

Newsletter

THE INSTITUTION OF ENGINEERS
SRI LANKA

Western Australia Chapter

January 2023

*IESL WA wishes a Prosperous New Year to all its
members and well-wishers.*

As the APEX Body of Sri Lankan Engineering fraternity in WA, during this year too, IESL WA plans to conduct Webinars, CPDs, Technical Workshops and Career Guidance Seminars with higher values as usual.

In this edition of the Newsletter, we would like to introduce the newly appointed Executive Committee for the year 2023/24.

The 9th AGM of the Institution of Engineers Sri Lanka, WA Chapter was held on Saturday 29th October 2022 at 4:00 pm at Centenary Park, Wilson.

The newly elected Executive Committee:

- President – Dr. Senaka Welideniya
- Vice President - Mathanga Perera
- Secretary - Mahesh Kariyawasam
- Treasurer - Tilak Jayantha
- Editor - Tharindu Weerasinghe
- Ex-Officio - Bandula Samarasinghe

Committee members:

- Dulan Rathnayake
- Dr. Tharanga Thotagamuwage
- Parakrama Sumanarathna
- Raveendra Salgado
- Yenuli Ranaweera
- Ravin Wijeyaratna
- Iresh Manjula
- Manjula Abayawickrama
- Harshani Jayarathne



Figure 1 The new executive committee elected for 2022-2023

MORE UPDATES:

- The first committee meeting of the IESL WA Chapter for year 2022/23 was held on 22nd November 2022 at Nagi's Kitchen with good Lankan cuisine. It was indeed a good meeting where we discussed and planned the upcoming calendar year for the IESL WA.



Figure 2 The first committee meeting on 22nd November 2022

- IESL WA has come into an agreement with Kardinya Community Centre Management to hire the meeting room for our committee meetings. Hereafter, we shall use Kardinya Community Centre as IESL-WA meeting venue.
- The 2nd committee meeting was held at Kardinya Community centre hall on 14th December 2022 at 5:30 PM. The committee discussed the progress achieved so far, planning of events, collaboration with other professional institutions as well as community associations.
- The 3rd committee meeting was held at Canning Vale where the committee mostly focused on the CPD events and Career Guidance Seminar.

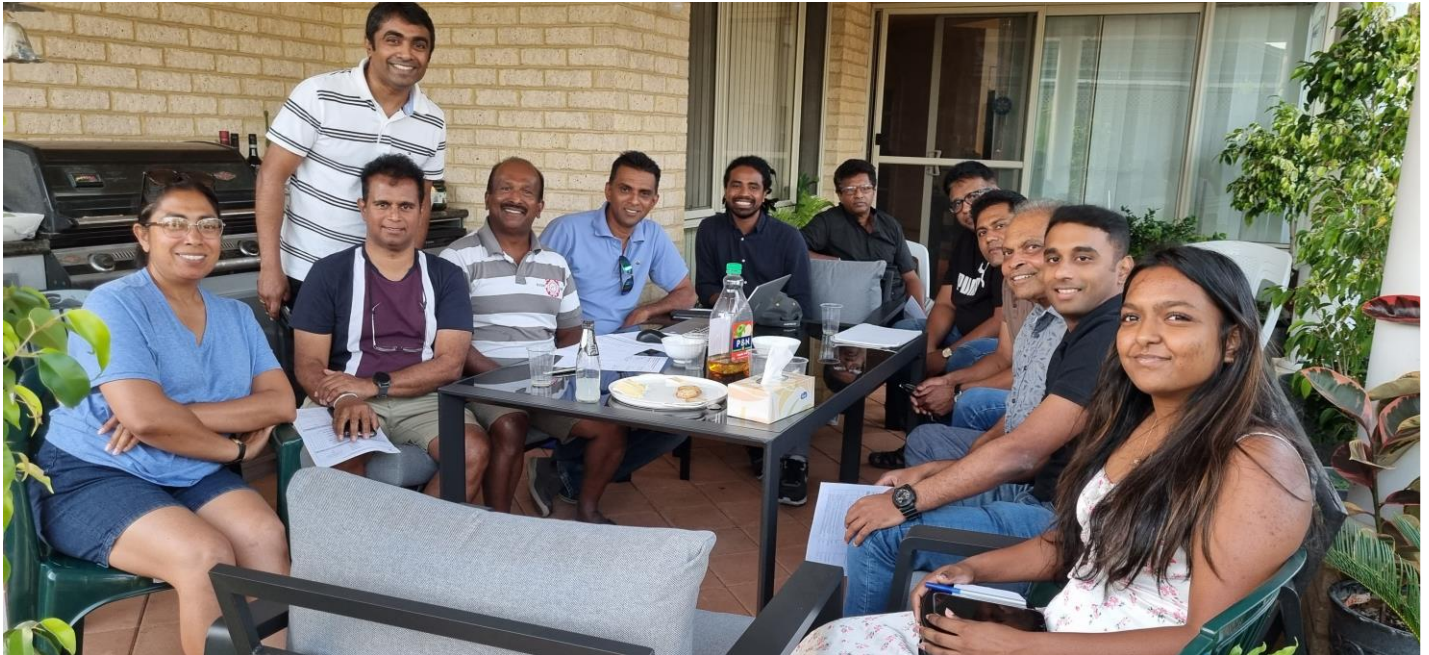


Figure 3 Committee meeting 3 on 15th January 2023 welcoming the New Year

- We also have updated the IESL WA web site with new features. It is up and running now.
- We were able to create a professional LinkedIn Page for IESL WA and it has 65 followers as of now.
- We kindly request the membership to share the information on IESL WA social media pages with your friends, professional circles as well as among other professional and social networks to increase awareness supporting the growth of our audience.
 - LinkedIn: <https://www.linkedin.com/company/institution-of-engineers-sri-lanka-iesl-wa-section>
 - Facebook: <https://www.facebook.com/ieslwa>

TAILINGS DAMS FAILURES AND STATIC LIQUEFACTION

Senaka Welideniya

The recent years have recorded many Tailings Dam failures due to static liquefaction, generating an interest in the industry and academia to further understand the mechanisms contributing to this phenomenon. Fundão and Mount Polley tailings dam failures could be sighted as classic examples of such dam failures.

- Fundao Talings Dam was in the south-eastern Brazilian State of Minas Gerais. The dam failed on 5th November 2015 and this event could be considered as one of the worst environmental disasters Brazil has experienced to date. It had released approximately 43 million m³ of iron ore tailings into the environment, polluting over 600km of watercourses and resulting in 19 deaths.
- Mount Polley Tailings Dam of Imperial Metals Corp.'s Mount Polley copper and gold mine near Likely, British Columbia, Canada, failed on Aug. 4, 2014, releasing 7.3 million m³ of tailings, 10.6 million m³ of water, and 6.5 million m³ of interstitial water into the environment. The tailings were defined as mostly finely crushed rock and not posing the risk of Acid Rock Drainage.



Figure 4 Fundano tailings dam after failure



Figure 5 Environmental disaster caused by Fundano tailings dam failure



Figure 6 Mount Polley Tailings dam after failure



Figure 7 Disastrous environmental impacts caused by Mount Polley Tailings Dam failure

Static liquefaction is associated with fine grained soils with low hydraulic conductivity undergoes sudden loss of strength at higher stress levels and unable to drain. Under loading it contracts the soils and produces excessive pore pressure which cannot be drained effectively. Static liquefaction happens so fast, and it is an extremely dangerous phenomenon that anyone who manages and deals with tailings dams need to understand very well.

Some paper abstracts that could shed more light to improve your awareness are presented below:

Assessment of the Liquefaction Susceptibility of Fine-Grained Soils

Jonathan D. Bray and Rodolfo B. Sancio

Abstract

Observations from recent earthquakes and the results of cyclic tests indicate that the Chinese criteria are not reliable for determining the liquefaction susceptibility of fine-grained soils. Fine-grained soils that liquefied during the 1994 Northridge, 1999 Kocaeli, and 1999 Chi-Chi earthquakes often did not meet the clay-size criterion of the Chinese criteria. Cyclic testing of a wide range of soils found to liquefy in Adapazari during the Kocaeli earthquake confirmed that these fine-grained soils were susceptible to liquefaction. It is not the amount of "clay-size" particles in the soil; rather, it is the amount and type of clay minerals in the soil that best indicate liquefaction susceptibility. Thus plasticity index (PI) is a better indicator of liquefaction susceptibility. Loose soils with $PI < 12$ and $w_{LL} > 0.85$ were susceptible to liquefaction, and loose soils with $12 < PI < 18$ and $w_{LL} > 0.8$ were

systematically more resistant to liquefaction. Soils with $PI > 18$ tested at low effective confining stresses were not susceptible to liquefaction. Additionally, the results of the cyclic testing program provide insights regarding the effects of confining pressure, initial static shear stress, and stress-path on the liquefaction of fine-grained soils.

Liquefaction Susceptibility Criteria for Silts and Clays

Ross W. Boulanger, M.ASCE; and I. M. Idriss, M.ASCE

Abstract

New liquefaction susceptibility criteria for saturated silts and clays are presented that are based on the mechanics of their stress-strain behaviour and which provide improved guidance for selecting engineering procedures for estimating potential strains and strength loss during seismic loading. Monotonic and cyclic undrained loading test data for silts and clays show that they transition, over a narrow range of plasticity indices (PI), from soils that behave more fundamentally like sands (sand-like behaviour) to soils that behave more fundamentally like clays (clay-like behaviour), with the distinction having a direct correspondence to the type of engineering procedures that are best suited to evaluating their seismic behaviour. It is recommended that the term liquefaction be reserved for describing the development of significant strains or strength loss in fine-grained soils exhibiting sand-like behaviour, whereas the term cyclic softening failure be used to describe similar phenomena in fine-grained soils exhibiting clay-like behaviour. For practical purposes, clay-like behaviour can be expected for fine-grained soils that have $PI \geq 7$, although a slightly lower transition point for soils with a CL-ML classification (perhaps $PI \geq 5$ or 6) would be equally consistent with the available data. Issues related to the practical application of these criteria are discussed.

The End