SLGS NEWSLETTER

SRI LANKAN GEOTECHNICAL SOCIETY

Established in 1986 **A Member Society of the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE)**

2007: No 2

A Message from the Editor

We are getting closer to the biggest event in the history of SLGS; The International Conference for the 20th Anniversary Celebrations. SLGS needs participation of members in the conference and the workshops and volunteers for the conference organizing to make it a success.

In the last issue Editor-Newsletter requested your innovative ideas to overcome and mitigate natural hazards, especially landslides. However, for the last 3 months, SLGS did not receive any comments from the members. To initiate the discussion, this newsletter contains a summary of a report provided by FEMA (USA), which was distributed during a workshop organized by the Asian Disaster Preparedness Center (ADPC) – Thailand. In this article, you will read some experiences and mitigatory measures taken by the Federal and State Governments of the USA. SLGS warmly invites the members who have been widely involved in the landslide mitigatory measures in Sri Lanka to share the experience with fellow members.

Once again this newsletter is the reminder of the International Conference to be held in August 2007.

Dr. Udeni P. Nawagamuwa – Editor Newsletter.

SLGS News

SLGS Conference on Applications of Geosynthetics in Construction and Ground Improvement Techniques

SLGS successfully conducted the conference on Applications of Geosynthetics in Construction and Ground Improvement Techniques at Hotel Galadari on 14th March 2007. A number of presentations were made by national and international experts.

Geosynthetical Applications in Civil Engineering Designs and Constructions by Dr. G.P. Karunaratne, Consulting Geotechnical Engineer, PCI, Southern Transport Development Project and Former Associate Professor of National University of Singapore.

Advantages of Paving Fabric for Road and Runway Construction by Mr. Michael Chong, Engineering Manager (Export Market), TenCate Geosynthetics Asia Sdn. Bhd, (formerly known as Polyfelt Asia Sdn. Bhd), Malaysia

Use of Heavy Tamping in Highway Construction –Experience in Southern Transport Development Project by Dr. Kamalnath Dissanayake, Chief Geotechnical Engineer, China Harbour Engineering Co., Southern Transport Development Project.

A Review of Soft Ground Improvement by Electro Osmosis by Eng. Lee Eng Choy, General Manager (Technical), Emas Kiara Group of Companies, Malaysia., Manufacturers of KiaraTex Geosynthetic Products.

Contents

First Sri Lankan Geotechnical Society (SLGS) International Conference on Soil and Rock Engineering Colombo, Sri Lanka -August 5~11 , 2007

will present

- Technical Sessions covering over 200 Technical Papers from 35 countries and 20 Special Lectures,
- Pre-conference Programme offering 7 Short Courses & Workshops,
- Technical Field Trips and Exhibition

Venue: Galadari Hotel, Colombo

Tentative Programme

Date	Morning Afternoon	Evening
August 5 (Sun)	**Short Courses and Workshops**	
August 6 (Mon)		
August 7 (Tue)		
August 8 (Wed)	**Conference Inauguration Session Main Session & Technical Sessions**	
August 9 (Thu)		**Welcome Banquet**
August 10 (Fri)		**Cocktail / Tea Party**
August 11 (Sat)	**Technical Field Trips**	

Pre-conference Short Courses (5th ~ 7th August , 2007)
One day courses (Registration fee: Rs. 4500 each)
One and half day courses (Registration fee: Rs. 7000 each)

Registration for the Conference
- for 2 days Rs. 7500.00
- for 3 days Rs. 10000.00

Please refer the details of the Pre-conference Short Courses and the Conference given in Pages 4 and 5.

Landslide Mitigation: an American Experience

Summarized from an FEMA Report by Dr. Udeni P. Nawagamuwa, Department of Civil and Environmental Engineering, University of Ruhuna

Introduction

Several human and natural factors may contribute to or influence landslides. Understanding how these factors interrelate is important in the study of landslide hazards. The principal human factors are mining and construction of highways, buildings, and rail roads. The principal natural factors are topography, geology, and precipitation.

Landslides occur in every State and in Guam, Puerto Rico, the U.S. Virgin Islands, and American Samoa. They are most common in the coastal ranges of California, the Colorado Plateau, the Rocky Mountains, and the Appalachian Mountains. During the past 20 years, landslides have resulted in 38 disaster declarations, 15 of them in California. According to a 1985 study, roughly 40% of the U.S. population is exposed to direct and indirect effects of landslides.

Landslides have damaged or destroyed roads, railroads, pipelines, electrical and telephone lines, mines, oil wells, buildings, canals, sewers, bridges, dams, seaports, airports, forests, parks and farms. Landslides often are triggered by other natural events such as floods, earthquakes, and volcanic eruptions. The damage caused by landslides often is attributed to the triggering events. The best estimates of annual losses resulting from landslides in the United States are 25 to 50 lives and $1 to $2 billion in property damage.

Successful mitigation programs have been undertaken at the local level, but the Federal effort is relatively under-funded. Recent efforts involved identification of landslide-prone areas, anticipating landslide events, and implementation of warning systems. Hazard reduction efforts involve reducing the frequency of landslides, reducing the likelihood that they will cause damage, and minimizing damage.

Hazard Identification

Landslide is used to describe the downward and outward movement of slope-forming materials reacting under the force of gravity. The term covers a broad category of events, including mudflows, mudslides, debris flows, rock falls, rock slides, debris avalanches, debris slides and earth flows. Landslides may consist of natural rock, soil, artificial fill, or combinations of these materials. Earthquakes trigger many landslides, as do heavy and prolonged rains which lead to saturated conditions.

Landslides are classified by type of movement and type of materials (Varnes, 1978). The types of movement are slides, flows, lateral spreads, and falls and topples (Varnes, 1978; Pearce and others, 1993; Fleming and Varnes, 1991). The types of material are bedrock and soils, where soils are described as predominantly coarse or predominantly fine. A combination of two or more of the principal types of flows is referred to as a complex movement.

Risk Assessment

Landslides often are involved in or triggered by other natural hazards, for example, the safety of a dam can be severely compromised by upstream landsliding or collapse of slopes bordering the reservoir or dam abutments. Landsliding and flooding are closely related because both involve precipitation, runoff, and ground saturation. Debris flows usually occur in small, steep stream channels and often are mistaken for floods. Landslides often result from seismic activity as experienced during the 1964 Alaska Earthquake, and volcanic activity such as that which occurred after the 1980 eruption of Mount St. Helens. The simultaneous or sequential occurrence of interactive hazards may produce cumulative effects that differ significantly from those expected from any one of the components.

Alger and Brabb (1985) listed 6500 references or sources that either incidentally mentioned or discussed in depth the subject of landslides. Brabb and Harrod's (1989) state-by-state analysis of landslides was the first of its kind, and included a 4-year reconnaissance of all the States, the U.S. Virgin Islands, and Puerto Rico, as well as extensive conversations and cooperative programs with geologists and engineers in State geological surveys and State departments of transportation.

Research, Data Collection and Monitoring Activities

The level of effort directed to landslide research and hazard assessment is small compared to some other hazards. At the Federal level, Brabb and Harrod (1989) concluded that the USGS devoted no more that 20 person-years each year to landslide research.

The rainfall data and measurements of soil moisture at a study site in the hills south of San Francisco are used to estimate moisture level of soils throughout the Bay area. Once the soils have reached a sufficient moisture level, USGS monitors NWS forecasts and uses real-time rainfall data from the gauge network to determine the potential for imminent debris flows.

USGS developed thresholds that describe the minimum rainfall rates that may trigger abundant debris flows on natural slopes in the San Francisco Bay region. NWS broadcasts warnings over weather radio and as an emergency broadcast system announcement over many radio and television stations.

Mitigation Approaches

Successful and cost-effective landslide mitigation programs can be implemented. Such programs exist in other countries, including Japan. Although there have been some impressive and successful local demonstrations of landslide control programs, information has not been widely disseminated. This is characteristic of the scattered and diffused state of landslide knowledge in the United States. As noted by NRC (1985), there is no recognized national leadership or systematic basis for communication.

Landslides stand out as a severe hazard, yet mitigation efforts are relatively underfunded. Practical application of land-use zoning measures, based on appropriate research and enforced by local regulations, can lead to dramatic loss reductions. This has been demonstrated in the Los Angeles area, where 92-97 % reduction in losses was achieved for new construction (Slosson and Krohn, 1982).

There are two distinct components to reducing the cost associated with landsliding: emergency management and response, and long-term hazard reduction (NRC, 1985). Emergency management includes: anticipation, prediction, and issuance of warnings of the impending occurrence of life and property threatening landslides; response that is required when landslides occur; identification of landslide-prone areas; and planning, training, and other preparatory measures necessary to ensure effective warning and response.

Long-term hazard reduction focuses on reducing the frequency of landslides, reducing the likelihood that landslides will cause damage and minimizing damage when landslides do occur. Landslide losses can be reduced in two ways: reducing the occurrence by requiring that excavation, grading, landscaping, and construction be carried out in ways that do not contribute to slope instability; and minimizing the damage when landslides do occur by restricting development in landslide-prone terrain and by protecting buildings and other structures from landslide damage)NRC, 1985). Wold and Jochim (1989) noted that insurance does not reduce losses, but provides financial protection to individual owners.

Kockelman (1986) discusses additional techniques for reducing landslide losses:

- Through land-use planning, discourage new developments in identified hazard areas by informing and educating the public and posting warnings of potential hazards;
- Remove or convert existing development through acquiring, exchanging, or removing susceptible properties and discontinuing non-conforming uses; and
- Provide financial incentives or disincentives by adopting lending policies that reflect risk of loss or conditioning Federal and State financial assistance.

Recommendations

Several programs have been proposed to reduce the cost of landslide related damage in the United States. The NRC Committee on Ground Failure Hazards (1985) recommended: more effective land-use regulation; building codes; research on landslide initiation and processes, landslide delineation, mapping, and control; technology transfer; landslide insurance (exclusive of debris flows, for which insurance already exists); national leadership; and legislation to direct a governmental or private program to reduce landslide losses.

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First Sri Lankan Geotechnical Society (SLGS) International Conference on Soil and Rock Engineering
Colombo, Sri Lanka – August 5-11, 2007

Pre-conference Short Courses (5th ~ 7th August, 2007)

One day courses (Registration fee: Rs. 4500 each)
• Soil and Sediment Remediation Technologies***** (6 th August)
• Geotechnical Design to Eurocodes 7 & 8 and Geotechnical Risk (6th August)
• Introduction to Geotechnical Earthquake Engineering (6th August)
• Design, Construction and Monitoring of Landfills (7th August)
• Unsaturated Soils: Latest Developments in Testing, Analysis and Design (7 th August)

One and half day courses (Registration fee: Rs. 7000 each)
• Rock Slope Stability Analyses(5th & 6th August)
• Block Theory and Applications for Surficial and Underground Rock Excavations (6th &7th August)

Note : * Short Course on Soil and Sediment Remediation Technologies to be sponsored and offered free of charge to selected applicants.

Technical Sessions (8th ~ 10th August, 2007)

Over 200 will be presented in 4 Parallel Technical l Sessions on Tentative Themes of
• Soil Properties
• Laboratory & Field Tests on Soils
• Unsaturated Soils
• Application of Geophysical Techniques
• Application of Statistics & Probability
• Analytical & Numerical Modeling
• Constitutive Models
• Fluid Flow in Geo Materials
• Soil-Structure Interactions
• Ground Improvement
• Soil Stabilization
• Shallow Foundations
• Pile Foundations
• Underground Excavations in Soils
• Dams and Embankments
• Geotechnical Construction
• Geo-environmental Engineering
• Geologic Hazards
• Soil Dynamics & Earthquake Engineering
• Landslides & Soil Slope Stability
• Rock Properties
• Rock Dynamics & Rock Cutting
• Rock Joint & Mass Properties
• Rock Foundations
• Surface Excavations in Rock
• Underground Excavations in Rock
• Tunnels and Shafts in Rock

Please see the **Conference Website** at URL
www.slgssr2007.org
For more information and Application Forms, please write to :-Secretariat, **Sri Lankan Geotechnical Societ**y: c/o National Building Research Organisation 99/1, Jawatte Road, Colombo 5, Sri Lanka Tel. 2588946 ext. 228/224
or please contact the Conference Co-chairs;
Dr. Athula Kulathilaka at University of Moratuwa Tel. 2650567 ext. 2003 e-mail: sas@civil.mrt.ac.lk or
Mr. Kirthi Sri Senanayake at National Building Research Organisation Tel. 2588946 ext. 228
e-mail:senanayakeks@hotmail.com

SHORT COURSE DETAILS

Course No. 1

Soil and Sediment Remediation Technologies

A One Day Continuing Professional Development Course by
Prof. Jay N. MEEGODA, Professor of Civil and Environmental Engineering, New Jersey Institute of Technology, New Jersey, USA
Scheduled for August 6, 2007 (8:30am - 5:00pm)

Course Outline
This course will provide the basic principles and design concepts for in-situ and ex-situ site remediation technologies and will be useful to persons dealing with contaminated soils, sediments and groundwater cleanup. Basic principles, practical applications, mechanisms, unit costs, technology limitations, and case histories will be presented.

Course No. 2

Design, Construction and Monitoring of Landfills

A One Day Short Course by
Prof. Krishna R. REDDY Ph.D., P.E., Professor of Civil and Environmental Engineering, University of Illinois, Chicago, USA
Scheduled for August 7, 2007 (8:00am - 4:30pm)

Course Outline
The large amounts of wastes created require disposal despite the best waste management practices like pollution prevention and recycling. Proper disposal of these wastes in engineered landfills is crucial to protect public health and the environment. This course will provide the essential knowledge required for the siting, design, construction and monitoring of landfills. Both fundamental and practical aspects are presented with examples and case studies.

Course No. 3

Unsaturated Soils: Latest Developments in Testing, Analysis, and Design

A One Day Short Course by
Prof. K.K. MURALEETHARAN, Ph.D., P.E., G.E. Presidential Professor and Dr. N. RAVICHANDRAN, Research Associate, School of Civil Engineering and Environmental Science, University of Oklahoma, U.S.A.
Scheduled for August 7, 2007 (8:30am - 5:00pm)

Course Outline
Unsaturated soils are quite prevalent in nature and are encountered in many engineering problems. Slope failures following heavy rainfall, damage to road pavements caused by swelling and shrinking soils, and differential settlements of foundations caused by collapsible soils are some of the unsaturated soil related geotechnical engineering problems. Unsaturated soils are three-phase porous media consisting of a solid skeleton and water and air occupying the pore space in between the solids. Due to the difficulties in dealing with the three-phase material the developments in unsaturated soil mechanics has lagged that of saturated soil mechanics. Even the definition of an effective stress, universally accepted for saturated soils, is controversial for unsaturated soils. In the last decade or so, however, number of

significant developments has occurred in the field of unsaturated soil mechanics. This short course will update the audience about the recent developments in testing and analysis of unsaturated soils and provide them with useful techniques and tools for designing geotechnical engineering structures made of and on unsaturated soils.

Course No. 4

Rock Slope Stability Analyses

A One and a Half-Day Short Course by

Prof.P.H.S.W. KULATILAKE, Dept. of Materials Science & Engineering, The University of Arizona, USA

Scheduled for August 5, 2007 (8:30am - 5:00pm) & August 6, 2007 (8:15am – 12 noon)

Course Outline

The objectives of the short course are to show the applications of kinematic and limit equilibrium analyses for rock mass surficial excavations. A few computer programs will be applied to joint data from Three Gorges dam site, China and a mine in Arizona to illustrate the applications.

Course No. 5

Block Theory and Applications for Surficial and Underground Rock Excavations

A One and a Half-Day Short Course by

Prof. P.H.S.W. KULATILAKE, Dept. of Materials Science & Engineering, The University of Arizona, USA

Scheduled for August 6, 2007 (1:00pm – 5:00pm) & August 7, 2007 (8:15am - 4:45pm)

Course Outline

The objectives of the short course are to present block theory and show the applications of block theory to rock mass surficial and underground excavations. The course lecture notes that is equivalent to about 200 pages will be produced on a CD ROM and will be distributed at the start of the course. A few computer programs will be applied to joint data from Three Gorges dam site, China and a mine in Arizona to illustrate the applications.

Course No. 6

Geotechnical Design to Eurocode 7 & 8 and Geotechnical Risk

A One Day Continuing Professional Development Course by

Dr. Indrasenan THUSYANTHAN Lecturer Department of Engineering, University of Cambridge London, UK and
Dr. Navin PEIRIS Senior Engineer, Arup, UK

Scheduled for August 6, 2007 (8:30am - 5:00pm)

Course Outline

Geotechnical engineers are often faced with variable and uncertain ground conditions to decide on the design parameters and foundation options for structures. These conditions, combining with natural hazards such as earthquakes, floods, tsunamis, etc., raise the potential risk of damage to geotechnical elements.

From 2010, Eurocodes will become the common code of practice throughout Europe and in many countries worldwide. Those involved in geotechnical field need to become familiar and be able to apply Eurocodes 7 & 8 in areas with seismic hazard. The course will give an overview of Eurocodes 7 & 8 and its use in foundation design. It will cover Part 1 (geotechnical design of shallow and deep foundations) of the Eurocode 7 (Geotechnical) and will concentrate on Part 1 (general rules, seismic actions and rules for buildings) and Part 5 (foundations, retaining structures and geotechnical aspects) of the Eurocode 8 (Design of Structures for Earthquake Resistance).

The course takes the form of lectures followed by practical workshops with simple design examples based on shallow and deep foundations.

Course No. 7

Introduction to Geotechnical Earthquake Engineering

A One Day Short Course by

Dr. Dharma WIJEWICKREME, P. Eng. Associate Professor, Department of Civil Engineering, University of British Columbia

Scheduled for: August 6, 2007 (8:30am - 5:00pm)

Course Outline

The performance of structures and facilities during earthquakes has a direct impact on regional economies and the living conditions of their citizens. This is of particular importance since geotechnical hazards have been found to be the major cause of system damage and associated service disruption to lifeline infrastructure in past earthquakes. The use of systematic approaches to assess the seismic vulnerability of structures/facilities and identify appropriate mitigation methods forms an essential part of minimizing the impact from earthquakes. Advances in the state-of-practice in seismic evaluation and retrofit of these systems require dissemination, particularly within the multi-disciplinary engineering community.

The purpose of this short course is to provide a basic introduction to the concepts and procedures of geotechnical engineering. Geotechnical engineering is a field supported by a multiplicity of sub-disciplines. It encompasses the understanding of: the origin of earthquakes, propagation of seismic waves, definition of seismic shaking hazard in relation to an acceptable level of risk, assessment of the performance of a given site while accounting for local soil and groundwater conditions, assessment of geotechnical hazard(s) such as prediction of liquefaction potential and associated ground movements, and development of mitigative measures. The above topics will be covered in an overview manner during this short course.

Course Number and Title Fees

CN 1 : Soil and Sediment Remediation Technologies
Rs. 4500

CN 2 : Design, Construction and Monitoring of Landfills
Rs. 4500

CN 3 : Unsaturated Soils: Latest Developments in Testing, Analysis and Design Rs. 4500

CN 4 : Rock Slope Stability Analyses Rs. 7000

CN 5 : Block Theory and Applications for Surficial and Underground Rock Excavations Rs. 7000

CN 6 : Geotechnical Design to Eurocodes 7 & 8 and Geotechnical Risk Rs. 4500

CN 7 : Introduction to Geotechnical Earthquake Engineering Rs. 4500

Forthcoming Conferences

(1). Geotechnical Engineering for Disaster Prevention & Reduction (25 – 27th July 2007), Yuzhno – Sakhalinsk – Russia. Contact: Prof. Askar Zhusupbekov, askarz@nets.kz

(2). **First Sri Lankan Geotechnical Society International Conference on Soil and Rock Engineering (6-11th August, 2007), Colombo, www.slgssr2007.org**

(3). X ANZ Conference on Geomechanics (21 – 24 October, 2007), Brisbane, Australia anzgeo2007@ccm.com.au

(4). GEO-CHANGSHA (28-30 Nov, 2007) Changsha, Hunan Province, China, www.cipremier.com

(5). XIII Asian Regional Conference on Soil Mechanics and Geotechnical Engineering (10 – 14 December), Calcutta, India. www.13arc2007.com

First Sri Lankan Geotechnical Society International Conference on Soil and Rock Engineering.

Sri Lankan participants have the option to register for either two days or for all three days. Presentations that are of special relevance to Sri Lanka will be covered in two days.
Registration fee for two days is Rs 7500/= and for three days Rs10,000/=
Registration fee covers the conference kit(conference bag with a CD on accepted papers, hard copies on abstracts and keynote lectures) and lunch and refreshments. For further details refer the web site.
www.slgssr2007.org

Geotechnical Forums since the last issue

Role of Public in Natural Disasters by Dr.Jayalath Edirisinghe on 25th January

Rock Blasting practices and Environmental Impacts by Dr.Welideniya on 26th February.

Geotechnical Forum for the month of March was not held due to the conference on *Applications of Geosynthetics in Construction and Ground Improvement Techniques.*

SLGS and ISSMGE Membership Fees

All the ISSMGE Members who still have not paid their membership fees for the years 2005 & 2006 are requested to pay any dues immediately to ensure their names are not deleted from the ISSMGE Membership List.
Members are informed that following membership fees are effective from year 2007.

Membership Admission Fee	Rs. 200/=
Annual Membership Fee	Rs. 300/=
ISSMGE Fee	Rs. 1000/=

The SLGS Newsletter comes to you in volumes of four fascicles issued in January, April, July and October in each year.

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