REAAA Newsletter

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Message from the President

Dr. Sung-Hwan Kim
President of REAAA

Dear Esteemed REAAA Members,

I trust this message finds you well and eager to contribute to the growth and success of our association. As we move forward with our mission to advance road engineering and technology, I would like to highlight several key points for your active participation and engagement.

Our thoughts are with Taiwan as they navigate the aftermath of the recent earthquake on 3 April 2024. We trust in Taiwan's resilience and capabilities to swiftly recover from this disaster. Thus, I trust that the REAAA's Technical Working Committee on Climate Change, Resilience & Emergency Management can serve as a model for implementing and achieving the objectives of the technical committee and the objectives and vision of REAAA. I hope the working committee stands ready to support and assist Taiwan during this challenging time. The working committee, and other working committees, can play a crucial role in offering assistance and expertise. Let us stand together in solidarity, and support Taiwan through this difficult period. Stay strong, Taiwan.

First and foremost, I urge all members to actively involve themselves in all activities organized by the REAAA. Your participation and input are essential in driving our initiatives forward and shaping the future of our association.

Secondly, I kindly request that you respond promptly when your expertise and assistance are needed. Your timely input and support can make a significant difference in the success of our projects and endeavours.

Furthermore, I encourage all members to contribute relevant articles for publishing in the REAAA Newsletter and the website. Sharing your knowledge and insights with fellow members not only enhances our collective learning but also strengthens our community.

I invite you to participate in esteemed awards such as the Katahira Award, Mino Best Project Award, Hwang Award, and Smart Highway Award at the upcoming 17th REAAA Conference, to be held in Ilsan, a satellite city located in the northwest of Seoul, Korea. Your outstanding projects and contributions deserve recognition, and these awards offer a platform to showcase your achievements to the industry.

Lastly, I encourage all members to introduce and promote new countries as potential members of REAAA. By expanding our membership base, we can create a more diverse and inclusive community that fosters greater collaboration and knowledge exchange.

Thank you for your continued support and dedication to REAAA. Together, let us work towards a successful future for our association and roads industry in the region.

Best regards,

Dr. Sung-Hwan Kim
REAAA President

World's First Road Tunnel Under an Operating Airport – Fuxing North Road Underpass at Songshan International Airport

Richard Moh
Chairman, Moh and Associates, Inc., Taiwan

Ting-En Wu
Deputy Chief Engineer, Moh and Associates, Inc., Taiwan

Introduction

Songshan Airport opened in 1936. It was Taiwan's first joint military-civilian airport and played a vital role as a transportation hub during the economic boom of the 1970s. However, its presence impeded north-south urban development in the area. To resolve this, the Taipei City Government launched a groundbreaking project to construct, at the time, the world's first underpass tunnel beneath Songshan Airport. The aim of this initiative was to enhance traffic flow from northern regions to central Taipei and stimulate regional commercial growth.

In May 1991, the Taipei City Government commissioned Moh and Associates, Inc. (hereafter referred to as MAA) to design the 'Songshan International Airport Fuxing North Road Underpass', a long-term traffic improvement plan. The design was completed in December 1995, with construction commencing at the end of January 1997. MAA was also responsible for project management and supervision. Serving for nearly 18 years, it has significantly improved north-south traffic in the area without disrupting airport operations, despite earthquakes, typhoons, and heavy rainfall. The tunnel's resilience and disaster prevention facilities were meticulously planned to ensure continuous 24-hour access for users and the safety of both vehicles and the airport's operations.

Aerial photograph of the location of the Fuxing North Road underpass tunnel

Constructing a tunnel crossing the main runway and taxiway of an operational airport required ensuring absolute flight safety and uninterrupted airport operations. In the 1990s, and even today, this feat was a significant engineering challenge with no precedents to follow. MAA carefully evaluated construction plans and contracting strategies to establish technical reliability and feasibility. A task force management system, combined with real-time reporting and automated monitoring systems, ensured the successful completion of what could be considered the world's first underpass under an operating airport runway. This project set multiple benchmarks for future large-scale engineering projects, such as the application of pipe jacking methods, bid strategiies, large-scale automated monitoring systems, joint insurance arrangements, and the establishment of combined safety management organizations during construction/operation. The project received Taiwan Year's Best Reward of Designing & Supervision of public construction commission, Executive Yuan, in 2003, marking it as an engineering milestone and a career highlight for all involved.

In 2000, Mr Ting-En Wu (far left) presented project progress to former Mayor Mr Ma (right)

MAA senior engineers and specilaists, led by Dr Za-Chieh Moh inspected the construction site during ESA tunneling beneath the runway

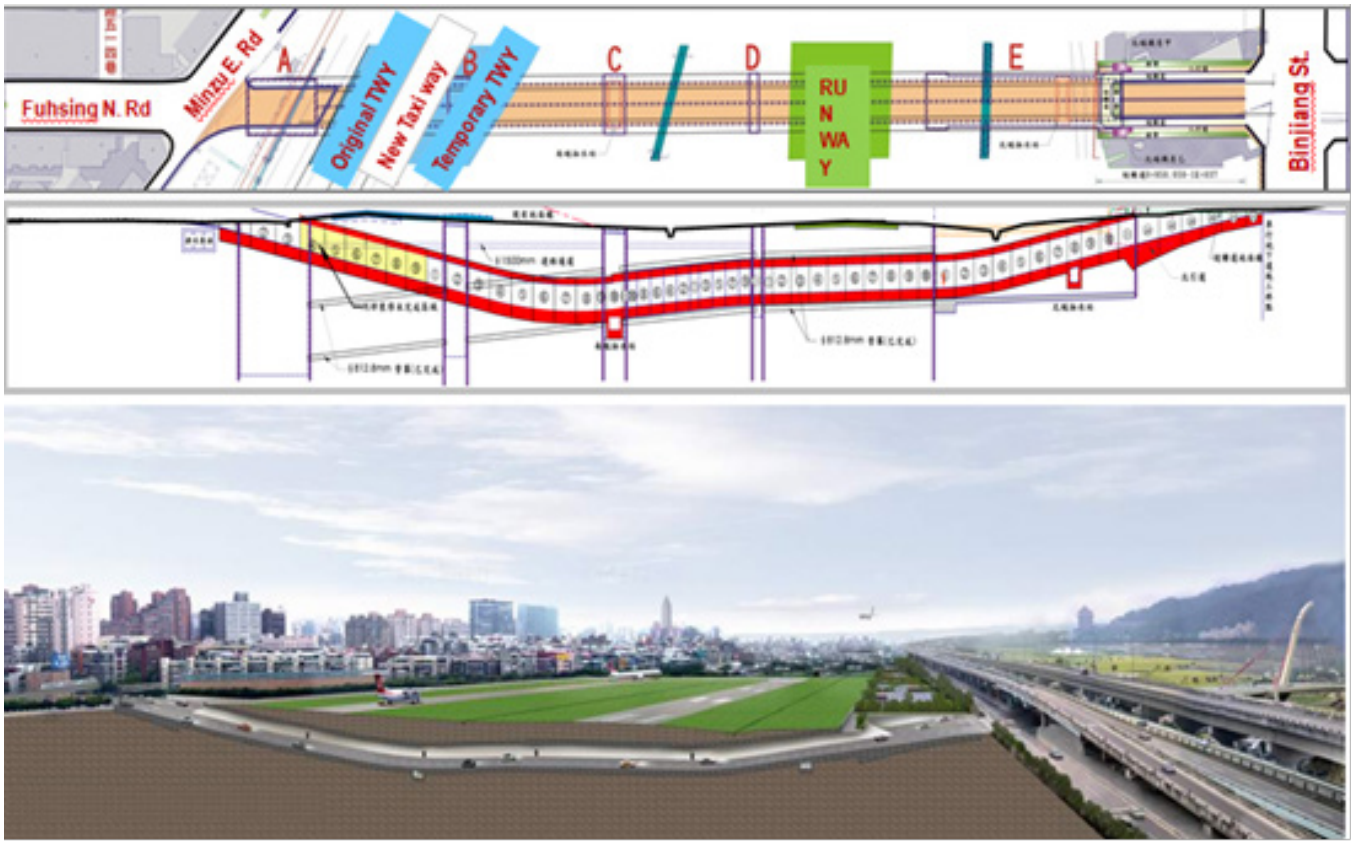
Project Overview

The tunnel underpassed the only runway in the airport and one taxiway, which had to kept fully operational during construction. The tunnel is 7.8 m high and 22.2 m wide to accommodate a two-lane roadway in each direction. It extends 677 m from Minzu East Road in the south to Binjiang Street's north access road. Ventilation, drainage, power distribution, and control rooms are located at the north end near Minzu East Road. Construction commenced on 20th January 1997, and the tunnel was opened on 29th November 2006. The project was divided into four sections across five work shafts, each employing diaphragm wall structures and cut-and-cover methods for nighttime operations. Various methods were used in the construction, including 211 m of cut-and-cover reverse construction, 74.2 m of pipe jacking and traditional excavation, 101 m of the Endless Self Advancing (ESA) construction method, and 73 m of open excavation for the north access road. The total project cost was over USD163 million (based on 1997 values[1]), including civil works, electrical and mechanical systems, ventilation, and insurance.

Engineering Challenges

Starting from the south entrance at Minzu East Road, the tunnel descends at a 7% gradient, transitions through 3.4% and 1.0% gradients under Songshan Airport, and then ascends at 7.75% to connect with Binjiang Street. With a minimum cover of only 4 m beneath the runway, the tunnel crosses a high-groundwater soft clay/silt with an SPT-N value of only 2-7. Given the airport's high air traffic volume and single runway/taxiway, construction had to proceed without disrupting operations, limited to the airport's nighttime closure from 11:00 pm to 05:00 am. All equipment had to be moved out before operations resumed, with an emergency evacuation timeframe of 40 minutes. Ensuring airport operational safety throughout the design and construction phases presented multi-faceted technical and managerial challenges. Additionally, mid-project modifications to the south access road exacerbated construction interface complexities and execution difficulties.

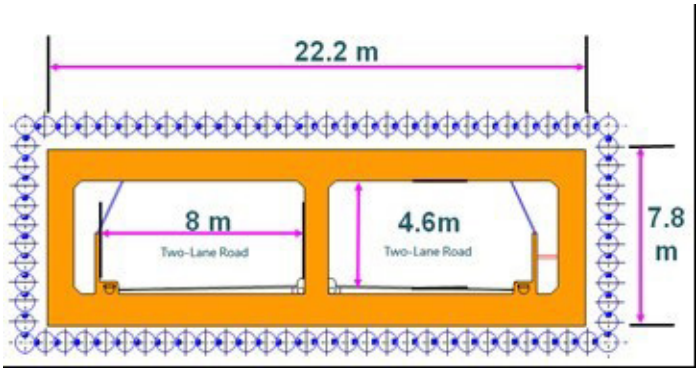
[1] A ground improvement technique used to accelerate the consolidation of soft, compressible soils, thereby enhancing their load-bearing capacity and stability.



Cross-section profile of the underpass

Innovations

Due to stringent construction conditions, safety requirements, and the need for runway subsidence control, the first-ever subsidence control criteria and roughness limit management values for runway crossings were developed. These included a ground surface settlement limit of 250 mm and a management value of 200 mm. Ground-penetrating radar inspections and runway repairs were initiated if these values were exceeded. Additionally, the project pioneered the first use of box-shaped pipe jacking in Taiwan's engineering history, marking it the only case of an operational airport runway crossing in the world to date.



Underground tunnel size and pipe roof around the tunnel

Comprehensive Planning

In response to the project's uniqueness, MAA developed appropriate execution plans and SOPs based on airport area needs. These included teams for design, supervision, and construction, work shaft and section method selection, full-time automated monitoring, pipe jacking and ESA supervision, airport operation and safety communication mechanisms, emergency drills, and night-time safety management. These plans were approved by the Civil Aeronautics Administration, airport and military authorities, and independent consultants, ensuring rigorous execution through a joint construction/operation safety management organization.

Conclusion

The Fuxing North Road Underpass Tunnel project was a global engineering milestone at the time, successfully overcoming the significant challenge of crossing an operational airport runway. From its commencement in 1997 to its completion and opening in 2006, the project employed the ESA method and multiple automated monitoring systems to ensure construction and subsequent airport operation safety. These innovative techniques and management mechanisms set a precedent for similar operational airport projects in Taiwan and globally. This project essentially represents a milestone of rapid advance in the region. Performance of challenged construction activities are based on reliable and quality instrumentation, monitoring, management and control.

This project has garnered numerous awards and accolades, establishing itself as an engineering benchmark and demonstrating the ingenuity and dedication of countless engineers and technicians. Notably, Dr. Za-Chieh Moh, who was the chairman at the time, personally supervised the project, embodying the core values of "innovation, dedication, responsibility, and ethics. " Additionally, MAA has long been committed to promoting "sustainability, core technology, and digitization," along with a professional capability paired with a rigorous attitude toward solving geotechnical environmental challenges, setting a standard for all engineers to follow.

Framework to Incorporate Bushfire Resilience into Road Infrastructure

WARRIP, Western Australia, and NACOE, Queensland

A bushfire is an unplanned vegetation fire. It is a generic term that includes grass, forest and scrub fires. Bushfires are characterised as a natural disaster or natural hazard. They are a natural hazard due to their ability to cause harm to people, property, infrastructure and the environment. Bushfires are classified as a disaster when a widespread, unacceptable level of loss occurs.

In Australia, the period of peak bushfire activity varies with seasonal weather patterns. For northern Australia, the peak bushfire period is during the dry season, which is generally throughout winter and spring. In southern Australia, the bushfire season peaks in summer and autumn. While these are the traditional peaks of the bushfire season, local conditions can drive dangerous bushfire activity at any time of the year. However, severe fire behaviour and resultant loss are much less likely outside the fire danger period.

Unprecedented bushfires across Australia have highlighted the fact that roads and associated infrastructure are critical enablers of bushfire prevention, preparation, response and recovery activities. However, these bushfires have also highlighted the vulnerability of road infrastructure and the travelling public during and after a bushfire. Severe bushfires have the potential to produce numerous economic, social and environmental impacts, which can range from short-term inconveniences to long-term life-changing effects.

These shifts can be a natural phenomenon but more recently have been linked to human activity. The consequence of climate change – the long-term shift in global or regional temperatures and weather patterns (a natural phenomenon but more recently linked to human activity) – on bushfire characteristics and high-risk conditions is pronounced and includes:

- longer fire seasons
- a decrease in the opportunity for hazard reduction works
- larger and more intense fires caused by prolonged high-risk weather conditions
- increased severity of bushfires due to increased temperatures, more severe winds and changes to rainfall patterns
- new high-risk areas previously deemed low or medium risk
- increased available fuel related to lower rainfall
- increased ignition opportunities caused by increased storm activity

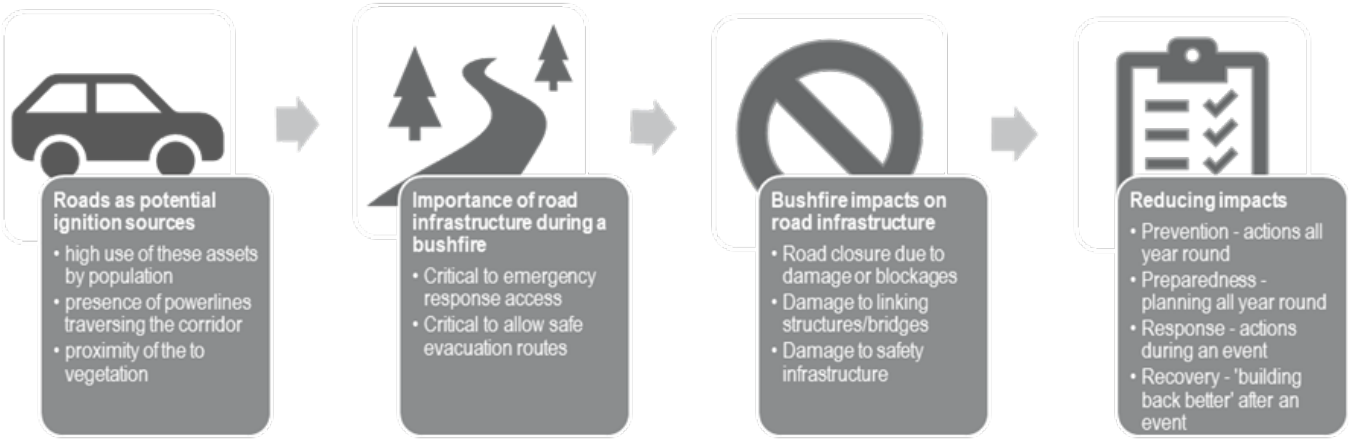
The purpose of a joint Western Australia Road Research and Infrastructure Program (WARRIP) and National Asset Centre of Excellence (NACOE) project, conducted by the Australian Road Research Board (ARRB), was to develop a guideline to assist road agencies with the management of the potential risks to road infrastructure caused by the impacts of bushfires, including:

- preventing bushfire ignition in the road corridor through appropriate roadside vegetation design and maintenance

- preventing the impact from a bushfire in a road corridor by minimising the damage which could be done to infrastructure in the road corridor
- in collaboration with emergency services, facilitating evacuation routes and protecting road users during an emergency
- enabling quick recovery of road operations following a bushfire

The guideline provides a framework for the integration of a prevention, preparedness, response and recovery (PPRR) bushfire risk management model into the planning, design, construction, maintenance and operations of road infrastructure. It includes:

- An overview of the purpose and basis of this framework including limitations to consider.
- An overview of bushfires and why bushfires are an issue for road infrastructure.
- The typical responsibilities of bushfire management for various parties, including collaboration and stakeholder consultation.
- Guidance on undertaking the two key requirements in understanding potential network vulnerability due to bushfires: (1) undertaking a risk assessment to identify bushfire-prone areas; and (2) using this risk assessment to identify all assets, critical links and assets for emergency access.
- An explanation of the PPRR model and how this will be implemented as part of this framework, and guidance for the incorporation and consideration of bushfire impacts when undertaking the planning, design, construction, maintenance and operations of road projects.
- A summary of the overarching management considerations for incorporating bushfire impacts into road infrastructure design and management.



The framework provides strategies for the management of bushfire impacts in the road corridor to ensure that road assets can continue to provide safe access for the community and emergency services. When considering the advice provided in this framework, consideration needs to be given to the following:

- All bushfire management actions and works determined by the use of the framework are in

alignment with legislation and regulatory frameworks.

- If the strategy is being implemented, all design, construction, maintenance and operational procedures need to be considered in the context of location, road type, project, budgets and other factors.
- The engagement of all stakeholders who may need to be involved or who are responsible for decision making and the implementation of varying strategies.
- The environmental trade-offs that may become apparent when undertaking prevention activities: jurisdictional environmental law, regulations and management strategies need to be consulted to ensure there is no conflict.
- The other assets which are present in the road corridor that may not be managed by the road agency. For example, in some cases, other agencies (such as utility providers) may have their own bushfire management strategies which will need to be considered when implementing the practices presented in the framework.
- The cultural heritage of the region and engaging the relevant parties in managing and protecting the area.

Main Roads Western Australia has used the framework to identify improvements and has captured these in an Action Plan. Should other road agencies wish obtain a copy of this action plan, then please contact brendon.wiseman@mainroads.wa.gov.au.

The report is available using the following link: https://warrip.com.au/project/incorporating-bushfire-impacts-into-road-design/. Details of the Queensland NACOE program can be found at: https://www.nacoe.com.au/

The Transformative Role of Artificial Intelligence (AI) Towards Road Management & Maintenance

By UEM Edgenta

Introduction

Artificial Intelligence (AI) has emerged as a pivotal technology, revolutionizing various industries worldwide. In the realm of road engineering, AI is leading the charge in enhancing the efficiency, safety, and sustainability of highway design, construction, asset management and maintenance activities. This article delves into the significant applications of AI in road engineering, highlighting its current uses, ongoing implementations, and future potentials.

AI in Highway Maintenance is one of the most impactful applications of AI in road engineering. AI-driven systems enable real-time monitoring and predictive maintenance, ensuring that potential issues are addressed before they escalate into major problems. For instance, AI algorithms can analyse data from various sensors embedded in road surfaces to detect wear and tear, predicting the optimal time for repairs and maintenance. This proactive approach minimizes disruptions and extends the lifespan of the road infrastructure.

Resource Optimization and allocation in road engineering have always been a challenge. AI addresses this issue by optimising the use of resources such as labour, materials, and equipment. Machine learning algorithms can analyse historical data and predict future requirements, ensuring that resources are allocated efficiently. This not only reduces costs but also minimizes environmental impact by reducing waste and optimising energy usage.

Smart Applications and Safety Enhancements AI has paved the way for smart applications that significantly enhance road safety. Intelligent traffic management systems use AI to analyse traffic patterns and adjust traffic signals in real-time, reducing congestion and the likelihood of accidents. Additionally, AI-powered cameras and sensors can detect hazardous conditions, such as carcasses or debris on the road, alerting authorities and drivers promptly to prevent accidents.

Automation in Construction Processes AI is also transforming construction processes in road engineering. Autonomous construction vehicles and drones, guided by AI, can perform tasks such as surveying, excavation, and paving with precision and efficiency. These technologies reduce the reliance on manual labour, enhance accuracy, and accelerate project timelines. Furthermore, AI-driven quality control systems ensure that construction standards are met consistently, reducing the need for rework.

1. USE CASE FOR ROAD ASSET MANAGEMENT & MAINTENANCE

Defect Detection AI-powered systems can detect defects on roads and highway assets such as lampposts, barriers, and signposts. Using image recognition and machine learning, AI can analyse data from cameras

and sensors to identify issues such as cracks, rust, or structural weaknesses. This allows for timely maintenance and repairs, preventing accidents and extending the lifespan of these assets.

1.1 Smart Pavement Monitoring is an innovative application of AI in road engineering. Sensors embedded in the pavement can collect data on temperature, moisture, and stress levels. AI analyses this data to predict pavement deterioration and optimise maintenance schedules. For example, in the United States, the Federal Highway Administration is testing smart pavement technologies that provide real-time data on road conditions, aiming to enhance maintenance efficiency and road safety. These smart pavements can alert maintenance teams to issues such as potholes or cracks before they become serious problems, enabling more efficient and timely repairs.

1.2 Bridge Inspection AI is proving invaluable in the inspection of bridges. Traditionally, bridge inspections require significant manual labour and can be dangerous for inspectors. AI-powered drones equipped with high-resolution cameras and sensors can capture detailed images and data of bridge structures. Machine learning algorithms then analyse this data to identify cracks, corrosion, and other potential issues. This method not only enhances safety and accuracy but also significantly speeds up the inspection process.

2. USE CASE FOR HIGHWAY TRAFFIC FLOW AND SAFETY

2.1 Traffic Flow Optimization AI In urban areas, AI is being used to optimise traffic flow and reduce congestion. AI systems analyse real-time traffic data from cameras and sensors, predicting traffic trends and adjusting signal timings accordingly. For example, the city of Hangzhou in China has implemented an AI-based traffic management system that has reportedly reduced travel time by 15% and improved traffic flow during peak hours. Such systems can dynamically reroute traffic, provide real-time updates to drivers, and even integrate with autonomous vehicle networks in the future.

2.2 Incident Detection and Management AI can enhance incident detection and management on highways. By analysing real-time data from traffic cameras and sensors, AI systems can quickly identify accidents, breakdowns, or other incidents. These systems can automatically alert emergency services, display warnings to other drivers, and suggest alternative routes to minimize congestion. Rapid incident response helps reduce the impact on traffic flow and improves overall road safety.

2.3 Weather-Adaptive Road Management AI is also enhancing road safety by providing weather-adaptive road management solutions. Systems that combine AI with IoT sensors can monitor weather conditions such as rain, snow, and fog. These systems predict hazardous conditions and automatically activate measures such as adjusting speed limits, deploying de-icing chemicals, or alerting maintenance crews. This proactive approach ensures safer driving conditions and reduces weather-related accidents.

3. USE CASE FOR SUSTAINABILITY

3.1 Smart Lighting Systems Smart lighting systems utilize AI to adjust the brightness and operation of highway lights based on real-time conditions. These systems can dim lights when traffic is low or during daylight hours, reducing energy consumption. During adverse weather conditions or at night, the lights can be automatically brightened to enhance visibility and safety. Such systems not only improve road safety but also contribute to energy efficiency and cost savings.

3.2 AI for ESG Initiatives AI can significantly contribute to Environmental, Social, and Governance (ESG) initiatives on highways. By optimizing traffic flow and reducing congestion, AI helps lower vehicle emissions and fuel consumption, positively impacting the environment. AI-driven predictive maintenance minimizes road closures and disruptions, enhancing the social aspect by providing a smoother travel experience. Additionally, AI systems can ensure compliance with regulatory standards and safety protocols, supporting strong governance practices.

4. USE CASE FOR CONSTRUCTION

Construction Monitoring AI-driven platforms can analyse data from various sources such as drones, cameras, and sensors to track the progress of construction projects in real- time. These platforms can detect deviations from planned schedules, identify potential safety hazards, and ensure compliance with construction standards. For example, AI can monitor the proper installation of materials and detect any discrepancies that might affect the quality and safety of the construction. This real-time monitoring helps project managers make informed decisions, ensuring projects are completed on time and within budget.

5. FUTURE PROSPECTS & INTEGRATION

The future of AI in road engineering looks promising, with ongoing research and development poised to introduce even more advanced applications. The integration of AI with other emerging technologies will further enhance the capabilities of AI systems.

5.1 IoT and 5G Connectivity. The integration of AI with IoT and 5G connectivity will revolutionize road engineering. IoT sensors embedded in road infrastructure can provide continuous real-time data on traffic, weather, and road conditions. AI can analyse this data to make dynamic adjustments and predictions. The high-speed, low-latency capabilities of 5G will enable seamless communication between connected devices, enhancing the efficiency and responsiveness of AI systems. This integration will lead to smarter, more adaptive road networks, improving safety, and optimizing traffic management.

5.2 Vehicle-to-Infrastructure Communication (V2I) communication is a promising future integration. AI will enable real-time data exchange between vehicles and road infrastructure, improving traffic management, safety, and efficiency. For example, smart traffic lights can adjust in real-time based on vehicle flow, while connected vehicles receive updates about road conditions and hazards.

5.3 Future Integration: Personalised Apps for Highway Consumers AI-driven personalized apps for highway consumers can provide real-time information on traffic conditions, suggest optimal routes,

and offer alerts on road incidents or closures. These apps can also provide tailored services, such as recommending nearby amenities, alerting users to toll charges, and providing maintenance schedules for regular commuters.

5.4 AI-Enhanced Road Design AI can also play a significant role in future road design. By analysing vast amounts of data from various sources, AI can help engineers design roads that are more durable, safe, and efficient. For example, AI can recommend optimal materials and construction methods based on specific environmental conditions and traffic patterns. AI-enhanced road design can lead to more resilient infrastructure and reduced maintenance costs.

6. AI TECHNOLOGY ROADMAP TO APPLICATION

6.1 Understanding AI's Role in Road Engineering

Before embarking on implementation, it is crucial to understand the diverse applications of AI in road engineering:

- Highway Maintenance: AI-driven predictive maintenance for early issue detection.
- Smart Applications: Real-time traffic management and safety enhancements.
- Resource Optimization: Efficient allocation of labour, materials, and equipment.
- Automation: Autonomous construction vehicles and quality control systems.
- Smart Lighting Systems: AI-adjusted highway lights for energy efficiency and safety.
- ESG Initiatives: AI’s role in environmental, social, and governance improvements.

6.2 Identifying Specific Use Cases

Determine which AI applications are most relevant to your project. Here are some use cases:

- Traffic Flow Optimization: Implement AI systems to analyse and manage traffic patterns.
- Weather-Adaptive Road Management: Use AI with IoT sensors for weather condition monitoring.
- Smart Pavement Monitoring: Integrate sensors in pavements to collect data and predict maintenance needs.
- Defect Detection: Utilize AI for monitoring highway assets like lampposts and barriers.
- Construction Monitoring: Employ AI for real-time progress tracking and compliance checks.

6.3 Preparing Infrastructure

Ensure that the necessary infrastructure is in place for AI implementation:

- Data Collection Systems: Install sensors and IoT devices to collect relevant data.
- High-Speed Connectivity: Deploy 5G networks for seamless data transmission.
- Cloud Computing: Use cloud platforms to store and process vast amounts of data.
- Edge Computing: Implement edge computing for real-time data analysis at the source.

6.4 Data Management

Effective data management is crucial for AI implementation:

- Data Collection: Gather data from various sources, including sensors, cameras, and drones.
- Data Cleaning: Ensure data quality by removing inaccuracies and inconsistencies.
- Data Integration: Integrate data from different sources into a centralized system.
- Data Security: Implement robust security measures to protect data from breaches.

6.5 Developing AI Models

Create AI models tailored to specific road engineering applications:

- Machine Learning Algorithms: Develop algorithms that can analyse patterns and make predictions.
- Deep Learning Models: Use deep learning for complex tasks like image recognition and anomaly detection.
- Predictive Analytics: Implement predictive models for maintenance scheduling and resource allocation.

6.6 Pilot Projects

Before deploying AI technologies on large-scale projects, begin with pilot projects. These smaller, controlled initiatives enable teams to test AI solutions in real-world environments, evaluate their impact, and identify necessary adjustments before broader implementation. Pilot projects offer valuable learning opportunities, minimizing risks and guiding future AI strategies.

6.7 Implementing Full AI Solutions After Pilot

Integrate AI solutions into your road engineering processes:

- Smart Traffic Management Systems: Deploy AI-driven traffic control systems for real-time optimization.
- Autonomous Construction Equipment: Use AI-guided machinery for precision and efficiency in construction tasks.
- Predictive Maintenance Tools: Implement AI tools to monitor infrastructure health and schedule maintenance.
- Smart Lighting Systems: Install AI-controlled lighting to adjust brightness based on traffic and weather conditions.

6.8 Training and Skill Development

Equip your team with the necessary skills to manage and utilize AI systems:

- AI Training Programs: Offer training sessions on AI technologies and applications.
- Collaboration with Experts: Partner with AI experts and researchers for guidance and support.

- Continuous Learning: Encourage ongoing education to keep up with AI advancements.

6.9 Monitoring and Evaluation

Continuously monitor and evaluate the performance of AI systems:

- Performance Metrics: Define key performance indicators (KPIs) to measure AI effectiveness.
- Regular Audits: Conduct periodic audits to ensure AI systems are functioning correctly.
- Feedback Loops: Create feedback mechanisms to refine and improve AI models over time.

6.10 Future Integrations

Stay abreast of future AI developments and integrations:

- Vehicle-to-Infrastructure Communication: Prepare for real-time data exchange between vehicles and road infrastructure.
- Personalized Apps for Highway Consumers: Develop AI-driven apps to enhance the user experience.
- AI-Enhanced Road Design: Use AI for designing more durable and efficient roads.
- Autonomous Maintenance Systems: Plan for the adoption of AI-powered autonomous maintenance robots and drones.
- IoT and 5G Connectivity: Integrate IoT and 5G technologies to enhance AI capabilities and connectivity.

Conclusion

AI is undoubtedly a game-changer in the field of road engineering. Its ability to monitor, predict, optimise, and automate various aspects of highway maintenance and construction is transforming the industry. As AI technology continues to evolve, its role in enhancing the effectiveness, safety, and sustainability of road systems will only grow more significant. Embracing AI in road engineering is not just an option but a necessity for building the roads of the future.

Artificial Intelligence: Paving the Future of the Smart Highway

By PLUS Malaysia Berhad

With a footprint over 1,130 km, PLUS Malaysia Berhad (PLUS), is South East Asia's largest highway operator plays a critical role in the sustainable development of the region, connecting Peninsula Malaysia with the borders Singapore and Thailand. The establishment of the PLUS highway played a catalytic role for the development of town, cities, and communities along Malaysia's west coast, sparking the creation of jobs, economic opportunities and ensuring the safe people, goods and services across the country.

PLUS is living its mission to shape a safe and sustainable future for all through serving its 1.8million daily customers by consistently pushes the boundaries of innovation and technology. Hence, PLUS is embarking on a journey to reimagine a smart highway of the future. A future where cutting-edge technologies are integrated to enhance safety, efficiency, and sustainability. Where real-time data analytics provide predictive maintenance schedules and optimized traffic flow, ensuring a seamless and comfortable journey for all. Artificial Intelligence (AI) is a key enabler to achieve all of this.

Artificial Intelligence (AI) incorporates the simulation of human intelligence processes including learning, reasoning, problem-solving, perception, and language understanding into machines and computer systems. AI encapsulates Machine Learning, Natural Language Processing, Robotics, and Computer Vision, each focusing on different aspects of intelligence and has unique applications.

AI is revolutionizing how businesses operate, offering unprecedented opportunities for efficiency, safety, cost optimization and innovation. As AI continues to evolve, organizations worldwide are leveraging on its capabilities as a competitive edge.

Internationally, AI is being increasingly used on highways. Some examples include the use to AI in camera sensors to optimize traffic flow in Singapore, the incorporation of AI systems to identify unusual traffic data patterns and detecting traffic incidences in Germany and the enabling of predictive road surface deterioration in the UK

Recognizing the transformative potential of AI, PLUS has embarked on its journey to integrate AI into its maintenance and operational processes, improving maintenance, operational effectiveness and customer safety and convenience. This includes piloting AI for road surface monitoring, incident, and hotspot detection and traffic management. Our applications of AI include :

- Optimized Asset Management

  At PLUS, a wide spectrum of road assets (pavement, slopes, bridges, drainage, carriageways, footways, cycleways, retaining walls, lighting columns, street furniture etc) need to be evaluated, maintained, and improved to ensure that roadways are safe, resilient, and well-designed. AI can be used to predict deterioration of assets, future road conditions, weather patters to for optimized Asset Management.

- Enhanced Efficiency and Productivity:

  Traditional maintenance and traffic management methods often involve labor-intensive and time-consuming processes. By applying Machine Learning and Computer Vision, we can automate many processes, leading quicker, more accurate decisions while eliminating the risk of manual human interpretation error. For example, AI-powered drones can quickly and efficiently inspect large stretches of highway infrastructure, identifying defects that would take significantly longer to detect through manual inspections.

- Improved Safety:

  Physical road evaluation is an arduous and sometimes dangerous task, posing safety risks. Contractors or surveyors spend long hours slowly driving along highways whilst visually analyzing road assets such as traffic signs and road surface conditions. This task would also require them to leave their vehicles posing threats from incoming traffic. Vehicle-mounted cameras equipped with laser technology can be used to capture and automatically analyse road assets, whilst the vehicle drives at the speed of traffic. The use of drones for highway asset inspections reduces the need for maintenance personnel to work in difficult conditions, thereby minimizing the risk of accidents.

- Data-Driven Decision Making:

  Data collected from AI systems such as Automatic Number Plate Recognition (ANPR), drones, High-Definition CCTVs allows us to analyze traffic patterns, monitor infrastructure conditions, and track maintenance needs in real-time. New data sets that are curated and recursively provided to the AI algorithm bringing about all-inclusive outcomes, independent of human subjectivity or limitations.

- Scalability and Flexibility:

  As traffic volumes increase and our infrastructure expands, AI solutions can be scaled up to meet growing demands without a proportional increase in operational complexity or costs. This scalability ensures that our systems remain effective and efficient even as the scope and nature of our operations evolve.

- Enhancing Key Customer Touchpoints

  We are exploring the use of AI, integrated into the CCTV cameras at our RSAs to help identify customer traffic. This would enable hourly, daily and monthly insights of footfalls in prime areas such as amenity zones, stalls, commercial lots and food court zones. This facilitates our analysis on customer trends, develop a deeper understanding of customer touchpoints and needs to ultimately improve our suite of services. Additionally, this will assist us to better manage our manpower, enhance safety and keep our customers satisfied.

Case studies for the incorporation of AI embedded Computer Vision are detailed below.

Automated Highway Asset Defect Detection (AHADD)

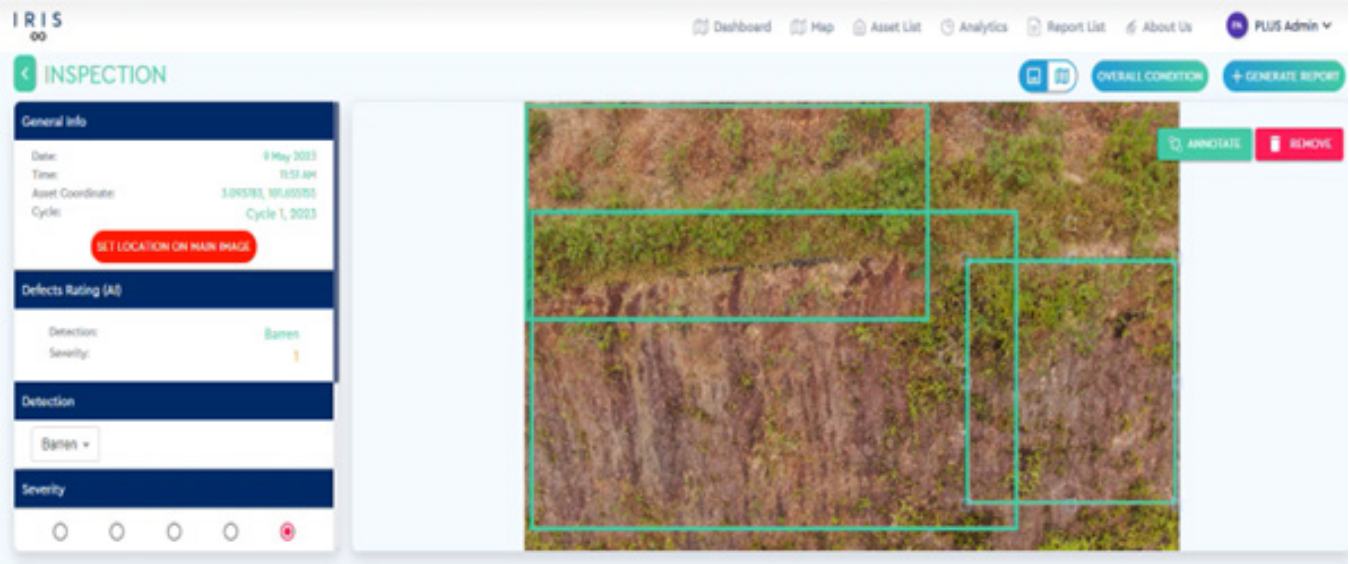


Figure 1: AHADD interface on slope defect detection

AHADD involves using AI powered cameras attached to drones and highway patrols to inspect highway assets and detect defects at slopes, bridges, and pavements. AI algorithms analyze images from various sources to identify defects such as cracks, potholes, and structural damage. The benefits of AHADD for maintenance and operations include increased efficiency by speeding up the inspection process and reducing the need for manual inspections, enhanced accuracy by providing precise identification and documentation of defects, and improved safety by minimizing the risk to maintenance personnel through reduced need for physical inspections in difficult areas.

Drones equipped with AI-powered cameras can cover large areas quickly, significantly reducing the time required for highway inspections. As a result, maintenance teams are able to conduct more frequent inspections, which help significantly improve asset condition, allowing early detection of wear and tear on highway assets, improving asset lifespan and long-term costs.

The AI system processes the aerial imagery to accurately classify and quantify the severity of each defect. This detailed analysis allows PLUS to prioritize maintenance and remediation efforts based on the criticality of the detected issues. AI technology provides precise data to identify defects and predict future issues for proactive maintenance.

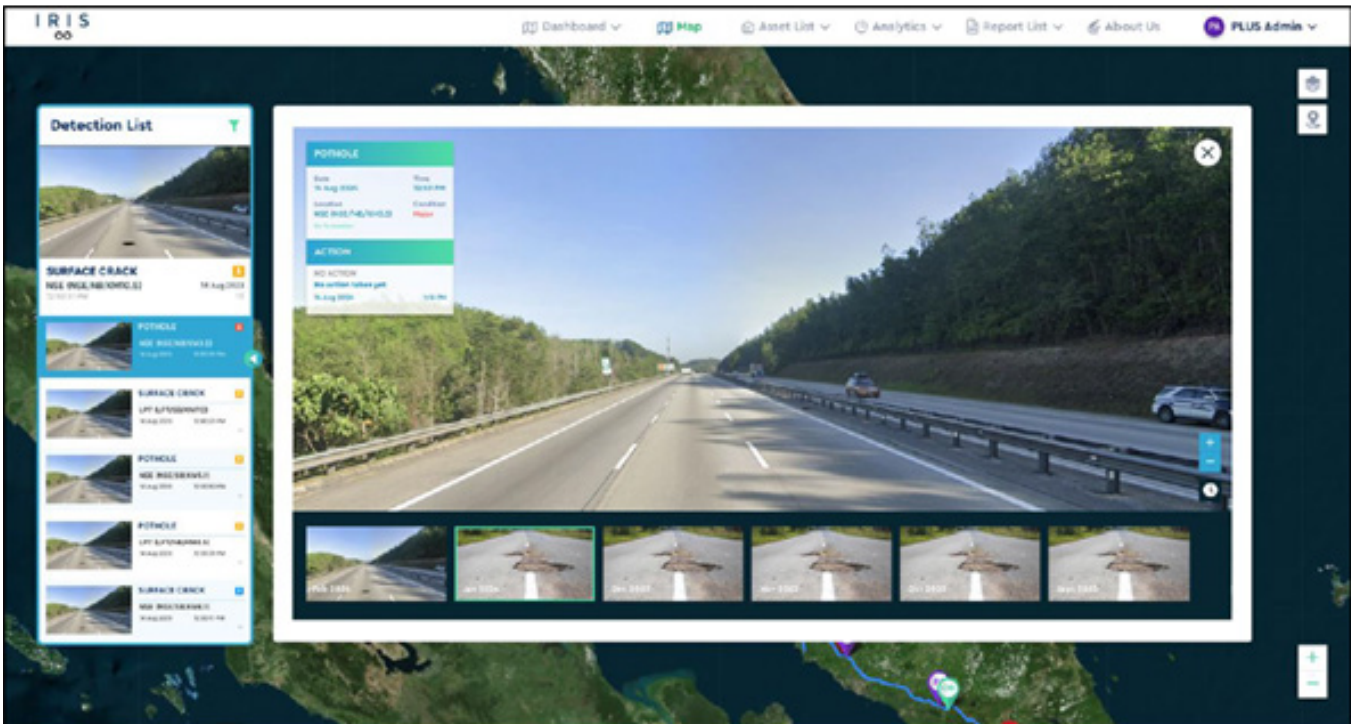


Figure 2: Pavement defect detection through highway patrol dashcams

AI-powered inspections minimize the need for maintenance personnel to be physically present, reducing human exposure to dangerous conditions and enhancing safety for maintenance workers. Additionally, drones can access hard-to-reach areas that may be challenging for humans to inspect, ensuring comprehensive coverage of all highway assets.

Automatic Number Plate Recognition (ANPR)

Figure 3: ANPR at Toll Booth

ANPR is a technology that uses optical character recognition to read vehicle registration plates. This technology is commonly used for vehicle identification and traffic management. At PLUS, we have implemented ANPR at our toll lanes to supplement RFID (Radio-frequency identification) detection.

This system uses ANPR to verify that the same vehicle has passed through both the entry and exit lanes, catering to cases where there is no entry information on the PLUS highway. The AI-driven ANPR cameras capture and process vehicle license plates in real-time, allowing for seamless RFID transactions.

ANPR systems provide a wealth of data that can be analyzed for various purposes. Traffic patterns, peak usage times, and vehicle type distributions are just a few examples of the valuable insights gained from ANPR data. This information is critical for infrastructure planning, road maintenance scheduling, and resource allocation. Additionally, the data helps in the analysis of traffic behavior, which provides essential input for the development of strategies to improve overall traffic management.

Video Analytics Vehicle Classification (VAVC)

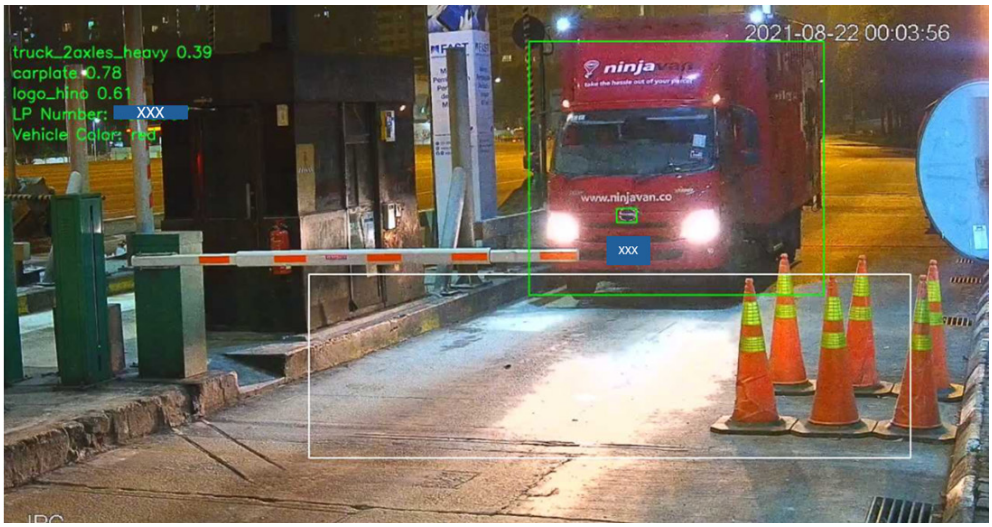


Figure 4: VAVC at Toll Booth

VAVC uses AI to classify vehicles into different categories (e.g., cars, trucks, motorcycles) based on camera footage. PLUS has deployed VAVC systems at toll plazas to automatically classify vehicles. The system uses machine learning algorithms to analyze video feeds and accurately categorize vehicles. With VAVC systems in place, toll plazas may operate with fewer toll booth operators dedicated solely to vehicle classification. This allows toll operators to be redeployed to high value roles requiring customer intervention such as customer service, traffic management, or incident response, where their skills and presence may be more beneficial. This optimization of manpower allows toll plaza management to streamline staffing levels while maintaining efficient operations.

VAVC technology would allow for detailed analysis of traffic composition. By classifying vehicles into various categories, PLUS is able to obtain precise data on the types and volumes of vehicles using the highways. This information is essential for designing maintenance strategies, thereby ensuring optimal use of resources, and prolonging the lifespan of the infrastructure.

Vehicle Counting at Highway Mainline

Figure 5: Vehicle Counting Counter at Bandar Serenia Interchange

Vehicle counting involves tracking the number of vehicles passing a specific point on the road. AI-based vehicle counting systems on the mainline allow monitoring traffic volumes at near real-time speed. The benefits of vehicle counting for maintenance and operations include improved traffic management by aiding in managing traffic flow and reducing congestion, support for data-driven decisions for road maintenance and capacity planning, and trend analysis to understand traffic patterns and trends over time.

The data collected from vehicle counting systems provides additional data for making informed decisions regarding road maintenance and capacity planning. By analyzing traffic volumes, PLUS can prioritize maintenance activities for high-traffic areas, ensuring that these sections of the highway remain in good condition. Additionally, understanding traffic patterns helps in planning for future infrastructure expansions to accommodate growing traffic demands.

In the near future, the data from vehicle counting systems will allow for accurate traffic prediction using time series analysis. This information is valuable for long-term planning and forecasting. By identifying trends in traffic volumes and patterns over time, PLUS can anticipate changes in traffic behavior and proactively implement measures to address potential challenges. Time series analysis helps in understanding the cyclical patterns, seasonal variations, and irregular fluctuations in traffic data, providing a comprehensive view of traffic dynamics. This proactive approach ensures that the highway network remains efficient and capable of handling future traffic demands, thereby enhancing road safety,

reducing congestion, and optimizing maintenance schedules. Traffic prediction models can simulate various scenarios to assess the impact of different factors on traffic flow. For example, they can predict how road closures, construction projects, or changes in traffic regulations will affect traffic volumes.

Suicide Attempt Alert System at Penang Bridge

Figure 6: Surveillance camera at Penang Bridge

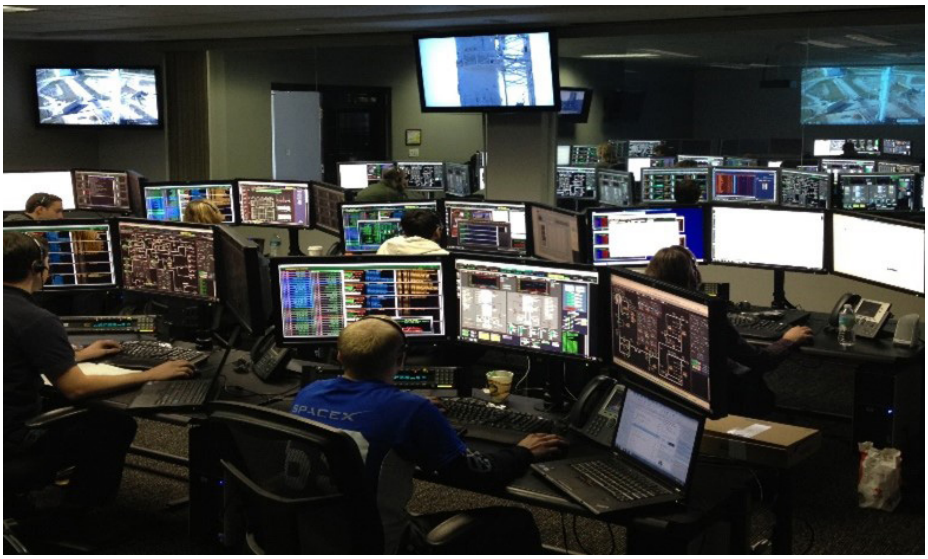


Figure 7: Monitoring at Traffic Monitoring Centre

Over the past few years, there has been an increase in reported suicide attempts at the Penang Bridge. It is believed that this trend is due to mental distress arising from personal reasons, rising costs of living and loss of employment. Cognizant of the potential of AI to be a game-changer, we are leveraging on its functionality to also strengthen our suicide prevention efforts. We developed a cutting-edge system that utilises AI technology and our existing Closed Circuit Television (CCTV) cameras to detect suspicious movements along the bridge's parapets. We infused our CCTV cameras with state-of-the-art AI Human Pose Estimation capabilities. This will not only enable the detection of suspicious motions, but also provide real-time audio warnings to highway customers and swiftly alert our Traffic Monitoring Centre (TMC) for immediate action.

Conclusion

The integration of AI technologies exemplifies how PLUS is leveraging on the rapidly growing advancements in AI to enhance the effectiveness and efficiency of operations and maintenance activities, providing a superior travel experience for all and ultimately ensuring safety for all.

PLUS continues to connect communities to shape a safe and sustainable future by pushing the boundaries of innovation and technology to reimagine and create the Highway of the Future.

Application Directions of AI in Road Management

Dr. Jaw Chang Laiw
Chief Technology Officer, Moh and Associates, Inc., Taiwan

With the rapid development of technology, the application of Artificial Intelligence (AI) is becoming increasingly widespread across various industries, especially in the management and maintenance of public infrastructure. Roads are the lifeline of transportation, and their effective management and maintenance are crucial. Traditional methods of road inspection and maintenance are often time-consuming, labor-intensive, and prone to accuracy issues. The introduction of AI technology into road management promises a revolutionary transformation. AI enables the efficient and precise detection and prediction of road conditions, optimizes resource allocation for maintenance, and enhances the lifespan and safety of roads. This article provides an overview of AI's potential applications in road management, demonstrating its significant potential to improve efficiency and quality in road management.

Traffic Management

1. Traffic Control

- Traffic flow monitoring: Utilizing AI technology to monitor real-time traffic flow via cameras and sensors, analyze traffic patterns, predict congestion, and optimize traffic signal timing.
- Smart traffic lights: AI dynamically adjusts traffic signal timings based on real-time traffic conditions to improve traffic flow and reduce congestion.

2. Vehicle Monitoring

- License plate recognition: AI enables the effective monitoring of vehicle entry and exit, tracking vehicle movements, and identifying and penalizing violations.
- Violation detection: AI rapidly detects violations such as speeding, improper lane changes, and illegal parking through image and video analysis, automatically reporting them to relevant authorities.

3. Enhancing Safety

- Accident prevention: AI analyzes historical and real-time traffic data to predict potential accident-prone areas and times, issuing early warnings.
- Intelligent rescue: In case of accidents, AI systems promptly initiate emergency response, notify rescue teams, and assist in planning optimal rescue routes.

4. Improving Service Quality

- Highway management: AI helps monitor highway conditions, promptly detecting and reporting issues such as road damage and equipment malfunctions to ensure road quality.

- Traffic flow prediction and information release: Using AI for traffic flow prediction and timely dissemination of road condition information via electronic signs, mobile applications, etc. to help drivers choose optimal routes.

5. Smart Toll Systems

- Electronic Toll Collection (ETC): Enhancing ETC systems with AI to improve accuracy and efficiency, reduce manual intervention, and enhance traffic flow.
- Dynamic pricing: Adjusting toll rates dynamically based on real-time traffic and road conditions to encourage traffic diversion and reduce peak-hour congestion.

6. Environmental Monitoring

- Air quality monitoring: AI technology aids in monitoring air quality along highways, identifying sources of pollution through data analysis, and proposing improvement solutions.
- Noise monitoring: AI systems monitor highway noise levels in real-time, analyze noise sources, and implement corresponding noise reduction measures.

Slope Safety Monitoring

1. Slope Monitoring

AI technology enables real-time monitoring of highway slopes using devices such as drones, sensors, and cameras. These devices capture slope images and data, which AI analyzes to detect potential risks and anomalies such as cracks and signs of slope instability.

Real-time monitoring of highway slopes using drones

2. Landslide Early Warning

Through AI analysis of historical and real-time monitoring data, factors like geological structure, rainfall, and soil moisture are assessed to predict landslide risks, forecast the potential area and scale of collapse, and to issue early warning signals to reduce the likelihood of accidents.

3. Data Analysis and Processing

AI processes large amounts of slope monitoring data, conducting in-depth analysis to identify potential safety hazards. This includes seismic activity, geological changes, climate conditions, etc. It enables the formulation of more effective slope management and maintenance plans.

4. Automated Inspection

Combining AI with drones and robots enables automated slope inspections when operating in hazardous environments. These automated devices transmit real-time data back to control centers for immediate analysis and processing, ensuring the stability and safety of highway slopes.

Bridge Safety Inspection

1. Image recognition and drone inspection

Using drones equipped with high-resolution cameras for bridge imaging, AI analyzes captured images to quickly detect cracks, corrosion, and other structural damage, thus achieving efficient and accurate inspection.

2. Structural Health Monitoring System (SHMS)

Using images captured by drones and various sensors installed on bridges (such as strain gauges, accelerometers, temperature sensors, etc.), SHMS monitors the dynamic and static characteristics of bridges in real-time. AI, through machine learning algorithms, analyzes historical and sensor data to assess bridge health and potential risks.

Using drones equipped with high-resolution cameras for bridge imaging

Pavement Maintenance Management

1. Image recognition technology

Collecting pavement images through onboard camera systems, AI models automatically identify damage points and analyze pavement surface images, quickly identifying cracks, potholes, and other damage to predict potential problem areas, optimizing resource allocation for maintenance.

2. Automated inspection vehicles

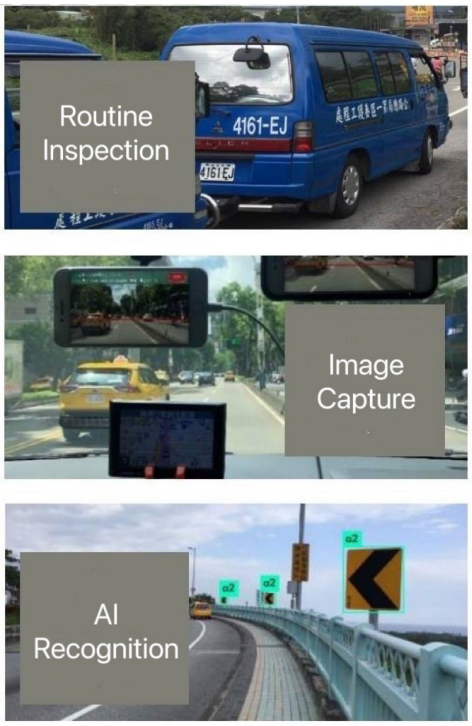
Equipped with multiple sensors, high-resolution cameras, and radar, automated inspection vehicles collect road data in real-time during operation. AI technology analyzes this data to generate real-time road condition reports.

3. Structure Health Monitoring System (SHMS)

Similar to bridge inspections, SHMS systems are applied to road pavements. By installing various sensors on roads, real-time monitoring of strain, temperature, vibration, and other parameters allows AI to analyze this data, evaluate road health, and proactively address potential issues.

4. Road maintenance management system

An AI-based road maintenance management system integrates multiple data sources to optimize maintenance plans and resource allocation, enhancing the efficiency and effectiveness of road maintenance. This effectively extends the lifespan of roads and bridges, enhancing public safety and traffic management.

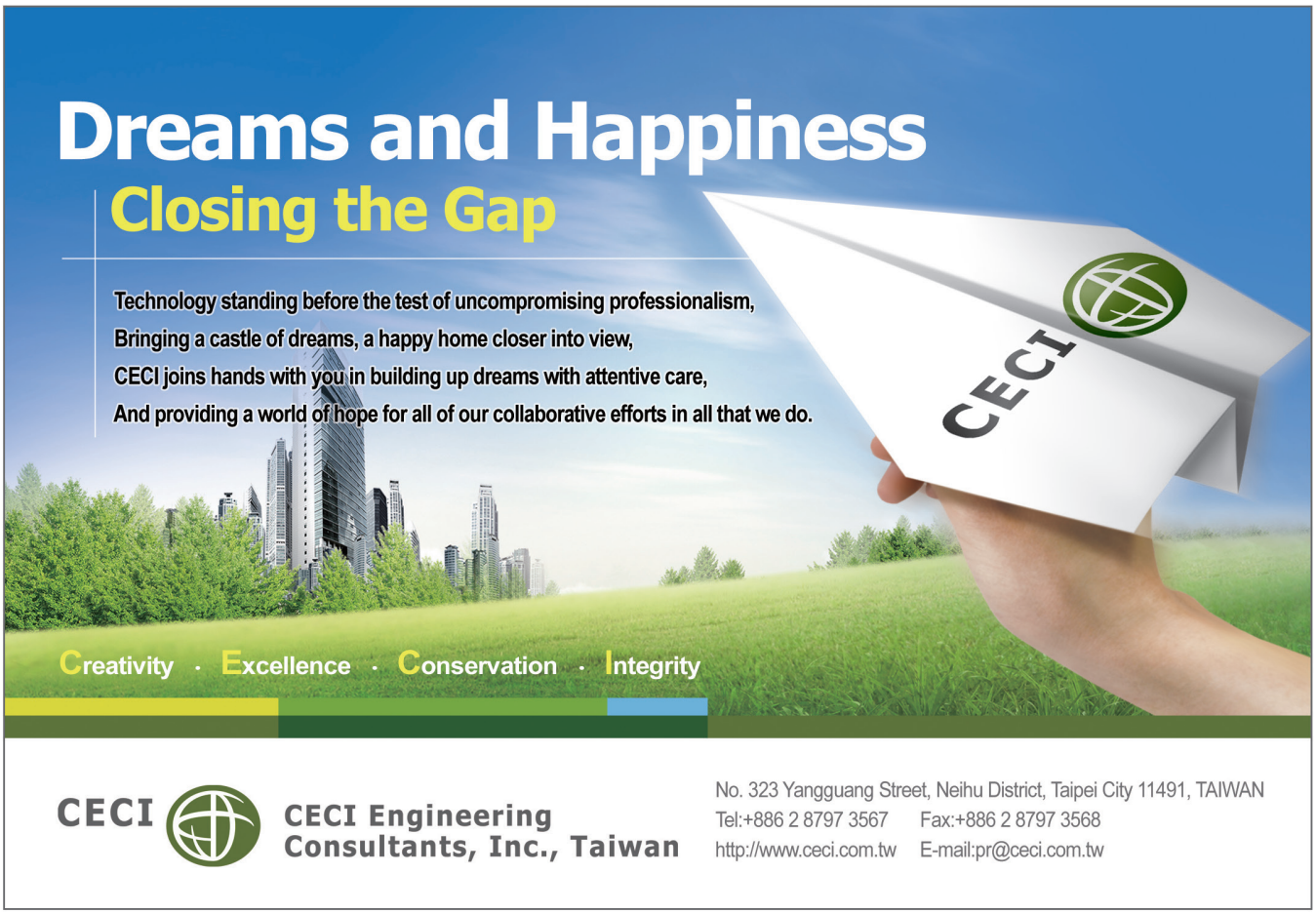


AI models automatically identify damage points and analyze pavement surface images

Conclusion

The application of AI technology in road management demonstrates enormous potential and practical benefits in traffic management, slope safety monitoring, bridge safety inspection, pavement maintenance management, etc. Through efficient and precise data analysis and predictive capabilities, AI significantly enhances the efficiency and quality of road management. While traditional methods of road inspection and maintenance are often time-consuming and inaccurate, AI not only improves detection and maintenance efficiency but also effectively extends the lifespan of roads and bridges, elevating public safety and traffic management standards. AI applications enable real-time monitoring, intelligent prediction, rapid response, optimized resource allocation, and enhanced overall road management efficiency. Innovations such as traffic flow monitoring, smart traffic lights, and intelligent toll systems lay a solid foundation for the future development of smart cities.

With the continuous advancement and application of AI technology, its potential and practical benefits in road management cannot be underestimated. Road management authorities should actively adopt AI technology, innovate continuously, and enhance the modernization of road management, thereby making greater contributions to road traffic infrastructure management and public safety.



121st REAAA Governing Council Meeting & Technical Tour

"Delegates of the 121st REAAA Governing Council Meeting and the 25th Young Engineers and Professionals (YEP) Meeting at TAFT I, Conrad Manila, Philippines, March 6, 2024. Spearheaded by Ir. Hamzah Hashim from Malaysia, the event featured updates from YEP members across Malaysia, Philippines, Japan, Korea, Indonesia, Singapore and Taiwan, alongside technical papers from Indonesian and Filipino representatives."

PHOTOS DURING THE 25th YOUNG ENGINEERS PROFESSIONALS (YEP) MEETING
DELEGATES FROM KOREA, MALAYSIA, JAPAN, PHILIPPINES, INDONESIA, SINGAPORE AND TAIWAN.

121ST REAAA GOVERNING COUNCIL MEETING

Group photo of the 121st REAAA Governing Council Meeting in Conrad Manila, Philippines on March 6, 2024

DR. SUNG HWAN KIM
REAAA PRESIDENT

DAVID G. SANCHEZ
REAP PRESIDENT

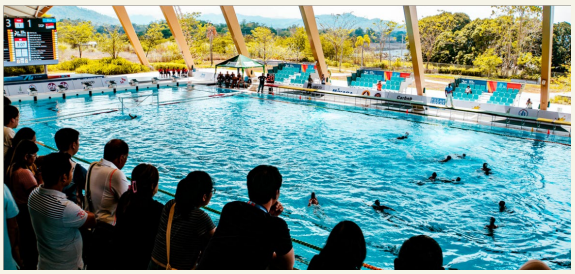
MARIA CATALINA E. CABRAL
PRESENTER

Undersecretary Maria Catalina E. Cabral, Ph.D. REAP Immediate Past President
Presented the "REVOLUTIONIZING THE PHILIPPINE TRANSPORT SYSTEM THROUGH
THE BUILD BETTER MORE PROGRAM".

ROAD ENGINEERING OF ASIA AND AUSTRALASIA *NEWSLETTER*

TECHNICAL TOUR

The Technical Tour was held on March 8, 2024 it was attended by Delegates from REAAA Malaysia, Korea, Indonesia, Singapore, Japan and Philippines we had a great tour at New Clark City Athletics Stadium and visited also the Sacovia Bridge. This is a worldwide-class stadium, last 2019 The SEA Games were held here.



25th REAAA Young Engineers & Professionals (YEP) Meeting

6th March 2024, Taft Ballroom, Conrad Hotel, Manila

Ir. Hamzah bin Hashim
Chairman, REAAA YEP

The 25th REAAA YEP meeting was held in Manila, Philippines, on 6th March 2024. As customary, the YEP meeting was organized to be held with the 121st REAAA Governing Council meeting and other associated events planned by the Road Engineering Association of the Philippines (REAP) and the REAAA Philippines Chapter. This was the third time that the Philippines had organized the YEP meeting since the inception of the YEPs in 2012, with other meetings held in 2013 and 2017.

The Chair of the YEP committee, Ir Hamzah bin Hashim from Malaysia, introduced the meeting by providing a brief historical background to the establishment of the YEP committee. Engr Jayson S. Jauco gave a welcoming speech on behalf of the host country. Delegates from Indonesia, Japan, Korea, Malaysia, the Philippines and Singapore attended the meeting as well as Governing Council members from Japan, Korea (including the President of REAAA, Dr Sung Hwan Kim), Singapore and Taiwan. There were also representatives from the Preparatory Committee for the 17th REAAA Conference scheduled for 2025 in Korea. Unfortunately, no facilities were available to allow members to attend virtually.

The meeting agenda allowed the YEPs to share information regarding current activities with other delegates. The activities of YEP Technical Working Group C4WC4 were also reported. The main objective of the working group is to encourage members to network with all REAAA countries and to provide the YEPs with the opportunity to present at international events in the region. The first objective of the working group has been achieved, with the being used to archive all the presentations made during YEP meetings. The second objective of the working group – to establish strategies to encourage participation in the Katahira Award for Outstanding Paper during the REAAA Conference – was also addressed. Attendees were given access to the past recipients of the award through REAAA website and Council members shared some tips on increasing the chances of winning the award.

The meeting continued with two presentations. The first presentation was given by Miss Tisara Sita from Directorate General of Highways, Indonesia, who discussed an artificial intelligence (AI) project on the creation of mobile applications for road damage detection. The presentation sparked a lot of interest from attendees as AI is an emerging technology that could help improve how to do things better. The second presentation was from Engr Kenneth Edward Fernando from the Department of Public Works and Highways, Philippines, who addressed the topic 'Understanding stakeholder perspectives on road development projects in the Philippines using Q methodology'. The thrust of his presentation was the need to take into consideration Stakeholder opinions and concerns regarding the use of

statistical methods for the derivation of benefits of infrastructural projects.

The meeting concluded with a photo opportunity!

The YEP Committee would like to thank the host country for the planning of the meeting, including the organisation of the venue – a pleasant memory which is now part of REAAA history.

Valediction : Dr. Za-Chieh Moh, Co-founder and Honorary Member of REAAA

Dr. Za-Chieh Moh (1931-2024)

It is with profound sorrow that we announce the passing of the co-founder and an Honorary Member of REAAA, Dr. Za-Chieh Moh, in March 2024 at the age of 94. Dr. Moh, alongside several other prominent engineers from Southeast Asian countries, co-founded the Road Engineering Association of Asia and Australasia (REAAA) in 1973. Dr. Moh served as the Honorary Treasurer/Secretary of REAAA from 1978 to 2000 and was elected as an Honorary Member in 2000.

Dr. Moh graduated from the National Taiwan University in 1953. He was awarded a Master's degree in civil engineering from Iowa State University in 1955, and a Doctor of Science degree in geotechnical engineering from Massachusetts Institute of Technology (MIT) in 1961.

Dr. Moh embarked on his career in academia as an Assistant Professor at Yale University from 1961 to 1965. In 1964, he was invited to continue to build the engineering school and spearhead the establishment of the Geotechnical Engineering Department in the SEATO (Southeast Asia Treaty Organization) Graduate School of Engineering, Asia's first graduate school of engineering; it was renamed the Asian Institute of Technology (AIT) in 1967. Although Dr. Moh was supposed to stay in his original assignment for only 18 months, he remained there for 11 years, serving in positions ranging from Associate Professor and Professor to Vice-President and Provost. During his tenure at the AIT, Dr. Moh achieved several significant milestones, including the co-founding of REAAA, the recruitment and training of top students in Asia, the exploration, analysis, description, and naming of Bangkok Clay, and the establishment of the Southeast Asian Geotechnical Society (SEAGS).

Dr. Za-Chieh Mon served as the session chairman at the 1st REAAA Conference

The 1st REAAA Conference was held in Bangkok, Thailand in 1973

1st REAAA Conference, Bangkok, Thailand, 1973
(Dr. Moh is the sixth from the left in the front row)

Dr. Moh continued his dedication to engineering education and remained engaged with AIT throughout his lifetime. In 1999, the AIT bestowed upon him an honorary doctorate degree in acknowledgment of his contributions and accomplishments within the academic community.

In 1975, Dr. Moh decided to leave the academic world and become a practicing professional engineer. With the vision of enhancing capacity building in the Southeast Asian region through the establishment of an international professional consulting group of firms based in Asia, he and his brother, Dr. Za-Lee Moh, founded Moh and Associates (MAA) in Singapore and Taiwan. In its 49 years of practice since then, the MAA has carried out numerous pioneering projects such as the Geotechnical Engineering Specialty Consultancy (GESC) for Taipei MRT; the Taipei Songshan Airport Underpass Tunnel, the world's first underpass constructed under an operating airport runway; and the Suvarnabhumi International Airport, the world's largest soft ground improvement project using the Prefabricated Vertical Drains (PVD) method[1]. During the same period, the company expanded its professional consulting services to include a diverse range of areas, including roads and highways, rail and high-speed rail, MRT systems, new town developments, airports, harbours, bridges, tunnels, common utility ducts, polluted soil remediation, wastewater treatment and reclamation, and digital applications across the Asian region. The company grew significantly, evolving from a 3-person specialty geotechnical engineering consulting firm to a 1,200-person multidisciplinary engineering consulting group. Today, MAA operates in Singapore, Taiwan, Hong Kong, Malaysia, Thailand, China and Myanmar, with projects in over 60 cities worldwide.

[1] A ground improvement technique used to accelerate the consolidation of soft, compressible soils, thereby enhancing their load-bearing capacity and stability.

The 3rd REAAA Conference was held in Taipei, Taiwan in 1981

Dr. Za-Chieh Moh & Dr. Louis Berger
at the 3rd REAAA Conference

Despite being busy running the company, Dr. Moh never ceased his commitment to capacity building. He served as the chairman of Taipei Professional Civil Engineers from 1980 to 1985, and founded the Chinese Union of Professional Civil Engineers Association in 1992. Under his initiative, Taiwan joined the Federation of Engineering Institutions of Asia and the Pacific (FEIAP) in 2008. Additionally, he initiated the annual CIE-HKIE-IEM Tripartite Seminar, which has been held alternatively in Taiwan, Hong Kong, and Malaysia since 2009. Furthermore, he promoted the APEC Engineer accreditation system, chairing the committee from 2011 to 2015. In recognition of his unselfish dedication and achievements, Dr. Moh was awarded Honorary Membership by REAAA and the Japanese Geotechnical Engineering Institute in 2000 and 2003, respectively. He was also elected as Engineer of the Year by APEC in 2008, and the Civil Engineering Achievement Award by ACECC in 2016. Dr Moh received the Engineering Medal from CIE in 2021, and was awarded the Anson Marston Medal by the College of Engineering at the Iowa State University's 89th Honors & Awards in 2021.

Ethics, accountability, dedication, and innovation were the four core values that Dr. Za-Chieh Moh continuously promoted and exemplified whenever facing difficulties and challenges. His character, knowledge, professionalism, elegance, passion, and pioneering spirit have made him a role model in our field, and without any doubt, he will continue to inspire us.

Dr. Za-Chieh Moh receiving the certificate of Honorary Membership from the then REAAA President,
Dr. Sadamu Mino, and delivering his acceptance speech in 2000

Valediction : Mr. Arthur Y. Chen, the 8th President of REAAA

REAAA regretfully announces the passing of the Former President of REAAA (1992-1995), Mr Arthur Y Chen on 22nd January 2024, at the age of 97. He made significant contributions to road engineering in the Asia and Australasian regions, as well as worldwide, and was highly respected among his professional peers for exemplary leadership.

Mr. Arthur Y. Chen (1928-2024)

Mr. Chen earned his degree in Electrical Engineering from the National Shanghai Chiao Tung University. He later advanced his expertise by completing a management program at Harvard Business School. He began his professional career at the Taiwan Power Company in 1948, where he served until 1966. Concurrently, he served as Chief Engineer and Director of Engineering Affairs at the Shihmen Reservoir Construction company from 1953 to 1966. His career path then led him to the Pan-Asia Engineering Construction Company, where he held roles as Deputy General Manager in Bangkok, and Manager in Guam, until 1973, roles which further enhanced his international leadership skills and engineering expertise.

In 1973, Mr. Chen joined the Ret-Ser Engineering Agency (RSEA), initially as Head of the Saudi Arabia Office, and subsequently as Deputy Director of the Overseas Department. He made invaluable contributions in overseeing the Shaer Descent Road project in Saudi Arabia, a challenging 58 kilometre project involving nine tunnels and 19 high-pillar bridges across rugged terrain. This project underscored his exceptional engineering capabilities.

Upon his promotion to Director of the RSEA in 1986, Mr. Chen steered the agency through a transformative period. He was fundamental in integrating four core operating principles – Reputation, Service, Efficiency, and Action – into the agency's culture. These principles, which align with the agency's acronym RSEA, became the cornerstone of the agency's ethos. His strategic vision during the revision of the agency's ten-year development plan in 1988 paved the way for numerous significant projects, both in Taiwan and abroad. In 1995, he was appointed Chairman of the Executive Yuan Public Works Committee, responsible for the supervision and coordination of public works in Taiwan.

Mr. Chen was an active member of various professional organizations, notably playing a crucial role in the REAAA. In 1991, he was appointed President of the China Road Federation (CRF), and a year later, in 1992, he was elected as the President for the 8th REAAA Council Term. During his tenure, Mr. Chen fostered close collaboration between REAAA and the CRF, strengthening the relationship between the two organizations. Under his presidency, Taiwan successfully hosted the 8th REAAA Conference in 1995.

The conference theme was 'Road Engineering for Future Development', and it drew over 690 attendees, including representatives from the USA, Canada, France, Germany, Iran, and other REAAA member countries.

Mr Chen's dedication to engineering and visionary leadership left an indelible mark on the field of road technology. His passing is a profound loss felt deeply by the global engineering community. Beyond his professional contributions, his legacy will undoubtedly continue to inspire and guide future generations of engineers.

The 52nd REAAA Council Meeting was held in Bangkok, Thailand in 1994
(Mr. Arthur Y. Chen is featured at the center in the front row)

The 122nd Council Meeting & The 5th International Conference on Highway Engineering 2024

The 5th International Conference on Highway Engineering 2024

"Future-Proofing Roads for Asia and Beyond"

&

PIARC International Seminar on the Transport Agency of the Future

4- 6 September 2024
Bangkok International Trade & Exhibition Centre (BITEC), Thailand

CONTENT

A: BRIEFING

The 5th International Conference on Highway Engineering (iCHE2024) and PIARC International Seminar on the Transport Agency of the Future is a free-to-attend concurrent event for those involved in the roads and road transport sector. The conference comprises of executive meeting, plenary session, technical presentation, workshop, panel discussion, technical visit, and exhibition. It will be held on 4th – 6th September 2024 at BITEC, Bangkok, Thailand.

CONFERENCE THEME

The event is organised under the theme "Future-Proofing Roads for Asia and Beyond" comprising four main tracks. Participants can join in these tracks according to their area of interest.

Track A: Efficient, Inclusive and Safe Road Management

Track B: Smart Mobility, Digital Technology and Innovation for Roads

Track C: Sustainability and Resilience of Road Networks

Track D: PIARC International Seminar on the Transport Agency of the Future

PAPER SUBMISSION

Authors are welcome to submit abstracts (not exceed 300 words) by the deadline of 30 April 2024. All submissions must be made online via https://www.iche2024.com/ If there is any enquiry, please contact conference secretary of the iCHE2024 via email contact@iche2024.com

Abstract Submission Deadline	: 30 April 2024
Abstract Acceptance Notification	: 15 May 2024
Draft Paper Submission Deadline	: 31 May 2024
Draft Paper Acceptance Notification	: 15 July 2024
Final Paper Submission Deadline	: 15 August 2024
Conference Day	: 4-6 September 2024

HIGHLIGHTS

Technical Session

The conference has three technical parallel sessions under three topics. In this forthcoming insightful technical sessions, academics, and practitioners will gather to share and exchange their wealth of knowledge and experience.

Forum & Workshop

Aside from the conference programme, attendants can participate in the forum and workshop sessions.

Exhibition & Networking

The iCHE2024 offers the opportunity to network with over 1,000 professionals, policy makers and

academics in road and transport sector and related fields. It presents an opportunity to showcase and promote the company's product brand and network.



B: DETAILS

1. ABOUT THE CONFERENCE

At present, the world is undergoing rapid changes, encompassing issues such as climate change, new technologies, urbanisation, demographic changes, and various global mega trends. As stewards of road infrastructure, we must contemplate how to plan, design, construct, maintain, and manage roads in various aspects to effectively address the challenges posed by these swiftly evolving trends that are approaching in the near future.

Highway construction technology and incident management have experienced significant advancements, particularly with the integration of AI technology. The exponential growth in computational capacity raises concerns among engineers, scientists, and technology developers about the sustainability of current technologies for future generations. Questions arise regarding the lifespan of highway structures, the environmentally responsible recycling of construction materials, and the need to address global warming concerns by promoting sustainable economic growth with controlled greenhouse gas emissions.

Ensuring a safe road environment for everyone and enhancing productivity for both public and private sectors are paramount. Striking a balance between technological innovation and environmental stewardship is crucial for the well-being of current and future generations. As we embrace advanced technologies, it becomes imperative to design and implement solutions that not only enhance mobility and safety but also contribute positively to economic growth while maintaining neutrality in greenhouse gas emissions.

The theme of the conference, 'Future-Proofing Roads for Asia and Beyond', makes a timely and crucial call to action. The iCHE2024, organized by the Department of Highways (DOH) and the Roads Association of Thailand (RATh), in concurrence with PIARC International Seminar on the Transport Agency of the Future is pushing the boundaries of 21st century roads and road transport, preparing them for the challenges and opportunities, and shaping the future of road transportation. This concurrent event aims to foster engagements of specialists, professionals, decision-makers, and industry leaders. as well as to help building resilient, adaptable, and future-proofing roads for Asia and beyond.

Professionals and academia are cordially invited to share their knowledge, experience, and insights in cutting-edge advancements for efficient, smart, and sustainable roads and road transport. The event program encompasses plenary sessions, technical presentations, executive meetings, workshops, and exhibition.

2. CONFERENCE PROGRAMME

Draft Program					
iCHE 2024: Future-Proofing Roads for Asia and Beyond & PIARC International Seminar on the Transport Agency of the Future					
4 - 6 Sep 2024 @ BITEC, Bangkok					
Day 1: Wed 4 Sep 2024					
Start from 8:00	Registration				
09:00 – 09:30	[GH 203] Opening Ceremony				
09:30 – 10:15	[GH 203] Signing Ceremony with PIARC				
10:15 – 11:00	[GH 201-202] Opening of Exhibition (Coffee break)				
11:00 – 12:00	[GH 203] Keynote Session : Green Roads for All: Building Equitable Road Infrastructure for Sustainable Future (TBC)				
12:00 – 13:00	Lunch Break				
13:00 – 14:30	[GH 203] **Track A:** Efficient, Inclusive and Safe Road Management	[MR 211-212] **Track B:** Smart Mobility, Digital Technology and Innovation for Roads	[MR 222-223] **Track C:** Sustainability and Resilience of Road Networks		[MR 224] **Workshop 1:** PIARC TC 3.1 : Road Safety
14:30 – 15:00	Coffee Break				
15:00 – 16:30	[GH 203] **Track A:** Efficient, Inclusive and Safe Road Management	[MR 211-212] **Track B:** Smart Mobility, Digital Technology and Innovation for Roads	[MR 222-223] **Track C:** Sustainability and Resilience of Road Networks	[MR 214-215] **Track D:** PIARC International Seminar (Innovation)	[MR 224] **Workshop 2:** Smart Tolling Hosted by FETC (TBC)
16:30 – 18:00	Networking Reception				
Day 2: Thu 5 Sep 2024					
09:00 – 10:00	[GH 203] Keynote Session : Roads to Resilience: Adapting Infrastructure to Changing Climate (TBC)				
10:00 – 10:30	Coffee Break				
10:30 – 12:00	[GH 203] **Track A:** Efficient, Inclusive and Safe Road Management	[MR 211-212] **Track B:** Smart Mobility, Digital Technology and Innovation for Roads	[MR 222-223] **Track C:** Sustainability and Resilience of Road Networks	[MR 214-215] **Track D:** PIARC International Seminar (Creating a stronger future focused workforce)	[MR 224] **Workshop 3:** BIM Hosted by TCA
12:00 – 13:00	Lunch Break				
13:00 – 14.30	[MR 223] **Track A:** Efficient, Inclusive and Safe Road Management	[MR 211-212] **Track B:** Smart Mobility, Digital Technology and Innovation for Roads	[MR 222] **Track C:** Sustainability and Resilience of Road Networks	[MR 214-215] **Track D:** PIARC International Seminar (Public Value Creation by Transport Agencies)	[MR 224] **Workshop 4:** Green & Sustaibable Hosted by DOH
14:30 – 15:00	Coffee Break				
15:00 – 16:30	[MR 223] **Track A:** Efficient, Inclusive and Safe Road Management	[MR 211-212] **Track B:** Smart Mobility, Digital Technology and Innovation for Roads	[MR 222] **Track C:** Sustainability and Resilience of Road Networks	[MR 214-215] **Track D:** PIARC International Seminar (Envisioning the TA of the Future)	[MR 224] **Workshop 5:** Road Safety Hosted by……. (TBC)
18:00 – 20:30	[GH 203] Gala Dinner & Cultural Show				
	**Technical Visit: M-Flow (Thu, 5 Sep 2024, 14:00 - 16:00) M-FLOW				
Day 3: Fri 6 Sep 2024					
09:00 – 10:30	[GH 203] **Track A:** Efficient, Inclusive and Safe Road Management	[MR 211-212] **Track B:** Smart Mobility, Digital Technology and Innovation for Roads	[MR 222-223] **Track C:** Sustainability and Resilience of Road Networks		[MR 224] **Workshop 6:** Energy Saving LED Hosted by ... (TBC)
10:30 – 12:00	[GH 203] Public Forum : CAV Friendly Road Infrastructure Hosted by ITS Thailand & iTIC (TBC)				
12:00 – 13:00	Lunch Break				
13:00 – 14:30	[GH 203] Public Forum : Future-Ready Roads for EV Hosted by EVAT (TBC)				
14:30 – 15:00	Coffee Break				
15:00 – 16:00	[GH 203] Outstanding Paper Awards & Closing Ceremony				
16:00	End of the Conference				
Post-conference Day: Sat 7 Sep 2024					
Social Program: A Round of Golf (TBC)					

3. PIARC EVENTS

PIARC stands for Permanent International Association of Road Congresses, which is the new name for the World Road Association. PIARC established in 1909 as a non-profit, non-political association aims to develop international cooperation and foster progress in the area of roads and road transport. It comprises of 125 member governments as well as private sector companies, universities, regions, individuals from high-income to low- and middle-income countries. PIARC is the world leader in the exchange of knowledge on roads and road transport policy and practices. The Association mobilizes the experience and knowledge of 1,200 experts from more than 80 countries in 20+ Technical Committees and Task Forces.

PIARC exists to serve all its members by:

- being a leading international forum for analysis and discussion of the full spectrum of transport issues, related to roads and road transport,
- identifying, developing and disseminating best practice and giving better access to international information,
- fully considering within its activities the needs of developing countries and countries in transition,
- developing and promoting efficient tools for decision making on matters related to roads and road transport.

The following PIARC events will be held:

1) PIARC International Seminar on the Transport Agency of the Future (during 4-6th Sept)

Theme: Transport agency of the future highlights creating a stronger future focused workforce, public value creation by transport agencies, envisioning the transport agency of the future, and innovation.

Call for papers in the following topics:

- Road transport administration and strategic improvisation of project management,
- Social equity and accessibility,
- Gender inclusion in the road sector

2) PIARC Workshop Session on Road Safety (Sept 4th)

3) PIARC Strategic Planning Commission (SPC) Meeting (Sept 2nd- 3rd)

4) PIARC Technical Committee (TC) Meeting: TC 1.1 and TC 3.1 (Sept 2nd- 3rd)

4. REAAA ACTIVITIES

REAAA is the Road Engineering Association of Asia and Australasia. The REAAA, established in 1973, is a regional body set up to promote and advance the science and practice of road engineering and related professions in the Asia Pacific region through developing professional and commercial links within and between countries in the region. Regional co-operation and technical harmony are the underlying principles of the Association. For over 12 member countries, the REAAA holds regular events including

a Council Meeting (twice a year), Heads of Road Authorities (HORA) meeting (annual) and the REAAA Conference (four years) to promote regional cooperation and technical exchange.

The iCHE2024, Thailand will host the following REAAA events:

1) 122nd REAAA Governing Council Meeting

The Management of the Association is vested in a Council which holds regular meetings to make policy decisions and set directions for the Association. On 5 September 2024, it will be on its 122nd Governing Council Meeting in Bangkok, Thailand after the 94th REAAA Council Meeting between the 20th and 21st of April 2012 at the Centara Grand and Bangkok Convention Centre, Bangkok, Thailand.

2) 26th REAAA Young Engineers and Professionals (YEP) Meeting

Another important initiative of REAAA is the Young Engineers and Professionals or YEP Meeting. It reaches young members of REAAA to actively involve in multi-national cooperation made possible by the Association. Each year the YEP meets to discuss ideas or promote activities to improve the capacity of young its members. The 26th REAAA YEP Meeting will be held in Bangkok, Thailand for its first time.

3) 11th REAAA Business Forum

REAAA Business Forum is designed to facilitate road sector business to business collaboration. The objectives are to create business to business collaborations in road engineering projects or related sectors and to enhance membership from business persons, institutions or companies.

Council members, associated members, their accompanies and partners from government organisations and private sectors in road engineering and technology industries of more than 200 delegates from 12 member countries will attend this REAAA event.

A number of road engineering organisation in the Asia Pacific region includes Korea Expressway Corporation (KEC), REAAA Korean Chapter, Ministry of Land, Infrastructure, and Transport (MOLIT)) Korea, Korea Expressway Corporation Research Institute, Kunhwa Consulting & Engineering Co., Ltd, China Road Federation, Taiwan (CRF), Moh & Associates, Inc., Taiwan, Public Works Department of Malaysia (PWD), Malaysian Highway Authority (MHA), Road Engineering Association of Malaysia (REAM), Malaysian Institute of Road Safety Research (MIROS), Minconsult Sdn Bhd, Malaysia Highway Authority, Japan Road Association (JRA), Japan, Express Highway Research Foundation of Japan (EHRF), NEXCO Research Institute, East Nippon Expressway Co. Ltd., Honshi Co.Ltd., REAAA Australian Chapter, New Zealand Transport Agency (NZTA), REAAA New Zealand Chapter, Australian Road Research Board, Indonesian Road Development Association (IRDA), Ministry of Public Works & Highways & Housing, Indonesia, Road Engineering Association of The Philippines (REAP), REAAA Philippines Chapter, Land Transport Authority, Singapore (LTA), Public Works Department, Brunei, REAAA Brunei Chapter, and Public Works & Transport Cambodia.

REAAA Activities
4th-5th September 2024 at BITEC

Wed 4 Sep 2024		
13:00-16:00	MR 220	11th Business Forum
16:30-18:00	TBC	Networking Reception
Thu 5 Sep 2024		
9:00-12:00	MR 220	26th YEP Meeting
12:00-13:00		Lunch Break
13:00-16:00	MR220-221	122nd REAAA Governing Council Meeting
18:30-20:30	GH203	Gala Dinner & Cultural Show

10：30 - 11：00 and 14：30 - 15:00 Coffee Break

5. TOPICS FOR THE CALL FOR PAPERS

Please submit your technical papers for the following topics:

Track A: Efficient, Inclusive and Safe Road Management

To ensure that road and road related infrastructure are managed efficiently, inclusively, and safely, road administrators are responsible for a wide range of tasks from planning for effective road networks to managing road infrastructure and transportation system in order to promote economic growth and social development as well as to improve the lives of citizens across the country. In addition, road safety is also an important issue that need to be addressed in road operators. The safety for all road users is a significant concern in low-income and developing countries with 90% of road traffic fatalities occurring in these countries. Improving road safety is essential towards achieving social equity in accessibility in rural areas. The ten key topics are to be addressed by this track.

Topic A.1 : Road Transportation Planning

Topic A.2 : Operation and Management in the Road Sector

Topic A.3 : Road Development and Management Tool

Topic A.4 : Road Transport Administration and Strategic Improvisation of Project Management

Topic A.5 : Social Equity and Accessibility

Topic A.6 : Gender Inclusion in the Road Sector

Topic A.7 : Public-Private Partnership to Boost the Road Infrastructure

Topic A.8 : Road Safety Management Practices and Processes

Topic A.9 : Measures of Improving Road Safety

Topic A.10 : Road Pavement Bridge, Tunnel, and Other Infrastructure Management

Track B: Smart Mobility, Digital Technology and Innovation for Roads

Mobility on roads is a crucial aspect of modern society, enabling people to access essential services, engage in economic activities, and connect with others. The application of new technologies and digital transformation concept in road transport can optimise the road network operations and enhance the intelligent transportation system. Connected and automated vehicles are also the future of transportation. Preparing road infrastructure is therefore essential towards digitalisation and modernisation for connected and automated driving. The implementation of emerging technologies and innovations can help supporting road agencies during the design, construction, operation, and maintenance of roads. The ten key topics are to be addressed by this track.

Topic B.1 : Mobility in Urban Development

Topic B.2 : Intelligent Transportation System

Topic B.3 : Digitalisation and Building Information Modeling in Transportation

Topic B.4 : Innovation for Mobility

Topic B.5 : Application of Emerging Technologies in Road Transport

Topic B.6 : Connected and Automated Vehicles

Topic B.7 : Artificial Intelligence in Road Transport

Topic B.8 : New and Innovative Methods and Strategies

Topic B.9 : Electric Road System

Topic B.10 : Innovative Renewal and Rejuvenation of Aging Infrastructure

Track C: Sustainability and Resilience of Road Networks

Sustainable and resilient road infrastructure and networks are vital for ensuring the serviceability and reliability of road transportation systems. An increasingly significant global impact of climate change and natural hazards such as floods, landslides, and earthquakes have a devastating impact on road networks, disrupting transportation and causing significant economic and social harm. Road administrators need to consider the resilience of their networks, develop robust disaster management plans, invest in resilient infrastructure designed to mitigate the impact of these events, as well as ongoing monitoring and adaptation to changing conditions. In addition, decarbonisation efforts, such as the use of low-carbon materials and the adoption of sustainable construction practices, can also make transportation systems more resilient to the impacts of climate change and reduce the carbon footprint of road construction and maintenance. Several issues that need to be addressed include how there can be a reduction in

emissions, the use of zero emission vehicles, as well as strategies such as pricing and business models that encourage their adoption. The ten key topics are to be addressed by this track.

Topic C.1 : Improvement Measures for Transportation Decarbonisation and Carbon Neutrality

Topic C.2 :Sustainable Transportation related to Environmental, Economical, Social, and Engineering Aspects

Topic C.3 : Resilience Road Infrastructure to Extreme Natural Events and the Environment

Topic C.4 : Natural Hazards and Disaster Management for Road Networks

Topic C.5 : Road Transport Sustainability and Resilience in the Context of Climate Change

Topic C.6 : Climate Change Adaptation Actions for Road Infrastructure

Topic C.7 : Environmental Sustainability in Road Infrastructure and Transport

Topic C.8 : Reducing the Carbon Footprint of Road Sector

Topic C.9 : Promotion of Use of New or Cleaner Energies in Road Transportation

Topic C.10 : Road Infrastructure Design for Sustainability and Resiliency

Submission

Authors are welcome to submit abstracts (not exceed 300 words) by the deadline of 30 April 2024. All submissions must be made online via https://www.iche2024.com/

If there is any enquiry, please contact conference secretary of the iCHE2024 via email contact@iche2024.com

Important Date

Abstract Submission Deadline	:	30 April 2024
Abstract Acceptance Notification	:	15 May 2024
Draft Paper Submission Deadline	:	31 May 2024
Draft Paper Acceptance Notification	:	15 July 2024
Final Paper Submission Deadline	:	15 August 2024
Conference Day	:	4-6 September 2024

Outstanding Paper Awards

The following are the award categories for iCHE2024:

1. Best Practical Paper

In order to be considered for the Award, nominated paper must meet the following conditions:

1) Social Effectiveness and Impact

- Economic benefit to the community – stimulation of economic growth, improvements in lifestyle, amenity etc.
- Impact on traffic flow – reduced congestion, delays etc.
- Impact on road safety – reduced road trauma (fatalities, injuries etc.).

2) Technical Excellence

- Innovation in design, construction, materials quality etc.
- Problem solving
- Cost-effectiveness

3) Environmental Friendliness/Awareness

- Environmental impact
- Reduced greenhouse gas emissions, noise, land acquisition etc.

2. Best Innovation Paper

The Award Selection Committee shall make the selection based on the following criteria:

- Being original or innovative application of the ICT technology.
- Being a newly developed or innovative technique, solution, service, or business model.
- Being successful in the service, concept, or product it provided.
- Making contributions to society, economy, and sustainability.
- Being innovative for Big Data application.
- Being a system with high efficiency and reliability.
- Promoting the effectiveness of maintenance.
- Making contributions to the growth of emerging industries.
- Promoting safety and effectiveness for road operation.
- Promoting effectiveness for energy saving and carbon reduction.

3. Young Professional Award

1) Authors who submit papers for iCHE 2024 are invited to nominate for the Young Professional Award if they meet the following conditions:

- The author must be under 35 years of age at the time of the submission of the paper. Where there is more than one author, only the first named author must be under 35 years of age.
- The author must be able to give an oral presentation at the Conference.
- The paper must not have been published elsewhere in the same form.

2) Papers are judged according to the following criteria:

- Originality: level of academic or theoretical work and/or practical application
- Level of innovation: creativity in adaptability/modification of existing practice
- Technical excellence: high level of technical accuracy and standard of reporting, including ease of understanding relevance to region.

Proceedings

Papers presented at the iCHE2024 will appear in the Conference Proceedings, which will be made available to registered participants. Selected high-quality papers in this conference will go through a reviewing process for potential publication in the REAAA journal.

6. TECHNICAL VISIT

The iCHE2024 offers the opportunity to visit "M-Flow." You can join the programme when registered.

What is M-Flow?

In a strategic initiative aimed at mitigating traffic congestion at toll plazas, the Ministry of Transport in Thailand has successfully deployed an innovative electronic tolling system known as M-FLOW (Multi-Lane Free Flow). M-Flow seamlessly integrates cutting-edge technologies, incorporating transponders and automatic license plate recognition (ALPR), to adeptly identify vehicles and streamline transaction processing. With an impressive throughput capacity, the M-Flow system effortlessly accommodates 2,000 – 2,500 vehicles per hour per lane, achieving speeds up to five times faster than traditional barrier-based tolling methods.

Motorists now experience a seamless traverse through toll plaza areas, eliminating the need for halting or deceleration, thereby significantly reducing delays—a long-standing challenge contributing to travel time inefficiencies. This groundbreaking system optimises toll payment processes and directly addresses a substantial component of travel time delays encountered at toll plazas.

In February 2022, the Department of Highways (DOH) achieved a significant milestone by inaugurating its first M-Flow implementation on the M9 motorway. This accomplishment involved transforming four toll plazas—Tap Chang 1, Tap Chang 2, Thanya Buri 1, and Thanya Buri 2—into a hybrid system, combining partial M-Flow tolling with conventional barrier-based tolling methods. Presently, the M-Flow system boasts 590,000 registered members and approximately 760,000 registered vehicles. The user base has witnessed a remarkable increase from 57,000 vehicle/days in the first month to 127,000 vehicles per day as of December 2023, constituting 40 percent of motorway users, with this proportion continuing to rise. Total transactions have surpassed 71 million to date.

M-FLOW has proven instrumental in reducing traffic queue lengths at toll plazas from 4 kilometres to 0.5 kilometres during peak times. Furthermore, the system's benefits evaluation demonstrates a reduction in travel time delays by over 3.3 million hours annually, a decrease in gas consumption by more than 14 million liters per year, and a notable contribution to environmental conservation—reducing carbon dioxide (CO2) and nitrogen oxides (NOX) emissions by 37,000 tons/year and 150 tons/year, respectively.

With these considerable benefits, the Ministry of Transport aims to extend M-FLOW implementation across the DOH' motorways and EXAT's expressways within the next five years. This will involve a hybrid system applied to currently operational motorways, including M7, and expressways such as Chalong Rat Expressway, Burapha Withi Expressway, Si Rat Expressway, Si Rat–Outer Ring Road Expressway, Chaloem Maha Nakhon Expressway, and under-construction motorways, namely M6 and M81. Additionally, fully open-road tolling systems will be implemented on the presently under construction motorway M82, and the Rama III – Dao Khanong-Outer Ring Road Expressway M82, and upcoming motorway M5 and M9 Bang Khun Tien – Bang Bua Thong. The successful implementation of M-FLOW represents a substantial leap forward in enhancing toll collection efficiency and reshaping the driving experience on Thai motorways and expressways.

7. GETTING AROUND

Welcome to Bangkok

Bangkok is a city of vibrant colour and excitement, renowned for its bustling atmosphere with people from various nationalities. The chaotic traffic and the ever-increasing number of towering skyscrapers define its dynamic landscape. Additionally, Bangkok is replete with tourist attractions and numerous relaxing retreats, making it an exceptionally diverse capital that caters to the needs of all visitors.

The diversity of Bangkok spans across arts, culture, temples, extensive shopping centres that include major department stores, and the renowned Chatuchak Weekend Market. You can also take part in a scenic cruise along the Chao Phraya River to witness breathtaking landscapes. The city boasts a multitude of culinary delights, offering a wide range of exquisite flavours.

We are delighted to invite you to experience everything that Bangkok and its surrounding areas have to offer. This city is a harmonious blend of tradition and modernity, promising an unforgettable journey.

Join us in September 2024 for iCHE2024, and we eagerly anticipate welcoming you to this captivating destination.

Interesting Tourist Attractions

The Grand Palace and The Temple of The Emerald Buddha

Bangkok Art and Culture Centre

Khon, masked dance drama in Thailand

Yaowarat Night Market (China town)

8. CONTACT INFORMATION

Telephone : +66 2206 3789
Email : contact@iche2024.com
Address : 2/486 Si Ayutthaya Road, Thung Phaya Thai, Ratchathewi, Bangkok, 10400, Thailand.
Website : https://www.iche2024.com

Partners

Highway Concession Conference 2024

12th MRC First Announcement

Conference at a Glance

12th Malaysian Road Conference & Exhibition 2024

The Malaysian Road Conference & Exhibition has been a key event in the field of road engineering since its inception in 1994. Held biennially, it serves as a vital platform for industry professionals, experts, and stakeholders to convene, exchange knowledge, and explore advancements in road infrastructure.

With a biennial schedule, the conference ensures a regular gathering of experts, researchers, policymakers, and industry leaders. This frequency allows for the continuous discussion of emerging trends, challenges, and innovative solutions in the field of road engineering.

The conference is organised by the esteemed Road Engineering Association of Malaysia (REAM), a leading association in road engineering. REAM plays a pivotal role in promoting collaboration, sharing expertise, and advancing the standards of road infrastructure in Malaysia.

5th International Road Federation Global Asia-Pacific Regional Congress

The 12th edition of the Malaysian Road Conference & Exhibition is distinguished by its concurrent organisation with the 5th International Road Federation Global Asia-Pacific Regional Congress. This collaborative effort enhances the global reach of the event, bringing together international perspectives and expertise in the road infrastructure domain.

Conference Theme : Driving Innovation for Better Roads

The central theme for the 12th Malaysian Road Conference & Exhibition 2024 is "Driving Innovation for Better Roads". This theme underscores the commitment to embracing innovation as a core driver for improving the quality, safety, and sustainability of road infrastructure.

With a focus on innovation, the conference aims to inspire participants to contribute to the continuous improvement of road networks. By driving progress and emphasizing sustainable practices, the event plays a crucial role in shaping the future of road engineering.

Conference Official Language

The official language of the events is English to facilitate clear communication and collaboration among the diverse international participants.

Target Audience

The 12th Malaysian Road Conference & Exhibition 2024, organised in collaboration with the 5th International Road Federation Global Asia-Pacific Regional Congress, promises to be a landmark event, uniting industry leaders, experts, and stakeholders to collectively drive innovation for better roads on a global scale.

The conference program is expected to include a series of technical sessions, workshops, and an exhibition platform. These components provide opportunities for in-depth discussions, presentations of research findings, and the showcasing of innovative products, technologies, and services in the road engineering sector.

The concurrent events facilitate international collaboration and networking. The events attract a diverse audience, fostering a global exchange of ideas and best practices in road infrastructure development.

The Organisers

Road Engineering Association of Malaysia (REAM)

The Road Engineering Association of Malaysia (REAM) has its roots in the establishment of the Road Engineering Association of Asia and Australasia (REAAA) in 1973. At that time, REAAA formed a permanent secretariat in Kuala Lumpur, Malaysia. In 1993, recognizing the importance of facilitating technology transfer both locally and internationally, the Malaysian Chapter of REAAA was established.

In 1997, a significant development occurred with the renaming of the REAAA (Malaysian Chapter) to the Road Engineering Association of Malaysia (REAM). This transformation was undertaken to align with national aspirations and emphasize REAM's commitment to advancing road engineering practices and standards within Malaysia.

REAM is a prominent organization dedicated to advancing the field of road engineering within Malaysia. As a professional association, REAM plays a pivotal role in promoting collaboration, knowledge exchange, and the continuous improvement of road infrastructure standards in the country. Through initiatives such as conferences, workshops, and educational programs, REAM provides a platform for industry professionals, researchers, and policymakers to stay abreast of the latest developments, share expertise, and contribute to the sustainable growth of Malaysia's road network.

International Road Federation Global (IRF Global)

The International Road Federation Global (IRF Global), based in Washington, DC is a leading, non-profit organization dedicated to promoting the development and sustainability of road infrastructure worldwide. Established since 1948 as a global platform, IRF Global focuses on fostering innovation, knowledge exchange, and best practices in the road and transportation sector.

Through conferences, training programs, and collaborative initiatives, IRF Global plays a crucial role in bringing together a network of professionals, policymakers, and industry leaders to address challenges, share expertise, and advance the state of global road networks in more than 70 members countries.

Conference Venue

World Trade Centre Kuala Lumpur

The World Trade Centre Kuala Lumpur (WTC KL) serves as a premier venue for conferences, exhibitions, and events, offering state-of-the-art facilities and a central location in the heart of Malaysia's capital. Equipped with modern infrastructure and versatile spaces, WTC KL is known for hosting international gatherings, showcasing its commitment to facilitating global exchanges across various industries.

Accommodations

Numerous hotels and accommodations are situated within proximity to WTC KL, providing convenience for conference attendees. Accommodation options cater to various preferences and budgets.

Local Attractions

While attending the conference, participants can explore nearby attractions, including iconic landmarks, shopping districts, and cultural sites, showcasing the vibrant mix of modernity and tradition that Kuala Lumpur has to offer.

Programme Overview

	4 November Monday	5 November Tuesday		6 November Wednesday		7 November Thursday	
Morning Session	Exhibition Set-up	Opening Ceremony	Exhibition	Parallel Technical Session 3	Exhibition	Parallel Technical Session 6	Exhibition
		Tea Break		Tea Break		Tea Break	
Morning Session		Parallel Technical Session 1		Parallel Technical Session 4		Closing Ceremony	
		Lunch Break		Lunch Break		Lunch Break	
Afternoon Session		Parallel Technical Session 2		Parallel Technical Session 5		Technical Visit	

Technical Visits

TV 1 - LRT SHAH ALAM LINE (LRT 3)

The LRT Shah Alam Line or LRT 3, is a medium-capacity light rapid transit (LRT) line which will be serving the Shah Alam and Klang regions on the western side of the Klang Valley, Malaysia. It will be the third LRT line, and the fourth fully automated and driverless rail system in the Klang Valley region.

TV 2 - EAST COAST RAIL LINK (ECRL)

The East Coast Rail Link (ECRL) is a transformative infrastructure project aimed at enhancing connectivity and fostering economic development in Malaysia's East Coast region. Spanning approximately 665 kilometers, the ECRL will connect the east coast states of Kelantan, Terengganu, and Pahang to the west coast, linking major cities and ports along its route. The infrastructure includes spur lines, tunnels, bridges and viaducts.

TV 3 - THE UEM EDGENTA PAVEMENT RESEARCH CENTRE

The UEM Edgenta Pavement Research Centre is located at Bukit Beruntung looks into the development of sustainable and environmentally-friendly road surfaces, amongst others. It involves pavement condition assessment, pavement rehabilitation, pavement testing, drainage maintenance, as well as cleaning and traffic safety services.

TV 4 - ROAD INFRASTRUCTURE AT MERDEKA 118

The Merdeka 118 tower is a 118-storey building located in the heart of Kuala Lumpur, Malaysia. With a completed height of 678.9 metres, the tower now stands as the tallest in Malaysia and Southeast Asia. The Merdeka 118 development will provide seamless connectivity for visitor's access. The precinct is directly connected to the newly built Merdeka MRT Station, 2 LRT stations, as well as 2 monorail stations.

CALL FOR PAPERS

12th Malaysian Road Conference & Exhibition 2024 and 5th International Road Federation Global Asia-Pacific Regional Congress

Driving Innovation for Better Roads

5-7 November 2024,
World Trade Centre, Kuala Lumpur, Malaysia

Papers are invited from local and international authors encompassing, among others, the following streams in tandem with the conference/congress theme **"Driving Innovation for Better Roads".** Papers should be written in following sub-themes:

Innovative Pavement Technologies	Environmentally and Sustainable Infrastructure
Resilient Transportation and Mobility	Innovative Traffic and Road Safety Initiatives
Advanced Bridge Technologies	BIM and Innovative Design Tools
Asset Performance, Management & Rehabilitation	Advanced Construction and Best Practice
Future in Slope and Geotechnical Technologies	Highway Engineering and Road Intelligent System

IMPORTANT DATES

DEADLINE FOR ABSTRACT SUBMISSION	DEADLINE FOR FULL PAPER SUBMISSION	DEADLINE FOR CAMERA READY SUBMISSION	CONFERENCE DAY
26 April 2024	18 July 2024	30 September 2024	5 November 2024

SUBMISSION GUIDELINES

Papers shall be submitted in two stages: first as an abstract and then as a full paper after the abstract has been accepted. Papers submitted should be original and have not been published or presented elsewhere. Abstracts and full papers must be written in English and submitted in Microsoft Word and PDF file format in accordance with the guidelines.

Abstracts should not exceed 300 words and must provide a clear overview of the objectives, methodologies and key findings. The paragraph should be formatted with double spacing on A4 size paper (210 x 297 mm). Names of author/co-authors, titles, position, organisations and contact address (including email address should be provided in the abstract. The presenting author's name must be underlined. At least three keywords should be provided.

Author of accepted full paper need to prepare a camera-ready (final) version for inclusion in the Conference / Congress Proceedings. Camera-ready (final) version will be substantially the same as the full paper but amended for reviewer's comments.

Disclaimer
Invitation to submit abstracts / full papers does not constitute an offer to pay travel and accommodation costs and registration fee associated with the conference / congress. Submission of abstracts and the subsequent full papers permits the Organising Committee to publish the text in the Conference/Congress Proceedings.

SCOPUS Indexed Publications
Selected papers will be published under SCOPUS indexed publications or equivalent subject to approval by Technical Programme Committee.

Awards for Outstanding Papers
Towards the objective of encouraging greater participation by Malaysians, cash awards and certificates will be awarded to the best three papers. All papers must be authored/ co-authored and presented by Malaysians.

Submission of Abstracts / Full Papers and Enquiries

All abstracts and full papers must be submitted to the Technical Programme Committee via email to:

technicalprogramme@12thmrc.com
or
fairul@jkr.gov.my

Tel: +603-55136521 / +603-55136522
(Ir. Dr. Fairul Zahri / Zaidi Mat Rifin)

Please visit the official website for more details.
www.12thmrc.com

Road Engineering Excellence Award

Introduction

The Road Engineering Association of Malaysia (REAM) invites entries for its Road Engineering Excellence Award, which will be conferred in conjunction with the Malaysian Road Conference. This award, introduced in 2002, was to give recognition to the most outstanding road engineering project built within Malaysia. There are 2 categories of award – project cost less than RM100 million and more than RM100 million. The Award will be presented by the guest of honour at the official opening ceremony of the 12th Malaysian Road Conference & Exhibition and International Road Federation Asia-Pacific Regional Congress.

Objectives

i To recognize outstanding achievements in road engineering in terms of project function, design, construction and operation.
ii To promote the development of quality built environment that contributes towards economic and social development of the country.
iii To promote public awareness of outstanding road engineering projects.

Award criteria

i Making contributions to society, economy, and sustainability.
ii Resourcefulness and innovation in planning, design, construction and solution of problems.
iii Safety features and operational safety record.
iv Preservation and protection of environment.
v Pioneering use of materials and methods, particularly those of Malaysian origin.
vi Incorporation of futuristic and aesthetic values.
vii Promoting effectiveness for energy saving and carbon reduction.
viii Promoting the effectiveness of maintenance

Panel of judges

A panel of not less than three judges comprising prominent personalities in the road engineering industry will be invited to review and select the winning entry.

The panel of judges shall have absolute discretion to accept or reject entries that do not comply with the requirements of the rules. The judges' discretion shall be final and binding on all entries and no discussion or correspondence whatsoever relating to any of the judges' decision shall be entered into.

Award eligibility

The types of projects, singularly or in combination, eligible for consideration:

i Roads / highways
ii Bridges / viaducts
iii Tunnels
iv Interchanges

The project must be built within Malaysia, completed and operational during the period between July 2022 - June 2024.

Award

The Award consists of one challenge trophy for each categories, three replicas and three certificates. The Project Owner, the Principal Designer and the Principal Contractor of the winning project shall each be awarded a replica and a certificate. The Project Owner shall be entitled to keep the challenge trophy for a period of six months, after which it shall be returned to REAM.

How to enter

Entries in typewritten form must contain the following data:

- Name of owner
- Location of project
- Name of project
- Date fully operational
- Name of principal designer
- Name of principal contractor
- Name, address, telephone / fax number of person / organisation submitting the entry

A brief on the project on two single-sided A4 size paper containing not more than 500 words with the following descriptions:

- Why the project should be considered for this award
- The purpose of the project
- The design approach
- Uniqueness and justification on the method of construction and
- Any other details considered relevant to the judging criteria.

Entries should include, if available, the following to illustrate the salient features of the project:

- Layout plan (on A3 size paper)
- Progress photographs
- Video clips from implementation to completion.

A short edited version of the video clips / photographs of the winning entry may screened during the award presentation ceremony.

Information provided in the submission need to be true. In the event false information is provided, this may affect the judging process with immediate disqualification.

Closing date

All nominations must arrive no later than **1 AUGUST 2024** at :

Secretariat for Road Engineering Excellence Award 2024
Road Engineering Association of Malaysia (REAM)
46A, Jalan Bola Tampar 13/14, 40100 Shah Alam, Selangor

For further enquiries, please contact:
Email: excellenceaward@12thmrc.com
Tel: +603-5513 6521 / 6522
Fax: +603-5513 6523

JOIN US!

YEP
Road Engineering Association of Malaysia
YOUNG ENGINEERS & PROFESSIONALS

MRC 12th MALAYSIAN ROAD CONFERENCE 2024

Special Talk on

ARTIFICIAL INTELLIGENCE IN ROAD ENGINEERING

Fees:

Non-REAM Member	RM 200
REAM Member	RM 100
Student	RM 50
For MRC Participant	Free

In conjunction with the 12th Malaysian Road Conference & Exhibition 2024 and 5th International Road Federation Asia-Pacific Regional Congress, REAM Young Engineers And Professionals (REAM YEP) are pleased to organise a special talk on Artificial Intelligence In Road Engineering.

Calling All Future Road Design Visionaries!

ROAD DESIGN COMPETITION

Unleash your creativity and design skills! We are looking for innovative and thoughtful concepts that will make our roads safer, more efficient, and sustainable. Don't miss this chance to showcase your ideas and make a real impact!

ENTRANCE FEE
RM 200.00 per group of 3

HOW TO PARTICIPATE?

Open to all undergraduates who are passionate about road engineering in shaping the future of our roadways.

RULES

- Participants will be provided with sufficient information;
- Participants will need to design a road which includes BIM Modelling up to LOD200;
- 3 minutes minimum of video modelling;
- Detailed rules and regulation will be provided at www.12thmrc.com.

YEP
Road Engineering Association of Malaysia
YOUNG ENGINEERS & PROFESSIONALS

Contact Person

Email: yepgroup@12thmrc.com

Ir. Muhamad Uzed bin Mahmud: 014 - 338 4136
Ir. Amirrul Izzat bin Ismail : 010 - 400 6091
Nur Syazwani bin Jamaluddin: 013 - 331 8294

Exciting prizes await you.

Exhibition

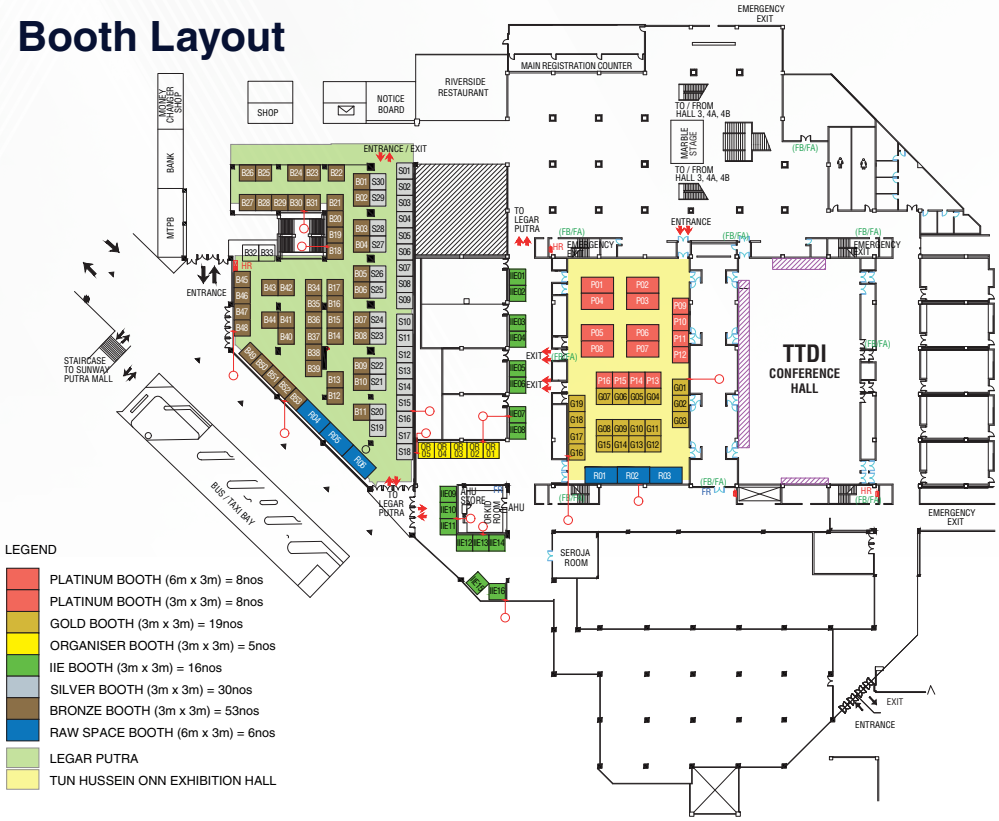
Road industry entrepreneurs have been invited to participate in this exhibition held simultaneously with the joint conference. More than 100 exhibitors expected to participate and take this opportunity to showcase their company's expertise, products, services and innovative outcomes to over 1000 middle to top management personnel in the road and highway industry in Malaysia and abroad who will be participating in the Conference.

Align with the theme 'Driving Innovations for Better Roads', exhibitions are pivotal to an integrated marketing strategy as they provide the springboard for:

- Promoting an organisation's achievements and unique contributions to the industry
- Networking with targeted key decision makers from public and corporate sectors
- Establishing new contacts and exchanging ideas and views
- Tapping into expertise brought forth by the conference

A total of more than 140 lots measuring 3m x 3m have been made available in this event. Exhibitors have the choice of opting for the standard shell scheme measuring 9 sq. metres and 18 sq. metres or the raw space measuring 18 sq. metres are up for grabs.

Booth Layout



LEGEND

- PLATINUM BOOTH (6m x 3m) = 8nos
- PLATINUM BOOTH (3m x 3m) = 8nos
- GOLD BOOTH (3m x 3m) = 19nos
- ORGANISER BOOTH (3m x 3m) = 5nos
- IIE BOOTH (3m x 3m) = 16nos
- SILVER BOOTH (3m x 3m) = 30nos
- BRONZE BOOTH (3m x 3m) = 53nos
- RAW SPACE BOOTH (6m x 3m) = 6nos
- LEGAR PUTRA
- TUN HUSSEIN ONN EXHIBITION HALL

Sponsors and partners may also consider supporting specific related events, provision of conference materials, taking advertising space in print materials etc.

For further enquiries, please contact:
Email: exhibition@12thmrc.com
Tel: +6016-345 0605 (Atikaa)
+6016-673 6660 (Kamarul)
+6013-624 4292 (Najib)

Booking Rates for Shell Scheme and Raw Space

Packages	Booth No.	Location	Area (m^2)	Standard Rates (RM)
Platinum X	P01 - P08	Tun Hussein Onn Hall	18 m^2	RM29,000
Platinum	P09 - P16	Tun Hussein Onn Hall	9 m^2	RM15,000
Gold	G01 - G19	Tun Hussein Onn Hall	9 m^2	RM12,000
Silver	S01 - S30	Legar Putra	9 m^2	RM9,000
Bronze	B01 - B53	Legar Putra	9 m^2	RM7,000
Raw Space X	B01 - B53	Tun Hussein Onn Hall	18 m^2	RM12,000
Raw Space	B01 - B53	Legar Putra	18 m^2	RM7,000

Standard Shell Scheme Booth
- Frame of Shell Scheme Booth
- One (1) Unit of Information Desk
- Two (2) Units of Folding Chairs
- One (1) Unit of 13amp Single Phase Socket
- Two (2) Units of 40w Fluorescent Light
- One (1) Unit Wastepaper basket
- Side/ back panels and Fascia Board with exhibitor's name

Raw Space
- One (1) Unit of Information Desk
- Two (2) Unit of Folding Chairs
- One (1) Unit Wastepaper basket
- Two (2) of Unit 13amp Single Phase Pocket

Sponsorship and Partnership

The conference offers exciting avenues ranging from partnerships, supporting event activities and many more to create a strong presence of your company in this event. Organisations and companies are encouraged to take advantage of this opportunity.

BENEFITS	PLATINUM RM 100,000	GOLD RM 50,000	SILVER RM 30,000	BRONZE RM 15,000	EXECUTIVE RM 5,000
Prime Position Complimentary exhibition space	✓	✓	✓	✓	-
Technical Paper Presentation Slot at the Conference	✓	-	-	-	-
Complimentary Passes Complimentary VIP tickets to the Opening Ceremony Complimentary conference registrations Additional complimentary conference registrations if confirmed before 15 August 2024	4 seats 5 seats 2 seats	2 seat 3 seats 1 seat	1 seat 2 seats 1 seat	1 seat 1 seat -	1 seat 1 seat -
Invitation to the event's soft launch and present mock cheque	✓	✓	✓	✓	-
Branding and Awareness Sponsor credit on all official and digital marketing collaterals	✓	✓	✓	✓	-
Advertisement Full colour advertisement to be placed in the Programme Book	1 page	1 page	1 page	1 page	Company's name

Sponsors and partners may also consider supporting specific related events, provision of conference materials, taking advertising space in print materials etc.

For further enquiries, please contact:
Email: partnership@12thmrc.com
Tel: +6013 288 2313 (Dr. Azmir bin Hasnur Rabiain)
+6019 435 4880 (Shaharuddin bin Abdul Samad)

Malaysian Road Conference Invention & Innovation Exhibition 2024 (MRC - IIE 2024)

The road sector in Malaysia has expanded a lot over the years. In order to encourage new research and development among the research institutes, universities, authorities, academicians, agencies and private sector, the organiser has conceptualized an exhibition platform to bring inventors and innovators of the relevant industries together to pave the way for better and quality roads in Malaysia.

Join us at the 4th Malaysian Road Conference - Invention and Innovation Exhibition (MRC-IIE 2024), held in conjunction with the 12th Malaysian Road Conference 2024. This exhibition serves as a platform to showcase ground-breaking inventions and innovative solutions in the road construction, maintenance, and transportation sectors. This would also enhance technological communication between road construction and maintenance department, construction enterprises and manufacturers of road construction and maintenance machinery.

Discover the latest advancements in road technologies, sustainable infrastructure solutions, and intelligent transportation systems designed to enhance road safety, efficiency, and environmental sustainability. Engage with industry leaders, researchers, and innovators to explore cutting-edge ideas and collaborative opportunities that will shape the future of Malaysia's road infrastructure.

Don't miss this opportunity to be part of a transformative event driving innovation for better roads in Malaysia. Join us at the 4th MRC-IIE 2024 and be inspired by the ingenuity shaping the roads of tomorrow.

Entrance Fee

The entrance fee for the 4th MRC-IIE 2024 will be RM500 per product.

For further enquiries, please contact:
Email: exhibition@12thmrc.com
Tel: +6019-712 1120 (Suhayya)
+6010-231 5100 (Suhaimi)
+6014-608 9505 (Ir Akmal)

Scope

The scope of the 4th MRC-IIE 2024 covers the following areas:

- Innovative Pavement Technologies
- Resilient Transportation and Mobility
- Advanced Bridge Technologies
- Asset Performance, Management & Rehabilitation
- Future in Slope and Geotechnical Technologies
- Environmental and Sustainable Infrastructure
- Innovative Traffic and Road Safety Initiatives
- Building Information Modelling (BIM) and Innovative Design Tools
- Advance Construction and Best Practices
- Highway Engineering and Road Intelligent System

Judging Criteria

New inventive and innovative products displayed at the exhibition will be judged by professional international/national juries for the award of Gold, Silver, Bronze Medals. Special Awards including international award to be given to the overall best of high achieving, break-through inventions, and innovative technologies.

The 4th MRC-IIE 2024 Judging Criteria Inventions are judged by one or more jury members qualified in a particular categories. Each invention is rated on a points system and judged based on the following criteria:

- Usefulness
- Creativity
- Overall Appeal
- Market Potential

Awards

Awards include MRC-IIE Gold, Silver and Bronze medals in 10 categories. There are also corporate sponsored trophies to be given to excellent inventions and innovations.

All winners will be announced at the 12th MRC 2024 closing ceremony.

12th Malaysian Road Conference & Exhibition 2024 and 5th International Road Federation Global Asia-Pacific Regional Congress

How to register

Prompt action in registering before the 25 October 2024 dateline will enable participants to benefit from the reduced registration fee offered and obtain firm confirmation for their choice of technical visit, each of which has limited seats. Please visit the conference website:

www.12thmrc.com

Fee structure

Registration category	Registration Fee (MYR)		
	Regular (until 25 October 2024)	**On-site** (from 25 October 2024)	**Daily Rate**
Participants	2,200.00	2,300.00	1,000.00/day
REAM Members & Public Sector Officers	1,900.00		
Speakers	1,000.00		
Students	500.00		
Student Speakers	300.00		

Note:

- Regular and On-site registrants for the full 3-day conference will receive the conference kit, attendance at the opening and closing ceremonies, all technical sessions and workshops, exhibition, one technical tour and refreshments provided during the period.
- Daily Rate registrants for any one day will receive the conference kit, attendance at the sessions, entry to the exhibition and refreshments scheduled during that day.
- Students are required to submit an official letter from their respective universities confirming their status as current students and present their student cards at the conference registration desk.
- Registrations (walk-in) after 25 October 2024 can only be done on-site.

Registration cancellation policy

Cancellation cut-off dates	Refunds
Cancellations received on or before 15 June 2024	90% refund of amount paid
Cancellation received between 16 June - 14 October 2024	75% refund of amount paid
Cancellation received on or after 15 October 2024	No refund

Note:

- Any intended cancellation should be notified in writing to the Registration Committee at registration@12thmrc.com
- All due dates are based on Malaysian Standard Time (GMT+8)

For further enquiries, please contact:
Email: registration@12thmrc.com


MRC
12th MALAYSIAN ROAD CONFERENCE
2024
IRF
GLOBAL
12th Malaysian Road Conference
& Exhibition 2024
and
5th International Road Federation Global
Asia-Pacific Regional Congress
Driving Innovation for Better Roads
Save the Date
5-7 November 2024
World Trade Centre
Kuala Lumpur, Malaysia
Jointly organised by:
Ministry of Works, Malaysia
Public Works Department, Malaysia
Road Engineering Association of Malaysia
Malaysian Highway Authority
Construction Industry Development Board Malaysia
In collaboration with:
Malaysian Institute of Road Safety Research
World Road Association
In association with:
Road Engineering Association of Asia & Australasia
Korea Road Association
Chartered Institution of Highway and Transportation (Malaysian Branch)
www.12thmrc.com
Malaysian Road Conference
12thMRC
12thMRC
12th Malaysian Road Conference & Exhibition 2024, Road Engineering Association of Malaysia
46A, Jalan Bola Tampar 13/14, 40100 Shah Alam, Selangor Darul Ehsan, Malaysia
Tel: +603-5513 6521 Fax: +603-5513 6523 E-mail: secretariat@12thmrc.com

2025 National Transport Research Organisaton (NTRO) International Conference

Australia and New Zealand's National Transport Research Organisation (NTRO) has set a date for its next International Conference. The Conference will be held in Melbourne, Australia, from May 7-9, 2025.

The theme of the conference is 'The Transport Revolution – Solutions Led By Innovation'. The focus of the conference will be on innovative solutions to the challenges faced both now and into the future for transport.

Calls for abstracts, and expressions of interest to attend and present, are now open.

You can find out more about the 2025 NTRO International Conference at https://www.ntroconference.com.au/ or register your interest here https://arrb.eventsair.com/the-ntro-international-technical-conference-2025/eoi/Site/Register

Welcoming The New Director General of the Public Works Department of Malaysia (PWD) – Dato' Ir. Roslan Bin Ismail

PWD Malaysia is proud to announce the appointment of Dato Ir. Roslan bin Ismail as the new Director General of PWD Malaysia. His appointment was delivered by the Minister of Works Malaysia, Dato Seri Alexander Nanta Linggi on 25th June 2024. By this appointment, he assumes the position of Vice President of REAAA representing PWD Malaysia.

Dato' Ir. Roslan bin Ismail has a Master in Project Management from Universiti Sains Malaysia (USM). He has vast experience for 29 years in planning and implementing public projects under PWD Malaysia. He holds multiple strategic post such as District Engineer, PWD State Director, Director of Construction and Senior Director before been appointed as Director General of PWD Malaysia.

We congratulate Dato' Ir. Roslan bin Ismail on his appointment and welcome him to REAAA. REAAA looks forward to working together in achieving REAAA objectives and betterment for regional road engineering fraternity.

Calendar of Events

Date	Event	Place	Type	Remarks
4th- 6th September 2024	· 5th International Conference on Highway Engineering((iCHE2024) · 122nd REAAA Governing Council meeting · 26th YEP Meeting · 12th Business Forum	Bitec Convention Center, Bangkok, Thailand	· International conference · Technical sessions & workshops · Meetings	· Conference theme: Future-proofing Roads for Asia and the Rest of the World · IRF & PIARC
17th-19th September 2024	· Highway Concession Conference (HCC2024)	Johor Bahru Johor Malaysia	Conference	Malaysian Highway Authorities
5th-7th November 2024	· 12th Malaysian Road Conference & Exhibition · 5th International Road Federation Global Asia-Pacific Regional	World Trade Centre Kuala Lumpur (WTC KL), Malaysia	Conference	REAM & IRF
10th-13th December 2024	· IRF Global R2T Conference & Exhibition	Orlando, Florida, USA	International Conference	IRF

Date	Event	Place	Type	Remarks
7th- 9th, May 2025	· NTRO International Conference 2025 · 123rd REAAA Governing Council meeting · 27th YEP Meeting	Melbourne, Australia	· International Conference · Meetings	NTRO&REAAA
27th-31st October 2025	· 124th & 125th REAAA Governing Council meetings · 17th REAAA Conference · 17th REAAA General Meeting · 28th YEP Meeting · 14th HORA Meeting · 15th Business Forum	Ilsan, Korea	· International Conference · Meetings	REAAA

REAAA WELCOMES NEW MEMBERS

The membership of REAAA as of 31st Deceber 2023 was 1,188. The REAAA Council and Chapters have approved the following 63 new members for the period between 15th July to 31st December 2023.

Institutional	*3*
Ordinary	*51*
Ordinary (reinstated)	*7*
Associate	*2*
TOTAL	***63***

The list of new members approved at the 121st REAAA Council Meeting in Manila, Philippines on 6th Mar 2024 is as follows:

Institutional Members

1.	King Ho Tai International Co. Ltd	I.0393 Taiwan
2.	Maltimur Resources Sdn Bhd	I.0394 Malaysia
3.	Safwa Global Venture (M) Sdn Bhd	I.0395 Malaysia

Ordinary Members

1.	Doo Byeok, Kim	O.3917 Korea
2.	Bradley Hutchinson	O.3918 Australia
3.	Brian Hartley	O.3919 Australia
4.	Ir. Saiful Azzuan bin Aznam	O.3920 Malaysia
5.	Ts. Dr. Wan Nur Aifa Wan Azahar	O.3921 Malaysia
6.	Abd Wahid bin Daud	O.3922 Malaysia
7.	Ir. She Tian Hock	O.3923 Malaysia
8.	Dr. Zul Fahmi bin Mohamed Jaafar	O.3924 Malaysia

Ordinary Members

9.	Ts. Mohd Tarmizi bin Che Othman	O.3925 Malaysia
10.	Po-Yu, Tang	O.3926 Taiwan
11.	Wei-Kai, Wang	O.3927 Taiwan
12.	Peter Geoffrey Lugg	O.3928 Australia
13.	Ts. Muhani Binti Rafi'I	O.3929 Malaysia
14.	Fendy Jiliun	O.3930 Malaysia
15.	Mohd Faizatul Akhmal Bin Md. Isa	O.3931 Malaysia
16.	Ir. Ts. Dr. Jeffryl Azniel Bin Adzar	O.3932 Malaysia
17.	Siti Maizatulharmi bt Mohd Taserip	O.3933 Malaysia
18.	Ir. Ts. Azrul Affandhi bin Musthaffa Al Bakri	O.3934 Malaysia
19.	Ir. Rozita binti Senapi	O.3935 Malaysia
20.	Ir. Ts. Hj. Norazan bin Hj. Morshidi	O.3936 Malaysia
21.	Abdul Malik bin Che Hamid	O.3937 Malaysia
22.	Ts. Abang Muhammad Qhairy bin Abd. Rahim	O.3938 Malaysia
23.	Noorhayati binti Ahmad	O.3939 Malaysia
24.	Shuken Dutt	O.3940 Malaysia
25.	Nithiyananthaan A/L Vijayakumar	O.3941 Malaysia
26.	Ir. Che Zabidi bin Che Ani	O.3942 Malaysia
27.	Ts. Ismarizal bin Ismail	O.3943 Malaysia
28.	Ir. Fatimah Nuri binti Mohd Yusof	O.3944 Malaysia

Ordinary Members

29.	Mohd Harizam bin Ibau Nui	O.3945 Malaysia
30.	Ir. Mohamad Zaidi bin Ibrahim	O.3946 Malaysia
31.	Ir. Madzri bin Malek	O.3947 Malaysia
32.	Ir. Ahmad Paridz bin Abdullah	O.3948 Malaysia
33.	Ir. Rizalman bin Darus	O.3949 Malaysia
34.	Ir. Ezamuddin bin Zulkifli Chan	O.3950 Malaysia
35.	Ahmad Fariz bin Sapian	O.3951 Malaysia
36.	Ir. Saufiyan Sauri bin Md Ramli	O.3952 Malaysia
37.	Lim Bok Kian	O.3953 Malaysia
38.	Ir. Ts. Sumie Sarmiza bin Abd. Suki	O.3954 Malaysia
39.	Mazlin bin Mazran	O.3955 Malaysia
40.	Ir. Ts. Aniza Md Idris	O.3956 Malaysia
41.	Ir. Tan Seong Lim	O.3957 Malaysia
42.	Ir. Ts. Awang Zakri bin Awang Adeni	O.3958 Malaysia
43.	Ir. Muhammad Iskandar Sapong	O.3959 Malaysia
44.	Ir. Wesley Chong Seng	O.3960 Malaysia
45.	Gawan Anak Nyandang	O.3961 Malaysia
46.	Rasidah binti Rahmathullah	O.3962 Malaysia
47.	Khoo Hooi Ling	O.3963 Malaysia
48.	Zakiah binti Hassan	O.3964 Malaysia

Ordinary Members

49.	Muhamad Asyraf bin Azizan	O.3965 Malaysia
50.	Hasyimunfazlie bin Muhamad Yusoff	O.3966 Malaysia
51.	Ir. Hanafi bin Abdullah	O.3967 Malaysia

Ordinary Members (Reinstated)

1.	Mohd Noor Asyraf Bin Amirudin	O.3804 Malaysia
2.	Dato' Ir. Hj. Mohd Zaki Bin Yusof	O.1964 Malaysia
3.	Sharifah Allyana Syed Mohamed Rahim	O.3357 Malaysia
4.	Ir. Kor Fong Yong	O.2958 Malaysia
5.	Tai Tsu Lim	O.1195 Malaysia
6.	Tan Swee Kun	O. 2382 Malaysia
7.	Ir. Murgu Subramaniam	O.2122 Malaysia

Associate Members

1.	Thurstan Williams	AS.0149 Australia
2.	Joel Christian Torres	AS.0150 Philippines