'etc.' – the abbreviation for *et cetera* – should be used as a list-ender when the list comprises things rather than people, and that 'et al.' (for *et alii*) should be used when the list comprises people. True?"

"Dear Loyal reader," the good doctor responded. "Sounds good, but it's untrue. *Et cetera* means 'and other things' or 'and so on.' You can use it for things or for people. By contrast, *et alii* means 'and other males.' BUT *et alii* is only one of three two-Latin-word phrases for which *et al.* is the appropriate abbreviation. The other two are *et aliae* ('and other females') and *et alia* ('and other things'). In other words, *et al.* is a somewhat neat Latin phrase whose true meaning depends on what's being referred to."

Human Resources Management

A September 24, 2010 article in the *Atlanta Business Chronicle* relates some good ideas for combating stress in the workplace. Written by Contributing Writer Romy Ribitsky, the article notes that stress' negative health effects haven't changed over time, but the causes and amounts of stress have changed, especially in the last three years, because of the Great Recession. Whereas stress used to stem principally from a desire to excel, today's principal stress inducers include:

- higher costs of living;
- widespread unemployment;
- constant fear of being laid off;
- less resilience and, therefore, more tension stemming from relationships with superiors; subordinates, and colleagues;
- more (or sometimes less) responsibility at work;
- constant distractions because of the need to multi-task;
- lack of leadership and little discussion of the company's mission; and
- lack of career direction.

Stress can be particularly difficult for small-business owners, Nova Southeastern University Associate Professor of Management Bahaudin Mujtaba said, noting that "entrepreneurs and small-business owners have more at stake and often deal with a higher level of stress than their corporate colleagues, who have deeper pockets to deal with the economic uncertainties."

Management Consultant Nacie Carson has adopted a different point of view, saying that entrepreneurs and small-business owners are in some ways "better suited to this economy because they are often used to an irregular income stream and have learned how to manage their financial needs around booms and busts in their own endeavors." In either case, small-business leaders need to think more about than just their own needs.

Carson advises that managers discuss the state of the company and job security with their subordinates. *Important:* Carson believes that manag-

ers can have a much more positive impact on employees' morale and mental health by conducting these conversations one-on-one, rather than in group settings. "Taking the time to check in and having an honest discussion with individuals is key to making people feel like they are respected [and] valued," she said.

Carson also pointed out that younger workers can be particularly needy when it comes to stress, because they have never before experienced this kind of economic devastation and the huge impact that layoffs and protracted unemployment are having on friends and relatives. Managers can respond by providing more training to younger or newer team members. "It's a great way to not only reduce stress, but also to reinvest in the organization," Carson said. She urges managers to highlight employees' potential and encourage ongoing skill development. The cost of doing so can be kept low through one-on-one coaching and mentoring, she suggested.

Humor in the workplace can also help reduce stress, as can activities that employees and their families can share, like a bowling or softball league. Nonetheless, according to Alex Lickerman, M.D., a primary care physician at the University of Chicago, support and encouragement are what employees need most. "They need to hear, 'You can do this. What you're dealing with now is just a bump in the road,'" Lickerman said. "And often, a 15-minute pep talk is just as effective as an hours-long discussion."

No matter what, it seems, one thing is clear: If you are going to keep your lean, mean staff intact, ready to move forward quickly as the economy improves, you need to develop a plan, launch it, monitor its effectiveness, and make the improvements needed to optimize results. There's far too much at stake to simply hope for the best.

BIM is Here to Stay. Where are You with BIM?

John Moebes presented an owner's view of building information modeling (BIM) adoption, risk, and reward at a recent Insight Information forum in Toronto. Moebes is director of construction for the 145-store Crate & Barrel chain, a retailer of housewares, furniture, and home accessories that doesn't use prototype designs. The chain adopted BIM because, Moebes said, "We had to reduce project costs and time. We looked around and didn't see a lot of options other than building fewer stores or fighting more court cases." With the experience of 22 projects, Moebes reported that BIM reduces time requirements by 40% and cost by 50%. He said Crate & Barrel opted for BIM because it already controlled most major project parameters.

From an owner's perspective, core BIM benefits include: improved project-document content, resulting in fewer requests for information and better downstream tender results; faster document production; and accelerated understanding of the project at all phases.

Core BIM risks include: resistance to process change in a "very conservative" industry; the BIM learning curve (20% of the tasks require familiarity with 80% the BIM platform); and required infrastructure upgrades. For owners wanting to give BIM a try, Moebes suggested:

- Select a smaller project and a willing project manager. (Moebes said someone hostile to the technology will "sink" the entire team.)
- Hire only those architects, engineers, and contractors who are familiar with BIM.
- Don't add any other irons to the fire.

Are you up-to-date on BIM? In five years you'll probably have to be. Those who adopt it sooner will have the best market later.

Eat My Smog

It's called photocatalysis, a process that uses light (natural or electric) to accelerate natural oxidation processes that cause air pollutants like carbon monoxide, nitrogen oxide, and benzene to decompose into water, nitrates, or carbon dioxide. Now being marketed as TX Active, the process was developed by Italcementi, the world's fifth-largest cement producer. The active photocatalyzing ingredient – a blend of titanium dioxide – can be incorporated into cement, mortar, paints, and plaster. Launched commercially in Europe, early results were called "astonishing." In Segrate, near Milan, TX Active was used to repave a street that experiences average traffic of 1,000 cars per hour. Italcementi spokesperson Alberto Ghisalberti said "we have measured a reduction in nitric oxides of around 60%." Near Bergamo, Italcementi's hometown, a 2-acre industrial area paved with active blocks experienced a 45% pollution reduction.

According to Italian experts, painting the walls, repaving the roads, and otherwise covering just 15% of all visible urban surfaces with TX Active products could cut pollution by as much 50% in large cities like Milan that experience persistent pollution problems caused by car emissions, smoke from

heating systems, and industrial activities.

Known in Italy as "cemento mangiasmog" or "smog-eating cement," the product has already made it to the United States, where Missouri's DOT is installing it in a section of Highway 141 and Ladue Road near St. Louis, a project slated for completion by the summer of 2012.

Looking to maximize your value and importance to the marketplace? Alerting others to important new products could help. Becoming a distributor could help even more!

Upcoming Meetings

Mark your calendar! You don't want to miss any of the upcoming meetings of ASFE/The Geoprofessional Business Association.

April 7-9, 2011
ASFE Spring (Annual) Meeting
Four Seasons Hotel
St. Louis, MO

October 6-8, 2011
ASFE Fall Meeting
Arizona Biltmore
Phoenix/Scottsdale, AZ

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WASTE GEO Technics

Fate and Transport of Process-Affected Water in Out-of-Pit Tailings Ponds in the Oil Sands Industry in Canada

Alexander Holden, Trevor Tompkins, Shama Haque
Leo Perez, Heather Sutherland, Mike Bowron
Kevin Biggar, Rob Donahue, Carl Mendoza
Jon Martin, K. Ulrich Mayer, Jim Barker
Dave Sego, Ania Ulrich

Introduction

Due to operational necessities in the oil sands industry, above-grade tailings ponds are constructed to store tailings and process-affected (PA) water before their ultimate placement is realized within the excavated, open-mine pits. Due to local geological depositional histories and operational considerations and constraints, there are a number of locations where the placement of these impoundments will occur atop natural, buried outwash deposits, relicts from previous glacial rivers. If no engineered measures are taken, these sand channels have the capacity to act as potential flow paths for PA water to migrate away from the tailings ponds and into downstream surface or ground waters. Flow and transport modeling of a case study site suggests that PA seepage may occur downward through glacial till deposits into an underlying sand channel; however, the potential impact of the PA water on native sediments and groundwater resources is not known. Suncor Energy Inc.'s South Tailings Pond (STP), with approximately 8km and 50% of the footprint of its dyke structure atop the Wood Creek Sand Channel, represents the first known such facility, and offers the opportunity to develop better understanding and management techniques for this particular challenge.

A long-term research initiative has been established between the Universities of Alberta, Waterloo, and British Columbia and Suncor Energy Inc., with the principal objectives being: 1) to understand the fate and transport of PA water through native sediments; and 2) to explore different remediation strategies for PA water-impacted groundwater, ranging from monitored natural attenuation to in situ chemical oxidation. This paper provides a description of the field site and the various research activities, with an emphasis on the field experiments that are being conducted.

Site Details

The STP (Figure 1) covers an area of approximately 2300ha with an approved, current tailings holding capacity of 230Mm^3. The STP is designated for storage of PA water and fine tailings, and deposition commenced June 2006. Three

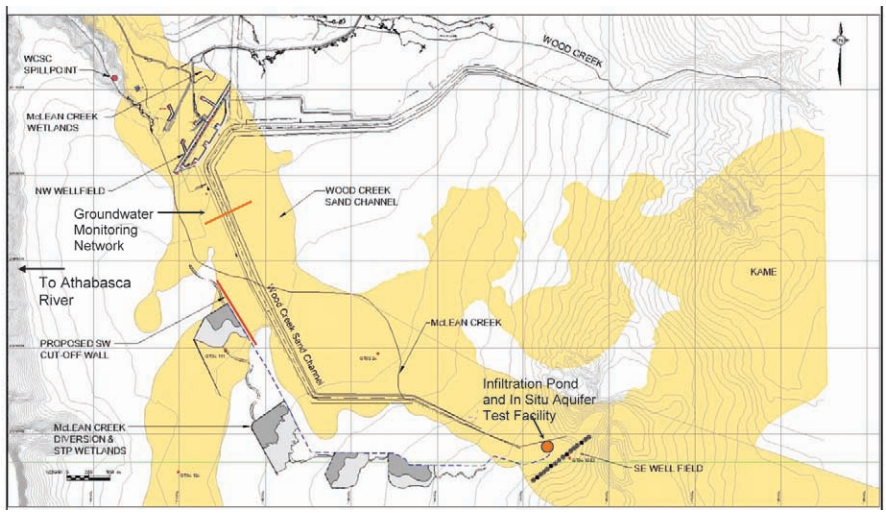

Figure 1. Schematic of the South Tailings Pond, showing the underlying Wood Creek Sand Channel (WCSC) in yellow and the approximate locations of the Infiltration Pond, Groundwater Monitoring Transect and In Situ Aquifer Test Facility.

continuous retaining dykes make up the North, West and South portions of the STP. Containment to the East is provided by naturally elevated ground.

In descending order below the ground surface, the geology at the STP consists of 1-2m of muskeg-based Holocene organic soil, approximately 8-15m of Pleistocene glacial till (although thin (<5m) coverage has been observed at several locations across the site), and 20-30m of Pleistocene, glaciofluvial dense sands and gravels comprising the Wood Creek Sand Channel. The SE to NW branch of the Wood Creek Sand Channel is the principal flow feature and controls groundwater conditions in the connecting offshoots. A "spill-point" exists beyond the NW corner of the STP dyke, where the Sand Channel discharges into the McLean Creek, a tributary to the Athabasca River.

Suncor has identified three potential locations for release of PA seepage waters into the environment. These will be mitigated by: an interception pumping well field to the NW (groundwater is currently pumped back into the STP), a cutoff wall to the SW, and if required, a pumping well system in the SE (under investigation) (Figure 1). These containment measures for potentially contaminated waters permit aquifer injection experiments critical to this research project.

Overview of Research Activities

Project objectives will be realized through a comprehensive series of experiments, presently underway. The intent of laboratory experiments is: a) to characterize the hydrogeological properties of subsurface sediments; and b) to characterize the i) aqueous geochemistry of pore waters, ii) solid phase geochemistry of sediments, and iii) *in situ* microbial communities present in the clay till and sandy sediments below the tailings pond, both before and after exposure to PA water. Results will be extended to the field scale by c) a field study of the infiltration rates and induced biogeochemical reactions as PA water infiltrates through the base of a small-scale, constructed representation of the STP; d) a field program to sample and continuously monitor groundwater for potential migration and evolution of PA seepage from the STP; e) a field evaluation, using controlled input of PA water, of natural attenuation in the sand channel aquifer; and finally f) an evaluation of the viability of *in situ* chemical oxidation to destroy toxic organic compounds contained in the PA water, assuming migration into the Sand Channel occurs.

Central to this project are three instrumented field research facilities: a groundwater monitoring network to monitor flux from the tailings pond, a field-scale infiltration pond, and a system of injection/sampling wells in the Wood Creek Sand Channel (locations shown in Figure 1). Each is described in detail below.

Groundwater Monitoring Network

In the Spring of 2006, a groundwater monitoring network was established across the West Dyke, immediately downstream of the STP based upon understanding of the local and regional groundwater flow patterns, thus permitting early detection of potential PA water migration beneath the Pond. The completed network consists of 4 nests of multilevel groundwater monitoring points, together spanning the width and depth of the glacial till and Wood Creek Sand Channel.

Monitoring Well Installation Details

Nests 1 and 2 were instrumented with seven monitoring wells each, to permit the regular collection and geochemical analysis of groundwater samples from several elevations in the subsurface. Their implementation is summarized in Figure 2. During borehole drilling, sediment cores were collected using SONIC drill rig-mounted Lexan liners and were capped at the surface to maintain the *in situ* redox conditions. Core samples were collected in 1.5m lengths at the same depth intervals as monitoring wells screens and the

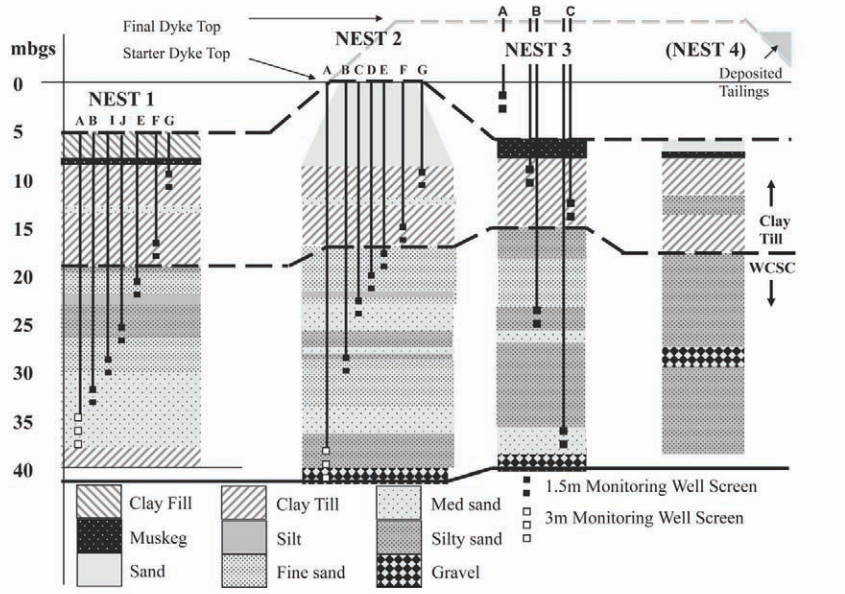

Figure 2. Schematic of the vertical delineation of surficial geology by monitoring wells at the Groundwater Monitoring Transect. Monitoring wells were constructed from 50mm (I.D.) Schedule 80 PVC solid pipe, with 0.5mm slotted casing well screens. Sand filter packs extend beyond the well screen by at least 0.3m in either direction. Bentonite chips were used to grout the remaining void space up to ground surface. (mbgs=metres below ground surface, WCSC = Wood Creek Sand Channel).

initially installed data loggers (see below).

Data Logger Installation Details

In Spring 2006, Nests 3 and 4 were each instrumented with four grouted LTC (level, temperature, conductivity) Solinst 3001 data loggers to permit real-time monitoring of contaminant migration. Loggers were installed in the upper and lower regions of both the clay till and the saturated portion of the Wood Creek Sand Channel. Monitoring wells were not initially constructed here, given the likelihood of their damage during dyke construction. This precaution was shown to be well-founded: several of the Nest 2 monitoring well casings have been bent due to dyke shifts during its construction. This has complicated extending pre-existing well casings and in extreme cases, wells can no longer be sampled.

Once dyke construction is completed, sacrificed loggers will be replaced with monitoring well nests similar to Nests 1 and 2 (Nest 3, 2010; Nest 4, 2011).

Infiltration Pond

Another key component to the research infrastructure is a field-scale analogue of the STP - the Infiltration Pond (completed August 2008). The Infiltration Pond (Figure 3) permits field-scale investigation of the rate of infiltration of PA water into the clay till, and of the microbial and geochemical impact of this water as it migrates through the sediments.

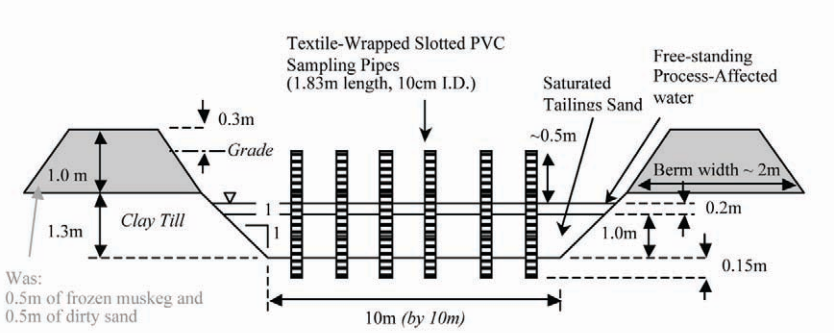

Figure 3. Cross-section schematic of the Infiltration Pond. The pond is square in shape, excavated ~1.3m deep into competent clay till. Thirty 10cm I.D. slotted PVC casing pipes were placed across its base to facilitate collection of future sediment and water samples. Pipes were recessed only deep enough to fix the screens in place, and covered with Nilex Nonwoven 4545 geotextile filter socks.

Infiltration Pond Construction Details

During excavation, vegetation, muskeg and a locally present surficial sand layer were stripped away and the pond floor was excavated to a depth of 1.3m into the clay till unit (Figure 3). The pond top was aligned below the base of the surficial sand layer to prevent lateral leakage of PA water through a highly conductive stratum into the surroundings. Excavated clayey material was deposited around the perimeter of the excavation and compacted with a backhoe to replace the removed organic and sand layers and to line the sidewalls with a low permeable material. To provide locations for sampling the till beneath the pond over time, and to enable collection of water samples from just above the point of infiltration, thirty slotted PVC pipes were evenly spaced within the pond and embedded 0.15m into the till. Tailings sand was deposited (1m thickness) and compacted around the pipes to set them in place. Lastly, a water truck was used to flood the pond with PA water to ~0.2 m above the top of the tailings sand. Four continuous core samples were collected to a depth of 12m during pond construction to characterize the sediments and pore waters prior to infiltration. Future samples will be taken by coring beneath the slotted pipes in 2010 and 2011, to quantify both the progress of infiltration by isotope tracking, and the microbially-mediated and geochemical impact of PA water ingress into the clay till.

In Situ Aquifer Test Facility

The In Situ Aquifer Test Facility is a system of injection and monitoring wells, positioned within the Wood Creek Sand Channel, created as a predictive field-scale model. Two injection/monitoring wells were constructed in Spring 2007: one screened within yellowish-red sand (STP-07-158-SS), the other deeper, within grey

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sand (STP-07-159-SS). This zonation, which may reflect differences in redox conditions, provides a means of monitoring the interaction of PA-injectate within two chemically distinct layers of the aquifer. Slug testing found the hydraulic conductivity to be 6.4 x 10-3 m s-1 in the shallow zone and 2.4 x 10-3 m s-1 in the deeper region, while groundwater chemistry suggests the entire aquifer may be mildly anaerobic.

A nest of multilevel monitoring points was constructed in June 2008, in the estimated down-gradient direction from each injection well (Figure 4). These wells improve the researchers' ability to identify local groundwater flow direction and velocity and permit study of injectate-aquifer interactions over greater residence times. Nest STP-08-158A was installed 3.7m from STP-07-158-SS and STP-08-159A was positioned 8.6m from STP-07-159-SS, at an approximate bearing of 200 degrees S/SW from the injection wells. Difficulty in precisely characterizing local groundwater flow patterns precluded more distal placement of these nests.

Injection and Sampling Well Assembly

Each injection well is instrumented with an inflatable packer, pump and data logger to aid in the aquifer injection experiments. A Schlumberger CTD-Diver data logger continuously records pre- and post-injectate groundwater temperature, pH and electrical conductivity. During injection experiments, the Hoskin Scientific Ltd. RST Instruments N-Packer is used to seal the well screen from the overlying stagnant water in the well and a Grundfos Redi-flo2 submersible pump is used to sample the groundwater. Injections themselves are driven by the ~15m difference in hydraulic head between the discharging tank and the water table. The components were assembled in-house such that tubing and wiring pass through the packer (positioned just above the well screen) to the probe and pump (aligned within the well screen), thereby allowing for samples and measurements to be taken with the packer inflated and in place. Lastly, each down-gradient multilevel well is also equipped with a Schlumberger CTD-Diver.

Continuous core samples were collected within the Wood Creek Sand Channel for grain size, falling head permeameter, fraction of organic content, calcite and dolomite content, anaerobic microcosms, and sequential extraction procedures (to assess the partitioning of trace elements within the solid phase).

Other Available Suncor Facilities

Additionally, Suncor has made available to this project the use of pressure relief wells at the toe of the dyke, internal dyke drains and its own extensive network of monitoring wells as well as their historical sampling records. This offers the project a means to further corroborate and extrapolate findings beyond the localized boundaries of the three research facilities.

Conclusions and Outlook

In Northern Alberta, it is expected that the placement of out-of-pit tailings ponds atop permeable, glaciofluvial sand channels will become increasingly prevalent. This project is the first of its kind to investigate the lifecycle of process-affected water seepage from an oil sands tailings pond in this setting – beginning with in situ background conditions, through to seepage migration and evolution, and culminating with preliminary investigation into potential mitigation strategies. This research is expected to benefit the entire oil sands industry, with ramifications extending to the future placement of tailings ponds, remediation and mine closure strategies and legislation for environmental compliance.

Acknowledgements

The authors wish to acknowledge Suncor Energy Inc., NSERC, the Alberta Innovates Technology Futures and Klohn Crippen Berger Ltd. for supporting this project.

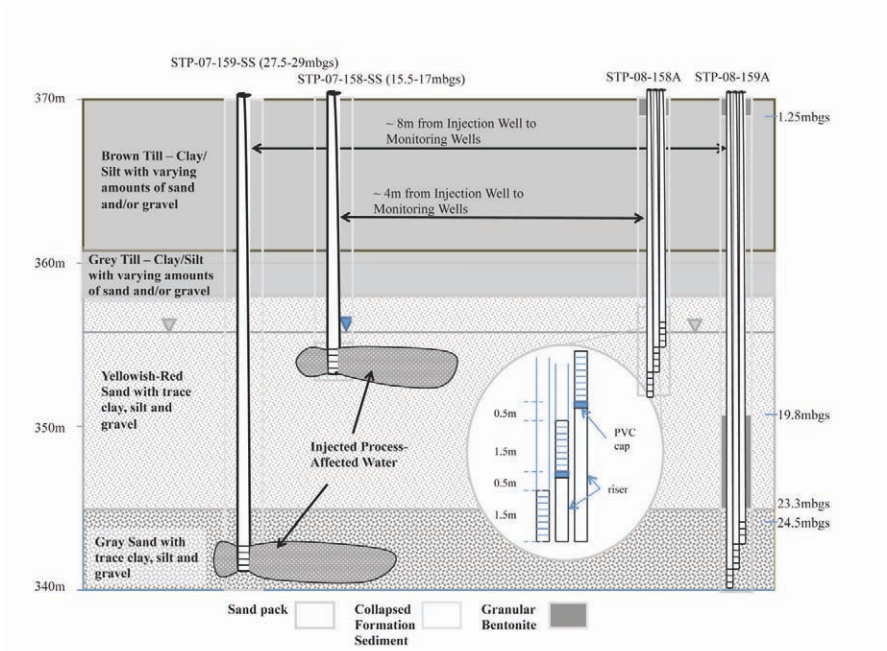

Figure 4. Cross-section schematic of wells at the In Situ Aquifer Test Facility. Each multilevel nest was instrumented with three, 2.5cm diameter, Schedule 40 PVC wells. Well screens were hand-slotted using a hacksaw and wrapped with filter fabric to prevent ingress of sand. To facilitate installation of each screen at the target depth, a section of 2.5cm Schedule 40 PVC riser was subtended to the well screen. A PVC cap was mounted between the base of the well screen and the riser top, to prevent the accumulation of water in this section beneath the screen. (mbgs = metres below ground surface, elevation (m) in metres above sea level)

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The GROUT LINE

Grout Line

Paolo Gazzarrini

Overture

Twenty-third appointment with the Grout Line and, despite the busy time for the grouting industry (preparation of the papers for the 2012 Grouting and Deep Soil Mixing International Conference), my good friend Sam Bandimere was able to prepare an article related to some consideration about the grouting industry "today".

Before I present his article, I would like to remind you that June 13-17, 2011 the 32nd annual Short Course about the Grouting Fundamentals and Current Practice will be held at the Colorado School of Mines – Golden (CO).

Here's the link to the agenda,

http://csmspace.com/events/grouting/agenda.html

and here's the link to the instructors

http://csmspace.com/events/grouting/instructors.html.

Some topics of the course: Grouting (soil and rock), grout mixes and additives, Anchor grouting, Jet-grouting, Composite cut-off for dams (Soil mixing, Diaphragm Walls/Slurry Walls), and Grouting for Tunneling. So as you can see, this event is not only about grouting. There are also interesting topics related to dam cutoffs and tunneling.

I have already written a fair bit, in previous issues of the Grout Line, about the course and so, if any of you are interested in participating please visit our webpage www.groutline.com.

Here is Sam Bandimere's article. Sam, owner of Bandimere Grouting Consulting Services, Denver, C0 (sbandimere@msn.com) is an undisputed grouting expert with more than 30 years experience in the Grouting Industry. An active member of the Geo-Institute's Gouting Committee, Sam is also one of the organizers/instructors for the Grouting Course previously mentioned.

30 Years of Grouting

Sam Bandimere

Having been involved in the grouting industry for over two decades as a contractor and now as a grouting consultant for over a decade, it has been my pleasure and privilege to observe the grouting industry from this unusual perspective. I would like to take this opportunity to share some observations.

First, I would like to point out that few industries have made as many advances in technology and operation as the grouting (and overall, ground improvement) industry. I'm sure there are many of you who can recall with me days of old when contractors protected their marketing program with secret mix designs, self fabricated and manufactured equipment, and their market area was regional at best. With few exceptions, this not only made them unique but led them to see the industry from a hammer-and-nail scenario which explains why the industry had a reputation of "Black Magic". Under those conditions, they tended to have either huge project successes or horrible failures depending on whether the contractors' limited application capabilities happened to fit a project's technical needs.

Prior to our current information age and globalized markets, contractors and engineers tended to see their markets from very local perspectives and they strove to meet clients' needs with what could be done and produced locally. This led to some unique innovations we still use today. I can think of

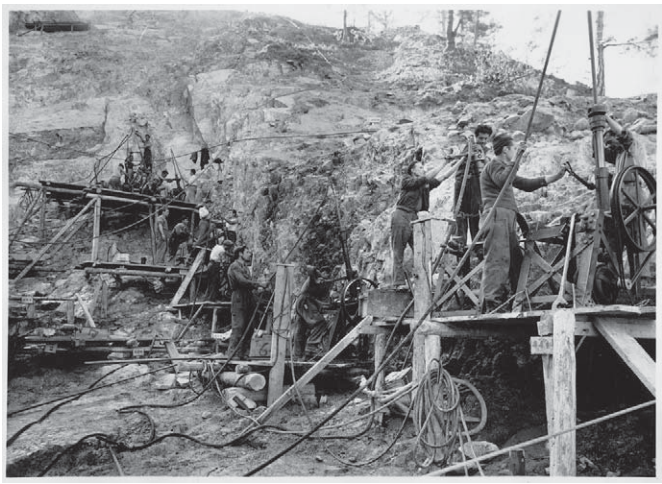


Figure 1. Drilling and grouting in the 40's.

Figure 2. Grouting plant in the 40's.

Figure 3. D&G 2010.

Figure 4. Grout plant in 2010.

numerous, very innovative contractors (and engineering firms) who did amazing things back in the 1950's, 60's, and 70's who are no longer around, but would have thrived in today's market except for the fact that they were ahead of their time. I don't know about you, but I'm very grateful for those guys and humbled to see ICOG and other industry organizations honor them as our "Grouting Greats". The contributions they made are still pivotal to the technological advancements we have today.

In the 1980's, there were some specialty contractors who wisely took advantage of the early days of the information age and became global operations. They are still major market share-holders of the grouting-and-ground improvement industry today, and what they have contributed to the industry is absolutely invaluable.

Now that the information and globalization age has had some time to take hold, a host of ground improvement issues and opportunities have resulted in some interesting results. First and foremost are the educational and information aspects which opened up "local" engineering and contracting communities to "global" knowledge and information about the grouting industry. This not only gives local engineers the capability of meeting a client's grouting needs with a whole new toolbox of means and methods, but also empowers local contractors to access the means-and-methods information to produce excellent ground improvement and grouting operations with very competitive costs.

Second, there are manufacturers who now produce "shelf-ready" equipment that allow contractors to set up for a project's rigorous equipment needs in short periods of time, and in fact, allows them to do this work without having to re-invent that equipment.

Third, is the fact that it is now almost impossible for any contractor to produce some "secret" mix design or product that is not available on the open market. We now have excellent

Figure 5. Grouting in 2010.

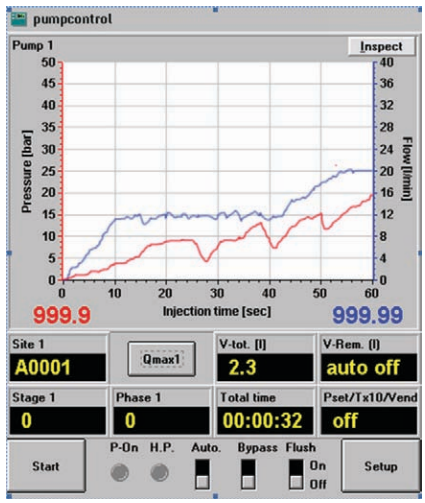


Figure 6. Grouting in 2010.

suppliers who are very knowledgeable and capable of giving technical support to any engineer or contractor for proper applications of a given product.

All of this has produced some very exciting aspects to the grouting-and-ground improvement industry. Now it's a matter of looking at how the industry moves forward from here. Over the past decade I've had the op-

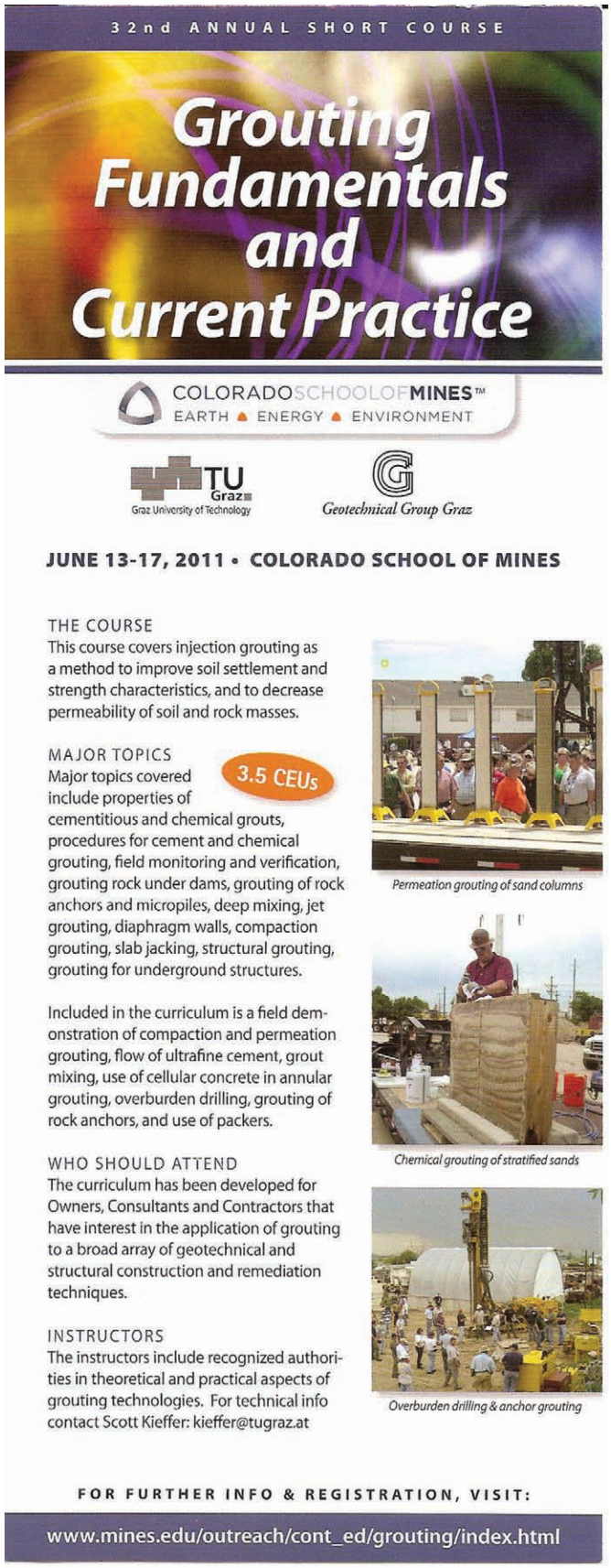
portunity of working with both small and large engineering firms, contractors, manufacturers, and suppliers. It's been interesting to observe the different approaches to an industry that has branched out to the point that we now have become susceptible to what I have heard referred to as "High-Tech Black Magic". The application of "grouting" has become entangled with so many ground improvement and structural repair techniques that it is now possible to confuse clients with many options, experience levels and case histories. It's almost impossible to determine who to believe for a project's best application, based on its technical and sometimes just plain "basic" needs. This can lead to a sales-pitch dream where it's all about who can do the best sales presentation rather than what the client really needs or wants.

It is one of my goals to make sure this industry never forgets that there are a lot of very innovative and focused "local" contractors who may not have all the capabilities of our major players, but need to be given opportunities of providing specific grouting applications for reasons of keeping community and economic resources close to home. I could get on that soap box, but for now will keep that for a future article. In the mean time, I hope there is no engineering firm, contractor, manufacturer or supplier who feels they are

I want to thank the "Grout Line" for giving us a venue for promoting a focus where we govern ourselves by an integrity that promotes the industry as a whole. I, for one, believe our history is a testament to the fact that we are doing a good job of that.

Now that the papers for the 2012 Grouting Conference are finished and presented, I hope you will have time to prepare something for the Grout Line. I await your contribution. Write to: Paolo Gazzarrini, fax 604-913 0106 or paolo@paologaz.com, paologaz@shaw.ca_or paolo@groutline.com. Or tweet me @groutline.

Ciao!



GEO INTEREST

the Water in the Soil – Part 2

Bill Hodge

This is the second in a series of articles in which I am proposing a way of calculating the pore water pressure that comes about within a saturated granular soil while it is undergoing deformation.

In the previous article I began the development and justification of this idea by showing that when a particle is falling through water there is a pressurized zone ahead of the particle, and suggested that the magnitude of this pressure front is somehow dependent on how far the particle had fallen through the water. Then I ended with a prediction of what would be the rate of generation of water pressure in front of a solid sphere in a test to be carried out in the research laboratory at UBC under the kind auspices of Professor Vaid.

Now here are those results and my interpretation of them. Afterwards I'll go on to suggest what these findings say about liquefaction of saturated soils.

Results of Test at UBC

[Note: Figures 1 – 4 were in Part 1 – December 2010] In Figure 5 the ragged blue line is a trace of the digitized record of weight against time measured at UBC for the fall of a 2 inch ball bearing. The red curve is the weight predicted earlier. The x-axis shows time. The y-axis shows the system weight, and where the line approaching from the left is hovering around zero.

If you recall, the test setup that produced this trace (Part 1, Figure 3) has the ball suspended from an electromagnet below the water level in the cylinder; the load cell records the weight of all the hardware (cylinder, water, electromagnet and ball). So the trace in Figure 5 is the weight of all components measured before, and for about a half second after the power to the electromagnet is cut, resulting in the ball being abruptly dropped to let it "free-fall" through the water column.

Now, what the trace shows us is a sudden weight drop into negative values, and then, a subsequent gradual oscillating recovery of weight until, at the end of the trace, the readings go off-scale. The mechanical explanation for the shape of the trace shape is as follows.

Immediately the ball is set loose the system records the complete loss of the buoyant weight of the steel ball. Now that it's weight is no longer attached to the side of the cylinder, the cylinder itself which up to that point has been carrying that load in axial compression, reacts like a spring and begins bouncing up and down. This vibration

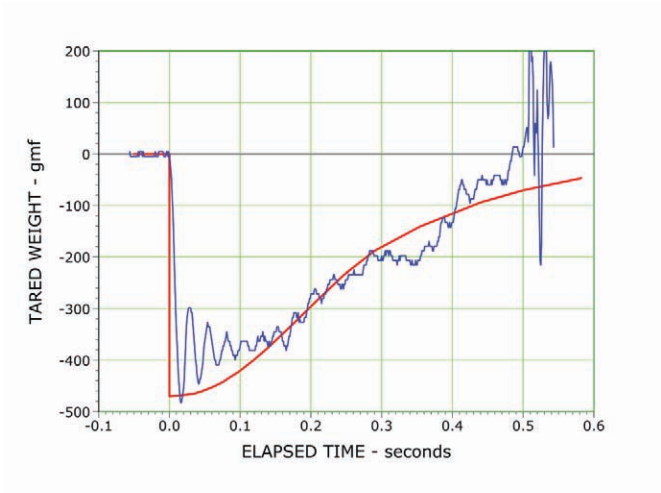


Figure 5. Digital results of UBC test.

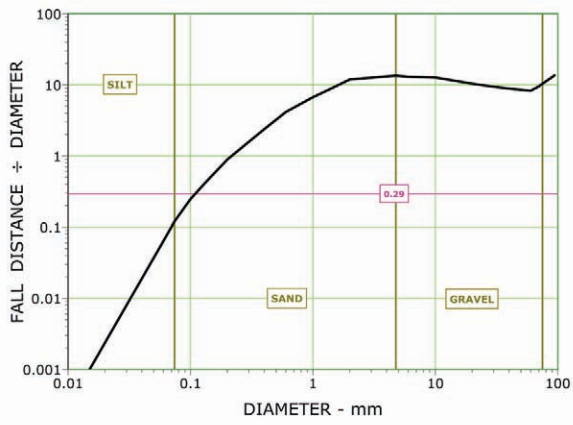


Figure 6. Weight transfer for fall distance.

is seen as the cyclical waveforms superimposed on the record of the apparatus weight. Anyway, looking past the superimposed waves, it can be seen clearly enough that within a short time the weight of the system comes climbing back towards its pre-release weight. The excitement at the end of the trace is the crash when the ball runs into a sand buffer at the bottom of the cylinder.

The waveforms due to system resonance are a bit of a nuisance and are a result of using a ball too big for the overall mass of the system. Basically, in hindsight, the cylinder was too small for the size of the ball. And also, apart from vibrations, I should think it likely there are boundary interference effects involved which contaminate the data. So what is being done at the moment to remove these undesirable attributes is to build a much longer and wider cylinder where the water pressure ahead of the ball is measured with an array of pressure transducers distributed about the base. Here, David Woeller of ConeTec has come to my aid by contracting Ron Dolling of Adara Systems to build this new apparatus, and most generously, donating it to this effort. So more and better data is on its way.

In any event, I believe there is already enough confirmation from the UBC results to answer the Three Beaker question, and to keep moving forward with this idea.

Interpretation of UBC Results

As the load cell was set to read zero after all the objects contributing to the mass of the experimental setup were in place, any weight change subsequently showing up from this initial static condition would need to be explained in terms of a force arising out of the dynamic activity within the system. So as I see it, what went on inside the cylinder to explain the recorded trace may be understood as follows.

The instant the ball is released by the electromagnet its buoyant mass is set free in the gravitational field. In consequence, being instantaneously exposed only to gravitational attraction it begins to accelerate at a rate of "g" towards the centre of the earth. Therefore, since the ball is at this first instant in absolute free-fall there is no net acceleration acting on the mass to give it weight. This situation can be expressed as

$$\text{Weight} = m (g - g) = 0$$

This is why the load cell suddenly loses awareness, or fails to perceive, the ball's existence at the instant the electromagnet drops it. The next thing that happens – really it begins to happen simultaneously with the ball being set free - is that the ball starts to move downwards in response to gravity.

Once relative motion is initiated between the two phases, the water becomes aware of the ball's presence and tries to obstruct its further intrusion. This is because, as a viscous fluid, the water opposes the cavity expansion imposed on it by the progress of the ball through its domain. This opposing force we call hydraulic drag. Now, and this is the essential point: In order to support these drag forces it is then necessary that the water below the ball provide an equal and opposite reaction. It is this drag force reaction which shows up as increased weight on the load cell. The only way the water can convey this load is by compressive pressure. And I believe this is a clear example of the very same mechanism which accounts for excess pore water pressure in saturated soils.

If there is enough open water below the falling ball it then becomes a competition between gravity and drag, the one trying to increase the speed of fall, the other trying to slow it down. And the drag force, being proportional to the square of the ball's velocity, is bound to win in the end. With enough fall distance they come to a standoff when the speed of the ball reaches the point where the increasing drag forces rise to become equal to the buoyant weight of the ball. This familiar condition we know as Terminal Velocity [v_T].

Terminal Velocity & Liquefaction

In our line of business at present, we come across the concept of Terminal Velocity in the hydrometer test where Stokes' Law provides the relationship between small spheres and their v_T values, thereby allowing us to calculate the size distribution of silts. But now perhaps there is another more interesting use for it. And that is as a criterion for liquefaction.

I think that attaining relative velocities of v_T for particular sized particles is a necessary condition for saturated soils composed of those particles to liquefy. This is simply because at v_T the entire buoyant weight of the particle has been transferred to the water, thus rendering it effectively weightless. Weightless particles can have no frictional capacity because there is no normal force to impart to neighbouring particles. In essence, they have become dominated by the enveloping water, and functionally a part of the fluid. In a word, liquefied.

A consequence of this line of reasoning is that it is only uniformly graded soils that are prone to liquefaction. This seems to be so because if different sizes were involved in the mix it is hard to imagine how they all could attain v_T at the same time without moving past one another.

For some time past I've been hoping to establish an axiom of saturated soil behaviour that says: Increasing pore water pressure is not the *cause* of failure – it is the *result* of failure. In the particular case of the liquefaction-type failure discussed above that seems to be true. This is because the triggering event in the sequence is the failure of the soil-structure to prevent a particle from falling. It is only after the fall that water pressure begins to increase. Whether that argument can be sustained in the more general case of non-catastrophic soil-structure deformations I'll have to try and sort out as we go along.

Answer to the Three Beaker Question

This UBC lab test was designed to replicate the essential situation in the Three Beaker question, and that is, what weight would show up on the scales during collapse of the soil-structure?

After this effort it seems the answer is that at the moment of collapse the weight drops. It then gradually recov-

ers. And I suppose, as the grains come to rest again, for an instant at least, the weight could even increase a bit.

How the Prediction was Made

Despite the fact that apparatus resonance and boundary conditions obscured what would otherwise have been a clearer picture, I was quite happy with the comparison between the history of load cell output and the prediction.

The prediction was made on the simple assumption that the weight shown on the scales would be equal to the resistance offered by the water to the falling ball.

In Fluid Mechanics a hydrodynamic force is known to act in resistance to solids moving through fluids. Our sister technology tells us how to determine the magnitude of that Drag Force [F_D] for any relative velocity between the two phases (solid and liquid). This force is calculated using their equation:

$$F_D = C_D \rho A v^2/2$$

where:

- C_D Coefficient of Drag
- ρ mass density of fluid (water)
- A equatorial area of the solid (ball)
- v relative velocity of fluid and solid.

Of these four variables "ρ" is virtually a constant (1000 N/m^3) over the range of temperatures we're interested in. We pick the value of "A", or rather, the diameter of the sphere we want to look at. The relative velocity is the independent variable we want to track.

For the moment I'll not show you the standard Fluid Mechanics way of presenting the range of values for C_D, and I'm withholding it for two reasons. First, it is such an ugly looking log-log plot related to that rather obscure hydraulic leveller, the Reynolds Number, that I'm afraid any interest the normal geotechnical reader might have in this idea would evaporate on the spot. Secondly, in the next article I will propose what I believe to be a better, more intuitively acceptable, way for us to view C_D. This "geotechnical" version of the Hunter Rouse relationship, while giving the same values as the original for the spherical solids I'm dealing with here, also opens a door to important insights into other hydrodynamic aspects of Soil Mechanics.

Using the above equation I wrote a simple computer program ("BALLFALL.exe") to determine the position of the ball, and the force acting on it at any time I wanted during its progress from stationary to Terminal Velocity. That's where the data for the red curve comes from. This program is freely available from Geotechnical News for anyone who wants it.

The conclusion I draw from the reasonable correspondence between the test readings and the calculated values is that the water in front of the moving solid carries a compressive force which is just about equal to the drag resistance offered by the water to the moving particle. Furthermore, I believe this reveals the actual physical mechanism of pore water generation within saturated soils experiencing deformation.

Pore pressure generation is simply a matter of hydrodynamics. And when you think about it, how could it be otherwise ?

What this Approach says about Liquefaction

The program BALLFALL does the calculations needed to construct the curve in Figure 6. This relationship is for a spherical particle of specific gravity 2.65 falling through 20° C water. The x-axis covers the range of diameters of interest to us. The y-axis gives the amount of fall required to transfer 99% of the particle's weight to the water; for convenience this value is shown in terms of the ratio of the fall distance to the particle diameter.

The ratio 0.29 is highlighted because it is theoretically a readily achievable amount of fall. This is the amount of free drop which is available when the idealized loose packing of spheres contracts to the stable dense packing, involving a void ratio change from 0.91 to 0.35. And this geometric fact immediately suggests an interesting proposition: If this same density change were suddenly brought about in a saturated fine rounded sand by some triggering event, then the condition necessary for liquefaction of the mass would exist during the transformation.

Although I intend to limit myself to dealing with manageable geometric shapes I should say here that I think the more angular shapes of natural grains make them more vulnerable to this effect, and this is because of the larger voids that can exist between less rounded particles. So on this basis I don't have difficulty in thinking very loose sand-sized deposits, for instance, pro-glacial sands, or some dredged fills, could very easily liquefy once the saturated soil-structure gets a serious jolt, or more to the point, as I discuss in a later article, is exposed to a surface wave.

Looking further along the x-axis of Figure 6 to the coarse sand and gravel size range you can see that the ratio of fall-to-diameter is above 10. This implies that a gravel, of say 1 inch size, would need to find an open space of about 10 inches depth beneath it to fully shed its weight, and thereby, its frictional capacity. It is very difficult for me to imagine any geotechnical circumstances, whether natural or artificial, where almost a foot of open space could exist in a gravel deposit. This tells me that the idea of gravel size deposits liquefying is unreasonable. Of course in the case of a debris flow, that's quite another matter, and one which I hope to return to later in this series.

Along the same line of reasoning, how a well graded deposit of any type could liquefy I find quite unimaginable. Even if the finer particles found room to lose their weight these would entail only a small loss of the general frictional capacity, the loss being proportional to the relative volume they contributed to the overall soil mass. Within such an aggregate there is just nowhere the larger particles could drop unhindered.

Summary of Practical Implication

What the foregoing hydrodynamic line of reasoning says to me about liquefaction is that:

- It is easy enough to understand how loose fine sands can liquefy.
- It is difficult to imagine how gravel sizes could be brought to liquefaction either as a natural deposit, or as a construction fill, however poorly placed.
- It is even more difficult to figure out how well graded materials of any density could manage to fail in this manner.

But a very interesting question arises and remains to be answered, and that is about silts. If this line of reasoning is valid, then: Why aren't silts even more prone to liquefy than sands? Figure 6 suggests they scarcely need to budge at all to reach their v_T.

In the Next Article

The next step in the development of this method of looking at the interaction of water and discrete solids is to show how C_D can be viewed as a geotechnical parameter. It is at this stage that an answer to the question of silt's apparently inexplicable behaviour will be first broached.

I will also provide values for the "L-factor" which is the first of two variables entering into the calculation of pore water pressure magnitude. The derivation of the L-factor is simple and straightforward. I will leave until a later article the more complicated development of what I call the "Crowding Factor". This K-factor is necessary to extend the implications of single discrete particle movements, presented so far in relation to liquefaction, into the much broader realm of real soils undergoing non-catastrophic deformations.

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Kenneth R. Peaker 1932-2010

Even fighting the effects of skin cancer, Dr. Ken Peaker kept coming into work. If asked how he was feeling, he'd always say "Life is peachy".

Ken Peaker died on June 27, 2010. Ken was one of Bill Trow's first partners at Trow Associates. He would go on to form two other geotechnical consulting firms fairly late in life - Shaheen & Peaker Limited, and just two years ago – SPL Consultants Limited. Ken had a rare combination of technical acumen and keen business sense.

He had a humble start. Only five when his mother died of cancer, he and his brother Gary grew up in a prairie foster home until they were almost teenagers, when his father remarried and reunited his family. They lived without indoor plumbing or electricity in Riverton, Manitoba until Peaker left for the University of Manitoba, having put himself through school on the avails of trapping, fishing and a firewood business. Ken was fortunate to be awarded an Athlone Fellowship for post-graduate studies at Imperial College in London, an award that would change his life in many ways, the most important of which was meeting his future wife Lorna. Ken and Lorna were married in Manchester, England in 1961.

Following his DIC in 1956 at Imperial, he went on to study with the late Professor Peter W. Rowe at the University of Manchester, where he received his Ph.D. in 1964. Rowe and Peaker's work on passive earth pressures resulted in a change in the British Civil Engineering Code of Practice in retaining wall design. Ken and school chum Don Shields invented the first porous plastic piezometer, which they fabricated in their spare time between repairing motorcycles and studying.

Active in consulting in Ontario, the Caribbean and Middle East over his 45 year career, Ken advanced the practical application of geotechnics on many landmark projects, including Ontario Place, Scotia Plaza, Metro Convention Centre, Ontario College of Art, Ground Zero, to name a few.

Much of Ken's involvement with the Canadian Geotechnical Society (CGS) was with the Canadian Geotechnical Society - Southern Ontario Section (CGS-SOS) group in Toronto. He was the Chairman of the CGS-SOS for two terms, in 1992-1993 and 1993-1994. For his contributions to the CGS-SOS over many years he was presented with the CGS-SOS AWARD in 2008. Ken was also awarded a Fellow of the Engineering Institute of Canada (FEIC) in recognition of excellence in engineering practice and exceptional contributions to the well being of the profession and to the good of the society.

Despite his unwavering resolve in business, Ken was deep down, a shy and unassuming individual who was more comfortable on his weekend farm with the family, than in the boardroom - though he excelled at both. Ken and Lorna have three children and seven grandchildren. When cancer meant he had an ear removed, he told a grandson he'd lost it in a pirate fight. When he was hospitalized in the last couple of months of his life, he never lost his interest in the technical aspects of his work.

He will be missed by all those that had the good fortune to meet him.

News from Geoengineer.org
A Center for Information Dissemination on Geoengineering

A Note from the Founder

Happy New Year! We hope that this will be a happy, healthy and productive year for everybody. Geoengineer.org is working on a number of projects that we hope to announce soon. Stay tuned, and remember our Center is always reachable on the Web at : http://www.geoengineer.org.

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Join us in Toronto this October

2011 Pan-Am CGS Geotechnical Conference

October 2-6 octobre 2011, Toronto, Ontario, Canada

www.panam-cgc2011.ca

64th Canadian Geotechnical Conference and 14th Pan-American Conference on Soil Mechanics & Geotechnical Engineering

64e conférence géotechnique canadienne et 14e conférence panaméricaine sur la mécanique des sols & l'ingénierie géotechnique

Be sure to visit us in Toronto this October when CGS will join with ISSMGE to host the 2011 Pan-Am CGS Geotechnical Conference. The Technical Committee has accepted over 800 abstracts and is on track to be the largest CGS conference ever.

"Geo-Innovation Addressing Global Challenges" is the theme of this integrated conference. In addition, the 5th Pan-American Conference on Teaching and Learning of Geotechnical Engineering will be held on Sunday, October 2, 2011 and will explore teaching and learning methods, as well as the implementation of industrial practice sessions into the classroom.

2011 PAN-AM CGS CONFERENCE PROGRAM HIGHLIGHTS WILL INCLUDE:

R M Hardy Address presented by Dr. K Y Lo (University of Western Ontario)

Casagrande Lecture by Dr. Kerry Rowe (Queen's University)

750+ delegates and more than 400 technical and special presentations over three days!

Local Colour Night at the Royal Ontario Museum and the 4th annual CGS Gala Awards Banquet

Technical Themes

- Retaining walls
- Ground improvement/ remediation
- Geoengineering for development & education
- Geoenvironmental engineering
- Climate change & geohazards
- Mining & rock mechanics
- Buried structures & subsurface systems
- Behaviour of unsaturated soils
- Earthquake engineering & geophysics
- Geotechnics for energy exploitation
- Laboratory testing/ In situ testing
- Shallow foundations
- Deep foundations
- Embankments and dams
- Hydrogeology and seepage
- Transportation geotechnics
- Permafrost engineering
- Mine waste disposal
- Landslides
- Probability and reliability-based design

TECHNICAL TOURS (Thursday, October 6)

Tour 1 – Niagara Region Geotechnical Highlights

Tour 2 – Metro Toronto Geotechnical Highlights

The conference will be held at the Sheraton Centre Toronto in downtown Toronto, Ontario.

Please see the conference web site at **www.panam-cgc2011.ca** for detailed conference information and to register online.

Online delegate registration is now available – be sure to register early to take advantage of advance pricing discounts!

SOCIAL PROGRAM HIGHLIGHTS

Opening Icebreaker/Trade Show Reception

Local Colour Night in support of the Canadian Foundation for Geotechnique at the ROM

Gala Awards Banquet on October 4th

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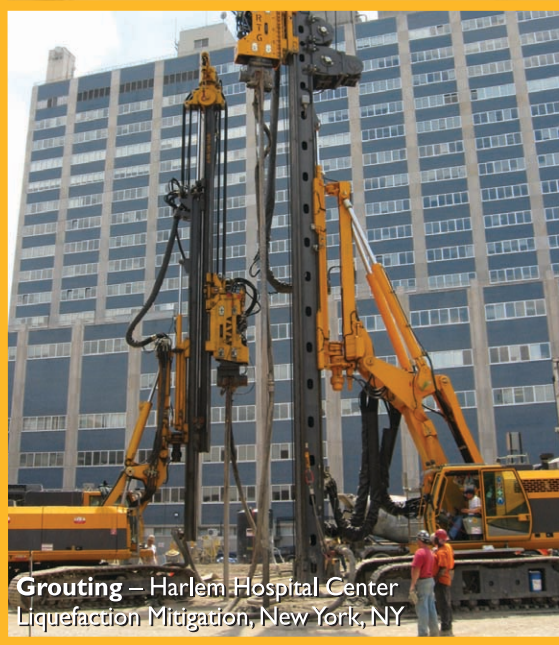
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