REAAA Newsletter

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For Members Only

Congratulate REAAA on its 50th Anniversary

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Publisher

The Road Engineering Association of Asia & Australia
46 B, Jalan Bola Tampar 13/14, Section 13, Shah Alam, Selangor, Malaysia

Message from the President

Dr. Sung-Hwan Kim
President of REAAA

It is my pleasure to congratulate all members of REAAA as we celebrate our 50th anniversary. In Sept 2021, I started my role as the REAAA President and I am excited to join REAAA during this moment in history. 2023 is a milestone year for us- it marks our 50th anniversary.

On 17th December 1970, participants from nine countries attending a 'Road Construction Seminar' in Bangkok identified the need for a regional engineering association and proposed that such an association be formed. Subsequently, on 22nd March 1971, 90 road engineers from South East Asian countries attending a course on 'Road Planning, Design, Construction, and Maintenance' in Kuala Lumpur endorsed and supported the establishment of such an association.

Following these events, the Public Works Department (PWD) of Peninsular Malaysia and the Institute of Engineers, Malaysia, sponsored a Conference on 'Road Engineering in Asia and Australasia' in Kuala Lumpur. One of its main objectives was to formally launch the Association. The Organising Committee, under the chairmanship of Mr. Thean Lip Thong, entrusted the preparation for the formation of the Association to a select group consisting of senior members of the engineering profession and leading business administrators. Though there were divergent professional interests, the group was solidly united in the belief that regional cooperation in technology would bring national progress.

On 15th June 1973, some 300 delegates from ten countries attending the Conference unanimously resolved to form the Road Engineering Association of Asia and Australasia (REAAA) with a permanent secretariat in Kuala Lumpur. A Governing Council, consisting of 15 members, was elected and the Association began to function with Mr. Thean Lip Thong of Malaysia as the First President.

To mark this significant milestone, we have organised a special anniversary celebration that not only honours our rich history but also highlights our unwavering commitment to innovation, growth, and unparalleled excellence.

We have cultivated partnerships with organisations like PIARC and IRF to share experiences and knowledge in science and technology.

As we reflect on our journey over the years, we take pride in how we have evolved and are thrilled about the possibilities that the future holds. As REAAA prepares to celebrate its 50th anniversary, let us continue to progress, guided by our mission to empower our members to be critical thinkers prepared for the challenges that will face us moving ahead.

I would like to thank the Newsletter Working Committee in Taiwan who contributed to the publication of the Newsletter.

We invite you to join our 50th anniversary celebration in Labuan Bajo, Indonesia. Your support and attendance are valuable to us!

Those are the dreams we make real. See you in Labuan Bajo.

Dr. Sung-Hwan KIM, REAAA President
15th June 2023

50 Years of REAAA

Compiled by Editors of Newsletter

Congratulations to REAAA for reaching an extraordinary 50 Years milestone. Throughout this remarkable journey, the Association has been at the forefront of advancing road engineering in the Asia and Australasia region. The unwavering commitments of all members to excellence, fostering collaboration among professionals, and promoting the exchange of knowledge and expertise have been instrumental in shaping the landscape of road networks. Over the past five decades, REAAA's contributions have not only facilitated economic growth and connectivity but have always played a critical role in road development since 1973. We believe REAAA will continue to bring success, innovation, and a more sustainable future.

REAAA History

Regional cooperation and technical harmony are the underlying principles of the Road Engineering Association of Asia and Australasia (REAAA). Many developing and emerging countries in Asia recognized the importance of technology and expertise to national progress after World War II. The transfer of technology from advanced countries outside the region did not always work under local conditions as compared with the technical exchange between regional countries where the environmental conditions were similar. Road engineering was no exception. In the early 1960s, a few individuals started organising road engineering courses in the region. These courses were well received by the developing countries and, recognising the value of these pioneering efforts, many senior members of the profession responded by giving their energy and time to the organisation of subsequent regional activities. By the end of the decade, it was realised that the coordination of such a major undertaking should be entrusted to a permanent regional body charged with the promotion and advancement of the science and practice of road engineering in the region.

At the Road Construction Seminar, held in Bangkok in 1970, participants from nine countries confirmed the need to form an association to cater to the region’s road engineers. Some of the views expressed by the participants included the following:

1. Current activities in road engineering in member countries lack coordination on a regional basis. Drawbacks included the following:

    - Any research conducted in the member countries is undertaken independently and the findings are seldom, if ever, exchanged. Duplication of effort is inevitable, resulting in a drain on resources and expertise: a wastage that developing countries could ill afford.

    - In the absence of a well-coordinated feedback channel, universities and research bodies lack guidance from planners, designers, construction engineers, and technologists regarding application requirements and problems occurring in the field. As a result, the emphasis on research projects tended to be predominantly academic at the expense of immediate practicality.

    - In this situation, member countries sometimes resorted to borrowing expertise from more-developed countries outside the region, a type of ‘transplant’ that does not always work under local conditions. In regional countries, however, where the environmental conditions were similar, there was a stronger case for closer liaison and mutual exchange without the risks of transplant rejection.

- The opportunities for the sharing of expertise were limited if the regions are isolated.

2. The advantages associated with having a regional road engineering association were suggested as follows:

   - Such a body could well prove a catalyst for future development and activities.
   - Regional engineers associated with road planning, design construction and maintenance would have a focal point, which they currently lacked. This would offset the dangers associated with the localised approach, which had too narrow a focus. An association within a regional body could stimulate the cross-fertilisation of ideas, open up mental horizons, and create better understanding amongst member countries at both the national level and the level of the individual practitioner.
   - Better functional links could be established through the parent body bringing together road planners, designers, construction engineers, technologists, machinery manufacturers and all the other services and traders associated with road engineering.
   - A regional information service centre on road engineering would also function to promote closer cooperation.

As a result, it was proposed at the Seminar that a regional road engineering association should be formed. It was felt appropriate that the launching of the association coincided with a regional road engineering conference. Mr. Nibon Rananand of the Department of Highways, Thailand, and Mr. YC Yuen of Malaysia were charged with investigating and initiating steps to bring this about.

Subsequent discussions took place in both Bangkok and Kuala Lumpur, and on 22 March 1971, the then Minister of Works, Post and Telecommunications of Malaysia, Tun VT Sambanthan, declared the Malaysian Government's support for the formation of a regional road association at the opening ceremony of the Road Planning, Design, Construction and Maintenance Course held in Kuala Lumpur.

Meanwhile, the Public Works Department, West Malaysia, had been working on this project, more lately in conjunction with the Institute of Engineers, Malaysia. These two organisations jointly sponsored a Conference on Road Engineering in Asia and Australasia in June 1973. One of the main objectives of the conference was to explore the formation of the Road Engineering Association of Asia and Australasia (REAAA).

Mr. Thean Lip Thong, who was then the Director-General of Public Works, West Malaysia, and also the Chairman of the conference, was invited to write a Foreword to a Manual of the Formation of the Road Engineering Association of Asia and Australasia.

On Friday 15 June 1973, some 300 participants from 19 countries who were attending the Conference on Road Engineering in Asia and Australasia in Kuala Lumpur unanimously resolved that the Road Engineering Association of Asia and Australasia be formed, with a permanent Secretariat in Kuala Lumpur. The objectives of the Association as stated in the Constitution (1973) are as follows:

- To promote and advance the science and practice of road engineering and related professions.
- To encourage communication between persons charged with the technical responsibility for the

planning, design, construction and maintenance of roads and allied structures.

- To obtain and diffuse among the members, information on road engineering and related matters affecting the profession, and to print, sell, publish, issue and circulate the records of transactions of the association or any papers, periodicals, books, circulars and other literary undertakings or any extracts therefrom as may seem conducive to any of these objects.
- To educate and seek to improve, extend and elevate the technical and general knowledge of members and persons concerned with road engineering.
- To serve as a focal point for the exchange of ideas related to road engineering.
- To conduct, encourage and collate research in road engineering.
- To establish, form and maintain an index of available or existing literature and articles of interest in connection with road engineering.
- To cooperate, as may seem conducive to any of these objects, with national and international organisation and to support and supplement their work.

First Council Term

The first Governing Council consisting of 15 members was elected with Mr. Thean Lip Thong, the Director of Public Works of Malaysia, and Mr. Chaleo Vajrabukka, the Director of Highway Bureau of Thailand, serving as the first President and the Vice President, respectively. The members of the first governing council are shown in Figure1 and listed in Table 1. Participation and involvement of public officials are the characteristics of REAAA as most of the council members are serving as the heads of the road authorities of member countries at the same time. As of 2023, REAAA has about 1,400 members from 24 countries.

Figure 1: Members of Governing Council (1st term 1973-1976)
Seated from left: Harry Y.C. Huen, Chaleo Vajrabukka, Then Lip Thong, John James W. Laurie
Standing from left: K.R. MacKenzie, Nibon Rananand, Chai Muktabhant

Table 1: List of First REAAA Governing Council

Position	Name	Nationality
President	Thean Lip Thong	Malaysia
Vice President	Chaleo Vajrabukka	Thailand
Honorary Secretary General	Harry Y.C. Huen	Malaysia
Honorary Treasurer General	John James W. Laurie	Australia
Council Member	K.R. Mackenzie	Australia
Council Member	Nibon Rananand	Thailand
Council Member	Mahfoz bin Khalid	Malaysia
Council Member	Liew Him Wai	Singapore
Council Member	Yoshio Ueda	Japan
Council Member	Major-Gen. K.C. Soni	India
Council Member	Suryatin Sastromijoyo	Indonesia
Council Member	F.H.P. Williams	Australia
Council Member	G.M. Yoganandan	Sri Lanka
Council Member	T.A. Arkinson	Australia
Council Member	Chai Muktabhant	Thailand

REAAA President

Since 1974, there have been a total of 17 presidents in REAAA.

Table 2: List of All REAAA Presidents

Term	Name	Nationality	Period
1st	Mr. Thean Lip Thong	Malaysia	1974-1976
2nd	Mr. Chaleo Vajrabukka	Thailand	1976-1979
3rd	Mr. Don H. Aitken	Australia	1979-1981
4th	Mr. Suryatin Sastromijoyo	Indonesia	1981-1983
5th	Dr. Nobutaka Katahira	Japan	1983-1986
6th	Tan Sri Dato' Talha bin Hj. Mohd Hashim	Malaysia	1986-1990
7th	Dr. Tan Swan Ben	Singapore	1990-1992
8th	Mr. Arthur Y. Chen	Taiwan	1992-1995
9th	Dr. Robin Dunlop	New Zealand	1995-1998
10th	Dr. Sadamu Mino	Japan	1998-2000
11th	Prof. Ian R. Johnston	Australia	2000-2003
12th	Mr. Salvador A. Pleyto SR.	Philippines	2003-2006
13th	Dr. Kyung-Soo Yoo	Korea	2006-2009
14th	Dato' Sri Ir. Dr. Judin Abdul Karim	Malaysia	2009-2013
15th	Dr. Achmad Hermanto Dardak	Indonesia	2013-2017
16th	Mr. Romeo S. Momo	Philippines	2017-2021
17th	Mr. Sung-Hwan Kim	Korea	2021-2025

REAAA Conference, Forum, and Meeting

REAAA Conference was held every 2 to 4 years in different member countries. The 1st Conference was held in Bangkok, Thailand over five days from February 16th to February 20th, 1976. Over 700 representatives from 24 countries participated in the event with a total of 53 papers published. The most recent REAAA Conference is the 16th Conference took place from September 10th to September 15th in 2021 in Manila, Philippines. As a result of the impact of Covid-19, this conference was conducted online through the Zoom platform. Table 3 lists all the REAAA Conferences.

Table 3: REAAA Conferences

Ordinal No	Date	Location	Number of participants
1st	16-20 Feb. 1976	Bangkok, Thailand	700
2nd	16-20 Oct. 1978	Manila, Philippines	900
3rd	20-24 April 1981	Taipei, Taiwan	700
4th	22-26 August 1983	Jakarta, Indonesia	800
5th	25-29 August 1986	Adelaide, Australia	900
6th	4-10 March 1990	Kuala Lumpur, Malaysia	1,100
7th	22-26 June 1992	Singapore	800
8th	17-21 April 1995	Taipei, Taiwan	600
9th	2-8 May 1998	Wellington, New Zealand	600
10th	4-8 Sept. 2000	Tokyo, Japan	1,080
11th	18-23 May 2003	Cairns, Australia	700
12th	20-24 Nov. 2006	Manila, Philippines	600
13th	22-26 Sept. 2009	Incheon, South Korea	3,000
14th	25-28 March 2013	Kuala Lumpur, Malaysia	1,000
15th	22-24 March 2017	Bali, Indonesia	500
16th	10-15 Sept. 2021	Manila, Philippines	Virtual Meeting

The Heads of Road Authorities Meeting (abbreviated as HORA meeting), initiated by REAAA, is a platform for communication, exchange and sharing of knowledge and experience among road authorities of the countries in Asia and Australasia region. Twelve HORA meetings have taken place since the year 2002. The main themes being discussed included road asset management, disaster risk management, road network operation effectiveness, Public-Private Partnerships, and so on. Table 4 lists the HORA Meetings that have been held thus far.

Table 4: REAAA HORA Meeting

Ordinal No	Date	Location	Number of participants
1st	17-20 April 2002	Kuala Lumpur, Malaysia	44 representatives from 23 countries
2nd	19-20 May 2003	Cairns, Australia	24 representatives from 14 countries
3rd	9 Oct. 2004	Manila, Philippines	15 representatives from 9 countries
4th	15 June 2005	Bangkok, Thailand	73 representatives from 18 countries
5th	22 Nov. 2006	Manila, Philippines	60 representatives from 13 countries
6th	9-10 May 2007	Seoul, South Korea	Representatives from 13 countries
7th	4-5 June 2008	Tokyo, Japan	72 representatives from 13 countries
8th	24 Sept. 2009	Incheon, South Korea	-
9th	4 April 2010	Kuala Lumpur, Malaysia	47 representatives from 11 countries
10th	14 Sept. 2011	Jakarta, Indonesia	42 representatives from 9 countries
11th	2 Nov. 2015	Seoul, South Korea	14 countries
12th	23 March 2017	Bali, Indonesia	11 countries
13th	24 August 2023	Labuan Bajo, Indonesia	-

To meet the requirements of member countries in road engineering technology advancement and information communication, REAAA initiated the business forum in 2014. As shown in Table 5, a total of 10 forums have taken place up until 2023.

Table 5: REAAA Business Forum

No	Date	Location	Theme
1	April 2014	Bali, Indonesia	Public, Private Partnership
2	October 2014	Sydney, Australia	Improving Road Engineering Collaboration and Market Access and Upcoming Opportunities
3	November 2016	Tokyo, Japan	New Technology on Road Construction
4	March 2017	Bali, Indonesia	Expanding Opportunities for Infrastructure Investment in Developing Countries
5	July 2017	Manila, Philippines	Golden Era of Infrastructure Development in Philippines
6	October 2018	Selangor, Manila	Potential Partnership for Business Opportunities in Asia and Australia
7	April 2019	Taipei, Taiwan	Smart, Sustainable and Resilient Road with Future Engineer Leadership
8	September 2021	Manila, Philippines	Shaping the Future of Road Engineering with Advanced Technology
9	March 2022	Seoul, South Korea	Smart Construction Technology in Road engineering
10	August 2023	Labuan Bajo, Indonesia	Implementation of Technology 4.0 to Support Sustainable Road Development

Honorary Members

REAAA Individual Members with outstanding eminence in the advancement of road engineering technology or engineering practice and who have been devoted to serving the association over a sustained period of time are eligible to be elected as Honorary Members. Only 49 members of REAAA have been elected as Honorary Members to date.

Table 6: All Honorary Member

Membership No.	Name	Country
H.0001	Bultaz A Aquino	Philippines
H.0002	Wang Chang-Ching	Taiwan
H.0003	Thean Lip Thong	Malaysia

Membership No.	Name	Country
H.0004	Chaleo Vajrabukka	Thailand
H.0005	J.J. W Lauire	Switzerland
H.0006	Huen Yeong Ching	Australia
H.0007	Donald Hector, Aitken	Australia
H.0008	Tan Sri Dato' Ir Muhd Yusuff B Muhd Yunus	Malaysia
H.0009	Dr. Sadamu Mino	Japan
H.0010	Mah Guan Seng	Malaysia
H.0011	Dr. Moh, Za-Chieh	Taiwan
H.0012	Prof. Ian Johnston	Australia
H.0013	Dr. John Metcalf	Australia
H.0014	Tan Sri Dato' Ir Dr. Wan Abdul Rahman Wan Yaacob	Malaysia
H.0015	Kieran Gerard, Sharp	Australia
H.0016	Hendrianto Notosoegondo	Indonesia
H.0017	Sunaryo Sumadji	Indonesia
H.0018	Kwang-Ung, Hwang	Korea
H.0019	Tan Sri Dato' Ir. Talha Bin Hj Mohamad Hashim	Malaysia
H.0020	Ian Lester, Stenberg	New Zealand
H.0021	Rasuman, Bashir D	Philippines

Membership No.	Name	Country
H.0022	AP Gopinath Menon	Singapore
H.0023	Prof. Chang Chia Juch	Taiwan
H.0024	Tavepatana Tinamas	Thailand
H.0025	John Gerard Waldron	Australia
H.0026	Philip Ladner	Australia
H.0027	Raymond John Farrelly	Australia
H.0028	Poedji Rahardjo	Indonesia
H.0029	Ruslan Diwiryo	Indonesia
H.0030	Dr. Kyung Soo Yoo	Korea
H.0031	Keon Chang Cho	Korea
H.0032	Dato' Ir. Han Joke Kwang	Malaysia
H.0033	Dato' Ir. Chew Swee Hock	Malaysia
H.0034	Mr Richard Thomas Steel	New Zealand
H.0035	Mike Rudge	New Zealand
H.0036	Jaime Abarsoza Pacanan	Philippines
H.0037	Dr. Mao Chi-Kuo	Taiwan
H.0038	Brendan John Marsh	Australia
H.0039	Tom Wilmot	Australia

Membership No.	Name	Country
H.0040	DR. Achmad Hermanto Dardak	Indonesia
H.0041	Ir. Gandhi Harahap	Indonesia
H.0042	Dr. Danis Hidayat Sumadilaga	Indonesia
H.0043	Asao Yamakawa	Japan
H.0044	Yasumasa Torii	Japan
H.0045	Dato' Seri Ir. Dr. Judin Abdul Karim	Malaysia
H.0046	Dato' Ir. Dr. Dennis Ganendra	Malaysia
H.0047	Dr. Angel L. Lazaro III	Philippines
H.0048	Salvador Pleyto	Philippines
H.0049	Dr. Aram Kornsombut	Thailand

Once again, Congratulate REAAA on its 50th Anniversary. We would like to express our sincere appreciation to all the country members, as well as Past Presidents, Honorary Members, Technical members, secretaries, and administrators, for their countless support and incredible effort for the association. Over the past 50 years of continuous development, REAAA has built a bridge of communication and interaction for its members from various countries, enabling them to continuously improve themselves and promoting the development of roads and highways in each member country. REAAA's efforts have strengthened our commitment to the goal of sustainable development and digitalization. The journey from a group of individuals to the comprehensive foundation established by the First Council Term is a monumental achievement. In recent years, we have faced various challenges such as climate change, pandemics, labor and material shortages, etc. REAAA relies on the collective efforts of all its members to address even more challenging issues and ensure continuous growth and development in the future. We look forward to working close together with each other members and embracing a brighter future in the next 50 years of the association for the future generation.

Official Launch of Smart Highway Award

Issued by REAAA and CRF

The China Road Federation (CRF) has been promoting its corporation with international road engineering societies ever since its first participation in the 2nd Governing Council Meeting of REAAA in 1978. As a long-term member of the REAAA, CRF is willing to establish the Smart Highway Award as a gratitude for the long-term support from REAAA. The Award has been set up according to the endorsement of 119th REAAA Council Meeting in 2023.

The Award aims to recognize REAAA members for their outstanding achievement and contribution to the development and application of smart highway management systems, as well as exchange and share the experience in smart highway development, and promote cross-disciplinary integration and smart technology applications for road engineering in response to the rapid advancement of AI, 5G, Big Data, IoT and other smart technologies.

The Award is sponsored by the CRF; the Fund of the Award is sponsored by the Far Eastern Electronic Toll Collection Company (FETC) as a member of CRF. Award recipient shall receive 20,000 US dollars as the prize money and an award plaque with the following texts inscribed.

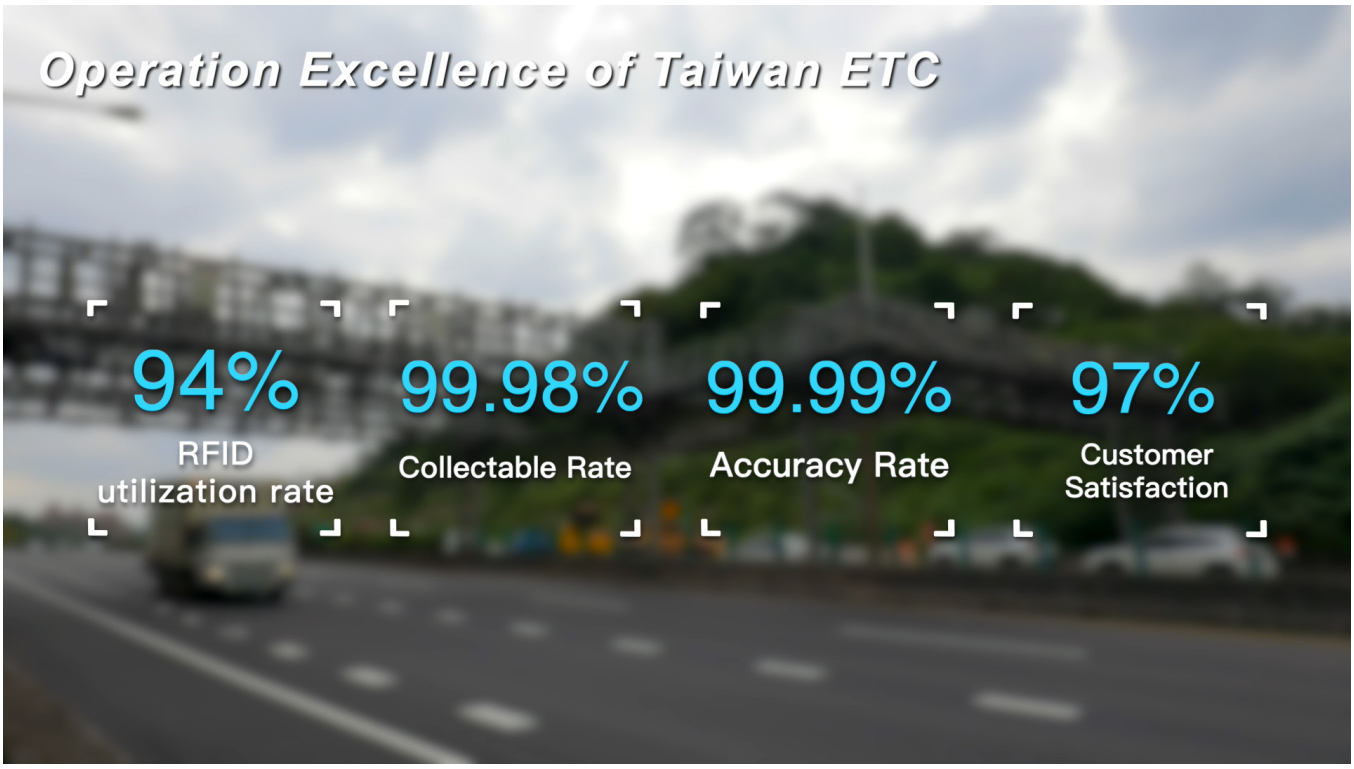
> We hereby present (Recipient of the Award) with this award for the (Name of the Project) in recognition of its outstanding achievement in the operation and management of highway in Asia and Australasia.

The amount of prize money (20,000 US dollars) will include handling fee and tax.


Smart Highway Award
Official Launch
25th August 2023
REAAA 50th Anniversary Celebration


Exchange the Experience
in Smart Highway Development
Tag ID
Deduction Module
Detection Module
JKL 6789
DEF 4567
ABC 1234
GHI 5678
Cloud Based
Manual Validation Center


Taiwan's Freeway Toll Collection System
Present (2014-Now)


Operation Excellence of Taiwan ETC
94%
RFID
utilization rate
99.98%
Collectable Rate
99.99%
Accuracy Rate
97%
Customer
Satisfaction

Selection Process

In March 2024, the REAAA Secretariat and the CRF Secretariat, representing Organizer and Co-organizer, will initiate the call for applications. After a period of 3 months, the Organizer will manage the application documentation and review the qualifications of the applicants. Following the review process, the applicants will have an opportunity to address any comments received. Subsequently, the Award Committee will take 2 months to select the recipient. In January 2025, the Organizer will notify the chosen recipient. Last but not least, the Award conferment will take place in March 2025. The schedule of the Award is illustrated in Figure 1.

Figure 1: Schedule of the Award

We welcome all members to participate in the Award. For more details, please refer to the following QR code for the registration information for the Award.

REAAA Website
Relevant information will be updated on 1st March 2023.

Hot-in-Place Recycling Patching Technology in Taipei City

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Kun-Hu Lin
Director, New Construction Office, Public Works Department, Taipei City Government, Taiwan
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Po-Sen Yang
Chairman, Saint-Dong Building Production and Service Inc.
paul@bim-group.com

Su-Wun Chou
Deputy General Manager, Saint-Dong Building Production and Service Inc.
kswchou@bim-group.com

Background

Traditionally, road damage is often improved by the square milling method of destroying the road surface and then overlaying it with asphalt. In addition to causing multiple patches and unevenness, the construction process often requires large-scale machinery that occupies the road and blocks traffic. Moreover, noise and air pollution, and construction waste are produced due to repeated milling and overlay. This affects the quality of the environment and does not conform to the concept of environmental protection.

Taipei City pioneered the introduction of hot-in-place recycling patching technology in 2016. The New Construction Office, Public Works Department, purchased a hand-push hot-in-place recycling patching machine in 2017, as shown in Figure 1(a). It was the first maintenance unit in the country to use hot-in-place recycling patching technology. However, the hand-push hot-in-place recycling patching machine has a small effective construction area and, due to continuous heating, the surface of the road can be scorched without an adequate heating depth being achieved. Smoke can also be generated due to overheating. In 2019, a large-scale hot-in-place recycling repair unit (PM220) was purchased, as shown in Figure 1(b).

Hot-in-place recycling repair equipment is suitable for ‘roads where it is difficult for heavy equipment to enter or where there is concern about environmental noise‘. It is appropriate in applications as potholes, depressions, rutting, alligator cracking, cracking, raveling, grooving, and thin overlay separation in urban roads and alley roads.

(a)

(b)

Figure 1: Hot-in-place recycling patching technology
(a) Hand-push hot-in-place recycling patching machine;
(b) Hot-in-place recycling repair unit

Hot-in-Place Recycling Patching Technology

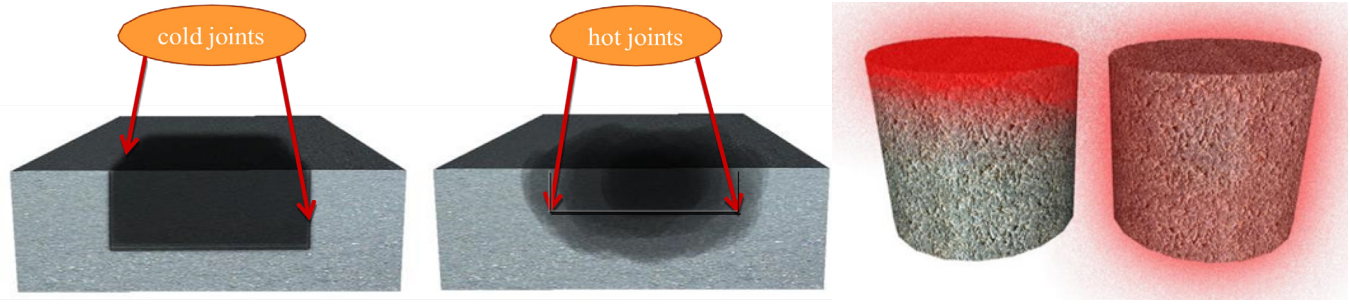
Technical features

Hot-in-place recycling repair is a highly-efficient, energy-saving, and environmentally friendly asphalt repair technology. Using intermittent radiant heating technology, the road surface is not burnt with an open flame. This ensures that the original characteristics of the asphalt can be retained and the service life of the road can be extended. As shown in Figure 2(a), if directly heated by the flame from above, the surface will become overheated and the asphalt surface layer will be damaged due to aging (Figure 2(a) left specimen); if intermittent radiant heating is used, the surface of the whole pavement can be evenly heated (Figure 2(a) right specimen).

The operation is simple and efficient, and the heating time can be set. After 8-10 minutes, the road surface can be heated to a working temperature of 170-200°C.

Intelligent control, with solar charging and an automatic electronic ignition device, can prevent safety concerns such as gas leakage caused by flameout.

It is safe and reliable in use and is lined with heat-insulating material to prevent the operator from being scalded by the high temperature of the shell during the combustion process.



(a) Traditional Repair (b) Heating Repair

Figure 2: Advantages of hot-in-place recycling patching technology:
(a) evenly heated by intermittent radiant heating;
(b) cold joints can be avoided

Technical advantages

The advantages of hot-in-place asphalt recycling repair technologies include the following:

- Good repair effects and strong water resistance: the repaired area and the surrounding area are heated at the same temperature to avoid cold joints and repair gaps, as shown in Figure 2(b).
- Recyclable, dust, and disposal-free: The original asphalt is heated and reused: only a small amount of new asphalt needs to be added to reduce waste of raw materials and waste disposal costs.
- Short repair time and reduced traffic impact: It only takes 15-20 minutes for one person to complete a repair with the hand-push hot-in-place recycling patching machine. Generally traffic can be restored within 30 minutes of a single repair.
- Few construction tools, environmental protection, and minimum noise: construction does not require tools for cutting, milling, transportation, and waste removal. Exhaust gas emissions are not generated and there is no noise pollution.
- Low repair costs and high economic benefits: by saving raw materials, manpower, time, and equipment, the cost of road repair is reduced, the quality is more stable and durable, and the economic benefit of road repair can be effectively improved.

Differences between hot-in-place recycling patching technology and traditional saw-break-fill

In traditional saw-break-fill pavement such as pothole repair, the method of breaking the original pavement around the pothole after square cutting is often used, as shown in Figure 3(a) and described as follows: draw a cutting line on the pavement around the pothole, use a hydraulic pick hammer to break the surface materials, remove the scrap materials, clean the repaired area, spray a tack coat, fill with new asphalt, and finally manually level and compact. The sides and lower layer of the broken pavement and the new asphalt will be bonded together like glue using tack coat. However, the sides and lower surface of the pavement are at room temperature, and the new hot asphalt will cool and shrink after contact,

therefore, it is easy for weak interfaces and gaps to form. Rainwater can then infiltrate into the asphalt, causing fall off, and potentially the pothole to reappear.

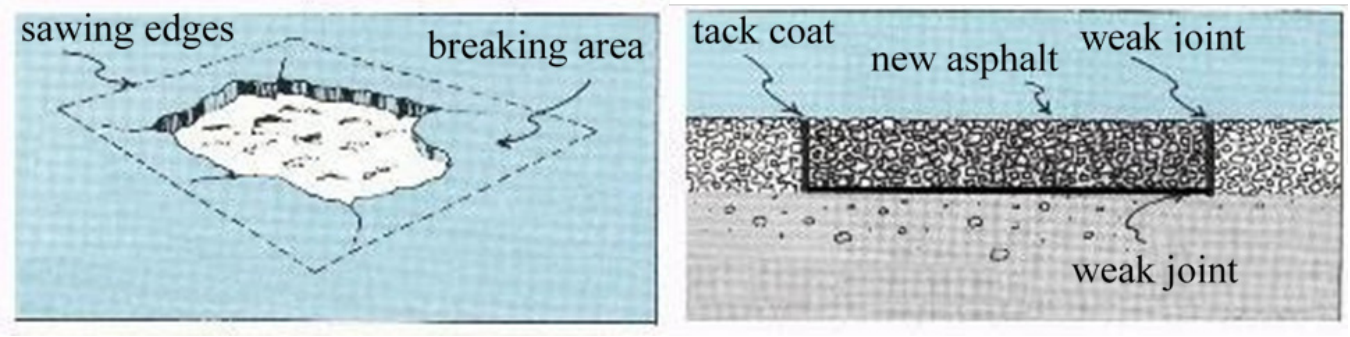


Figure 3: Traditional pothole repair method

Hot-in-place recycling patching technology for pothole repair is sawing and breaking-free. It uses heat to soften the asphalt on the road surface while retaining and using the original asphalt, so the asphalt on the original side and lower surface is also hot. When laying new hot asphalt, both the new and original asphalt are at a high temperature that is close to each other, As a result, a good thermal bonding effect can be achieved, and the asphalt is fused together in a manner similar to welding. This reduces the generation of weak interfaces and gaps, and the strength can be improved. Like a newly-paved road, it is difficult for the pothole to reform, as shown in Figure 4.

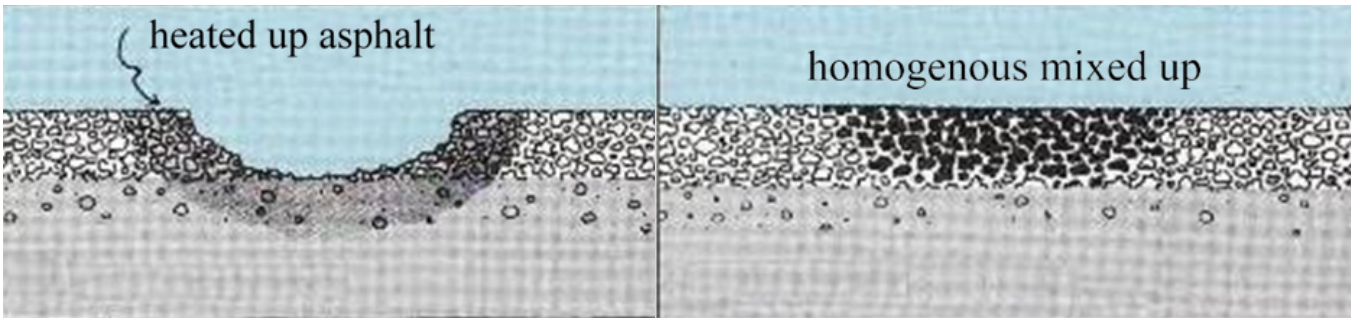


Figure 4: Hot-in-place recycling patching technology for pothole repair

Construction Process

The construction process of the hot-in-place recycling repair using the PM220 is shown in Figure 5, whilst the self-check form for hot-in-place recycling patching projects is provided in the Appendix. The process is as follows:

- Drive the repair vehicle to the damaged location, start the power supply and hydraulic system of the equipment, and lower the transformable heating panel to heat the road surface.
- After softening the asphalt on the surface, close the transformable heating panel, lay down the iron rake, and start the self-propelled iron rake to scarify the road surface.
- Spray emulsified asphalt.
- Open the dual hoppers with the heating and keeping functions and fetch new asphalt mixes.

- Add new asphalt mixes to the road surface.
- After manual levelling, use a VR50 single-drum vibratory roller to compact the repaired road surface
- Open the road to traffic after the road surface cools down.

(a) (b) (c)

(d) (e) (f)

Figure 5: Hot-in-place recycling repair unit PM220 operation process

Cost-benefit Analysis of Hot-in-place Recycling Patching Technology

The construction cost and production capacity of the PM220 is analyzed as follows:

- Materials: 1.7 kg of liquefied petroleum gas (LPG) (fuel consumption is approximately 1 kg/m^2). The average spraying amount of emulsified asphalt is approximately 0.5-1.0 L/m^2, and the new asphalt mixture is approximately 30-40 kg/m^2 (500 mm surface course).
- Three to four workers: drivers, equipment operators, construction workers.
- A single repair area ranges from 2-10 m^2, and it takes about 20-50 minutes. If the repaired area is less than 4 m^2 in area, it takes only 20-30 minutes to complete the entire repair work.
- One PM220 loaded with new asphalt mixes can be repaired: a volume of 2 m^3 insulation silo can hold 3 t of hot asphalt mix, which can be used to repair an area of about 70 m^2.
- The number of repairs per day depends on the concentration or dispersion of the damaged locations. If the damaged locations are relatively concentrated and there is no need to continuously move the equipment, then large-area repairs can be conducted. An area of 10 m^2 can be repaired at one time, which takes about 20-50 minutes. It is estimated that the daily production capacity is about 40-60 m^2 (deducting workers' rest time). If the damaged area is small and scattered, it is difficult to quantify the number of repairs in a day.
- The unit price of the PM220 hot-in-place recycling patching technology is approximately TWD 860/m^2 (USD 28/m^2).

Case Studies

Hot-in-place recycling patching technology has been widely used on urban roads in Taipei City since it was introduced to Taiwan by the Taipei City Government in 2016. This technology is similar to the mechanism of an 'iron'. It provides a highly-efficiency, energy-saving, and environmentally friendly construction method. It is suitable for repairing road surface damage such as potholes, alligator cracking, bumps, rutting, etc. Examples of the use of the technology in Taipei City in recent years, which demonstrate the practical achievements of the method, are shown in Figure 6.

(a) construction area
2.1 m * 3.5 m = 7.35 m^2

(b) construction area
1.7 m * 1.9 m = 3.23 m^2

(c) construction area
(1.7 m * 1.9 m) * 2 = 6.46 m^2

(d) heating depth = 40 mm
construction area
1.9 m * 1.7 m = 3.23 m^2

(e) construction area
1.7 m * 1.9 m = 3.23 m^2

(f) construction area
1.7 m * 1.9 m = 3.23 m^2

Figure: 6: Case studies of hot-in-place recycling patching technology application in Taipei City

Conclusions

Hot-in-place recycling patching technology is one of many road patching technologies. It has the advantages of low cost, low pollution, high efficiency, and high quality. The Taipei City Government continues to guide road contractors to introduce new construction methods and new equipment into road repair works, trial various new materials and new technologies, identify the best repair method in order to extend the service life of roads, and to provide travellers with a more comfortable, smooth, convenient, and safe road environment.

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Appendix: Self-check Form for Hot-in-place Recycling Patching

Project				
Sub-project	Hot-in-Place Recycling Patching		File No.	
Third party			Date of examination	YYYYMMDD Time:
Location				
Construction procedure	□ before construction	□ during construction	□ after construction	
Results	【○】approved	【×】deficiencies/to be corrected	【/】not applicable	
Check item	Check standard of design drawings and specifications (quantitative/qualitative)		Actual status (describe in value)	Result
Supplier checked?	Reference (File No.)			
Mix design checked?	Reference (File No.)			
Testing data for asphalt concrete	Reference (File No.)			
Environmental survey data (marking lines, induction coils)	current situation photos, records			
No of construction on rainy days at the construction site	The temperature is above 10°C, the background photo			
Traffic safety facilities and traffic conductors around the construction site	Set up according to the regulations? Security personnel are present?			
Ditch cleaning hole (galvanized grille) covered?	Already covered			
Heating and milling for heating machine	Heating 4 cm below the pavement surface up to 170°C, on-site photos			
Old materials and puffy, bad materials, sundries, etc. of the subgrade are removed, dry and free of water accumulation	On-site photo of site showing clean and dry			
Spray emulsified asphalt	Evenly apply the tack coat on the repaired area and the vertical section of the original surface course			
Asphalt mixes	No segregation			
Temperature of asphalt mixes	120°C≦ temperature ≦163°C			
Use compaction equipment to roll to the specified evenness	The height difference shall not be greater than 0.6 cm			
Pavement cooling	Open to traffic when the temperature is below 50°C			
Road cleaning	Asphalt residue removed			
Results of Defect Re-examination: ☐ Complete Improvement ☐ Incomplete Improvement, fill in Item _____in "Non-conforming Product Control Summary Form" to track and improve Date of Re-examination: Title of Re-examiner: Signature:				
Remarks: The checking standards and actual checking situation should be specific and clear (for example: the brickwork must be opaque after completion) or quantified size (for example: brick joints 7 mm ~ 10 mm). Mark "○" for those who pass check, "×" for those who fail, and "/" for items that do not need to be checked. Serious deficiencies, deficiencies in which on re-examination failed to complete the improvement in time, should fill in the "Non-conforming Product Control Summary Form" for tracking and improvement, this form can be archived first. This form shall be verified and recorded by the on-site engineer or foreman after on-site checks.				
Field Engineer (Examiner) Signature		Worksite Directors (Person in Charge of Worksite) Signature		

A Case Study of a Capillary Barrier System for Resilient and Sustainable Slopes

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Introduction

Residual soil and weathered rock slopes are typically found in mountainous and hilly terrains in most tropical regions such as Thailand and other ASEAN countries. These earth slopes are often in an unsaturated condition with negative pore-water pressure or matric suction. The presence of matric suction is a favorable condition because it has a beneficial effect on the shear strength of unsaturated soils and thus increases the stability of slopes. However, when rainfall infiltrates into the slope, the pore-water pressure increases and the matric suction decreases, thus reducing the stability of the slope. This phenomenon causes the slope to become more prone to failure, which is commonly known as rainfall-induced slope failure. It is one of the most destructive natural disasters; they are often random and sudden events that are hard to predict.

According to Polemio and Petrucci [1], rainfall is the main cause of landslides and slope instability. Rainfall-induced slope failures and surface erosions have been increasingly becoming more severe in Thailand and many other ASEAN countries in the tropics due to more frequent extreme events and climate change impacts. A photo of slope erosion and failure at Highway No. 1192 in Chiangmai Province is shown in Figure 1.

Figure 1: Slope erosion and failure at Highway No. 1192, Chiangmai Province

Slope erosion and subsequent failure impacting on the performance and life cycle costs of engineering infrastructures is a global issue. With the increasing severity of natural disasters, limited government budgets, and global concern about environmental issues, the provision of climate-resilient-sustainable infrastructure can help increase the resilience and performance of engineered infrastructure as well as improve the natural ecosystem. The key to the implementation of resilient infrastructure requires an understanding of resilient design, adaptation

strategies, evaluation methods, the vulnerability of infrastructures, and the monitoring performance parameters.

A natural solution to the problem involves the use of vegetative cover placed on top of the capillary barrier system (CBS). It is becoming an attractive slope stability application because it is a lower cost, higher sustainability, more environmental-friendly measure which provides improved aesthetics compared to traditional concrete-based solutions.

A CBS is a two-layered cover system that consists of an upper finer-grained layer overlying a coarser-grained layer. Its design is based on unsaturated soil mechanics. The CBS can effectively improve slope stability during a rainfall event by maintaining the desirable condition in a slope and thus mitigate rainfall-induced landsliding hazards. It is also possible to use marginal materials and local products such as biochar, biowaste,and reclaimed and recycled materials. Although CBS offers an innovative solution to this important practical problem, it has been rarely applied in the USA and ASEAN countries.

Because of the lack of work conduxted into the performance of the nature-based solutions in different and changing climates, there is a need to investigate the performance and effectiveness of CBS as a sustainable mitigation to overcome rainfall-induced landsliding hazards under tropical climatic conditions with high rainfall intensities especially in Thailand and ASEAN countries.

Capillary Barrier System (CBS)

The use of capillary barrier systems as an effective slope stabilization system has recently gained more interest globally [2-4]. Operating on the principles of capillarity and hydraulic conductivity, the CBS employs a two-layered system consisting of a coarse-grained layer underlying fine-grain layer (Figure 2). The coarse-grained layer, positioned on the protected slope, has lower permeability when unsaturated, effectively inhibiting infiltration into the slope through this layer. Meanwhile, the fine-grained layer located above absorbs moisture from rainwater infiltration, due to its higher unsaturated permeability, and redirects seepage downslope until its capacity limit is reached, surpassing the cross-over suction threshold. This system has been continuously developed and investigated in several slope stabilizations and erosion control systems [5-12]. It can be effectively used to improve slope stability during rainfall by maintaining matric suction in the slope [12] and hence mitigate rainfall-induced slope failures [5-7].

In Thailand, an innovative approach in the use of CBS has been taken by incorporating biochar in the fine-grained layer and reclaimed asphalt aggregate (RAA) in the coarse-grained layer. This

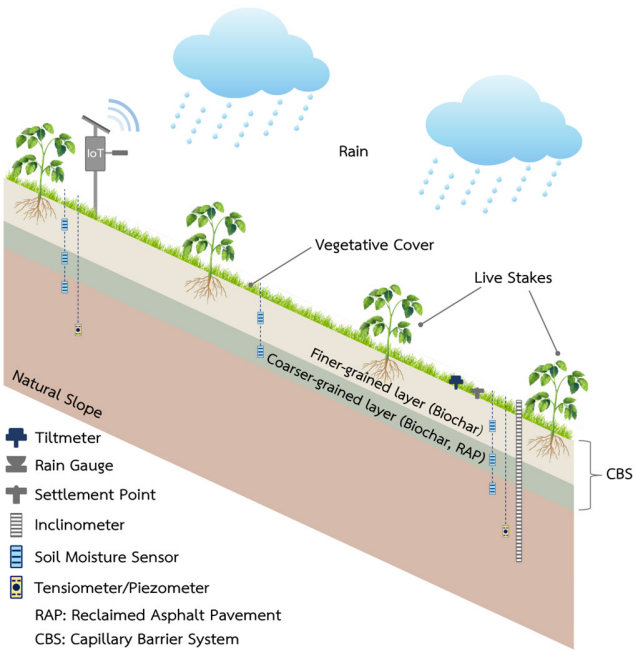

Figure 2: Capillary barrier system (CBS)

approach offers several benefits. Firstly, the biochar acts as a growth promoter for plants in the upper fine-grained layer, while its highly porous structure helps retain moisture. This contributes to improved vegetation and water management on the slope. Additionally, the use of RAA, which is a hydrophobic coarse-grained material, serves as an additional barrier to prevent infiltration into the protected slope. By employing biochar-amended soil and RAA, the approach addresses the challenge of water infiltration effectively while at the same time being able to maintain the ecological value of the slope.

Moreover, the integration of RAA in the construction process aligns with sustainable practices by reusing waste materials. This approach not only reduces the volume of waste products but also aids in the rehabilitation of highways. It presents a viable solution that contributes to a circular economy. It is noteworthy that the biochar utilized in this study was derived from corn cobs obtained from corn plantations in the northern part of Thailand. Typically, corn cobs are considered to be residues from corn cultivation and are disposed of through open-air burning, which leads to air pollution. By repurposing these corn cobs as biochar, its use not only offers a circular solution to the management of waste materials but also it contributes to carbon sequestration. The mixing of biochar with soi helps prevent soil erosion while aiding in carbon capture. The incorporation of biochar and RAA in CBS in Thailand showcases a multi-faceted approach that enhances plant growth, the retention of moisture, and slope protection. Furthermore, it embraces sustainability by repurposing waste materials and mitigating environmental concerns, e.g. air pollution and soil erosion.

Experimental Section

To investigate the performance of various natural soil covers, an experimental section was constructed at km post 11+500 of Highway No. 1192 in Chiangmai province, in the northern part of Thailand. The geology of this area consists of granitic rock which typically decomposes to silty and clayey sand. The residual soil is highly erodible and severe rills, sheets and gullies are frequent in the area, often leading to shallow (< 1.0 m) translational soil slide at the cut slope along the route.

A comprehensive investigation of the experimental section included UAV surveys for accurate topographical mapping, geophysical surveys, ground-water aeration sound surveys, and Kunzelstab penetration tests. Details of site investigation are presented in Figure 3. The cut slope was primarily composed of weathered granite that had decomposed into clayey sand (SC) with a plasticity index ranging from 9 to 18. The loose soil mantle thickness varied across the slope, measuring approximately 1.0-1.5 m at the slope crest and ranging from 0 to 0.6 m at the slope toe. Notably, the investigation revealed the concentration of groundwater and seepage around the slope toe, which aligned with the visual observations of soil erosion mechanisms observed on-site.

Based on the site investigation, a comprehensive understanding of the site conditions and characteristics was achieved. The findings not only validated the visual observations of soil erosion but also provided important insights into the soil composition and groundwater behavior along the slope. This information is crucial for developing effective strategies to address erosion issues and implement appropriate slope protection measures. As shown in Figure 4, a series of screw piles (76 mm in diameter, 1.0 m spacing and 1.6 m deep) was installed at the slope toe which acted as a retaining structure for flapped soil bags with vegetation (Bougainvillea). This toe strengthening was an essential element for achieving slope stabilization as indicated by the high seepage zone and severe erosion near the slope toe. The upper

part consists of three kinds of soil covers: VS – vetiver system, ECB – erosion control blanket, and CBS – capillary barrier system.

Figure 5 illustrates the visual appearance of the section as various treatments were undertaken at different stages of construction, whilst Figure 6 presents the monitoring results obtained from the instruments installed at the site. The data clearly indicates that the implementation of CBS (specifically, the utilization of biochar-fine-grained soil in geocell overlying coarse-grained RAA) effectively preserved soil moisture in the fine-grained layer while maintaining optimal soil suction in the underlying soil. The visual observations, in conjunction with the instrumentation results, demonstrate the superior performance of CBS (with biochar top soil) compared to alternative systems such as erosion control blankets and vetivers.

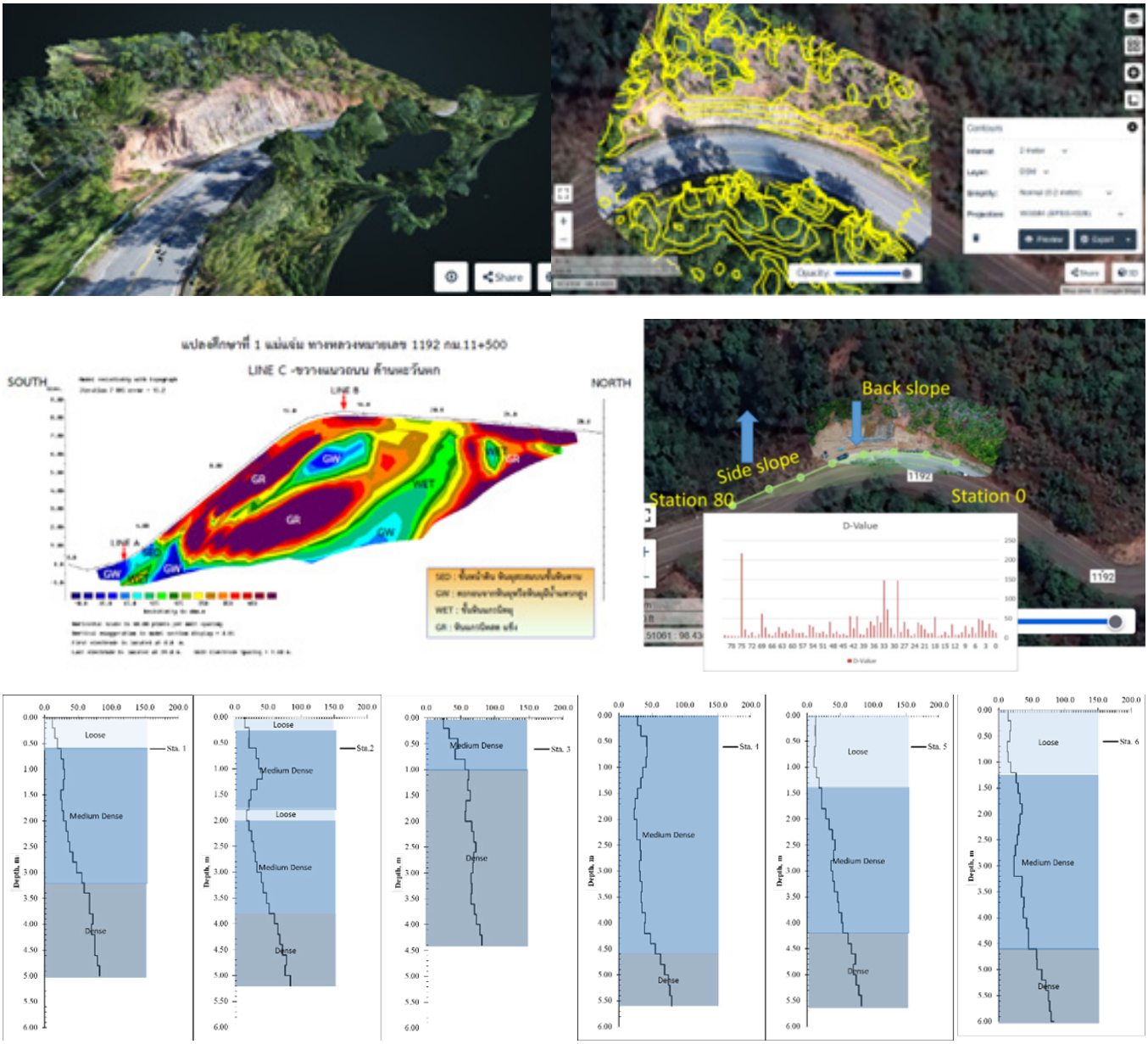

Figure 3: Details of site investigation

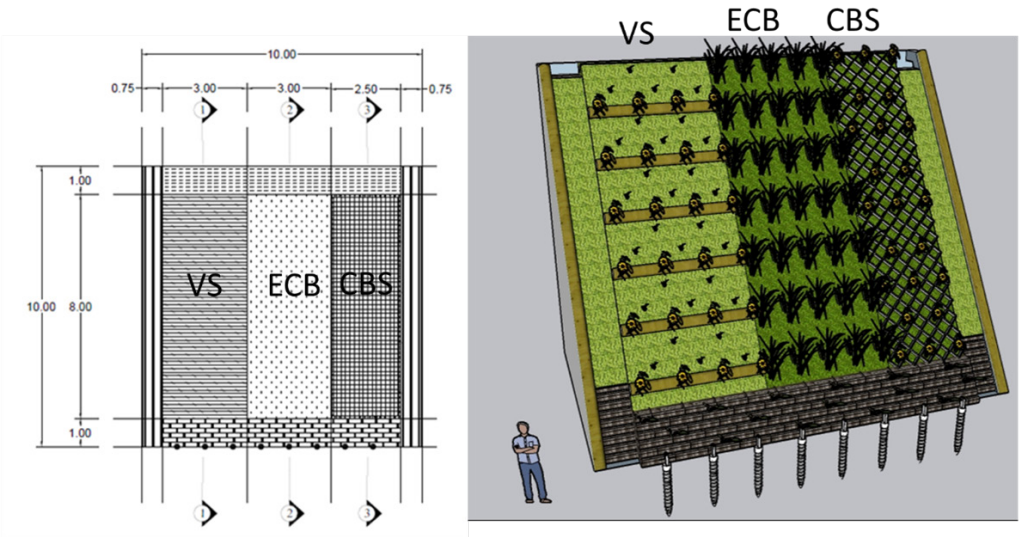

Figure 4 Experimental section at Highway No. 1192, Chiangmai province.

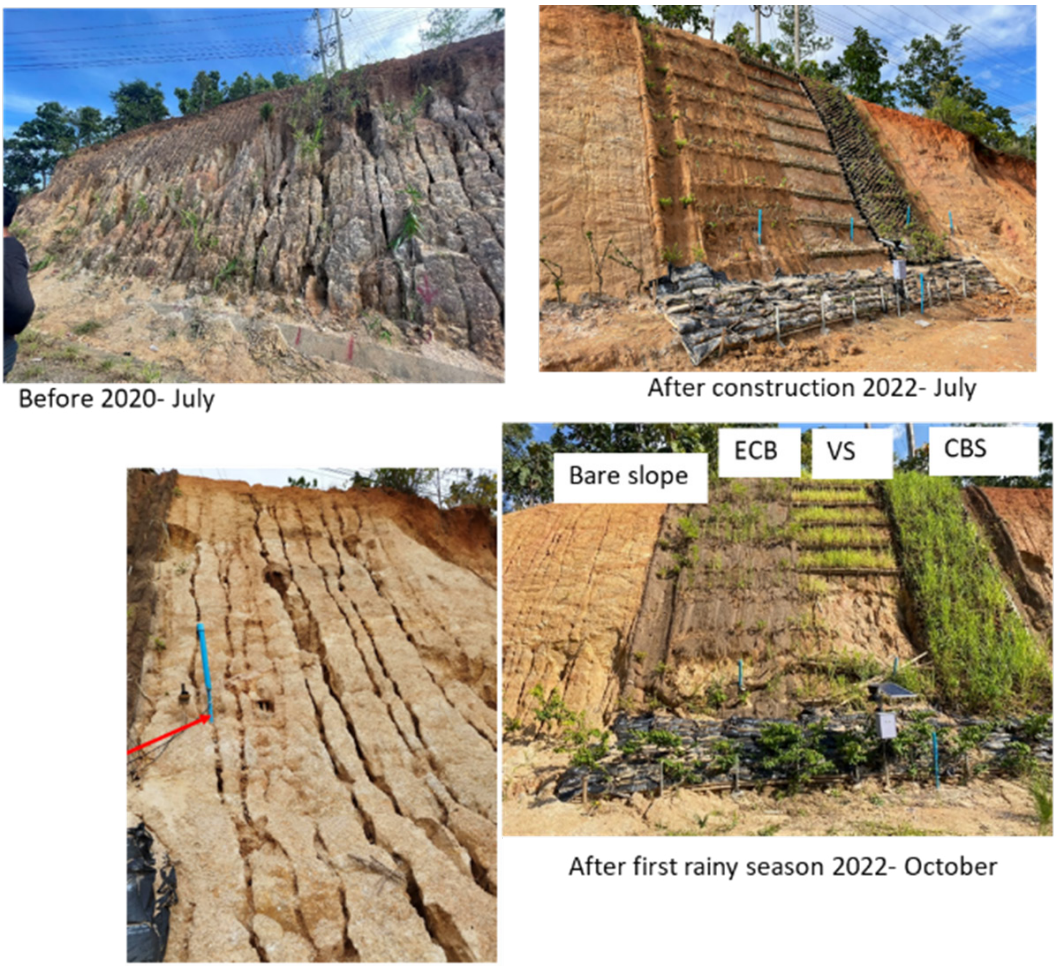

Figure 5 Different slope treatments at various stages of construction

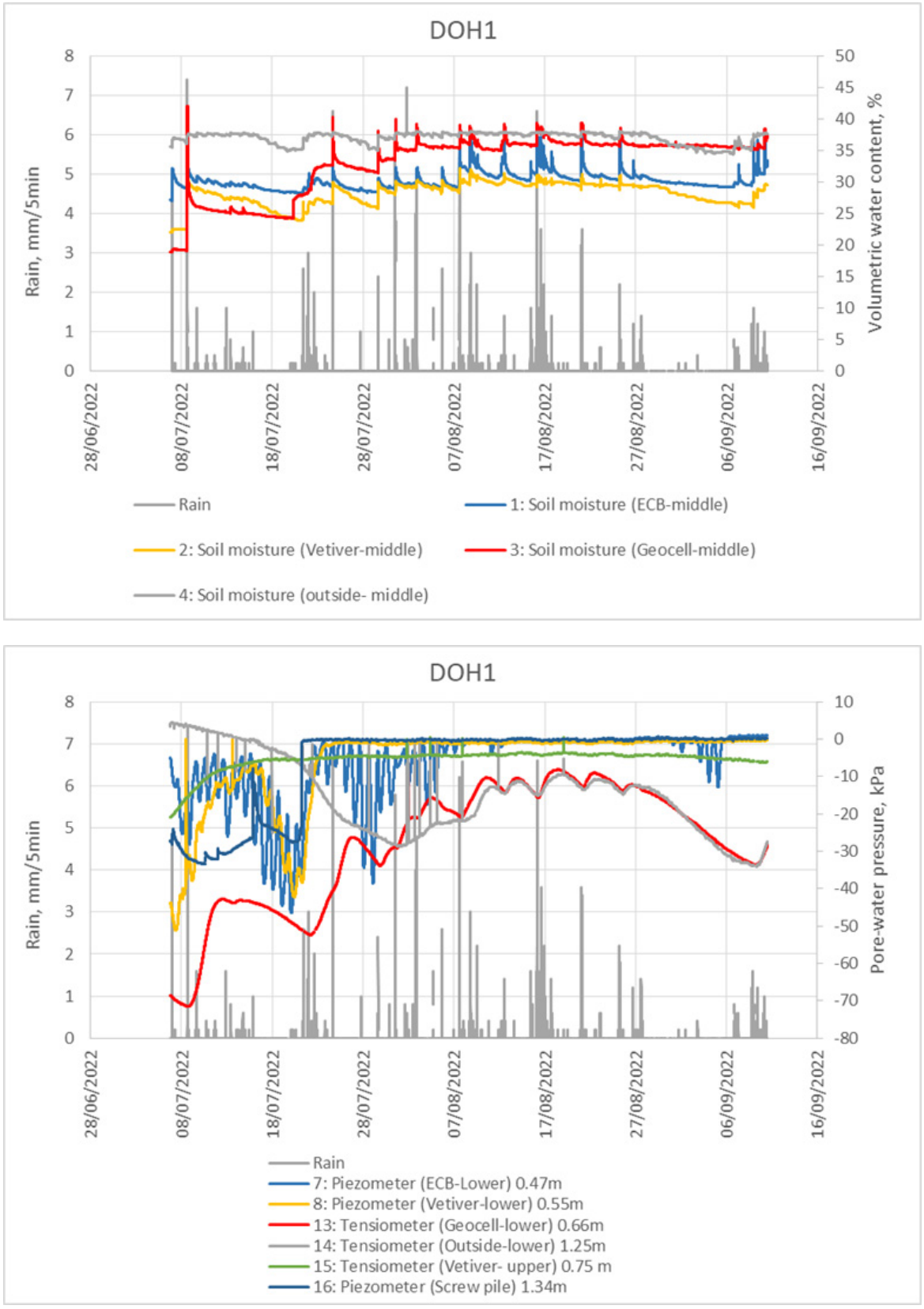

Figure 6: Results of monitoring obtained from instruments installed at the site

Conclusions

This article introduces a capillary barrier system (CBS) designed to mitigate erosion and improve slope stability. The CBS incorporates biochar-amended soil as a fine-grained layer and reclaimed asphalt aggregate as a coarse-grained layer. It was demonstrated in an experimental section along the cut slope of Highway No. 1192, Chiangmai Province, that the biochar CBS outperformed other soil covers, e.g. the vetiver system (VS) and erosion control blanket (ECB).

The outcome of this study provides a natural solution for slope resiliency and sustainable mitigation to rainfall-induced slope failure and surface erosion under Thailand's tropical climatic conditions. The application of vegetative covers placed on top of the CBS helps improve resilience and reduce the risks from extreme weather and climate change. Recommendations, guidelines, and criteria for this slope stability application for the prevention of rainfall-induced slope instability can be further developed based on the performance and effectiveness assessment of two-layered cover systems in minimizing infiltration from rainwater into unsaturated slopes and in maintaining negative pore-water pressures during the low and high intensity rainfall periods.

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The Muar Trial Embankments Programme

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Background

When Lembaga Lebuhraya Malaysia (LLM) initiated the construction of the North South Expressway in 1984, there was considerable embankment subsidence in the stretches built over very soft soils. The subsidence magnitudes exceeded the performance limits conducive to safe high speed expressway usage. The subsidence also continued long after the completion of construction as evident on the road linking to the First Pulau Pinang Bridge. There were concerns that the subsidence would afflict a majority of the expressway, the construction of which had yet to commence.

LLM was soon overwhelmed with proposals and representations from specialist firms suggesting that the issues experienced would be eliminated with the use of their products/techniques. Some of these were proprietary in nature. This presented LLM with a great problem in terms of establishing what worked and what did not, as well as their true cost effectiveness.

Muar Trial Embankments

Given these issues, in 1986 LLM embarked on a major comparative study of various ground treatment techniques for construction of embankments on Malaysian marine clays. A piece of land over very soft marine clays was set aside to one side of the North South Expressway before Sungai Muar for the study. The programme was named the Muar Trial Embankments (MTE). LLM would construct the embankments and install and monitor instrumentation. The manufacturers of specialist products to be incorporated into study were required to supply and install them on complimentary basis. Each embankment over a treatment ground scheme was 50m long and 20m wide at the crest.

Every ground treatment process including the construction of the embankment had to be completed in 15 months and, thereafter, its performance over the ensuing 2 years monitored to evaluate the efficacy of the treatment scheme. The acceptance criterion was that the completed embankment construction under evaluation should not settle more than 100mm over the 2 years test period.

A total of 9 different ground treatment methods were implemented at the MTE with the construction of 13 full-scale embankments, with 4 having a final height of 3 m and 9 a final height of 6 m above the surrounding ground surface (MHA, 1989). This made the MTE programme the most varied and comprehensive embankment trials in the world. The programme included a control embankment each for 3m final height and 6m final height where no treatment were applied to the foundation. The 2 embankment heights represented commonly adopted roadway heights: 3m for low embankments over

water-logged and flood-prone ground and 6m for high embankment approaches to bridges. Details of the trials are presented in Table 1.

Table 1 Muar Trial Embankment Schemes (MHA, 1989)

	Trial Scheme ID	Ground Treatment Method	Intended Embankment Height (m)
1	3/1*	Chemical injection	3
2	3/2	None (Control)	3
3	3/3	Sand Sandwich	3
4	3/4	Geo-reinforcement and Vertical Drains	3
5	6/1*	Chemical injection	6
6	6/2*	Well-point preloading	6
7	6/3*	Electro-osmosis	6
8	6/4*	Prestressed spun piles	6
9	6/5*	Sand compaction piles	6
10	6/6	None (Control)	6
11	6/7	Vacuum preloading and Vertical Drains	6
12	6/8	Geo-reinforcement and Vertical Drains	6
13	6/9*	Vertical Drains	6

*Abandoned scheme

Of the 13 participating embankments shown in Table 1, only 6 could eventually be constructed to the status to allow their performances during the test period to be evaluated. The other 7 embankments failed prior to completion of construction.

Following completion of ground treatment process, monitoring for 2-year test period commenced in September 1989. Figure 1 shows the MTE in 1989.

Figure 1. Muar Trial Embankments in 1989 (Courtesy of Robert Hudson).

International Symposium on Trial Embankments on Malaysian Marine Clays

In 1989, LLM organized the International Symposium on Trial Embankments on Malaysian Marine Clays, which was held at the Saujana Hotel, Subang from 6 to 8 November to present the findings of the trials (MHA, 1989).

Monitoring Following Conclusion of the 1989 Symposium

In conjunction with a follow-up Symposium, International Symposium on Practical Applications of Ground Engineering for Embankments on Soft Soils, held in Kuala Lumpur in 2022, monitoring of the MTE was revived for a period of 2.5 years from November 2019 to June 2022. It can be reported that the recent

measurements shown that a high embankment scheme at the MTE had settled by as much as 4.1m since its construction in 1987. During the same embankment scheme's treatment period, it had settled 3.3m.

The latest monitoring results were presented at the 2022 Symposium (IEM, 2022). Table 2 summarises the latest measured settlement characteristics.

Table 2 Latest Settlement Performance at MTE (IEM, 2022)

Trial Scheme ID	Final Fill Thickness (m)	Settlement into Foundation Soft Clay from Sept. 1989 to End June 2022 (m)	Ongoing Settlement Rates from June 2020 to June 2022 (mm/30 days)
Scheme 3/2	3.93	1.371	1.211
Scheme 3/3	4.166	1.166	1.455
Scheme 3/4	4.753	1.075	0.960
Scheme 6/6	7.5	2.342	1.5219
Scheme 6/7	9.444	1.159	0.496
Scheme 6/8	8.43	2.616	1.612

Preservation of the MTE and Future Monitoring

The MTE is one of the only three known very long term surviving comprehensively instrumented trial embankments on soft clays in the whole world; the other 2 are located in Sweden. But the MTE is the only full scale embankments-testing programme in the world with a very wide variety of treatment techniques implemented into the same ground. It is also the only trial scheme with embankments constructed to 6m high. Both these features make the MTE the most unique full scale experimental embankments programme in the world.

Efforts are underway by LLM to have the MTE declared a National Heritage Site and then, ultimately, a World Heritage Site to ensure its preservation for the benefit of the engineering community.

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The Benefits of Independent Certification of Transport Infrastructure Products: The TIPES Scheme

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Background

Public and private sector transport agencies are increasingly seeking trusted, independent, fit-for-purpose assessments/evaluations of innovative and emerging products and new technologies. Often such products fall outside the scope of established standards and specifications and the independent certification by subject matter experts against a manufacturer/supplier technical claims for a product is often a good way of providing confidence in the composition, performance, and resilience of that product. Where a certificate is awarded, it has kudos and value and becomes compelling as a safe and reliable point of reference for designers, specifiers, procurers, and end-users, often a cross-functional coverage performed by transport agencies. If the assessment/evaluation process is consistently applied and recognised and supported, the end result can be a list/register of approved products. The need for multiple, often long-term field trials can also be significantly reduced.

This article provides a brief description of the Transport Infrastructure Product Evaluation Scheme (TIPES) scheme, its history, benefits, scope, an overview of the key elements, and recent developments. The article concludes by highlighting the necessary evolution of the scheme, which has seen practical updates to reflect contemporary changes in the provision and on-going management of transport infrastructure.

Brief History of TIPES

TIPES was developed and established in 2015 by the Australian Road Research Board (now the National Transport Research Organisation, NTRO[1]) on behalf of its member road agencies with the specific purpose of evaluating and certifying products falling outside the scope of established standards and specifications. It was established as, and remains, a national scheme, having received endorsement by: all Australian State and Territory transport agencies; the Institute of Public Works Engineering Australia Queensland (IPWEAQ), the Queensland Local Roads Alliance; the Western Australian Local Government Association (WALGA) and a number of high-profile private sector organisations with an interest in surface transport, e.g. mining companies.

[1] As ARRB's member road agencies have become transport agencies, the Australian Road Research Board (ARRB Group Ltd) rebranded itself as the National Transport Research Organisation (NTRO) covering roads, rail, ports and airports in 2022.

Benefits Accrued by All Key Stakeholders

The benefits of independent product evaluation and certification, as outlined in the earlier Background section of this article, are afforded across the key stakeholders that interface and communicate throughout the recognised stages of the transport asset lifecycle.

As the demands and pressures on transport agencies grow and rapidly change, technological advances and innovation in the products used are very necessary. In addition, the emergence and acceptance of true global economies have led to innovators, manufacturers and suppliers seeking wider and more lucrative markets for their products.

This gives transport agencies a considerable challenge – to keep abreast of innovative, new, and previously unknown but mature products, and then prior to their usage, gaining confidence that the products are going to perform, often over a life span of 20 or 30 years. This is a time-consuming and labour-intensive activity which is often repeated across a region or country owing to the absence of a harmonised approach and/or individual organisations being risk averse.

In deciding whether to use a particular product, transport agencies have historically relied on the technical claims made by the manufacturer/supplier of a product, perhaps supported by past case studies of successful usage and/or user testimonials. However, more than an informed 'leap of faith' is needed, and field-trials are often additionally required. This is time consuming, and it is also important to note that the manufacturer/supplier typically incurs the cost, often at a stage in the organisation's development where securing capital and cash flow are critical. This situation is magnified where a manufacturer/supplier is being faced with the prospect of conducting and financing a number of field trials, in some cases in adjoining geographical or administrative areas or regions. Duplication of effort and inconsistency in product adoption can lead to frustration, delays and in some cases, a very worthy and innovative product not reaching the marketplace or being used, in favour of what might be seen as a safer option.

Recognised, independent product certification schemes are therefore a more compact solution to remedy to this issue, where the supporting transport agencies accept the currency and outcomes of a consolidated schedule of product testing and ideally, a single compelling field trial.

How does TIPES Work?

TIPES is built on a robust, three stage framework:

- Stage 1 – Application
- Stage 2 – Evaluation
- Stage 3 – Certification

The standard Terms and Conditions of TIPES include a dedicated application proforma, to be completed by the product manufacturer/supplier seeking to go through the TIPES process. As well as generic company and product information, the applicant is required to set out its technical claims for product, based upon its intended/specified usage. The proforma also prompts the applicant when preparing a portfolio of supporting evidence, tuned to the technical claims for the product. The applicant submits the

documentation to ARRB, which then conduct a check on thoroughness and applicability. If compliant, the application can progress to Stage 2.

Under Stage 2, ARRB assembles a Product Evaluation Panel (PEP), comprised of independent industry recognised subject matter experts, researchers, and road agency representatives, as appropriate to the product's type and proposed usage. The PEP rigorously assesses the product, firstly considering the application and its supporting documentation. This will nearly always include technical data, laboratory testing results and previous usage field and case studies, where these are available. Where the PEP considers further information is required, this is sought from the applicant. Towards the end of Stage 2, the PEP will determine whether any additional laboratory testing, field trialling or pilot usage observation is required to enable it to agree whether the technical claims for the product have been fully met and the product is consistently fit for purpose. Progression to Stage 3 can only occur when the PEP recommends that the product is deserving of a TIPES Certificate and the process undertaken for that product has been validated by the TIPES Governance Board.

At Stage 3, a TIPES Certificate is physically issued, with the document setting out the terms and conditions of the issue, including any special/unique requirements. Certificates have a currency of three years. Should significant changes be proposed/made to the product's composition and/or usage, the manufacturer/supplier must contact ARRB and additional evaluation may be required. If the product and/or its usage remains constant throughout the three-year certification period, the product manufacturer/supplier may apply for renewal.

It is important to note that it is stressed to applicants that there is no guarantee that an application will lead to certification. Similarly, if ARRB receives concerns regarding the in-service performance of a certified product, then the TIPES Governance Board will investigate and ultimately has the power to withdraw certification.

Products awarded a TIPES certificate are listed on a specific register available through the ARRB website. Each product entry includes the product name, product category/sub-category, a summary of the technical claims for the product, the product manufacturer/supplier, and the certificate details (e.g. type, unique reference number, expiry date, etc).

Product manufacturers/suppliers are then able to use the TIPES certificate and position on the register as a marketing tool towards future procurement and usage by other road agencies or private sector road network operators.

What does TIPES Traditionally Cover and how is its Reach Changing?

Up until 18 months ago, the TIPES scheme was confined to products utilised in road infrastructure, e.g. pavement materials, geotechnical/drainage-related products, pipe systems, Intelligent Transport Systems (ITS) and across the disciplines of traffic control and traffic engineering.

However, the extensive recent consolidation in Australia of public road, rail, maritime and aviation agencies into one-stop, transport agencies means that the TIPES scheme can now be offered for infrastructure products across all of these modes.

ARRB has also taken the opportunity to launch a dedicated NTRO/ARRB Certification team as well as

extending the reach of TIPES beyond products to processes, services, and people (training). A brief explanation of each category is as follows:

Processes – where an innovator and/or manufacturing organisation seeks certification for a process which takes a product/s as inputs and produces a valued output. The output of a process may also be subject to its own TIPES product certification.

Services – where a service provider seeks certification for a tool or device which provides a data output, e.g. certification of a device that is then used to measure a road condition parameter which appears in a performance specification.

People (training) – where an employee or contracted worker can obtain certification for the undertaking of a certain specialist/critical task – e.g. a roadworker using a pneumatic breaker – or where a training provider seeks to have a training workshop or course certified.

This growth has only been possible due to the flexibility and robustness afforded by the original TIPES framework.

Recent Developments & the Future of Transport Certification in Australia

While TIPES certificates have demonstrated themselves to be highly compelling in product manufacturers/suppliers securing local approvals for usage, it has been found that a more streamlined process and optimum outcome can result from early, active engagement with transport agencies.

This is achieved by either of two ways:

1. The transport agency effectively acts as a 'sponsor' or 'supporter' at the early stages of the process, such that the transport agency's precise local needs and performance parameters are discussed, agreed, and documented, to ultimately be met by the product. This removes reliance on the applicant's claims. An example of this could be a transport agency having a particular interest in an innovative temporary traffic control device as a solution to a unique local issue: it liaises with the NTRO/ARRB, as the certifier, and the manufacturer/supplier, to agree in advance the evaluation criteria, which are likely to include a field observation or formal field trial.
2. The transport agency is keen to establish a list/register of certified products of a particular type, and works with the NTRO/ARRB, as the certifier, and ideally, 'the industry' (the range of product manufacturers/suppliers across the particular product type), to agree and document a local supplement to set out the technical usage, performance, testing and evaluation criteria to then be applied consistently to all applications. An example of this would be a transport agency wishing to establish a local list/register of certified coloured road surfacing treatments, with evaluation against the local technical supplement.

Again, these developments have only been possible due to the flexibility and robustness afforded by the original TIPES framework and the experience of the operation of TIPES over close to a decade. It has been found that TIPES certificates achieved through adopting one of the two contemporary approaches outlined above are accepted more widely by kindred transport agencies (i.e. other than the originating agency). Similarly, the evaluation parameters developed can also be used to stimulate interest across kindred transport agencies. This results in efficiencies through common acceptance, ultimately supporting national harmonisation in the future.

Australian National Harmonisation Framework

The aforementioned emergence of multi-modal transport agencies in Australia has led to a widened understanding and appreciation of other certification schemes operating outside of road network provision and management. Perhaps the primary and most mature example of this is rail, where Product Third-Party Assessment schemes (PTAs) and associated Approved Product Lists/Registers have been the norm for many years, and in many cases are mandated. These elements of certification are often referred to as 'type approval'.

In response, a harmonisation project was instigated by Transport for New South Wales (TfNSW) in 2021, with the objective of developing and piloting an agreed national framework for product certification, built upon ten core principles and which affords risk-based scalability.

The latter is particularly important, as it allows for innovative/new products which, on initial assessment, permit minimal safety and operational risk to be 'fast-tracked' into usage, whereas products seemingly presenting more obvious and acute levels of risk receive more in-depth consideration and assurance requirements. Four tiers of evaluation have been determined, ranging from a desk-top study to a requirement for a full, formal, long-term field trial of a product.

This national development has allowed NTRO/ARRB Certification to benchmark its TIPES process and protocols. Comprehensive alignment has been identified with the core principles and draft of the national framework. Crucially, NTRO/ARRB Certification is well positioned to be an external certifier to transport agencies, either using TIPES or through the development and/or management of a locally-developed certification framework/scheme.

The current draft national framework is due to be piloted late in 2023 and into 2024.

Closing Remarks

From its humble beginnings nearly a decade ago TIPES has provided the NTRO/ARRB with a platform to grow and strengthen its certification function into a dedicated team, NTRO/ARRB Certification. Experience has shown that flexibility in service offering has been, and remains, the key to allowing the team to help shape the way ahead in Australia as well as continuing to be well placed in supporting and serving transport agencies in the both the public and private sector in identifying and evaluating innovative and new products that afford properties of in-service performance and resilience. To manufacturers/suppliers of innovative and new products, especially where a technical specification does not yet exist, achieving certification opens opportunities and markets and can go a long way to reducing the need for multiple local approvals for usage and field trials.

The product approval model presented in this article is adaptable to all public and private sector transport agencies in REAAA member countries who are seeking trusted, independent, and fit-for-purpose assessments/evaluations of innovative and emerging products and new technologies.

Further information relating to the TIPES scheme can be obtained from the ARRB website (www.arrb.com.au/tipes)

Successful 119th REAAA Governing Council Meeting

The 119th Governing Council meeting was held on 9th May 2023 at the Carlton Hotel Singapore, in conjunction with the Dialogue Session Roads Less Travelled – "Navigating Challenges and Opportunities of Sustainable Road Development". The dialogue included a selection of presenters from Korea, Malaysia and Singapore. The presentations selected for the dialogue addressed the topics of "Navigating Challenges and Opportunities of Sustainable Road Development". The session was successful, with more than 60 participants attending including, President, Dr. Sung Hwan Kim, Vice President(s), Mr. Katsugi Hashiba, Dr. Ir Hedy Rahadian, Honorary Secretary-General, Ir. Mohd Shahrom Ahmad Saman, Honorary Tresurer-General, Ms. Nonon, and Council members from Indonesia, Korea, Japan, Malaysia, Taiwan, and the host country, Singapore. The YEP members and the secretariat members from the member countries also attended the dialogue.

Group photo: Presenters with President REAAA.

Council members also attended the dialogue.

Speakers and moderator

The 23rd Young Engineers and Professionals (YEP) meeting was held at LTA Hampshire Office (HSO) on 8th May 2023, before the Pre-Council meeting and the 119th REAAA Council meeting. The Pre-Council meeting was attended by President Dr. Sung-Hwan Kim, Vice President Mr. Hashiba Katsugi, Vice President Dr. Ir. Hedy Rahadian, the Honorary Secretary-General, Ir. Mohd Shahrom, Honorary Treasurer-General Mr. Nyoman of the Ministry of Public Works and Housing Indonesia and secretariat members from REAAA, Korea Road Association and Indonesian Road Association Development. Several important decisions were made and key proposals were discussed at the Pre-Council meeting and endorsed at the Governing Council meeting.

Members at the 23rd YEP meeting.

The REAAA Governing Council meeting was successful, with 27 of the 36 Council members attending in hybrid (physical and online). A total of 50 delegates from Australia, Indonesia, Japan, Korea, Malaysia, Philippines, Singapore, Taiwan, and Thailand attended the meeting physically and 20 participants joined the meeting online platform.

The President extended his sincere appreciation to all Council members for giving up their time to attend the meeting. The President conveyed apologies on behalf of Council members who were unable to join the meeting.

Issues addressed at the meeting included preparation for the 120th Council meeting and associated events. The meeting also endorsed the Terms of Reference (TOR) for the Smart Highway Award, preparation for the REAAA 50th anniversary celebration, and collaboration with PIARC, IRF, and UN ESCAP/ADB.

It was also noted at the Council meeting that the Finance Committee requested the local Chapters and Council members help to collect remittances of current and overdue membership subscriptions. It

was agreed that all Council members would promote REAAA and recruit a minimum of 3 institutional members in 2023. Council members were also asked to provide any suggestions to improve REAAA's finances.

The 120th Governing Council Meeting, to be jointly hosted by the Ministry of Public Works and Housing, the Republic of Indonesia, and the Indonesia Road and Development Association (IRDA) from 23rd until 27th August 2023 in Labuan Bajo in conjunction with the REAAA 50th Anniversary.

The host has planned various events to celebrate the presence of the guests including, a technical program, meetings, and farewell dinners.

Group photo : 119th Governing Council meeting in Carlton Hotel, Singapore, and Hybrid.

The hosts of the 119th meeting also organised a tour fo the city and they enjoyed the beautiful scenery, cleanliness, and road transport system in Singapore.

They provide the opportunity to visit LTA Intelligent Transport Systems Centre (ITSC), where hundreds of sensors and cameras gather data on traffic flow, travel time and road demand over Singapore's 160km network of expressways and road tunnels. Called the Intelligent Transport Systems (ITS), this web of data collection technologies forms a dynamic, real-time picture of the ebb and flow of a population moving through their daily lives and use of sensors, traffic & control systems and data analytics, to maximise road network efficiency and manage traffic flow.

The participants also participated in a technical tour at Samwoh Smart Hub. As a champion of sustainability in construction, Singapore's home-grown engineering and construction firm, Samwoh Corporation, took its "green" journey to another level with the construction of the Samwoh Smart Hub, the first positive energy industrial building in Singapore. The technical visit also includes a description of the various types of recycled construction materials and the range of services they provide such as pavement testing and monitoring.

At the end of this technical visit, the participants were divided into two groups with President Dr. Kim and other Council members participated in a round of golf at Sentosa Golf Club. Sentosa Golf Club prides itself as the world's first carbon-neutral golf club as part of its sustainability commitment. One of the top Championship courses in Asia and ranked within the Top 100 of Golf Digest's World's Greatest Golf Courses, the Serapong has been the host venue for the Singapore Open since 2005.

The President, on behalf of the Governing Council, extended his sincere thanks to the Land and Transport Authority Singapore and REAAA members in Singapore, and whoever else contributed to the success of the meeting and associated events.

REAAA Secretariat
June 2023.

Participants upon arrival at Samwoh Smart Hub.

REAAA Technical Committee Working Committee C4WC1: Pavement Technology

Dr. Keizo Kamiya
Chair, REAAA Working Committee on Pavement Technology

Progress with Compendium

Working Committee C4WC1 is currently working on a project to investigate the practices or challenges used in member countries to improve the life of damaged pavements, by focusing on factors such as structure, mix design, materials, repair techniques, etc. Case studies of practices that have been used, or tried, to rehabilitate damaged pavements in urban or rural areas are being collated.

To date, case studies have been submitted by Australia, Taiwan, Japan, Singapore, Malaysia and Thailand.

The Chair hosted an online meeting of the PTC on 8th May 2023 where he asked those countries who had not yet submitted case studies to please do so. Council members are also asked to ensure that contributions are submitted.

Responses will be collated and a draft report for comment by the Working Committee will be prepared by the end of July 2023, with the draft of the final report for endorsement by the Governing Council finalised by the end of September 2023.

KLIPS 2023

The Kuala Lumpur International Pavement Seminar 2023 (KLIPS) was held on 7th – 9th March 2023 in conjunction with a meeting of PIARC Technical Committee TC.4.1 (Pavements). The theme of the seminar was 'Leveraging Innovation Towards Green Technology and Resilient Pavement'.

A presentation by the Chair of the REAAA Pavement Technology Committee (PTC), Dr. Keizo Kamiya, formed part of the opening ceremony. Papers were presented in four technical sessions. The papers presented by representatives of REAAA were as follows:

- Recycling technology
  - Recycling opportunities for granular pavements in new and rehabilitated pavements from Australia
    Dr. Didier Bodin, Australia
- Recycling practices
  - Hot-in-place recycling patching technology in Taipei City
    Jia-Ruey Chang, Taiwan
  - Study of the effects of repeatedly recycling asphalt pavements in Japan
    Dr. Atsushi, Japan

- Use of steel slag aggregates and crumb rubber modified bitumen in asphalt mixes
  Than Than Nyunt & Leon Ying Fong, Singapore

- Pavement resilience: issues and challenges
  - Managing the impact of overloaded heavy vehicles on pavement service life using a high-speed weigh-in-motion system on the PLUS expressway
    Khairul Anuar Ahmad Affandi, Malaysia
  - A hybrid design concept for pavement resilience of National Highway No. 117: Nakornsawan-Nongtao, Thailand
    Dr. Auckpath Sawangsuriya, Thailand

- Innovative pavement resilience practices
  - Formulating cold mix standard for pothole patching works in Malaysia
    Ir. Hamzah Hashim, Malaysia
  - Performance of all-weather cold mix asphalt reinforced with Aramid and Polyolefin Muhd Azim Abdul Rahaman, Malaysia
  - Development of longitudinally-grooved rough surface pavement
    Dr. Shigeki Takahashi, Japan

After KLIPS, thanks to Mr. Sharp's coordination, Australia provided three more possible case study reports.

23rd REAAA Young Engineers & Professionals (YEP) Meeting

Ir. Hamzah bin Hashim
Chair, REAAA YEP Working Committee

The 23rd REAAA YEP meeting was held on 8th May 2023 at the offices of the Land Transport Authority of Singapore (LTA). As customary, YEP meeting was organized together with 119th REAAA Governing Council meeting and other associated events planned by the LTA. This also the first time that a YEP meeting had been conducted in Singapore since the YEP was established in 2012. Singapore is one of the international hubs for many airlines and airlines from REAAA member countries fly direct to Singapore making it a smooth traveling experience for the members.

LTA hosted the meeting in their Digital Lab at LTA Hampshire office in an effort to promote LTA business and initiatives in transportation, roads and highway in Singapore. The lab has only recently started operation. It has a modern outlook and up-to-date equipment which encourage the staff to be more creative and productive. YEP members and observers were impressed with the setup of the lab. The Chairman of YEP Committee, Ir. Hamzah bin Hashim from Malaysia, started the meeting by providing a historical background of YEP followed by ice breaking session. Members from Singapore, Korea, Philippines and Indonesia attended the meeting, while members from Japan, Australia, Taiwan and Malaysia attended virtually. Following the introduction, each country presented updates. This agenda allows YEP members to share current activities with others and replicate back home where suitable. The meeting also discussed YEP Technical Working Group C4WC4. The main objective of the working group is to encourage members to network with all REAAA countries and provide YEP with an opportunity to present at international events in the region. Discussion then centered on the Asia Australasia Road Conference and the 50th Anniversary of REAAA. The YEP from Indonesia presented the plan for the proposed YEP meeting to be held during the 50th Anniversary celebration. Topic "IoT for Road Design & Construction" was chosen to be the meeting theme. YEP will prepare presentations that address this topic at the next meeting. Meeting then continued with technical presentation from Ms. Nyunt Than Than, Assistant Chief Specialist, Pavement Engineering Singapore. The title of her presentation was "Analysis and Visualisation for Pavement Condition Assessment Using Network-Level Survey Data".

The meeting concluded with a photo session. YEP thank the host country for their great arrangement of venue, and overall planning for this REAAA event. A pleasant memory of REAAA event in Singapore shall be scripted in REAAA history.


Meeting
02:45:07
Chat
People
Raise
React
View
Rooms
Apps
More
Camera
Mic
Share
Leave
KS
Kieran Sharp (Guest)
Yu-Min Su (CRF) (Guest)
YEP Malaysia (Guest)
IS
Isnaini S (G...
D
Della_INA (...
JI
julia INA (G...
広地 豪
James Grenfell
前原 慎也
JKR Tou (Guest)
Kitaguchi Osamu(Japanese YEP,C-NEXCO) (Guest)
小林 弘昌
4:02 pm

Asia Australasia Road Conference 2023

Date & Day	Time (GMT+8/ WITA)	Activity	Participants	Location
Wednesday, 23rd August 2023	18.30 – 21.00	The 24th REAAA YEP Meeting "IoT for Road Design and Construction"	REAAA YEP Meeting Participant	Meruorah Hotel
Thursday, 24th August 2023	09.00 – 12.00	The 120th REAAA Council Meeting	REAAA	Meruorah Hotel
	12.00 – 13.00	Break	All participants	Meruorah Hotel
	13.00 - 16.30	Parallel room:		
		The 13th REAAA HORA Meeting "Standardized Asian Highway and Road Development"	REAAA	Meruorah Hotel
	17.00 – 20.00	Welcoming Reception	REAAA, PIARC, and Executive	Meruorah Hotel
Friday, 25th August 2023	08.30 – 09.00	Opening Cerenomy		
		Exhibition Opening	Limited Participants	Meruorah Hotel
	09.00 – 09.45	Keynote Speaker (Ballroom): 1. Investment and Technology Opportunity in Indonesia's New Capital City (Bambang Susantono, Ph.D - Head of Nusantara Capital City Authority)*	All participants	Meruorah Hotel
	09.45 – 10.30	2. Environmental Sustainability in Road Infrastructure (Dr. Sung-Hwan Kim - President of REAAA)	All participants	Meruorah Hotel
	10.30 – 11.15	3. Green Financing for Road Development (Nazir Alli - President of PIARC)	All participants	Meruorah Hotel
	11.30 – 13.00	Break	All participants	Meruorah Hotel
	13.00 – 17.00	Parallel room:		
		1. The 10th REAAA Business Forum Theme: Knowledge Sharing "The Implementation of Technology 4.0 to Deliver Sustainable Road Infrastructure"	State-Owned Enterprises & Business Partners	Meruorah Hotel
		2. Technical Session: Topic A: New and Innovative Pavement Design & Maintenance/ Road Pavement Recycling Topic B: Road Safety Topic C: Resilience and Disaster Management for Road and Climate Change Topic D: Geotechnics, Bridge, and Tunnel	All participants	Meruorah Hotel
	18.30 – 22.30	50th REAAA Anniversary Celebration	All participants	Meruorah Hotel

Date & Day	Time (GMT+8/ WITA)	Activity	Participants	Location
Saturday, 26th August 2023	09.00 – 09.30	Opening by REAAA Technical Committee	All participants	Meruorah Hotel
	09.30 – 12.00	Parallel room:		
		Technical Session	All participants	Meruorah Hotel
		*Continue previous session Topic A: New and Innovative Pavement Design & Maintenance/Road Pavement Recycling Topic B: Road Safety Topic C: Resilience and Disaster Management for Road and Climate Change Topic D: Geotechnics, Bridge, and Tunnel		
		*New session Topic E: Transport and Highway Planning, Geometric of Road, and Accessibility Topic F: Transport Administration and Strategic Improvisation of Project Management Topic G: Asset Management and Digital Technology in Road Network		
	12.00 – 13.00	Break		
	13.00 – 15.00	Technical Session (*continue previous session*)		
	15.00 – 15.15	Break		
	15.15	Technical Session (*continue previous session*)		
	17.30 – 18.00	Closing Ceremony	All participants	Meruorah Hotel
Sunday, 27th August 2023	09.00 – end	Parallel event:		
		1. Technical Visit (Labuan Bajo -Tanamori Road & Widening of Labuan Bajo - Waekelambu Road)	All participants	Labuan Bajo-Tanamori Road & Widening of Labuan Bajo-Waekelambu Road
		2. Cultural visit*	Optional via registration and the fee is exempted from registration fee	Komodo Island, Pink Beach, and Padar Island
		3. IRDA Senior Official Meeting	IRDA members	Meruorah Hotel

** to be confirmed*

For more information, please access this link:

linktr.ee/AARC2023

Organized by:

Supported by:

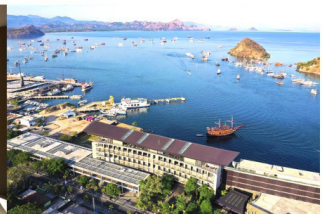
24TH REAAA YOUNG ENGINEERS & PROFESSIONAL (YEP) MEETING

The 24th REAAA YEP Meeting

Wednesday, 23rd August 2023
18.30 - 21.00 WITA (GMT +8)

Flores 6
Meruorah Hotel, Labuan Bajo, East Nusa Tenggara, Indonesia

REAAA YEP Meeting participant, council member, and observer



Proposed YEP Meeting Agenda

1. **Opening remarks**
   Chairman of YEP
2. **Welcome remarks**
   YEP Indonesia
3. **Updates from the representatives of YEP members**
4. **Presentation on REAAA C4WC4**
   Working Group on Young Engineers & Professionals

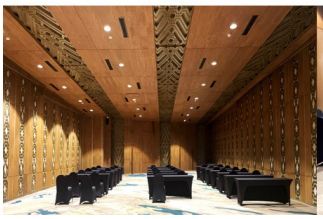
THE 120th REAAA COUNCIL MEETING

The 120th REAAA Council Meeting

Thursday, 24th August 2023
09.00 - 12.00 WITA (GMT +8)

Komodo 2 and Komodo 3
Meruorah Hotel, Labuan Bajo, East Nusa Tenggara, Indonesia

REAAA Council Members and observers



Proposed REAAA Council Meeting Agenda

1. **Welcoming remarks**
   REAAA President - Dr. Sung Hwan Kim
2. **Confirmation of Minutes of the 119th REAAA Council Meeting & Actions** (from previous meetings)
3. **Progress Reports: Chairmen's and Owners' reports**
   (further details can be discussed)

THE 10TH REAAA BUSINESS FORUM

BUSINESS FORUM EVENT COMMITTEE

Chairman Advisory Committee AARC 2023
Dr. Ir. Hedy Rahadian, M.Sc.

President of REAAA
Mr Sung – Hwan Kim

Chairman Organizing Committee AARC 2023
Dr. Ir. Nyoman Suaryana, M.Sc.

REAAA Business Forum Coordinator
Ms Lydwina Marchiela Wardhani

Chairman of 10th REAAA Business Forum
Mr Agung Fajarwanto

25th August 2023
13.00 - 17.00 WITA (GMT +8)

Ballroom Komodo 3, Meruorah Hotel

60 participants

REAAA 50TH ANNIVERSARY CELEBRATION

Golden Jubilee Gala Dinner

25th August 2023
19.30 - 22.30 WITA (GMT +8)

Ballroom Komodo 1, 2, 3
Meruorah Hotel, Labuan Bajo, East Nusa Tenggara, Indonesia

Estimated 600 participants

Proposed Agenda

1. **Welcoming speech by Host Country**
   Dr. Hedy Rahadian
2. **Opening speech**
   REAAA President - Dr. Sung Hwan Kim
3. **Speech by Guest of Honour**
   Ministry of Public Work and Housing - Dr. Basuki Hadimoeljono
4. **Performance by member countries**
5. Announcement of **Appreciation to REAAA long service Council Members, Fundraising and Appreciation to the Sponsors**
6. **Performance by Guest Star**
7. **Event closing and photo session**

OPENING CEREMONY & KEYNOTE SPEECH

Opening Ceremony

Opening Ceremony
Welcoming the honorable guests and participants, welcoming speeches, and exhibition opening by the host country - Dr. Hedy Rahadian

25th August 2023
08.30 - 11.30 WITA (GMT +8)

Ballroom Komodo 1, 2, 3
Meruorah Hotel, Labuan Bajo, East Nusa Tenggara, Indonesia

800 participants

**to be confirmed*

Topics and Keynote Speakers

1. **Investment and Technology Opportunity in Indonesia's New Capital City**
   Bambang Susantono, Ph.D - Head of Nusantara Capital City Authority*
2. **Environmental Sustainability in Road Infrastructure**
   Dr. Sung-Hwan Kim - President of REAAA
3. **Green Financing for Road Development**
   Nazir Alli -President of PIARC

Bambang Susantono, Ph.D
Head of Nusantara
Capital City Authority

Dr. Sung Hwan Kim
President of REAAA

Nazir Alli
President of PIARC

AARC 2023
Asia Australasia Road Conference

PUPR
SIGAP MEMBANGUN NEGERI

PIARC

ASIA AUSTRALIA ROAD CONFERENCE 2023 (AARC)

LABUAN BAJU - FLORES - EAST NUSA TENGGARA - INDONESIA

24TH - 27TH August 2023

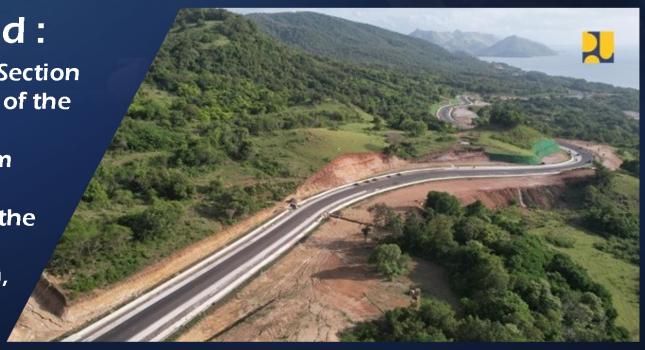
TECHNICAL VISIT

27TH AUGUST T 23

Labuan Bajo - Tanamori Road :

Construction of the Labuan Bajo - Tanamori Section of the road was built in 2022. The objectives of the development this section are :

1. Support the Labuan Bajo National Tourism Strategic Area (KSPN)
2. Support the connectivity and economy of the local community
3. Support the Special Economic Zones (KEK), as well as open access for isolated roads to the Golomori area



Labuan Bajo - Tanamori Road Sta. 19+000 :

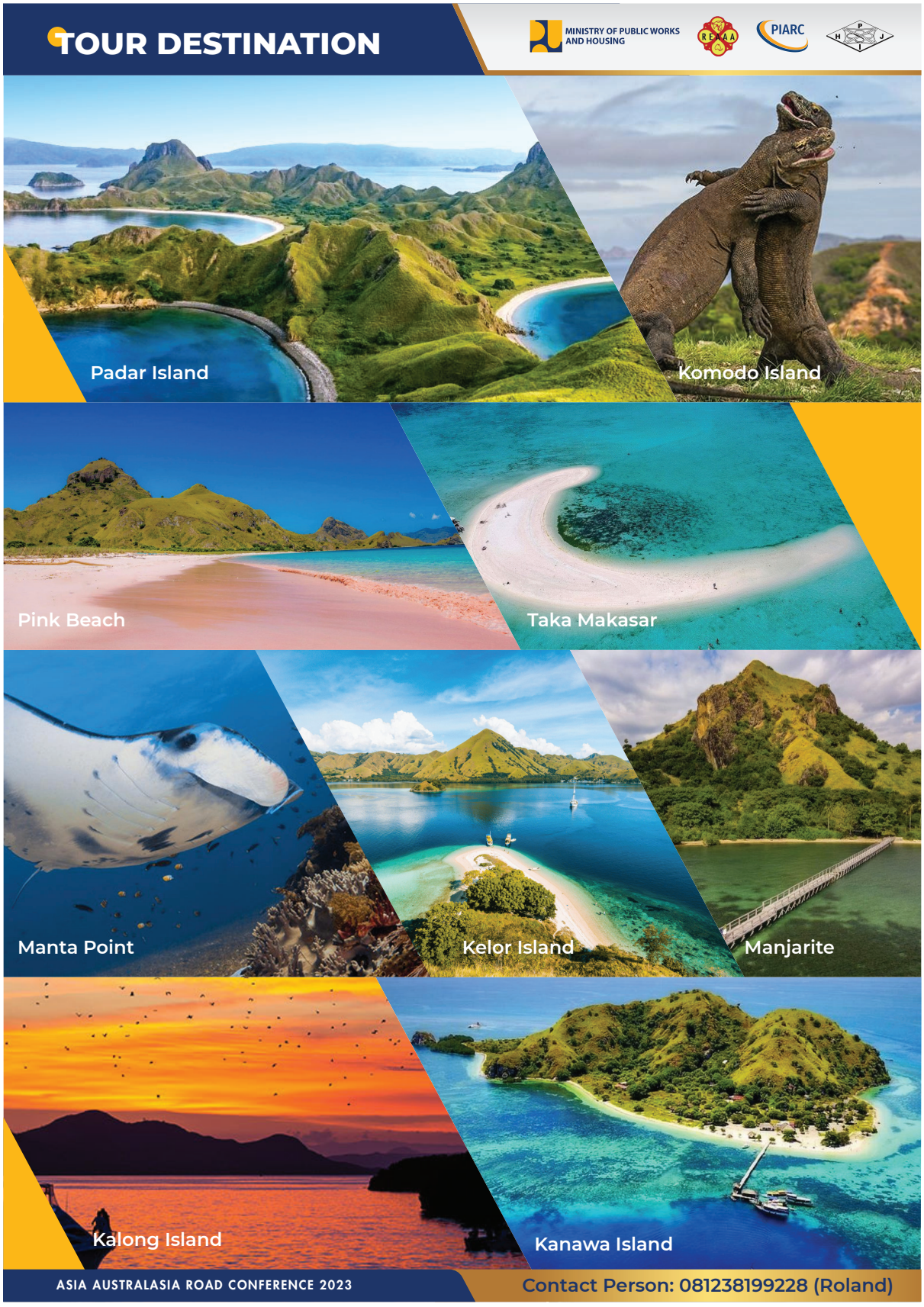
The Vetiver System (VS) is a simple, low-cost technology that utilize live vetiver plants for soil and water conservation and protection environment. VS is very practical, inexpensive, easy to maintain, and very effective in controlling soil erosion and sedimentation, water conservation, and stabilization and rehabilitation land.

Vetiver in Indonesia is known as vetiver (Vetiveria zizanioides) or usar (Vetiver nigritana), is a kind of large grass that has many privilege. Vetiver's magic as an ecological plant is due to systems unique roots. This plant has fibrous roots that go very far in the soil, where the current record for the longest vetiver root of 5.2 meters has been found

Kenari Roundabout Intersection

Labuan Bajo -Tanamori road with The Vetiver System (VS)

Nanga Na'e Bridge

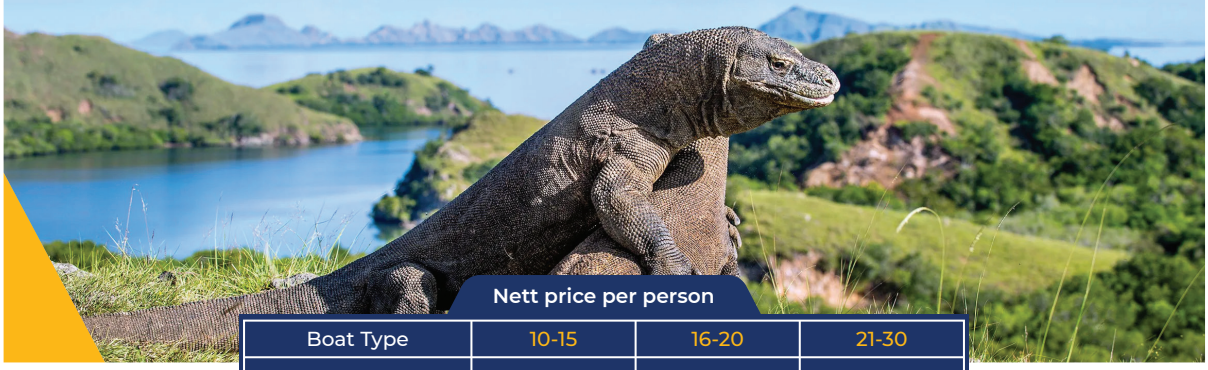

TOUR DESTINATION
MINISTRY OF PUBLIC WORKS AND HOUSING
PIARC
Padar Island
Komodo Island
Pink Beach
Taka Makasar
Manta Point
Kelor Island
Manjarite
Kalong Island
Kanawa Island
ASIA AUSTRALASIA ROAD CONFERENCE 2023
Contact Person: 081238199228 (Roland)

FULL DAY TOUR
TAMAN NASIONAL KOMODO

MINISTRY OF PUBLIC WORKS AND HOUSING

Code **NFW001**

Tour Category **Classic** Tour Duration **8 Hours** Boat Type **Speed Boat**



Nett price per person

Boat Type	10-15	16-20	21-30
Speed Boat	IDR 2,997,500 USD 200	IDR 2,749,688 USD 185	IDR 2,659,286 USD 180

Labuan Bajo - Padar Island - Pink Beach - Komodo Island - Taka Makasar - Manta Point - Kanawa Island - Labuan Bajo (Lunch)

Tour starts at 6am - 5pm

In the morning, you will sail by speed boat to Padar Island to climb to the top of Padar and see the magical scenery around the island. It is all surrounded by three turquoise bays, and each bay beach has a different color of sand: One is pearly white, another is charcoal black, and the third is a very rare baby pink. It's a rare combination, which makes the island unique. After that, you will head to Pink Beach, located near the Padar Island hike. After enjoying the beautiful Pink Beach, continue to Loh Liang - Komodo gate to explore the world's most giant lizard called the Komodo dragon. Trek through the tropical rainforest and hunt Komodo dragons with your camera and watch the birds in the forest as some beautiful birds are living here. After that, head to Taka Makasar to enjoy the beauty of the beach, shaped like a small island. Head to Manta Point for snorkeling to see mantas, turtles, and several types of fish. Head to Kanawa Island for snorkeling and enjoy the beautiful white sand at Seraya. In the afternoon, you will sail to Labuan Bajo to spend the night in Labuan Bajo.

Inclusions

- AC vehicle
- Soft drink
- Tour guide
- Rice box
- Mineral water
- Private charter speed boat
- All entrance fees & donations according to the program
- Ranger fee
- Snorkeling equiptment
- Travel Insurance

Exclusions

- personal expenses
- Tips

Notes

- Bring cash
- Trekking/hiking shoes
- Swimsuit & towel
- Hat and sun-screen
- Anti-mosquito lotion

ASIA AUSTRALASIA ROAD CONFERENCE 2023 Contact Person: 081238199228 (Roland)

2D1N TOUR AMAZING KOMODO

MINISTRY OF PUBLIC WORKS AND HOUSING

Code **NFW002**

Tour Category **Classic** | Tour Duration **2 Days 1 Night** (Spend the night on the boat) | Boat Type **Phinisi**

Nett price per person

Boat Type	10-15	16-20
Pinishi (Superior)	IDR 9,954,000 USD 665	7,014,656 USD 470
Pinishi (Deluxe)	IDR 13,419,000 USD 900	IDR 10,006,219 USD 670

Day 1 : Labuan Bajo - Kelor - Manjarite - Kalong Island (Lunch, Dinner)

After your arrival at Komodo Airport, your tour guide will pick you up and drive to the harbor. You will sail to Kelor Island to see the beauty of the surrounding landscape from the top of Kelor Island. Afterward, you will head to Manjarite for snorkeling, seeing various fish and turtles. In the afternoon, before sunset, you will leave for Kalong Island to see thousands of bats coming out of their nests while enjoying the sunset. You will spend the night on the boat.

Day 2 : Kalong Island - Padar Island - Pink Beach - Komodo Island - Manta Point - Labuan Bajo (Breakfast, Lunch)

In the morning, you will climb Padar Island to see the beauty of three different beaches from the top of Padar Island. This is known as the best place to take pictures. Your tiredness will disappear as soon as you reach Padar Peak. Next, you will head to Pink Beach to relax on the beach or snorkel. Head to Komodo Island to see the Komodo Dragon, which is known as the largest lizard in the world. Lunch will be served on board. You will sail to Manta Point for snorkeling. Stay overnight and have dinner on the ship.

Inclusions		
- AC vehicle - Coffee & tea - Tour guide - Consumption	- Mineral water - Private charter phinisi - All entrance fees & donations according to the program	- Ranger fee - Snorkeling equiptment - Travel Insurance
Exclusions	**Notes**	
- personal expenses - Tips	- Bring cash - Trekking/hiking shoes - Swimsuit & towel	- Hat and sun-screen - Anti-mosquito lotion

ASIA AUSTRALASIA ROAD CONFERENCE 2023 Contact Person: 081238199228 (Roland)

Nett price per person

Boat Type	10-15	16-20
Pinishi (Superior)	IDR 11,498,760 USD 770	7,954,065 USD 530
Pinishi (Deluxe)	IDR 16,639,560 USD 1110	IDR 12,112,065 USD 810

Day 1 : Labuan Bajo - Kelor - Manjarite - Kalong Island (Lunch, Dinner)

After you arrive at Komodo Airport, your tour guide will pick you up and drive to the harbor. You will sail to Kelor Island to see the beauty of the surrounding landscape from the top of Kelor Island. After that, you will head to Manjarite for snorkeling, seeing various fish and turtles. In the afternoon, before sunset, you will leave for Kalong Island to see thousands of bats coming out of their nests while enjoying the sunset. You will spend the night on the boat.

Day 2 : Kalong Island - Padar Island - Pink Beach - Komodo Island - Manta Point (Breakfast, Lunch, Dinner)

In the morning, you will climb Padar Island to see the beauty of three different beaches from the top of Padar Island. This is known as the best place to take pictures. Your tiredness will disappear as soon as you reach Padar Peak. Next, you will head to Pink Beach to relax on the beach or snorkel. Head to Komodo Island to see the Komodo Dragon, which is known as the largest lizard in the world. Lunch will be served on board. You will sail to Manta Point for snorkeling. Stay overnight and have dinner on the ship.

Day 3 : Kanawa Island - Labuan Bajo - Airport (Breakfast, Lunch)

In the morning, after breakfast, you will go snorkeling on Kanawa Island. Afterward, return to Labuan Bajo and directly transfer to the airport for the flight to the next destination.

Inclusions		
- AC vehicle - Coffee & tea - Tour guide - Consumption	- Mineral water - Private charter phinisi - All entrance fees & donations according to the program	- Ranger fee - Snorkeling equiptment - Travel Insurance
Exclusions	**Notes**	
- personal expenses - Tips	- Bring cash - Trekking/hiking shoes - Swimsuit & towel	- Hat and sun-screen - Anti-mosquito lotion

ASIA AUSTRALASIA ROAD CONFERENCE 2023 Contact Person: 081238199228 (Roland)

TOUR BOAT LIST

MINISTRY OF PUBLIC WORKS AND HOUSING

Speed Boat
Pinguin

Facilities
AC, Toilet, Life jacket, Snorkling Equipment

Engine
AC, Yamaha 250 PK (2 Units)

Pinishi (superior)
Arumi

Upper Deck
1x Master cabin with balcony
(double bed)(private bathroom)
1x Deluxe Cabin
(double bed)(private bathroom)

Main Deck
1x Master cabin
(double bed + extra bed)(private bathroom)
1x Deluxe Cabin
(double bed + extra bed)(private bathroom)

Lower Deck
1x Superior cabin
(double bed + 2 single bed)(private bathroom)
2x Superior Cabin
(double bed + extra bed)(private bathroom)

Pinishi (deluxe)
Cajoma V or similiar

Upper Deck
- 1x Double, 2x single bed (for 4 people)
- 3x Single bed (for 3 people)
- 1x Double, 1x extra bed (for 3 people)

Lower Deck
- 1x Double bed (for 2 people)
- 1x Double bed (for 2 people)
- 1x Double, 1x single bed (for 3 people
- 1x Double, 1x single bed (for 3 people)

Accomodation & Facilities
- Double cabin & bunk bed style
- Ac cabin
- En-suite bathrooms hot & cold shower
- Daily house keeping
- Non-diver (snorkeler) friendly
- Audio & video entertainment
- Indoor resto & lounge
- 1 Spacious outdoor dinning
- Sun deck, lazy chair, and bean bag

ASIA AUSTRALASIA ROAD CONFERENCE 2023

Contact Person: 081238199228 (Roland)

Calendar of Events

Date	Event	Country / Venue	Organiser
23rd-27th August 2023	Asia Australasia Road Conference 2023 • 120th REAAA Council Meeting • 24th YEP Meeting • 13th HORA Meeting • 50th Year REAAA Anniversary	Labuan Bajo, Indonesia	REAAA, IRDA, Ministry of Public Works and Housing, Indonesia. https://linktr.ee/aarc2023
2nd-6th October 2023	XXVIIth World Road Congress	Prague (Czech Republic)	PIARC https://www.piarc.org/en/News-Agenda-PIARC/News/2023-02-07,PIARC-World-Road-Congress-2023-registration-is-open.htm
14th-17th November 2023	IRF Global R2T Conference & Exhibition	Arizona State University Memorial Union Building, Phoenix, AZ	IRF https://www.irf.global/events/

REAAA WELCOMES NEW MEMBERS

The membership of REAAA as of 31st March 2023 was 1125. The REAAA Council and Chapters have approved the following 47 new members for the period between 31st August 2022 to 31st March 2023.

Institutional	*3*
Life	*4*
Ordinary	*40*

The list of new members approved at the 119th REAAA Council Meeting in Carlton Hotel, Singapore on 9th May 2023 is as follows:

List of newly elected members

Institutional Members

1.	Novapave Sdn Bhd	I.0387 Malaysia
2.	Or Kim Peow Contractors (Pte) Ltd	I.0388 Singapore
3.	Hwa Seng Builder Pte Ltd	I.0389 Singapore

Status Changed from Ordinary to Life

1.	Ir. Loi Yew Hua	O.2929 to L.0436 Malaysia
2.	Ir. Ts. Tung Sow Hoong	O.3596 to L.0437 Malaysia
3.	Ralph Joed Dela Cruz	L.0434 Philippines
4.	Ms. Tae-Min JUNG	L.0435 Korea

Ordinary Members

1.	IP Kim Man	O.3872 Hong Kong
2.	Dato' Ir. Mohd Safari Bin Ahmad	O.3873 Malaysia

REAAA WELCOMES NEW MEMBERS

3.	Ir. Paisal Bin Salim	O.3872 Hong Kong
4.	Haji Solahuddin Bin Azuwa	O.3875 Malaysia
5.	Ir. Dr. Ruslan Bin Hassan	O.3876 Malaysia
6.	Siti Nur Asyilah Binti Azri	O.3877 Malaysia
7.	Muhamad Azri Bin Abu Bakar	O.3878 Malaysia
8.	Ir. Meor Burhan Shuhdy Bin Mior Khairudin	O.3879 Malaysia
9.	Ir. Zainuddin Bin Hussain	O.3880 Malaysia
10.	Reza Febriano	O.3881 Indonesia
11.	Ir. Nixon Mdep Sitorus	O.3882 Indonesia
12.	Rahmat Hidayat	O.3883 Indonesia
13.	George I.M.P. Manurung	O.3884 Indonesia
14.	Ir. Ts. Dr. Anizahyati binti Alisibramulisi	O.3885 Malaysia
15.	Dr. Norshariza binti Mohamad Bhkari	O.3886 Malaysia
16.	Assoc. Prof. Dr. Akrizan binti Shaffie	O.3887 Malaysia
17.	Ir. Dr. Muhd Noshasri bin Muhd Sidek	O.3888 Malaysia
18.	Mohd Afiq bin Abu Bakar	O.3889 Malaysia
19.	Ir. Rusman bin Rais	O.3890 Malaysia
20.	Nuruleffa binti Saron	O.3891 Malaysia
21.	Ts. Hj. Meor Mohamed Haris bin Meor Hussein	O.3892 Malaysia
22.	Hanif bin Latif	O.3893 Malaysia
23.	Mohamad Farid bin Rosli	O.3894 Malaysia

REAAA WELCOMES NEW MEMBERS

24.	Ir. Haji Mohd Faizul bin Mohd Ali Hanapiah	O.3895 Malaysia
25.	Ahmad Ashraf bin Abu Bakar	O.3896 Malaysia
26.	Ts. Dr. Farah Alwani binti Wan Chik	O.3897 Malaysia
27.	Muhamad Faez bin Azman Shah	O.3898 Malaysia
28.	Norazimah binti Md Arifin	O.3899 Malaysia
29.	Muhammad Hilman bin Adnan	O.3900 Malaysia
30.	Nurul Wahida binti Mohamed	O.3901 Malaysia
31.	Muhammad Syahmi bin Ahmad Subri	O.3902 Malaysia
32.	Muhammad Faiz bin Kamarun Talib	O.3903 Malaysia
33.	Nur Shaffiqa binti Mohd Yusoff	O.3904 Malaysia
34.	Nik Mohd Mahzan bin Nik Mohd Mahathir	O.3905 Malaysia
35.	Tajul Ariffin Zulkarnain	O.3906 Malaysia
36.	Aida Amalina binti Abdullah	O.3907 Malaysia
37.	Maisarah binti Musa	O.3908 Malaysia
38.	Dr. Farahiyah binti Abdul Rahman	O.3909 Malaysia
39.	Dr. Ilya binti Joohari	O.3910 Malaysia
40.	Suzuki, Toru	O.3911 Japan