REGISTRATION FORM

ONE DAY SEMINAR ON GEOPHYSICAL TECHNIQUES AND EXPERIENCES IN GROUND ENGINEERING APPLICATIONS

29TH NOVEMBER 2016, TUESDAY

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- ✓ The Organizing Committee reserves the right to cancel, alter, or change the program due to unforeseen circumstances. Every effort will be made to inform the registered participants of any changes. In view of the limited places available, intending participants are advised to send their registrations as early as possible so as to avoid disappointment.

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IEM reserves the right to postpone, reschedule, allocate or cancel the Seminar. No cancellation of registration will be accepted 1 day prior to the date of the event or during the event day. Replacement or substitute name and additional fees however, can be made at least 3 days prior to the event date.

Jointly Organised by:
Geotechnical Engineering Technical Division (GETD), IEM
&
The Malaysian Site Investigators Association (MSIA)

IEM-MSIA JOINT SEMINAR ON GEOPHYSICAL TECHNIQUES AND EXPERIENCES IN GROUND ENGINEERING APPLICATIONS

Date/Day: Tuesday, 29th November 2016.

Time: 8.00 am – 6.30 pm

Presenters:

Ir. Dr Ooi Lean Hock, Dr Zuhar Zahir Tuan Harith, Mr. Ng Chak Ngoon, Ir. Liew Shaw Shong, Mr. Devendran Arumugam, Mr. Mikael Joergensen, Dr Loke Meng Heng, Mr. Rien Corstanje, Ir. Yee Thien Seng, Ir. Lim Wee Tin and En. Mohd Hariri Arifin

Venue:
Hilton Petaling Jaya, Kristal Ballroom 1, Level 1, West Wing, No. 2, Jalan Barat, 46200 Petaling Jaya, Selangor Darul Ehsan

Managed by: IEM Academy Sdn Bhd
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REGISTRATION FEES (INCLUDING GST):

Closing Date: 15th November 2016

Grade	Normal Fee (by fax & email)	Online Fee (Log-in IEM Website – only for IEM Member)
IEM/MSIA Member	RM 477.00	RM 424.00
Non-IEM/MSIA Member	RM 954.00	RM 848.00

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CPD/PDP Hours: 7 Hours
Ref. No.:
IEM16/HQ/459/S

CIDB Approved
CCD Hours: 10 Hours
Ref. No.:
CIDBHQ/C/2016/0072

3 Coffee Breaks and 1 Buffet Lunch will be served in 5-Star Hotel!

IEM-MSIA JOINT SEMINAR ON GEOPHYSICAL TECHNIQUES AND EXPERIENCES IN GROUND ENGINEERING APPLICATIONS

TENTATIVE PROGRAMME

Time	Presentation Title	By
7.30 am to 8.30 am	Registration and Log In	All Participants / Secretariat
8.30 am to 9.10 am	Opening Address	Session Chairman
9.10 am to 9.50 am	Geophysical Investigation: The Good, The Bad and The Ugly	Ir. Dr Ooi Lean Hock
9.50 am to 10.30 am	Geophysical methods in shallow subsurface investigation	Dr Zuhar Zahir Tuan Harith, Khairul Arifin Mohd. Noh & Devendran Arumugam
10.30 am to 11.00 am	Coffee/Tea Break	
11.00 am to 11.40 am	Geophysical techniques in engineering ground investigation	Ng Chak Ngoon
11.40 am to 12.20 pm	The Use of Geophysical Principles in the Detection and Characterization of Solution Channels, Voids in Limestone Formation and Rock Slope Discontinuity Survey	Ir. Liew Shaw Shong
12.20 pm to 1.45 pm	Lunch Break	
1.45 pm to 2.25 pm	The use of geophysics in groundwater exploration	Devendran Arumugam & Mikael Joergensen
2.25 pm to 3.05 pm	The use of electrical resistivity tomography (ERT) surveys in near surface investigations	Dr M.H. Loke Meng Heng
3.05 pm to 3.45 pm	Image logs of a core drilled borehole vs hammer-down-the-hole borehole	Ir. Dr Ooi Lean Hock, Rien Corstanje & Devendran Arumugam
3.45 pm to 4.15 pm	Coffee/Tea Break	
4.15 pm to 4.55 pm	The consequences of an incorrect seismic survey	Ir. Yee Thien Seng & Ir. Lim Wee Tin
4.55 pm to 5.35 pm	Resistivity and induced polarization (IP): A combination of geophysical techniques for site investigation	Mohd Hariri Arifin
5.35 pm to 6.35 pm	Open Discussion Session	All Presenters
6.35 pm to 7.00 pm	Seminar Close, Log Out and Collection of Certificate of Attendance	Secretariat

ABOUT THE PRESENTERS

(1) Ir. Dr Ooi Lean Hock graduated with PhD from the University of Sydney, Australia. In the past he has worked as a geotechnical consultant and as a specialist contractor. He is currently the Lead Geotechnical Engineer in the Design & Technical Department of MMC GAMUDA KVMRT (T) SDN BHD for the second line of Klang Valley Mass Rapid Transit from Sg. Buloh – Serdang – Putrajaya (SSP) Line. He has extensive experience in ground treatment works, more recently in deep excavation and tunnelling works. He also has a keen interest in geotechnical instrumentation and testing. He has been involved in many interesting infrastructural projects such as railways, runways, highways, tunnels and hydropower both locally and abroad.

(2) Dr Zuhar Zahir Tuan Harith is a Professional Geoscientist (PG59) with nearly 20 years of experience in all aspects of the planning, management, and implementation of geophysical investigations, including, survey design, cost estimates and proposals, data acquisition and interpretation, preparation of reports and scientific publications, and professional teaching and training. Currently working as a Technical Director at Beicip Technology Solution, an international subsurface consulting company dealing with oil and gas, and Principle Consulting Geophysicist for VIGOROUS Geophysics Sdn Bhd. He is also frequently be invited to be a geophysics reviewer for Geological Bulletins of Malaysia.

(3) Mr. Ng Chak Ngoon; Since his graduation as geologist from the University of Malaya more than 40 years ago, Mr. Ng Chak Ngoon has been practicing engineering geology as a consultant and/or contractor in site investigation works including projects like the Peninsular Gas Utilisation Project II, Kuala Lumpur International Airport, the North-south Highway, Malaysia-Singapore Second Crossing, and the Kuala Lumpur MRT. His special interest in the application of geology and geophysics to engineering especially in residual soils has led to the publication of several papers on the topic and ground investigation techniques. He has been a founder member and one time president of the Malaysia Site Investigators Association, a member of Institute of Geology Malaysia, a life member of the Geological Society of Malaysia, and member of the International Association of Engineering Geologists. Although not a member of IEM he has on numerous occasions spoken at the Institution on various topics related to his fields of interest.

(4) Ir. Liew Shaw Shong obtained B.Sc degree in Civil Engineering with First Class Honours from National Taiwan University at Taipei in 1991 and worked as a geotechnical engineer in Sino Geotechnology Inc. at Taipei for a year. In 1992, he continued his post-graduate study in University of New South Wales in Sydney, Australia and obtained his M.Eng.Sc in 1993. He then returned to Malaysia to work as geotechnical engineer in a multi-discipline engineering consultant firm. In 1999, he jointly established a geotechnical specialist consulting firm with another two partners till now. He is now the senior director of G&P Geotechnics Sdn Bhd. In the past twenty three years of his professional career, he has strong interest in many types of geotechnical engineering problem and challenges. He has published more than 50 technical papers on geotechnical engineering. In 2005, he won the Ir. Tan Sri Hj. Yusoff Prize for the best IEM Technical Paper Award. Ir. Liew serves in Geotechnical Engineering Technical Division of The Institution of Engineers, Malaysia (IEM) as the past chairman for Session 2010 to 2013 and the advisor for Session 2014 to 2016. He is also presently the secretary general of Malaysia Geotechnical Society (MGS).Ir.

(5) Mr. Devendran Arumugam is a geophysicist and works as the manager for soil investigation at MMC-Gamuda KVMRT. He is currently involved in the MRT tunnelling project. Previously, he worked as a senior geophysicist in Sime Darby Water Resources in charge of geophysical exploration program. He graduated from University of Science Malaysia with a degree in Geophysics in 1985. His experience includes land and marine geophysics. He is also a council member of the Institute of Geology Malaysia, Member of EEGS, EAGE and Life member of Geological Society of Malaysia.

(6) Mr. Mikael Joergensen is a hydrogeologist with professional experience from 25 countries. He is currently working as Team Leader on a water supply project in Bangladesh. In 2009-2010, he worked as consultant for Sime Darby in relation to groundwater exploration, including geophysical exploration. He graduated from University of Aarhus, Denmark, with a degree in geology in 1985. He has undertaken geophysical exploration in 9 countries in Europe, Africa and Asia and has been involved in siting of more than 1000 wells.

(7) Dr Loke Meng Heng graduated with a PhD in Earth Sciences from the University of Birmingham, U.K. in 1994. He was a lecturer at Universiti Sains Malaysia for 25 years. He is currently the director of Geotomosoft Solutions (Malaysia) and Geotomo Software Pty Ltd (Australia) that provides software for 2-D and 3-D resistivity and I.P. surveys.

He is an Editorial Board member of the Journal of Applied Geophysics and Near Surface Geophysics. He is a member of the SEG, ASEG and EAGE. His present research interests are in fast numerical techniques for 2-D, 3-D and 4-D inversion of geoelectrical data, optimisation of electrode arrays for 2-D and 3-D surveys and time-lapse inversion techniques.

(8) Mr. Rien Corstanje has an MSc in geology from the University of Amsterdam, The Netherlands and an MSc in Hydrogeology from IHE in Delft, The Netherlands. He has worked and lived for over 25 years in The Netherlands, Yemen, Nigeria and Malaysia. He has been in Malaysia for more than 17 years and with ALT for over 10 years. ALT is the provider of logging instruments such as acoustic and optical televiewers, and the WellCAD software. He is in charge of marketing and sales of both the instruments and WellCAD in Malaysia and other parts of the world. In Malaysia he has worked with MMC Gamuda, Test S/B, Penjom gold mine, MINT, JMG, Petronas, Shell, ExxonMobil and many other companies.

(9) Yee Thien Seng graduated in civil engineering from the University of Malaya in 1978 and has over the years worked on projects largely involving heavy plant and building foundations as well as large infrastructures. He had also carried out numerous work on distress evaluations and rehabilitation engineering. In 1994, Ir. Yee set up his own practice, Geo.Consult, to support the construction industry with both expert and specialist advice; in particular on geotechnical engineering aspects. His participation in recent projects of significance are the Kuching Deep Water Port, Shah Alam Expressway, North-South Expressway, Kuantan Port Inner Harbour Development, Kuantan-Kerteh Railway and the Rawang-Ipoh Double Tracking Railway. He is also a non-active partner at ICON Consulting Engineers Sdn. Bhd. He has authored/co-authored more than a dozen technical papers in local and international conferences. Ir. Yee is an expert witness and accredited checker registered with the Board of Engineers Malaysia for the design of geotechnical engineering works. Ir. Yee is the Chairman of the Geotechnical Engineering Technical Division of The Institution of Engineers, Malaysia (IEM) for Session 2016/2017.

(10) Ir. Lim Wee Tin graduated in civil engineering from the University of Sabah, Malaysia in 2001 and has worked on many housing projects particularly in infrastructures. Prior to his joining in the engineering consultancy firm, he has worked in a large contracting firm and had gained considerable experience in the construction of "Wisma Putra" and the "Palace of Justice" in Putrajaya. Whilst in consultancy practice, he has gained various design experience in local housing projects in various part of the Malaysia and had extensively involved in the site supervision for infrastructure works and also on building foundations. Ir. Lim had been appointed the Director of Perunding Baram Sdn Bhd in year 2008 and a year later set up his own practice, Icon Consulting Engineers Sdn Bhd. Through his own set up, he had ventured more into high-rise building works apart from industrial and commercial projects. Ir. Lim is also currently in the advisory role in SYF Resources Berhad and Y&G Corporation Bhd, particularly in the development division.

(11) En. Mohd Hariri Arifin received his BSc (Hons) degree in Geology in 2008 and MSc (Geology) in 2012 from Universiti Kebangsaan Malaysia. Presently, he is pursuing his PhD research at Geophysics Unit, School of Physics, Universiti Sains Malaysia in exploration geophysics with a focus on the geothermal exploration of West Malaysia. He served in the Minerals and Geoscience Department as a contract officer between 2011 and 2012. He is presently a junior lecturer in the Geology Program of the Universiti Kebangsaan Malaysia.

He is an active member of many professional bodies; some of these professional bodies are: The Board of Geologist Malaysia (PGeol No.28).

- The Institute of Geology Malaysia (IGM No.646)
- The Geological Society of Malaysia (Life Member)
- The International Geothermal Association (Student Member)
- Society of Exploration Geophysicist (Member)
- The Malaysian Site Investigators Association (Associate Member, AM0011).

He also founded the Geo Technology Resources Sdn. Bhd.

The Institution of Engineers, Malaysia

MSIA

IEM-MSIA JOINT SEMINAR ON GEOPHYSICAL TECHNIQUES AND EXPERIENCES IN GROUND ENGINEERING APPLICATIONS

ABOUT THE PRESENTATION

1 Geophysical Investigation: The Good, The Bad and The Ugly

Ir. Dr Ooi Lean Hock
MMC GAMUDA KVMRT (T) Sdn. Bhd.

The use of Geophysical Methods is increasing in Geotechnical Site Investigation works. There are however limitations to each technique, and the prescription of these techniques ought to be related to the geology and setting of the site. Some case examples are presented, highlighting the cases where the geophysical surveys are used successfully and less successfully. The goal of this presentation is to show that the quality of the results is subject to the mercy of the geology, data acquisition, data processing and interpretation.

2 Geophysical Methods in Shallow Subsurface Investigation

Dr Zuhar Zahir Tuan Harith, Khairul Arifin Mohd Noh & Devendran Arumugam

Accurate subsurface structure and geotechnical data as well as hydrogeologic information are very information in any engineering projects. Normally those information (1D) were directly gathered from a traditional soil investigation (SI) method. Depending on the complexity of geology, the cost for acquiring the information can be monumental. Indirectly, geophysics provides an efficient means of collecting geologic and hydrologic information of the subsurface. Various techniques can be used to help determine the structures, depth to bedrock, extent of ground water, location of voids and/or subsurface hazard, and the presence of buried material such as steel drums, tanks, pipelines or even pile cap. Principally each techniques will measure unique physical properties. Combining several methods will hedges against one method failing to provide useful data.

Geophysical investigations are most effective when used in conjunction with a drilling or boring program and should not be a substitute for such a program. To combine the measurements and results of geophysical surveys with geotechnical soil data, information must be taken directly from drilling or digging. Borehole geophysics, which provide a direct link between geophysics and geotechnics on the spot. Several criteria need to be considered when selecting the method such as 1) the objective of the investigation; 2) general geology, 3) features that may interfere with the instrument(s), 4) site access, and 5) determine cost. An understanding of the method's theory, field procedures, and interpretation along with an understanding of the site geology is necessary to successfully complete a survey.

3 Geophysical techniques in engineering ground investigation

Ng Chak Ngoon
Subsurface Engineering SB

Geophysical techniques, once confined mostly to petroleum exploration, are now being recommended by BS5930:2015 for consideration as part of any geotechnical ground investigation. Their advantages over conventional methods include lower costs, higher speed, better coverage, and non-destructive testing. However, their successful application requires the understanding of the underlying theories, assumptions, and their limitations. Consequently, despite obvious advantages, they have remained underused because of the enigma surrounding them. In Malaysia, by far the most commonly used is seismic refraction, mostly to map rockhead. Where the superficial material is unconsolidated sediments, electrical methods may be more effective because resistivity can vary greatly from very low in clay to very high in rock. New applications include mapping water seepage paths within slopes to demarcate areas of potential instabilities. MASW, effectively the measurement of shear wave velocity as a function of depth, is a recently developed technique. In Malaysia, it is currently being used mostly to map karstic limestone rockhead. However, its greater potential lies perhaps in replacing the usual combo of boreholes, sampling and testing to acquire data for foundation design. Various cases are cited to illustrate how various these geophysical techniques work or did not work, or where in some instances the only viable methods of investigation.

4 The Use of Geophysical Principles in the Detection and Characterization of Solution Channels, Voids in Limestone Formation and Rock Slope Discontinuity Survey

Ir. Liew Shaw Shong
G&P Geotechnics Sdn Bhd.

This lecture will cover a forensic investigation involving hydraulic failure at a quarry site with occurrence of sinkholes in river banks and washout of cavity infill to a lower rock face in a limestone formation. The content will cover the planning, execution and interpretation of survey data from 2D resistivity survey with objective to detect high moisture zone implying fractured or jointed rockmass and cavity features with either infill or empty in a limestone quarry face. The interpreted results with respect to their geophysical properties will be compared and validated with the observation of wet spots on the rockmass, cavities and boreholes implying the existence of such features. The resistivity survey also helps to reveal the connectivity of the sinkhole occurrence in the nearby river banks with well-developed solution channels to the emerging river water from the quarry bench surface. In relation to the hydraulic investigation, the stability of the jointed rockmass slope using the ground borne terrestrial Light Detection and Ranging (LiDAR) technique will be presented to demonstrate the efficiency of discontinuity survey on jointed rock slope. The intention of this lecture is also aimed to illustrate how the engineering professional shall make effort in applying and adopting new technology available with good fundamental understanding of the operational principles for the challenging engineering applications. This involves convincing the project client to move forwards from traditional surveying and investigating techniques with these new high quality and efficient geophysical methods.

5 The use of Geophysics in Groundwater Exploration

Devendran Arumugam[1] & Mikael Joergensen[2]
[1]MMC-Gamuda KVMRT (T) Sdn. Bhd., [2]Hydrogeologist

When exploring for groundwater or siting a water well, geophysical techniques play a major role. However, the successful use of geophysical techniques is largely depending on the service provider and the user. Many geophysical methods are applicable to map the aquifers that can be alluvial or within rock. Main methods commonly utilised include seismic refraction, resistivity, induced polarisation, electromagnetic (EM), ground penetrating radar (GPR), transient electromagnetic (TEM), magnetic resonance imaging, and downhole logging. Minor applications include seismic reflection and gravity surveys. This presentation shows the use of EM, electrical methods and downhole geophysical logs used in groundwater exploration. Methodological approach for hydrogeological exploration is illustrated. The case studies also show how to systematically design a geophysical groundwater exploration program. The importance of using a hydrogeological model is emphasised in designing of the geophysical survey. Electrical resistivity and IP techniques have been proven useful in mapping and delineating aquifers. The success of the techniques largely depends on the array type, equipment capability, expertise of field crew, site geology and expertise of the site crew. Importance of the geophysical expertise, software and presentation is also illustrated. Local case studies in various geological settings are used to show how geophysics have been applied to aid the hydrogeologist in siting wells.

6 The use of electrical resistivity tomography (ERT) surveys in near-surface investigations

Dr Loke Meng Heng
Geotomosoft Solutions

The past 25 years has seen rapid advances in the electrical resistivity tomography method. It has progressed from providing simple 1-D earth models until the early 1990s to present day complex 3-D models in both space and time. The developments were made possible by improvements in instrumentation, field survey design and data inversion techniques. Multi-dimensional geoelectrical surveys are now widely used in engineering, environmental, hydrological and mining applications. Since the mid-1990s, the 2-D resistivity method has become one of the standard tools of geophysical companies with the availability of multi-electrode resistivity meters and fast interpretation software. It is particularly effective in near surface engineering and environmental studies where changes in the groundwater content and its chemical composition are accompanied by significant resistivity variations. Induced polarization (I.P.) measurements, sometimes made together with the resistivity measurements, can help differentiate between sand and clay. 3-D surveys are now more widely used in very complex areas where 2-D models suffer from artefacts due to off-line structures. Unlike seismic methods, the resistivity property of soils is more closely linked to the chemical (rather than physical) properties of the soil. They are useful in situations where seismic methods are more limited, such as in waste disposal sites, ground water salinity mapping, differentiating between sandy and clayey soils, water leakage, near surface voids, boulders and movement of groundwater. One new development is long term monitoring of potentially unstable slopes. Movements of the slope are sometimes linked to changes in groundwater content. Measurements are repeated at regular intervals to detect changes in the subsurface resistivity linked to groundwater movement.

7 Image Logs of a Core Drilled Borehole vs. a Hammer-Down-The-Hole (Air-Percussion Drilled) Borehole

Ooi Lean Hock[1], Rien Corstanje[2] & Devendran A/L Arumugam[1]
[1]MMC-Gamuda KVMRT (T) Sdn. Bhd., [2]Advanced Logic Technology

Grouting in fractured limestone is very important to stabilise the shallow subsurface before tunnelling can commence. Hammer-down-the-hole (air percussion drilling) is the preferred method to drill the grouting holes as it is fast and cost effective. Geotechnical engineers, however, would like to know how fractured the limestone is, and whether to expect cavities.

The Acoustic Televiewer provides valuable information of structures in the subsurface: fractures and joints can be detected, and also bedding planes and cavities. Dip, strike and aperture of these structural elements can be determined and displayed in different forms over user-defined intervals in powerful software. The Acoustic Televiewer works best in a smooth borehole wall, e.g. the borehole wall of a cored borehole. Drilling a cored borehole, however, is time consuming and expensive. This paper compares the results of the Acoustic Televiewer in a cored borehole with the results of a hammer-down-the-hole. In the cored borehole major and minor fractures were detected, with dip and dip directions. In the hammer-down-the-hole only (partial) major fractures were detected, also with dip and dip directions.

The results of both data sets were compared: depth distribution of major fractures, frequency of major fractures, and average dip and dip directions of major fractures. Result from the analysis of this log data is presented together with core data of the cored borehole.

8 The Consequences of an Incorrect Seismic Survey

Ir. Yee Thien Seng[1] & Ir. Lim Wee Tin[2]
[1]Geo.Consult, [2]ICON Consulting Engineers Sdn. Bhd.

Boreholes provided discrete subsurface information in plan on the ground at a proposed development site. A seismic survey was completed to bridge the gaps in ground information; particularly the depths to bedrock, between the boreholes and was relied upon for the quantification of the foundation piles and construction resources required. During the construction of piles, bedrock was encountered at significantly larger depths at portions of the development than reported by the seismic survey. The consequences to the development from the error in bedrock depths are presented.

9 Resistivity and induced polarisation (IP): A combination of geophysical techniques for site investigation

Mohd Hariri Arifin
Universiti Sains Malaysia

Combination usage of two physical properties to measure Earth material allows site investigation to be better and interpretation process become more accurate. Resistivity and Induced Polarization (IP) method will be discuss detail together with other methods including the successes and unsuccessful experiences along the journey in his geology and geophysical work carrier.