### 2016 ANNUAL CHAIRMAN’S AWARD

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Connected Vehicles and SunGuide® Software in Action to Help Prevent Wrong-Way Driving

As part of the Florida Department of Transportation (FDOT) intelligent transportation systems (ITS) work to prevent wrong-way driving incidents, Atkins and Southwest Research Institute (SwRI) demonstrated a Wrong Way Driving connected vehicle application at the Traffic Engineering Research Laboratory in Tallahassee, Florida. Through SunGuide—FDOT’s advanced traffic management system (ATMS) software—the demonstration showed how this technology can be applied to everyday driving using SunGuide’s ability to process connected vehicle data and provide it back to drivers to improve mobility and safety.

All demonstration vehicles were equipped with an on-board unit (OBU) that included a dedicated short-range communication (DSRC) radio, DSRC antenna, GPS antenna, and computer. These components were integrated into a small, portable case for quick and easy installation into a vehicle. As part of OBU’s function, it transmitted a basic safety message (BSM) 10 times per second received by other OBU-equipped vehicles and roadside units (RSU).

The demonstration determined that the RSU will detect equipped vehicles entering a detection zone against the defined direction of travel, and will send an alert to the wrong-way vehicle that it is traveling in the wrong direction. The other vehicles in the demonstration were also alerted by the RSU that a vehicle driving the wrong way was in their vicinity. SunGuide software processes the alert from the RSU, displays the incident as a “wrong-way driver” icon on the operator map, and provides real-time updates on the location of the wrong-way vehicle. Upon receiving these data, the SunGuide operator can send a message to police, traffic management centers (TMC), and/or infrastructure—such as a dynamic message sign (DMS) system—as well as to mobile devices on vehicle OBUs. The demonstration confirmed that, once the wrong-way vehicle corrected its direction of travel, the RSU discontinued the alert.

This ground-breaking system is the first to integrate connected vehicle technology with an existing ATMS to prevent wrong-way crashes. The system offers short- and long-term benefits because, as with ATMS integration, data from existing wrong-way detection systems can be integrated with other systems, such as connected vehicles. Through SwRI’s SunGuide system, any combination of detection equipment can be made compatible through the ATMS.

Ultimately, with increased market penetration of in-vehicle OBUs and the ability to send signals to mobile devices, this demonstration showed that an agency can integrate any combination of existing equipment or upgrade its connected vehicle equipment with SunGuide’s ATMS.

About Atkins. Atkins (www.atkinsglobal.com) is one of the world’s most respected design, engineering and project management consultancies, employing over 18,000 people across the UK, North America, Middle East, Asia Pacific and Europe. We build long term trusted partnerships to create a world where lives are enriched through the implementation of our ideas. You can view Atkins’ recent projects on our website.
CDM Smith have developed a national level tolling analysis tool which can be used to determine the revenue potential, capital and operating cost and operational impacts of tolling any interstate route(s) in any state including Florida. These estimates are intended to be used for planning level analyses only.

Using traditional methods, the determination of revenue potential of toll facilities involves extensive modeling efforts. Larger projects involving multiple jurisdictions potentially involve combining several models for a better representation of traffic through the project corridor. Even with such extensive effort, these models may or may not adequately capture long distance interstate traffic. The representation of proposed tolling system also involves consideration of open versus closed system and toll rates based on vehicle type and urban/rural area. Another factor to be considered is the proportion of electronic versus cash toll collection. The determination of capital cost involves an assessment of the number and types of toll gantries and associated hardware as well as physical infrastructure and staff required to run the toll system. The operating cost estimate require the number of toll transactions and staff resources.

The Interstate Tolling Analysis Tool developed by CDM Smith facilitates all the above mentioned tasks in a fully customized software environment. This tool is built on top of a national roadway network based on the National Highway Planning Network (NHPN) and a set of trip matrices developed by using several national datasets including Freight Analysis Framework (FAF), Traveler Analysis Framework (TAF), US Census and several others. The roadway network and trip tables were enhanced in urban areas for better representation of traffic. The tool does not require any prior experience with travel demand modeling.

The tool provides the ability to select state(s) where tolling implementation is to be analyzed, the user can select which interstate routes are to be tolled. The selection of type of tolling includes open versus closed system as well as State border tolling and tolling of bridges by length. The user can provide toll rates separately for cars & trucks for urban and rural areas. A fully automated process then executes a traffic assignment run. After the completion of the run, the tool provides automated generation of reports including estimated revenue and capital and operating cost of tolling implementation. Determination of capital cost is based on prevailing unit costs of various hardware as well as estimates of the operational impacts of tolling are expressed as aggregate VMT and VHT before and after tolling for tolled and toll-free facilities.

While the results of this tool are not intended to replace the need for detailed T&R analysis, it provides a quick estimate of revenue and cost for tolling the interstate routes within the State of Florida. The tool can also be customized to analyze state routes.

The development of this tool is a unique achievement as being the first of its kind, it is expected that with continued enhancements, this would evolve into a much more powerful analytical tool for large scale tolling analyses.
Thank you for your consideration of the ETAN Industries’ video tolling solution for the 2016 Chairman’s Award. ETAN has helped improve mobility in Florida by bringing to market an accurate and efficient toll-by-plate product that offers drivers without a transponder a customer-friendly way to take advantage of the Miami-Dade Expressway Authority’s roadways. Prior to contracting with ETAN, MDX had suspended image billing due to system errors and invoice inaccuracies. Both bondholder and consumer confidence were suffering. With the probability of toll leakage growing and an increasing risk to its credit rating, MDX sought a new vendor under an emergency procurement process.

MDX selected industry newcomer ETAN Industries to implement a complete toll-by-plate billing and account management solution. ETAN’s Financial Accountability Solution for Tolling, or FastLane, was designed to manage the entire lifecycle of a video toll customer from the moment the vehicle crosses the gantry to the point at which payments are reconciled within the toll authority’s ledger.

Key to the success of FastLane was the paradigm shift in how the video toll customer is perceived and treated by the authority. Across the industry, drivers without transponders are considered “violators.” FastLane was developed under the assumption that these travelers are customers, not criminals. Consideration to the customer experience was taken at every level of the system design—from contact center scripting, to bill messaging, to the website interface. The assumption was that more people would use the roadways because they understand that there are efficient ways to pay, even if they don’t have a transponder.

When the specifications of the project were defined, MDX estimated that there were a total of 65,000 billable (balances over $3) toll-by-plate customers and set the high-water mark for daily invoice production at 6,500. Today, there are over 2.5 million video toll accounts with more than 530,000 of them meeting the invoicing threshold. On average, ETAN is producing 23,000 invoices daily.

The components of FastLane include:

**Transaction Processing & Billing:** FastLane provided timely and accurate account creation and billing mechanisms, and a transaction engine capable of high-volume processing to accommodate MDX’s invoicing backlog. The system adds flexibility to billing practices with configurable business rules.

**Account Management:** This design process of this module focused on improving the customer experience. This interface offers a variety of self-service options accessible through the consumer website, and gives the customer service and administrative staffs the ability to review toll transaction and DMV information, update customer information, perform fee adjustments and authorize toll rate corrections. **Today, all customer disputes are responded to within 48 hours.**

**Customer Relationship Management:** FastLane launched with a fully staffed and trained contact center team, a service-focused consumer website, and a library of carefully crafted consumer communications that range from invoicing to registration hold removal instructions.

**Accounting & Reconciliation:** The financial component of FastLane was architected under the scrutiny of accounting professionals to ensure complete financial accountability and GAAP compliance. **Since implementing FastLane, video toll accounting and reconciliation at MDX has balanced to the penny every month.**

**Violations Enforcement:** ETAN reserves the term “violator” for drivers who do not pay invoiced accounts and who are turned over for collection efforts. In this area, ETAN was able to leverage a 40-year history in debt collection to develop a dynamic tolling-specific, customer-centric collections package. This approach is working. In fact, **48% of accounts that enter the collections process are satisfied within 60 days.**

“FastLane has exceeded our expectations,” said Steve Andriuk, Deputy Executive Director and Director of Toll Operations for Miami-Dade Expressway Authority. “It has improved the video tolling customer experience, and provided accuracy, transparency and accountability to our billing.” In fact, the system has balanced to the penny every month. In July of 2015, ETAN Industries was recognized with the IBTTA Toll Excellence Award for Private Sector Innovation for FastLane and its implementation at MDX.
Operation and Maintenance of the I-4 Ultimate Construction Project

Maintaining traffic flow and managing existing roadway assets can prove to be challenging during any prolonged roadway construction project. When in a highly populated urban area, with an AADT of over 180,000 vehicles, these challenges can be increased exponentially. These are the challenges faced in providing emergency incident response, local and state agency support, and in managing all aspects of roadway assets within the “I-4 ULTIMATE” project while reducing, to the greatest extent practicable, any undo economic stress to local commerce.

While interagency communication is an important component in any project, the ability to utilize proven technologies to oversee the general public traffic patterns, and then strategically place our support forces within that pattern, has established itself as a key success factor. By using multiple geospatial tracking technologies, HDR ICA has been able to accomplish over 16,000+ roadway assistance calls, providing aid and assistance to the traveling public throughout the “I-4 ULTIMATE” project limits within the contractual stipulation of response times of 30 minutes per occurrence. Utilizing both response vehicle tracking, traffic pattern tracking, as well as work order tracking, HDR ICA has exceeded all expectations by successfully meeting these strict response conditions.

For the day to day operation and maintenance of a major interstate facility, we have developed an underlying program within a Google application to document field work orders from cradle to grave. Technicians, using remote tablet technology, create a work order for repair by photographing and documenting the asset in need of repair or maintenance. Once entered, the program creates an individual data file for each event. Each event is documented with GPS coordinates and is instantly included into a company program making the real time information easily accessible to others for review or editing purposes. This enables a seamless transfer of information from the field to any individual having access to the program anywhere within the company. The individual field work orders are placed in a layer within Google Earth, creating a real time footprint representation of work efforts. This technology has allowed us to review and make assessments of areas which may require subtle changes to the existing asset or condition in order to improve safety.

By utilizing a multifaceted approach to all available technologies, the “I-4 ULTIMATE” project team has ensured reduced delays during construction while providing excellent service to our customers, the motoring public of Florida. Whether they are local residents or international visitors, the people behind the scene of this very ambitious project will continue to effectively improve our business model for the customer’s benefit and safety.

Contact: Christopher Warren, PE
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Odebrecht USA respectfully submits for your consideration our Miami Dade Expressway Authority (MDX) SR 836-28 — Operational, Capacity and Interchange Improvements of SR 836 from West of NW 57th Avenue to NW 17th Avenue — Ultimate project for the 2016 Chairman’s Award. The project is the largest infrastructure investment in MDX’s history and consists of designing and building SR 836 to accomplish the following improvements:

- Addition of a continuous westbound through lane and interchange improvements at NW 57th Ave and NW 17th Avenue, including the reconstruction of the median barrier wall to accommodate full width shoulders;
- Addition of a continuous eastbound through lane from west of NW 42nd Avenue to NW 27th Avenue with interchange improvements at NW 42nd Avenue and NW 27th Avenue, including the reconstruction of the median barrier wall to accommodate full width shoulders;
- Construction of an eastbound collector-distributor (CD) road for NW 45th Avenue, NW 42nd Avenue and westbound improvements at the NW 37th Avenue interchange; and
- Necessary infrastructure modifications to preserve the ORT conversion of SR 836 by replacing the ORT tolling location points at NW 57th Avenue and NW 27th Avenue impacted by the Project. This project has an estimated 200,000 vehicles per day traveling within our project limits.

The team is led by Odebrecht, in partnership with TY Lin the designer, and performed for our client MDX and its consultants New Millenium, EAC, and RS&H. The proven technologies applied on the project that aid in the movement of vehicles and in motorist’s safety are:

- The use of the smartphone based application called Zello. Zello allows our project team to effectively communicate with one another in providing critical time-sensitive information to allow for the smooth implementation of all temporary traffic control ensuring an uninterrupted and safe flow of traffic for the public. Zello also allows for immediate correction of any Traffic Control Plan deficiencies.
- Diverging Diamond Interchanges (DDI) implementation. Through the use of a traffic flow software which allows us to analyze and design two (2) DDI on NW 57th Ave and NW 27th Ave, we will improve car circulation through the intersections due to increased traffic being predicted in the software analysis.
- GoPro camera applications. Another technology we use to ensure clear traffic control patterns and avoid any confusion for the traveling motorist, is the use of a GoPro camera. We first travel the intended route and then use a GoPro camera to film the traffic control set up to ensure that the traffic control is proper. We also inspect daily all traffic control set up to ensure immediate correction of any deficiencies.
- Utilization of Work Zone Intrusion Alarms. We are the first company in South Florida to use work zone intrusion alarms. These alarms attach onto the traffic control devices and will emit a high pitch noise of 125dB when struck by a motorist. Although this is primarily a tool used for the safety of our workers we have found that it is effective in alerting the traveling public when they are distracted or fatigued. These devices are placed at strategic locations within the traffic control set-up such as tangents and buffer zones.

Based on the use of the aforementioned technologies we believe that our project provides one of the safest sites for the traveling public in South Florida and respectfully wish to be considered for the 2016 Chairman’s Award.
Project Name: THEA’s Innovative Approach to Tolling Operational Back-Office System

The Tampa Hillsborough County Expressway Authority (THEA) developed and implemented an innovative Tolling Operational Back-Office System which separates a traditional tolling back-office system into fully modular “operational” and “financial” operations.

In 2010, THEA completed conversion of its toll facility, the Selmon Expressway, to an All-Electronic Tolling (AET) system. Quickly realizing the need to keep up with the rapidly-changing demand of its new tolling environment, THEA developed a low-cost, non-traditional operational back-office system which was implemented in 2013. Through this system, THEA is able to create accurate, billable transactions for all toll customers (SunPass and Toll-by-Plate) and transmit those transactions from its back-office system to that of Florida’s Turnpike Enterprise. Once invoicing cycles are completed by FTE’s back-office system, unpaid toll transactions are transferred back to THEA for routing to the financial back-office system of its delinquent account collector, Linebarger Goggan Blair and Sampson, LLP, for further processing. This process ensures transaction reconciliation and traceability while maintaining full financial accountability.

In addition to other benefits, THEA’s tolling operations back-office system also serves as the system of records for its finance department, allowing for the creation of reports and providing an interface between the Division of Highway Safety and Motor Vehicles (DHSMV) and Florida’s Clerk of Courts for enforcement of unpaid tolls. This non-traditional tolling operational back-office approach also provides the agency with the flexibility to choose a financial back-office provider that best suits its current and future needs without disruption to roadside and video enforcement systems.

“Four years of AET operations and the experience of others has caused us to evolve our methods and change the traditional functions outsourced as a ‘single back office service.’ Our revised approach segments the back office into the ‘operational back office’ and the ‘financial back office,’ which provides us with more flexibility and better accountability.” - Joe Waggoner, THEA Executive Director

THEA’s project objective was to create an independent and modular back-office system to improve the quality of the transaction and revenue collection while enhancing operational and financial management capabilities. Implementation of this streamlined approach has resulted in an accuracy level of 100% in SunPass and Toll-by-Plate transaction reconciliation and ≥99.95% (.05% errors) in Toll-by-Plate image review operations, which has translated into improved cash-flow and a significant reduction in operating costs.

The implementation of the tolling operations back-office system and its supporting modules has also aided in the movement of traffic by improving the manner in which commuters pay for incurred tolls while utilizing THEA’s roadways.

This project was made possible through the collaborative efforts of THEA staff, Atkins, HNTB Corporation, TransCore, Q-Free, TollPlus, and Linebarger Goggan Blair and Sampson, LLP.
VAIR Introduction

VAIR (Volkert Automated Inspection Report) is a program developed by Volkert to help track and maintain construction activities. The system was developed for the I-4 Ultimate project in order to increase report integrity and quality. VAIR is based around a Witness/Hold Program increasingly used in P3 projects around the country. The Witness/Hold Program reduces Quality Assurance costs on DOT projects by reducing the amount of time QA Technicians need to spend on a specific work activity.

The idea behind the Witness/Hold Program is that inspection plans are developed to define all work activities with structured hold points. A Hold Point (HP) is a point at which the contractor is required to notify the QAF and obtain verification that the work is in conformance with the Contract Documents prior to proceeding with subsequent work. This essentially means that the contractor needs to stop all work until the QAF releases the hold point. All operations in an inspection plan that are not hold points are considered witness points. This means the QAF will occasionally check in on the operation to verify all work is done according to plans and specifications. The inspection plan will also define Test Sample Requirements (TSR). A TSR is a notification from the contractor to Quality Control and the QAF that a material sample needs to be taken at a given location and tested for verification purposes. This is made possible by the contractor self-performing Quality Control.

The VAIR system has created a way to track specific work activities on the project on both the QA and QC side to help verify that all the work is done in accordance with plans and specifications. The basic principle in VAIR is that the contractor creates a Work Request (WR) in that is to be approved by the QAF. Once approved, this Work Request is assigned a WR number. Both QA and QC can work off the approved WR to have a complete documentation of all QA/QC inspections conducted for the longevity of the WR. The WR will stay open until all work is complete and all inspections are final.

Throughout the work both the QA and QC firms can issue Non-conforming Work Reports (NCWR). An NCWR is a VAIR report of all construction items on the project that have been reported as unfinished or incomplete, have not been done at all, require replacement or repair, or require additional work to achieve an acceptable level of quality and workmanship.

VAIR also has many other capabilities such as metric tracking, C22 card entry, Random Number Generator, Water/Cement Ratio Calculator and EEO/OJT reporting. This guide will outline the basics for Field Engineers and QA Technicians.