2015 Global Road Achievement Awards

Book of Winning Projects

International Road Federation
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15 Years of Recognizing Outstanding Projects

On behalf of the International Road Federation and our international panel of judges, I would like to congratulate the winners of the 2015 IRF Global Road Achievement Awards! This year’s winners represent some of the most forward-thinking and cutting edge organizations around the world. I invite you to examine the groundbreaking projects listed in this book and learn from their outstanding accomplishments. In a first for the IRF GRAA program, we have 12 winners from 12 different countries. The diversity and quality of the projects are a great testament to IRF’s status as the leading platform for best practices around the globe.

Established in 2000, the IRF GRAA Program plays a significant role in the IRF’s mission to gather global best practices and promote technology transfer, by seeking out innovative and successful organizations and highlighting their accomplishments to share with the global transportation community. By showcasing new technologies and creative solutions, we are able to learn from each other, and build on our successes.

As we continue fulfilling IRF’s mission of encouraging and promoting better, safer and more sustainable roads through the continuous exchange of knowledge and best practices, I would also encourage leading companies and organizations to submit their exemplary projects to the 2016 GRAA Competition.

Eng. Abdullah A. Al-Mogbel
IRF Chairman
National Freeway No. 1 Widening Project from Wugu to Yangmei
CECI Engineering Consultants, Inc. and Taiwan and National Expressway Engineering Bureau, MOTC

In order to resolve traffic congestion problems on the northern part of National Freeway No. 1 serving the Taipei Metropolitan Area and neighboring Taoyuan, where Taiwan’s main gateway the Taiwan Taoyuan International Airport is located, this freeway widening project commenced in 2009 so as to increase the number of lanes running on a section of freeway from Wugu to Yangmei for a stretch of 40 kilometers. The lanes were added via two new viaduct structures which were built in a narrow corridor along each side of the freeway.

The project presented tremendous challenges owing to its attributes of having very limited space for construction; having to pass by a geologically sensitive area; having to maintain the existing traffic on a busy section of freeway with 250,000 vehicles per day; and having to implement a very complicated technical design in a short period of time. Thus, to overcome these challenges, new and innovative construction methods were introduced to Taiwan for the first time, and the Designer, CECI Engineering Consultants, Inc., Taiwan (CECI), played a crucial role as a bridge between the Client – the Taiwan Area National Expressway Engineering Bureau (TANEEB), and the Contractors, for fast-tracking the project’s design and construction activities in parallel with each other. After four years of intensive efforts, the entire widening section viaduct was opened to traffic in April 2013.

CECI was commissioned to carry out the design and construction supervision services for both the northern and middle segments of the project having a continuous running length of 28 kilometers, and right from the start, undertook a design emphasizing speed, value and innovation without sacrificing quality and safety. Chief among these design solutions were:

- Adopting a Fast-track Implementation Program where the contractors follow up on the on-going design requirements; construction adjustments are incorporated back into the design; and the allocation of construction resources are optimized during all stages of work.
- Employing special construction methods for the first time in Taiwan, including the bamboo cut method which keeps the excavation area to a minimum, and the horizontal rotation method which was able to avoid deploying temporary piers or supporting structures on the freeway which would otherwise disrupt the existing freeway traffic running below.
- Creating a unique “F-type” double-deck structure by merging the two viaducts along both sides of the freeway together in which both decks use the same supporting columns for a length of 2.857 kilometers in order to avoid a geologically sensitive area.
- Designing overpasses for the viaduct to cross the freeway and merge into the “F-type” double-deck structure without impeding the freeway below - a large span structure is adopted with 3 continuous steel box girders in which the main center span has a length of 216 meters; the longest of its kind in Taiwan.
- Adopting environmentally protective measures including those for tree relocation and transplantation; the designation of non-disturbance zones; the preservation of habitats, ground soil and wetlands; and the installation of animal escape ways, artificial bat nests, etc., so as to accommodate the diverse range of wild life including 15 types of protected animals.
- Adopting safety and noise reduction measures to maximize performance of the viaduct including low noise expansion joints and infiltration pavement.

Upon its culmination, the “Wu-Yang Viaduct” has been highly touted for its immediate impact and success in restoring smooth and fast flowing traffic to this section of National Freeway No. 1, and has henceforth ushered in a multitude of newly added benefits, including:

- Shortening the travel time along the section by increasing the peak-hour vehicular speed from 40KPH to 90KPH;
- Mitigating 32,500 tons of carbon emission each year and saving fuel costs of USD 1.7 million each year;
- Reducing the project cost from an estimated USD 2.94 billion to an actual USD 2.02 billion through its careful design, planning and coordination.

The project is a testament of how the collective efforts of the government, designers and builders can realize a unique road engineering design solution which so aptly answers to the needs of society, and so responsibly pays respect to the usage and conservation of our natural resources.

Dr. John C. Li
Chairman of the Board, CECI

“To be selected and placed among such an elite circle of winners of the IRF’s Global Road Achievement Awards is both a tremendous honor and a great source of pride for CECI. The recognition of the 2015 GRAA in the Design category will be a constant reminder for us to keep on improving the quality of life and maintaining a delicate balance with nature while building innovative and sustainable road infrastructures in the future.”
ASSET PRESERVATION AND MAINTENANCE MANAGEMENT

Preparation and Operation of a Pavement & Asset Management System
Ministry of Public Works, United Arab Emirates

Knowing the importance of infrastructure maintenance to a country, the Ministry of Public Works, UAE started the implementation of an Asset and Pavement Management System in June 2012. The Road Department embarked on maintenance activities for all road assets to increase their life spans and safety levels. This action promoted cost-saving measures and ensured satisfactory results while matching an excellent policy established by H.E. Sheikh Khalifa Bin Zayed, President of United Arab Emirates.

The System has been implemented more as a philosophy to be followed within the Road Department. Federal Road Network comprises 670Km of roads (mainly highways) with 3,100 lane km. These roads connect the Northern Emirates (Ajman, Fujairah, Ras Al Khaima, Sharjah and Umm Al Quwaim) with the Emirate of Dubai and Oman.

Procedure

The main steps taken as part of implementation were:

- Inventory Data collection and pavement image collection (3,200 Lane km)
- Inventory Data Processing
- Data Collection of condition survey (3,200 lane km):
  - Skid Resistance; International Roughness Index; Deflection Rutting; Cracking
- Traffic counts and Load Observation
  - Permanent traffic counts and Dynamic Weight-in-motion Stations (25 VCC + 5 WM)
  - Temporary counting stations for chosen junctions and road sections (50 locations)
- Preparing, processing and installing system cartography in SHP format
- Managing IT System Installation (ICARO RAMS)
- Providing training in using Ultra-Mobile PC (Portable devices for routine maintenance)
- Installation of IT servers to store and process all information
- Others
  - Training Ministry personnel in using the maintenance system (system philosophy and procedures)
  - Development of a Bridge Management System from inventory to routine inspection
  - Managing modules relating to No Objection Certificates (NOC) for any road segment
- Proposal to test several alternative asphalt procedures and monitoring test results. This included use of geo-composites to avoid crack reflect; use of polymer modified bitumen to reduce rutting; crack sealing with coloured resins; hot recycling using a mixture of existing asphalt and rejuvenators; application of reflective paint in assets like metal guardrails and concrete barriers.

Results

The system has been successfully used to improve the following needs in the Road Department:

- Asphalt maintenance for roads E-18 (Manama – Sha’ams), E-89 (Dibba – Masafi), E-99 (Dibba – Fujairah), E-311 (Sheikh Mohammed Bin Zayed) and E-88 (Dhaid – Masafi) leading to considerable savings in time and money.
- Improvement in cross-sections for new and maintained test segments
- Performance of new applied research
- Provision of traffic information (extending to other external Federal Agencies)
- Report-making for decision makers

Future

These activities have been successfully implemented during 2.5 years. The System is working currently as an integral part of Road Department procedures. The following tasks are to be implemented in the coming years:

- Installation and operation of Intelligent Telecommunication Systems in the network (mainly VSM and Cameras), starting with Sheikh Mohammed Bin Zayed road (E-311)
- Implementation of Maintenance Procedures based on Key Performance Indices, starting with a primary stage and expanding to the rest of the network in different areas.
- Construction and operation of a Control Centre, where the following divisions will be working together:
  - Asset and Pavement Maintenance and Management; Traffic Control Room; Routine Maintenance; Emergency and Civil Defence; Ministry Road Inspectors
- Continuous improvement of roadway cross-sections.
- Maintaining applied research in road system management while expanding to different assets
- Improving the Bridge Management System by extending capabilities of the System to Principal Inspection and data storage for Special Inspection.
- Improving information interchange from this system to the general Federal GIS
- Studying bridge projects to gauge previous conditions with current ones
- Setting fundamental steps to develop a Load Test Manual for bridges
- Inspection of slopes and other geotechnical features.
- Improving traffic safety by performing safety audits and exchanging all necessary information with the Ministry of Interior
- Exchanging all necessary information with Ministry of Interior

HE. Eng. Zahara Salman Alaboodi
Acting Deputy Minister, Ministry of Public Works, UAE

“To win the IRF Global Road Achievement Award in the category of Asset Preservation and Maintenance Management provides high motivation to look for continuous improvement in all the tasks related to our Department — especially those linked to the Maintenance and Management of our roads and road networks.”
CONSTRUCTION METHODOLOGY

New Girder-Conveying Track Cable Technique for Erection of the Stiffening Girder on the Aizhai Bridge

Hunan Road & Bridge Construction Group Corp.

As a key engineering project on the Changsha-Chongqing Expressway in Southwest China, the Aizhai Bridge, constructed by the Hunan Road & Bridge Construction Group Co. Ltd. (HNRB), was opened to traffic in March 2012. The Aizhai Bridge crosses the 1000m-wide scenic Dehang Canyon at an elevation of 355m. It has a main span of 1,176 meters, making it the world’s longest canyon-crossing bridge in the world. It has recently been listed on the World’s Top Ten “Must Go” Tourism New Landmarks released by NBC Website.

The erection of the main girder (the stiffening girder) of the Aizhai Bridge encountered serious challenges, including large bridge span length, deep valley, dangerous mountain roads, narrow construction site, complex weather condition, etc. All the three conventional girder-erecting techniques at the time failed to address the needs in constructing the Aizhai Bridge. After five years of hard and persistent exploration, the team of HNRB proposed an innovative technique, called the “Girder-Conveying Track Cable” (GCTC) technique, which overcame the constraints with the conventional methods due to the poor transportation condition and resolved their drawbacks of long construction period, high costs and poor safety control. This new technique enables a safe, highly efficient, and economical solution for girder erection, and has now been widely accepted as the fourth method for the construction of the suspension bridges in the world.

The basic principle of the GCTC technique is to install horizontal wire ropes under the suspenders as temporary traveling rails (track cables), which are used to transport segments of the main girder from both banks to their mounting positions, where they are then lifted by lifting devices and connected to the suspenders. The erection of the main girder starts from the mid-span and proceeds from there to both banks until all the segments are completed.

This technique creatively uses the main cable, suspenders and temporary track cables to form a safe and stable supporting system. It significantly increases the installation capacity and enables the transportation and installation of large-size girder segments (up to 200 t). In addition, it significantly speeds up the construction. With a construction speed six times faster than the conventional methods, this technique has become the fastest technique for erecting the main girder of suspension bridges. The technology is especially applicable for the construction of long-span suspension bridges when the horizontal or vertical transportation of the girder segments is restricted. It is also applicable for the installation of the main girder of half-through and through arch bridges, and is expected to be a promising technique to be used widely.

The application of the GCTC Technique has shown a great success in the Aizhai Bridge. It took only 80 days to complete the erection of all 69 girder segments and shortened the construction period by 10 months as compared to conventional methods. Meanwhile, the new technology has reduced the use of structural steel by about 2000t, creating a direct economic benefit of CNY 124Million (equivalent to USD 20.5 M).

The GCTC technique has thus won a total of six patents and a series of significant awards, including the 2012 National Outstanding Patent Award, the 2012 First Prize for Technical Innovation by Hunan Province, the 2013 First Prize for Science and Technology by the China Highway and Transportation Society, etc.

The Vice-President of the International Association of Bridge and Structural Engineering (IABSE), Professor YozoFujino, spoke highly of the GCTC technique, “the Chinese bridge engineers pioneered the Girder-Conveying Track Cable technique with their own wisdom, ......the GCTC technique represents the real advancement in construction of suspension bridges made by the Chinese bridge designers, and is worthy of promotion and popularization.” The Academician Mr. Man-Chung Tang of the American Academy of Engineering also made high praise of the GCTC technique, “It contributes to the world a new steel truss girder construction scheme. This innovation will have far-reaching positive impact on design and construction of suspension bridges in mountainous area in the future.”

Mr. Fang Lianmin
CEO, Hunan Road & Bridge Construction Group, Co. Ltd

“We are honored that the international Road Federation confers the GRAA Trophy for Design on Hunan Road and Bridge Construction Group Company Limited. This prize means a lot to us. It will promote the influence of our brand and the competitiveness of our Group. It will also motivate our engineers to persistently carry out scientific research and technical innovation to develop safer, more economical and reliable construction technologies of roads and bridges, which will help us fulfill our dream of “Better Roads. Better World.”
We are impressed with the amazing network and the positive attitude of the IRF to promote this powerful opportunity of having roads as instruments of climate change adaptation.
The Eastern Indonesia National Roads Improvement Project (EINRIP) is a component of the Australia-Indonesia Partnership for Reconstruction and Development, a AUD1 billion assistance package announced by the Australian Government in response to the 2004 Indonesian Ocean earthquake and tsunami.

The project has made it easier, safer, and less costly for road users to conduct economic activities, attend school, and participate in community life. But the real achievement of EINRIP is in the way it identified and addressed challenges through targeted strengthening of contract and project management practices for better road construction. As a result of EINRIP, Indonesia’s Directorate General of Highways is now working to adopt standards and processes that will lead to higher quality and longer-lasting roads.

The project was designed to demonstrate the application of international management practices to existing Government systems, in a sector that has consistently underperformed and delivered roads of questionable quality and short service life. Management of the loan project is handled by the Indonesian Directorate General of Highways (DGH). DGH management of this complex program was bolstered by:

- Planning and preparing Final Engineering Designs (FED) for all 20 road projects. Important features of the FED include: 20 year pavement design life; improved alignment and drainage; full environmental documentation and a detailed land acquisition and resettlement plan;
- Delivering a program of independent technical and financial audits to assess construction quality and advising the program management unit on remedial measures necessary to ensure substantial compliance with design specifications;
- Undertaking a comprehensive road safety audit program of all projects at both the design stage and during construction;
- Establishing a long-term monitoring and evaluation program to assess the impact of the investment on the local economy and communities, and building an evidence base for repeated application of improved construction practices;
- Undertaking program safeguards that draw heavily on established Multilateral Development Bank procedures with which Government of Indonesia is familiar and comfortable with; and
- Providing a full-time monitoring unit delivering daily advice on implementation issues and liaising with all associated parties. A FIDIC-based contract was adopted, with DGH for the first time delegating operations authority to a supervision consultant as the Engineer.

The project has been extremely effective, with the completed roads achieving very high standards. At first, achieving these standards proved difficult, but as awareness of the importance of quality grew amongst stakeholders, and as supervision standards improved under the harsh light of independent technical audit findings, construction quality also improved.

The monitoring and evaluation program indicates significant impacts for road users and the surrounding communities. Vehicle speeds have increased by over 30 per cent against a baseline, halving long-distance journeys in some road corridors. Improved road and traffic conditions have led to significant growth in local economic activities, with communities reporting improved access to goods and services, and evidence showing a sharp drop in vehicle operating costs.

The partnership built between the Australian Department of Foreign Affairs and Trade and DGH has transformed ingrained past practices. The integration of new ideas is strengthening ongoing management and renewal of Indonesia’s national road network. By incorporating new approaches, EINRIP cultivated improvements in the way roads are provided.

EINRIP is a demonstration of how to achieve good quality and long-lasting roads that bring positive social and economic benefits to local economies and road users. DGH has strongly supported and benefited from the increased attention given in EINRIP to achieving quality, strengthened contract management, strengthened supervision practices, and improved standards of engineering design. The sustained application of the measures introduced in EINRIP will be an essential part of the major program of road renewal and capacity expansion that Indonesia will embark on.

EINRIP comprises of a loan of AUD300 million and a AUD40 million grant for technical assistance to rehabilitate 400 kilometres of vital national road links and bridges across Eastern Indonesia.

Ir. Hediyanto W. Husaini, MSCE, M.Si
Director General of Highways, Ministry of Public Works and Housing, Indonesia

“We are honoured to receive this award. In EINRIP, we have demonstrated the difference we can make through applying effective program management practices to deliver long-lasting roads that will provide long-term benefits.”
PROJECT FINANCE AND ECONOMICS

LSIORB East End Crossing
Indiana Finance Authority, Indiana Department of Transportation, and Parsons

The $2.3 billion Louisville-Southern Indiana Ohio River Bridges (LSIORB) Project is the largest bi-state transportation project ever undertaken by the states of Kentucky and Indiana. It is also one of the largest transportation improvement projects in the U.S. LSIORB, sponsored by the Indiana Department of Transportation (INDOT) and the Kentucky Transportation Cabinet (KYTC), will connect the outer ring-road expressway I-265/KY841/SR265 with a new East End Crossing of the Ohio River northeast of Louisville and expand the current I-65 crossing of the Ohio River in downtown Louisville.

The project culminated more than 40 years of planning to address the need for expanded cross-river connections in the metro Louisville and Southern Indiana region. The states initially planned to construct the project using traditional design-bid-build contracts and conventional financing. However, after the 2008 Initial Financial Plan, which estimated total project costs at $4.1 billion, the states realized that conventional financing would not be sufficient and that the length of time needed for that approach would involve a tremendous amount of cost escalation. In 2011, the Governors of Indiana and Kentucky agreed to a modified alternative, which still included two new bridges but reduced project costs to $2.6 billion. They also agreed to include tolling in the project financing plan and to divide the project into two major parts, with Indiana taking responsibility for completing the East End Crossing, and Kentucky taking responsibility for the Downtown Crossing.

Indiana’s $763 million East End Crossing will complete a long-needed highway loop around the Louisville-Southern Indiana metropolitan area. It is approximately half of the overall LSIORB project and will include a new state-of-the-art cable-stayed bridge, a tunnel under historic property in Kentucky, and eight miles of new-terrain highway in Kentucky and Indiana. Highlights include:

- Building a new East End bridge eight miles upstream from downtown Louisville
- Extending the Snyder Freeway (SR 841/I-265) in Kentucky to the new bridge, including a 1,700-ft tunnel under the Drumanard Estate in Prospect
- Constructing eight miles of new-terrain highway in Kentucky and Indiana that will extend the Lee Hamilton Highway (SR 62/SR 265) in Indiana across the new bridge and through the new tunnel to connect with I-265/I-71 in Kentucky

Over the next 25 years, cross-river travel is expected to grow by more than 85,000 trips per day. These improvements will reduce anticipated vehicle delays by 43,000 hours per day and improve the quality of life for residents and travelers. A 2012 Economic Impact Study estimated the project would generate an average of nearly 18,000 jobs per year, a cumulative total of $27.3 billion in additional personal income and $78.0 billion in additional economic output in the regional economy.

Indiana advanced this part of the LSIORB as a public-private partnership (P3) procurement for development, design, construction, financing, operation, and maintenance of the new crossing, the Indiana approach, and a portion of the Kentucky approach. Parsons served as the technical advisor for the implementation of the P3, which will save $228 million in construction costs over the original estimate, and deliver the project—on an accelerated schedule—242 days prior to the Indiana Finance Authority’s timeline in its Request for Proposal (RFP). In addition, the project will be completed 8 years sooner than what would be likely under a traditional design-bid-build method of project delivery. At $677 million, the project finance plan includes the largest issuance to date of private activity bonds for a P3 transportation project.

The concession period comprises 3.6 years of design and construction plus 35 years of operation. The P3 procurement was conducted in less than 13 months from start to financial close, and it met every target date in the Request for Qualifications and Request for Proposal—a rare achievement for a nearly $1.0 billion transportation procurement. The P3 procurement shortlisted 4 of the 6 teams who submitted qualifications, and received proposals from each of the shortlisted teams, which itself is an indication of the industry’s confidence in the owner and the process.

The final design and construction of both the East End Crossing and Downtown Crossing are well underway, with both being approximately 70% complete (to date) and both expected to be substantially complete by the end of 2016.

Todd Wager
Group President, Parsons

“Parsons is pleased the Ohio River Bridges East End Crossing received the Global Road Achievement Award for finance and economics from the International Road Federation. It’s a confirmation of the significant cost savings and accelerated project delivery that can be achieved with the use of a public-private partnership procurement process. Through this prestigious international award, we are able to share our expertise in innovative alternative project delivery solutions, and highlight best practices to fund much-needed infrastructure projects across the globe.”
Thiruvananthapuram City Roads Improvement Project

IL&FS Transportation Networks Limited and Kerala Road Fund Board

IL&FS Transportation Networks Limited ("ITNL") was formed in the year 2000 as a wholly owned subsidiary of infrastructure leasing and financial services limited ("IL&FS"), which has been a major player in india in infrastructure development and financing for the last 25 years. ITNL is widely recognised as the pioneer of public private partnership in domain of road sector in INDIA. ITNL acts as developer, operator and facilitator of surface transportation infrastructure projects taking from conceptualization through commissioning to operations and maintenance. Today, ITNL has evolved as a market leader in the transportation sector with more than 14,500 lane km comprised with 28 projects. ITNL's ability in turning infrastructure capacity creation into commercially viable proposition has aided the company to expand into other areas of transportation sub-sectors such as railways, urban transportation systems and border check-posts. ITNL is the first indian international road development company to have footprint in europe, latin america, africa and china. ITNL's subsidiary, elsamex S.A. ("Elsamex"), a Spanish group is involved in providing maintenance services primarily for highways and roads in many continents. ITNL is one amongst the largest road developer and operator in the world with about 34,000 lane km under its portfolio. The company is listed at Bombay stock exchange (BSE 533177) and national stock exchange (IL&FS Trans) of India. The corporate headquarters is located at Mumbai, with offices at Singapore, Dubai, Madrid, Colombia, Nigeria, Botswana, Kenya and Washington.

Project Background: Thiruvananthapuram City Road Improvement Project

Thiruvananthapuram, or Trivandrum, as it was conveniently re-christened by the English, is the southern-most district and Thiruvananthapuram city is the district headquarters as well as the state capital of Kerala. Thiruvananthapuram, the capital city of Kerala had been witnessing rapid urbanization. The government of Kerala implemented the Thiruvananthapuram city Road Improvement Project (TRCIP) to widen the existing 42 km of existing road network to cater the needs of rapid urbanization.

The government of Kerala started the initiative with the enactment of Kerala road fund act in 2001 and setting up of the Kerala road fund board (KRFB) in 2004 to approve the public private partnership arrangement and allocate funds for TRCIP. A dedicated road fund was established to increase the comfort level of the private sector for participating in the project. The procurement of concessionaire for the TCRIIP was based on a two stage (RFQ and RFP) global competitive bidding process. The project was awarded to the lowest bidder, based on the lowest annuity amount quoted, in march 2004 to an SPV, Thiruvananthapuram road development company limited (TRDCL) formed by IL&FS transportation networks limited. TRDCL had to complete work within 30 months and undertake operation and maintenance (O&M) for the next 15 years based on O&M requirements specified in the concession agreement.

The concessionaire had to ensure assured availability with each annuity period, the stretch es were deemed unavailable if the same were closed for traffic use or if the riding quality thereof had deteriorated below levels prescribed as per the O&M manual. Construction risk including the time and cost overruns due to contractor default was to be borne by the operator. However, the overruns due to delays in areas such as land handover were to be borne by the public works department. The project needed acquisition of around 5000 land parcels in a thickly populated (4400 people / sq/km) urban scenario. Concessionaire is responsible for the performance risk, there are penalties for non-compliance with contractual commitments through performance guarantee. The concessionaire had to handover the possession of project facilities in good operating condition at the end of the project. This project adopted a “life-cycle” approach to road improvement, making the concessionaire responsible for long term maintenance of the roads and ensuring better quality of services.

This is the first urban road project in India, where an attempt was made to develop and maintain a city road project through ppp arrangements and it has been proved to be successful. It’s also unique in its use of a road fund for ensuring annuity payments to the private participant. The project had to be executed in the midst of people with very high literacy and political awareness and involvement of human rights groups and environmentalist made the project extremely challenging. The union government of india has lauded the public-private partnership (PPP) model adopted for the city road improvement project. The professional approach adopted by ITNL in the urban road development had made the state a model.

Mr. Mukund Sapre
ED, IL&FS Transportation Networks Limited & MD Elsamex S.A, Spain, Company

“Trivandrum City Road Project is a shining example where non budgetary finance has been effectively used to finance, develop an urban road network with active participation of patient bankers (all Indian), supporting Government and peaceful and proactive citizens. We developed and delivered an entirely new paradigm of implementing urban road network improvements in the City.”
Automated People Mover (APM) for Princess Noura Bint Abdulrahman University for Women, Riyadh, KSA
Saudi Binladin Group

The Saudi Binladin Group (SBG) has always understood the IRF vision of “Better Roads. Better World” not only as a commitment to a most critical mode of transportation but also as part of an efficient and total transportation system and support services. The objective is always Mobility of People, Commodities and Ideas with safety of users and service providers as a high priority. Here, SBG provides complete mobility by combining an automated people mover with roads and pedestrian facilities within the university, and with outside roads and the future Riyadh metro. This project is a state-of-the-art complex system made safe and user-friendly. It represents all the good attributes of a perfect mobility system with Safety, Low Life-Cycle Cost, Efficiency, Zero-Carbon footprint, and Driverless operation. The inauguration of this project by the late king Abdullah confirms the importance of this national landmark.

The Fully Automatic Train Control System operations are accomplished by a combination of elements located on the train, along the wayside (Third Rail), in stations and at remote Central Control facilities. These elements interact to form a command and control system with four major operations:

- Automatic Train Protection (ATP): to prevent collisions and derailments;
- Automatic Train Operation (ATO): the automatic control of train movement and stopping at stations;
- Automatic Train Supervision (ATS): Control of the direction of train movement in relation to the train movement schedule / time table;
- Communication – the interchange of information among elements of the system and the “intelligent” interaction of several subsystems and equipment.

The entire system is controlled by a modern High-Tec Operation Control Centre (OCC) which is located in the Depot Area (Maintenance & Storage Facility).

Project Description

The Automated People Mover operates on an elevated guide-way / viaduct that separates the movement of its cars from vehicular and pedestrian movement on the University Campus, and provides dedicated and separate service.

The following statistics reveal the special characteristics and performance level of the Project:

<table>
<thead>
<tr>
<th>Capacity (Passenger / Hour).</th>
<th>4,413</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trains / Current (No.).</td>
<td>22</td>
</tr>
<tr>
<td>Trains / Ultimate (No.).</td>
<td>33</td>
</tr>
<tr>
<td>Cars per Train (No.).</td>
<td>2</td>
</tr>
<tr>
<td>Separate Routes / Lines (No.).</td>
<td>4</td>
</tr>
<tr>
<td>Length of Elevated Concrete Viaduct / Guide-Way (km).</td>
<td>12</td>
</tr>
</tbody>
</table>

Elevated Stations (No.). | 14 |
Elevated Platforms (No.). | 28 |
O&M Service Depot With all Maintenance and Control Facilities & Systems Including a Modern High-Tech Operation Control Centre (OCC). | |
Minimum Headway (Seconds). | 90 |
Speed Limits (km/h) |
- On Curves | 27-32 |
- Normal | 72.5 |
International Specifications & Standards for Required Compliance (No.). | 8 |

Project Achievements in Technology, Equipment & Manufacturing

- The first Light Rail Transit (LRT) in the Kingdom of Saudi Arabia.
- Serving the Kingdom’s First and the World’s Largest Exclusively for Women University for 50,000 Female Students.
- Driverless State-of-the-Art Technology.
- All Electronic Monitoring and Controlling Operations.
- 100% Environmentally-Friendly with Zero-Carbon Footprint.
- Successful Mobilization of a World-Class Specialist Work Force.
- Successful Procurement of Advanced Specialty Hardware, Software, and Services, including World Class Equipment and Rolling Stock.
- Seamless Integration with University Pedestrians and Road Facilities.
- Incorporation, in the Design, of Optimum Connectivity with the Roads and the Future Riyadh Metro System Outside the University.
- Completed and Delivered on Time.
- Since its start of Service on 01 September 2012 the APM Travelled (2.7) Million Kilometers and Carried (10.9) Million Passengers without a Single Accident, Injury, or Loss of Life; a Remarkable Accomplishment for such a First Time Technology in the Kingdom.

Mohammed M. Binladin
Deputy Chairman & General Manager for Public Relations, Saudi Binladin Group

“This IRF Global Road Achievement Award is for the Kingdom of Saudi Arabia and its Ministry of Finance. The Saudi Binladin Group (SBG) is honored to be a partner in this landmark project.”
QUALITY MANAGEMENT

THALES Tollway Quality Management System
Attikes Diadromes S.A.

Attica Tollway is the Ring Road of Athens, Greece and it is a 70km closed-toll motorway that provides traffic decongestion of the city center and of its radial (in direction) routes. It also serves as a link to the national motorway network and direct access to the Athens International Airport (AIA). It was the first road concession/toll road project in Greece, and also one of the first tolled motorways with urban characteristics.

As a tolled road with urban characteristics, Attica Tollway faced significant difficulties in the design and construction stages, due to the complexity of constructing a motorway in an old, dense, fully-built metropolitan area with limited roadway capacity and acute traffic problems. As far as operation is concerned, a tolled road concession project relies primarily on user/public acceptance to ensure its financial viability and overall success, while the customers of Tollways have higher service-level expectations compared to the users of non-tolled motorways. As a result, during the operation stage, the operation and maintenance company of Attica Tollway — “Attikes Diadromes S.A.” — implemented a robust quality management system called “Thales”, which was crucial in ensuring the level of these services.

The system is named after the Greek pre-Socratic philosopher and mathematician from Miletus, Asia Minor, who is considered to be the first of the Seven Sages of Greece. He, unlike his era, attempted to interpret natural phenomena through scientific explanations, avoiding reference to mythology.

Similar to Thales’ philosophical approach, Attikes Diadromes managed to create a verified system that collects data, monitors performance and compares the company’s goals and results with the customers’ perception of the services provided, hence ensuring an overall assessment of the company’s performance. The system has two purposes: first, to set and certify operation and service delivery; and second, to measure and verify the performance of the Tollway in aspects that are linked to stakeholder satisfaction.

To ensure that operation of the motorway is carried out in a distinct, stable and standardized way, Attikes Diadromes uses procedures that have been certified by:

- ISO 9001: 2008 Quality Certification
- BS OHSAS 18001: 2007 Health & Safety Certification
- EN ISO 14001: 2004 Environmental Certification
- ISO 39001:2012 Road Traffic Safety

Each certification has been chosen in order to ensure that the operation of the company is carried out in a standardized way, proving the company’s commitment to stakeholder satisfaction. Trying to expand beyond common practice, Attikes Diadromes was one of the first, and still one of the few, road O&M companies in the world to receive certification for the new ISO 39001:2012 that deals with Road Traffic Safety. Processes and procedures were already in place prior to the certification; the process simply certified the commitment to the safety of the personnel travelling on the motorway in their line of work.

In parallel to the above, Attikes Diadromes developed, in collaboration with the company InVision, a system for measuring, monitoring and analyzing the performance of the urban Tollway. This system acts as a verification mechanism, protecting the expected “value” that arises from the payment of toll fee. The major components of this program are the 35 “Key Performance Indicators” (KPIs), which are based on a multifunctional survey, in reference mainly to safety, customer service, maintenance and toll collection. The Operations Reporting System allows the creation and monitoring of all the Key Performance Indicators over time and succeeded in detecting changes in service conditions, deviation from planned targets and in measuring Service Levels, so as to identify the necessary measures that will lead to level-of-service optimization.

In addition to KPIs, what makes the “Thales” quality Management System unique is the way that the grid of the self-assessment tools is combined with the customer/stakeholder satisfaction surveys. To achieve that, the company uses annual Road Side Surveys, to verify its performance against user expectations, and Mystery Shopping, to ensure that procedures are followed by the personnel and that commitment to the stakeholders remains undiminished.

Within a certified work environment, the employees of the operation company work together to constantly measure and assess the performance of Attikes Diadromes, making the principle “Trust but verify” an everyday process.

Bill Halkias
CEO, Attikes Diadromes S.A.

“For years, the International Road Federation has served as a great hub for the exchange of knowledge among experts of the road sector and for Attikes Diadromes, participation in IRF processes, publications and awards has been a great privilege and a valuable source of best practices relating to Motorway Operation. We look forward to continuing our collaboration in the years to come, to learn and share more with the other IRF members.”
Development of Shell Bitufresh to Reduce Odour of Asphalt

Shell Bitumen

Shell Bitumen is the world’s largest marketer of bitumen with over 1,600 customers across 28 countries. We supply enough bitumen to resurface 450km of road every day; that’s enough to travel around the world 4 times in one year. For over 90 years Shell has been a leader in bitumen solutions and has developed a broad portfolio of product and service offerings customised to the needs of the road, roofing and airport sectors and some specialty applications.

Innovation is the lifeblood of Shell Bitumen, and we are committed to helping our customers meet their goals through cutting-edge technology. This is evidenced in our continued investment in R&D, and our global network of technical experts. Our dedicated Bitumen Solution Centres provide technical support before, during and after product application. World-class facilities in diagnostics and sample testing are made available through our field engineers who work collaboratively with our customers around the world. Our products are the solution of choice for a range of sectors, from airports and highways to roofing and Formula One™ tracks. Shell’s pioneering innovations in coloured binders, low-temperature solutions, low-odour bitumen and underwater adhesives have set the industry standards for these applications. At our international R&D centre located in Bangalore, experts monitor the evolving needs of the bitumen in the world 4 times in one year. For over 90 years Shell has been a leader in asphalt technologies such as polymer modified bitumen, multigrade bitumen, bitumen emulsions, synthetic bitumen, bio-bitumen, industrial bitumens as well as a number of asphalt developments.

Bitumen and asphalt operations face increasing public concern about odour emissions, especially for production facilities located in urban and populated areas. These complaints can necessitate significant investment by our customers or even threaten the continued operation of their plant. Challenges associated with odour control for our customers include: restricted operational hours to avoid busy times, plant modification requirements related to odour, forced relocation of plants due to external concerns and limited flexibility of the range of bitumen grades used in construction.

To address these challenges, Shell Bitumen set about developing a solution — Shell Bitufresh. Shell Bitufresh is a bitumen additive that has been specially formulated to reduce the odour of bitumen, helping to improve working conditions for workers and to reduce odour nuisance for neighbouring local residents. Research was carried out between 2006 and 2009 with successful trials held from 2009-2011. Odour neutralising technologies were applied in an innovative way to improve the materials available to the road construction industry. Historically people used masking agents (perfumes) to hide the smell, but innovations in Shell Bitufresh converted the odour agent into a thermally stable non-odorous compound. The product was commercialised in 2012 and has since been sold in many countries around the world. After appropriate addition, Shell Bitufresh helps maintain a low odour profile of the bulk bitumen through the manufacture of the asphalt mixture and laying of the pavement. Once properly dosed, the reduction of bitumen odour should persist for at least two weeks under normal storage conditions. The low odour additive is designed to be effective at low dosage levels thanks to the well balanced mixture of neutralising components. As a result, the bitumen’s characteristics remain unchanged. Shell Bitumen seeks to develop and provide pavement solutions designed to help reduce impact on the environment. Shell Bitufresh is a product developed to help reduce bitumen smell, improve working conditions for staff and minimise odour nuisance for residents. Shell Bitufresh has advanced roadway development by; effectively reducing bitumen odour during bitumen storage at asphalt mixing and laying operations, helping to improve working conditions for staff and helping to reduce odour nuisance for residents. Reduction of odour can allow extended operational hours, reduce likelihood of plant relocation (reducing potential costs), reduce modifications required to plants and increase the flexibility of the bitumen grades used.

We are now working on new manufacturing solutions with improved performance, cost and environmental benefits to meet the needs of the industry. Areas of research include low-temperature solutions, enhanced asphalt workability, crumb rubber modified bitumen and odour reduction. Shell Bitumen is also working to further develop technologies such as polymer modified bitumen, multigrade bitumen, bitumen emulsions, synthetic bitumen, bio-bitumen, industrial bitumens as well as a number of asphalt developments.

John Read
General Manager for Technology, Shell Bitumen

“It is a great honour for all of us at Shell Bitumen to be recognised by the IRF for Shell Bitufresh. This award is testament to the fact that we are different to our competitors and have something very special to offer to our customers. At our international research and development centre in Bangalore, India, experts monitor the evolving needs of the industry and undertake cutting-edge research to find fit-for-purpose solutions to address the challenges of the future.”
SAFETY

Advancing Road Safety in Latin America through the Implementation of Low-Cost, Short-term Measures Safety Program

City of Bucaramanga and CDM Smith

On May 11, 2011, the United Nations released the Global Plan for the Decade of Action for Road Safety 2011-2020. Its aim is to serve as guidance to countries to implement safety measures that will lead to the stabilization and ultimately a 50% reduction in the number of fatalities in traffic crashes around the world by 2020. Road authorities in more than 120 countries have committed to meet this challenge.

The Government of Colombia identified Road Safety as a national policy in their National Development Plan 2010-2014, and the Ministry of Transport adopted the National Plan for Road Safety 2011-2016 on March 30, 2012 with a goal to reduce traffic fatalities 50% by 2016. Similar to the UN Global Plan for the Decade of Action for Road Safety 2011-2020, the Colombia National Plan set actions and measures related to the following strategies: institutional aspects, human behavior, motor vehicles, road infrastructure, and the recovery and rehabilitation of victims of traffic accidents. The driving motivation was the traffic crash fatality rates in 25 Colombian cities that averaged more than 12 fatalities annually per 100,000 inhabitants, with the percentage of motorcycle and pedestrian fatalities growing to 78% of all fatalities in 2010.

The adoption of the National Plan for Road Safety 2011-2016 stresses the need for developing road safety plans at the regional, urban, and local levels based on the fundamental principles and policies defined in the national plan. To advance the development of municipal road safety plans (MRSP), the Colombia Ministry of Transport signed agreements with the mayors of ten medium-sized cities at the end of 2012. CDM Smith was responsible for developing the MRSPs. By the summer of 2013, CDM Smith had delivered the ten MRSPs and the City of Bucaramanga had embraced its plan and started implementing it right away.

The Municipal Administration of Bucaramanga adopted their Sustainable Development Plan 2012-2015 and its MRSP, Bucaramanga, moving towards sustainable and safety mobility 2013-2016, designed to increase its competitiveness and visibility as a sustainable role model for the country of Colombia. The City executed a stakeholder engagement plan from day one to ensure the buy-in of a diverse group of public officials and private interests. The focus was on institutional initiatives, education and prevention campaigns, policy enforcement, and low-cost infrastructure improvements. Featured in these initiatives are:

- Restrictions on the hours of operation and types of passengers and cargo for motorcycles
- Requiem (public prayers) for pedestrian victims of traffic accidents
- Nearly 70,000 signed Citizen Covenants
- 73% increase in the budget for safety campaigns
- Tripling of traffic fines issued to motorcyclists
- Low-cost infrastructure improvements including pavement markings and raised markers, signage, and sidewalks

The efforts implemented by the City of Bucaramanga have resulted in remarkable social achievements: injured accidents between midnight and 4:00 AM from January to September 2014 decreased by 35 percent compared to the same period in 2013; from January to October 2014, no motorcyclists were killed by traffic accidents between midnight and 4:00 AM; total traffic accidents decreased by 8 percent (from 4,070 in 2013 to 3,732 in 2014); and the fatality rate (number of fatalities per 100,000 inhabitants) decreased by 33 percent (from 15.4 in 2013 to 10.4 in 2014).

The City’s goal of reducing the number of traffic fatalities to 50 by 2016 seems to be an attainable goal. The implementation of low-cost, short-term measures has resulted in a substantial reduction of 32 percent in traffic fatalities in the last two years (from 81 fatalities in 2013 to 55 fatalities in 2014) and the city appears to be on the right track to meet its target.

To the extent that data on traffic violations by type are available in the coming years, a correlation analysis can be conducted to gain better insight into the effectiveness of policy enforcement measures by road users. This study presents a tremendous opportunity for a benefit-cost analysis (BCA) of the road safety initiatives being implemented by the City of Bucaramanga. The proposed BCA will contribute to advance the state-of-the-knowledge on the effectiveness of low-cost/short-term implementation measures, particularly in Latin American cities with limited resources to improve road safety.

Ricky Ward, P.E.
Vice President, CDM Smith

“IRF is playing a key role in implementing the United Nations’ Decade of Action for Road Safety to combat the global epidemic of traffic fatalities and injuries. The success experienced in Bucaramanga in such a brief period is a testament as to why IRF and its members are so passionate about addressing road safety needs around the world.”
Extension of the Electronic Toll Collection System in Slovakia
SkyToll, a.s.

The Slovak electronic toll collection (ETC) system, developed and operated by the company SkyToll, was launched in 2010. It was the second toll collection system in the EU to use satellite navigation technology (GNSS), after Germany. Slovakia’s distance-based charging system is used for vehicles weighing more than 3.5 tons (compared to over 12 tons in Germany, decreased to 7.5 tons from January 2015). For the first time in a nationwide scheme, the majority of the tolled roads were first class roads – as opposed to tolling only motorways and highways.

Since the launch in 2010, the system has collected a total amount of 793.84 million Euros. SkyToll has achieved a very high efficiency of toll collection over the years, above 99%.

Following five years of successful operation, potential improvements to the scheme were identified. One of the undesired effects of tolling motorways was the traffic diverted to secondary roads. Such traffic diversion results not only in the loss of toll revenue; the secondary road network suffers significant damage, causing an increase in maintenance overhead and traffic congestion. Towns and villages also suffer the negative impact of heavy traffic (noise, pollution, road safety, etc.).

In order to tackle this problem, on 1st January 2014, Slovakia undertook the largest network expansion to date, extending the number of km within the network from 2,447 to 17,762. Most importantly, the new road segments included 13,479 km of minor roads and roads in towns and villages. All motorways, first, second and third class roads now fall under the national toll network.

The fees for 1st class roads running parallel to motorways were raised, in order to prevent avoiding the latest. The segments on the second and third class roads, which are zero tolled, allow the National Motorway Company to monitor the HGV traffic intensity on the whole network, and analyse the aggregated data to improve policies and identify critical segments with diverted traffic and bottlenecks.

An additional measure to tackle diverted traffic was the grant of price incentives to frequent users of tolled segments, and since 2014, 57,695 vehicles have received a toll rate discount. Finally, measures were proposed to incentivise cleaner fleets, by reducing the rate for lower emission vehicles.

With the improvements introduced in 2014, the Slovak toll scheme has become a worldwide reference on efficiently scaling to secondary roads. The updated network after the 2014 extension is now the largest scheme of its kind in Europe.

This ambitious project was all achieved in three months and without having to build new toll gates. This was only possible thanks to the extensibility benefits that satellite positioning technology (GNSS) provides, only requiring an update of the back-office software.

It also gave the road authority the ability to influence traffic behaviour (and thus optimize the road networks) through tariff incentives based on the traffic in specifically defined zones.

SkyToll has adopted the best state-of-the-art technology in the new generation of OBUs, which are prepared to use several satellite systems (GPS/EGNOS, Galileo and Glonass). The exceptional features of Slovak project were confirmed by the European GNSS Agency, recognising the improved performance and reliability that will be achieved by adopting a multiconstellation approach. The ability to make the major network expansion in 2014 within only three months was only possible thanks to the extensibility that GNSS technology can offer.

If the selected technology would have been solely based on a DSRC or RFID solution, the cost of roadside infrastructure required would have been particularly high on first, second, and third-class road categories. It would have been necessary to construct 3.100 new toll gates and a long period of labour intensive work.

Besides those measures, the roll out on 1st January 2014 also included incentives for regular use of the system and the adoption of more efficient vehicles. These measures aimed to improve the efficiency of transport in the country while reducing the negative impact on the citizens’ mobility and quality of life.

The technology adopted has also the potential to provide additional benefits in the future: the participants in the scheme could benefit from traffic management tools such as detection of accidents, management of truck parking, journey-time planning, and route recording.

Mr. Matej Okali
Chairman of the Board of Directors and CEO, SkyToll, a.s.

"With this award, the International Road Federation provides institutions and companies with global recognition, contributing to the networking and exchange of experience internationally.”
2016 GRAA Application Process

APPLICATION DEADLINE: APRIL 11, 2016

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/2016-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:
The submission of copyrighted material to IRF for the Global Road Achievement Awards shall constitute a general grant of permission to IRF to use the materials for promotional purposes.

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 April 11, 2016. 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@IRFnews.org
Tel: +1 703 535 1001
2016 IRF Global Road Achievement Awards
APPLICATION DEADLINE: APRIL 11, 2016

Submitting Organization: ________________________________________________________________

Project Name: _______________________________________________________________________

Contact Name (Individual): _____________________________________________________________

Address: ___________________________________________________________________________

Address continued: ____________________________________________________________________

City: ______________________________________________________________________________

State / Province: _____________________________________________________________________

Zip / Postal Code: ____________________________________________________________________

Country: ___________________________________________________________________________

Tel (with country code): + ______________________________________________________________

Fax (with country code): + ______________________________________________________________

Email Address: ______________________________________________________________________

Entry Category (Select ONE):

☐ Environmental Mitigation ☐ Safety ☐ Construction Methodology
☐ Design ☐ Quality Management ☐ Program Management
☐ Project Finance & Economics ☐ Maintenance Management ☐ Research
☐ Traffic Management and Intelligent Transportation Systems ☐ Technology, Equipment & Manufacturing

Application Package Checklist (Each application package must contain the following):

☐ Application Form
☐ Application Fee: US $400 for IRF Members, US $875 for non-members
☐ Brief project summary (< 500 words)
☐ Explanation of how project meets category-specific award criteria (~ 100 words)
☐ PowerPoint™ presentation

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Fax the completed application form to the IRF at +1 703 535 1007 or email to graa@IRFnews.org
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