



2019 GLOBAL ROAD ACHIEVEMENT AWARDS

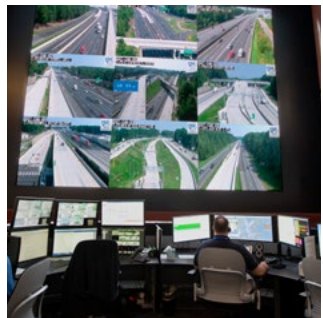
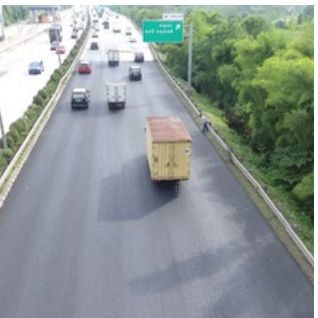
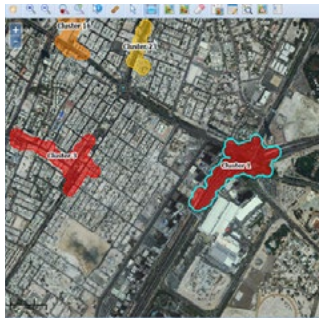
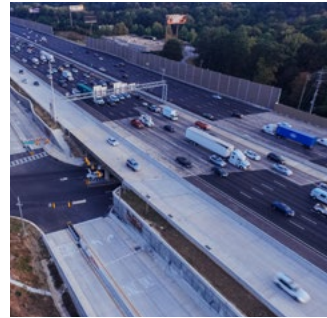
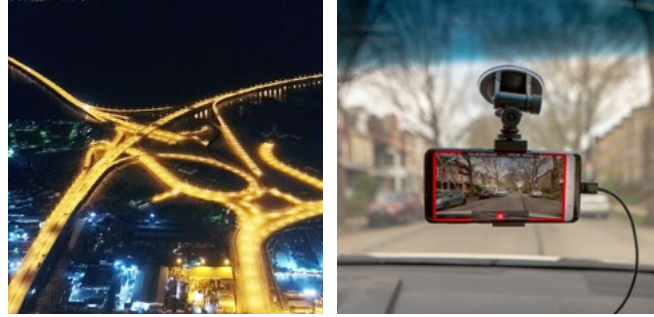


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FOSTERING A GLOBAL MARKETPLACE FOR INDUSTRY SOLUTIONS

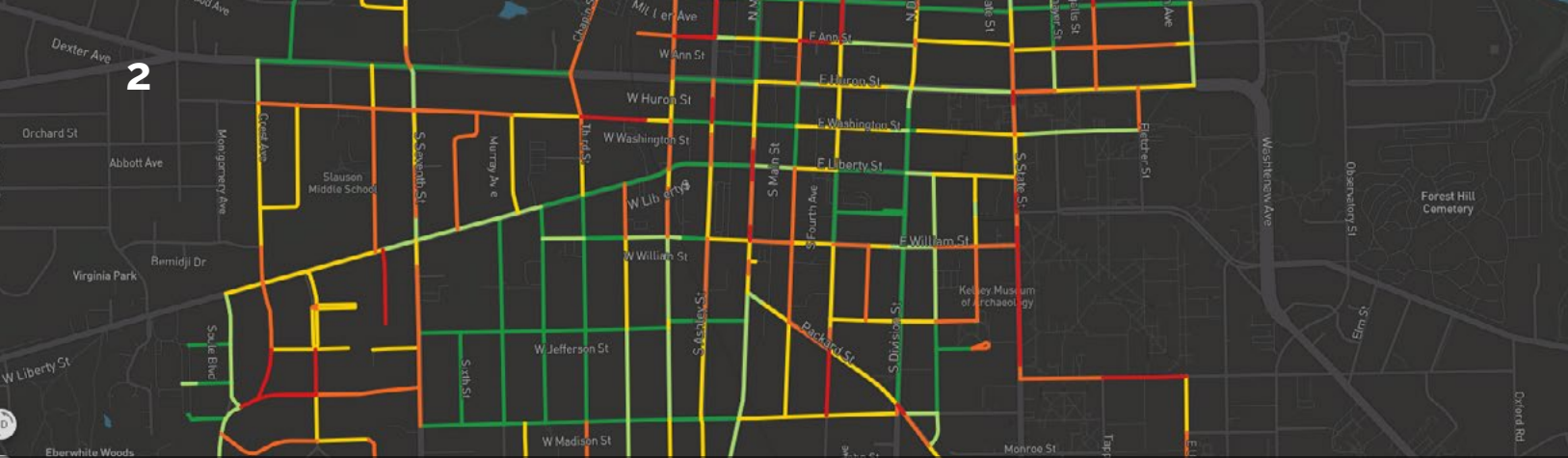


H.E. Abdullah A. Al-Mogbel
IRF Chairman

On behalf of the International Road Federation (IRF) and our panel of judges, I would like to congratulate the winners of the 2019 IRF Global Road Achievement Awards. They are an asset to an industry that is constantly investing in new solutions to deliver efficiency gains and sustainability advances that benefit everyone.

Instituted in 2000, the Awards have distinguished more than 170 programs, projects and products 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. For our sector, they also serve as an accelerator of progress and new ideas. By showcasing new technologies and creative solutions, we are able to learn from each other, and build on our successes.

IRF's flagship industry award program is characterized first and foremost by its universal appeal, and this year is no different with 12 winners from nine countries. The diversity and quality of these projects are also a great testament to IRF's status as the global marketplace for best practices and industry solutions. I invite you to examine them in detail and to submit your own exemplary projects to the 2020 GRAA Competition.



ASSET PRESERVATION AND MAINTENANCE MANAGEMENT

ROADWAY

ROADBOTICS

RoadWay is RoadBotics' accessible online platform that allows road managers to view their road assessments. RoadWay users can see road conditions, prioritize maintenance, and visually inspect roads on the platform.

A full, customized view of your city's roads and a rating of every road segment in your network after data collection appears on an online color-coded map. The assessment data is also compatible with your existing GIS or pavement management system.

RoadWay helps visually communicate the status of roads to council members and other stakeholders, focus on roadways that are in dire need of repair, and save time on visual inspection by providing a time-stamped image of each 10-foot section of road.

Roadbotics' assessments are accomplished and shared in three simple steps:

1. Data Collection: Road images are collected by driving the entire road network while collecting data using smartphones.
2. Artificial Intelligence (AI) Assessment: Images are analyzed using deep-learning AI algorithms and rated on a 1-5 scale according to surface damage
3. View your assessment: Users view the assessment on RoadWay,



our proprietary cloud-based platform or on their GIS software/platform.

RoadWay benefits to public works directors, civil engineers, and anyone who oversees the road maintenance in several ways:

The online platform is a powerful communication tool. It allows interdepartmental coordination across organizations or in council meetings. Every member of a team can view the road network assessment, or an individual can share the map in a council meeting or when speaking with citizens to offer transparency about current projects, budget requirements, or the status of ongoing repairs.

The platform is easy to access. Project managers can view their assessment on any computer at any time and visually assess their road network right from their desk. High-resolution photos of every 10 feet of road network help road managers see what needs to be done before assigning work.

The platform shares objective data. Visual road inspection is subjective. Anyone's visual inspection process can differ from another's - making the road condition data inconsistent. With RoadBotics, AI algorithms assess the road network. Each point consists of an image, taken every 10 feet and rated using a 1-5 score depending on the severity of its distresses.

As of mid-2019, RoadBotics has 160+ customers.

"We used RoadBotics to show the ward leaders that the road conditions were not equitably good or bad across all wards. This helped our ward leaders look at road conditions from a township-wide perspective. They understood why we made certain pavement decisions," said Ryan Fonzi, a RoadBotics client in North Huntingdon Township, Pennsylvania, USA.

Engineering firms and governments all over the world use RoadWay. The platform is continuously being updated and improved for road managers everywhere.

RoadWay is just one part of RoadBotics' mission to apply our technology to not only improve the world's roads, but also the critical infrastructure that impacts people's lives every day.

To learn more, go to www.roadbotics.com

Nikhil Ranga

Director of Product and Customer Experience, Roadbotics

"We're on a mission to make road maintenance simpler and more cost-effective for everyone, and our technology is doing just that. We're honored that the International Road Federation sees the potential in this product making a difference for road managers all over the world."

CONSTRUCTION METHODOLOGY

SHAIKH JABER AL-AHMAD CAUSEWAY BRIDGE

PUBLIC AUTHORITY FOR ROADS & TRANSPORT, KUWAIT

The Sheikh Jaber Al-Ahmad Al-Sabah Causeway is considered one of the most iconic projects in the State of Kuwait until this day, and is ranked as one of the top 5 longest bridges over water in the world. The purpose of the project is to connect Kuwait City from Al-Ghazali interchanges with Jamal Abdalnasser Street at the Al-Shuwaikh Port to Al-Subiya Highway and the future Al-Hareer City (Silk City) (New Subiya) thus, shortening the travel time from approximately 90 minutes to 30 minutes, and reducing the travel distance from 104km to 36km.

The causeway is a marine bridge with an approximate length of 36.14 km. This includes a 340m cable stay main span with a navel passage of 120 meters wide, and a vertical clearance of 23 meters, for ships to access Al-Doha Port.

The project also includes 2 man-made islands along the corridor. One near Kuwait City (South Island) with approximate size of 30 hectare, and the other (North Island) near Al-Subiya City with approximate size of 33 hectare. These islands contain governmental buildings for bridge operations, security, emergency, and traveler services, as well as, marina and green areas for future investments.

The bridge deck has (3) lanes for vehicular traffic in either direction, including shoulders for emergency and other uses. A tolling system will also be implemented during the operation and maintenance of the bridge.

The State of Kuwait did not overlook the environmental aspects of this massive structure in the sea. Every measure of environmental protection was taken into consideration during the planning, construction and operational phases of the project. Major steps have been taken to

protect, relocate, and nourish marine life impacted by the construction; and comply with all requirements of the Kuwait Public Authority for the Environment (PAE).

The bridge cost is approximately 740 million Kuwait Dinar.

Work commenced: 3/11/2013.

Final completion date: End of September 2019.

Completion percentage: 99.97%.

His Highness Sheikh Sabah Al-Ahmad Al-Sabah officially opened the main bridge on 30/4/2019.



Eng. Suha Jassim Ashkanani

Managing Director, Public Authority for Roads & Land Transport

“ An international winning project, to PART, means that the organization is striving and succeeding in delivering the showcase projects with best quality and sustainable practices to achieve the objectives with environmentally and socioeconomically friendly solutions. ”



DESIGN

YAVUZ SULTAN SELIM BRIDGE

MINISTRY OF TRANSPORT AND INFRASTRUCTURE, REPUBLIC OF TURKEY

The third Bosphorus Bridge, which is called the Yavuz Sultan Selim Bridge, plays the role of a new landmark for the city of Istanbul. It has been designed using the most up-to-date technology and knowledge in structural engineering, advanced computer calculations, material capacities and qualities, method of construction and durability concepts. This structure represents a huge step forward in understanding the behavior and characteristics of hybrid bridges.

The Yavuz Sultan Selim Bridge represents many world records such as one of the longest suspension bridges hosting a railway system on it with a main span of 1.408m, the highest suspension bridge with a tower that is 322m high and the world's widest suspension bridge with a deck width of 59m. Due to its size, many constitutive elements had to be developed, either with new concepts or by applying existing concepts to a much larger scale and capacity.

The design has proven its structural efficiency and its elegance. In comparison to a traditional suspension bridge of the same magnitude, many advantages can be highlighted as follows:

- ▶ A great architectural style and a contemporary suspension bridge
- ▶ Allows for a slender single level deck (only 5.50 m) compared to the huge classical double decks with a height of 12-15 m
- ▶ Allows for an excellent aerodynamical shape of the deck
- ▶ Allows for a very slender deck with the railway because of the high stiffness provided by the stiffening cables
- ▶ Great seismic behavior due to a good damping coefficient and high stiffness
- ▶ An excellent horizontal and vertical service limit state with less deflections that ease the operational conditions of the railway
- ▶ A good torsional behavior due to the high transverse stiffness procured by the stiffening cables
- ▶ Natural longitudinal stabilization of the deck due to the cable system, improved by the use of pendular bearings
- ▶ The size of the main cable limits aerodynamical effects
- ▶ Time-saving erection procedure due to the simultaneity of erection zones and elements which allowed for early delivery
- ▶ Easy and reasonable maintenance due to the limited surface to be repainted (only the external faces of the deck)

Overall, the Yavuz Sultan Selim Bridge is an extremely elegant and aesthetically pleasing bridge located in a unique place in the world, in Istanbul, along the Bosphorus, connecting Europe to Asia. A success by accomplishing the Client's initial wish of "respecting the philosophy and the architecture of the two existing bridges." This outstanding structure, which has been admired all around the world places Turkish suspension bridges again in the front line of international landmarks.



Mehmet Cahit TURHAN

Minister of Transport and Infrastructure of Republic of Turkey

"We are pleased to receive a major international award for the Yavuz Sultan Selim Bridge, for which we have achieved many firsts from the design stage until today and has become one of the landmarks of Turkey in a short period of time. Yavuz Sultan Selim Bridge is rising on the Bosphorus as a product of high end engineering and technology. With all its aesthetic and technical features, it has taken its place among the world's few bridges and is called the "bridge of firsts". The definition "bridge of firsts" is reinforced over and over again with awards that have been given. Thousands of people poured their heart and souls into the construction of the Yavuz Sultan Selim Bridge. Each award received makes us feel an infinite honor and gives Turkish engineers the power to create new projects."

ENVIRONMENTAL MITIGATION

WEST COAST EXPRESSWAY: BA-DONG-LIAO TO JIU-KUAI-CHOU PROJECT SINOTECH ENGINEERING CONSULTANTS, LTD. & DIRECTORATE GENERAL OF HIGHWAYS, MOTC, TAIWAN

West Coast Expressway: Ba-Dong-Liao to Jiu-Kuai-Chou Project is an elevated highway that goes across an environmental sensitive coastal and wetland area in southern Taiwan. The Directorate General of Highways (DGH), MOTC, studied the environment impacts thoroughly and concluded the needs of developing comprehensive carbon management and environment mitigation in the phases of planning, design, and construction to combat global warming and carbon emissions. DGH worked with Sinotech Engineering Consultants Ltd. and proposed a framework of carbon management and developed strategies of environment mitigation for the Project.

During construction, DGH and Sinotech set up the inventory boundary, the inter-organization interface, and an on-line inventory information system. Training sessions and regular on-site counseling were accommodated for contractors, subcontractors and suppliers. Suppliers of main materials including cement, reinforcing bar, asphalt concrete were requested to conduct carbon inventory for their own products. Moreover, international forum and seminars were held to consolidate the local carbon management framework of roadways. Through true inventory and third-party verification, DGH and Sinotech verified the carbon emission estimation and obtained data of engineering materials and roadway construction activities.

Environment mitigation strategies were developed throughout the project as well. Environmental monitoring and mitigation, green design, and low-carbon design were considered. Green and low-carbon designs included reinforced earth wall, groundwater infiltration, green belt design, and porous asphalt concrete pavement. The carbon emissions by different design alternatives, such as alignment, substitute materials and structure options, were further analyzed. In addition, habitat monitoring and corresponding compensations were put into the design and construction. Underwater cultural heritage was surveyed thoroughly before construction due

to the project site is considered one of the earliest developed areas in Taiwan.

The outcome of the Ba-Dong-Liao to Jiu-Kuai-Chou Project achieved the first construction project that has acquired ISO/TS 14067 and PAS 2050 assessment, established carbon footprint product category rules (CFP-PCR) of roadways and bridges, and provided guideline for the framework of construction carbon management. The carbon emission of the project reduced 22% of concrete by substituting cement with fly ash and ground-granulated blast-furnace slag, 88% of retaining wall by constructing the reinforced earth wall, and 50% of pavement by utilizing porous asphalt concrete pavement. Moreover, detailed unit emissions in main lane, ramp, pile, foundation, pier and superstructure were disclosed and capable of serving as great references for future projects. In summary, the West Coast Expressway: Ba-Dong-Liao to Jiu-Kuai-Chou Project not only preserved the environmental sensitive area with multiple environment mitigation strategies, but also engaged the very first carbon management system for in roadways and bridges in Taiwan.



Yen-Po Chen

Director General of DGH, MOTC, Taiwan

“ The Directorate General of Highways (DGH)—a roadway agency of the Ministry of Transportation and Communication is proud to build, maintain, and connect roadways for motorists in Taiwan. The West Coast Expressway: Ba-Dong-Liao to Jiu-Kuai-Chou Project with joint efforts of Sinotech Engineering Consultants Ltd. was the first completed project that passed ISO/TS 14067 and PAS 2050 assessments and utilized the strategies of environment mitigation. Winning the IRF 2019 Global Road Achievement Award in environment mitigation truly inspires us to endeavor more efforts to implement low-carbon emission and environmental mitigation thinking to future roadways and other infrastructures.”

PROGRAM MANAGEMENT

NORTHWEST CORRIDOR

GEORGIA DEPARTMENT OF TRANSPORTATION

The completed Northwest Corridor represents the delivery of the largest transportation project in Georgia's history and the first Georgia Department of Transportation (GDOT) project to be procured as a design-build-finance project. This massive project, which involved 29.7 miles of roadway, three intersecting interstate highways, and 39 bridges, required myriad innovations, accommodations, and considerations, including solutions to address impacts to the traveling public, environmentally sensitive wetlands, and the potential duration and cost of construction. The successful and seamless teamwork, coordination, and innovation involved in this immense project make the Northwest Corridor a model for the delivery of future design-build mega projects around the world.

Cobb and Cherokee counties, in metropolitan Atlanta, required an expressway solution to accommodate increased traffic through a densely populated and fast-growing area. This massive project had been planned for more than 15 years. Under the leadership of Georgia Department of Transportation,

the full project team comprising of WSP USA (formerly Parsons Brinckerhoff) as environmental lead, Parsons as Lead Designer, Northwest Express Roadbuilders (NWER), a joint venture of Archer Western and Hubbard Construction, as the builders, HNTB Corporation as program manager, Michael Baker International as design reviewers, and Atkins as owner's verification firm responded to the inherent challenges of such a large and complex project with alternative technical concepts, accelerated bridge construction techniques, and creative solutions, resulting in reducing cost by approximately \$150 million; accelerating the schedule; and reducing or eliminating impacts to the environment, highway users, and the traveling public along the corridor.

Through innovative designs, construction techniques, and alternative technical concepts, the project team saved approximately \$150 million. The final design reduced right-of-way acquisition by more than 60 parcels, which further reduced costs and accelerated the delivery of the Northwest Corridor. Furthermore, the team used a phased design and construction approach to complete final design. This required 866 early work package design drawings within 11 months from notice to proceed. Efforts of more than 190 full-time engineers during the peak design phase were coordinated to complete 50 early work packages, 157 final packages, and 20 notices of intent to meet the aggressive schedule goals on this project.

After opening on September 8, 2018, the Northwest Corridor has had a tremendous impact on the community and region, reducing one-way commute times an average of 45 minutes every day, with many express lane users proclaiming the benefits to them as "life changing". As the longest installment of the state's express lanes system, the Northwest Corridor project has set the bar for future mega-design-build project delivery within Georgia and around the country.



Darryl D. VanMeter

Asst. P3 Division Director/ State Innovative Delivery Administration, Georgia Department of Transportation

"This world-class recognition of Program Management excellence for the landmark NWC Express Lanes project is an incredible honor. Some key success factors include sustained commitment to vision, timely decision-making, outstanding industry responsiveness, and persistence in execution. The NWC's popularity and dramatic reduction of commute times provide real promise for sustainable mobility. This successful approach is proving foundational for GDOT's commitment to delivery of Georgia's unprecedented \$11 billion Major Mobility Investment Program."

PROJECT FINANCE AND ECONOMICS

EURASIA TUNNEL

MINISTRY OF TRANSPORT AND INFRASTRUCTURE, REPUBLIC OF TURKEY

The Eurasia Tunnel route was identified based on extensive feasibility studies done by Nippon KOEI in 2005, for the “Ministry of Transportation and Infrastructures” who announced an international tender through the “Directorate General of Infrastructure Investments” (AYGM) with Build-Operate-Transfer model. Tender was awarded to ATAS -special purpose company to build and operate-, formed by Yapı Merkezi and SK E&C on 25/2/2011. “Implementation Contract” became effective on 30/1/2013 after completion and securing of financing. The project completed in 47 months 3 days, almost 8 months prior to the construction period defined in the contract, approximately with a total investment of USD 1.3 billion. The project has been operated since December 2016 and to be transferred to the public after 25 years operation.

Eurasia Tunnel connects the Asian and European sides of Istanbul for the first time via a highway tunnel going underneath the seabed. The Eurasia Tunnel Project has been serving along the Kazlıçeşme-Göztepe (14.6 kilometers) route. It includes a 3.4-km twin-deck tunnel beneath the seabed at the southern end of the Istanbul Strait, 2 km of NATM tunnels, and 1 km of cut-and-cover tunnel structures in addition to the junction and road arrangements along approach roads on both sides, with an aim to relieve Istanbul’s transcontinental traffic pressure. The tunnel is designed for passenger vehicles and small vans with a limited vertical clearance of 2.8 m. The most essential benefits of the Project are ‘reduced travel time’ thereby ‘reduced emissions’, economy through ‘less fuel consumption’ and ‘maintenance cost savings’.

The TBM used for this project ranks “first” in the world with its 33.3 kW/m² power per area of cutter head and “first” world wide with its operating pressure of 12 bars for the its excavation diameter of 13.7 meters.

The tunnel alignment is located in a seismically active region, about 17 km to the North Anatolian Fault Zone. To decrease the stresses and strains forming in the tunnel lining during a seismic event below the permissible levels, two flexible seismic joints (rings); with displacement limits of ± 50 mm for shear and

± 75 mm for extraction/contraction; were designed specially for the geological and geotechnical conditions, tested in laboratory; implemented ‘first time’ in TBM tunnelling under such high pressure. The design earthquake magnitude was specified as moment magnitude of 7.25 and design of functional and safety evaluation earthquakes have a return period of 500 and 2,500 years, respectively.

TBM boring operation was completed in 476 calendar days. During excavation, hyperbaric repair-maintenance operations were carried out 4 times due to erratic geology and these operations were successfully performed both by specially trained divers and the TBM crew. One of them occurred around the lowest depth under 10.8 bar pressure which was a “first” in TBM tunneling.

The Project is considered as Pioneering Project not only technically but also in respect of its environmental and social policy with the implementation of a comprehensive Environmental and Social Impact Assessment process in accordance with the Equator Principles and international guidelines.

In terms of financing, with a maturity of 18 years, the 960 million international loan package is the “one” with the longest maturity in Turkey in Build-Operate-Transfer Infrastructure Projects until today.



Mehmet Cahit TURHAN

Minister of Transport and Infrastructure of Republic of Turkey

“Connecting two continents, Eurasia Tunnel is a remarkable civil engineering and infrastructure project significantly improving quality of life in Istanbul by reducing the time consumed in traffic and air and noise pollution. With its complex financing structure, Eurasia Tunnel is a successful example of how a promising project can bring parties from across the globe, including leading multinational financial institutions, to support Turkey. As the Ministry of Transportation and Infrastructure, we are very proud to have initiated such a visionary project and prizes as such motivate us and fuel our efforts towards creating many other well-performing infrastructure projects.”

QUALITY MANAGEMENT

LONG-TERM MANAGEMENT AND MAINTENANCE OF STATE ROADS IN SARAWAK

CMS WORKS SDN. BHD.

CMS Roads Sdn Bhd (CMSR), which is a subsidiary company of CMS Works Sdn Bhd, was awarded the Long-term Management and Maintenance contract of State Roads in Sarawak in January 2003. This was the privatization program of State roads that were previously managed and maintained by the Public Works Department (Jabatan Kerja Raya Sarawak).

CMSR has been accredited with the Integrated Management System (IMS) which incorporates ISO 9001: Quality Management System, ISO 14001: Environmental Management System and OHSAS 18001: Occupational Health & Safety Management System since 2006. These accreditations allow for efficient and holistic approach to planning, implementation and review towards the delivery of value-added services in full compliance with contractual agreements, specifications, standards and statutory requirements to our customers and stakeholders.

Our guiding principles are working actively and collaboratively with our clients and stakeholders in meeting their expectations and required service level and constantly benchmarking our performance to ensure continuous improvement in all aspects of the contract.

CMSR has established and implemented a comprehensive quality assurance system with its specific quality control procedure for road maintenance works and material tests executed within the 18 road maintenance units (RMUs) and 4 regional offices which spreads from the South-western tip to the North-eastern part of

Sarawak including Bario which is 3,280 feet above sea level.

Road Feature Condition Inspection (Form A) is used for reporting road feature conditions such as pavements, road shoulder, draining, culverts, unpaved road surface, and road markings conditions. The inspection is used to prioritize the maintenance and necessary improvement works to be carried out.

Road Feature Safety Audit (RFSA) is the inspection on road safety aspect such as signboards, safety barriers and road configurations. From the inspections carried out, priority of maintenance works required and improvement works can be determined.

Quality Assurance 1 (QA1) is the quality control for pavement work being carried out on site. The purpose is to ensure that the quality of work is in accordance to the performance standards and specifications.

Quality Assurance 2 (QA2) is the quality control for completed pavement works following QA1. The first assessment is carried out 3 months after QA1 is completed, followed by another 3 other assessments with 3 months between them.

Non-Conformance Report (NCR) is adopted to ensure that maintenance works that are being carried out are in accordance with the Performance Standard guidelines and specifications.

The Quality Assurance System is not only confined to quality assurance but it serves to measure response time, provide justification for prioritization of routine, periodic and extraordinary maintenance activities that are further stipulated and summarized in the Network Maintenance Strategy and Prioritization of Rehabilitation and Improvement Works Report to the State Government.

CMSR aims to do things right the first time to minimize the amount of rework needed.

CMSR continues to pursue the highest service level as possible in this industry by continually improving quality, occupational health, safety and environmental standards in upholding the highest level of accreditation in ISO9001, ISO14001 and OHSAS18001 with uncompromised integrity and best ethics in the management and maintenance of infrastructure works in Sarawak.



Karim Reduan

Chief Executive Officer, CMS Works

"Winning the projects means a lot to CMS Works. It is a fitting testament to our high standards of Quality Management at the international level on our Long-term Management and Maintenance of State Roads in Sarawak."

RESEARCH

INDONESIA JORR W2 TOLL ROAD

CONSULPAV, CONBLOC INFRATECNO, MARGA LINGKAR JAKARTA

The Jakarta, Indonesia JORR W2 Toll Road project is the result of research and development of a novel and unique reacted and activated rubber dry powder (RARX) consisting of chemically prepared granulates of scrap tire crumb rubber. Consulpav researched and developed RARX, which when mixed with hot asphalt instantly make rubberized asphalt with superior elastic properties which prevent cracking, improve durability and age more slowly. These benefits of reacted an activated crumb rubber were shared with CONBLOC INFRATECNO an Indonesian contractor.

CONBLOC INFRATECNO was interested in this new product potential to address many of the pavement performance issues in Indonesia. They recognized that pavements in Indonesia are subjected to extremely high rainfall and ultra violet radiation which promote rapid pavement deterioration, as evidenced in cracking and potholing occurring in as little as two to three years after paving. They reviewed the RARX development in Portugal and agreed to support a very short length test section in Jakarta, Indonesia, to see whether the RARX could be successfully used in Indonesia and perform as claimed. This trial pavement test section was constructed on an arterial road, with heavy truck traffic, at a turning intersection and performed as predicted, no cracking or potholing.

After the success of this trial section CONBLOC INFRATECNO and Consulpav approached the JORR W2 Toll Road authority, MARGA LINGKAR JAKARTA, about using RARX to overlay a recently built concrete toll road (100000 vehicles per day/15% trucks) that had badly cracked after only three years of service. The Toll Road authority reviewed the CONBLOC INFRATECNO/Consulpav pavement overlay proposal. This proposal consisted of placing a RARX rubberized asphalt seal coat membrane layer 19 mm thick, followed by a 50 mm RARX-Gap graded asphalt hot mix on top of the 250 mm concrete cracked pavement. Both of these layers consisting

of RARX represented a major challenge to construct on the scale proposed by this project. Equipment had to adapted to mix and apply the rubberized asphalt for the seal coat, a new mix design process was needed for the asphalt hot mix and new specifications for the material quality control had to be created for this first of its kind use.

The project was constructed in March 2017 with goal of providing a five year maintenance free life. The Toll Authority for comparative purpose had an adjacent cracked concrete pavement section overlaid with a typical Indonesia hot mix of the same thickness without the RARX. The adjacent regular hot mix section has multiple potholes and extensive cracking, whereas the RARX project has been a complete success with virtually no cracking or potholing to date. The project success relied on all three parties Consulpav, CONBLOC INFRATECNO and MARGA LINGKAR JAKARTA to support the use of a newly researched and developed reacted and activated rubber dry powder, RARX. The use of RARX provided improved pavement structure properties to reduce cracking, reduce the effect of UV damage, provide a water proof membrane seal coat and provide a long life pavement structure with improved elastic properties.



Dr. Jorge B. Sousa
President, Consulpav

“Winning the IRF Global Road Achievement Award (GRAA) in the research category for the Indonesia JORR W2 Toll Road project means the following for each participating organization; for Consulpav recognition of the years of research and development of the reacted and activated rubber dry powder (RARX) and recognition of the superior elastic properties it imparts to the pavement structure; for CONBLOC INFRATECNO a recognition as a leader in Indonesia and other Asian countries of practically applying the results of innovative research to a valuable new and useful asphalt paving product and for MARGA LINGKAR JAKARTA a recognition of its management skills to carefully review the research supporting the new innovation to better maintain its vital toll road investment for the benefit of the roadway users.”



SAFETY

TRAFFIC ACCIDENT BLACKSPOT SYSTEM ANALYSIS PROJECT

ROADS AND TRANSPORT AUTHORITY (RTA), DUBAI, UAE

Dubai's Roads and Transport Authority's (RTA) vision is "Safe and Smooth Transport for all". With this in mind, it initiated a special project, together with an international consultant, to further improve traffic safety on its roads by enhancing the methods of treatment of blackspot locations based on best international practice. The project, Traffic Accident Blackspot System Analysis, aimed to identify weaknesses in its existing manual blackspot management system, review international best practice, develop a new comprehensive computer based accident blackspot analysis system and prepare countermeasures for blackspot locations in Dubai.

This complex project was divided into three phases; review of the existing manual system, review of best international practices and the development of a new bespoke blackspot identification, analysis and treatment system for Dubai roads.

The primary technical goal of the project was to contribute to an accelerated improvement in traffic safety. Fatalities per 100,000 of population fell from 3.5 to 2.4 since 2014 (30%)

In 2007 Dubai witnessed 332 road fatalities. The fatality rate per 100,000 population was 21.7. By 2018 this had dropped to 141 and 2.4 respectively which resulted in lowering the social and economic impact on the fabric of Dubai.

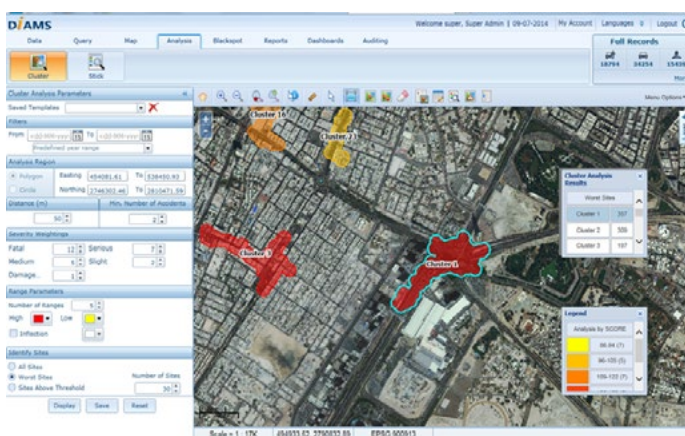
Blackspot Safety Management (BSM) and Network Safety Management (NSM) are the most innovative and efficient engineering based approaches to improving road safety. However, these methods are reactive. The RTA has adopted a proactive approach, utilizing various tools to support the existing Dubai Integrated Accident Management System (DIAMS).

This new automated blackspot analysis system is technically superior to the existing system (5 times more efficient) and it was specifically developed using actual Dubai accident data. The attributes that define blackspots such as weighting the type of injury and their severity were validated through a series of iterative processes using sensitivity analysis thereby ensuring system relevance to Dubai.

A database of possible countermeasures was developed. The accident Crash Modification Factor (CMF) was used to express the reduction in accidents after implementation of the countermeasures. The International Road Assessment Program (IRAP) toolkit and the Institute of Transport Engineers (ITE) issue brief NO.8 were integrated into the system to provide a library of countermeasures and to evaluate their effectiveness. In addition, additional measures based on Dubai's own experience, were added.

Fatalities per 100,000 on two of Dubai's major highways, Emirates Road and Sheikh Mohammed Bin Zayed Road, fell dramatically from 27 to 20 and 34 to 12 respectively.

Dubai's current accident fatality rate of 2.4 per 100,000 population is now safely perched between Norway's at 2.0 and Sweden's at 2.5.



Eng. Maitha Bin Adai

Chief Executive Officer, Traffic & Roads Agency, RTA Dubai

"Winning this Safety Award is a great opportunity for the RTA to highlight that they are firmly committed to introducing creative solutions to beat Dubai mobility challenges by ensuring safer roads for all road users"

TECHNOLOGY, EQUIPMENT AND MANUFACTURING

EHUB02

EROAD

EROAD's purpose is safer, more productive roads for every community. This is why EROAD develops products and technology services that improve driving behavior, make it easy to manage vehicle fleets, support regulatory compliance and reduce the costs associated with driving.

In 2009 EROAD pioneered regulatory telematics, introducing the world's first nationwide electronic road user charging (eRUC) system based on GPS/cellular technologies. Now, around 46% of collected heavy vehicle road user charges in New Zealand are being collected using EROAD technology. In America, EROAD created the first electronic Weight Mile Tax service in 2014 and the first independently verified Electronic Logging Device in 2017.

Traditional vehicle telematics solutions have functioned as a management tool to improve driver behavior through feedback sessions, usually retrospectively. The solutions developed by EROAD, encourage safer driving practices because useful information is delivered directly to the driver.

EROAD's in-vehicle telematics solution (called EHUB0) collects data from the vehicle which is then transmitted via a secure cellular link to our cloud-based web portal (called Depot), for customer access and easy reporting.

The easy-to-understand feedback enables drivers to self-correct, which reduces the frequency and seriousness of road incidents. For example, the difference between the driver's road speed and the speed limit, is shown using a simple icon and color change. This supports behavioral change that delivers improved driving even when they are in vehicles not fitted with an EHUB0.

There has been a sizeable decline in over-speed events with customers who have actively implemented EROAD's 'Safe Driver' solutions – some customers reporting reductions of over 80%. Other EROAD solutions, like Driver Leaderboard,

enable driver coaching to improve safety outcomes, reward good performance and provide training where necessary.

EROAD also believes the people who use the roads should inform the design and funding options for future transport networks. This is why the company works with government stakeholders (who are evaluating transportation funding options) and why EROAD has created a data and analytics consultancy service to work alongside regulatory authorities, academia and freight research communities to leverage the company's expertise and innovative research methodology using GPS data.

EROAD's one technology platform is helping transport operators reduce the frequency and seriousness of incidents through improved driving, using accurate and reliable information that also enables operational efficiencies. EROAD's data can further help making educated funding and network decisions, identify early warning signs of increased risks and monitor the effectiveness of any implementation measures.



Steven Newman
Chief Executive Officer, EROAD

"It is a great honor indeed to receive this international recognition for the difference EROAD is making in enabling safer, more productive roads."

TRAFFIC MANAGEMENT AND INTELLIGENT TRANSPORTATION SYSTEMS

GDOT REVERSIBLE EXPRESS LANES ITS & TRAFFIC INFORMATION MANAGEMENT

PARSONS

With Atlanta's traffic congestion among the worst in the United States, the Georgia DOT (GDOT) implemented the State's first two Reversible Express Lanes Projects on the I-75 South Metro and Northwest Corridor roadways. The projects were completed in January 2017 and September 2018 by GDOT and the Georgia State Road and Tollway Authority (SRTA).

The I-75 South Metro Express Lanes are newly constructed reversible toll lanes that run 12 miles along I-75 and operate northbound in the morning toward Atlanta and southbound in the evening. The Northwest Corridor Express Lanes project adds 29.7 miles of express lanes. The new highway infrastructure includes reversible toll lanes, seven express lane interchanges, three access points, and 40 bridges. The express lanes are designed to improve traffic flow, increase commuter options, provide reliable trip times, and bring economic benefits to the region.

Parsons was involved in all project aspects including civil design, Intelligent Transportation Systems, and Traffic Incident Management for the re-use and extension of the company's previously installed Advanced Transportation Management System (ATMS) iNET™. Parsons was the lead designer for this extensive civil engineering project and the team continues to support the operation and technology to ensure GDOT's success in the operation, management, and maintenance of this critical traffic asset.

Parsons designed and developed GDOT's technological advancements in ATMS for the 1996 Summer Olympics, Branded as NaviGator. For the current project, Parsons enhanced NaviGator to assist GDOT in monitoring traffic real-time via 405 closed circuit cameras, predict commute times, relay express lanes dynamic pricing via 89 dynamic messaging signs, and operate 160 road access gates. The system automates the workflow required for safe and effective roadway reversal transitions. Parsons provided SRTA with the design, implementation, and installation of the ITS network along with Parsons'

iNET™ software to enable dynamic toll pricing. SRTA's solution was lower cost and risk because of the re-use of the NaviGator software.

Parsons' emergency transportation specialists and GDOT Highway Emergency Response Operators (HERO) spent hundreds of hours training to safely operate and reverse the Express Lanes, communicate and coordinate with GDOT Traffic Management Center, and manage incident response to mitigate the impact to motorists.

GDOT and Parsons have partnered for 25 years to provide ATMS solutions that leverage existing infrastructure and drive innovation. As reported by the State Traffic Engineer, the effectiveness of the project is evident:

- Morning rush hour congestion now forms an hour later and clears an hour sooner.*
- Speeds in general purpose lanes are 10-15 mph faster.*
- Speeds in the express lanes are 30% faster than the general purpose lanes.*
- More than 6 million trips registered in the express lanes over the past year.*

*Andrew Heath, State Traffic Engineer, Georgia DOT, August 12, 2019



Donald Graul

Connected Communities Market Leader, Parsons

"We're proud to have continuously delivered intelligent transportation system solutions for the Atlanta region since the first time we installed these solutions in support of the 1996 Atlanta Olympics. This project exemplifies how Parsons' technology can improve mobility of the traveling public, increase their safety, and reduce the region's carbon footprint."

URBAN PLANNING AND MOBILITY

TORINO SMART ROAD

CITY OF TORINO

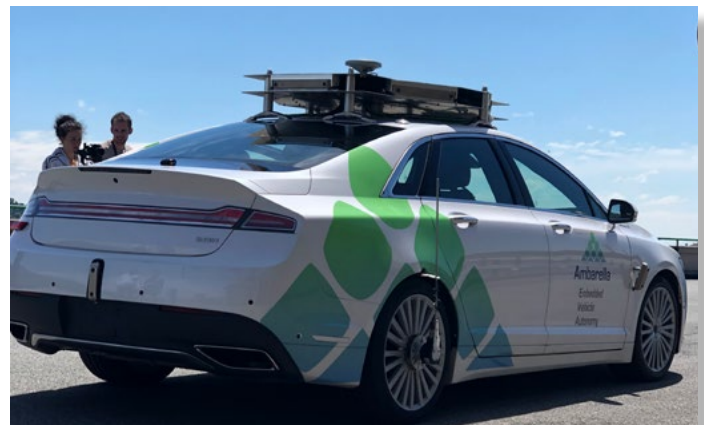
New emerging technologies, such as automated vehicles, big data and sharing mobility are significantly changing and revolutionize the individual and collective mobility focusing on new personalized and customized services. This new phase is challenging how the current transport system is organized and operates and how the transition can be managed catching all the benefits and limiting the negative effects. In this scenario, public authorities are called to assume a new regulatory role that can combine technological pushes with the real needs of citizens.

This is the case of the City of Torino, the first city in Italy to promote the “Torino Smart Road initiative”, a challenging project with the aim to test and allow self-driving cars to run on urban roads in order to have an urban mobility more innovative, greener, safer and more security. In order to make Torino the national “laboratory city” for autonomous and connected driving in urban environment, the Italian Ministry of Infrastructures and Transport signed a specific Memorandum of Understanding with the Municipality in July 2018.

The territory of Torino is rich in companies, university departments and R&D institutions active in the fields of automotive, components, telecommunications, sensors, advanced electronics and artificial intelligence. The project, by the, supports dialogue and cooperation between these stakeholders for many reasons: first, to preserve and strengthen the local public and private ecosystem on innovation in the field of mobility and transport; secondly, to enhance existing know-how and in the end, to attract new companies. But the main focus for the Municipality is to involve its citizens in this process designing new business and social models for the city.

The City of Torino, with a Deliberation of City Council, has committed itself in promoting a Torino Smart Road MoU with all the partners for sharing a common interest in the project. Nowadays, the project involves 33 partners: 5T, FCA, GTT, General Motors, Magneti Marelli, Mercedes-Benz consulting,

Adient, ItalDesign, CSI SpA, Fev, Bylogix, Mobileye, I-Mobility Garage (Navya distributor), Objective Software, VisLab, Tim, Intel, Openfiber, Swarco Mizar, SM Optics, Politecnico di Torino, Università degli Studi di Torino, Torino Wireless, Istituto Superiore Mario Boella, UnipolSai, Anfia, Unione Industriale, Amma, Blue Engineering, Tecnositaf, INRIX, Accenture. Moreover, the Municipality has authorised a 35 km circuit of urban streets augmented to create a real-world testing ground for autonomous vehicles and driver-assistance systems. Along the route, the city and its partners are installing 5G mobile internet infrastructure to enable V2V (Vehicle to Vehicle) and V2I (Vehicle to Infrastructure) communication, an array of 72 smart traffic lights, and dedicated cloud-computing servers close to the network. The City is indeed supported by its special company 5T that manages the Mobility Centre of the City of Turin with highly specialized experience in Intelligent Transport Systems. From the pioneering early ‘90s solutions, 5T has designed and deployed, and currently operates urban mobility services as: traffic monitoring and control (covering over 300 controlled intersections), Low Emission Zone control and real-time traveller information services.



Marco Pironti

Smart City and Innovation Councilor, City of Tu

“ The ‘Torino Smart Road initiative’ is in our opinion a good example of innovation through ecosystem strategic approach. Three years ago, in fact, we have started a new innovation journey within the City, aiming to leverage urban experimentation as a mean of business and citizens positive impact, we have created an open innovation platform (Torino City Lab) and given it a long term vision. The Smart Road initiative is key in this strategy, and we are delighted to share our vision and experience during this congress, hoping to attract new global innovators to our city lab. ”

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