

2024 IRF GLOBAL ROAD ACHIEVEMENT AWARDS

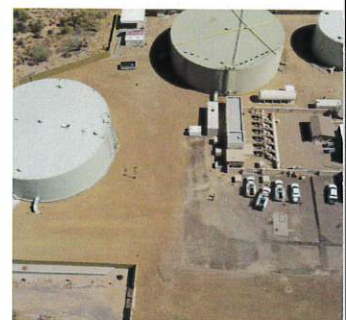
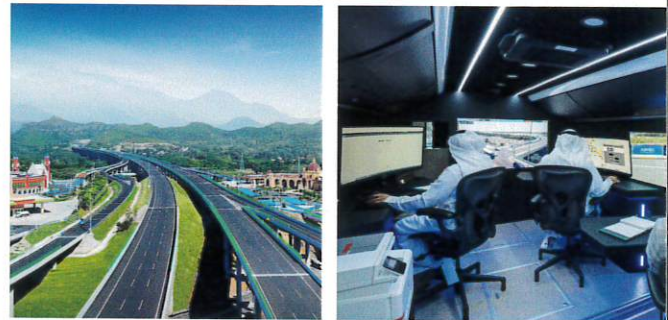


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MORE THAN AN INDUSTRY ACCOLADE



H.E. Abdullah A. AlMogbel
Chairman Emeritus for Life
International Road Federation

The IRF Global Road Achievement Awards (GRAA) Program was founded to publicize to the world the innovative, practical, creative, cost-saving and sustainable solutions the road industry provides to societies and economies.

Instituted in 2000, the GRAA Program has distinguished more than 260 projects, products and technologies from around the world. Today, the Awards are recognized as a prestigious industry accolade in their own right, but they also serve to remind a much wider audience that the mobility everyone takes for granted would not be possible without the talent and commitment of our industry. Lastly, the IRF Awards are an accelerator of progress and ideas: by showcasing our achievements, we are able to learn from each other, and build on our successes.

On behalf of IRF Global and our international panel of independent judges, I would like to congratulate the winners of the 2024 IRF Global Road Achievement Awards. They are an asset to an industry that is constantly investing in new solutions to deliver gains and sustainability advances that benefit everyone.

The diversity and quality of this year's winning projects are also a great testament to IRF Global's status as the international marketplace for best practices and industry solutions.

I invite you to examine them in detail and to submit your own exemplary projects to the 2025 GRAA Competition.

ASSET PRESERVATION AND MAINTENANCE MANAGEMENT

SOUTHERN CROSS-ISLAND HIGHWAY-A DECADE OF EFFORTS IN MAINTENANCE, REHABILITATION, AND RECONSTRUCTION HIGHWAY BUREAU, MOTC, TAIWAN

The Southern Cross-Island Highway, a vital 204-kilometer route traversing Taiwan's Central Mountain Range, was severely damaged by Typhoon Morakot in 2009. This document details the extensive reconstruction efforts undertaken over a decade to restore functionality and ensure the highway's long-term sustainability.

Devastation and Response:

Typhoon Morakot's record-breaking rainfall caused catastrophic damage, including:

- Roadbed loss and subbase depression
- Bridge collapses and embankment failures
- Riverbed elevation and widespread landslides

The Highway Bureau implemented a three-phased strategic reconstruction program:

- **Short-term (2009-2017):** Emergency repairs to maintain minimal traffic flow, focusing on stabilizing the most critical sections.
- **Mid-term (2017-2022):** Structural reinforcement projects to improve traffic capacity and prevent future disasters. This involved securing embankments, preventing rockfalls, and restoring vegetation.
- **Long-term (2022-present):** Disaster-resilient reconstruction in severely affected areas, including building new bridges and open-cut tunnels.



Recovery and Innovation:

By 2022, the Southern Cross-Island Highway was fully reopened to traffic. The project's success can be attributed to several factors:

- **Strategic reconstruction plan:** The phased approach allowed for efficient resource allocation and targeted interventions.
- **Advanced technologies:** Lidar, UAVs, and InSAR were used to assess damage, monitor progress, and inform reconstruction strategies.
- **Emergency preparedness:** Optimizing emergency response times and deploying real-time monitoring systems improved safety and incident management.
- **Sustainable practices:** The project prioritized ecological balance by restoring vegetation, implementing rest days for ecosystem recovery, and employing local indigenous people as highway patrols and gatekeepers.

Outcomes and Impacts:

The reconstruction project achieved significant results:

- **Infrastructure restoration:** Over 78 kilometers of roadbed, 15 open-cut tunnels, and 24 bridges were rebuilt.
- **Enhanced communication:** 5G network coverage and power systems were strengthened, ensuring connectivity and reliability.
- **Improved safety:** Measures like automatic vehicle plate monitoring and routine emergency drills enhanced safety for motorists and residents.
- **Economic revitalization:** Reopening the highway revitalized tourism and facilitated economic activity in the region.
- **Community engagement:** Local communities were actively involved in reconstruction and environmental protection efforts.

Looking Ahead:

The Southern Cross-Island Highway's successful reconstruction serves as a testament to the Highway Bureau's commitment to resilience and sustainability. Ongoing maintenance and rehabilitation strategies, combined with continuous monitoring and emergency preparedness, will ensure the highway's long-term functionality and safety, while preserving the delicate ecosystem of the Central Mountain Range.

Wen-Rui Chen
Director General of the Highway Bureau (MOTC)

"The strategic three-phase approach prioritizing sustainability, ecological balance, and community well-being is exemplified by the prestigious IRF award and recognized for a decade of effort."

CONSTRUCTION METHODOLOGY

KÖMÜRHAN BRIDGE

MINISTRY OF TRANSPORT AND INFRASTRUCTURE, REPUBLIC OF TÜRKİYE

Elaziğ province, which has a history of more than 4 thousand years and which is established at the foot of Harput, is named as the 'Holy city' thanks to its air, water, soil and people. The city is surrounded by Keban and Karakaya Dams, which are located within the large arch drawn by Euphrates River.

This bridge, which is constructed right next to Kömürhan Bridge that was constructed on the Euphrates River in 1980s, constitutes an important section of the road (5.155 km), which is constructed with high standards thanks to its tunnels, at-grade intersections and bridge crossings.

Main span of Kömürhan Bridge, which is constructed by Doğuş-Gülsan Joint Venture, is 380 meters, and the cross section of a very large part of the aforementioned span consists of an orthotropic steel deck. Total length of the bridge is 660 meters, including 100 meters of posttensioned concrete approach slab, which is connected to the tunnel from Elaziğ direction, and an anchorage block of 180 meters coming from the direction of Malatya.

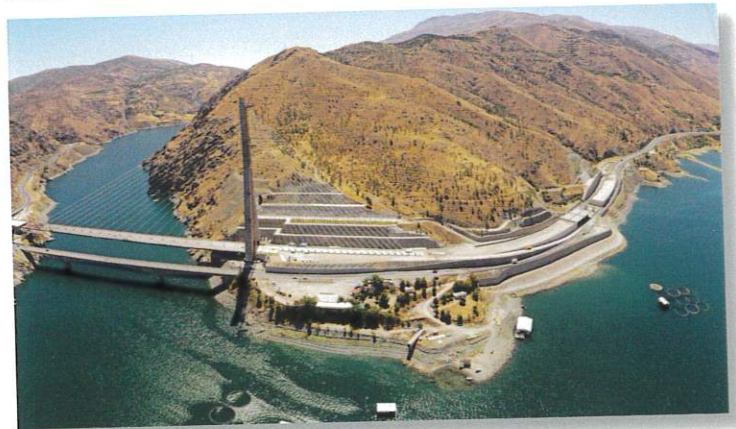
The width of the structure is 25 meters at main span, and it included a 2x2 traffic lane. The approach slab of 100 meters has a posttensioned box-type cross section, and its width reaches to 30.60 meters when it is being connected to tunnels. Transverse posttensioning is also used on the posttensioned concrete.

Kömürhan Bridge is the first and only single-pylon cable-stayed of our country, and it is listed among top four bridges that show such characteristic globally. On the bridge, 2x1 cables are organized in the middle of the deck and in a way to be located on a single plane. Deck is embedded in the pylon. Cables are comprised of 7-Wire low-relaxation 15.7 mm strands (tensile strength: 1860/670 MPA) Amount of strands used in cables:

Amount of S355J2+N steel that is used to build Kömürhan Bridge is 7000 tons, and it is equal to the amount of steel used to build Eiffel Tower. Length of the weld seam, which is used in transverse and longitudinal assembly of segments, is approximately 450.000 meters. The length of strands, which are used in cables that connect steel segments to the tower, is 853.000 meters.

Pylon bolt, total height of which is 168.5 meters, is in the shape of a reversed Y, and it is comprised of a reinforced concrete box girder. Individual steel cores are created in areas where anchorages of cables are present in the pylon. The pylon is placed on the ground through 46.5x16.0x7.0 meters headstall sitting on 2 reinforced concrete caissons of 15 meters in diameter and 22.5 meters in depth, which are arranged under beam level.

Kömürhan Bridge and Tunnel, which is opened to traffic on 02.01.2021, is located in a strategic location on roads that connect East Anatolia Region and Southeastern Anatolia Region to each other, as well as Central Anatolia Region and Mediterranean Region.



Abdulkadir URALOĞLU

Minister of Transport and Infrastructure of the Republic of Türkiye

"We are very honored to be awarded the Construction Methodology award by IRF GRAA, which is highly respected around the world. Winning awards is of great importance for our country as it confirms our relentless efforts and outstanding performance. This recognition, which is a testament to teamwork, innovation and the pursuit of excellence, encourages us to outdo ourselves and achieve even greater success in the future."

DESIGN

KINMEN BAY BRIDGE PROJECT

FREEWAY BUREAU, MOTC, TAIWAN

The Kinmen Bay Bridge, completed in October 2022, stands as a testament to innovative engineering and collaborative effort. This 4,770-meter-long bridge connects Kinmen and Lieyu Islet, previously solely reliant on ferry services often hampered by seasonal fog and challenging weather. The bridge not only provides a reliable transportation link but also boasts a unique aesthetic design that reflects the local culture and landscape.

Overcoming Challenges through Innovative Design:

The construction of the Kinmen Bay Bridge faced numerous challenges, demanding ingenious solutions and meticulous planning.

- **Complex Geology:** The bedrock, consisting of weathered granite with varying depths and conditions, required the use of reinforced concrete piles and additional drilling tasks to ensure stability. The team employed real-time drilling adjustments and specialized techniques to overcome the complexities of the granite basin.

- **Steep Basin and Strong Tidal Surge:** To counteract the challenges posed by the deep basin and strong tidal currents, the bridge design incorporated anti-scouring protection works, braced cofferdams, and structural reinforcement to withstand breaking waves and high tidal surges.

- **Extreme Seasonal Weather Conditions:** The bridge's design and construction addressed the region's extreme weather, including typhoons and dense fog. This involved increasing the concrete's protective cover, utilizing hot-dip galvanized steel bars,



implementing a multi-protection cable system, and installing a comprehensive bridge monitoring system for long-term performance evaluation.

- **Tight Schedule and Long Shipping Distance:** Efficient logistics planning was crucial due to the distance between Kinmen and mainland Taiwan, where many construction materials and precast box girders originated. A well-coordinated schedule ensured the timely delivery of materials and personnel, employing both sea and air transport as needed.

- **Offshore Construction Safety:** A comprehensive safety plan was implemented throughout the design and construction phases, with routine checks and risk assessments. Specific measures included monitoring the trestle bridge's integrity, establishing a marine traffic control team, and adhering to strict safety protocols on the floating platform.

A Scenic Bridge Reflecting Local Culture:

The bridge's design is not only functional but also aesthetically pleasing, reflecting the local culture and preferences. The "Sorghum-Shape" pylons, chosen through a public vote, harmonize with the surrounding landscape and offer a unique visual identity. Nighttime lighting further enhances the bridge's beauty and ensures safety for navigation.

Significance and Impact:

The Kinmen Bay Bridge has significantly improved connectivity and quality of life for the residents of Kinmen and Lieyu Islet. It provides a reliable transportation link, facilitates access to essential services, and promotes tourism. The bridge's resilience ensures its continued functionality even during challenging weather conditions, contributing to the region's economic development and social well-being.

Conclusion:

The Kinmen Bay Bridge serves as a shining example of successful bridge design and construction, overcoming numerous challenges through innovative solutions and a commitment to safety and aesthetics. It stands as a symbol of connection, resilience, and progress for the Kinmen region.

Yi-Fang Shih & Shing-Hau Jaw

Chairman, CECI & Director General of the Freeway Bureau (MOTC), Taiwan

"The Kinmen Bay Bridge project provides a vital, resilient, and scenic connection between Kinmen and Lieyu, significantly enhancing mobility and emergency services. The IRF GRAA fuels our continued pursuit of excellence for both organizations."

ENVIRONMENTAL MITIGATION

HUIZHOU-QINGYUAN SECTION OF SHANTOU-ZHANJIANG EXPRESSWAY GUANGDONG HIGHWAY, BRIDGE AND EXPRESSWAY CO., LTD.

The Huizhou-Qingyuan section of the Shantou-Zhanjiang Expressway (referred to as the “Huizhou-Qingyuan Expressway”) is located in the central region of Guangdong Province, spanning the three cities of Huizhou, Guangzhou and Qingyuan, with a total length of 125.28 kilometers. It was completed and opened to traffic in October 2020. Since then, the driving time between Huizhou and Qingyuan was shortened from the original 3 hours to 1.5 hours, benefiting about 28 million local people. The Huizhou-Qingyuan Expressway passes through many national, provincial, municipal and county-level ecologically sensitive areas. The ecology along the route is beautiful, there are many scenic spots, and there are over 60 tourist attractions. Protecting the environment and implementing green construction are key difficulties of the project.

During the construction process, the project team of Huizhou-Qingyuan Expressway strictly implemented the philosophy of “technology driven, ecologically coordinated, constructed green, and intelligently managed”, carried out 14 research programs, 35 green technology applications and 104 micro-innovations etc., summarized and formed 52 green highway construction systems, successfully overcame the difficulties of green highway construction and intelligent management of construction in ecologically sensitive areas, and created a “Huizhou-Qingyuan paradigm” for green highway construction.

The project team of Huizhou-Qingyuan Expressway has incorporated the “green gene” into the entire construction process, and successfully applied technologies such as ecological line selection, “permanent and temporary combination”, tree transplantation, high-standard farmland embankment slope reduction, topsoil protection and utilization, and tunnel slag comprehensive utilization. A total of 10 ecologically

sensitive areas were avoided, 20 “permanent and temporary combinations” of electricity use were achieved, and more than 2,000 precious trees were transplanted; 1.03 million cubic meters of topsoil were recycled and utilized, achieving a recycling rate of 100%; over 4 million cubic meters of tunnel slag along the entire line were recycled and utilized, effectively reducing the area of tunnel slag stacking site by nearly 700 mu, and achieving high economic and social benefits.

With fruitful results in green construction, the Huizhou-Qingyuan Expressway has been successively rated as a national soil and water conservation demonstration project of the Ministry of Water Resources, a demonstration green highway of the Ministry of Transport, a pilot project for science and technology demonstration and quality control, an excellent pilot project for a country with strong transportation network, and one of the “Top Ten Socially Responsible Projects of State-owned Enterprises in the Guangdong-Hong Kong-Macao Greater Bay Area (Ecological Civilization)”.



Lv Dawei

Deputy General Manager, Guangdong Highway, Bridge and Expressway Co., Ltd.

“Lucid waters and lush mountains are invaluable assets. The project team of Huizhou-Qingyuan Expressway proposed the concept of green expressway construction at the initiation stage. During the construction process, a large number of green construction processes were applied. It has achieved great economic and environmental benefits. This time, we won the Global Road Achievement Award (GRAA) of IRF Global in recognition of our environmental protection efforts, we feel very honored and proud. We will continue to make more efforts in green construction and environmental protection and make greater contributions to the transportation industry and global sustainable development.”



PROGRAM MANAGEMENT

MORAVA CORRIDOR MOTORWAY PROJECT

BECHTEL - ENKA

Bechtel and ENKA each boast rich histories, and together, we possess nearly 200 years of combined experience—an impressive feat in today’s competitive landscape. For 35 years, our joint venture has tackled some of the industry’s most challenging motorway projects. The Morava Corridor Motorway Project’s program management exemplifies our commitment to excellence, representing a complex endeavor that few can undertake.

The Morava Corridor Motorway Project is a 112 km dual carriageway designed for speeds up to 130 km/h, connecting Pojate and the A1 through Kruševac to Preljina, north of Čačak. Running along the West Morava River valley, it links central Serbia with Pan-European Corridors 10 and 11, facilitating connections to Bosnia, Montenegro, and North Macedonia. By improving the flow of goods and people, it will enhance safety, reduce transportation costs, shorten travel times, boost trade, attract investment, and stimulate economic growth, making it a key driver of regional prosperity.

Our project management team, equipped with extensive expertise in Environment, Safety & Health (ES&H), Engineering, Construction, Quality Assurance and Control, Procurement, Project Controls, Finance, Human Resources, Public Relations, Community Relations, and Sustainability, is dedicated to delivering this vital project of national importance for our Employer, the Government of Serbia.



The 112km motorway is elevated to 4.3m in most sections to prevent flooding. The project encompasses 3,647,448 m³ of excavation for motorway works, 12,017,032 m³ for river regulation, and 36,875,058 m³ from borrow pits. It includes 20,975,470 m³ of gravel fill, 1,835,026.92 m³ of subgrade, and 1,240,261.77 m³ of subbase material. We will lay 1.23 million tonnes of asphalt, construct 37 overpasses, build 78 bridges, and install 236 km of drainage systems with 202 oil separators.

Final touches include 478 km of guardrails, 230 km of wire fencing, 150,000 m² of road markings, and 2,450 traffic signs to ensure safety and efficiency. The motorway boosts Serbia’s appeal to investors by integrating smart features and a 5G digital corridor for enhanced communication and operational efficiency. Situated on the Morava River’s floodplain, it utilizes innovative hydro-technical solutions to manage water flow and reduce flood risks in surrounding areas.

At Bechtel-ENKA, sustainability drives our operations on the Morava Corridor Motorway, and our fleet’s efficiency reflects this commitment to reducing our climate footprint. By strategically locating borrow pits and waste areas close to sites, we cut operational cost, minimized equipment travel, and reduced fuel use and greenhouse gas emissions, contributing to climate change mitigation.

From 2020 to 2024, we employed 11,324 individuals from 32 nationalities. Our current workforce exceeds 4,000 employees, comprising 48% Indian nationals, 24% Turkish, and 27% Serbian. To support our diverse workforce, we launched a Mental Health Action Plan to prioritize well-being and safety. Our Human Resources, ES&H, Public Relations, and Camp Management teams collaborate to organize inclusive events that builds community, celebrates diversity, and promotes wellness.

In December 2023, the first three sections of the motorway, totaling 27 km, opened to public traffic ahead of schedule, and we are on track to deliver the next 30 km to our Customer by year-end.

Shawn MacCormack

Bechtel-ENKA Project Director for the Morava Corridor Motorway Project

“The International Road Federation (IRF Global) is a crucial advocate for best practices in global road development, championing excellence and sustainability. The Bechtel-ENKA Morava Corridor Motorway Project views the IRF as an inspiring leader that fosters innovation and knowledge sharing, empowering us to address today’s challenges. We are honored to receive the prestigious Program Management Award from IRF, recognizing our commitment to leading industry trends, continuous improvement, and elevating project management standards.”

QUALITY MANAGEMENT

PARKING AREAS FOR THE FIFA WORLD CUP QATAR 2022

PUBLIC WORKS AUTHORITY 'ASHGHAL'

The Roads Projects Department (RPD) is a crucial division of Qatar's Public Works Authority (Ashghal) entrusted with executing infrastructure projects in the country. In 2011, a nationwide program was launched encompassing the design and construction of roads and infrastructure networks throughout Qatar. Spearheaded by Ashghal's Road Projects Department (RPD), this initiative aligns with Qatar's National Vision 2030, forming part of the nation's transformation plan. Ahead of the 2022 FIFA World Cup event, RPD was responsible of delivering a plethora of projects serving FIFA stadiums. Among other outputs, RPD has particularly played a pivotal role in the development of parking areas providing a total of more than 6.5 sqm of temporary parking to the stadiums.

To ensure unwavering quality and precision, RPD employed and meticulously implemented a Quality Management System (QMS), encompassing every phase from conceptualization and design to the final utilization stage. This approach underscored RPD's commitment to excellence, resulting in seamless creation of world-class parking facilities that left a lasting impression during the prestigious global sporting event.

Requirements were communicated, and stakeholders remained actively engaged from the initial concept stage to the construction of numerous temporary parking infrastructures to accommodate the vast volume of vehicular parking for the mega event. Emphasizing sustainability and cost-effectiveness, these temporary parking structures were designed to fulfill their purpose while adhering to the overarching goal of Qatar National Strategy (2018-2022) that served as the guiding framework for Ashghal's comprehensive recycling initiative integrated into the implementation of all construction projects.

For the layering of asphalt, RPD devised an innovative pavement design solution. This involved utilizing recycled

asphalt pavement (RAP) sourced from previous projects as a substitute for the originally proposed new asphalt Base Course across most of the temporary parking infrastructure. To ensure surface stability and enhance overall riding quality during parking maneuvers, RPD conducted multiple trials incorporating prime coat and tack coat spray applications. The desired outcomes were successfully achieved, resulting in effective surface protection and improved user experience.

The decision to use 100% recycled asphalt pavement (RAP) for the parking areas was highly beneficial in terms of performance, cost-effectiveness, and environmental impact reduction. This was achieved through careful planning, adherence to policies and protocols, and focus on meeting the desired outcomes.

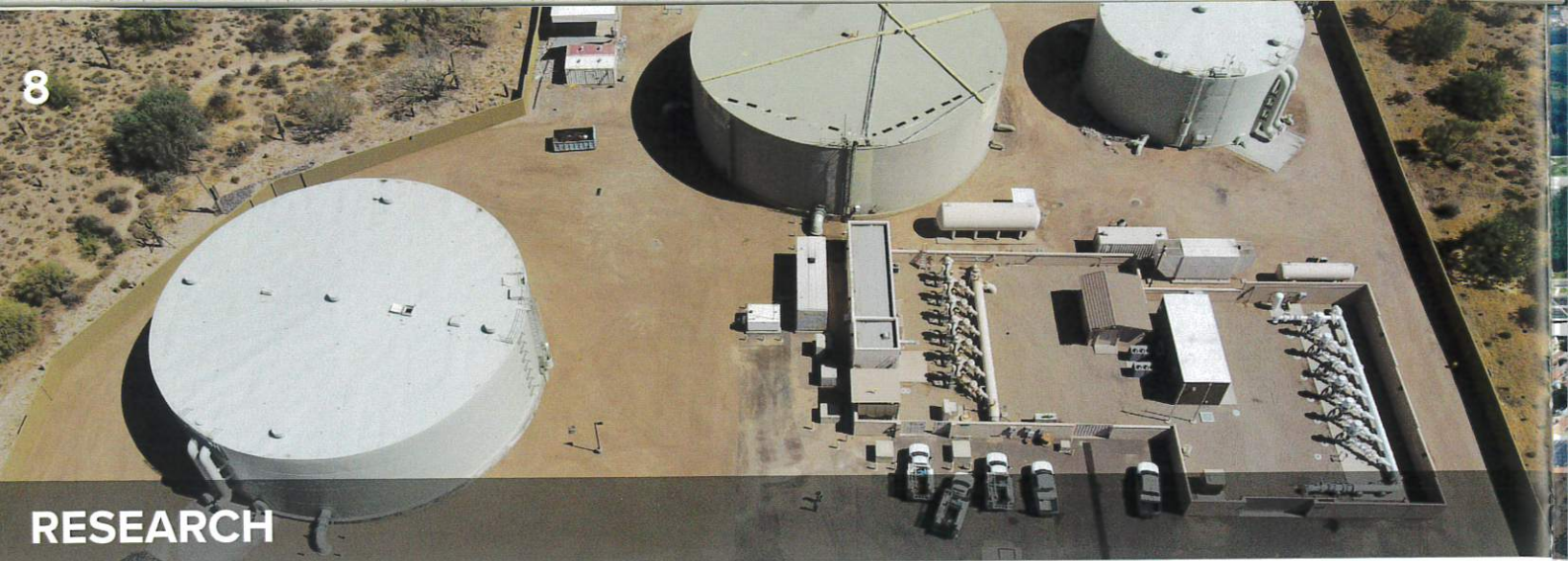
These efforts enabled Ashghal to provide sustainable parking spaces for all eight stadiums without encountering any quality control issues, at a significantly lower cost. Ashghal and RPD take great pride in their contribution to the success of such a monumental event and were keen to share the lessons learned for the use of asphalt pavement recycled materials. The workshops were conducted by international experts and focused on mechanisms and equipment involved in asphalt milling and paving, featuring live demonstrations.



Eng. Salem Al-Marri

Roads Project Department Manager, Public Works Authority 'Ashghal'

"We are very pleased by this win that signifies a big recognition of our efforts in ensuring efficient quality management as "Ashghal" has never ceased to commit to deliver excellence, support sustainable construction practices and has even mandated their implementation across its projects. Winning the IRF Global Road Achievement Award is a testament to our commitment to quality, innovation, safety, and sustainability in infrastructure, as it is a shared responsibility to serve the community, protect the environment inside and outside of Qatar for future generations and benefit from the advantages of these practices in preserving available resources and reducing costs in the long term. It inspires us to continue pushing boundaries and shaping a better future for transportation worldwide."



RESEARCH

SOLID EARTH INNOVATIVE LIQUID POLYMER TO STABILIZE ROADWAYS, PATHWAYS, AND RECREATIONAL TRACKS

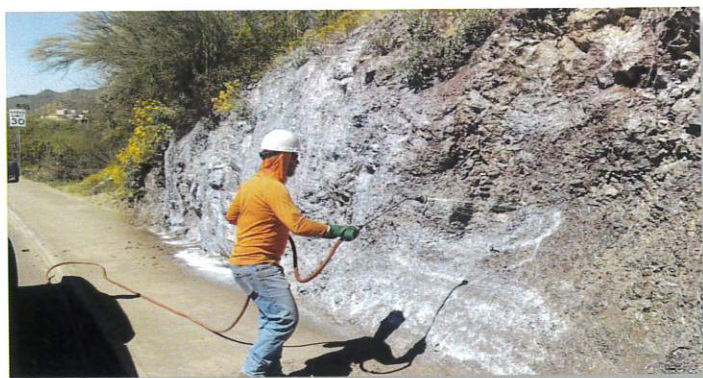
SOLID EARTH INC.

Soil stabilization is a cost-effective method to strengthen low-quality soil for various engineering applications, such as paved surfaces and embankments. While there are many stabilizers available in the construction industry, some lack durability, and others are energy-intensive, contributing to high CO2 emissions.

Solid Earth has developed a proprietary virgin polymer, supported by years of research and field experience, that outperforms other soil stabilizers in durability. It has proven exceptional resilience to extreme weather conditions and provides significant environmental and health benefits with no leaching impact on water or soil.

When mixed with fine aggregates, Solid Earth demonstrates excellent moisture resistance, maintaining its structural integrity even when exposed to prolonged wet conditions. The product is applied through a cost-effective and time-efficient method—simply sprayed and compacted onto loose soil—that requires no specialized equipment. Local teams can carry out the process with Solid Earth’s personalized advisory and training services, promoting local economic growth and job creation. Its versatile applications include service roads, bike paths, and more.

Furthermore, **Solid Earth is non-toxic and extends the lifespan of paths and roads by 10 to 20 years without affecting the surrounding environment.**



In collaboration with Arizona State University (ASU), Solid Earth Inc. conducted comprehensive testing to evaluate the performance of SEi. The tests covered strength, durability, resistance to freeze-thaw cycles, moisture damage, wind erosion, and environmental impact.

| Measure | Result |
|-----------------------|--|
| Durability | (ASTM D559). Weight loss < 4.9% and good dimensional stability. 3 times better than industry limits. |
| Strength | (ASTM D2166) 3.5 times more than conventional materials. |
| Wind Erosion | (Portable In-Situ Wind Erosion Laboratory). Erosion is sustained at 90% and 84% for 12 m/s and 16 m/s, respectively. |
| Environmental Testing | Minimal impact on groundwater contamination, with tested chemicals remaining within acceptable levels |

Utilizing both industry standards and innovative testing protocols, the results confirmed that Solid Earth provides excellent erosion resistance and durability, reducing maintenance costs for long-term infrastructure. It is particularly effective for structural pavement layers and dust control.

Environmental testing further validated that Solid Earth has no negative impact on sublayers or surrounding vegetation, reinforcing its commitment to environmental stewardship. With its combination of superior performance and minimal environmental footprint, Solid Earth stands out as a premier option for soil stabilization and dust control.

Based on ASU’s testing, Solid Earth has proven to be a sustainable and efficient solution to modern infrastructure challenges. Solid Earth not only advances roadway construction and maintenance but also aligns with the industry’s focus on groundbreaking developments in sustainability and technological innovation.

Hadar Rahav
President, Solid Earth Inc.

“ We are humbled and excited to be part of this prestigious IRF Awards program. We appreciate the opportunity to share our technology, driven by our three core passions: performance, well-being, and environmental stewardship. Our purpose is to build strong pathways that connect individuals with their communities, livelihoods, and cultures in harmony with their surroundings. ”

SAFETY

JINAN TO WEIFANG EXPRESSWAY PROJECT

SHANDONG HI-SPEED GROUP CO., LTD.

The Jinan to Weifang Expressway is known as the First Zero-Carbon Smart Expressway in China, a major transportation corridor in the country and artery from Jinan to Qingdao. The expressway is 162km long with six lanes in dual directions and has been rated as a key project of new infrastructure in the field of transportation and demonstration Project for Creating Century-Old Quality Projects by the Ministry of Transport of China.

The Expressway prioritizes public travelling safety as its core objective, striving to comprehensively enhance safety assurance for adverse weather conditions, key road sections, key vehicles and tunnel security, as well as the capabilities to efficiently deal with incidents.

1. Adverse Weather and Driving Safety Assurance Technology

In response to problems such as poor visibility and significant safety hazards during rainy nights and adverse weather conditions, technologies for visibility analysis and safety assurance during rainy and foggy weather, friction coefficient analysis and safety assurance during icy and snowy conditions, as well as safety assurance technologies for key points such as merging and diverging areas, have been developed to improve driving safety under adverse conditions. Considering the vehicle-road interaction, the project has also developed a powerful platform with the functions of in-time risk warning, prevention and control. The platform can provide safe driving assistance and early warning for key vehicles such as hazardous materials transport vehicles.

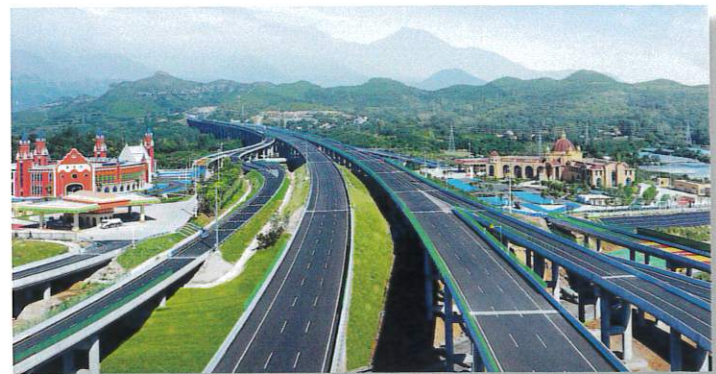
2. Complete Tunnel Safety Assurance Technology

Focusing on the challenges posed by limited tunnel space and difficult accident rescues, innovative technologies have been developed for optimal visual adaptation in tunnel driving, safe and uninterrupted tunnel operations, automated fire safety assurance, full-domain precise perception of the entire

tunnel area, and event linkage disposal technology. These advancements provide comprehensive protection for passage safety in tunnels.

3. Precise Event Perception and Emergency Response Technology

To address the problems of high latency in detecting road incidents and low efficiency in emergency response, the project has developed technologies of precise event perception in all weather conditions and event emergency response by multi-party collaborations. It enables incidents to be discovered in seconds and hence improves the incident response efficiency in the "perception-dispatch-disposal" process. The project has also optimized the technology of emergency road rescue service, to update the service level and quality for road rescue. Additionally, the project has innovated in multi-party coordinated event emergency response technology, forming a business management loop of "event-operation monitoring, during-event-command and dispatch, post-event-digital evaluation". Finally, the project has innovated in accompanying travel service information release technology, achieving a precise, personalized, and customized service experience in the whole travelling process.



Wang Qifeng

Chairman, Shandong Hi-Speed Group Co., Ltd.

"Shandong Hi-Speed Group Co., Ltd. is an investment company in the infrastructure sector and also a Fortune Global 500 company. Currently, the group owns 8,745km long highways and has been always adhered to the mission and vision of "to create and share a better path of life" and is committed to providing safer and more convenient travel services. We are honored to receive the GRAA, which is a high recognition for our innovative ideas and practices and we are grateful to IRF Global for selecting our project and providing a stage to fully showcase our construction achievements to the world, further expanding the international influence of the "Shandong Hi-Speed & Pure Excellence" brand, and contributing Chinese strength to the technology progress of the transportation industry."



TECHNOLOGY, EQUIPMENT AND MANUFACTURING

RMAD (ROAD MARKING ASSESSMENT DEVICE)

MIYAGAWA KOGYO CO., LTD.

The Statement of Policy by the International Road Federation in 2014 stated: "Road markings are one of the most cost-effective safety solutions that are available to policy-makers and road owners..." A decade on after the statement, road markings have become increasingly essential for both traffic safety and the development of autonomous driving technologies. However, evaluating road markings with diminished visibility remains a challenge that requires significant time and resources. Consequently, there is an urgent need for technology that addresses the short life cycle of road markings efficiently.

Miyagawa Kogyo Co., Ltd., leveraging over 60 years of expertise in Japan's road marking industry, recognized this need and initiated the development of the RMAD (Road Marking Assessment Device) in 2016. RMAD was conceived to streamline maintenance cycles through "simple and quantitative" analysis, which is essential for effective infrastructure management. Since 2018, we have collaborated with the National University Corporation, Nagaoka University of Technology, to incorporate advanced AI technologies, thereby enhancing the lifecycle management of road markings.

The RMAD technology has garnered widespread recognition, winning the Infrastructure Maintenance Award in 2021 and the

Infrastructure DX Award in 2023. The technology has been featured prominently in Japanese media, including NHK, Japan's leading public broadcaster, and various newspapers and magazines.

One major strength of RMAD lies in its ability to focus on the wear and presence of road markings, quantifying their condition through evaluation judgments of the presence rate. Another key strength is its ability to display the road marking status on GIS maps with a color-coded ranking system. By leveraging AI and proprietary algorithms, the technology automates the recognition of road markings, calculates their presence rates, classifies them into five distinct ranks, and visualizes this information on electronic maps using GPS data.

These strengths eliminate the need for specialized measuring equipment or skilled technicians, as the necessary information can be collected simply by attaching a phone with a dedicated app to any vehicle. The app's GPS-based auto-shooting function captures data at set intervals, further streamlining the process. RMAD then automatically calculates and displays the condition of road markings by rank, allowing road administrators to more easily determine whether the road markings meet required standards and plan maintenance accordingly.

Due to these advantages, RMAD can significantly reduce the time and costs associated with road maintenance project planning, making it highly welcomed by both national research institutions and local governments. In Japan, RMAD has been employed in Japan national collaborative research on autonomous driving. Furthermore, their research findings suggests that there is a strong correlation between the presence rate and retro reflectivity.

"The Statement of Policy" continues as follows: "road markings should have a minimum performance of 150 mcd/lux/m² and a minimum width of 150 mm for all roads." With its convenient and reliable data acquisition, along with comprehensive analysis, RMAD is the solution capable of analyzing this issue.



Satoshi Miyagawa Chief Executive Officer of Miyagawa Kogyo Co., Ltd.

"We are honored to receive the 2024 IRF Global Road Achievement Award for our innovation in automatic quantification of road marking conditions and visualization on maps. This award underscores our commitment to advancing road infrastructure maintenance through cutting-edge technology. This recognition affirms the dedication our team has invested in developing RMAD, and inspires us to continue pursuing high-impact and sustainable solutions for road infrastructure maintenance in Japan and beyond."

TRAFFIC MANAGEMENT AND INTELLIGENT TRANSPORTATION SYSTEMS

MOBILE TRAFFIC MANAGEMENT CENTER (MOBILE TMC) INTEGRATED TRANSPORT CENTER - ABU DHABI MOBILITY

The Integrated Transport Centre in Abu Dhabi launched the Mobile Traffic Control Centre in November 2023. This state-of-the-art mobile unit is designed to monitor and manage road traffic within the Emirate of Abu Dhabi, leveraging cutting-edge technologies, including artificial intelligence. The centre is crucial for traffic management, particularly during major events, by bringing together decision-makers from various authorities to enhance traffic flow, reduce congestion, and improve safety for both vehicles and pedestrians.

The project integrates advanced technologies such as AI, remote sensing, and geomatics (GIS), managing a network of 645 traffic signals and 1,665 surveillance cameras for real-time monitoring and analysis. The integration adheres to Intelligent Transportation System (ITS) standards, including ISO 14813 for framework architecture and ISO 21217 for ITS station architecture, ensuring compatibility and interoperability of different systems.

The modular and mobile nature of the centre allows for easy replication and deployment in other regions or cities facing similar traffic management challenges. The use of widely available technologies like surveillance cameras and GIS enhances its scalability. ITS communication standards like DSRC (Dedicated Short-Range Communications) and C-V2X (Cellular Vehicle-to-Everything) ensure the system can be adapted to various urban environments.

By reducing congestion and improving traffic flow, the Mobile Traffic Control Centre offers significant cost savings through reduced fuel consumption and travel time. The project optimizes resource allocation via real-time data analysis, making it a cost-effective solution for traffic management. AI's predictive analytics help in proactive traffic control, reducing the need for typically more costly reactive measures.

The project contributes to social and economic benefits by reducing travel times, enhancing road safety, and lowering emissions through decreased congestion. Its sustainable approach aligns with broader environmental goals, promoting a greener urban environment. Utilizing AI-driven traffic management aligns with the UN's Sustainable Development Goals (SDGs) for sustainable cities and communities.

Key events managed by the centre include the F1 Abu Dhabi Grand Prix (23-26 November 2024), UAE National Day Celebration (2 December 2023), and DRIFTX and Abu Dhabi Mobility Week (25 April - 1 May

2024). One crucial aspect is facilitating multi-agency coordination at incident or event sites in one location, making decision-making and response faster and more effective.

The innovative use of existing technologies, such as surveillance cameras and GIS, in a mobile and integrated manner, demonstrates how these tools can be repurposed to meet new challenges in traffic management. The integration of existing standards such as ISO 11073 for health informatics and ISO 19107 for spatial schema in GIS adds value to the project.

The application of AI for real-time traffic analysis and decision-making represents a significant advancement in how traffic data is collected, analyzed, and utilized to improve road conditions. This implementation uses standards like ISO 29182 for sensor networks and ISO 17572 for location referencing to enhance its effectiveness.

While primarily leveraging existing technologies, the project also involves the development of new communication protocols and data analysis algorithms tailored specifically for the needs of a mobile traffic control centre. This development aligns with standards such as ISO 17215 for video communication and ISO 13185 for cooperative ITS.

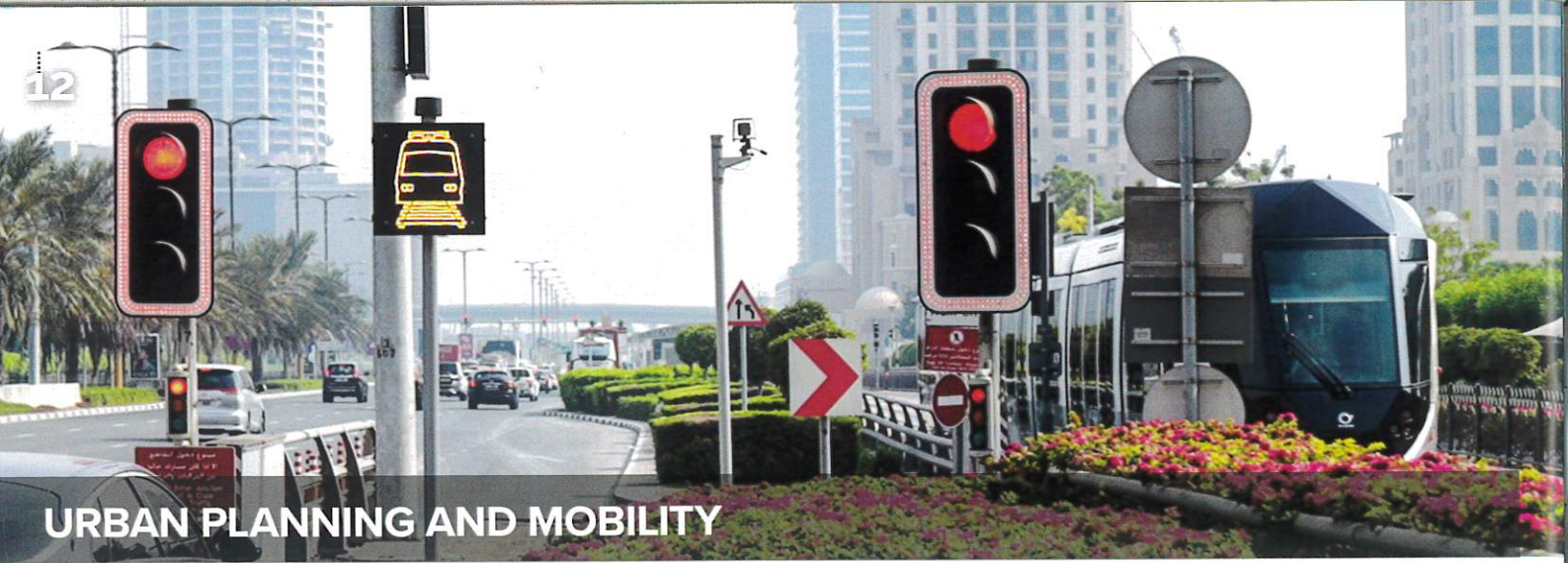
The project surpasses minimum regulatory requirements by integrating advanced technologies and innovative approaches to traffic management. It sets a new standard for how cities can handle traffic during peak times and special events. Compliance with standards such as ISO 39001 for road traffic safety management systems and ISO 26262 for functional safety in road vehicles underscores its excellence.



Eng. Hamad Bakheet Thabet

Director, Traffic Management Division, ITS Sector, Integrated Transport Center - Abu Dhabi, UAE

" Winning the IRF Global Road Achievement Award for our Mobile Traffic Management Centre is a testament to our commitment to leveraging advanced technologies to enhance road safety and mobility. This recognition reinforces Abu Dhabi's leadership in smart transportation solutions, which are vital to our vision of sustainable and efficient urban mobility. Our collaboration with the International Road Federation has been instrumental in sharing expertise and adopting best practices that drive innovation in road and transport systems globally. "



URBAN PLANNING AND MOBILITY

TRAM/TRAFFIC SMART SAFETY INITIATIVES PROJECT

ROADS & TRANSPORT AUTHORITY (RTA), DUBAI, UAE

The Roads and Transport Authority (RTA) is responsible for the efficient & sustainable movement of transport in Dubai. A key component of this responsibility is road safety, which directly relates to one of RTA's goals "Safety and Environmental Sustainability". The increasing rate of car ownership and transportation systems needs has been a direct result of a fast-growing economy and increase in population. Dubai Tram's safe integration into the broader public transportation network is a key focus for RTA. The tram seamlessly & safely connects with other mobility services, including the metro, buses, taxis and cycling lanes, ensuring accessibility to various destinations and aligning with the emirate's vision of promoting sustainable and preferred mobility choices.

In December 2023, it was announced that Dubai Tram has remarkably served approximately 52 million riders since its inauguration in 2014. Over the course of its nine-year journey, the Dubai Tram has safely covered 5.3 million kilometres, connecting 11 stations. It is at grade driver operated people mover that interfaces with the road network at 21 junctions, it has eight minutes headway covering approximately 623,000 km travelled annually.

The Tram Smart Safety Initiatives project reflects RTA's strategy for achieving sustainable development and improving the city's quality of life. RTA reiterates its commitment to adopting the smart technologies in transportation, which enhances the

passenger experience in Dubai. The smart initiatives sustain a safe environment around Dubai Tram/road interface to complement the overarching Traffic Safety Strategy and its five-year Action Plan to reach "vision Zero" accidents between the Tram and other road users. This is achieved by using the latest technologies and innovations to launch a Next Best Practice in smart and innovative safety measures like traffic signal LED Backboards, Pedestrian audible alarms and Blank out activated vehicular/pedestrian signs.

Twenty smart initiatives were studied according to a comprehensive evaluation criterion (details below), twelve initiatives were chosen with the top four selected for pilot initiatives at various tram/road intersections as per the following Criterion:

- Compatibility with the existing operations.
- Risks – (Security, Operational, Technology & Failure Risks).
- Licensing Requirements.
- Long Term Maintenance – (Effectiveness, Reach, Impact).
- Life Cycle Cost.
- Other Factors - (Availability, Lead time, Infrastructure readiness).

In 2023, after a six-month evaluation period for the LED Outlined Backboards, it yielded a significant reduction in red-light violations from 948 to 697 (27%). To maintain the successful approach and demonstrate a culture of continuous improvement, the initiative is being rolled out to the remaining tram/road intersections in 2024/2025.

Also, Dubai Tram has witnessed 59% improvements in the Near Misses between the Tram and other road users due to the significant counter-measures stipulated in the Dubai Road Safety Strategy and the Tram/Road Safety Strategy.

The impactful initiatives resulted in developing the journey toward revolutionizing urban mobility and RTA's commitment to sustainable and safe transportation solutions. Replicable initiatives are currently being developed and will go ahead once the site evaluation of the LED Outlined Backboards for the traffic signals take place.



Hussain AL Banna CEO, Traffic and Roads Agency, RTA

" Winning the IRF Global Road Achievement Award for our Tram Smart Traffic Safety initiatives project is a profound honor and a significant milestone for the Roads and Transport Authority. This prestigious recognition highlights our relentless commitment to advancing urban mobility through cutting-edge technology and innovative traffic safety solutions. Our Tram Smart Traffic Safety initiatives represent a transformative approach to enhancing the efficiency and safety of public transport in Dubai. This award not only validates our efforts but also reinforces our dedication to setting new benchmarks in the global transportation sector. The International Road Federation plays a crucial role in promoting best practices worldwide, providing a platform for sharing groundbreaking advancements and fostering global collaboration. This award underscores our shared vision for a smarter, safer, and more sustainable future in urban transit. "

2025 GRAA Application Information

APPLICATION DEADLINE: MAY 8, 2025

The application package must include:

1. A completed application form
 2. A project summary (<500 words)
 3. An explanation of how the project meets the criteria of the category in which it has been submitted (~100 words)
 4. Microsoft PowerPoint® presentation (.ppt or .pptx) including but not limited to slides, photographs, drawings, diagrams, videos, or additional explanatory materials. (Presentations should be limited to 30 slides or less).
 - If completing a paper application, please compress all your files into a single ZIP archive and send the files via email (if <5MB) or a file-sharing service (if ≥5MB) such as Dropbox, WeTransfer, ShareFile or other like service.
- OR
- Complete our online application, which includes built in file uploading (<https://irf.wufoo.com/forms/2025-graa-application>)

Incomplete applications will not be considered. All materials must clearly identify the name of the project, the award category, and contact information of the submitting applicant.

Please note:

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Each application package must be accompanied by a non-refundable entry fee of \$400 for IRF Member, \$875 for non-members. A separate application package (accompanied by payment of the entry fee) must be submitted for each project entered in each category.

Entry packages must be received by the IRF, at the address listed below, by 5:00pm EST on May 8, 2025. Entries must be addressed to:

Global Road Achievement Awards
c/o International Road Federation
500 Montgomery Street.
5th Floor
Alexandria, VA 22314 USA

For further information, please contact:

graa@IRF.global
Tel: +1 703 535 1001

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