

# CHANGE? NOT ANYMORE...

## THE OPERATIONAL CHALLENGES OF CONVERTING TO ALL-ELECTRONIC

Andy Warhol once said, "They always say that time changes things, but you actually have to change them yourself." This attitude will help take the Miami-Dade Expressway into a new era of efficiency and improved customer service

**T**he Miami-Dade Expressway Authority (MDX) operates and maintains five of the most critical east-west expressways in Miami-Dade County, totaling 67.8 miles. Of those five, only four are tolled with a total of just six tolling points. Each expressway is tolled using an 'open-barrier system', with distinct tolling points that allow for numerous free movements on the system. Although most tolling points are bidirectional, there are two that are only tolled in one direction. As in many heavily urbanized areas, expressway entrances are spaced at roughly one-mile intervals. Drivers can make over 80 possible trip movements, none of which are tolled. To put the problem into perspective, 45% of users traveling the MDX system pay a toll, while all others use the system for free – as recently as June 2007, only 28% of the system users actually paid! Systematically, MDX will leverage electronic tolling to close the system; from the master plan, to the recent unveiling of the first All Electronic Toll (AET) section in 2007, to the complete transformation in the next few years. In the end, there will be no more 'change'. 'Pay only for what you use' is the axiom used when talking about closing the system. The questions are, how and by how much?

### AVAILABLE OPTIONS

An electronic version of the ticket system, or a system-wide rate per mile? A rate per mile specific to each MDX corridor, or perhaps a revenue-neutral rate for the system where MDX collects yearly budgetary totals equal to what is collected today? (Remember, now 100% will pay a toll.) Maybe tolls could be indexed based on Consumer Price Index (CPI), but annually, triennially? All of these are very difficult options that MDX staff

took into account in their recommendations to the MDX Governing Board for final decisions. Some of the MDX corridors can be converted quite easily. Others, not so.

The idea of an electronic version of the ticket system was discarded quickly for the simple reason that the amount of entry and exit points greatly increased the number of gantries, making it cost prohibitive – especially on a corridor such as Miami's Dolphin Expressway (SR 836). Also, trip matching in this urban environment when entry reads fail would be a nightmare at best.

A system-wide rate per mile was discarded as well. The vetoing of the entry-exit ticket system and the possibility for short distance movements on and off would have required a rate less than the cost to collect for these tolling points, in doing so skewing the system-wide rate. Deductive reasoning led MDX to regard a multiple barrier system as ideal. By systematically capturing 99% of the customers and charging them about the same as they pay today we would achieve our objective that all customers share the costs with the likelihood that many would pay less. Today, a customer who enters onto an expressway near a tolling point and travels through that tolling point pays the entire fare – US\$1.00. Tomorrow, this same customer may only pay half or less for that same trip.

Gratigny Expressway (SR 924) is MDX's next expressway scheduled for conversion to AET around early 2010. This corridor provides commuters with direct access from Broward County to the north with the business centers in north Miami-Dade County. Currently, the Gratigny has one bi-directional conventional toll plaza on the eastern end, with only 50% or less of the



users paying a toll. SunPass, the electronic system operating in south Florida, is used by 75% of the Gratigny customers daily, with peak hours exceeding 80%. Having only one major interchange not covered by a toll, the Gratigny AET configuration was the least complicated to convert.

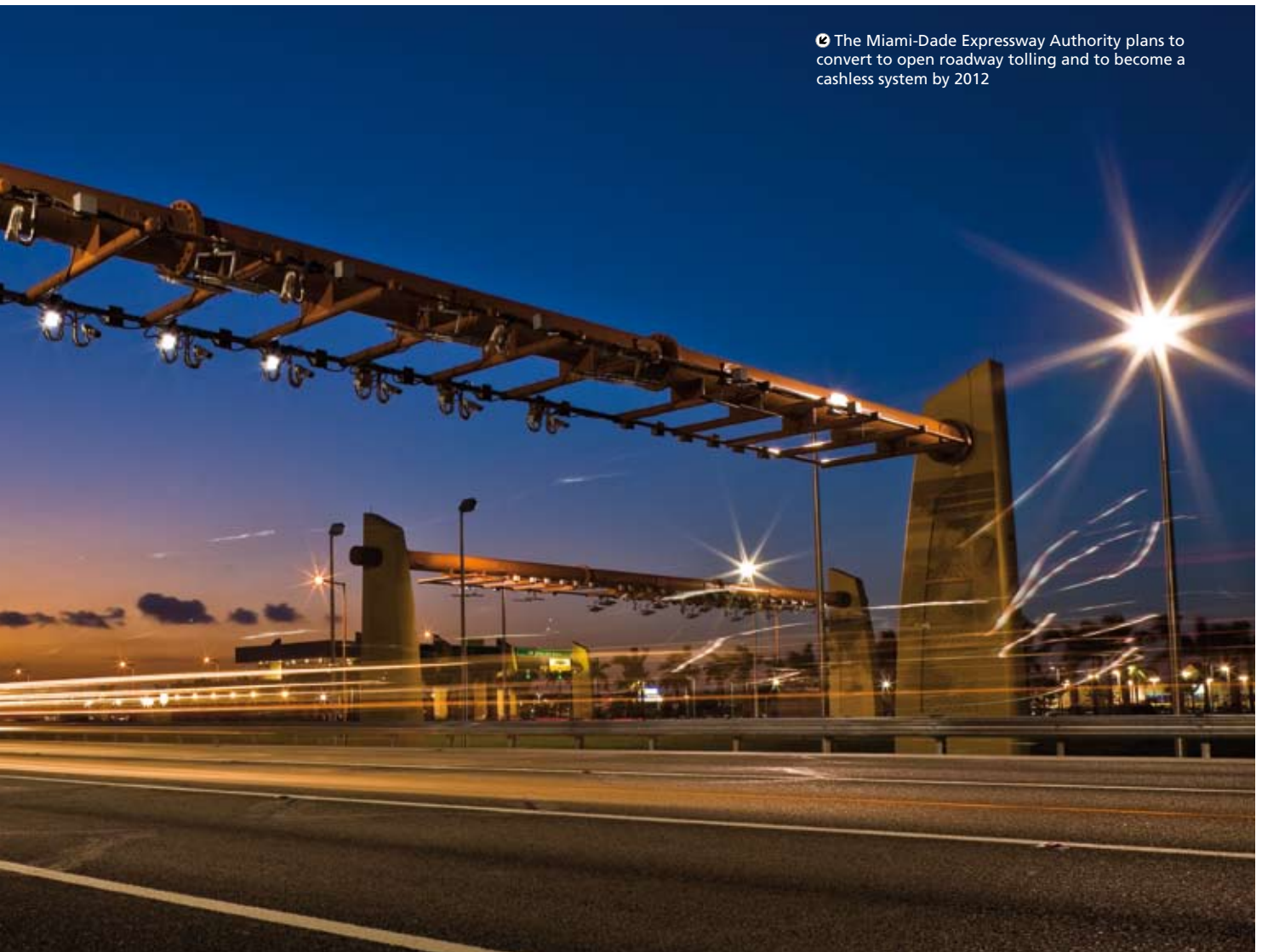
The Don Shula Expressway (SR 874) and the Snapper Creek Expressway (SR 878) are two expressways on the MDX system providing mobility in the southwestern portions of Miami-Dade County. Approximately 145,000 users from the south-west Miami-Dade areas travel on these corridors daily. On the Don Shula Expressway, only 54% of the users pay a toll and the Snapper Creek Expressway is currently not tolled. MDX has invested over US\$30 million in new capacity and new movements on these expressways with additional improvements of over US\$160

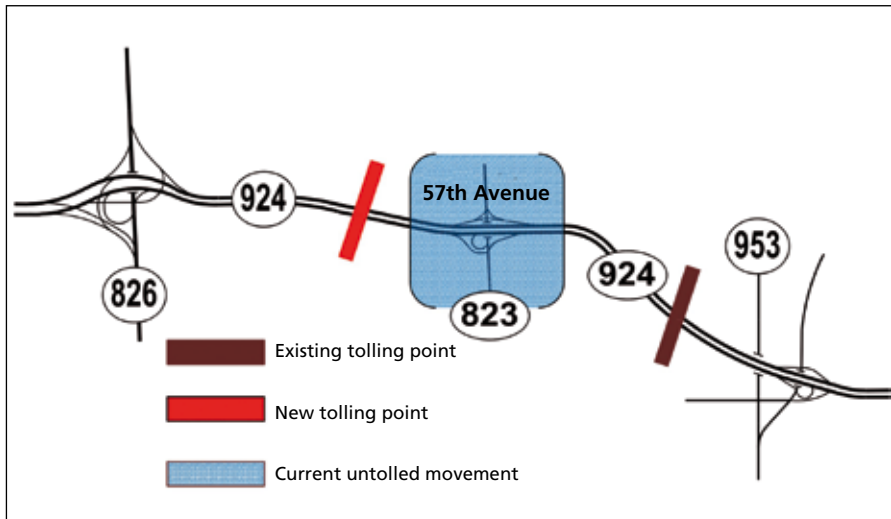
million planned in the next four years. These are tangible benefits for users that will provide travel-time savings, enhance safety, and improve traffic operations. SunPass usage in this corridor is also extremely high, exceeding 70% on a 24-hour average. These corridors, SR 874 and SR 878, will follow the Gratigny conversion to AET in late-2010/early 2011. Although a little more complicated than the Gratigny, with multiple interchanges currently not being tolled, a viable AET solution was nevertheless

determined. In the pre-AET example (p90), you will see that the Don Shula Expressway has a bidirectional toll plaza near the southernmost end of the corridor. The current fare at that bidirectional plaza is US\$1.00. Around 50% of the traffic traveling on the Don Shula Expressway enters north or exits just south of the Killian Parkway, never paying a toll. Under the AET example, you will see that the tolling point that exists today gets converted to an AET gantry with a rate of US\$0.25 in each direction, which

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📍 The Miami-Dade Expressway Authority plans to convert to open roadway tolling and to become a cashless system by 2012





☛ The above illustration shows the 2009/2010 plan for all-electronic tolling on the SR 924 in Florida

is a quarter of the current rate for the use of that segment. Additional mainline gantries are added north of Killian Parkway – one at US\$0.25 and the other north of the SR 878 spur for US\$0.50. The cost for those paying today remains the same (US\$1.00 in each direction) with those only driving on shorter segments paying less. On the Snapper Creek Expressway, currently untolled, two mainline gantries are envisioned – one west of 87th Avenue and the other east of 87th Avenue – thereby closing the system and eliminating the free movements and reducing the cost for those who pay today but do not travel the entire distance. The SR 874 round trip pre-AET costs the existing paying customer US\$2.00. The round trip cost post-ORT is US\$2.00. The paying customer who today makes a round trip from Florida's Turnpike to Kendall Drive pays the same US\$2.00, whereas post-AET

launched. In June 2008, MDX held a toll industry review forum, with the intent to provide an open forum to discuss MDX's AET movement and the process that could be undertaken to get the job done. All aspects of the industry were invited: system integrators, toll equipment and construction suppliers, engineers, designers, and operators. Real feedback was required from these important entities regarding how MDX should move forward with procuring the services to design, build, operate and maintain this AET solution. Should the in-lane system be separated from the back-office solution or not? Should the civil work be included as part of the system integrator's responsibilities? Listening to the professional advice received during the forum, MDX continued to work toward the successful deployment of the procurements. Toll systems integration

## “Ultimately, all-electronic tolling will only be successful through the full automation of the operation and the back-office processes”

that same trip will cost US\$1.00. MDX is working closely with the Florida Turnpike Enterprise as it, too, looks to convert to AET in this area. This is a great example of agencies partnering for the good of the public to ensure a seamless customer base and successful conversion to all-electronic.

### WHERE ARE WE NOW?

How is MDX going to place all of these gantries, have in-ground vehicle classification (MDX uses an axle-based classification system), protect equipment, monitor traffic, alert the drivers with signage and media? One of the most aggressive procurement campaigns ever has been

(in-lane)? Check. Account Management and Toll Enforcement System (AMTES)? Check. Public Communications – advertising? Check. Design and Construction for all the Civil work and infrastructure components? Check. System-wide ITS and system-wide fiber optic deployment? Currently getting installed, but check. Road Rangers? Check.

In addition to all of the other US\$180 million MDX work program projects being implemented for construction, the above successful conversion to AET is expected to exceed US\$50 million in contracts. The MDX Governing Board has taken this task very seriously, setting the stage for the future of transportation in Miami-Dade County.



To support all the previously mentioned initiatives, MDX has engaged in an ITS program to actively monitor and respond to incidents more quickly. This ITS program includes the use of CCTV cameras to monitor traffic conditions, roadway detector systems to facilitate incident detection and a fiber-optic communication backbone to effectively support all communications needs for the agency, as well as interagency communications between MDX and other local transportation authorities. In addition, MDX users can benefit from an Advanced Traveler Information System (ATIS) as the result of participation in the South Florida 511 system. At the core of all of these systems – and in partnership with the Florida Department of Transportation (FDOT) – MDX uses the SunGuide Transportation Management Software to assist its TMC operators strategically co-located at the FDOT SunGuide Center. This co-location facilitates the interagency coordination and collaboration among FDOT, MDX and other local participating agencies, such as Florida Highway Patrol.



MDX oversees the county's five major east-west arteries: The Dolphin Expressway; The Airport Expressway; The Don Shula Expressway; The Snapper Creek Expressway; and The Gratiigny Parkway

### LIGHTS, CAMERA, VIOLATIONS...

When you start using 'electronic tolling-only' on a segment of roadway that has never been tolled before, you're going to have some violations, right? Without a doubt, yes. MDX's experience in opening an all-electronic section of roadway yielded violations upward of 20% within the first few days, although a steep drop-off in violations followed. The normalization of the violation rate to below 3% occurred within six weeks after the violation system was activated on these new all-electronic tolling points. Many commuters who were driving this expressway segment on a daily basis didn't know they were going through a tolling point and not paying the toll. Signage misunderstanding and confusing language on the signs were the primary excuses drivers gave for violating. After talking with many of these customers – and communicating to them that they had entered into an all electronic 'SunPass-only' zone – we discovered how complacent some became on their daily commute. Many telephoned back after their next commuting



Funded by tolls, MDX has been aggressively upgrading and updating its roads over the past decade



⬆ The above illustration shows the existing toll plaza location and rates for the Don Shula/SR 874-Snapper Creek/SR 878 Expressways



⬆ The above illustration shows the proposed AET location and toll rates for the Don Shula/SR 874-Snapper Creek/SR 878 Expressways

day and said, "Wow, I never paid attention to the signs. It was only after talking with you that I was more attentive when I drove through the next time, and I see now that this is a tolling point for SunPass-only vehicles." After this feedback, MDX took additional steps to capture the drivers' attention by painting 'SunPass ONLY' on the roadway prior to entering the electronic-only zones. The operator is continually improving the operational aspects of having all electronic segments on its system by drawing from peers in the tolling world – using their best practices and solutions,

to convert the violator into a customer. Ultimately, if you opted into the program, the fines for all toll violations were reduced by 60% – a win-win for everyone. This program was a big success and registered ridership on these sections increased.

Another issue encountered was the increased load of citations being handled by the county court system. With the addition of these tolling points, MDX found itself writing more citations on a daily basis than all of the traffic citations written by all police jurisdictions in Miami-Dade County combined. The answer to this was to work

process is under way and the preliminary findings again show gain in efficiency as well as a reduction in labor costs.

**TECHNOLOGY AS THE BACKBONE**

Technological advancements bring us to the future now. As MDX moves into the realm of converting its entire expressway system to all-electronic, we will encounter numerous operational challenges in the transition to remove the ability to pay cash on the system. We are very fortunate to be in an industry that has an extremely well-informed networking system where solutions and experiences of other tolling professionals are just a phonecall away. Ultimately, all-electronic tolling will only be successful through the full automation of the operation and the back-office processes. In particular, technology is demonstrating tremendous improvements in recognition systems that take digitized images and correctly identify license plate characteristics and extract the required information for registered owner correlations. These improvements, coupled with advancements in 'fingerprinting technology' – the technology that associates characteristics of a vehicle similar to the way a fingerprint is associated to a unique individual – is boosting the accuracy of the entire automated violation process into the more than 90th percentile realm. Truly, these technological advances are allowing us to leap into the future at lightning speed. ■

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**"Many commuters who were driving this expressway segment on a daily basis didn't know they were going through a tolling point and not paying the toll"**

but tailored to meet the specific needs of South Florida.

MDX had a six-week grace period for toll violations when the first all-electronic section of roadway was opened. Toll violation notices or citations were not sent out for the first six weeks of operations. One lesson learned was that those drivers not paying attention violated for those six weeks. Once notices began to be mailed out, people woke up from their complacency and stopped violating. Dealing with these drivers became a customer service issue. We needed them to buy into the SunPass program and at the same time recoup the costs to process their violations. The solution – taken from other tolling entities in the country – was

with the courts and to fast-track a solution that was in the works called 'e-Citation'. Normally, Uniform Traffic Citations, or 'UTCs', were delivered by hand to the court, requiring them to scan each UTC into the system and then load the information into their case load computers for traffic court. With e-Citation, MDX would electronically file the UTCs with the court on a daily basis with little or no human intervention. This was a tremendous efficiency gain and a labor cost reduction for both the court and MDX.

The next step in the process is to consolidate cases by 'name', requiring someone to appear in court only once, despite the fact that they might have multiple citations. The test project for this