Geotechnical Engineering Journal of the SEAGS & AGSSEA

Vol. 53 No. 4 March 2022

ISSN 0046-5828

GEOTECHNICAL ENGINEERING

Journal of the

SEAGS Southeast Asian Geotechnical Society

AGSSEA ASSOCIATION OF GEOTECHNICAL SOCIETIES IN SOUTHEAST ASIA

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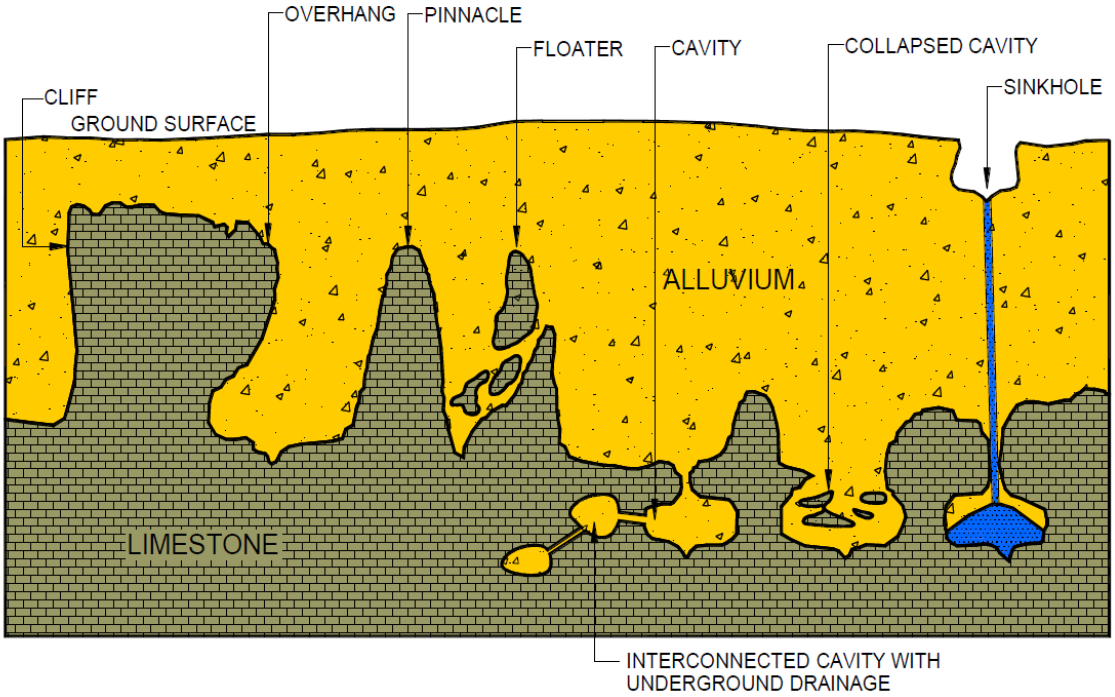

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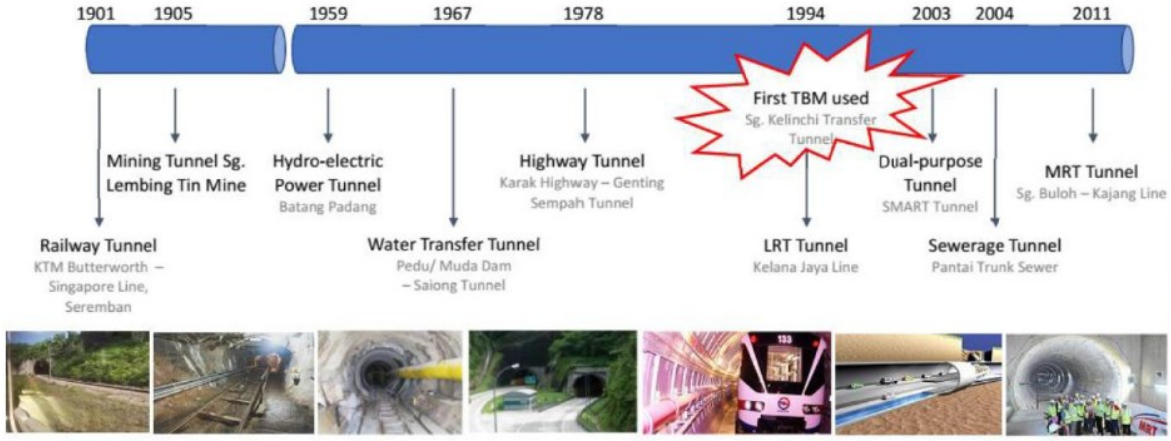


Figure 4. Milestone of First Tunnel Constructed according to Category

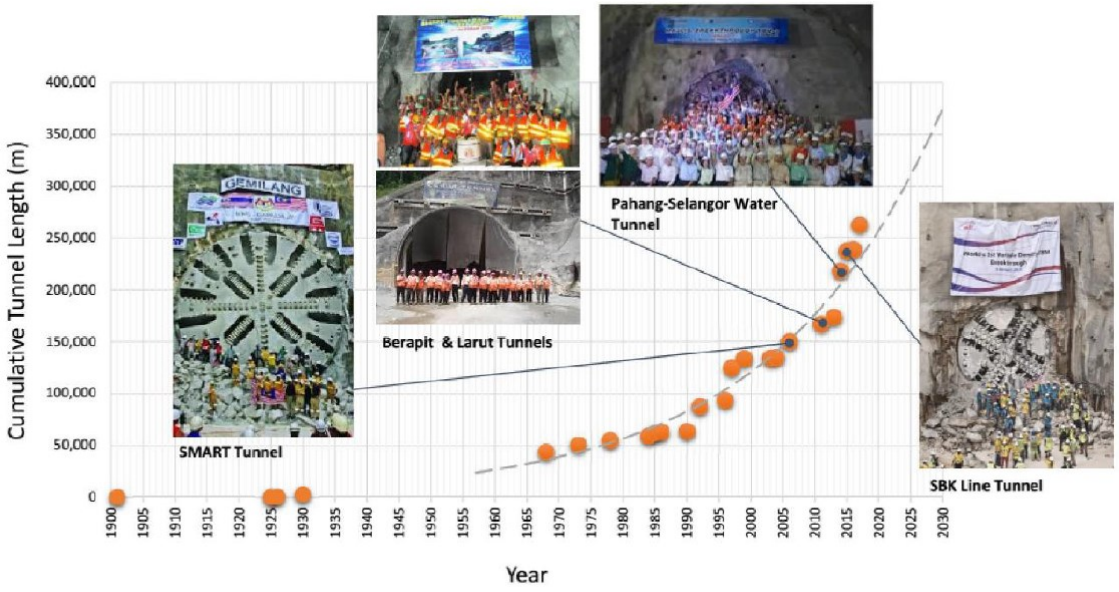
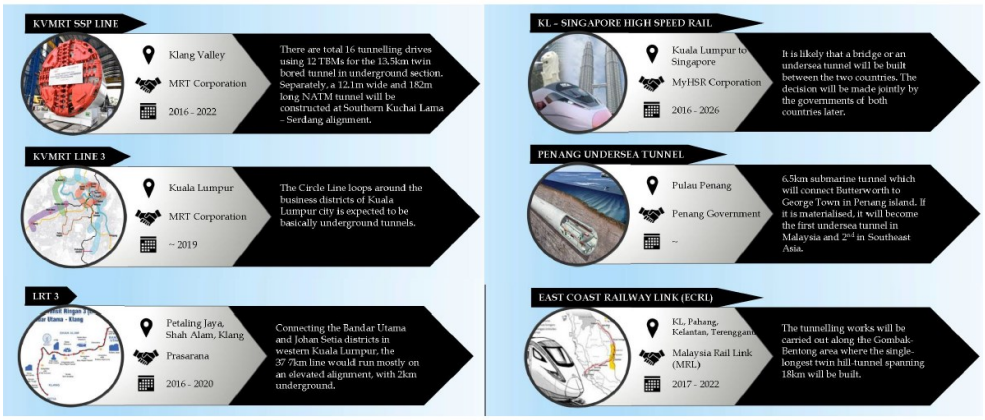


Figure 5. Cumulative Length of Tunnels Constructed since the 1990s

Upcoming Tunnelling Projects



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Earth, J.B., and Geo, W.P. (2011). "Asian Geotechnical amongst Authors of Conference Publications", Proceedings of Int. Conference on Asian Geotechnical, publisher, city, pp 133-137.

Finn WDL and Fujita N. (2002). "Piles in liquefiable soils: seismic analysis and design issues," Soil Dynamics and Earthquake Engineering, 22, Issues 9-12, pp731-742

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1: Call for Abstracts & Review - May-August, 2019

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3: Review of Papers: Jan –July 2020

2: Release of Issue : End of 2020- Mid 2021

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PREFACE

ACKNOWLEDGEMENT

Fourteen papers are contained in this issue. No doubt the material contained herein would be most valuable to our profession. The editors have adequately described the contributions in the preface. They are to be congratulated for these contributions.

Dr. Teik Aun Ooi
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Geotechnical Engineering Journal of the SEAGS & AGSSEA

Vol. 53 No. 2 June 2022

ISSN 0046-5828

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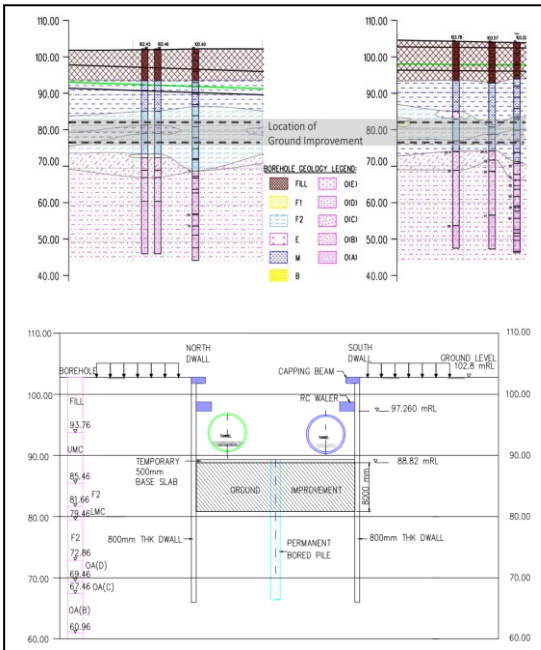
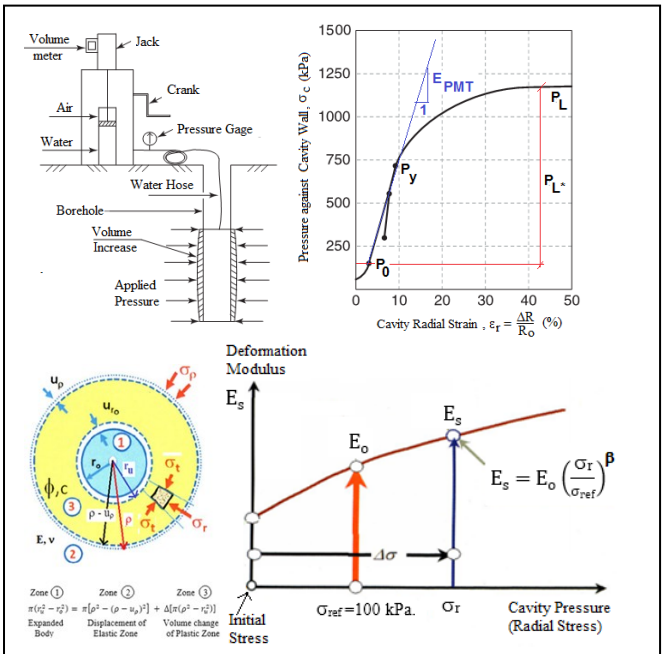
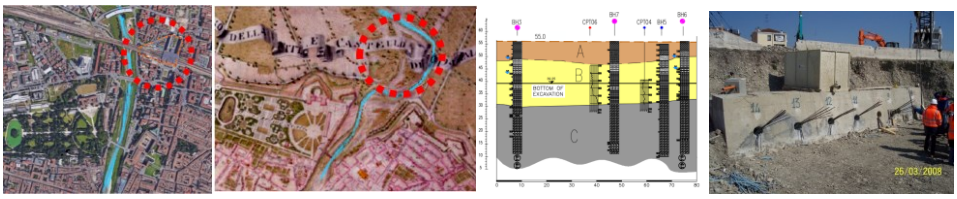


Deep Excavations with Ground Improvement – A Study using statistics and back analysis from a monitored excavation: by G.A. Pittaro and G. Murphy



Estimating Pile Axial Bearing Capacity Derived from Pressuremeter Test by Tjie-Liong GOUW



The use of the Observational Method in deep excavations for the realization of a residential compound in a complex hydrogeological context by M. Carassini, F. Bucci, A. Antiga

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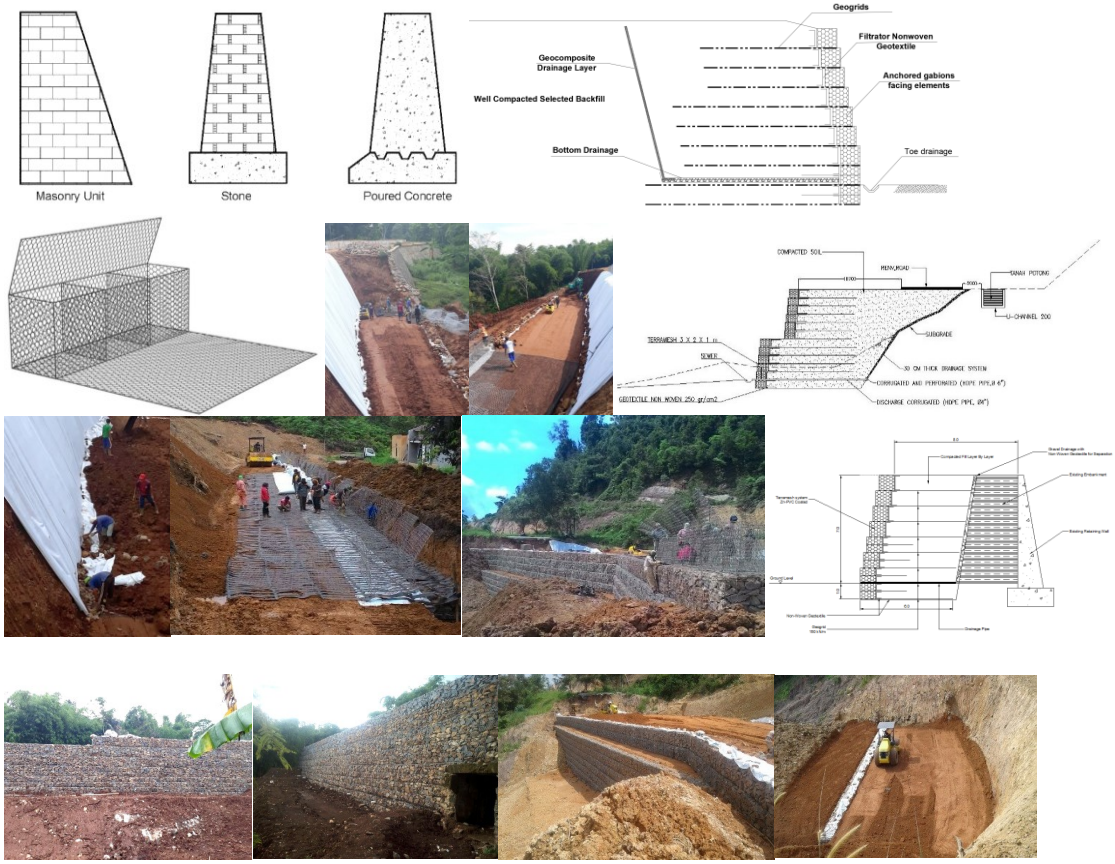

Emergency Works and Landslide Remediation using
Geosynthetics Reinforced Soil Structures– recent Indonesian case studies
By Deny, Matteo Lelli, Dinda Mutiara Savitri

GEOTECHNICAL ENGINEERING

PREFACE

This Issue is papers related to 22nd SEAGC-3rd AGSSEAC held in Jakarta.

The first paper is on the Influence of cyclic behaviour of vibratory pile driving and surging on pile performance observed in model load tests in dry and saturated sand grounds by S. Moriyasu, M. Aizawa, T. Matsumoto, S. Kobayashi and S. Shimono: This study focuses on the effect of "cyclic" behaviour of pile installation methods on the penetration resistance and bearing capacity. A series of laboratory model test was conducted to investigate the cyclic effect by comparing three kinds of piling methods; monotonic jack-in, pseudo-dynamic push-in and pull-out, i.e. "surging" and vibratory driving in dry or saturated sand grounds. It was found that surging or vibratory pile driving decreased the pile penetration resistance due to the negative dilation caused by the cyclic shearing of the soil surrounding the pile. The static load test showed that surging and vibratory pile driving provided the same or larger pile head load than jack-in method. Furthermore, the fluctuation of the pore water pressure strongly indicated the change of dilation. It was seen that surging and vibratory pile driving prevent the positive dilation than jack-in method due to the difference of cyclic shearing and monotonic loading.

The second paper is on Deep Excavations with Ground Improvement – A Study using statistics and back analysis from a monitored excavation by G.A. Pittaro and G. Murphy: Deep excavations in soft ground often require soil stabilisation to deliver an efficient and safe design. Ground Improvement (GI) methods are widely used in Singapore to develop temporary grouted-props at the base of excavations. The most common soil improvement methods are; Jet Grouting Piles (JGP), Deep Soil Mixing (DSM) and Wet Speed Mixing (WSM). Ground improvement works by increasing the soils strength and stiffness by mixing water and cement to the soil matrix and has been found to be highly effective in soft soils often encountered in Singapore such as the Kallang formation. However, GI is an expensive process and there are additional environmental and social considerations as the installation method in quite invasive. Therefore, it is highly desirable to minimise the volume of GI required. This paper demonstrates how the design efficiency of a GI stabilised deep excavation can be improved by considering more realistic ground improvement parameters. This can be achieved through statistical analysis of lab tests on GI samples to derive less conservative strength and stiffness parameters and by also by re-considering additional modelling assumptions. The findings are validated through the back analysis of the measured performance of a diaphragm wall using 2D Finite Element Modelling.

The 3rd paper is on A New Breakthrough – Application of Control Modulus Column for Settlement and Stability Control under Soft Soil and High Embankment Load at Pemalang-Batang Toll Road by Ryan Rahmat Setiaji, Panji Utomo, KM. Abuhuroyroh: Pemalang-Batang (Pematang) Toll Road as a part of Trans Jawa Toll Road is currently being constructed. The Pematang Toll Road which has 39.2 km length with 13 embankments before bridges (bridges approach / oprit) will be constructed above very soft river sedimentation soil. The construction of embankment on the soft soil leads to excessive settlement and high susceptibility toward slope stability failure. Ground improvement using Controlled Modulus Columns (CMC) is adopted to reinforce the soil, increase the strength thus reduce the settlement and stabilize the embankment. The application of CMC at Pemalang-Batang Toll Road is indeed a breakthrough in history of toll road construction as a new construction technology in Indonesia, where majority the settlement/stability issue commonly solved by structural or conventional solution such as: slab on pile, cerucuk matras beton, PVD/Vacuum Preloading etc. Control Modulus Column is one of ground improvement technique installed by forming a regular grid of semi-rigid inclusion to enhance global stiffness of soil mass so that the problem such as: settlement, bearing capacity can be controlled. The installation of CMC itself performed using special design auger element that is able to force the soil displace laterally induce volumetric expansion resulted a lateral compaction of surrounding soil. In Indonesia, Menard has been successfully implementing CMC in several projects for different sector. The CMC's design technology makes them uniquely efficient for the immediate support of road for public transport, large liquid or bulk solid storage tanks warehouse,

and other infrastructures building or facilities. This paper gives a brief description of application of CMC for supporting embankment to achieve settlement criteria, special design concept, and recommendation are briefly discussed.

The 4th paper is Estimating Pile Axial Bearing Capacity by c-ϕ Derived from Pressuremeter Test **by** Tjie-Liong GOUW**:** Due to its rather brittle nature, retrieving undisturbed samples of Jakarta cemented greyish stiff clay, often found at a depth of 30 to 120m, is very difficult. Good and reliable effective shear strength parameters, i.e., c' and ϕ' values, obtained from triaxial test are hardly available. By modifying cavity expansion theory, Gouw (2017) was able to derive these effective shear strength parameters through Pressuremeter in situ test stress strain curve. It was found Jakarta cemented clay exhibiting a drained behaviour when loaded. Its effective cohesion, c', values are linearly increasing with depths, averaging from around 95 kPa at 20 m to around 475 kPa at 100m depth, while its effective friction angle ϕ' values are within 20^o – 30^o, averaging to around 24^o. The values found to be similar to the values derived from CIU triaxial compression test from relatively good undisturbed samples. This paper presents the methodology in deriving the shear strength parameters and then applying the derived Pressuremeter c' and ϕ' values to estimate the pile axial bearing capacity through finite element simulation and comparing it with the commonly known SPT method applied in Jakarta.

The 5th paper is on the use of the Observational Method in deep excavations for the realization of a residential compound in a complex hydrogeological context by M. Carassini, F. Bucci, A. Antiga: The urban redevelopment works of the "Railway Station Area ex-Boschi", was developed on an area of nearly 17.0000 m2, it entailed the execution of deep excavations in a difficult geotechnical and hydrogeological context. In order to overcome these critical issues a design based on an observational approach was developed. This design considered several possible hydrogeological scenarios and staged excavations over small areas. The Observational Method has been successfully extended from the more traditional case of tunneling works to the less usual case of deep excavations in large construction areas.

The 6th paper is on the Application of Distributed Fibre Optic Sensor (DFOS) in Bi-directional Static Pile Load Tests by Lee Siew Cheng, Tee Bun Pin, Chong Mun Fai, Hisham Mohamad and Ang Koh An, and Paulus P. Rahardjo: This paper describes a case study of a bi-directional load test on a working pile located at limestone formation area. The test pile was instrumented with Distributed Fibre Optics Strain Sensors (DFOS) to measure the change in strain and to determine the pile shaft friction and end bearing. This paper highlights the advantages and limitations of DFOS in measuring the continuous strain profile of a test pile. Interpretation on the anomalies detected through the DFOS results is discussed. The paper aims to introduce to the industry, the superior information obtained using the innovative fibre optic technology for geotechnical testing and monitoring.

The 7th paper on the Volcanic Cohesive Soil Behaviour under Static and Cyclic Loading by W. O. Sumartini, H. Hazarika, T. Kokusho and S. Ishibashi: The objective of this study is to evaluate the behavior of reconstituted samples of a volcanic soil under static and cyclic loading using series of undrained static and cyclic test. The static test results show that at a low confining pressure, the soil exceeds contractive behavior followed by dilative behavior. This behavior indicates that the pore water pressure development is not higher than the soil shear strength. Otherwise, the soil shows contractive behavior. The cyclic test results show cyclic mobility behavior under an investigated cyclic stress ratio. In one hand, at low cyclic stress ratio, the shear strain increased slowly, and after a certain number of cyclic, it significantly increases. In another hand, the shear strain increases gradually at high cyclic stress ratio. These results indicate a contradictive behavior of the soil under different confining stress and cyclic stress ratio.

The 8th paper on CBR VALUE OF EPS GEOFOAM AS FILL MATERIALS IN COHESIVE SOIL by Lestari, A. S and Julian Clementio: Expanded polystyrene (EPS) Geofoam is lightweight filler material with an approximate weight that is less than 1 % of natural soils. Under certain circumstances, the utilisation

of EPS Geofoam would be a good proper alternative for the construction of embankment . This study utilised EPS29 as a filler material on several samples of cohesive soil from different location. The laboratory test covers the California Bearing Ratio (CBR) with soaked and unsoaked condition, with three (3) samples in the different grain soils distribution, using Standard Proctor method. The effectiveness of EPS Geofoam as filler material on cohesive soils is indicated by the comparison of CBR values between the original soil sample and the soil plus geofoam sample. The results show how the correlation between the amount of energy and the placement of EPS Geofoam could effect the value of CBR. The soil with finer grains provides improved CBR values which are more significant. The value of CBR of unsoaked sample on soft cohesive soils could be improved about 50 – 70 %. And the value CBR of soaked sample improves by 15-150%. But the sample with a small clay content shows that the CBR value 0f soil plus geofoam sample is not bigger than the original sample.

The 9th paper is on the numerical simulations of an excavation case in Central Jakarta by hypoplasticity model for clays by Melisa Kosasi, Fuchen Tengand Benson B. C. Hsiung: Numerical simulations of a top-down constructed excavation in Central Jakarta was carried out in this study. The excavation supported by the diaphragm wall has been constructed in a medium-stiff Central Jakarta clay. Measurements on wall deflections were made during the construction. The numerical simulations were conducted by using a hypoplasticity model (HC model) for clays which is capable of modeling small strain non-linearity, soil anisotropy, and recent stress-history effects. Properties of the medium-stiff Jakarta clay were collected and studied carefully to calibrate the HC model. Numerical simulations with consideration of pre-excavation recent stress history effect is thus suggested herein and parameters of HC model used for excavations in Central Jakarta are thus recommended also.

The tenth paper is on Emergency Works and Landslide Remediation using Geosynthetics Reinforced Soil Structures– recent Indonesian case studies by Deny, Matteo Lelli, Dinda Mutiara Savitri: Landslides like any other natural disaster are unpredictable. These events may compromise the function of some infrastructures or structures around the affected area. Mitigation measures or emergency works must be performed as soon as possible to regain the function of the affected infrastructure. Reinforced soil structure is one of the most suitable solution to be applied to restore the landslide slope and prevent future landslide disaster. Reinforced soil structures built using geosynthetics have shown many advantages for emergency works or landslide remediation if compared to conventional retaining structures such as mass gravity and cantilever walls. This paper aims to give explanation about the advantages of performing remediation works using reinforced soil structure with polymer as the primary reinforcement. Two completed projects are presented to provide author's experience regarding the application of the reinforced soil structure and proper construction process for emergency works and landslide remediation in Indonesia.

ACKNOWLEDGEMENT

Fourteen papers are contained in this issue. No doubt the material contained herein would be most valuable to our profession. The editors have adequately described the contributions in the preface. They are to be congratulated for these contributions.

Dr. Teik Aun Ooi
Dr Geoff Chao
Prof. Kwet Yew Yong
Dr. Noppadol Phienwej
Prof. A. S. Balasubramaniam

GEOTECHNICAL ENGINEERING

June 1922 SEAGS –AGSSEA Journal

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Vol. 53 No. 1 March 2022

ISSN 0046-5828

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Journal of the

SEAGS Southeast Asian Geotechnical Society

AGSSEA ASSOCIATION OF GEOTECHNICAL SOCIETIES IN SOUTHEAST ASIA

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Honouring Prof John Burland: Geotechnical Practice : Dedicated to late Prof Kenneth Harry Roscoe

John Burland & Late Roscoe

Guest Editors: Prof Buddhima Indraratna et al

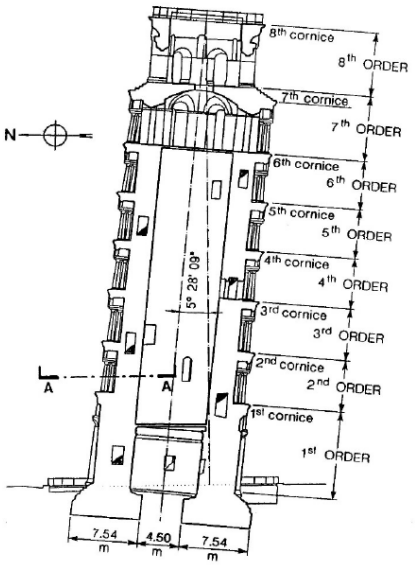

Figure 1 Cross section through the tower of Pisa in the plane of maximum inclination (very nearly coincident with the north-south plane)

Figure 15 Underexcavation trial field

John B. Burland

Michele B. Jamiolkowski

Carlo Viggiani

Underexcavating the Tower of Pisa: Back to Future

J. B. Burland[1], M. B. Jamiolkowski[2] and C. Viggiani[3]

Details of the Journal Issue

1: Prof John Burland is an Eminent Person of many parts with schooling and education at; Parktown Boys' High School; First Class Honours BSc degree in Civil Engineering from Witwatersrand University in 1959; University of Cambridge research in Soil Mechanics under the supervision of Professor Kenneth H. Roscoe which led to the award of a PhD degree in 1967. His thesis title was Deformation of soft clay. Prof Burland then joined the UK Building Research Establishment (BRE) focussing on field measurements of the performance of building foundations, deep excavations and embankment dams; then moved to Imperial College London in 1981 where he served as Professor of Soil Mechanics for over 20 years and Head of the Geotechnics Section.

2: Potential contributors for this Journal Issue are expected to include among others :

Dr Hugh St John worked with Professor Burland

Professor David Potts who worked on many projects together with Prof Burland, in particular the Pisa Tower.

Professor Richard Jardine co-author of many publications

David Hight, co-author of many publications

Professor Teta Georgiannou , co-author many publications

Dr Andrew Ridley developed the suction probe with Prof Burland

Professor Sasha Puzrin has worked closely together on a number of challenging geotechnical problems.

Professor Lord Mair worked closely together on a number of infrastructure projects

Dr Jamie Standing continue to work closely together and have published many papers

Professor Guy Houlsby wrote on the 50th anniversary of the paper with Roscoe on the Modified Cam Clay model

Professor Carlos Viggiani On the applications of geotechnics in the preservation of historic monuments.

Professor Michele Jamiolkowski was chairman of the Pisa Commission – Prof John Burland work on this prestigious project

2: Overlapping Timelines (Tentative-subject to change depending on progress)

1: Call for Abstracts & Review - May-August, 2019

2: Call for Papers &Full Paper Submission – May to December 2019: Indvited Papers and contributed papers

3: Review of Papers: Jan –July 2020

2: Release of Issue : End of 2020- Mid 2021

GEOTECHNICAL ENGINEERING

PREFACE

This Issue is papers will be edited by Prof Buddhima Indraratna to honour Prof John Burland & dedicated to late Prof Kenneh Harry Roscoe of Cambridge University.

Details will follow

ACKNOWLEDGEMENT

Fourteen papers are contained in this issue. No doubt the material contained herein would be most valuable to our profession. The editors have adequately described the contributions in the preface. They are to be congratulated for these contributions.

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Prof. A. S. Balasubramaniam

GEOTECHNICAL ENGINEERING

June 1922 SEAGS –AGSSEA Journal December 2021

Guest Editors: Prof Buddhima Indraratna et al

Buddhima Indraratna with Chandra Desai

Scholarly Book Chapters

BC13 Indraratna, B., Sathananthan, I., Bamunawita, C., and Balasubramaniam, A. S. (2015). Theoretical and numerical perspectives and field observations for the design and performance evaluation of embankments constructed on soft marine clay, in Embankments with Special Reference to Consolidation and Other Physical Methods. Elsevier Scientific (UK). Edited by Indraratna, B. Chu, J. and Rujikiatkamjorn, C., pp. 83-122.

BC12 Indraratna, B., Rujikiatkamjorn C., Balasubramaniam, A. S. and Wijeyakulasuriya, V. (2015). Predictions and observations of soft clay foundations stabilized with geosynthetic drains and vacuum surcharge. in Embankments with Special Reference to Consolidation and Other Physical Methods. Elsevier Scientific (UK). Edited by Indraratna, B. Chu, J. and Rujikiatkamjorn, C., pp. 209-240.

BC4 Indraratna, B., Sathananthan, I., Bamunawita, C., and Balasubramaniam, A. S. (2005). Theoretical and numerical perspectives and field observations for the design and performance evaluation of embankments constructed on soft marine clay. Ground Improvement-Case Histories, edited by Indraratna and Chu, pp. 199-230. (Citation: 3)

Refereed Journal Articles

J195	Indraratna, B., Balasubramaniam, A. S., Poulos, H. G., Rujikiatkamjorn, C. and Ameratunga, J. (2013). Performance and prediction of marine clay treated with vacuum and surcharge consolidation at Port of Brisbane, Australian Geomechanics, 48(4), pp. 161-180.
J166	Indraratna, B., Rujikiatkamjorn, C., Balasubramaniam, A. S. and McIntosh, G. (2012). Soft ground improvement via vertical drains and vacuum assisted preloading. Geotextiles and Geomembranes, 30(1), pp. 16-23.
J82	Indraratna, B., Sathananthan, I., Rujikiatkamjorn, C. and Balasubramaniam, A.S. (2005). Analytical and Numerical Modelling of Soft Soil Stabilised by PVD and Vacuum Preloading. Int. J. of Geomechanics, ASCE 5 (2), pp. 114-124.
J34	Indraratna, B., Balasubramaniam, A.S. and Sivaneswaran (1997). Analysis of Settlements and Lateral Deformation of Soft Clay Foundation beneath Two Embankments. International Journal of Numerical and Analytical Methods inGeomechanics, 21(9), pp. 599-618.
J26	Indraratna, B., Balasubramaniam, A.S. and Khan, M. (1995). Effect of Fly Ash with Lime and Cement on the Behaviour of a Soft Clay, Quarterly Journal of Engineering Geology, British Geological Society, 28(2), pp.131-142.
J24	Indraratna, B., Balasubramaniam, A. and Ratnayake, P. (1994). Performance of Embankment Stabilized with Vertical Drains on Soft Clay. Journal of Geotechnical Engineering, ASCE, 120(2), pp. 257-273.
J22	Indraratna, B. (1994). Effect of Normal Stress-Friction Angle Relationship on Stability Analysis of a Rockfill Dam, Intl. J. of Geotechnical & Geological Engineering, 12(2), pp. 113-121.
J20	Indraratna, B., Wijewardena, S. and Balasubramaniam, A.S. (1994). Large Scale Triaxial Testing of a Greywacke Rockfill. Authors' Reply and Discussion, Geotechnique, Institution of Civil Engineers, London, 44(3), pp. 539-543.
J17	Indraratna, B., Wijewardena, S. and Balasubramaniam, A.S. (1993). Large Scale Triaxial Testing of a Greywacke Rockfill. Géotechnique, Institution of Civil Engineers, London, 43(1), pp. 37-51.
J14	Indraratna, B., Balasubramaniam, A. and Balachandran, S. (1992). Performance of Test Embankment Constructed to Failure on Soft Clay. J. of Geotechnical Engineering, ASCE, 118(1), pp. 12-33.

J13	Indraratna, B., Balasubramaniam, A., Phamvan, P. and Wong, Y.K. (1992). Development of Negative Skin Friction on Driven Piles in Soft Clay. Canadian Geotechnical Journal, 29, pp. 393 - 404.

Refereed Conference Proceedings

C320	**Presidential Lecture:** Indraratna, B., Balasubramaniam, A. S., Rujikiatkamjorn, C., and Zhong, R. (2014). Recent advances in soft ground improvement - from bumpy rides to rapid transit, Proceedings of Softsoils 2014, October, 21-23rd 2014, Bundung, Indonesia Vol 1, A1-1-A1-35.
C305	Indraratna, B., Rujikiatkamjorn, C. and Balasubramanian, A. S. (2014). Consolidation of estuarine marine clays for coastal reclamation using vacuum and surcharge loading, GeoCongress 2014, From Soil Behavior Fundamentals to Innovations in Geotechnical Engineering, pp. 358-369.
C284	Indraratna, B., Rujikiatkamjorn, C and Balasubramamiam, A.S. (2013). Ground Improvement at the Port of Brisbane, Australia using Vertical Drains and Vacuum Assisted Preloading. 2013 GeoCongress-A Geotechnical Special Publication (GSP) Honoring the Contributions of Robert D. Holtz, Stuedlein, A. W. and Christopher, B. R., pp. 540-550.
C204	**Keynote Paper**: Indraratna, B., Rujikiatkamjorn, C., Wijeyakulasuriya, V., and Balasubramaniam, A. S. (2009). Soft ground improvement via vertical drains and vacuum assisted preloading. International Symposium on Geotechnical Engineering, Ground Improvement, and Geosynthetics for Sustainable Mitigation and Adaptation to Climate Change including Global Warming December 2009, pp. 29-43.
C185	**Special Lecture:** Indraratna, B, Rujikiatkamjorn, C., Wijeyakulasuriya, V., and Balasubramaniam, A. S. (2007). Soft clay foundation improvement with drainage and geo-inclusions, with special reference to the performance of embankments and transportation systems. First Sri Lankan Geotechnical Society (SLGS) International Conference on Soil and Rock Engineering, Colombo, Sri Lanka, (5-11 August 2007) (in CD).
C37	Indraratna, B. and Balasubramaniam, A.S. (1995). Consolidation of Soft Marine Clay Foundation under Embankment Loading. Int. Symp. on Compression & Consolidation of Clayey Soils, Hiroshima, pp. 683-688.
C27	Indraratna, B and Balasubramaniam (1993). Numerical Analysis of Hollow Concrete Piles Subjected to Downdrag. 11th Southeast Asian Geotechnical Conference, Singapore, pp. 541-546.
C14	Balasubramaniam, A.S., Bergado, D.T, Indraratna, B. (1991). Geotechnical Problems related to Construction Activities in Soft Clays, First Young Asian Geotechnical Conference, Bangkok, Thailand, pp. 37-66.
C8	Phamvan, P., Buensuceso, B., Indraratna, B. and Balasubramaniam, A.S., (1990). Negative Skin Friction on Driven Piles, Proc. 10th Southeast Asian Geotechnical Conference, Taipei, Taiwan, pp. 367-372.
C6	Indraratna, B., Naguleswari, S. and Balasubramaniam, A.S. (1989). Physical and Mathematical Modelling in Underground Excavations, 30th U.S. Symp. Rock Mech., Morgantown, W. Virginia, pp. 301-3082.
C4	Balasubramaniam, A.S., Phien-Wej, N., Indraratna, B., and Bergado, D.T. (1989). Predicted Behaviour of a Test Embankment on a Malaysian Marine Clay, Int. Symp. on Trial Embankments, Kuala Lumpur, Malaysia, Vol. 2, pp. 1-8.

Geotechnical Engineering Journal of the SEAGS & AGSSEA

Vol. 54 No. 1 March 2022

ISSN 0046-5828

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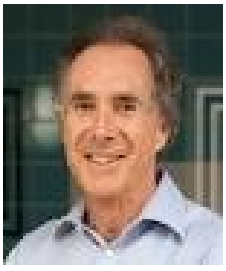
Geotech Hanoi 2019

Dr Long & Late Sven Hansbo



Harry G Poulos, Mark Randolph, Masaki Kitazume, Fredlund et al Guest Lecturers in Geotec Hanoi 2019(Others as well)

Honorary Guest Editor: Long et al

The series of International Conference on Geotechnics for Sustainable Infrastructure Development (GEOTEC HANOI) was organized successfully in 2011, 2013 and 2016 in Hanoi and it has become a well-known event not only in Vietnam but also internationally for its excellent quality and organizational scale.

Following the success of the three previous events, the 4th International conference, GEOTEC HANOI 2019 (GH2019) will be organized by FECON Corporation, the Vietnamese Society for Soil Mechanics and Geotechnical Engineering (VSSMGE), the Thuyloi University (TLU), and Kokusai Kogyo Co., Ltd (KKC) on November 28-29, 2019 at the National Convention Center, Hanoi, Vietnam. GEOTEC HANOI 2019 will be honorably patronized by the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE) and Japan International Cooperation Agency (JICA).

1: Contributing Authors: Partial List

Harry G. Poulos

Professor of Geotechnical Engineering and Soil Mechanics at University of Sydney, Australia.

As an expert on soil behaviour and pile foundations, Prof. Harry G. Poulos has had enormous academic research contributions to the behaviour of piles. He has been involved worldwide in various basic construction projects, such as pile foundations for skyscrapers in Dubai (Burj Al Arab, Emirates Towers, the Burj Dubai, the tallest skyscraper in the world, where he performed the geotechnical testing), the Docklands Project in Melbourne, or 700 km Egnatia Odos motorway straight through Greece (2001 to 2005), where in particular the earthquakes played a role. Other projects included consultations with various offshore structures such as oil rigs.

Adam Bezuijen

Professor of soil mechanics and geotechnics at Ghent University, Belgium and part-time senior specialist at Deltares, Delft, the Netherlands.

Pro. Adam Bezuijen was involved in research on revetments, dredging, tunnelling, geotextiles and model testing and was the scientific coordinator of the geotechnical centrifuge of Deltares. As a professor in Ghent, he guides PhD and Post-doc research on tunnelling, piled embankments, geotextile reinforcement, polymer treated bentonite and backward erosion piping. He is chair of the ISSMGE technical committee TC204 "Underground Construction in Soft Ground" and member of TC104 "Physical Model Testing."

Masaki Kitazume

Professor of Department of Civil and Environmental Engineering at Tokyo Institute of Technology, Japan.

Prof. Masaki Kitazume has over 40 years of experience on soil stabilization, ground improvement and foundation engineering. He was involved in many land reclamation and ground improvement projects in Japan and also invited as a technical committee member of several overseas construction projects. He has published many papers, mainly on the geotechnical aspects of soil stabilization, ground improvement and centrifuge model test-ing. He also published three books from Balkema Publishers and Taylor & Francis, on Deep Mixing Method, Sand Compaction Pile Method and Pneumatic Flow Mixing Method.

Delwyn G. Fredlund

Prefessor and Head of the Golder Unsaturated Soils Group, Canada

Professor Delwyn G. Fredlund has spent more than 40 years conducting research into the behavior of unsaturated and expansive soils. Prof. Delwyn G. Fredlund has undertaken international programs of collaboration with countries such as China, Africa, and Vietnam. He is the author of several books related to soil mechanics such as Soil Mechanics for Unsaturated Soils (1993), Unsaturated Soil Mechanics in Engineering Practice (2012)… He is also a recipient of the Order of Canada and is a member of the Canadian Academy of Engineering.

Lidija Zdravkovic

Professor of Computational Gemechanics and Head of the Geotechnics Division at Imperial College London, UK

Pro. Lidija Zdravkovic has led and managed several research projects in collaboration with industry and other academic groups, focusing on the development and application of numerical methods in geotechnical design and providing solutions to a wide range of geotechnical problems, including renewable energy, nuclear waste disposal and infrastructure resilience. She has authored and co-authored over 150 technical publications and received prizes from the Institution of Civil Engineers and the British Geotechnical Association, UK. Pro. Lidija Zdravkovic is active in the profession, advising on recent projects involving Heathrow Terminal 5 development, Crossrail excavations, offshore foundations and embankments and cut slopes on the High Speed Rail route in the UK.

Mark Randolph

Professor of Civil Engineering in the Centre for Offshore Foundation Systems, the University of Western, Australia.

The research of Prof. Mark Randolph interests range broadly across foundation engineering, with particular focus on pile foundations, and offshore geotechnics. He has co-authored two books, including "Piling Engineering" and the more recent "Offshore Geotechnical Engineering", and over 250 journal articles. He interacts closely with industry, both in research and through his role as Technical Advisor within Fugro AG. He is a Fellow of several learned academies including the Royal Society in the UK, was elected Western Australian Scientist of the Year in 2013 and was granted an honorary doctorate from ETH, Zurich in 2015.

2: Overlapping Timelines (Tentative-subject to change depending on progress)

The organizing committee of GEOTEC HANOI 2019 would like to thank very much for your interesting abstracts submitted to the conference. 270 abstracta are now received from around the world and are now in the process of receiving full papers. Each full paper will carefully be reviewed by 02 peer reviewers and the accepted full papers will be published as an E-proceedings in a series of **Lecture Notes in Civil Engineering** of Springer, which is **indexed in Scopus**.

The organizing committee would very much like you to note the following deadlines for full paper submission.

- **August 1, 2019**: Deadline for submitting full papers of accepted abstracts
- **September 1, 2019**: Deadline for submitting final version of accepted full papers.

For your full paper preparation, please use the full paper template, which can be downloaded at:
https://geotechn.vn/paper-submission/#paper-submission-fullpaper
Thank you very much for your valuable contribution to the conference.
We look forward to receiving your full papers soon.
Best regards
The organizing committee

GEOTECHNICAL ENGINEERING

PREFACE

Will be assembled once the papers are received

ACKNOWLEDGEMENT

Fourteen papers are contained in this issue. No doubt the material contained herein would be most valuable to our profession. The editors have adequately described the contributions in the preface. They are to be congratulated for these contributions.

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March 1922 SEAGS – Geotec Hanoi 2019

Editors: Dr Long

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Draft Outline

Coastal & Offshore Structures: Honouring Prof Mark Randolph

Winthrop Professor Mark Randolph is an internationally recognised geotechnical engineer who was named Western Australian Scientist of the Year in November 2013.

Guest Editors from UWA:

1: Prof. Yuxia Hu,Head of Department, Professor in Geotechnical Engineering
Department of Civil, Environmental and Mining Engineering, UWA

2: Christophe Gaudin, Professor, UWA

3: Masaki Kitazume, TIT, Japan

4: Chu Jian, NTU, Singapore

3: Fuping Gao, Principal Investigator, Ijnstitute of Mechanics, CAS

Prof Mark Randolph

Based at the Centre for Offshore Foundations and the ARC Centre for Geotechnical Science and Engineering, Professor Randolph has applied his geotechnical expertise to meet the scientific and engineering challenges of the offshore oil and gas industry. His leadership has established Perth as an internationally recognised hub for excellence in geotechnical engineering and attracted many world-leading companies as well as academics.

In 2011 Professor Randolph was elected to the prestigious Royal Society. The Royal Society is the world's oldest scientific academy in continuous existence, and has been at the forefront of enquiry and discovery since its foundation in 1660. The backbone of the Society is its Fellowship of the most eminent scientists of the day, elected by peer review for life and entitled to use FRS after their name.

Professor Randolph founded the Centre for Offshore Foundation Systems (COFS) in 1997 to better understand the particularity of Australian soils and to develop suitable foundation solutions.

Since its establishment COFS has developed one of the most sophisticated research and modelling facilities in offshore geomechanics and engineering anywhere in the world. A team of 76 internationally recognised researchers, consulting engineers and technical staff work together to solve some of the key engineering challenges of today and tomorrow.

The Centre's work on the mechanics of seabed sediments, offshore foundations systems, pipeline and deep water offshore engineering and geohazards provides pivotal support to both the local and global engineering community.

Professor Randolph's work has advanced the design of piled foundations and he has carried out important research on finite-element analysis of soil penetration, new techniques for offshore site investigation, and the difficult, little-studied, and economically important foundation problems of calcareous materials off the Australian coast.

His work includes analysis, computations, experiments, the development of new software, and comparisons between those techniques and the observed behaviour of large offshore structures.

"During the past decade, we have significantly improved our knowledge and understanding of the North West Shelf seabed conditions through the work of COFS," Professor Randolph said.

"In particular, we've gained some important insights from model tests using the Centre's innovative centrifuge facility - the only such facility in Australia."

Professor Randolph is also a Fellow of the Australian Academy of Science, the Australian Academy of Technological Sciences and Engineering, the Royal Academy of Engineering in the UK and the Institution of Engineers Australia.

- *We expect many papers on the Offshore side frojm UWA. On the Coastal side in Asia, in many contries the population is large and the land is scarce. So, plenty of land reclamation work is going on and Japan, Singapore and Hong Kong have many projects. On the Offhore side UWA have done excellent work in identifying the key mechanisms at a micro-structural level that dictate critical aspects of behaviour, and quantify that behaviour within numerical models that capture development of damage or volume collapse under cyclic loading;*
- *evolve conceptual models for the calculation of foundation performance under monotonic and cyclic loading, and develop unified finite element treatment of the effects of cyclic loading on foundation systems – eventually for three dimensional geometries;*
- *develop coupled fluid-structure-soil models for problems such as scour, pipeline and steel catenary riser response, and performance of jack-up rigs; and*
- *establish a design framework for optimising the choice of foundation system, taking account of risk factors.*

Additionally the UWA facilities include: The UWA O-Tube Program is the only facility of its kind in the world. This program pioneers improvements in engineering designs, promoting safety, reducing human and environmental risks and optimizing infrastructure investment. Together, the large and mini O-Tube are revolutionizing research on pipeline stability design and sediment transport.

Our Centrifuge Facility with a fixed beam centrifuge (3.6m diameter) and a drum centrifuge (1.2m diameter) is used extensively for both industry and academic testing and research. A third 10m diameter centrifuge will be housed in the currently under construction Indian Ocean Marine Research Centre, which will make COFS the only geotechnical modelling facility in the world with three centrifuges.

Our Geotechnical Testing Laboratory hosts an extensive library of offshore soils collected for our industrial testing and fundamental research programs. The facilities in this laboratory enable us to conduct a wide range of tests for industry and academic partners and clients.

The themes of this Issue will be rather broad including :
For Offshore side it includes topics such as

Mechanics of seabed sediments

Offshore foundations systems

Pipeline geotechnics

Geohazards

The additional details are:

1: Sea Bed Characterization & Foundation Design

2: Spudcan-soil interaction during building a jack-up rig

3: Numerical analysis techniques for suction caisson anchor-soil interaction

4: Hybrid foundation system for jack-up foundation

5: Capacity of foundations under sustained cyclic loading

6: Uplift resistance of buried pipelines with fins ction bucket foundations for offshore wind energy installations in layered soil

For the nearshore reclamation topics

1: Site Investigation

2: Reclamation methods

3: Case histories will be included

More details will be given as we progress further.

GEOTECHNICAL ENGINEERING

PREFACE

Will be assembled soon

ACKNOWLEDGEMENT

Fourteen papers are contained in this issue. No doubt the material contained herein would be most valuable to our profession. The editors have adequately described the contributions in the preface. They are to be congratulated for these contributions.

Dr. Teik Aun Ooi
Dr Geoff Chao
Prof. Kwet Yew Yong
Dr. Noppadol Phienwej
Prof. A. S. Balasubramaniam

GEOTECHNICAL ENGINEERING

June 1922 SEAGS – Coastal & Offshore Geotechnics

Editors: **Guest Editors from UWA:**

Offshore Geotechnics

1: Prof. Yuxia Hu,Head of Department, Professor in Geotechnical Engineering
Department of Civil, Environmental and Mining Engineering, UWA

2: Christophe Gaudin, Professor, UWA

Nearshore Geotechnics and Reclamation works

3: Masaki Kitazume, TIT, Japan

4: Chu Jian, NTU, Singapore

3: Fuping Gao, Principal Investigator, Ijnstitute of Mechanics, CAS

Geotechnical Engineering Journal of the SEAGS & AGSSEA

Vol. 53 No. 2 December 2022

ISSN 0046-5828

GEOTECHNICAL ENGINEERING

Journal of the

SEAGS Southeast Asian Geotechnical Society

AGSSEA ASSOCIATION OF GEOTECHNICAL SOCIETIES IN SOUTHEAST ASIA

Sponsored by

AIT Asian Institute of Technology

Griffith UNIVERSITY

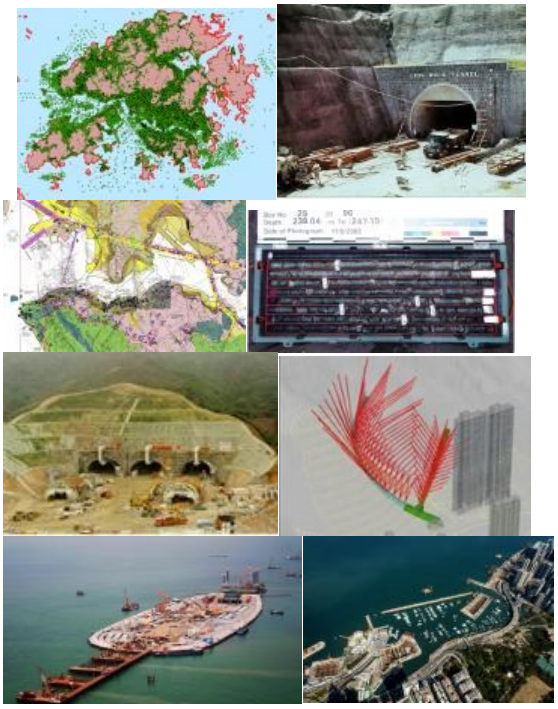
Indexed by EI since 1970 Scopus since 2001 ESCI since 2017

Honouring Prof Herbert Einstein : Rock Engineering-Engineering Geology etc

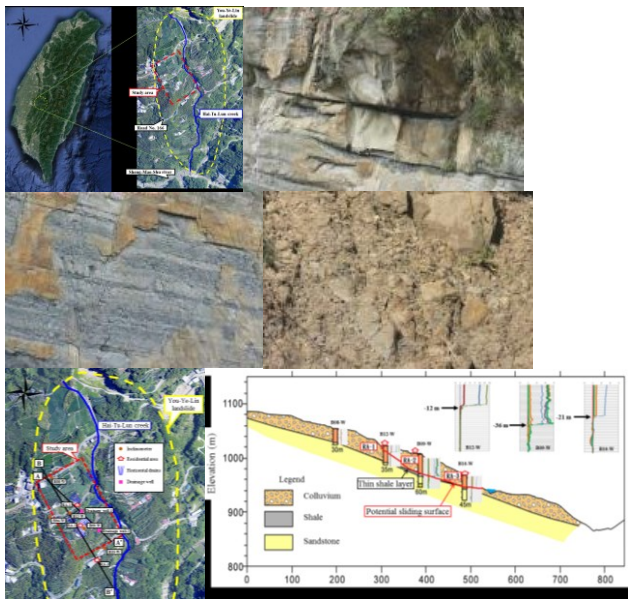
Honorary Guest Editors: Paul Marinos, Giovanni Barla, Prinya Nutalaya

Guest Editors: Ranjith Pathegama, Noppadol Phienwej, Pham Giao, Geoff Chao, Wu Wei, Erwin Oh

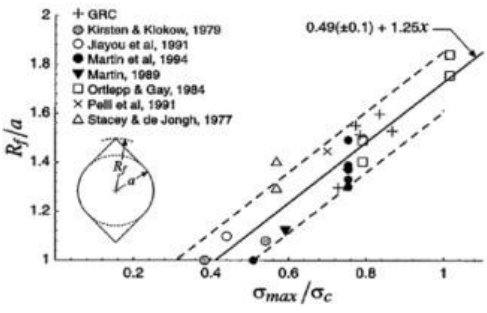
Dedicated to Evert Hoek

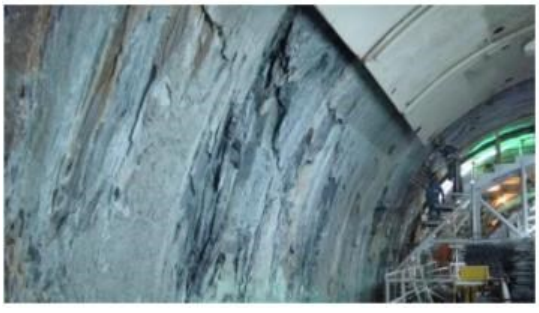


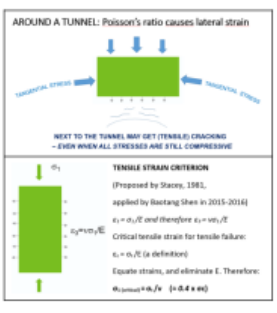
Innovations in tunnelling: by L.J. Endicott



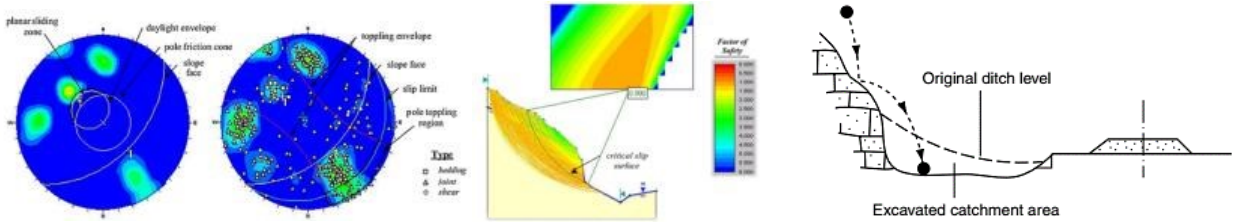
Evaluating the Efficiency of Subsurface Drainages for the Slope Stabilization of Large Landslides : by D. G. Lin, W. H. Chen, and W. T. Liu



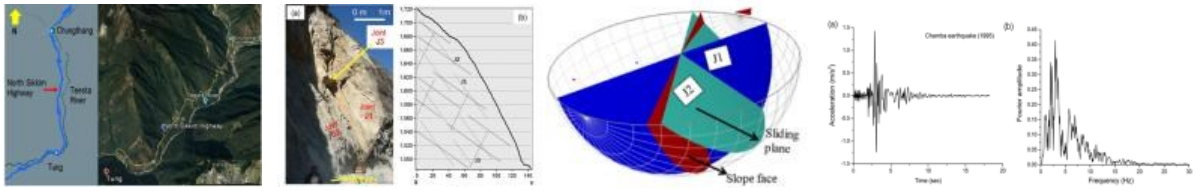




Deep tunnels, cliffs, mountain walls and mountains: an exploration of failure modes in rocks and rock masses
By Nic Barton



A review on rock slope stability: failure mechanisms, stabilization techniques and implications for mining engineering by : William NGAHA TIEDEU , 2, Deyi JIANG , Jie CHEN , Jinyang FAN



Analysis of Seismicity Induced Rockslide in North Sikkim Highway using Finite Element Explicit Joint Model
By Jana A., Dey A., Sreedeep S.

Practical Rock Engineering Evert Hoek

Details of the Journal Issue

1: Topics subject to refinement

1: Geological Investigation-Site Investigation, Data Collection, GIS System

2: Laboratory & Field Tests; Insitu measurements

3: Geological Strength Index, Rock Mass Classification

4: Failure Criteria including Hoek & Brown Theory; Rock Mass Strength

5: Ground water Problems

6: Rock re-inforcement and support design

7: Excavation Methods in Rocks

8: Rock slopes

8: Analytical tools

9: Rock dynamic, reservoir geomechanics and underground space development

9: Case histories

10: Others

2: Overlapping Timelines (Tentative-subject to change depending on progress)

1: Call for Abstracts & Review - May-August, 2019

2: Call for Papers &Full Paper Submission – May to December 2019: Indvited Papers and contributed papers

3: Review of Papers: Jan –July 2020

2: Release of Issue : End of 2020- Mid 2021

Special Issue: In Hour of Herbert Einstein

Herbert Einstein is very famous and more details can be found in
http://herbert-einstein.org

Herbert H. Einstein's group at the Massachusetts Institute of Technology conducts research in rock mechanics, engineering geology, and underground construction, spanning a wide range of studies from field measurements to laboratory experiments to numerical and analytical models. Since 1973, this research work has resulted in thirty-three Ph.D. dissertations and over three hundred authored and co-authored professional publications on the mechanical properties of soils and rocks; analysis, design, and project management of underground structures; risk analysis of landslides; and probabilistic methods in rock engineering and engineering geology. Professor Einstein teaches courses in rock mechanics, engineering geology, and underground construction at M.I.T and has also taught many a short course in universities worldwide. For advancing the field of rock mechanics and rock engineering, Herbert H. Einstein received the 2006 Outstanding Contributions to Rock Mechanics award from the American Rock Mechanics Association (top national honor) and the 1999 Müller Lecture award from the International Society for Rock Mechanics (top international honor).

Giovanni Barla: Special Contributor

Giovanni Barla graduated in mining engineering from Politecnico di Torino in 1965. He moved to Columbia University, New York, where he obtained the MScEng degree in 1967 and the DScEng degree in 1970, with a thesis on the analytical and numerical (finite element method) analysis of stress distribution around underground excavations. He came back to Italy and joined the Politecnico di Torino.

The research interests of Giovanni Barla span over a variety of topics in the fields of rock mechanics, tunnel engineering, rock slope and dam engineering, numerical methods in geomechanics. It should be observed that he is among the small group of European researchers who studied and applied the finite element method in the field of rock and soil mechanics since the early developments of the technique. Giovanni Barla is author and co-author of more than 300 papers that appeared in international journals, in proceedings of national and international conferences and as chapters of edited books.

The papers cover a number of subjects, such as: laboratory and in situ testing, with major interests in weak rocks and rock discontinuities; rock mass characterization and classification; numerical modelling; performance monitoring and back analysis; rock-structure interaction for underground works and tunnels; surface and underground mining; near-surface tunnels, with particular reference to ground treatment, pre-stabilization, and pre-support; tunnels and cavities in weak rocks with major interest in squeezing and swelling ground; mechanized tunneling; stability assessment of artificial cuts and natural slopes; rock falls; active and passive protective measures; stabilization and reinforcement measures; analysis of the foundations of dams. Giovanni Barla is currently editor of the Rock Mechanics and Rock Engineering Journal, publishing 240 papers per year. Prior to becoming editor of the above journal, he has been member of the editorial boards of the International Journal of Rock Mechanics and Mining Sciences, of the International Journal of Numerical and Analytical Methods in Geomechanics and of the

International Journal of Geomechanics.

Prof. Paul G. Marinos:Special Contributor

Paul G. Marinos: marinos@central.ntua.gr
EMERITUS PROFESSOR OF ENGINEERING GEOLOGY AT THE NATIONAL TECHNICAL UNIVERSITY OF ATHENS
Past President of the International Association of Engineering Geology and the Environment
INDEPENDENT CONSULTING ENGINEER

Dr Paul Marinos received a Mining Engineering degree from the School of Mines of the National Technical University of Athens, Greece in 1966, a postgraduate degree in Applied Geology from the University of Grenoble, France, and his Doctorate in Engineering Geology from the same University in 1969. He worked for French and Greek design and construction companies until 1977 and then was elected as Professor at Democritus University in Northern Greece. Since 1988 Dr Marinos has been Professor of Engineering Geology in the School of Civil Engineering in the National Technical University of Athens and has served as head of the Geotechnical Section of the School for several years. From 2001 to 2004 and from 2006 to 2008 he was the Director of a Graduate Course in Tunneling and Underground Construction. He was a visiting Professor in the Geology Department of the University of Grenoble (1987) and of the School of Mines in Paris (2003). He is a doctor honoris causa of the Democritus University of Thrace.

Dr Marinos is a member of AEG and GSA and fellow of the Geological Society of London. He is a past President of the International Association of Engineering Geology and the Environment (IAEG), Past president of the Geological Society of Greece, past president of the Greek Tunnelling Society and honorary member of the International Association of Hydrogeologists (IAH).

Dr Paul Marinos has received several awards, including the Hans Cloos medal of IAEG, and the Andre Dumont medal of the Geological Society of Belgium. He was selected for the presentation of named lectures, including the 6th Glossop Lecture in London (2002), the 19th Rocha Lecture in Lisbon (2002), the 33rd Cross Canada Lectures Tour (2005), the Rock Mechanics annual Lecture in Madrid (2006), an invited lecture tour in 5 major cities in Australia by the Australian Geomechanics Society and as the 2010 Jahns distinguished Lecturer of the Geological Society of America and the Association of Engineering Geologists. In 2013 he presented by invitation workshops in tunneling and dam geology in 6 countries in SE Asia. In 2013 he was awarded by the French Republic as “Chevalier de l’Ordre des Palmes Académiques”

Dr Marinos and his team conduct research on a variety of applications of geology to engineering, mainly rock mass characterization, weak rock properties and behavior, karstic terrain, with special

emphasis to engineering design and construction of tunnels and underground works. His work also covers landslides and dam geology. His other significant interest is the protection of historic monuments and archeological sites. Dr Marinos has authored or co-authored over 300 papers in journals or major conference proceedings. He was a key or invited lecturer in more than 50 conferences or special events. He has given lectures to University Courses or Workshops, among them the University of California Berkeley, MIT, UCLA, Georgia Tech, Virginia Tech, Univ of Texas Austin, Purdue University, to the ASCE in USA, at the Federal Technical University (EPFL) in Lausanne, Switzerland, the Polytecnico of Turin, Italy, the University of Durham, U.K., the University of Coimbra, Portugal, the University of Kobe, Japan, the Black Sea University Romania, the Aristotle University of Thessalonica, Greece, the Griffiths University, Australia. In 2013 he presented training courses for tunneling and dams in Vietnam, Myanmar, Thailand, Singapore and Malaysia.

He has edited proceedings published by international publishers. Dr Marinos is editor in chief of the journal "Geotechnical and Geological Engineering" and also a member of the Editorial Board of a number of prominent journals as "Engineering Geology", "Bulletin of the International Association of Geology", Landslides", "Environmental Geology", "Rock Mechanics" and from 2009 "Environmental and Engineering Geosciences".

Dr Paul Marinos has extensive industrial experience having served as consultant, independent reviewer and member of consulting boards or panel of experts on major civil engineering works and water resources projects in Albania, Burundi, Chile, Ecuador, Ethiopia, Greece, France, India, Iran, Israel, Jordan, Kenya, Lebanon, Morocco, Nigeria, Papua New Guinea, Peru, Portugal, Qatar, Saudi Arabia, Laos, Rwanda, Serbia, Spain, Sweden, Tajikistan, Tanzania, Turkey, Uganda and Zambia.

Dedicated to Dr Evert Hoek: Practical Rock Engineering Legend

Evert Hoek was born in Zimbabwe and graduated in mechanical engineering from the University of Cape Town with a B.Sc in 1955 and an M.Sc in 1958.

He became involved in rock mechanics in 1958 when he joined the South African Council for Scientific and Industrial Research and worked on problems of rock fracture in very deep level gold mines. He was awarded a Ph.D in 1965 by the University of Cape Town for his research on brittle rock failure.

In 1966 he was appointed Reader and, in 1970, Professor of Rock Mechanics at the Imperial College of Science and Technology in London. He was responsible for establishing an inter-departmental group for teaching and research in rock mechanics. He ran two major research projects, sponsored by a number of international mining companies that provided practical training for graduate students. These research projects also resulted in the publication of Rock Slope Engineering (with J.W. Bray) in 1974 and

Underground Excavations in Rock (with E.T. Brown) in 1980. These books have been translated into several languages and are still used as text books in a number of university programs.

In 1975 he moved to Vancouver in Canada as a Principal of Golder Associates, an international geotechnical consulting organization. During his 12 years with this company he worked as a consultant on major civil and mining projects in over 20 countries around the world.

In 1987 he returned to academia as NSERC Industrial Research Professor of Rock Engineering in the Department of Civil Engineering in the University of Toronto. Here he was involved in another industry sponsored research project which resulted in the publication of a book entitled Support of Underground Excavations in Hard Rock (with P.K. Kaiser and W.F. Bawden) in 1995. During this time he continued to work on consulting boards and panels of experts on a number of international projects. In 1993 he returned to Vancouver to devote his full time to consulting as an independent specialist, working exclusively on consulting and review boards and panels of experts on civil and mining projects around the world. He retired from active consulting in 2013 but continues to write and to work on updating these notes.

His contributions to rock engineering have been recognized by the award of an honorary D.Sc in Engineering by the University of Waterloo in 1994 and an honorary D.Eng in Engineering by the University of Toronto in 2004 and by his election as a Fellow of the Royal Academy of Engineering (UK) in 1982, a Fellow of the Canadian Academy of Engineering in 2001 and as a Foreign Associate of the US National Academy of Engineering in 2006.

GEOTECHNICAL ENGINEERING

PREFACE

This Issue is papers related to Rock Engineering-Engineering Geology-Tunnelling etc: First in a series

The first paper is by Nic Barton on Deep Tunnels, Cliffs, Mountain walls & Mountains
An Exploration of Failure Modes in Rock & Rock Masses: In relation to soil, rock is usually extremely strong, with a compression strength that will seldom be mobilized, even in deep tunnels. Intact rock may also have cohesion that is so high that it makes mountain avalanches rare events.Frictional Strength tends to be high as well, due to the big contribution of dilation unless the rock has high porosity. The weakest link of the intact rock is of course the ternsile strength. It is realized now that Poisson's Ratio also plays a major role in failure, as even rock under 3D compression can fail in tension die to the mechanism of external strain in the direction of a free surface. This is an important morphological property. Naturally if the rock is jointed, there are usually massive changes in strength and stability and slope height, in relation to slopes in intact rock. Failure may be progressive in natur, involving several components.In this paper all these aspects will be explored utilizing deep tunnels, and then the maximum heights of cliffs and mountain walls. The apparent 8 to 9 km height limit of mountains will also be addressed using critical state shear strength arguments sine confined compression strength is too high.
The second paper on Innovation in tunneling is by L J Endicott: During the last 50 years there have been so many innovations in tunneling. There are now many types of versatile tunnel boring machines in use in a range of sizes from micro tunnels of less than one metre in diameter to over 17m in diameter. More time is spent in planning and ground investigation includes techniques, such as horizontal directional coring that can extend more than a kilometer along the proposed route, geophysical surveys, gravity surveys, and resistivity surveys. Methods of design and determination of ground movements have been facilitated by numerical methods that were impossible 50 years ago. This paper reflects on some of the milestone achievements and some of the changes that have taken place in the planning, design, and construction of tunnels in Hong Kong and some projects in Asia during the last 50 years.

The third paper is on Evaluating the Efficiency of Subsurface Drainages for the Slope Stabilization of Large Landslides: by D. G. Lin, W. H. Chen, and W. T. Liu: You-Ye-Lin landslide had a long term of intermittent large ground movements during torrential rainfall since extensively triggered in Typhoon Morakot of 2009. Currently, a subsurface drainage system consisted of two drainage wells (vertical shaft with multi-level horizontal drains) has been designed to drawdown the groundwater level and stabilize the unstable slopes of the landslide. This paper presents the field conditions with emphasis on the design and construction of subsurface drainages and evaluation of their stabilization efficiency on the slopes using three-dimensional (3-D) numerical analyses. Numerical results demonstrate that the subsurface drainages are functional and capable of accelerating the drainage of rainwater induced from high rising groundwater level during torrential rainfall in typhoon season. The large groundwater drawdown due to subsurface drainages protects the slopes from further deterioration and maintains the slope stability at an acceptable and satisfactory standard.
The fourth paper on a wireless railway monitoring system of the problematic embankment in the tunnel is by Yanxin Yang, Chunhui Su, Jianlin Ma, Yong Huang: The railway embankment needs to be monitored to determine whether the embankment is stable. In the paper, the damages to the embankment of the heavy-haul railway in the tunnel were recognized and the grouting technology and water pipes were used to avoid further damages. To monitor the state of the embankment in the tunnel, a wireless monitoring system was developed. The accelerometers, laser rangefinders, water level gauges, and cameras were used in the sensor module, the fiber optics and mobile telephony were used in data transferring module, and a data managing system was developed in the control center. To examine the monitoring system, the measured vertical displacement and horizontal displacement, the settlement, and the water levels at the site were presented. The measured data showed that the underground voids still existed after the grouting technology and water pipes of installation were applied. The horizontal and vertical displacement and settlement were induced by the underground voids and the loading of the train. The water level varied at the three locations,

and the change of the water level beneath the surface showed that the flowing water was drained due to the water pipes. The wireless monitoring system was successfully developed to monitor the real-time data of the embankment and determine if the embankment was stable.

The fifth paper is on a review on rock slope stability: failure mechanisms, stabilization techniques and implications for mining engineeringby William NGAHA TIEDEU, Deyi JIANG, Jie CHEN and Jinyang FAN: Mines worldwide are now exploited at very large depths to recover minerals lying within the rock strata. The increase in the mining depth often leads to real risk of large-scale stability failure. This would further be aggravated by mining companies seeking to realize large profits by often operating at the steepest possible slope. As the slope angle increases, its stability decreases and in case of collapse, casualties are often immense. It is therefore crucial to conduct a thorough analysis when designing slopes. In this review paper, we have gathered the most relevant and updated information regarding rock slope stability and its practical application in the field of mining engineering. Specifically, after reviewing the principle underlying rock slope stability, we have presented a clear procedure for geological data collection and computational techniques used for slope analysis. Stabilization and protection techniques used in rock slope have also been presented and in the end, we have analyzed how these different technologies are applied in the field of mining engineering through bench design in open-pit mines and shaft design in underground mining.

Other papers will follow

ACKNOWLEDGEMENT

Fourteen papers are contained in this issue. No doubt the material contained herein would be most valuable to our profession. The editors have adequately described the contributions in the preface. They are to be congratulated for these contributions.

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Prof. A. S. Balasubramaniam

GEOTECHNICAL ENGINEERING

June 1922 SEAGS –AGSSEA Journal on Rock Engineering-Engineering Geology

Editors: Noppadol Phienwej, Pham Giao, Geoff Chao, Erwin Oh

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