SIMSG ISSMGE

ISSMGE Bulletin

Volume 13, Issue 6
December 2019

International Society for Soil Mechanics and Geotechnical Engineering
If the quality of the distributed file is not satisfactory for you, please access the ISSMGE website and download an electronic version.
www.issmge.org

TABLE OF CONTENTS

Select all items below

1 Message from member society
4 Young Member Arena
5 Major project
20 TC corner – TC symposium on "Laterites and lateritic soils"
21 Conference reports
- The 2nd International Geotechnical Seminar, Mozambia
- The 3rd Dr Victor de Mello Goa Lecture, India

23 ISSMGE Foundation reports
28 Obituary – Prof. Petro Kryvosheiev
29 Event Diary
36 Corporate Associates
39 Foundation Donors

EDITORIAL BOARD

al-Damluji, Omar (Editor for Asia)
Bouassida, Mounir (Editor for Africa)
Cazzuffi, Daniele (Editor for Europe)
Chang, Der-Wen (Editor for Asia)
Davis, Heather (Editor for Africa)
Gonzalez, Marcelo (Editor for South America)
Jefferis, Stephan (Editor for Europe)
Leung, Anthony Kwan (Editor-in-Chief)
Ng, Charles Wang Wai (Ex-officio)
Rujikiatkamjorn, Cholachat (Editor for Australasia)
Sanchez, Marcelo (Editor for North America)
Siemens, Greg (Editor for North America)
Taylor, Neil (Ex-officio)
Baser, Tugce (Editor for YMPG)

Message from member society

Geotechnical society of Bosnia and Herzegovina

The ReSyLAB & GEO-EXPO 2019 symposium was organized in two sessions - 4th Regional Symposium on Landslides in the Adriatic-Balkan Region (ReSyLAB 2019) and 9th Scientific and Expert Conference (GEO-EXPO 2019), with focus on the following topics: landslides in general, landslides mapping, geotechnical investigation and monitoring, environment engineering, underground structures, geotechnical hazard and risk, road infrastructure, foundations and landfills. The Symposium was held at the Hotel Holiday in Sarajevo, Bosnia and Herzegovina, from 23rd to 25th of October.

ReSyLAB & GEO-EXPO 2019 Symposium, Sarajevo, Bosnia and Herzegovina

Four plenary lecturers, a young key lecturer and more than 35 authors, scientists and experts delivered their presentations to over 160 symposium participants from the region and abroad during two-day sessions.

The plenary lectures were delivered by: Professor Charles Wang Wai Ng, ISSMGE President, from the Hong Kong University of Science and Technology, Professor Norikazu Shimizu, ISRM former Vice President at Large, from Yamaguchi University, Tokio (Japan), Professor Željko Arbanas, ICL Vice President, from University of Rijeka (Croatia), and Professor Alessandro Corsini from University of Modena and Reggio Emilia (Italy).

Message from member society

Geotechnical society of Bosnia and Herzegovina (Con't)

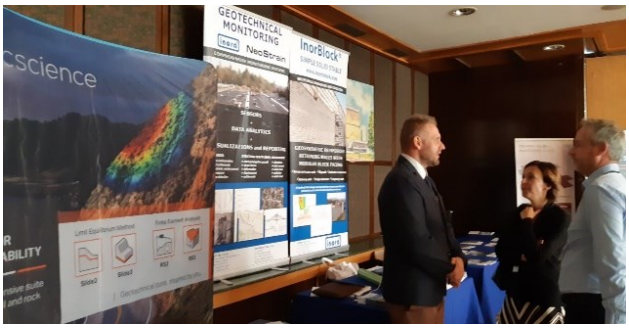
The Symposium participants benefited from the plenary lecture delivered by Professor Charles Wang Wai Ng, the president of the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE), titled: "Ecological engineering for soil slopes: hydrological and mechanical effects".

Prof. Charles Wang Wai Ng, the President of ISSMGE, delivering a lecture

Prof. Martina Vivoda Prodan presenting her research

This year the ReSyLAB session offered an opportunity to one young experienced scientist, also a member of the ICL ABN group (International Consortium on Landslides Adriatic-Balkan Network), to deliver a lecture pertaining to his/her research in the field of landslide science. There was an additional option for the authors to present their papers in the form of poster sessions at the symposium.

The symposium participants had an opportunity to gain information on the latest achievements in the field of geotechnics and related disciplines from 10 exhibiting companies from the region and world, who presented their technologies, projects, equipment, software and other products. The theme of the round table discussion was: "Enhancing cooperation between the landslide scientist and stakeholders from public bodies dealing with policies or decision making". The ICL ABN members reported on the current state in the regional communities in regard to landslides and the application of mitigation and remediation measures.



Company representative in the conference exhibition hall

Poster presentatons

The annual general meeting of the Geotechnical Society of Bosnia and Hercegovina was held on the first day of the symposium. Mr.sc. Amer Džindo, the President of the Society's Assembly, was re-elected to the position.

Message from member society

Geotechnical society of Bosnia and Herzegovina (Con't)

The closure of the Symposium was marked at the gala dinner on October 24. Professor Mato Uljarević, the President of Geotechnical Society of Bosnia and Hercegovina, thanked plenary lecturers, paper authors, participants, sponsors and everyone present for their contribution to the success of the symposium. The invitation was extended to attendees to join the 10th anniversary GEO-EXPO 2020 scientific and expert conference in Prijedor (Bosnia and Herzegovina) next year and 5th ReSyLAB symposium in Rijeka (Croatia) in 2021.

The next day was reserved for the field study tour to massive landslides „Bogatići" in Foča, „Čemerno" in the Gacko municipality and „Sutjeska" landslide and National Park in the southeastern part of Bosnia and Herzegovina. The field study tour ended with the lunch at the National Park „Sutjeska".

The symposium participants visiting „Čemerno" landslide

In front of monument erected to commemorate the World War II Battle of Sutjeska

Young Members Arena

On the borderline between geotechnical and earthquake engineering – a young members' partnership

About one year ago, in March 2018, the French Society for Soil Mechanics and Geotechnical Engineering (CFMS) encouraged its young members to get together and create a young members group. CFMS has assigned some initial goals for this internal working group, which were mainly focused on involving young French engineers in the geotechnical community, both nationally and internationally, so that they could gradually gain visibility and contribute with senior members.

Since the first call for volunteers this new community has shown a great potential for success. The young members were given the autonomy to decide how to manage and develop the group by themselves. The senior members, however, were active on supervising and providing meaningful advises during the first steps. Four poles of activities were created: "promotion and communication", "national and international relations", "technical and general events", and "relations with senior working groups and technical committees". A poll was used to pick a name and the majority voted for "*CFMS Jeunes*". All CFMS members under 35 years can be a part of the group and support it by proposing and organizing activities.

The results of the effort were noticeable after one year of committed work. The group is now integrated to the CFMS main web site and it has its own LinkedIn page, which is a handy tool to communicate with its almost 50 members, in addition to being accessible for non-members. Other efforts include the involvement of the young members on the process of scientific paper review and on the CFMS' senior working groups.

The most recent activity was a technical event organized in partnership with the young members of the French Association for Earthquake Engineering (AFPS *Groupe Jeunes*). This young members' association founded in 2011, is more mature and helped *CFMS Jeunes* with organizing this first event. The fruitful cooperation was made possible thanks to the active participation of members integrated to both societies. The access was free to the whole community, young and seniors. More than one hundred persons participated, 64% being young members.

The technical event entitled "*On the borderline between geotechnical and earthquake engineering*" lasted for a full day (April 3rd, 2019) and included six presentations, which were performed in the morning, given by doctorate students, researchers and young and senior engineers to tackle with the following subjects:

- Numerical modeling of seismic wave propagation in soils;
- Engineering methods for studying the risk of liquefaction under earthquake;
- The design of a contiguous retaining wall for seismic loadings;
- The design difficulties for works involving current geotechnics and seismic loads;
- The experimental study of the behavior of a group of piles under earthquake loads – centrifuge modeling;
- Semi-analytical modeling of the response of a pile under lateral cyclic loading;

As part of the event, the guests had option to choose betvisit renowned soil mechanics research laboratories (Navier Geotechnique, at Ecole des Ponts Paristech, or SRO at IFSTTAR), or the construction site where an underground metro station linking an existing line with two new ones is being built in the afternoon.

There is no doubt that this event was a very important contribution to the geotechnical society. The young members are very proud of this action and are very motivated to keep on working on organizing new activities like this first one. They are currently preparing a new event, which will be dedicated to the subject "history and geotechnics".

If you think this is an inspiring beginning, join us and help us make an even better community!

Young Members Arena (Con't)

On the borderline between geotechnical and earthquake engineering – a young members' partnership

Figure 1. Conference organized by the CFMS and AFPS young members and visit to a soil mechanics laboratory

Figure 2. Visit to an underground metro station under construction

Follow us on LinkedIn:
https://www.linkedin.com/showcase/cfms-jeunes/

https://www.linkedin.com/company/comit%C3%A9-fran%C3%A7ais-de-m%C3%A9canique-des-sols-et-de-g%C3%A9otechnique-cfms-/

#cfmsjeunes
#cfms
#géotechnique

Alexandre Lopes dos Santos
CFMS young member

Major project

Abstract

In this report, monitoring the stability of a road embankment at Lawrence Hargrave Drive along the Illawarra coast is discussed. The embankment supports a coastal road and had been subject to an ongoing process of coastal erosion at the embankment toe and instability due to elevated piezometric pressures after heavy or sustained rainfall. In this paper, the stability issues and potential failure mechanisms are discussed. In order to allow a long term solution to be developed, an interim real time, web based monitoring system was installed. An outline of the investigations and geotechnical conditions at the site is presented. The paper discusses the monitoring system, including the instrumentation used (in-place inclinometers, piezometers, rain gauge, wave height buoy and web cam, the development of monitoring plans, the integration of instrumentation to develop a Trigger Action Response Plan (TARP), the development of trigger levels based on antecedent monitoring data, and the successful operation of the system.

Introduction

Lawrence Hargrave Drive is a coastal road along the Illawarra coast north of Wollongong NSW. North of the Seacliff Bridge viaduct, the road is constructed on an embankment rising from the shore below. The site location is shown in Figure 3 and an oblique view of the site is presented in Figure 4. The embankment was originally constructed over old landslide debris and colluvium, which now forms the base of the slope. The slope has been subject to episodic instability, the formation of a slip zone due to elevated piezometric pressures within and behind the slope, and coastal erosion at the toe. The slip is located to the north of the Seacliff Bridge and south of a major drainage line. The slip is a cuspate slip with the back scarp located on the slope batter east of Lawrence Hargrave Drive and the toe located at the base of the slope, approximately at sea level. The toe has been over-steepened as a result of coastal erosion forces. With the development of further localised instability in the slope, this slip is referred to as the “main slip”. Following heavy rain and high seas in July 2011, the main slip back scarp regressed towards the pedestrian footpath, and significant material was eroded from the toe of the slope by wave action. Surface monitoring results obtained from Roads and Maritime indicated a significant downward movement had occurred in the lower slope and flanks of the slipped mass, leading to more active management of the slope and acceleration of remedial option development. Heavy rain and wave action caused further movement of the slope in March 2012.

Figure 3. Site location

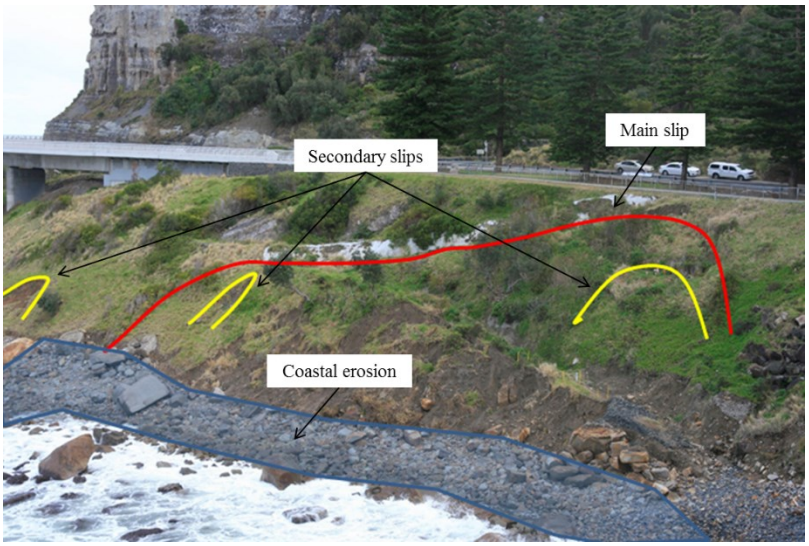


Figure 4. View of the main slip, showing secondary slip features and coastal erosion.

Major project (Con't)

By this time a 2.5m back scarp had formed at the rear of the main slip and slope movements had become more severe. There was a concern that the instability would regress further back into the embankment and endanger first the footpath and rest area immediately behind the slope and ultimately the road itself. Geotechnical investigations and analyses were carried out and monitoring and slope management programs were put in place as an interim measure to allow the development of permanent stabilisation measures.

Lawrence Hargrave drive is an iconic route on the Australian tourist map, and any remediation measures would need to be sensitive to this aspect in addition to the environmental, urban design and technical challenges at the site.

Geotechnical conditions

Geotechnical investigations were carried out to assess subsurface conditions for stability analyses. A description of the ground conditions is presented in Table 1 and a cross section showing the inferred geotechnical conditions for analysis is shown in Figure 5.

Table 1. Summary of general ground conditions

Unit	Thickness of unit (m)	RL at base of unit (m AHD)	Description
Colluvium	0.5 to 21.0	-0.35 to -1.25	Highly variable but predominantly composed of Clayey Gravelly Sand and Clayey Sandy Gravel with numerous cobbles and boulders of sandstone (approx. 15%-20% by volume). Subordinate pockets of clay dominated the fine fractions. Generally moist, becoming wet with depth. Generally medium dense.
Gravelly Sandy clay (possible crushed zone)	0.05 to 0.4	-0.47 to -1.45	Generally Sandy Gravelly Clay of high plasticity, light grey. Generally firm to stiff, estimated moisture content greater than plastic limit. This is possibly a mix of crushed bedrock and colluvium.
Bedrock (Wombarra Claystone)	Base not seen	Base not seen	Generally interbedded fresh medium to high strength sandstone and siltstone, sub-horizontally bedded (possibly dipping northward at less than 5°).

Underlying the colluvium is a crushed zone interpreted as possible crushed / reworked bedrock and colluvium, which could have a lower shear strength than the overlying colluvium. Underlying the crushed zone is the Wombarra Claystone bedrock, which forms a gently northward dipping surface that is likely to represent a relict wave cut platform. The depth to the top of the bedrock below the surface is about 21.5 m at the embankment crest and about 1 m just beyond the toe of the main slip.

Two possible slope failure mechanisms were identified below the road:

- A deep seated failure, which could potentially result in tension cracks and ground displacement behind the crest of the slope and would be more likely to impact on the road.
- A shallow slip, which was less likely to have a direct impact on the road.

Major project (Con't)

Back analyses were undertaken using the two failure modes described above. Both failure planes pass through the existing back scarp. The shallow failure plane remains within the colluvium. The deep seated failure plane passes through the previously identified crushed zone at the base of the slope. The ground model and geometry of the failure mechanisms is presented in Figure 5.

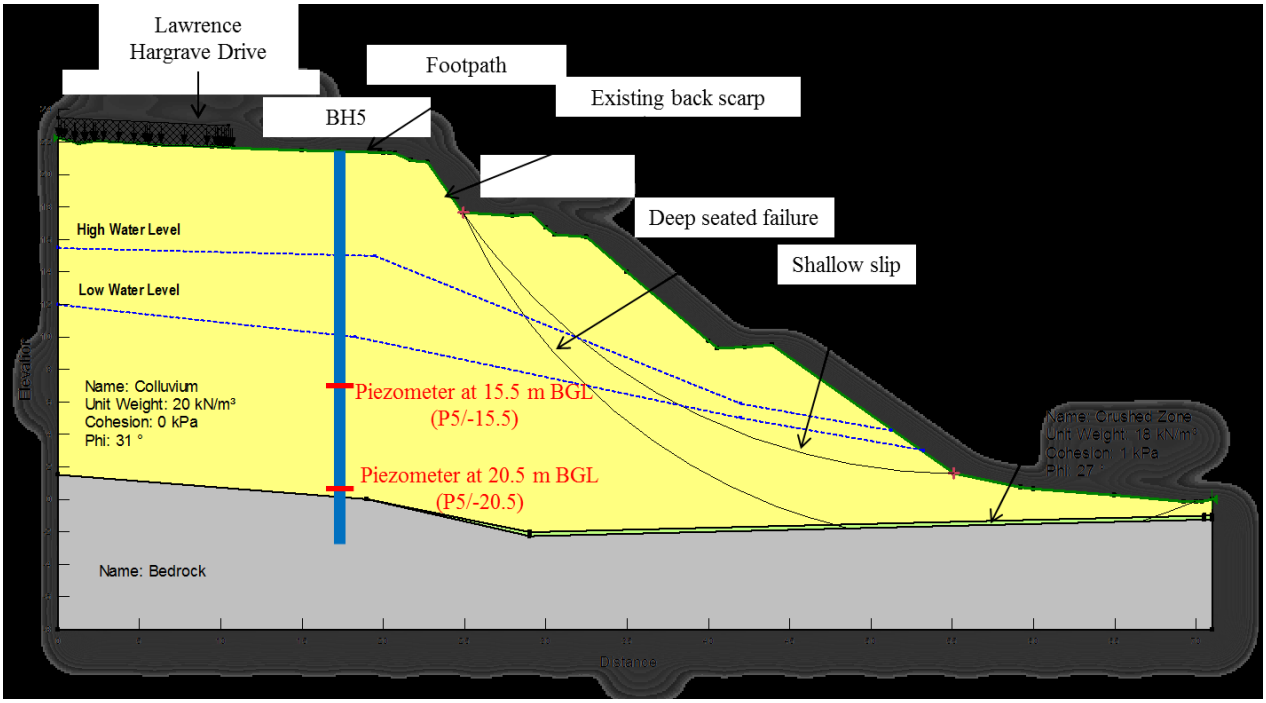


Figure 5. Ground model of main slips.

Monitoring, investigations and analyses combined to confirm that the shallow failure mode was more likely to occur. This was an important outcome as it suggested that other than local instability at the 2.5m high back scarp, there was a relatively stable zone behind the main slip. This zone could be managed by monitoring in the short term whilst stabilisation measures were developed. Stabilisation measures were likely to include substantial marine protection measures. The analyses also indicated that slope stability could be improved by lowering the piezometric pressures in the slope. This provided an option to include depressurisation wells as an option for interim stability management of the slope. However, lower piezometric levels alone did not offer sufficient improvement in stability to meet the target design safety margins. Hence, drainage measures in isolation were not considered to be a feasible long term remediation option.

The stability of the embankment is influenced by multiple factors including geotechnical, marine and environmental conditions. Therefore, it was necessary to develop a monitoring plan for this embankment to integrate these various aspects.

Integrated monitoring program

A monitoring program was developed to provide information so that Roads and Maritime could manage the road asset on the embankment behind the main slip in such a way as to mitigate the landslip risks to road users and pedestrians. The monitoring program would be required as an interim measure as the development of permanent stabilisation measures were potentially time consuming due to the need for physical coastal modelling. The monitoring program was designed to manage the road asset behind the main slip. Local instability of cuts, fills and scarps on the slope were not captured as part of the program due to the dynamic nature of the slope.

Major project (Con't)

The monitoring program was designed as an integrated system that would allow data from various monitoring instruments to be recorded by data loggers and transmitted to a web-based portal. This data could then be accessed by personnel involved in the project. This integrated, real-time monitoring program allowed the identification of relationships between the various parameters recorded by the monitoring devices.

Instrumentation

The borehole locations and the instrumentation in these boreholes are presented in Figure 6.

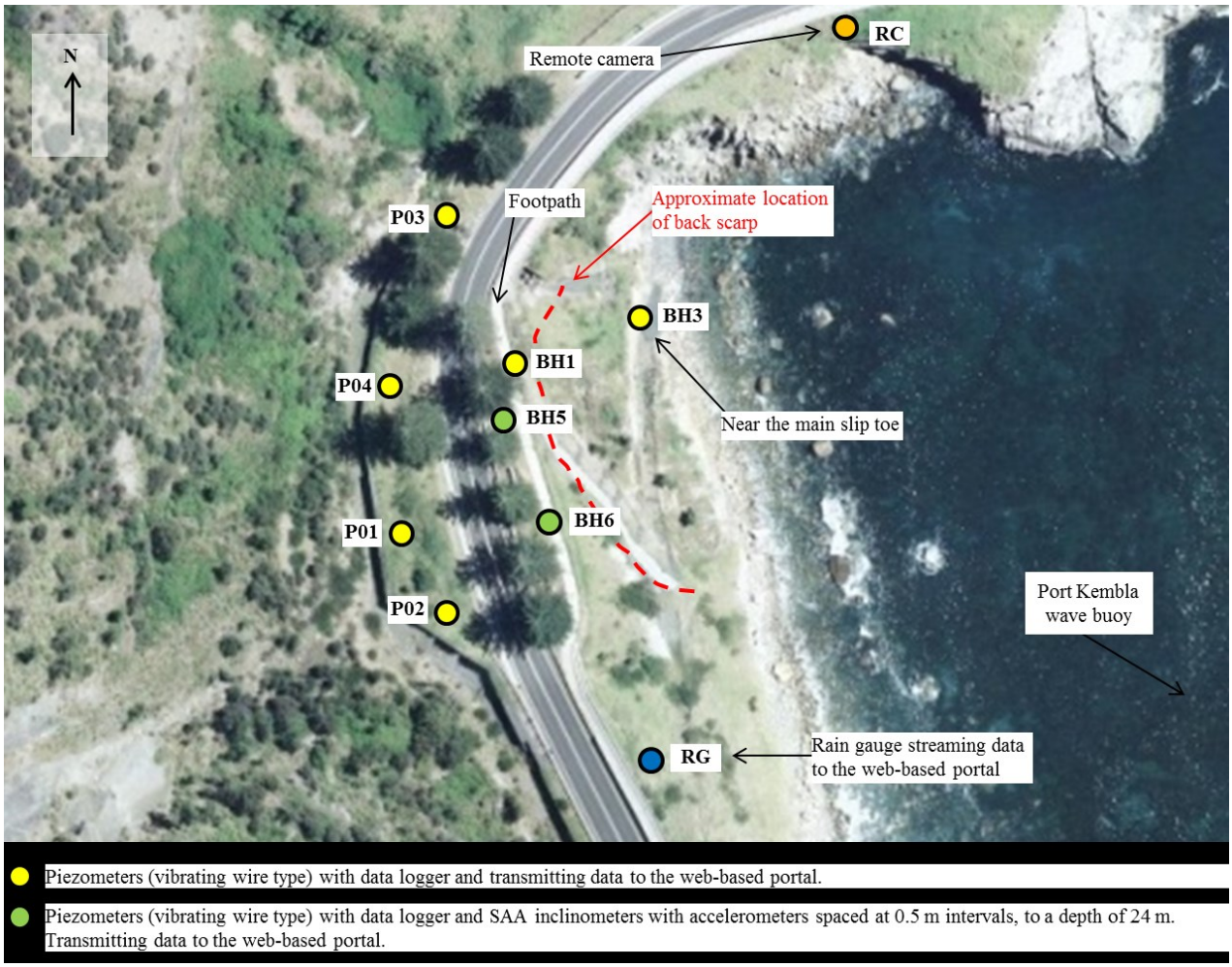


Figure 6. Borehole locations and Instrumentation plan.

Boreholes BH5 and BH6, which contained the main geotechnical instrumentation (vibrating wire piezometers and SAA inclinometers), were located behind the slip failure. This was done for three reasons:

- It was likely that due to the dynamic nature of the slip zone, instrumentation located across the slip would be rendered inoperative in a short space of time
- The aim of the monitoring program was to manage risk to road users. Locating the instrumentation immediately behind the slip would allow any regression of the slip into the marginally stable area behind the slip zone to be detected by the instrumentation
- The ground behaviour in the slip zone was reasonably well understood. Further detailed monitoring in this area would provide little further useful information in relation to either slip behaviour or road user risk mitigation.

Major project (Con't)

Remote real-time data collection system
A web-based online portal with data base application, Vista Data Vision (VDV), was adopted to collect and manage monitoring data from the field instruments. The portal provided real-time updates of the incoming data and setting of pre-programmed triggers. It allowed automatic transmission of trigger exceedances via SMS and email to selected recipients.

Monitoring plan
A monitoring plan focussed on mitigating road user risk was developed for the instrumentation. The essential components of the monitoring plan are presented in Table 2 below. The table provided the basic monitoring requirements for each instrument so that all personnel involved in the project could quickly identify their responsibilities and understand the capabilities of the instrumentation. Also, if any amendment to instrumentation was required, the purpose of the existing instrumentation would be understood and considered.

Table 2. Monitoring plan

Instrument	Accuracy	Frequency	Responsibility	Purpose
Rain Gauge	0.1 mm/hr	Recorded in mm/half hour intervals Transmitted to web portal every 15 minutes	AECOM	Provide rainfall intensity and duration data in the GD4 area
Piezometers	0.01 mm piezometric pressure	Transmitted to web portal every 15 minutes	AECOM	Provide piezometric pressure data at particular points within the main slip in GD4
Inclinometers (SAA type)	1 mm/m	Transmitted to web portal every 15 minutes	AECOM	Provide ground movement data west of the main slip
Inclinometers (Manual)	0.5 mm/m	Monthly	AECOM	Provide ground movement data in the slope below the piled roadway to the north of the slip
Bureau of Meteorology (BoM) rainfall predictions	BoM standard	Daily	AECOM	Provide predictions of rainfall and duration in slip area
Wave Buoys (Sydney and/or Port Kembla)	MHL standard	Daily	AECOM	Provide significant wave height information
Remote Camera		Transmitted to web portal every 15 minutes	AECOM	Provide visual image of slope

Major project (Con't)

Relationships between monitored parameters

General

Using the data obtained from the instrumentation in the monitoring plan, it was possible to develop relationships between the various monitored parameters. Data from various sets of instruments were plotted to the same time scale as in the example in 5. The figure was plotted to assess the interaction between rainfall, piezometric pressure and wave height with inclinometer movement. The data set presented in the figure is from borehole BH5, located immediately behind the main slip. The following data are plotted from this borehole in Figure 5:

- Daily rainfall
- 30 day cumulative rainfall.
- Maximum, significant wave height and tide obtained from MHL.
- Piezometric pressure (15.5m (Piezometer P5/-15.5) and 20.5m (Piezometer P5/-20.5) below ground level (BGL)).
- SAA inclinometer movements at rock interface (20m below ground level), 10m below ground level and surface.
- Rate of pore pressure rise (rates of rise greater than +/-3m/day not shown in order to filter out anomalous responses due to the effects of surface water).

In the sections that follow, the relationship between piezometric pressure and inclinometer movement is discussed in some detail and in more general terms for other data. The storm event in March 2012 presented in Figure 6 provides much of the data for establishing relationships between the various monitored parameters and referred to from here on as 'the storm event'.

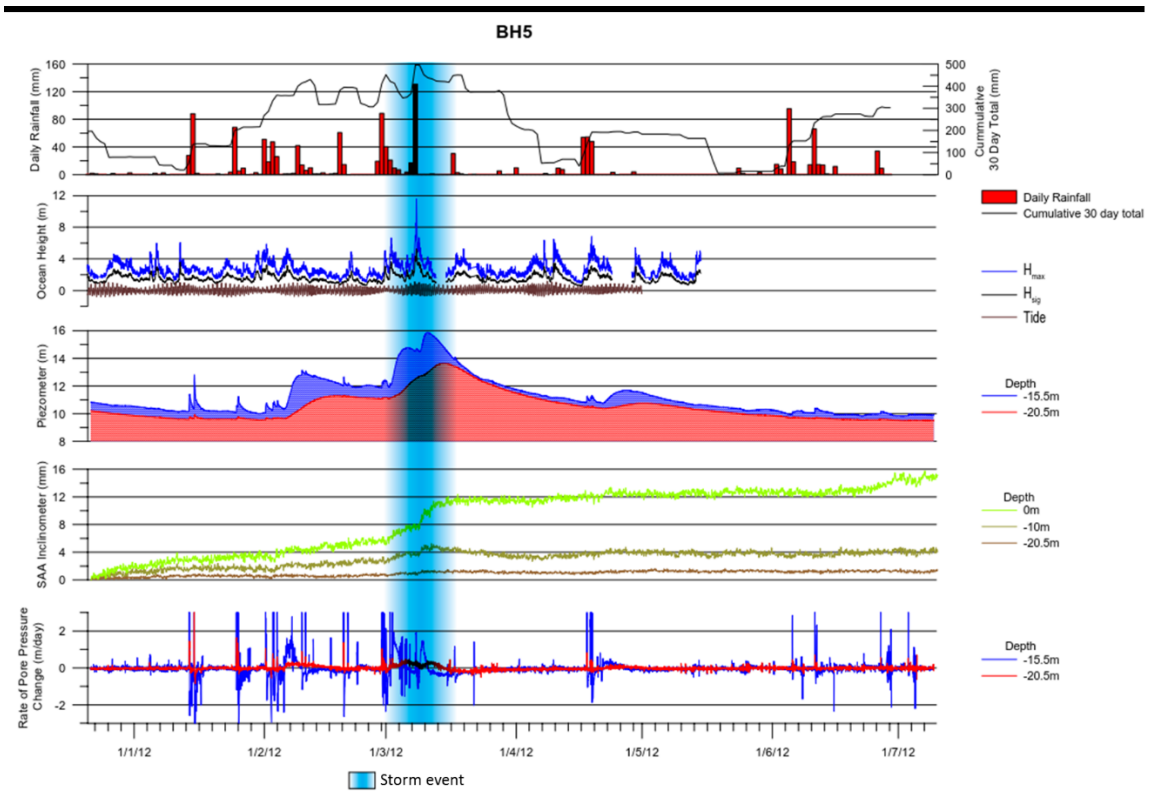


Figure 7. Temporal relationship between monitoring data at Borehole BH5.

Major project (Con't)

Relationship between piezometric pressure and rainfall
Following rainfall, pore pressures rise rapidly at the piezometer at P5/-15.5 with very little lag, suggesting the recharge is close to the slope. The effect of surface water ingress can be clearly seen with sharp spikes in piezometric pressure associated with rainfall. It would not be practical to accommodate these spikes in a response plan. However, after relatively simple upgrades and repairs to surface drainage, it can be seen from the figure that these sharp spikes were eliminated after February 2012. It illustrates graphically the importance of surface water management in slope risk management. After this time the rate of pore pressure rise associated with rainfall is approximately 1.4 m/day.

Lower piezometric pressures and flatter and smoother recharge curves lagging approximately three days behind rainfall were recorded at the piezometer at 20.5m BGL suggesting a longer flow path for groundwater at this level. The rate of piezometric pressure rise after rainfall at 20.5m BGL is approximately 0.4m/day, a significantly lower rate of rise than at P5/-15.5, and less critical in terms of response planning.

Towards the end of the monitoring period, piezometric pressures do not rise after rainfall due to the effects of the depressurisation wells.

Relationship between piezometric pressure and inclinometer movements
It can be seen from Figure 7 that there are a number of distinct patterns of movement in the inclinometer at the three levels plotted in the figure.

At the rock interface (-20.5 m) there is distinct inclinometer movement of approximately 1 mm at the time of the storm event. From review of the full height time displacement curves for this inclinometer, this movement was interpreted as shear movement within the crushed zone at the base of the colluvium as a result of elevated piezometric pressures. It can be inferred from the data that once piezometric pressures at P5/-15.5 exceed approximately 14 m, there was a possibility of deep seated failure occurring. There was no further significant movement in this zone during the monitoring period.

At the slope mid-level (-10 m), piezometric pressures during the storm event once again result in mobilisation of the slope with movements in the order of 2 mm. Whilst there is some oscillating movement in the inclinometer after the storm event, the slope remains stable.

At the surface, the inclinometer records indicate that movement can occur at less severe rainfall events such as that in February 2012. However, the greatest sustained movement occurs during the storm event when piezometric pressures are in excess of approximately 14 m. These movements cease once piezometric pressures drop.

Further surface movement occurs during sustained rain in April. This movement was considered to be the result of saturation of the ground surface and subsequent movement towards the back scarp of the main slip as a result of lack of restraint at the free face of the scarp.

Surface movement occurred once again in June/July but with very little rainfall and without any associated rise in piezometric pressure. This was attributed to further ground movement within the main slip and subsequent movement of the ground behind.

Piezometric pressure peaks in P5/-20.5 generally lag approximately three days behind those in P5/-15.5 and the curve is substantially smoother. It is considered that this was due to recharge from further behind the slope or slow percolation through the slope.

Major project (Con't)

Pressure at Piezometer P5/-20.5 did not appear to be a good predictor of the initiation of slope movement, but triggers were set for this piezometer as it was considered that there could be some contribution to ground movements with elevated pressures, and piezometric pressures here did track the piezometer above albeit with a lag. This lag could result in elevated piezometric pressures at depth some time after a rainfall event.

Piezometric rates of rise to establish trigger levels were modified from the values in Figure 7 to account for the following:

- Implementation of surface water control measures. It can be seen in Figure 7 above that after February 2012 the sharp spikes immediately following rainfall events have been eliminated.
- Installation of groundwater depressurisation wells. The impact of these wells can be seen in the muted response to rainfall in the piezometers after June 2012.

Offshore wave height and embankment toe erosion

Toe erosion due to wave action has been a contributor to slope instability and movement at the site. Hence, the potential for toe erosion due to wave action was monitored. However, no direct correlation between significant wave height and extent of erosion was established. Slope movements and erosion did occur during the storm event and towards the end of May 2012, in association with high tides and a significant wave height of approximately 5.5 m. However, no movements associated with slope instability or erosion were recorded during a sea storm with 8 m significant wave height. It is likely that the direction of the swell, which is not monitored at the buoy, is an important factor in toe erosion at this site.

Trigger action response plan

General

The purpose of the Trigger Action Response Plan (TARP) was to provide planned, graduated responses to changing slope conditions at the site in order to mitigate the landslip risks to road users/pedestrians. Clear and concise responses would be required at each trigger level to ensure that the correct actions were taken by responders, particularly those not directly involved in the formulation of the TARP. The points listed below were considered when developing trigger levels:

- The trigger levels need to reflect the urgency or criticality of the actions required.
- Realistic responses must be possible on receiving automated SMS / email alerts.
- These responses must be possible within a reasonable time frame.
- SMS / email trigger alerts must not occur so frequently that they are regarded as nuisance occurrences or important events are dismissed due to repeated false alarms.

Monitoring frequencies need to be consistent with trigger response times, particularly for electronic monitoring devices. If time is of the essence, the monitoring frequency must be reduced. The time taken to implement responses needs to be considered as well. The logistics of implementing a response may require frequent sampling to ensure the response can be implemented timeously.

Trigger status

Trigger status or trigger levels for this project were set to provide escalating responses when each trigger level was exceeded. The general concept of the status for each trigger level is provided in Table 3.

Major project (Con't)

Table 3. General concept of the status for each trigger

Trigger Status	Condition	Response
Green	Normal operation.	Monitor in accordance with monitoring plan.
Blue	Trends in data indicate that amber trigger may be exceeded.	Consider whether pre-emptive action is required, and implement where necessary.
Amber	Data indicates that unless action is taken within a predetermined time frame slope movement may take place.	Decide on and implement actions.
Red	Slope is potentially unstable.	Implement predetermined actions. Actions are prescriptive.
Grey	Loss of communication with web portal. Loss of data. Malfunctioning of instrumentation.	Response is targeted at reinstating instrumentation and action related to the slope is not necessarily required.

Development of triggers

General

A set of trigger levels were developed based on back analysis of the stability of the slope and review of monitoring data over the timeline of previous slope instability events. This review involved the assessment of the relationships between monitoring data such as piezometric pressure, inclinometer movement, antecedent rainfall (both daily and cumulative) and wave height as well changes in the slip area from remote camera images.

The slope movements were dependent on piezometric pressures, which in turn were dependent on rainfall intensity and duration, and antecedent piezometric pressures. Hence, triggers for rainfall could be varied depending on the piezometric pressures prevailing in the slope at the time. However, introducing interdependent triggers would have brought a level of complexity to the TARP, which could impact on reliability and risk.

Also, the slope was located in a very dynamic environment. Changes such as significant toe erosion leading to a reduction in slope stability, could change the piezometric level at which the slope is mobilised, rendering existing trigger values unconservative and requiring adjustment. Alternatively, pre-emptive action such as installing dewatering pumps to stabilise the slope could allow some relaxation in trigger levels. Hence, it was very likely that the trigger levels would be changed during the course of the monitoring program. Therefore, independent trigger levels were adopted for each monitoring device in this TARP.

Setting piezometric trigger levels

Development of trigger levels for the piezometer at P5/-15.5 at borehole BH5 are discussed in some detail as an example of how trigger levels were set. Trigger levels for other instruments were developed in a similar fashion.

Major project (Con't)

The critical piezometric level, the level which initiated approximately 5 mm of surface movement in the inclinometer during the storm event was set at 14.7 m BGL. From this level, there was a further rise in piezometric pressure of approximately 1.4 m. This represents one day's rate of pressure rise. The higher pressures did not lead to failures within the area of the footpath and Norfolk pines, although visual inspection indicated that significant further movement of the main slip had occurred. Survey carried out after the storm indicated ground movements of up to 1.5 m occurred in the main slip since a previous survey a week before the storm event. Some of these movements may have been associated with heavy rain and erosion due to high wave heights after the storm. This behaviour indicated that failure occurred as relatively shallow circular slip failure on the slope face, followed by ongoing creep movement identified by inclinometer data as shear at the rock/colluvium interface and stress relief in the upper section of the main slip. In view of this embankment behaviour behind the main slip when critical piezometric pressures were exceeded, it was considered that these pressures had been selected conservatively.

With the above in mind, red triggers were set to allow six hours of response time to execute management measures, such as closing the footpath, before the critical pressure was reached.

An amber trigger was set to allow one day for action before a red trigger was reached. Action could for instance include activating pumps in depressurisation wells which had recently been installed or assessing what further pre-emptive action could be taken to avert a red trigger.

A blue trigger was set to allow one day before an amber trigger was reached. Whilst no specified action was required on reaching a blue trigger, it allowed review of the data to identify trends which could result in further instability and consider possible pre-emptive actions.

To set the above trigger levels, the following process was followed:

Determine the piezometric pressure at which slope movement is initiated (critical pressure)

- The six hour rise is subtracted from the critical pressure to obtain the red trigger.
- The 24 hour rise is subtracted from the red trigger to obtain the amber trigger.
- The 24 hour rise is subtracted from the amber trigger to obtain the blue trigger.

The resulting raw trigger levels for a sample piezometer are presented in Table 4.

Table 4. Raw piezometric trigger levels.

Borehole	Piezometer	Critical Piezo level (mAHD)	Maximum Rate of rise (m/day)	Six hour rise	Red Trigger	24 hour rise	Amber Trigger	Blue Trigger
BH5	P5/-15.5	14.7	1.4	0.35	14..4	1.4	13.0	11.6

Table 5 below presents the piezometric trigger levels and response plan for the P5/-15.5 in BH5. Similar response plans were developed for the other instrumentation on site.

Major project (Con't)

Table 5. Piezometric pressure trigger levels at P5/-15.5.

Peizometric Triggers (mRL)			Maximum Response time from trigger notification
Grey	Loss of communication with web portal Loss of data Malfunctioning of instrumentation	Identify reason for malfunction and reinstate device	12 hours during green and blue status 2 hours during amber and red status
Green	N/A	Monitor in accordance with monitoring plan	N/A
Blue	10.8	Review data (AECOM) and meet with Roads and Maritime to agree if action is required. Review to include following data: Rain gauge information. BoM rainfall predictions. Wave height data. Tide data. camera images Evidence of erosion at the toe of the main slip. Piezometric pressures in BH5, BH6, and BH1. Rate of rise of piezometric pressures in BH5, BH6, and BH1.	24 hours
Amber	12.75	Inspect footpath, slope and road between bridge abutment at southern end of GD4 and BH4 (if safe to do so). Activate depressurization pumps and check discharge to confirm operation Review data (AECOM) and meet with Roads and Maritime to agree further action. Review to include following data:x Rain gauge information. BoM rainfall predictions. Wave height data. Tide data. Camera images Site observations. Evidence of erosion at the toe of the main slip. Piezometric pressures in BH5, BH6, and BH1. Rate of rise of piezometric pressures in BH5, BH6, and BH1. Decide whether to run depressurisation pumps.	12 hours 12 hours 24 hours

Major project (Con't)¶

Peizometric Triggers (mRL)			Maximum Response time from trigger notification
Red	14.2	Inspect footpath, slope and road between bridge abutment at southern end of GD4 and BH4 (if safe to do so) Close footpath Activate pumps and check discharge to confirm operation Review data (AECOM) and meet with Roads and Maritime to agree further action. Review to include following data: Rain gauge information. BoM rainfall predictions. Wave height data. Tide data. Camera images. Evidence of erosion at the toe of the main slip. Piezometric pressures in BH5, BH6, and BH1. Rate of rise of piezometric pressures in BH5, BH6, and BH1.	6 hours 6 hours 6 hours 24 hours

Piezometric trigger review against historical data

The piezometric data was assessed against the historical monitoring data to check the trigger levels under which the slope would have been managed had the TARP been in place from the installation of the piezometers. The assessment indicated that trigger levels would have been exceeded over the time frames listed below and the slope managed in accordance with those trigger levels in that time:

- Blue – approximately three and a half months
- Amber – approximately 30 days
- Red – approximately 10 days

Had these triggers been in place, the footpath would have been closed as a precautionary measure for a period of 10 days during the storm event. This would have been a reasonable management measure as there would have been very little pedestrian traffic in this area during that time. The need to manage the slope under an amber trigger for a period of 30 days would be undesirable, but it is likely that the depressurisation pumps would have been activated to avert this need. Hence, the risk to road users could be reasonably managed with the trigger levels developed for the site.

During the subsequent operation of the monitoring plan and TARP, the footpath was closed for one weekend due to high piezometric pressures and recorded inclinometer movements.

Conclusions

The road embankment at Lawrence Hargrave Drive, immediately north of Seacliff Bridge, was subject to instability due to elevated piezometric pressures and erosion due to wave action at the toe. Interim management measures which would not impact on the tourist value of this iconic route were required to ensure safety of the public whilst long term stabilisation solutions could be developed.

Major project (Con't)

A comprehensive monitoring program was developed to provide an interim management tool to ensure public safety. The monitoring plan included detailed real-time monitoring of several parameters which contributed to instability issues. These included rainfall measurements, piezometric pressures, slope movement, wave climate and toe erosion due to wave action. From the data collected as part of the monitoring program, it was possible to establish relationships between these parameters, leading to development of a comprehensive TARP, which allowed efficient interim management of the slope whilst long term solutions were developed.

Management of the slope under the TARP has been a success and a permanent solution consisting of a rock revetment at the base of the slope, surface drainage measures and slope protection have now been installed. These measures are illustrated in Figure 8 below.

Figure 8. Slope showing rock revetment at the base of the slope, surface drainage measures and slope protection.

Acknowledgements

The authors wish to acknowledge the valuable contribution of Roads and Maritime Services of NSW in the operational management of this successful project, and for their permission to publish this paper.

Major project (Con't)

References

Roads and Maritime Services NSW. *Guide to Slope Risk Analysis (Version 4)*, 2014.

Authors:
Henk Buys
Technical Director, Ground Engineering and Tunneling Team, AECOM Australia Pty Ltd (Sydney), Australia

Puvaneswary Rajarathnam
Geotechnical Engineer, Ground Engineering and Tunneling Team, AECOM Australia Pty Ltd (Sydney), Australia

TC corner

Inauguration of the TC107 symposium "Laterites and lateritic soils"

ISSMGE TC107 Symposium on "Laterites and lateritic soils" was inaugurated by Prof. E. C. Shin (Incheon University, Korea) in the presence of TC107 Committee members – Prof. R. Shivashankar (NIT Surathkal), Dr. Joshua Omer (Kingston University, London), Prof. J. Jayamohan, (LBSITW, Trivandrum) and Prof. Purnanand Savoikar (GEC) and Prof. Deepankar Choudhury (IIT Bombay). Prof. Deepankar Choudhury explained how TC107 and TC 207 are interconnected and noted that collective programs could be organized in the future.

Prof. E. C. Shin (Incheon University) delivered an inaugural keynote lecture on "*Use of weathered granite soil for construction of earth structures*". He presented the behavior of retaining walls made by connected bags of weathered granite soil resting on gabion layer. Case studies were presented on "*seismic analysis of foundation systems*" by Prof. Deepankar Choudhury, in his invited keynote lecture. Prof. R. Shivashankar delivered a keynote lecture on "*Laterite soils: properties and problems*" highlighting some slope stability problems and erosion issues in lithomargic clays. A number of case studies involving geotechnical challenges were presented. Prof. Joshua Omer delivered a keynote lecture on "*Use of artificial neural networks and CPT data to assess influence zone around pile base*". In his lecture, case studies using ANN networks to predict pile capacity and its validation with field studies were presented. Dr. Jayamohan delivered a keynote lecture on "*Lateritic soils: Some research studies and some case studies*". He highlighted an important aspect on how behaviour of laterites is different from conventional soil mechanics. Case studies of the failure of retaining walls were presented. Prof. Jaykumar Shukla presented a number of case histories in his keynote lecture. Last but not least, Dr. Purnanand Savoikar's lecture on "*Soils in Goa - Geotechnical properties, problems and solutions*" was about some case studies of lateritic soils in Goa.

Twenty-four full length technical papers were received in this symposium, out of which 16 were presented in two technical sessions. The papers were presented in two themes namely laterites and lateritic soils and other problematic soils. Two parallel sessions were held for paper presentation. The papers on lateritic soils in Goa authored by Prof Tanvi Mardolkar and Leonardo Souza and the other one on the problematic soils authored by Dr. Vinod Mauriya and Satish Yadav were voted as the best papers in the symposium.

Dr. Krupa Shankara (Principal of Goa College of Engineering Farmagudi) was the chief guest for the valedictory function and Er. Ravikiran Vaidya (Principal, Geodynamics) was the guest of honour. Dr. Nisha P. Naik welcomed the gathering and presented a brief overview about the two-day event. Prof. E. C. Shin, Prof. Joshua Omer, Er. Karthikeyan, Er. Madhav Kamat Ms. S Vibha expressed their feedback about the symposium. Er. Ravikiran Vaidya and Dr. Krupashankara M S. also spoke on the occasion. Prof. Purnanand Savoikar proposed the vote of thanks.

Inaugural ceremony

Delegates attending the symposium

Conference reports

The 2nd International Geotechnical Seminar, Maputo, Mozambia

Under the co-ordination by Prof. Pedro Sêco e Pinto, the II International Geotechnical Seminar took place in Maputo, Mozambique from 2nd to 3rd October 2019. This seminar is a joint organization of the ISSMGE and the Mozambican Geotechnical Society (SMG). ISSMGE sponsored the participation of the international lecturers including Mr. Sukumar Pathmanandavel (Australia), Prof. Roger Frank (France), Prof. Ikuo Tohata (Japan), Prof. Pedro Sêco e Pinto (Portugal), Prof. Mounir Bouassida (Tunisia), Prof. Etienne Kana (Cameroon) and Prof. Roberto Terzariol (Argentina). SMG covered the accommodation and local expenses.

More than 90 local participants attended the seminar, from which 42 students were sponsored by the African Development Bank, SMG and TECNICA, Ltd. and 54 professionals and researchers. During the Seminar, 19 papers were presented, being 13 authored by Mozambican engineers.

On the second day of the seminar, an interactive course was delivered by Eng. Roberto Terzariol, Prof. Pedro Pinto, Prof Ikuo Tohata and Prof. Roger Frank. The main subjects of in this course were foundations, retaining structures and slopes. The courses were excellent and it was a very successful initiative.

The opening ceremony was conducted by Dr. Etienne-Marcelin Kana (VP Africa), Prof. Pedro Pinto (Past President of ISSMGE), Prof. Carlos Quadros (President of SMG) and graced with the presence of Dr. Eneas Comiche, Mayor of Maputo.

The 2-day seminar contributed to foster bonds between the local geotechnical community and international experts. The significant presence and active participation of students was very encouraging and a good augur for the future. If one of the goals of the Seminar was to attract more young professionals to the field of Geotechnical Engineering it was surely achieved.

Such initiatives must be supported and encouraged, especially in Africa were many talented young engineers need guidance and more frequent interaction with experienced professionals to develop their skills and knowledge.

Delegates attending the seminar

Prof. Carlos Quadros
President of SMG

Conference reports

The 3rd Dr Victor de Mello Goa Lecture, India

The 3rd Dr Victor de Mello Goa lecture was organised by the Civil Engineering Department of Goa Engineering College and IGS Goa Chapter on 20th September 2019. The lecture was delivered by Prof. Pedro Simao Seco E Pinto (Professor at University of Coimbra, Portugal) on the topic: "*Static and seismic pile foundation design by load tests and experimental methods*". In his lecture, Prof. Pinto introduced Eurocode 7 - Geotechnical design and Eurocode 8 on the design of structures for earthquake resistance. He presented two case studies related with pile design of new Tagus bridge and Leziria bridge. Prof. Pinto also presented some information about the ISSMGE to the audience.

During this session, Prof. M. R. Madhav (Emeritus Professor, IIT Hyderabad and JNTU) delivered an invited keynote on the topic "*Geotechnical challenges - Case Studies*". Prof. Purnanand Savoikar presented the life sketch of Dr. Victor de Mello. The programme was inaugurated by Er. Anil Counto (Chairman and Managing director of M/s Alcon Enterprises). In his speech, the chief guest Engr. Anil Counto gave a valuable suggestion of establishing the Laterites and Lateritic Soil Research Centre in Goa, which will carry out research on lateritic soils. Prof. Savoikar welcomed the audience. Prof. K G Guptha, Head of Civil Engineering Department, briefed about the department activities. Prof. M R Madhav and Prof. E C Shin (Vice President Asia of ISSMGE) also presented their views. This event was attended by about 100 engineers, faculty, UG/PG students and research scholars.

Prof. Pinto delivering the Lecture

Release of proceedings

Delegates attending the lecture

Prof. E C Shin delivering his keynote

Prof. Purnanand Savoikar

ISSMGE Foundation reports

The 16ARC was organized by the Chinese Taipei Geotechnical Society at Taipei International Convention Center (TICC) in Taipei. The theme of the conference was "*Geotechnique for Sustainable Development and Emerging Market Regions*". The conference was aimed at covering the topics on modern geotechnical technologies and activities. The conference consisted of various programs which included the invited lectures, keynote lectures, theme lectures, technical parallel sessions, Young Geotechnical Engineers Session (YGES), exhibition, technical visits and The ISSMGE Bright Spark Lecture. Besides, a welcome reception was held on Monday 14th October and a banquet dinner was held on Wednesday 16th October.

The conference started on 14th October 2019 with a wonderful inaugural ceremony. It was followed by the first keynote lecture given by Prof. Charles W.W. Ng on "*Fundamental framework to design multiple rigid barriers for resisting debris flows*". The series of inspiring lectures on the other days comprised of other various keynote lectures.

The technical sessions included papers on TC103-Numerical methods in geomechanics, ATC6-Urban geoengineering, TC104Pphysical modelling in geotechnics, TC202-Transportation geotechnics, TC209-Offshore geotechnics, TC302-Forensic geotechnical engineering , TC304-Risk assessment and management, TC305-Megacities, and others like ATC7, ATC10, ATC18. Each of the technical sessions consisted of around 8 technical papers and sufficient time were given to the presenters to present their work followed by a brief discussion. In between the sessions and during the breaks, I could also visit the exhibition stalls that had interesting in situ techniques for underground excavation, ground improvement, dynamic testing and others.

Another feature of the conference was the ISSMGE Bright Spark Lecture. The Young Member Presidential Group (YMPG) and Young Geotechnical Engineers Session (YGES) was to enable delegates of 36 years age to exchange research ideas and share work experiences in the geotechnical engineering profession. The aim of the program was to bring up young geotechnical engineers who will move forward to the aims and ideals of the ISSMGE. The participants of the YMPG/YGES from each member society were supposed to give oral presentations in the allotted sessions, which were evaluated by a screening committee. The two selected official members of YMPG would deliver the ISSMGE Bright Spark Lecture at 16ARC.

In overall, the 16ARC conference gave me a valuable platform to learn and understand the different aspects of geotechnical engineering and update myself with the latest technologies thereby giving me an opportunity to extend knowledge in my area of research. I am indebted to ISSMGE Foundation for providing me with financial support for participating in this esteemed conference.

During my presentation

Kaustav Chatterjee
Indian Institute of Technology Roorkee

ISSMGE Foundation reports (Con't)

The 17th European Conference on Soil Mechanics and Geotechnical Engineering was held between 1st - 6th of September in Reykjavík, Iceland. The conference itself is the most prestigious event of the ISSMGE in Europe, therefore it is only organized in every 4 years. On the first day the presidents of the ISSMGE (Charles Ng) and IGS (Hreinn Haraldsson), also the former president of Iceland, Mr. Ólafur Ragnar Grímsson gave a welcome speech, and an Icelandic drum quartet SUMA did a short performance.

After the opening ceremony, keynote lectures were given about actual topics such as the risk evaluation of dams and the geotechnical challenges of Iceland. In the afternoon the discussion sections began with engineers and researchers giving short presentations about their work in smaller conference rooms. On the following days, in the early hours invited lectures were given for a larger group of audience, and they were followed by discussion sessions until 6 PM every day.

During the whole 17th ECSMGE event there was an open Exhibition hall where participants had opportunity to get to know better the work of companies and organizations which were present. There was also a separate Poster section hall, where participants could observe the poster of papers that were submitted, but not presented during discussion sessions.

I would like to express my appreciation to the ISSMGE Foundation for the support which enabled me to attend two of these prestigious events of the ISSMGE.

During my presentation

With a few Hungarian colleagues at Harpa

Dr. Gábor Nagy
Budapest University of Technology and Economics, Budapest, Hungary

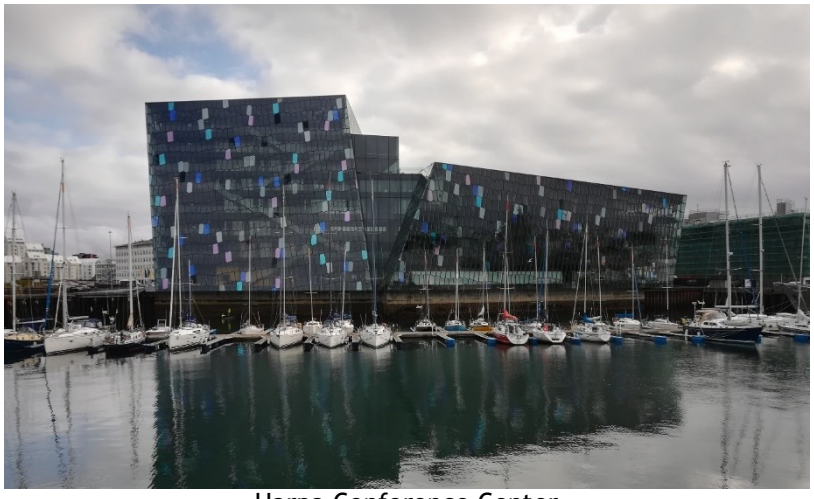
ISSMGE Foundation reports (Con't)

Thanks to the ISSMGE Foundation I had a great opportunity to participate in the 17th European Conference on Soil Mechanics and Geotechnical Engineering was organised in Reykjavik, Iceland. The conference was held on September 1st – 6th, 2019. The main theme of the Conference was '*Geotechnical Engineering, foundation of the future*'. All sessions took place in an amazing place called Harpa Conference Centre, whose architecture was inspired by basalt columns and minerals dominating the Icelandic landscape. The scientific presentations were divided into the main sessions, parallel discussion sessions and poster sessions. In addition, scientific talks could have been continued in the exhibition area.

The Conference programme was very rich and comprehensive. It certainly gave the possibility to confront the knowledge and set new directions. One of very inspiring Keynote Lecture entitled '*Geotechnical challenges in Iceland*' was given by Sigurður Erlingsson from University of Iceland, Iceland. He presented specific problems faced by Icelandic engineers, resulting from frequent volcanic eruptions, retreat of glacier and tectonic movements. The threat of glacial flood, sea level rising and behaviour of poorly graded materials are important aspects which should be frequently taken into account while designing new structures. Contrary to that overview lecture, Dr Lidija Zdravkovic from Imperial College London, the United Kingdom, given very direct and detailed lecture about '*Extending the life of existing infrastructure*'. She showed the use of advanced numerical modelling tools to consider the complexity of geomaterials behaviour in time.

When it comes to my contribution, I gave a speech about '*The procedure of design-accelerogram deconvolution in 2D time-domain FEM analysis*' during Numerical methods session. Therefore, I was also particularly interested in the Keynote Lecture entitled '*Recent developments in geotechnical earthquake engineering and application*' given by Sebastiano Foti. The main issue of the presentation focused on significant amplification of acceleration for specific stratigraphic and topographic conditions. It gave me a general perspective on the subject of my current research. There were also several presentations, presented during the two discussion session: Numerical methods and Earthquake, that were closely related to my research area. All mentioned presentations certainly supported my development.

I would like to express my gratitude to the ISSMGE Foundation for allowing me to participate in the Conference.



Harpa Conference Center

Aleksandra Korzec
Institute of hydroengineering, Polish Academy of sciences

ISSMGE Foundation reports (Con't)

The XVII European Conference on Soil Mechanics and Geotechnical Engineering was held on the 1st – 6th September in Reykjavík, Iceland in the Harpa conference hall. This conference is the most important geotechnical conference in Europe. The event started with the meetings of technical committees on Sunday, and next day was officially opened by such honoured guests as the former president of Iceland, Ólafur Ragnar Grímsson and Charles Ng, the president of ISSMGE. On the following days, in the morning keynote and invited plenary speakers gave their presentations, in the afternoon technical discussions and parallel sessions was held in the conference rooms. During the breaks the participant could also have a look at the exhibited posters. The coffee and lunch breaks between the sessions provided an excellent opportunity to discuss the presentations and exchange ideas with colleagues.

The official closing ceremony took place on Thursday afternoon, but on the last day the various technical visits such as tour to one of the largest ice tunnels in Europe and a geothermal power plant were closing the conference.

During the conference I could widen my horizon in various fields of geotechnical engineering as a PhD student. I would like to thank the support of ISSMGE foundation, which allowed me to attend the most prestigious geotechnical conference in Europe and not least to visit this enchanting country. I am also tankful to the Hungarian Geotechnical Society, which is the Hungarian Member Society of ISSMGE.

First day of the conference

Miklós Pap
Budapest University of Technology and Economics, Budapest, Hungary

ISSMGE Foundation reports (Con't)

I would like to acknowledge the ISSMGE foundation for providing me this award for attending and presenting my research work in the conference of core area of Unsaturated soil mechanics, AP-UNSAT 2019 at Nagoya, Japan during 23-25 August 2019. The conference provided the opportunity to young researchers and academicians to enhance network in between and to exchange experiences of practical challenges in the real-world problems related to the core area. All keynote lectures were presented in different area of unsaturated soil mechanics. I got a chance to discuss with Prof Harianto Rahardjo, Professor of Nanyang Technological University, Singapore and also made a collaborative work in the field problem on the topic of stabilization of unsaturated soil using plastic waste. The whole conference was a useful, informative and inspiring experience for me. I am very much grateful to ISSMGE foundation to give me the financial assistance to attain this prestigious conference.

Discussion with Prof Harianto Rahardjo during coffee break

Dave Bhavita Subhashbhai
S V National Institute of Technology, Surat, Gujarat, India

Obituary

Prof. Petro Ivanovych Kryvosheiev

With great sadness we announce that on 7th October, 2019, at the age of 85, Prof. Petro Ivanovych Kryvosheiev (**c**andidate of technical sciences), who headed the State Research Institute of Building Constructions (NIISK) for over 18 years, passed away. Since the organization of the Society for Soil Mechanics, Geotechnics and Foundation Engineering in Ukraine (UkrSSMGFE), he was the permanent President of the society. From early 1990s to 2016, he was the head of the Ukrainian group of the International Federation for Structural Concrete (*fib*) and the only person in the former USSR territory to be honored with a *fib* medal for his significant contribution to the reinforced concrete development.

Ukraine lost a great scientist and advisor whose deep knowledge was directed to the construction industry development.

Prof. Petro Ivanovych was distinguished by sincerity, devotion and love for the Institute. Everyone, who knew Prof. Petro Ivanovych, loved and respected him for his sensitive attitude to people, great spiritual generosity, kind heart and patriotism.

It is hard to believe that we will never hear his wise words again and will never see his sincere smile. But love, gratitude and greatest respect in our hearts will never fade away.

The bright memory of Prof. Petro Ivanovych will forever remain in our hearts.

In these sorrowful days we express our sincere, deep condolences to the family and friends of the deceased.

SE NIISK personnel
Ukrainian fib group
Ukrainian society for SMGFE

Event Diary

ISSMGE EVENTS

Please refer to the specific conference website for full details and latest information.

2020

International Conference on Geotechnical Engineering - Iraq
Location: Baghdad, Iraq
Date: 19-02-2020 - 20-02-2020
Organiser: Iraqi Scientific Society of Soil Mechanics and Foundation Engineering;
Contact person: Mahdi O Karkush;
Address: Aljadriah;
Phone: 07801058893;
Email: mahdi_karkush@coeng.uobaghdad.edu.iq;
Website: http://issmfe.org/international-iraqi-geotechnical-conference/

4th International Conference on Geotechnical Engineering
Location: Le Royal Hammamet Hotel, Tunisia , Hammamet, Tunisia
Organiser: Research Laboratory Geotechnical Engineering and Georisks
Date: 09-03-2020 - 11-03-2020
Contact person: Mme Haifa Guerfi. Address: ENIT, BP 37 Le Belvédère Tunis; Phone: +216.27.036.080; Fax: +216.71.872.729; Website: http://www.icge20.geolab.tn; Email: contact@geolab.tn

First International Symposium on Construction Resources for Environmentally Sustainable Technologies (CREST2020)
Location: Nishijin Plaza, Kyushu University, Fukuoka, Japan
Date: 10-03-2020 - 12-03-2020
Organiser: Kyushu University, Fukuoka, Japan;
Contact person: Dr. Siavash Manafi Khajeh Pasha, Address: West Building No. 2, Room No. 1124 744 Motooka, Nishi-ku, Phone: +81 092-802-3369, Fax: +81 092-802-3368,
Email: info@crest2020.com,
Website: https://crest2020.com/.

4th European Conference on Physical Modelling In Geotechnics
Location: Luleå Technical University, Sweden
Date: 15-03-2020 - 17-03-2020
Organiser: Luleå Technical University - Jan Laue; Contact person: Per Gunnvard; Address: LTU Laboratorievägen; Phone: +46920493582; Email: per.gunnvard@ltu.se; Website: http://www.ltu.se/ecpmg

14th Baltic Sea Geotechnical Conference 2020
Date: 25-05-2020 - 27-05-2020
Location: Clarion Hotel Helsinki, Finland
Language: English
Organiser: Finnish Geotechnical Society
Contact person: Leena Korkiala-Tanttu
Email: leena.korkiala-tanttu@aalto.fi
Website: http://www.ril.fi/en/events/bsgc-2020.html
Email: ville.raassakka@ril.fi

Event Diary (Con't)

18th NGM Nordic Geotechnical Meeting
Date: 25-05-2020 – 27-05-2020
Location: Helsinki, Finland
Contact person: Ville Raassakka
Email: ville.raassakka@ril.fi
Website : http://www.ril.fi/en/events/ngm-2020.html

1st International Conference on Embankment Dams (ICED'2020): Dam Breach Modelling and Risk Disposal
Location: Beijing International Convention Center, Beijing, China,
Date: 05-06-2020 - 07-06-2020
Language: English
Organiser: ISSMGE TC210 on Embankment Dams;
Website: http://iced-2020.host30.voosite.com/;
Email: iced2020@163.com

International Conference on Challenges and Achievements in Geotechnical Engineering
Location: POLIS University campus, Tirana, Albania;
Date: 11-06-2020 - 13-06-2020
Language: English
Organiser: Albanian Geotechnical Society
Contact person: Erdi Myftaraga
Phone: +355699336911,
Email: emy@greengeotechnics.com

XIII International Symposium on Landslides (13 ISL) - Cartagena 2020
Date: 15-06-2020 - 19-06-2020
Location: Hotel Las Américas, Cartagena, Colombia
Language: English
Organiser: Colombian Geotechnical Society
Contact person: Juan Montero Olarte
Address: Transversal 28B No. 37-47
Phone: 57 1 2694260
Email: isl2020@scg.org.co
Website: http://www.scg.org.co

International Conference on Geotechnical Engineering Education
Location: Greece, Athens
Date: 24-06-2020 - 25-06-2020
Language: English
Organiser: TC306
Contact person: Marina Pantazidou
Email: gee2020athens@gmail.com
Website: https://www.gee2020.org

Event Diary (Con't)

4th European Conference on Unsaturated Soils - Unsaturated Horizons
Location: Instituto Superior Técnico, Lisbon, Portugal
Address: Av Rovisco Pais, 1
Date: 24-06-2020 - 26-06-2020
Language: English
Organiser: IST, TUDelft and UPC
Contact person: info@EUNSAT2020.tecnico.ulisboa.pt
Website: http://www.EUNSAT2020.tecnico.ulisboa.pt

TC204: Geotechnical Aspects of Underground Construction In Soft Ground - TC204 Cambridge 2020
Date: 29-06-2020 - 01-07-2020
Location: University of Cambridge, United Kingdom
Language: English
Organiser: University of Cambridge
Contact person: Dr Mohammed Elshafie
Address: Laing O'Rourke Centre, Department of Engineering, Cambridge University
Phone: +44(0) 1223 332780
Email: me254@cam.ac.uk

3rd International Conference on Geotechnical Engineering
Location : Cinnamon Grand, Colombo ; Sri Lanka
Date : 10-08-2020 - 11-08-2020
Language : English
Organiser : Sri Lankan Geotechnical Society ;
Contact person: Dr. JSM Fowze;
Address: 415, Bauddhaloka Mawatha
Email: slgssecretariat@gmail.com;
Website: http://icgecolombo.org/2020/index.php

4th International Symposium on Frontiers in Offshore Geotechnics
Date: 16-08-2020 - 19-08-2020
Location: University of Texas, Austin, United States
Language: English
Organiser: ISFOG 2020 Organising Committee
Contact person: Phil Watson
Address: The University of Western Australia
Phone: 0418881280
Email: phillip.watson@uwa.edu.au
Website: http://www.isfog2020.org

4th International Conference on Transportation Geotechnics (4th ICTG)
Location: Sheraton Grand Chicago, USA
Date: 30-08-2020 - 02-09-2020
Organiser: Professor Erol Tutumluer, 4th ICTG Chairman and Chair of ISSMGE TC 202,
Contact Information: Professor Erol Tutumluer,
Address: 1205 Newmark CEE Laboratory, MC-250 205 N. Mathews,
Phone: +1 (217) 333-8637,
Email: CITL-ICTG2020@illinois.edu,
Website: http://www.conferences.illinois.edu/ICTG2020

Event Diary (Con't)

6th International Conference on Geotechnical and Geophysical Site Characterization
Date: 07-09-2020 - 11-09-2020
Location: Budapest Congress Center, Hungary , Budapest
Language: English
Organizer: Hungarian Geotechnical Society
Contact person: Tamas Huszak
Address: Muegyetem rkp. 3.
Phone: 0036303239406
Email: huszak@mail.bme.hu
Website: http://www.isc6-budapest.com
Email: info@isc6-budapest.com

27th European Young Geotechnical Engineers Conference and Geogames
Location: National Research Moscow State University of Civil Engineering, Russia, Moscow
Date: 17-09-2020 - 19-09-2020
Language: English
Organiser: Russian Society for Soil Mechanics, Geotechnics and Foundation Engineering
Contact person: PhD Ivan Luzin
Address: NR MSUCE, 26 Yaroslavskoye shosse
Phone: +7-495-287-4914 (2384)
Email: youngburo@gmail.com
Additional Information: https://t.me/EYGEC2020

2nd International Conference on Energy Geotechnics
Location: Robert Paine Scripps Forum for Science, Society and the Environment. La Jolla, CA, USA. , Date : 20-09-2020 - 23-09-2020
Language: English
Organiser: John McCartney (UC San Diego, USA) and Ingrid Tomac (UC San Diego, USA),
Contact Information: ICEGT-2020 Secretariat,
Address: 9500 Gilman Dr., La Jolla CA,
Phone: +1-858-822-5212,
Fax: +1-858-822-2260,
Email: secretariat@icegt-2020.com,
Website: https://icegt-2020.eng.ucsd.edu/home

3rd International Symposium on Coupled Phenomena in Environmental Geotechnics
Location: Kyoto University, Japan
Date: 29-10-2020 - 30-10-2020
Language:English
Organiser: TC215 (Environmental Geotechnics), Japanese Geotechnical Society (JGS), and Kyoto University
Contact person: Takeshi Katsumi
Address: Yoshida-honmachi
Phone: +81-75-753-9205
Fax: +81-75-753-5116
Email: katsumi.takeshi.6v@kyoto-u.ac.jp
Website: https://cpeg2020.org
Email: cpeg2020@geotech.gee.kyoto-u.ac.jp

Event Diary (Con't)

10th International Conference on Scour and Erosion
Location: DoubleTree Washington DC – Crystal City, USA,
Date: 15-11-2020 - 18-11-2020
Language: English
Organiser: Geotechnics of Soil Erosion Committee, ASCE Geo-Institute;
Contact person: Ming Xiao (ICSE-10 Chair);
Address: Pennsylvania State University;
Phone: 010-814-865-8056;
Email: mxiao@engr.psu.edu;
Website: https://www.engr.psu.edu/xiao/ICSE-10%20Call%20for%20abstract.pdf

2021

6th Geochina International Conference 2021
Location: NanChang, China
Date : 19-07-2021 - 21-07-2021
Organiser : East China Jia Tong University in Cooperation with Chinese Ministry of Education, GeoChina Civil Infrastructure Association, University of Oklahoma
Contact person: Dr. Dar Hao Chen ; Address: Texas Transportation Institute ; Email: d-chen@tti.tamu.edu;
Website : http://geochina2021.geoconf.org; Email : geochina.adm@gmail.com

20th International Conference on Soil Mechanics and Geotechnical Engineering
Location: International Convention Centre Sydney, Australia
Date :12-09-2021 - 17-09-2021
Language: English
Organiser: The Australian Geomechanics Society;
Contact person: ICMS Australasia;
Address: Level 9, 234 George Street Sydney NSW 200 ;
Email: emmab@icmsaust.com.au;
Website: http://www.icsmge2021.org/

NON-ISSMGE SPONSORED EVENTS

2020

2nd International Symposium on Seismic Performance and Design of Slopes
Location: John McIntyre Conference Centre in Pollock Halls, 18 Holyrood Park Road, Edinburgh EH16 5AY, UK,
Date: 18-01-2020 - 22-01-2020
Language: English
Organiser: The University of Edinburgh, UK
Contact person: Chongqiang Zhu, Ph.D.
Address: Institute for Infrastructure and Environment, School of Engineering, the University of Edinburgh, Thomas Bayes Road, Edinburgh EH9 3FG, UK
Phone: 441316505588
Email: v1czhu3@exseed.ed.ac.uk
Website: https://www.isspds.eng.ed.ac.uk/

Event Diary (Con't)

Geoamerica 2020
Location: Windsor Convention Expo Center, Rio de Janeiro; Brazil
Date: 26-04-2020 - 29-04-2020
Language: English
Organiser: International Geosynthetics Society;
Contact person: André Estêvão Silva;
Email: geoamericas2020@geoamericas2020.com;
Website: http://www.geoamericas2020.com

DFI Deep Mixing 2020
Dates: 15-06-2020 - 17-06-2020
Location: TBD, Gdansk, Poland
Organizer: Deep Foundations Institute
Contact person: Theresa Engler
Address: 326 Lafayette Avenue, Hawthorne, NJ 07506, USA
Phone: 19734234030
Fax: 19734234031
Email: tengler@dfi.org
Website: http://www.dfi.org
Email: staff@dfi.org

The 3rd International Conference on Environmental Geotechnology, Recycled Waste Materials and Sustainable Engineering
Location: Dokuz Eylul University, Izmir, Turkey
Dates: 18-06-2020 - 20-06-2020
Organiser: Dokuz Eylul University
Contact person: Tugce Ozdamar Kul
Address: Dokuz Eylul University
Phone: +905325164800
Email: egrwse2020@gmail.com
Website: http://www.egrwse2020.com

16th International Conference of the International Association for Computer Methods and Advances in Geomechanics - IACMAG
Location: Politecnico di Torino Conference Centre, Italy ,
Date: 29-06-2020 - 03-07-2020 English
Organiser: Politecnico di Torino
Contact person: Symposium srl
Address: via Gozzano 14
Phone: +390119211467
Email: info@symposium.it
Email: marco.barla@polito.it

Event Diary (Con't)

7th International Conference on Recent Advances in Geotechnical Earthquake Engineering and Soil Dynamics
Location: The National Science Seminar Complex, India , Bengaluru
Date: 13-07-2020 – 16-07-2020
Organiser: Indian Society of Earthquake Technology
Contact person: Dr Ravi Jakka
Address: Department of Earthquake Engineering, Indian Institute of Technology Roorkee
Phone: + 91-1332-285591
Email: jakkafeq@iitr.ac.in
Website: http://7icragee.org/index.php

16th International Conference of the International Association for Computer Methods and Advances in Geomechanics - IACMAG
Location: Politecnico di Torino Conference Centre, Italy ,
Date: 29-06-2020 - 03-07-2020
Organiser: Politecnico di Torino
Contact person: Symposium srl
Address: via Gozzano 14
Phone: +390119211467
Email: info@symposium.it; marco.barla@polito.it

Recent Trends in Geotechnical and Geo-Environmental Engineering and Education
Location: Bali, Indonesia
Date: 15 – 17 July 2020,
Organiser: RTEE Conference
Contact person: Amy Marshall ; Email: support@rtgee.org; Website : https://rtgee.org/ .

DFI 45th Annual Conference on Deep Foundations
Dates: 13-10-2020 - 16-10-2020
Location: Gaylord National Resort & Convention Center, Oxon Hill, MD, USA
Organizer: Deep Foundations Institute
Contact person: Theresa Engler
Address: 326 Lafayette Avenue, Hawthorne, NJ 07506, USA
Phone: 19734234030
Fax: 19734234031
Email: tengler@dfi.org
Website: http://www.dfi.org
Email: staff@dfi.org

Fifth World Landslide Forum
Dates: 02-11-2020 - 06-11-2020
Location: Kyoto International Conference Center, Kyoto, Japan
Organizer: International Consortium on Landslides
Contact person: Ryosuke Uzuoka
Address: Gokasho
Phone: +81-774-38-4090
Email: uzuoka.ryosuke.6z@kyoto-u.ac.jp
Website: http://wlf5.iplhq.org/
Email: secretariat@iclhq.org

FOR FURTHER DETAILS, PLEASE REFER TO THE WEBSITE OF THE SPECIFIC CONFERENCE

Corporate Associates

AECOM Asia Company Ltd
8/F, Tower 2, Grand Central Plaza
138 Shatin Rural Committee Road
Shatin, NT
HONG KONG

A.P. van den Berg
IJzerweg 4
8445 PK Heerenveen
THE NETHERLANDS

Ove Arup & Partners Ltd.
13 Fitzroy Street
London W1T 4BQ
UNITED KINGDOM

AOSA
Tacuarí 1184 - (C1071AAX)
Cdad. de Buenos Aires
Argentina
http://www.aosa.com.ar

S.N. Apageo S.A.S.
ZA de Gomberville
BP 35 - 78114 MAGNY LES HAMEAUX
FRANCE

Aurecon
Level 8, 850 Collins Street
Docklands Victoria 3008
Melbourne
AUSTRALIA

Coffey Geotechnics
Level 19, Tower B,
Citadel Towers
799 Pacific Highway
Chatswood NSW 2067 Australia

Dar Al Handasah Corp
Smart Village,
Cairo-Alexandria Desert Road
Street 26, Building 10
P.O. Box: 129, Giza 12577,
Egypt

Deltares
PO Box 177
2600 AB Delft,
THE NETHERLANDS

Fugro N.V.
PO Box 41
2260 AA Leidschendam
THE NETHERLANDS

GDS Instruments Sdn. Bhd.
124, Jalan Kapar 27/89, Section 27, Taman Alam Megah, 40400 Shah Alam, Selangor, Malaysia
https://www.gdsi.com.my/

Geomil Equipment BV
12/F, Asia Trade Centre, 79 Lei Muk Road, Kwai Chung, NT, Hong Kong
http://geomil.com

Geoharbour Group
Geoharbour Building, 6A, No.1228, Jiangchang Rd.,Jing'an District, Shanghai, 200434, P.R.China.
Tel: +86 21 3126 1263
Fax: +86 21 2301 0238
Web: www.geoharbour.com

Golder Associates Inc
1000, 940-6th Avenue S.W.
Calgary, Alberta
CANADA T2P 3T1

Ground Investigation Ltd
Attn: Marco Holtrigter
PO Box 104-089,
Lincoln North
Auckland 0654
New Zealand

GHD Pty, Ltd.
57-63 Herbert Street
Artarmon NSW 2064
AUSTRALIA

Corporate Associates (Con't)

Huesker Synthetic GmbH
Fabrikstrasse 13-15
48712 Gescher
GERMANY

International I.G.M. s.a.r.l.
P.O.Box: 166129 Achrafieh
Beirut
LEBANON

Jan de Nul N.V.
Tragel 60,
B-9308 Hofstade-Aalst
BELGIUM

Keller Ground Engineering
Level 1, 4 Burbank Place, Baulkham Hills
NSW 2153
PO Box 7974, Baulkham Hills NSW 1755
Australia

KGS Ltd,
22 Chaikovskii St,
Temirtau City,
101403 Republic of Kazakhstan
http://kgs-astana.wixsite.com/society

Maccaferri
Via Kennedy 10
40069 Zola Predosa (Bologna)
ITALY

NAUE GmbH Co KG
Gewerbestrasse 2
32339 Espelkamp-Fiestel
GERMANY

Norwegian Geotechnical Institute
P.O. Box 3930 Ullevaal Stadion
N-0806 OSLO
NORWAY

Pagani Geotechnical Equipment
Localita Campogrande 26
29010 Calendasco (PC)
Italy
www.pagani-geotechnical.com

RCF Ltd
4C Ologun Agbeje
Victoria Island
Lagos,
Nigeria

Member of the Surbana Jurong Group

SMEC Australia PTY ITD
Level 6, 480 St Pauls Tce Fortitude Valley
QLD 4006
www.smec.com

Siemens Energy
Kaiserleistrasse10
63067 Offenbach
GERMANY

SOLETANCHE BACHY SA
133 boulevard National, 92500 Rueil-Malmaison,
FRANCE

SRK Consulting
Oceanic Plaza,
22nd Floor, 1066 West Hastings Street,
Vancouver, BC, Canada V6E 3X2

TenCate Geosynthetics
9, rue Marcel Paul
B.P. 40080
95873 Bezons Cedex
FRANCE

Tensar International Ltd
Cunningham Court
Shadsworth Business Park
Blackburn, BB1 2QX,
UNITED KINGDOM

Terrasol
42/52 Quai de la Rapée - CS7123075583
Paris CEDEX 12
FRANCE

Corporate Associates (Con't)

Terre Armée
280, avenue Napoléon Bonaparte
92506 Rueil Malmaison Cedex
France

University of Wollongong, Australia
Northfields Ave,
Wollongong
NSW 2522
Australia

Wagstaff Piling
56 Tattersall Road,
Kings Park,
NSW 2148
Australia

Zetas Zemin Teknolojisi AS
Merkez Mah. Resadiye Cad. No. 69/A
Alemdag, Umraniye
Istanbul, 34794
TURKEY

Foundation Donors

The Foundation of the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE) was created to provide financial help to geo-engineers throughout the world who wish to further their geo-engineering knowledge and enhance their practice through various activities which they could not otherwise afford. These activities include attending conferences, participating in continuing education events, purchasing geotechnical reference books and manuals.

- **Diamond: $50,000 and above**
  - **a.** ISSMGE-2010 http://www.issmge.org/
  - **b.** Prof. Jean-Louis and Mrs. Janet Briaud https://www.briaud.com and http://ceprofs.tamu.edu/briaud/
- **Platinum: $25,000 to $49,999**
- **Gold: $10,000 to $24,999**
  - **a.** International I-G-M http://www.i-igm.net/
  - **b.** Geo-Institute of ASCE http://content.geoinstitute.org/
  - **c.** Japanese Geotechnical Society http://www.jiban.or.jp/
  - **d.** The Chinese Institution of Soil Mechanics and Geotechnical Engineering – CCES www.geochina-cces.cn/en
  - **e.** Korean Geotechnical Society www.kgshome.or.kr
  - **f.** Comité Français de Mécanique des Sols et de Géotechnique www.cfms-sols.org
- **Silver: $1,000 to $9,999**
  - **a.** Prof. John Schmertmann
  - **b.** Deep Foundation Institute www.dfi.org
  - **c.** Yonsei University http://civil.yonsei.ac.kr

Foundation Donors (Con't)

d. CalGeo – The California Geotechnical Engineering Association
www.calgeo.org

e. Prof. Ikuo Towhata
towhata.ikuo.ikuo@gmail.com
http://geotle.t.u-tokyo.ac.jp/

f. Chinese Taipei Geotechnical Society www.tgs.org.tw

g. Prof. Zuyu Chen
http://www.iwhr.com/zswwenglish/index.htm

h. East China Architectural Design and Research Institute ECADI
http://www.ecadi.com/en/

i. TC 211 of ISSMGE for Ground Improvement
www.bbri.be/go/tc211

j. Prof. Askar Zhussupbekov www.enu.kz/en, www.kgs-astana.kz

k. TC302 of ISSMGE for Forensic Geotechnical Engineering
http://www.issmge.org/en/technical-committees/impact-on-society/163-forensic-geotechnical-engineering

l. Prof. Yoshinori Iwasaki yoshi-iw@geor.or.jpwww.geor.or.jp

m. Mr. Clyde N. Baker, Jr.

n. Prof. Hideki Ohta

o. Prof. Eun Chul Shin www.incheo@incheon.ac.kr n.ac.krecshin

p. Prof. Tadatsugu Tanaka

q. ARGO-E (Geoengineer.org)
http://www.argo-e.com

- **Bronze: up to $999**

a. Prof. Mehmet T. Tümay http://www.coe.lsu.edu/administration_tumay.html
mtumay@eng.lsu.edu

b. Nagadi Consultants (P) Ltd www.nagadi.co.in

c. Professor Anand J. Puppala
University of Texas Arlington
http://www.uta.edu/ce/index.php