

The Feasibility of Open Road Tolling in Florida



November 2001

Prepared by the Center for Urban Transportation Research,
University of South Florida, in collaboration with the Florida Department of
Transportation, Florida's Turnpike, the Miami-Dade Expressway Authority,
the Orlando-Orange County Expressway Authority, and the Tampa-Hillsborough
County Expressway Authority

Table of Contents

Executive Summary	3
Introduction	8
Open Road Tolling Defined.....	9
Background.....	12
Study Purpose	13
Study Organization	14
Why Examine All Electronic Toll Collection?	16
Customer Impacts and Marketing.....	18
Telephone Survey.....	19
Focus Group Findings	24
Operations and Collections Reliability	28
Leakage	28
ETC Participation Goals	31
Business Policies and Procedures.....	32
Statutory Changes	32
Other Enforcement Capabilities	33
Employing a Surcharge to Make Operating Costs Neutral	34
Current Technological Performance and Capability.....	35
Backroom Operations	37
Traffic and Revenue	39
Current Traffic Characteristics	39
Comparison to Other ORT Systems	43
Estimated Future Traffic and Revenue	45
Revenue Realization.....	50
Estimated Revenue Loss	52
Engineering	55
Potential Capital Cost Issues	55
Toll Plaza Traffic Throughput.....	58
Organizational and Legal	63
Organization	63
Legal Review	67
Implications on Other and Smaller Toll Agencies	73
Conclusion and Recommendations.....	75
List of Appendices	79

Executive Summary

The study of the “Feasibility of Open Road Tolling in Florida” was a collaborative effort undertaken by the Florida Department of Transportation, the Miami-Dade Expressway Authority, the Orlando-Orange County Expressway Authority and the Tampa-Hillsborough County Expressway Authority. A commitment to continuous improvement and a heavier reliance on the toll road sector to provide Florida with transportation enhancements led the group to investigate the possibility of implementation of a statewide all electronic toll collection system.

The effort used two existing systems that employ all electronic toll collection as case studies (Toronto and Melbourne) and reviewed the concept from the perspectives of Customer Service and Marketing, Operations and Collections Reliability, Traffic and Revenue, Engineering and Organizational and Legal. Subcommittees for each of these functional areas were formed along with a Management Committee to oversee the effort. Project management services were provided by the Center for Urban Transportation Research at the University of South Florida.

Perspectives

Customer Impacts and Marketing

While the case studies used are currently employing all electronic toll collection (AETC), both facilities were designed, constructed and marketed as toll highways that would not accommodate any provision for paying cash on the highway. The Customer Impacts and Marketing group assessed the impacts and potential customer acceptance of employing open road tolling on an existing system. A telephone survey conducted as a part of the study revealed an overwhelming majority of current cash paying customers and non-toll road users believe that cash should always be an option on toll facilities. Almost as many indicated a willingness to subscribe to an electronic toll collection program if discounts were offered or if it meant not having to stop to pay a toll.

Of all of the issues addressed throughout the course of the study, none was more debated and discussed than that of the wisdom and appropriateness of eliminating the ability of customers to pay cash in a traditional toll lane. What is clearly apparent is that in order to move to more automated and high-speed toll collection, actions and programs to increase the use of electronic transponders must continue to be pursued. The cost of collecting a toll electronically is less

than a manual transaction, the queuing at toll plazas can be reduced and the hurdle of non-transponder users is minimized if ORT is pursued.

Operations and Collections Reliability

Several significant issues are raised in the analysis of Operations and Collections Reliability. There seems to be little doubt that the introduction of an all-electronic toll collection system will result in some additional loss of potential revenue to toll agencies. The extent of this loss is difficult to estimate given that a specific system for the state has not yet been specified. In addition, the employment of AETC with the current technology requires a practice of video billing. When a non-transponder customer uses the AETC toll facility, an image of the license plate is captured, processed, and the vehicle owner of record is then billed. The cost for this transaction is estimated to be as high as \$0.75 compared with an ETC transaction cost of about \$0.15.

The Operations and Collections Reliability group determined that the technology exists for the implementation of pilot projects in Florida, statutory changes will help the implementation of open road tolling, and that if video tolling is employed in Florida, a surcharge to cover the incremental costs should be established.

Traffic and Revenue

The Traffic and Revenue group analyzed existing revenues for the participating agencies and provided projections of traffic and revenue for the four operating agencies for fiscal year 2010 with and without open road tolling. The OOCEA's projections are identical since it has embarked on a 10-year plan to collect tolls in an open road environment through express, high-speed lanes while maintaining manual collection to the extent that the market dictates.

Estimates of traffic and revenue are provided for the open road tolling and non-open road tolling options. Building off of the work of the operations group, a \$0.50 surcharge is assumed for video transactions. With this assumption, the open road-tolling scenario becomes revenue neutral.

Engineering

The Engineering group focused on the potential capital cost avoidance of open road tolling. Using four plazas on the Miami-Dade Expressway Authority's system, several detailed estimates were developed. The analysis yields no universal factor that can be applied to a potential toll plaza to estimate capital cost avoidance because of the extreme variances by location. In the four Miami-

Dade cases examined, estimated savings range from 14% to 74% from traditional toll plaza construction to the use of ORT.

An examination of toll plaza throughput shows that while the use of express lanes can theoretically address toll plaza throughput, the advantage lies in the smaller footprint required for an ORT collection point in contrast to a traditional toll plaza. In some cases the reduction of the capital required to build a toll plaza may make the difference in a projects' financial feasibility.

Organizational and Legal

The review of potential legal issues and existing statutes revealed some potential for improving the climate for all electronic toll collection. Several organizational models were examined in light of the increased coordination that is recommended if a statewide ORT system were to be pursued.

There are several organizational models that would be appropriate to forward the cause of AETC and open road tolling. Those participating in this study seem to support an organization that would focus on interoperability, consensus and respect for individual business practices and operating needs. While there is no compelling legal obstacle to the implementation of AETC, the technology needs to be of sufficient reliability to satisfy the requirements of the bondholders of the various authorities. As new debt issuances are contemplated, particular attention must be paid to the Operating Statement development and other documents, if an agency is seriously considering the implementation of AETC.

Conclusion and Recommendations

The test for feasibility of open road tolling in Florida in this effort has been to identify any fatal flaws in the concept. While there have been many potential obstacles revealed that must be addressed before implementing a system across the State, none has emerged as fatal.

The range of issues that have been identified represent challenges that need to be overcome before the deployment of a statewide, "barrierless" toll collection system can be successful. Based on this analysis none of the challenges appear to be technologically insurmountable. Several of the social and political ramifications present formidable issues. What has become clear through this study is the uniqueness of each of the participating agencies and the differences between facilities operated by the same agency. Open road tolling with all electronic toll collection is, however, feasible.

The recommended approach for Florida to move to AETC is an evolutionary path. It is recommended that Florida begin to offer high speed, non-stop toll collection at as many locations as possible, thereby reducing customer demand for traditional toll collection. As the demand for manual collection wanes, the resistance to all electronic collection will diminish. This evolution will occur at a different pace in the various locations and facilities. The next step for many agencies is to remove the traditional tollbooths from the centers of mainline toll plazas in order to create express lanes.

Commit to as Many Express Lanes as Feasible as Quickly as Possible

This form of open road tolling (although not AETC) will attract more customers to participate in the ETC programs. Offering more non-stop collection opportunities will not only provide a more attractive option to the customer, it will also allow toll agencies and their private sector partners to work on the revenue loss issues. As the leakage rates come more in line with other methods of collection, toll operators, their boards of directors and the financial community will become increasingly more confident in an All Electronic Toll Collection model.

The widespread express lane approach is the next logical step in the evolution of the toll plaza and associated toll customer enhancements. Manual lanes evolved to automatic coin lanes, to AVI, and to dedicated ETC lanes. Express ETC lanes represent the next move to total barrier free collection or AETC. The increased plaza capacity afforded by these lanes in conjunction with the attendant increase in ETC participation could help defer some of the plaza expansion that would otherwise be required. As ETC participation rates warrant, lanes in existing plazas can be converted to match local demand and coincide with toll agency reconstruction plans.

Toll Agencies Must Work Even More Closely for a Consensus-Based Strategic Evolution

Although TEAMFL and the collaboration on this study represent a level of cooperation among toll entities that is commendable, an even closer relationship needs to be established if the goal is to address many of the challenges outlined in this report. One good example, and there are many, is the issue of electronically collecting tolls from customers in rental cars. While there are ongoing attempts to arrive at a solution, this is not an issue that should be negotiated or settled by one of the toll agencies alone. The policy and business practice implications are too important. Another issue is the one dealing with trying to capture a large percentage of the commercial vehicle market for ETC.

The chief executives of the four agencies that participated in this study could create a formidable alliance in these endeavors and send an even stronger message that movement towards a seamless more convenient system of toll facilities in Florida is a top priority.

Steps Should be Taken Now to Establish Tiered Pricing

It seems apparent from this study that for the reasons of customer acceptance, revenue protection, and good management practice, a course needs to be set to eventually establish a toll schedule bearing a closer relationship to the cost of collection. All of the agencies have programmed a planned increase into their long-range financial forecasts. It is recommended that these plans be reviewed to examine the timing of future increases to perhaps create a “discount” for ETC customers. This may take the form of postponing the ETC increase or accelerating the cash toll increase. This could establish a precedent for a differential where none now exists (some operators already have established differential).

Prepare a Legislative Proposal for the 2003 Legislative Session

Several legislative actions will not only help the evolution of toll collection in Florida, but can also help to create a more efficient and reliable system based on today’s practices. It is recommended that the general and bond counsels of the participating agencies review this report, particularly the Operations and Collection Reliability section, and work with a group that was involved in this effort to draft any desired statutory changes.

The effort involved by dozens of staff and consultants in the analysis cannot be overstated. While some of the conclusions and recommendations may appear to be obvious to the reader, the data collection, analysis, discussion, debate and finally consensus-building were no small tasks. The Management Committee should be acknowledged for their commitment of time and patience. The Steering Committee should be applauded for the attention and time that they devoted to making this a comprehensive look at the feasibility of open road tolling in Florida.

Introduction

As the demands for increased mobility and transportation capacity continue to outpace traditional highway funding in Florida, toll facilities are becoming a larger piece of the transportation solution. Currently, tolled highways and bridges total approximately 700 miles in Florida. This represents almost 20 percent of the Florida Intrastate Highway System, the major highway network carrying 32 percent of the state's traffic. While the number and extent of tolled highways and bridges in the state are significant, what is more compelling is that the new center line mileage that is being added to the State Highway System to serve the explosive growth is essentially all tolled.

A recent analysis by the Tampa-Hillsborough County Expressway Authority for the Transportation and Expressway Authority Membership of Florida (TEAMFL) shows that some \$4 billion worth of toll projects have been completed since 1975 and an additional \$2.6 billion are now being developed. The heavier reliance on toll entities to provide highway capacity has led to a redoubled effort to maximize the financial capacity of these institutions.

This heavy reliance on toll entities to provide more of Florida's transportation capacity along with the long-standing entrepreneurial nature of transportation authorities, have led to an examination of a concept to operate toll facilities more efficiently in the state.

As a possible method to decrease both operating expenses and future capital outlays, the concept of all electronic toll collection has been examined by four of the state's toll entities. The Florida Department of Transportation's Turnpike District (the Turnpike), the Miami-Dade Expressway Authority (MDX), the Orlando-Orange County Expressway Authority (OOCEA), and the Tampa-Hillsborough County Expressway Authority (THCEA), collaborated to conduct this assessment of feasibility of the concept of open road tolling. Representatives from the Florida Transportation Commission and TEAMFL also agreed to participate. This collaborative effort while significant and forward thinking is only one of many efficiency and customer service initiatives being carried out by the toll agencies in Florida.

This feasibility of open road tolling (ORT) in Florida is a fatal flaw analysis conducted from at least five different perspectives. The implications of introducing ORT were examined from the operations, engineering, customer impacts, revenue and legal/organizational standpoints. This report summarizes

the work of staff and consultants of the participating organizations along with the University of South Florida's Center for Urban Transportation Research.

Open Road Tolling Defined

Open road tolling, or ORT, is a method and system of collecting tolls on expressways and other facilities that essentially involves no people collecting tolls in traditional tollbooths. Through the use of the proven technology of automatic vehicle identification (AVI), a portion of the tolls is currently being collected automatically at Florida's toll facilities. AVI collection in Florida currently requires that a customer subscribe to a program that allows their vehicle to be automatically identified in a toll lane by an electronic or other device affixed to the vehicle. This device can be an electronic transponder such as SunPass, the Florida Department of Transportation's system, or E-Pass, the Orlando-Orange County Expressway Authority's system. Older AVI systems employ the use of a simple bar code sticker on the vehicle. In each of these cases, the customer has registered with the toll entity and pre-paid into an account. When the customer uses the toll facility, a reader in the toll lane identifies the customer's vehicle as valid to proceed legally. The collection methodology that employs electronic transponders is known as electronic toll collection or ETC.

Typically, toll agencies use several other systems in the ETC toll lanes to encourage payment compliance, to identify potential toll violators, and to provide financial controls. Both the SunPass and E-Pass systems employ a video enforcement system. The system captures a video image of the rear license plate of the vehicle and is used in the event that an invalid vehicle proceeds through the lane.

Lanes at toll plazas are outfitted to either accept both cash payments and the electronic transactions or in many cases exclusive lanes are devoted to the electronic toll customers. Most of the benefits of ETC accrue to the customer that uses an exclusive or "dedicated" lane. These ETC-only lanes provide faster toll payment in addition to the advantage of the driver not having to have cash or exact change ready to make payment. The cash-paying customer may also be advantaged by virtue of the electronic payment customers being removed from the lanes manned by toll collectors.

If the system is working efficiently, the benefits to the toll facility operator include the reduction of manpower to manually collect tolls, increased throughput of vehicles through the toll plaza (enhanced customer service) and reduced operating costs.

Open road tolling describes a toll collection scenario where all vehicles are identified for tolling purposes electronically while maintaining highway speeds. For existing subscribers to an electronic toll program like SunPass or E-pass, this presents some issues, but can be achieved. The challenges to be overcome in implementing ORT stem largely from collecting tolls from vehicles not equipped with identification devices. If the vehicle has no transponder, and there is no opportunity to pay cash, how can the toll be collected?

Through the use of essentially the same technology that Florida uses for video enforcement, a few toll agencies outside of the United States have deployed ORT. In one case, a customer without a transponder that proceeds along the toll facility is identified by means of digitally photographing the license tag, and the registered owner is subsequently billed for the trip.

Two current but different applications of ORT were examined throughout the course of the study. One application is in place in Toronto on the 407 ETR (Express Toll Route). The other application is in Melbourne Australia, on the toll project known as City Link.

Highway 407, Toronto



On Toronto's Highway 407, electronic sensors located on overhead gantries log highway entry and exit points.

Opened in 1997, the Highway 407 ETR was the first toll road in the world to apply ORT technologies. Highway 407 ETR runs east and west just north of Toronto, Canada's largest city, for a total of 65 miles. A customer's toll charge is calculated on a per mile basis. Vehicles are detected at their entrance and exit points in order to calculate the appropriate toll.

The facility has over 500,000 transponders in service and approximately 700,000 daily toll transactions. No cash tolls are collected on the system. Transponders

are required for all commercial vehicles, and non-transponder equipped vehicles' entrances and exits are recorded via license plate recognition cameras and the customer is billed. Customers either have a transponder for the 407 OTR system or they are non-transponder users of the highway and treated as customers rather than violators. Their toll is collected through a video identification and billing system. The license plates of users who do not have transponders are identified through the use of high-speed cameras and optical character recognition (OCR) technology with manual verification when necessary. Non-transponder customers' addresses are obtained through the Canadian motor vehicle department, and the users are billed directly for their toll plus a trip surcharge to account for the additional administrative expense of the direct billing.

City Link, Melbourne

In Melbourne, a series of eight toll zones are created by gantries over the mainline of the highway to capture the toll transactions.



The City Link is located in the city of Melbourne, in the State of Victoria, Australia. The project is a Build-Own-Operate-Transfer (BOOT) that opened to traffic in January 2000. The project consists of approximately 13 miles of new limited access expressway connecting the airport to downtown Melbourne. The project provides two new tunnels under the Yarra River connecting downtown to the Southeastern Freeway and includes 17 interchanges. This exclusive ORT project has already generated over 650,000 transponders in service. A series of eight toll zones are created by gantries over the mainline of the highway to either capture the transaction via an ETC transponder, or to capture the non-subscriber with license tag recognition cameras. The system mounted on overhead gantries captures images of every vehicle at speeds up to 93 mph.

Unlike Toronto, City Link does not employ direct billing. In addition to ETC, City Link does allow occasional users without transponders to phone in advance (or immediately after) for a one-day use of the roadway. Users provide their license tag number and a credit card to which a flat rate is billed for the day to obtain a “day pass.”

Open Road Tolling is straightforward in concept but fairly complex when contemplating its implementation. The prospect of introducing this type of system on a well established network of toll highways that are owned and operated by various agencies in a state with nearly 50 million annual visitors (one fifth of which rent cars)¹ serving diverse customer bases raised many questions.

Background

Based on a strong tradition of innovation in the toll community in Florida, the Turnpike staff visited the innovative Highway 407 Express Toll Route (407 ETR) in November of 2000. An Open Road Tolling Forum was conducted on February 5 and 6, 2001. Representatives of 407 ETR, the private concessionaire that operates Highway 407 in Toronto, were invited to Florida for a daylong forum. Representatives of four toll agencies and the Florida Department of Transportation’s Office of Toll Operations (OTO) participated in work sessions with those that have implemented a toll operation where no manual collection is provided in the travel lanes and all collection is, in fact, electronic.

Subsequent to that forum, a presentation was made to TEAMFL at the March 14, 2001 meeting in Tallahassee, and each of the four operating entities participating in this effort presented their views.

It was the consensus of the TEAMFL Board of Directors that the concept of statewide open road tolling, while posing significant challenges and offering significant potential, warranted further study. The group decided to engage the services of the Center for Urban Transportation Research at the University of South Florida to act as project manager for a feasibility study and that the Turnpike would be the contracting entity. The other three toll agencies, OOCEA, THCEA and MDX pledged the full support of their staff and consultants.

Preliminary interviews were conducted with the executives of the four toll agencies as well as the chairman of TEAMFL and the Acting Executive Director of the Florida Transportation Commission in order to prepare for the project’s

¹ Source: BEBR, 1998 Florida Visitor Study

initiation. The study organization and assignment of key personnel, as well as the study purpose and schedule, were established at the first of a series of work sessions in early June 2001.

Study Purpose

The chief executives of the Turnpike, OOCEA, THCEA, and MDX with the chair of TEAMFL and the Acting Executive Director of the Transportation Commission (later described as the Management Committee) arrived at the following statement of purpose:

“The study of the feasibility of open road tolling in Florida will focus on the implementation of a “barrierless” toll collection system that is fully electronic, has the capability of collecting tolls from every customer at highway speeds, the ability to identify all vehicles regardless of the owner’s subscription to an electronic toll collection program, be interoperable statewide, and is easily understood and embraced by Florida’s toll facility customers.”

Some of the agencies are currently collecting tolls without barriers at highway speeds from customers with transponders, notably the OOCEA with its express lanes on State Route 429. As of this writing, others are close to doing so. The Turnpike District is about to open its express lanes on the Suncoast Parkway, and still others are planning for this option. The THCEA has designed its new, elevated reversible express lane facility to accommodate only electronic collection. This facility is scheduled to be open to traffic by early 2004. Although all of these facilities incorporate several important attributes of an open road toll project (“barrierless,” high speed and interoperable) none of them, with the exception of THCEA’s project, contemplated the notion of the absence of manual or “cash-less” collection. It should be noted that the elevated, reversible express lane facility in Tampa was conceived by THCEA as being available only to customers of SunPass or E-Pass. The agency is now contemplating an all-electronic system whereby non-transponder users would be billed using video license plate recognition technology.



The Orlando-Orange County Expressway Authority is collecting Tolls at highway speeds now at its Forest Lake Plaza – SR 429

Because of the potential confusion between collecting tolls in an “open road environment” as is now being done by OOCEA (express high speed lanes in the center of the plaza and cash lanes separated to the outside) and the concepts employed in Toronto and Melbourne (no accommodation for cash payments), a more appropriate term for what was examined in this study is All Electronic Toll Collection (AETC). For purposes of the “Feasibility of Open Road Tolling in Florida” the term Open Road Tolling and All Electronic Toll Collection are used interchangeably.

Study Organization

In order to address the wide range of issues presented, the following organization to conduct the research on this issue was devised. Several subcommittees, chaired by high-ranking officials from the participating toll agencies were established. These subcommittee chairs formed a Steering Committee for the project and ensured that overlap was minimized and that coordination occurred.

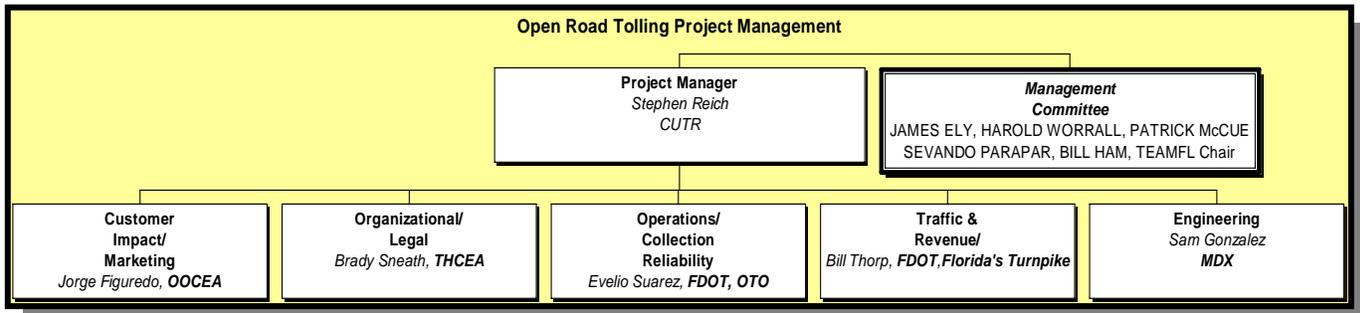


Figure 1.1 – Study Organization

Each subcommittee was staffed with representatives of the four participating toll agencies. Appendix A contains a complete list of the subcommittee membership.

The work of the subcommittees centered on answering dozens of key questions that were identified by the Management Committee and their work represents the vast majority of the research supporting this report. Several subcommittees documented their results in formalized reports. The Operations/Collection Reliability report is included in its entirety in Appendix B. The Traffic and Revenue Subcommittee's report is included in Appendix C.

Several questions emerge in addressing the potential statewide implementation of AETC. How will the toll customers accept a system that does not accept cash in the lanes? What benefits are there to the customers and the authorities? Is the technology sufficient to ensure adequate payment compliance? How will tolls from out of state and rental car customers be handled? What are the costs and organizational implications of instituting such a system? If the concept is feasible, how best should AETC be implemented in Florida?

This report attempts to answer these and many other issues regarding ORT, or AETC, and categorizes the assessment of feasibility by the functional areas represented by the subcommittees established: Customer Impacts and Marketing; Operations and Collections Reliability; Traffic and Revenue; Engineering; and Organizational and Legal.

Why Examine All Electronic Toll Collection?

One of the central reasons for looking at AETC is to ascertain if there are any opportunities to decrease operation costs of a toll highway. Unlike non-tolled highways, the cost of collecting the revenue to build, operate, maintain and expand the system is directly attributed to the agency. It is not necessarily true that toll roads cost more to operate, it is just that the collection costs are not indirect as they are for non-tolled facilities and more controllable by the operator. Any operating efficiency gained flows to bottom line, and depending on the agency's debt position, can be leveraged several times over. A fractional decrease in the cost of collection can be significant. As a matter of perspective, the FY 1999 Turnpike District's operating budget for toll collection was \$58.7 million.

A review of the cost to collect tolls in Florida shows that operating savings are achieved through the use of electronic toll collection. The extent of these operating cost savings vary significantly with cost allocation assumptions and the maturity of an ETC system. A system with a higher percentage of ETC transactions should see more savings per transaction due the spread of the fixed cost over a larger transaction base. Based on this review it is estimated that at current ETC usage rates, the operating cost savings per transaction over a manual transaction is on the order of \$0.05 to \$0.06.

Applying these differentials (understanding that this savings should grow as ETC market penetration increases) would result in an estimated annual operating savings for FDOT owned or operated facilities of \$23 million. This is roughly equivalent to the ability to bond over \$320 million for capital projects.

Another significant potential of an all-electronic collection system is that of customer convenience. The long-standing dilemma for toll operators is the customer service implication of charging for a premium service, in many cases a true timesaving, and then delaying the customer to accept payment. The potential of employing a system where no customer has to fumble for money and stop to pay a toll is both intriguing and worth investigating.

In addition to the operating costs of toll collection, there are significant capital costs involved in any toll facility. The widening of the highway to "flare" for the toll plaza, the administration building, the plaza and booths, canopy, access tunnels and the electronic equipment are expensive. A recent estimate for MDX projects a cost for a 14-lane plaza, not including the roadway work, right of way, pavement and drainage at over \$8 million (nearly \$600,000 per lane). The

estimate just to provide a tollbooth, equipped with manual and ETC equipment and a concrete barrier, is roughly \$260,000. It is important to understand if the introduction of AETC can reduce these costs in the future. The Turnpike alone expects to spend \$400 million over the next ten years to renovate or expand toll plazas on their existing facilities.

Potential benefits from an AETC system could be derived from eliminating the need to have toll collection personnel working in traffic lanes. The introduction of dedicated ETC lanes and express lanes complicates employee health and safety issues. Even with access tunnels there is routinely the need for supervisory, maintenance and other toll employees to confront highway traffic. Although a substantial number of customer service personnel would undoubtedly need to be employed in lieu of toll collectors offsetting operational savings, they would certainly work in a safer environment.

Other safety issues that may be involved include the elimination of queuing at toll plazas. If all tollbooths were eliminated, there would be no capacity reduction at the point of collection. The other side of this issue is that in some urban settings, the toll plaza acts as a traffic meter. The elimination of the plaza will in some cases overload downstream interchanges or highway sections. The backup will merely move from the plaza to another location. Although from the toll operator's standpoint, this may in fact be somewhat beneficial.

The next five sections of this report represent a summary of the in-depth work performed by the project subcommittees.

Customer Impacts and Marketing

While the concept of high speed, non-stop toll collection initially seems like a customer service enhancement, there are clearly some issues that require examination. As with the other subcommittees, the group was given a series of key questions developed by the Management and Steering Committees. These questions dealt with potential customer concerns regarding all electronic toll collection or AETC:

1. Is there customer resistance to not being able to use cash?
2. Will AETC encourage/discourage use of the (toll) roads?
3. What are today's impediments to the use of toll roads?
4. Do customers have privacy concerns over the use of video tolling?
5. What are reasonable collection and enforcement methods?
6. What is an acceptable delay to pay a toll?
7. Is pricing differential for payment method (cash, electronic, video) acceptable?

The Management and Steering Committees thought the most appropriate method of understanding customers' acceptance of an AETC system was to survey them. In addition to customer attitudes towards AETC, their receptiveness to SunPass and E-Pass needed to be better understood. If in fact all toll customers were ETC subscribers, eliminating manual collection would be simple.

With 100% ETC market penetration, concerns over not being able to use cash in the toll lanes, video collection and privacy would have all been overcome. The reality is that current ETC penetration for the Turnpike customers was 22% system wide as of July 2001 including "start-up" projects and rural facilities. OOCEA's more mature and urban E-Pass has achieved a 44% participation rate and is experiencing over 70% ETC transactions in the peak period in the peak direction at some of its plazas.

It follows that the need to understand more fully what impediments exist to using SunPass or E-Pass is important in assessing customer acceptance of AETC. In addition to the telephone survey conducted by the study team, a series of focus group sessions were recently conducted. The results of these two efforts have given valuable insight into the customer acceptance issues.

Telephone Survey

The purpose of the survey was to assess the opinions of cash users and those that do not use toll roads in selected areas in Florida with regard to the concept of open road tolling. *Pecora & Guitar, Inc.* of Winter Park, Florida, and *Dr. Evan Berman* conducted the study. *On-Target Marketing* of St. Louis (MO) conducted the interviews. Respondents were selected from four geographic areas within Florida. All respondents were randomly selected from among listed residential phone numbers from the South Florida, Orlando, Tampa and Turnpike regions. The Turnpike region was defined as an area within twenty-five miles of Florida's Turnpike from Boynton Beach to Wildwood, excluding the area from Kissimmee through Winter Garden due its inclusion in the Orlando survey area. The survey results in their entirety are included in Appendix B.

The phone survey was conducted between September 10 and October 1, 2001, excluding the days of September 11 and 12 due to the national tragedy. The final sample of completed surveys consists of 605 cash users and 606 non-users, and is distributed across regions as depicted in Table 2.1.

Table 2.1 - Survey Sample

	South				
	Orlando	Florida	Tampa	Turnpike	Total
Cash Users	151	151	151	152	605
Non-Users	151	152	150	153	606
TOTAL	302	303	301	305	1,211

The sample and population demographics are compared in Table 2.2.

Table 2.2 - Population and Survey Demographics

		Orlando		South Florida		Tampa		Turnpike	
		Population	Sample	Population	Sample	Population	Sample	Population	Sample
Age	18-24	13.5%	5.3%	11.0%	12.6%	9.4%	11.3%	8.1%	14.8%
	25-44	44.3%	37.5%	41.2%	38.4%	35.7%	30.2%	33.1%	33.8%
	45-64	28.3%	35.5%	28.7%	34.5%	29.8%	38.5%	28.3%	33.5%
	65+	13.9%	21.8%	19.1%	14.6%	25.1%	20.0%	30.5%	18.1%
Gender	Male	47.6%	47.4%	47.8%	40.3%	47.3%	41.9%	47.5%	43.8%
	Female	52.4%	52.7%	52.2%	59.8%	52.7%	58.2%	52.5%	56.2%

The sampling error for 600 completed surveys is about 4.0%. This means that, on repeated sampling, the results of this survey will be replicated 95% of the time with a margin of no more than plus or minus 4%.

Paying with cash

The majority of the respondents (all cash or non-toll highway users) indicated a strong preference for continuing the option of paying cash. The cash customers were stronger in this preference with 91.1% either indicating that they agreed or strongly agreed that cash should always be an option on toll roads (Figure 2.1.) The preference did not significantly vary by region but was, as expected, stronger in those that currently use cash on toll facilities.

There does seem to be, however, a willingness to shift to ETC if there was a pricing differential. When asked if it were less expensive to travel toll roads by having SunPass or E-Pass, both cash customers and non-users overwhelmingly responded that they would use ETC (Figure 2.2).

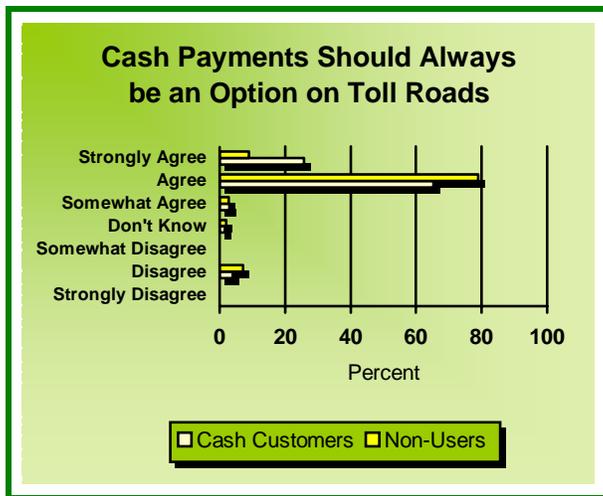


Figure 2.1 – Cash Payments

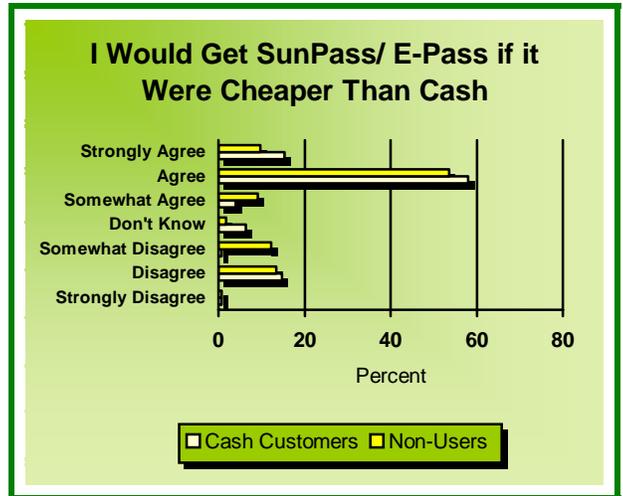


Figure 2.2 – ETC Discount

Toll Road Use

A large majority of those surveyed are very infrequent users of toll facilities. Previous research has indicated that the toll roads simply do not provide access to places that potential customers need or want to go. Over Eighty-one percent of cash users ride the toll roads less than 5 times per week, 13.4% use the toll roads between five and ten times per week, only 5% use the toll roads more than ten times per week. There does seem to be interest in not having to stop at a toll plaza to pay a toll. When asked if they would participate in an ETC program if they did not have to stop to pay their tolls, the results mirror the ETC discount question (Figure 2.3).

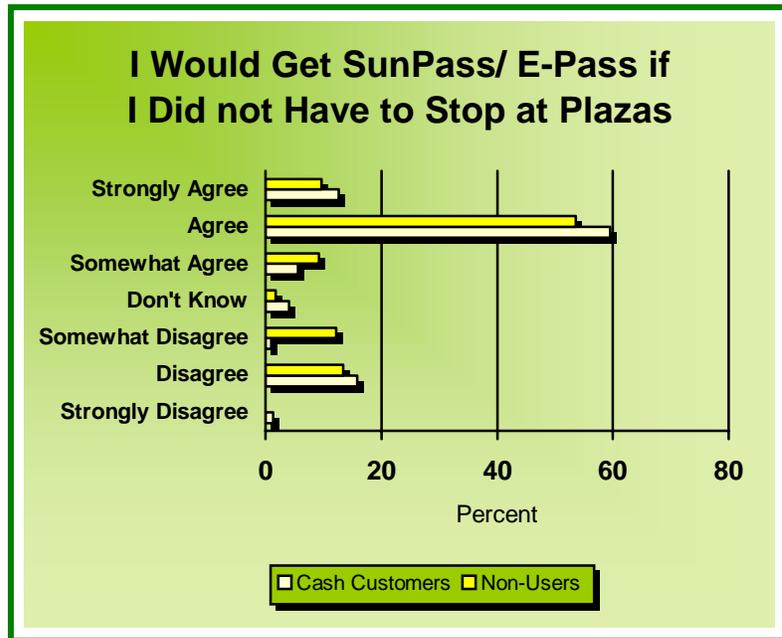


Figure 2.3 – Non-Stop Collection and ETC Acceptability

Privacy

Confidentiality of customer records is a concern to those individuals surveyed. Over 75% of cash customers (58.4% non-users) believe that motorist travel information generated by video tolling should not be made available to the general public. Nearly 88% of cash customers (75.6% non-users) believe that toll agencies should treat this information as confidential and 79.6% (74.8% non-users) feel that motorist travel information should only be made available when requested by the courts. If these safe guards could be put in place, 54% of cash customers (46.7% non-users) indicated that they would participate in an ETC program.

While privacy issues are of concern to the individuals surveyed, the mixed response to whether the customer would participate in an ETC program if safeguards were in place suggests that a large number of customers are not motivated by the privacy issue. Other factors, including frequency of use and unique individual travel needs are more important to enticing non-ETC customers to acquire new and advanced technology for their travels on toll roads.

It is recommended that changes in Florida Statutes be made to broaden privacy protection laws to include customer account and travel information that would be generated by future AETC systems. These recommended changes would be a consistent extension of existing privacy protections currently in place for the customer records/information of the SunPass and E-PASS programs.

Collection and enforcement methods

Toll enforcement methods currently utilized by Florida toll agencies have been proven to be an effective deterrent to toll violators in the state. These enforcement methods include the issuance of toll violation warning letters and Uniform Traffic Citations as provided for in Florida Statutes. Additional use of law enforcement officers to target high toll violation locations has also helped apprehend motorists who fail to pay the required toll. Use of these toll enforcement methods has resulted in a statewide toll violation rate of approximately two-percent.

The survey project asked cash users and non-users to respond to the statement: "It is OK for the government to hire a collection agency to collect unpaid tolls." Sixty-eight percent of cash customers responded that they either somewhat agreed, agreed, or strongly agreed with the use of collection agencies. Nearly 65% of non-users supported government hiring a collection agency to collect unpaid tolls, with one-fourth (25.6%) somewhat disagreeing, disagreeing, or strongly disagreeing with the idea. (The use of outsourced collection agencies may require legislative approval.)

Support among cash customers and non-users for this idea could serve as a platform for more aggressive action by toll agencies to pursue uncollected tolls. However, it should be recognized that an undercurrent of disapproval exists for the idea among those individuals who are the least likely to use the state's toll facilities.

Acceptable delays

The survey results identified elasticity in the tolerance for delays at toll plazas, with delays over one minute being viewed negatively. Cash users and non-users responded consistently when asked whether it was OK to wait one minute, three minutes, or five minutes to pay a cash toll. Approximately three-quarters of respondents either somewhat agreed, agreed, or strongly agreed that one-minute was an acceptable wait. A three-minute wait was acceptable to about half of respondents, and a five-minute wait was OK with less than one-quarter of people.

Pricing differentials based on payment method

The topic of pricing differential provided a near even 50-50 split among survey respondents. This mixed result suggests that additional clarification of the concept of a pricing differential may be necessary to gauge public acceptance of a hierarchical pricing structure based on payment type. When asked to choose between video toll collection and SunPass/E-PASS when Video Toll Collection (or VTR, the 407 ETR model that photographs the license tag and bills a customer) is more expensive, more than 80% chose the less expensive SunPass/E-PASS option. Further testing should be done to determine whether respondents were motivated to choose a preferred technology or whether their decision was motivated by price.

Cost of purchasing a transponder as a deterrent

Non-users surveyed responded favorably to the question of whether they would get a SunPass or E-PASS if the transponder were free. Seventy percent of participants said they either somewhat agreed, agreed or strongly agree that they would sign up if the transponder were free (Figure 2.4).

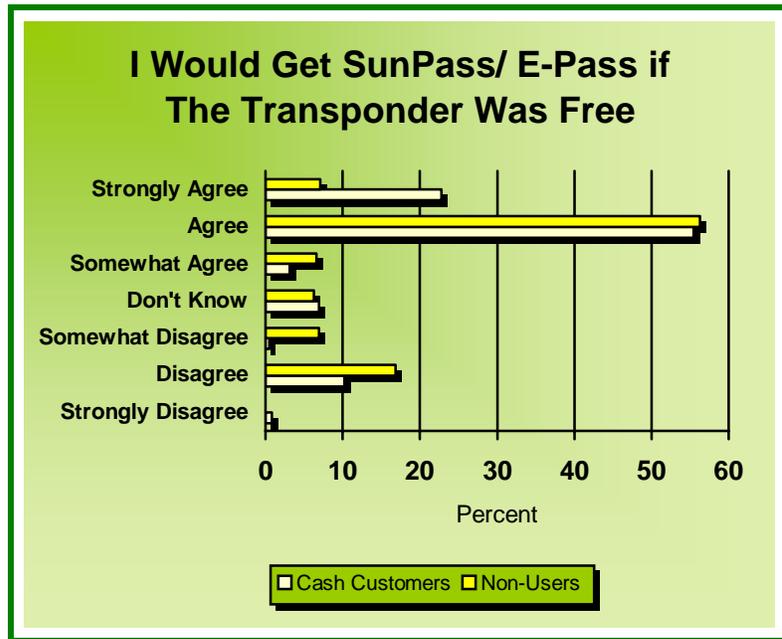


Figure 2.4 – ETC Acceptability with No Cost Transponder

Differences in demographics, travel patterns, and cultures between markets

The survey results are very similar across markets and can be further evaluated by the individual agencies as they move forward.

Focus Group Findings

Twelve focus groups were conducted in September 2001 in order to determine how current toll road customers react to different toll collection alternatives. *Resource Systems Group* of White River Junction, Vermont for URS Corporation and Florida’s Turnpike performed this work. The groups included randomly identified toll road customers in each of three metropolitan markets: Miami, Tampa and Orlando. Three of the groups consisted of current ETC customers (SunPass or E-Pass) and the remaining nine consisted of cash customers (used a toll road at least once in the past week). All participants were asked to complete a weeklong trip log for the period just prior to their session.

Each focus group consisted of approximately ten participants and was led by the moderator through the following discussion points:

- How do they perceive current travel conditions on the tolled and toll-free roads?
- What do they know about the current electronic toll collection (ETC) options?
- How would their use of different toll collection alternatives and travel patterns change with: 1) introduction of express lanes that bypass toll plazas, 2) introduction of video toll collection accounts (VTC), and 3) introduction of open road tolling?

At the end of the focus group discussion, participants completed a written questionnaire that covered the key discussion topics and included stated preference exercises that measured the quantitative trade-offs customers make in deciding whether to acquire ETC, and how their travel patterns might change under different tolling configurations. The Resource Systems Group's report on the focus group results is included in Appendix C.

ETC customers

- Current ETC users are generally among the most active toll road users
- ETC users are generally very satisfied with the system they use
- ETC users universally like the idea of express lanes bypassing plazas
- Open road tolling is perceived as providing equivalent benefits as express lanes

Cash customers

- Many cash customers are also frequent toll road users
- Awareness of existing ETC options is very low among cash customers
- The transponder purchase requirement is a significant disincentive for cash customers
- Cash customers do not place a high value on the convenience offered by the current ETC system
- ETC express lanes provide a real perceived benefit
- Reaction to VTC is mixed
- Open road tolling received a generally negative reception among cash customers

The focus group participants completed a questionnaire that covered most of the issues discussed in the groups. The following are initial observations from the stated preference responses:

- Almost three-quarters of existing cash customers would be willing to acquire a toll account (ETC or VTC) if an express lane system or open road tolling is instituted. Some would do so only with significantly more favorable account features than are currently offered but express lanes and open road tolling clearly provide an added incentive to acquire an account.
- Even if they were to remain cash customers, over three-quarters would continue to use the toll road with surcharges or other account requirements that could be imposed on them.
- Less than one-third of current cash customers make trips that could be diverted from toll-free roads to toll roads if an express lane system or open road tolling is instituted. Of these, about 80% indicate that they would divert to the toll road if they had ETC or VTC and did not have to travel through plazas.
- About two-thirds of current ETC users make trips that could be diverted from toll-free roads to toll roads if an express lane system or open road tolling is instituted. All of these users indicated that under some future circumstances they would shift their travel to the toll roads if plazas did not impede them.

Cash paying customers who participated in the focus groups stated a strong belief that the transponders should be free; however, many stated that even if the transponder was provided at no cost, they would still not sign up for SunPass or E-Pass. Simply put, those individuals felt they either did not use the toll roads sufficiently to make it worth their while to set up an account or they just wanted to continue to pay cash on a on-going basis.

From this work, it is apparent that there are some challenges to be overcome in order to implement AETC statewide. The customer responses to the discount and free transponder questions, their preference for non-stop toll collection along with their indication that they would not divert to another facility if AETC were implemented, show some potential level of acceptance to the idea.

It is also apparent that additional public education will help increase the acceptability of open road tolling. Although tighter privacy laws may help



overcome resistance to video tolling, the extent of the existing privacy protections also needs to be disseminated.

Operations and Collections Reliability

The Operations Subcommittee was charged with studying the viability of transitioning from a conventional toll collection environment to an open road tolling environment. Major areas that were reviewed include: potential revenue losses (leakage), enforcement capabilities, ORT technology, backroom issues, and operating costs.

The study relied primarily on information provided by the Toronto 407 ETR and the Melbourne City Link. In addition, information was gathered from the FDOT Office of Toll Operations, FDOT Turnpike District, Tampa-Hillsborough Expressway Authority, Miami-Dade Expressway Authority, and Orlando-Orange County Expressway Authority. This information was used for comparative purposes to ensure the information obtained from outside sources seemed valid and reasonable.

While the study did not reveal any unexpected “show stoppers,” several major areas of concern associated with deployment of ORT in Florida include: an increased potential for revenue losses due to un-collectable invoices, a surcharge to maintain revenue neutrality and the potential functional obsolescence of the existing AVI system.

Leakage

While toll agencies would prefer to avoid leakage entirely, it is an expected business cost of operating a toll road. In order to determine an “acceptable level of leakage” for a cashless toll collection system, leakage must be considered in the broader context of the total business cost of customer service in an ORT environment and the off-setting cost savings that may result from lower maintenance facilities and construction costs.

Revenue loss results from four major areas: violators, ETC customers (delinquent), equipment malfunctions and toll collector fraud. All will remain with ORT (except the latter), and it is possible that the others may actually increase, at least in the start-up phases.

Violations

The violation rate for Florida’s toll roads today averages 2-3%. Prior to implementation of SunPass and E-Pass, violation rates averaged 1% system wide. Florida’s toll agencies are actively seeking ways to reduce the current violation rate. Deterrents include increasing customer awareness, violation enforcement systems (VES), law enforcement presence on the toll roads, press coverage of violation consequences and signage.

Table 3.1 - Revenue Loss by Agency for Violations

Agency	Annual Toll Revenue	Revenue Loss for each % of Violations
FDOT	\$430,000,000	\$4,300,000
MDX	\$36,000,000	\$360,000
OOCEA	\$150,000,000	\$1,500,000
THCEA	\$24,000,000	\$240,000

The amount of revenue lost through leakage is dependent on the overall revenue figures for individual agencies, as illustrated in Table 3.1. It can be estimated that every one percent of revenue loss for these agencies represents about \$6.4 million. OOCEA’s experience with their new express lanes provides additional insight into the effects of barrierless tolling on leakage resulting from violations. The violation rate at Forest Lake Plaza is currently around 3%. The Forest Lake Plaza express lanes are the first of the Authority’s planned express lane projects, which will include 10 mainline plaza conversions within the next 10 years. These plans represent the OOCEA’s approach to Open Road Tolling.

Further insight into leakage expectations can be derived from existing open road tolling applications in operation today. However, the information provided by ORT operators at the Toronto 407 ETR and Melbourne City Link differ significantly. On Toronto’s 407 ETR, the leakage number is estimated by the study team to be between 4% and 5%, while the Melbourne City Link recently reported a violation rate of only 0.7%, which is lower than any existing ETC, express or dedicated lanes in the US. Because of the wide disparity in these numbers, the operational, societal and political differences between these two systems and Florida’s situation must be considered. Business rules also have a major effect on the percentage of violations. Both Toronto and Melbourne are supported by legislation favorable to ORT policies and violation deterrents. Users of the

Melbourne City Link tend to live in the local area, and 85% have a transponder on their vehicle. Toronto's largest revenue losses come from trucks, even though they are statutorily required to have a transponder in order to use the Highway 407, and owners risk substantial fines for non-compliance.

Unlike the Florida model, both the Melbourne and Toronto projects implemented ORT from the outset of operations, so their customers did not need to change their behavior. Implementation of ORT in Florida may face the natural resistance and confusion inherent with procedural change and the elimination of manual payment methods. The fact that U.S. drivers are less likely to correct their addresses when they move poses an additional challenge.

ETC Customer Delinquency

Just as with any business, there is a certain level of un-collectable accounts and receivables associated with the SunPass and E-Pass systems. The amount of leakage currently experienced by Florida toll agencies depends on their individual policies and procedures. For example, if ETC account balances are allowed to go negative, subsequent payments can be used to offset tolls missed when the account was without funds. The downside of this policy is that customers may take advantage of the opportunity to post-pay rather than pre-pay their accounts. Decisions as to whether an ETC customer is treated as a violator when his account balance reaches a no-funds status also influences delinquency behavior and the ability to recover lost tolls. This will continue to be the case in an ORT environment.

A higher level of leakage may be acceptable as long as cost savings are, at a minimum, off-setting. Operators of the existing ORT systems in Canada and Australia seem to have experienced differing results. While the 407 ETR has experienced substantial cost avoidance due to the lower operating costs of ORT, Melbourne's financial reports showed a loss of about \$120 million during their first 6 months of operation.² High start-up costs and operational challenges during the initial deployment of the Melbourne system contributed to the high initial operations costs.

² Toll revenue - \$34m, operating expenses of \$60m, concession fees payable to the state of \$13m, depreciation of \$35m and net interest of \$45m.

Methods to stop leakage and curb losses

Enforcement is a key element to the successful deployment of ORT. Toll operators must balance the cost of enforcement (including both infrastructure and administration costs) with its effectiveness as a deterrent.

In an ORT environment, using license plate information, customers without a valid transponder can be charged their tolls plus a surcharge. The existing 407 ETR system in Toronto, for example, has been using video toll collection and enforcement methods in an all-electronic environment since October 1997. This system, which claims to be the lowest risk ETC solution in the world, curbs leakage by using the following combination of policies, deterrents and fee structures:

1. The 407 ETR de-activates transponders for accounts that are outstanding and notifies the Registrar of Motor Vehicles for plate denial where the customer is unable to renew their license plate or obtain a new license plate until all tolls, fees and interest have been paid in full. This is the same process the Canadian Ministry of Transportation uses for parking tickets and parking permits.
2. Accounts overdue more than 90 days are sent to a collection agency and are subject to a Late Payment Fee of \$30 (Can. plus applicable taxes).

In order to implement similar measures, Florida's toll road operators will need authority to place registration stops in the Department of Highway Safety and Motor Vehicle (DMV) system. Since Florida has a substantial tourist industry, there will be a need to educate the vacationing public and to collect tolls and fees from those with out-of-state license plates. The OOCEA estimates that out-of-state violators account for 4.5% of all violators. The percentage of out-of-area violators in an ORT environment may be much higher because these motorists are unlikely to have transponders or accounts with Florida agencies. In addition, they may not be aware of toll payment requirements in an ORT environment and manual payment options will not be available at toll plazas as they are today. Common enforcement policies might also help to foster customer acceptance.

ETC Participation Goals

Substantial ETC participation will reduce leakage and administration costs. The ETC participation goal will depend on the ORT model. For example, an all-ETC model (such as Toronto) will require higher ETC participation than a day-pass model (such as Melbourne). Other variables include time of day (with peak periods at a higher level) and roadway profile (i.e., urban components typically report higher ETC levels than rural components). Florida’s toll operators are targeting a minimum of 65-85% ETC participation by 2010. The ORT participation goal is also expected to be in the 55% to 85% range.

Table 3.2 - Electronic Toll Collection Participation

Agency	Current ETC Participation	ETC Targets without ORT
<i>FDOT</i>	27% overall	55-70%
OOCEA	44% overall	65-85%

Business Policies and Procedures

Successful ORT will require new business policies and procedures to reduce leakage and curb losses. System payment methods may be ETC-based, video-based or may employ some new paradigm.

As an example, Florida toll road operators currently use an axle-based class structure. Multilane ORT systems of the future may require classification schemes that can be measured by overhead mounted equipment that is also more conducive to correctly classifying vehicles that are straddling lanes. Policies and procedures must have a seamless look and feel for ORT customers in Florida to avoid confusion and promote “buy-in”.

Statutory Changes

Statutory changes that support ORT operations are also needed. The following areas need to be considered:

- License Plate Readability – The variety of Florida license plate designs presents a definite challenge to license plate recognition systems. It would be helpful to set a standard for new plates within Florida that will require

consistency in character font, size, contrast of color and reflective materials. Background colors and designs should be designed to promote readability. Laws prohibiting license plate obstruction must also be enforced. Dirt, license placement on the vehicle, trailer hitches, decorative lighting and missing plates all contribute to VES problems with today's technology.

- **Payment Enforcement** – Laws that support both ETC and non-ETC payment methods, surcharges, and violation enforcement must have the necessary bite to make toll evasion unattractive to users of the toll facilities. Statutes with meaningful consequences for account holders with delinquent status will also help prevent leakage.
- **Law Enforcement Vehicle Access to Account Status** – Currently law enforcement officers can cite vehicles for non-payment of tolls, but it is often difficult for them to determine whether a vehicle is equipped with a working transponder. If law enforcement vehicles were equipped with portable transponder readers, this problem would be alleviated. Real-time access to account information could also be useful in resolving payment issues while the vehicle is using the toll facilities.
- **Access to DMV Information** – In order to collect tolls from both in-state and out-of-state drivers, easy access to current vehicle owner information is needed. Today, Florida's toll agencies have developed relationships with Department of Highway Safety and Motor Vehicle personnel in other states to obtain information on an as-needed basis. There are also companies that will provide tag look-up information as part of a batch process.

Other Enforcement Capabilities

One of the most important issues appears to be the need for legislation similar to Toronto's, where multi-axle commercial vehicles are required to have transponders. It would appear the transponder for commercial vehicles would need some kind of feedback mechanism for the drivers. The Type II transponder OOCEA is considering with the lights and tones is a possible alternative. As an alternative to requiring transponders, cameras could be used to photograph the front license plates on commercial vehicles thereby solving the problem associated with enforcing violations caused by leased trailers. Florida has a high volume of container freight and ownership of the trailers is often difficult to obtain. Front license plate photography may encounter political resistance.

Another issue for consideration is the use of new multiple protocol AVI readers that are capable of reading transponders from various manufacturers. This may be particularly beneficial in light of the large number of EZPass customers in the northeast, which continues to grow at a rapid pace. Multiple protocol readers might also facilitate acceptance of PrePass system transponders used by many freight operators at truck weigh and inspection stations throughout the country. The ability to read PrePass transponders might also allow toll operators to obtain vehicle ownership information for billing purposes even where a prepaid toll account does not exist. Additional investigation of this technology is warranted.

Employing a Surcharge to Make Operating Costs Neutral

Several calculations were performed to estimate the surcharge necessary for different participation rates of video billing. The most aggressive was 40% video billing customers and 60% ETC participation. Backroom operational costs were estimated to be between 3-12 cents per image. These estimates were based on current FDOT VES operating costs and estimates of Toronto's operational cost for video billing. FDOT Turnpike system roads currently generate approximately 1 million toll transactions a day. A sixty percent ETC rate would generate 400,000 video billing customers per day. This equates to 146 million trips at a cost of 3-12 cents or \$4.38-\$17.52 million per year.

Invoice production and postage is estimated to cost 30-40 cents per invoice. Invoicing would probably be monthly to save on postage and other related shipping and production costs. In an ORT environment, the number of billable transactions would likely be reduced by half because it would operate as a closed system (entry/exit). This would result in 73 million invoices per year at a cost of 30-40 cents or \$21.9-\$29.2 million.

Based on the above projections, the combined cost of operations and invoicing is estimated to be \$26.28-\$46.72 million per year, which is equal to 36-64 cents per video billing trip. It is important to note that these estimates are for operational costs only, and do not include initial equipment, facility or capital costs.

A contract with a third party for billing and collections would likely be utilized due to the large volume of invoices. Normal industry mark-ups for this service would increase the cost of each invoice by 25%, to 45-80 cents each. The surcharge would need to be somewhere between 50 cents and \$1.00 per video billing trip to make the operation cost neutral. Some savings might be possible by partnering

with utility companies to include invoices in their bills, or by allowing video customers to set up prepaid credit card secured accounts.

It is important to note that the estimated cost of video transactions in Toronto is 52 cents U.S. or 75 cents (US equivalent) in Melbourne. A more conservative approach may be in order. Starting with a surcharge of \$.50-\$1.00 would provide a much higher comfort level for financial feasibility. It will be much easier to lower the surcharge, if efficiencies are gained and costs are lower, than it would be to try to raise it if costs are higher than originally projected.

Given that the estimated operating cost recovery figure is about \$.50 per transaction, the Traffic and Revenue analysis that follows assumes only this amount.

Current Technological Performance and Capability

Based on the existence of the Toronto 407 ETR and Melbourne City Link systems, there is little doubt that technology exists today to support ORT. However, in order to optimize the effectiveness of an ORT deployment, there must be an evaluation and selection of the most appropriate AVI equipment for an ORT application. The physical configuration of ORT facilities requires a system that is capable of capturing traffic information in multiple lanes beyond the two-lane express lane design used in Florida today.

If migration from traditional barrier toll facilities to the ORT model occurs gradually by incorporating express lanes and maintaining cash lanes for non-transponder users, many important lessons may be learned along the way that may help to minimize the risk associated with an abrupt transition. A methodical phased transition may also be helpful by allowing ORT designs and systems to become more mature before the final transition occurs. Recent ORT innovations such as real-time enforcement and the use of transponder data by the incident detection algorithms in the traffic management sub-system are just a few examples of recent advances in technology.

The difficulty in looking at any one project to determine the viability of the associated video technology to be used for ORT is the uncertainty of what the final design will be and the lack of defined business rules. Therefore, the study approach focused on available technology and how it is being used or might be used to convert today's violators into video billing customers.

To address the pros and cons of today's ORT technology, a number of ORT and AVI projects from around the world were investigated. While none of the projects are exactly the same in their technological configuration or operation, they all involve similar applications of video technologies to high-speed traffic. In addition, because the degree of available data associated with each of the projects is different, it was also difficult to make direct comparisons of their effectiveness. The following represents the general pros and cons regarding current ORT technology.

Pros

Based on the research, the following information supports the use of current technology for ORT demonstration projects:

- Current state-of-the-art camera technology (cameras and trigger mechanisms) can produce images of high-speed vehicles and their license plates acceptable for use in optical character recognition (OCR) and/or manual identification procedures
- OCR software has been developed by multiple manufacturers to the point of being capable of scanning and identifying license plates with very high degrees of confidence based on the software's ability to "learn" font and graphic characteristics of specific plates and languages
- High-speed computer processors and storage devices are capable of processing, downloading and storing the vast amounts of data required to support video of high traffic volumes
- Communications technology has advanced far enough to ensure the accurate transmission of this data to the appropriate "back office" operations

Cons

The following information contains the concerns and issues uncovered during the research:

- The primary technological concern related to ORT is the lack of uniform standards in the U.S. (and worldwide) throughout all elements of ETC and

VES including transponder type, operations, software and communications and approaches to integrating video

- The wide range of quality and performance that exists among vendors of video and OCR technology that appears to be independent of the cost of these components
- Because there are few “experts” in this very new field, the possibility of a project getting out of control is higher, thus the potential for very high development costs exists. Ultimately this translates into higher management and oversight costs.

Even though there were a number of concerns related to the overall ORT technologies and the uneven nature of the available information about ORT projects, there is still enough data and reports about these projects to conclude that the upper end of the current video and related technologies will support implementation of pilot projects.

Backroom Operations

Interviews were conducted with primary hardware and software contractors and with field and back-office operational personnel. Field trips were taken to New York (Lockheed-Martin EZPass service center for the State of New York), Toronto (Highway 407 operations center), and New Jersey (JP Morgan/Chase EZPass service center for the State of New Jersey). Additional interviews were conducted with the principles and/or the consultants for Raytheon (prime ORT contractor for Highway 407 and the Cross Israel Highway), NESS (account management and customer service provider for Cross Israel), State of Victoria (representatives from the Melbourne City Link project), TrafficWerks (traffic engineering consultants to the Southern California toll road consortium), Adesta (formerly MFS – prime contractor for New Jersey E-Z Pass for installing lane equipment and performing VES), as well as numerous direct suppliers of ORT and ETC equipment including Transcore, Transdyne, Swartz Optical, Pulnix and Efkon.

Based on the interviews and the research, it is clear that economies of scale would be possible through centralizing back-office operations (no matter what operations are included in the back office). Typical support costs in terms of IT staff and equipment are extremely expensive and a single combined operation would minimize redundancy. Additionally, overall quality can also be enhanced

by centralizing in-house or outsourced expertise and communications (financial and customer account related) into one single location.

Centralized statewide processing and customer service centers for New York and New Jersey EZPass have resulted in high quality and efficient operations. All of these are outsourced operations. The contractors for these centers should be capable of migrating their processing approach to Florida with much lower startup costs because of the research and development that has already occurred on these projects. In essence, the learning curves to create an outsourced centralized back office to service the Florida toll industry should not be lengthy or expensive for these experienced service providers.

The downside to a single centralized approach is the potential for loss of direct feedback from customers which many agencies value highly. Another risk to a totally centralized operation is the potential for loss of service due to a disaster. Multiple strategically located decentralized centers could serve as back-ups to each other in the event of a catastrophic event. Additionally, an alternative to a completely centralized operation would be to share some outsourced backroom services to benefit from the economies of scale that would be otherwise available. Some examples of potential shared services are invoicing services, distribution services, and software support. It should be made clear that the EZPass backroom is not a single centralized operation. There are a series of large statewide centers that are interoperable with each other. Based on the reviews of the existing Highway 407 and EZPass operations, there is no doubt that the ability to provide numerous detailed financial and operational reports already exists. Each of the contractors for these centers produces a complete package of monthly financial reports that is used for analysis of the performance of the centers. Real-time as well as daily and monthly traffic reports for each of the operations provide the basis for current operational decision-making and future traffic planning activities.

The level of financial reporting that exists in these two operations is neither unique nor unprecedented in Florida. The OOCEA's Electronic Toll and Traffic Management System produces accurate and timely financial information. The reporting systems available to the other toll operators must be more precise and timely in order to effectively implement additional toll collection technology advances.

Traffic and Revenue

To assist in the analysis of the Open Road Tolling proposal, the various major toll agencies were asked to provide historical and estimated future traffic and revenue information. (Three of the four toll agencies estimated the traffic and revenue impacts based on deployment of a cashless ORT system. OOCEA, however, plans to utilize a form of ORT that would continue to permit customers to stop and pay their toll with cash.)

Currently, OOCEA utilizes this type of an ORT system on SR 429 (i.e., dedicated high-speed or express lanes, separated from conventional lanes). Furthermore, OOCEA anticipates conversion of its other facilities to this type of configuration by FY 2010. Thus, for OOCEA estimated traffic and revenue impacts included in this report are based on this model.

The traffic and revenue estimates provided by the various toll agencies for this analysis assume that ORT would be implemented so as to simply replicate the current cash barrier and closed ticket collection systems. Specifically, only vehicles passing through the current toll plaza locations would be assessed a toll and toll rates would be the same with or without ORT. Except for Florida's Turnpike Ticket System, the traffic and revenue estimates were not based on per-mile toll rates. Prior studies for Florida's Turnpike reveal that implementation of per-mile toll rates will result in a slight increase in traffic and a slight decrease in revenue. The traffic and revenue estimates do not include value-pricing rates.

Concerning future toll rate changes, the traffic and revenue estimates provided assume all current facilities remained tolled. If ORT were used to extend toll collection to currently toll-free sections, it is likely that the revenue impacts would be more positive than shown. Future toll rate increases were assumed for THCEA (FY 2010), MDX (FY 2002) and the Turnpike expansion projects only (10th and 15th year). However, for the three toll agencies that provide a cashless toll environment, a per-transaction surcharge fee was assessed to non-ETC transactions to cover the incremental increase in processing expenses. Lastly, the ETC discount program in place for three of the toll agencies (e.g., Florida's Turnpike, MDX and OOCEA) was assumed to continue.

Current Traffic Characteristics

The following five tables summarize traffic and revenue data for Florida's major toll agencies. The data are for the most recent fiscal year just ended, FY 2001 and categorized by vehicle class and ETC status.

Table 4.1 - Florida's Turnpike Revenue and Transactions

Florida's Turnpike Revenue and Transaction Information - FY 2001			
	Annual Gross Revenue (Millions)	Number of Daily Vehicle Trips	Number of Annual Transactions (Millions)
2 axle non ETC	\$258.2	682,300	320.8
3+ axle non ETC	56.0	31,800	14.9
2 axle ETC	47.9	190,900	89.7
3+ axle ETC	11.0	9,000	4.2
Total	\$373.1	914,000	429.6
Percent ETC	15.8%	21.9%	21.9%

Table 4.2 - THCEA Revenue and Transactions

**Tampa-Hillsborough County Expressway Authority
Revenue and Transaction Information - FY 2001**

	Annual Gross Revenue (Millions)	Number of Daily Vehicle Trips	Number of Annual Transactions (Millions)
2 axle non ETC	\$19.8	39,900	25.9
3+ axle non ETC	2.1	1,500	1.0
2 axle ETC	2	3,900	2.5
3+ axle ETC	0.2	100	0.1
Total	\$24.1	45,400	29.4
Percent ETC	9.2%	8.8%	8.7%

Note: SunPass was not in operation for the entire year

Table 4.3 - MDX Revenue and Transactions

**Miami-Dade County Expressway Authority
Revenue and Transaction Information - FY 2001**

	Annual Gross Revenue (Millions)	Number of Daily Vehicle Trips	Number of Annual Transactions (Millions)
2 axle non ETC	\$28.2	159,300	58.1
3+ axle non ETC	1.2	3,400	1.2
2 axle ETC	6.1	39,200	14.3
3+ axle ETC	0.3	800	0.3
Total	\$35.7	202,700	74.0
Percent ETC	17.8%	19.7%	19.7%

Table 4.4 - Orlando-Orange County Expressway Authority Revenue and Transactions

Orlando-Orange County Expressway Authority Revenue and Transaction Information - FY 2001			
	Annual Gross Revenue (Millions)	Number of Daily Vehicle Trips	Number of Annual Transactions (Millions)
2 axle non ETC	\$83.0	192,900	126.4
3+ axle non ETC	3.6	3,000	2.0
2 axle ETC	51.9	119,300	78.2
3+ axle ETC	4.7	4,400	2.9
Total	\$143.2	319,600	209.5
Percent ETC	39.5%	38.7%	38.7%

Table 4.5 - Florida's Major Toll Agencies Revenue and Transactions

Total for Florida's Major Toll Agencies Revenue and Transaction Information - FY 2001			
	Annual Gross Revenue (Millions)	Number of Daily Vehicle Trips	Number of Annual Transactions (Millions)
2 axle non ETC	\$389.2	1,074,400	531.2
3+ axle non ETC	62.9	39,700	19.1
2 axle ETC	107.9	353,300	184.7
3+ axle ETC	16.2	14,300	7.5
Total	\$576.2	1,481,700	742.5
Percent ETC	21.5%	24.8%	25.9%

Currently, almost \$600 million of toll revenues are collected annually from the four largest toll agencies in Florida. This represents approximately 750 million annual transactions or about 1.5 million daily vehicle trips. Comparing total

annual gross revenues to total annual transactions indicates that the average toll for the combined group is approximately \$0.78 per transaction. The information also shows that approximately 96 percent of the vehicles are 2-axle. Furthermore, with nearly 700 thousand SunPass and E-PASS transponders in service during FY 2001, approximately 26 percent of all transactions incurred were ETC.

Table 4.6 provides select miscellaneous traffic characteristics about Florida's major toll agencies.

Table 4.6 - Florida's Major Toll Agencies – Miscellaneous Traffic Information

Florida's Major Toll Agencies Miscellaneous Information - FY 2001				
Item	Florida's Turnpike	MDX	OOCEA	THCEA
Daily Volume - Vehicle Trips	914,000	202,700	157,300	45,400
Percent Traffic - Out of State	4%	2%	10%	3%
Percent Traffic - Home County	96%	90%	90%	90%
Percentage of Commuters	62%	50-60%	59%	60-70%
Peak Hour Percentage of Traffic	13%	7.5%	9.4%	12%
Peak Hour Directional Distribution	61%	68%	65%	66%
Percent Traffic - 2-axle	96%	98%	98%	97%
Percent revenue - 2-axle	82%	96%	94%	90%
Percent Traffic - ETC	22%	20%	26%	9%

Based on the current traffic mix information provided by the toll agencies, they generally serve a high percentage of 2-axle commuters. Also, most of the customers are from the home county or, in Florida's Turnpike case, from the State of Florida. On the surface, the ETC participation appears low; however, many of the toll facilities did not deploy ETC until FY 2001. Thus, the participation rate is expected to ramp-up significantly over the next few years.

Comparison to Other ORT Systems

Comparing Florida's major toll agencies to the two existing ORT Systems, Toronto Highway 407 Express Toll Route and the Melbourne City Link provides some interesting similarities.

On a typical weekday, 407 ETR serves nearly 300 thousand customers. Most of these customers are Canadian commuters operating 2-axle vehicles and making relatively short trips (10 to 20 miles). Toll collection is based on a "closed" or per mile toll rate system that charges between \$0.10 per-mile (night) and \$0.18 per-mile (day) for passenger cars and \$0.20 per-mile (night) to \$0.55 per-mile (day) for heavy trucks (U.S. equivalent). Currently, the 407 ETR is experiencing about 75% ETC participation. Non-ETC customers are video tolled; specifically, a photograph is taken of the vehicle's license plate, the license plate number is matched to the customer through a review of the DMV database, and a bill is subsequently sent.

For 407 ETR, a major reason for the high level of ETC participation rate—after considering that all users of this facility are customers—is the application of a relatively high surcharge fee for vehicles not equipped with a transponder. Transponders are leased from the highway's operator at a cost of \$1.00 per month (Can.) plus an activation fee of \$10.00 (Can). Specifically, if a customer does not lease a transponder, trips are logged by using a state-of-the-art, license plate recognition system. The system is located on each overhead gantry and sends up to 5 video images to a central processing computer when the customer enters and exits 407 ETR. Consequently, a \$2.00 non-transponder surcharge per trip is added for this process. Transponders are mandatory for heavy vehicles, which have a Registered Gross Vehicle Weight (RGVW) of over 5,000 kilograms (five tons). Currently, if a commercial vehicle uses the facility without a transponder, a \$25 (Can.) surcharge or fine is levied. This rate will increase to \$50 (Can) as of January 1, 2002.

For Melbourne's City Link, typical users are daily commuters and use of transponders through prepaid accounts or Day Passes (either pre- or post-arranged) is required. On typical weekdays, there are approximately 600,000 transactions of which approximately 92% are transponder transactions. This high level of ETC participation is due to the fact that customers must have a transponder or Day Pass in order to use the facility. All other users of the facility are considered violators.

All transactions are photographed and those without transponders (8%) are sent to their central computer system for processing. Valid Day Pass transactions (7%) are matched and approved. Valid trips without transponders (video tolling) are determined and the appropriate toll and processing fee charged. Non-

readable photographs are discarded and the remaining transactions are considered violations and sent for processing.

For City Link, toll collection is based on an “open” toll collection system and toll rates are adjusted quarterly to match inflation. An “open” system assesses the same toll to all vehicles of the same class that pass through a barrier/gantry. Such toll is based on an overall per-mile toll rate as an approximate standard; however, some customers may pay more or less than the standard per-mile toll rate depending on the trip length. Toll rates are applied in three categories for passenger vehicles, light trucks and heavy trucks with a toll cap of \$2.20 applied for vehicles traveling the maximum length. For passenger vehicles, this equates to \$0.16 per mile. All shorter trips pay a higher per-mile toll rate.

Customers of 407 ETR and City Link are generally urban residents commuting and making business trips, very similar to the customers of MDX, OOCEA, THCEA and urban sections of Florida’s Turnpike. Florida’s Turnpike rural toll facilities, including the Ticket System and parts of the Northern Coin System, are different. The typical customer profile for these two components is a long-distance business or vacation/recreation traveler. Only about a third of the customers on these two components are commuters. While Florida’s urban toll facilities may eventually record ETC participation rates similar to these two existing ORT systems, the rural toll components of Florida’s Turnpike will be significantly less (e.g., approximately 50 percent in FY 2010 with the deployment of Open Road Tolling).

Estimated Future Traffic and Revenue

Tables 4.7 through 4.9 provide FY 2010 estimates of revenue, vehicles and transactions without ORT and with ORT. The first group of three tables relates to Florida’s Turnpike. These estimates include traffic and revenue generated from the current existing system, future Seminole Expressway, Project 2 and future improvements contained in the 5-year Work Program. It should be noted that gross revenue shown below for the “with” ORT scenario assumes that violations and system errors are not higher than the “without” ORT scenario. However, such forecasts are reduced accordingly in the Estimated Revenue Loss section of this report.

Table 4.7 – Projected Turnpike Revenue Without ORT

Florida's Turnpike Revenue and Transaction Information - FY 2010 Without Open Road Tolling			
	Annual Gross Revenue (Millions)	Number of Daily Vehicle Trips	Number of Annual Transactions (Millions)
2 axle non ETC	\$218.1	520,300	244.6
3+ axle non ETC	47.3	24,600	11.5
2 axle ETC	223.6	644,400	302.9
3+ axle ETC	51.3	30,400	14.1
Total	\$540.3	1,219,700	573.1
Percent ETC	50.9%	55.3%	55.3%

Table 4.8 – Projected Turnpike Revenue With ORT

Florida's Turnpike Revenue and Transaction Information - FY 2010 With Open Road Tolling			
	Annual Gross Revenue (Millions)	Number of Daily Vehicle Trips	Number of Annual Transactions (Millions)
2 axle non ETC	\$162.1	246,400	115.8
3+ axle non ETC	35.1	16,400	7.7
2 axle ETC	303.3	864,200	406.3
3+ axle ETC	69.6	41,000	19.0
Total	\$570.1	1,168,000	548.7
Percent ETC	65.4%	77.5%	77.5%

Table 4.9 – Turnpike Traffic Comparison

Florida's Turnpike Revenue and Transaction Information - FY 2010 Differences - With vs. Without			
	Annual Gross Revenue (Millions)	Number of Daily Vehicle Trips	Number of Annual Transactions (Millions)
Amount/Volume	+\$29.8	-51,700	-24.4
Percent	+5.5%	-4.2%	-4.2%
Percent ETC	+14.5%	+22.2%	+22.2%

Traffic on Florida’s Turnpike is estimated to increase from approximately 430 million transactions (about 900 thousand daily vehicle trips) in FY 2001 to nearly 600 million transactions (about 1.2 million daily vehicle trips) by FY 2010. Furthermore, ETC participation is expected to increase to approximately 55% by FY 2010.

Should ORT be deployed in FY 2010, traffic would decrease 4.2 percent due to a \$0.50 per transaction surcharge assessed to non-ETC vehicles. While the amount of this surcharge is necessary to partially offset the incremental processing and video costs of non-ETC transactions, it represents up to a 200 percent increase in tolls for non-ETC customers. Because the surcharge represents a significant increase in the toll for non-ETC customers, setting the surcharge at an even higher level is cautioned. However, with ETC levels at approximately 78 percent of total traffic, the surcharge significantly encourages ETC participation. In addition to customers switching from non-ETC to ETC, it should be noted that ETC traffic also increases slightly (0.5%) due to the perceived conveniences of a barrier-less toll facility.

Florida’s Turnpike estimates that the \$0.50 surcharge will yield approximately \$59 million in gross surcharge revenues. Taking into account the net impact of a loss in traffic prompted by the surcharge, increased levels of SunPass discount due to increased ETC participation, and the gross surcharge revenues, overall

revenues for Florida’s Turnpike are estimated to increase by approximately \$30 million.

The following three tables disclose the overall traffic and revenue impacts for Florida’s four major toll agencies. For the detail on the OOCEA, MDX and THCEA refer to the full Subcommittee report in Appendix E.

Table 4.10 – Projected Revenue Without ORT – Turnpike, OOCEA, MDX, THCEA

Total for Florida's Major Toll Facilities			
Revenue and Transaction Information - FY 2010			
Without Open Road Tolling*			
	Annual Gross Revenue (Millions)	Number of Daily Vehicle Trips	Number of Annual Transactions (Millions)
2 axle non ETC	\$337.5	857,000	429.8
3+ axle non ETC	53.3	31,100	15.0
2 axle ETC	408.2	1,151,400	599.1
3+ axle ETC	67.1	47,000	24.4
Total	\$866.1	2,086,500	1,068.3
Percent ETC	54.9%	57.4%	58.4%

Table 4.11 – Projected Revenue With ORT – Turnpike, OOCEA, MDX, THCEA

Total for Florida's Major Toll Facilities			
Revenue and Transaction Information - FY 2010			
With Open Road Tolling			
	Annual Gross Revenue (Millions)	Number of Daily Vehicle Trips	Number of Annual Transactions (Millions)
2 axle non ETC	\$263.0	488,700	263.7
3+ axle non ETC	40.2	21,100	10.4
2 axle ETC	510.6	1,452,800	734.5
3+ axle ETC	86.7	59,400	30.1
Total	\$900.5	2,022,000	1,038.7
Percent ETC	66.3%	74.8%	73.6%

Table 4.12 – Traffic Comparison – Turnpike, OOCEA, MDX, THCEA

Total for Florida's Major Toll Facilities			
Revenue and Transaction Information - FY 2010			
Differences - With vs. Without			
	Annual Gross Revenue (Millions)	Number of Daily Vehicle Trips	Number of Annual Transactions (Millions)
Amount/Volume	+\$34.4	-64,500	-29.6
Percent	+4.0%	-3.1%	-2.8%
Percent ETC	+11.4%	+17.4%	+15.2%

Overall, combined traffic for the four major toll agencies is estimated to increase from approximately 743 million transactions (about 1.5 million daily vehicle trips) in FY 2001 to approximately 1,068 million transactions (almost 2.1 million daily vehicle trips) by FY 2010. Likewise, ETC participation is expected to increase to

approximately 58 percent by FY 2010. With ORT, ETC participation is expected to further increase to approximately 74 percent of total transactions.

Except for OOCEA which plans to continue providing a cash toll option and no surcharge for non-ETC customers, ORT for the other three toll agencies would require a \$0.50 per transaction surcharge assessed to non-ETC vehicles. This surcharge, considered significant, will prompt a net decrease in transactions of approximately 4 percent (approximately 3 percent when consolidating all four toll facilities) as some vehicles divert to other competing routes. Taking into account the net impact of a loss in traffic prompted by the surcharge and the gross surcharge revenues, overall revenues for these toll agencies are estimated to increase by approximately \$34 million or just over 5 percent (approximately 4 percent when consolidating all four toll facilities).

Revenue Realization

During the summer of 2001, representatives from the various toll agencies visited the Toronto Highway 407 ETR and the Melbourne City Link in Australia to discuss with its management the potential for revenue losses under the two open road tolling systems. At the core of their business, both 407 ETR and City Link indicated that management is very focused on mitigating revenue losses. In fact, the 407 ETR management plans to roll out several new procedures (i.e., increased use of vehicle registration renewal denial and ½ trip billing-current practice requires the entrance and exit transaction to match for a valid transaction) that will significantly increase revenue.

Revenue leakage is defined as the amount of revenue loss generated by violators/scofflaws, system errors and accounts receivables that are significantly past due with minimal chance of collection (i.e., write-offs). These types of losses can be classified as follows:

1. *Unreadable* – These revenue losses are generally caused by non-ETC customers that have no license plate, a dirty or rusty license plate, an obstructed license plate, bad video image due to lighting or weather conditions, or scofflaws. Based on discussions with the management of the two ORT systems, this type of revenue loss ranges between approximately 1% and 4% of total traffic.
2. *Un-billable* – These revenue losses are considered system errors and may be attributed to ETC or non-ETC customers. The reason for the error is often anomalous ½ trips or ½ video trips, overlapping trips, trips that are

too old to bill, or non-reads. By establishing a procedure to bill for the shortest trip, this type of revenue loss for a “closed” system could be controlled at approximately 2% of total traffic. For an “open” system, the revenue loss would be negligible.

3. *Un-collectible* – These revenue losses stem from customers not paying their bill. For the City Link, customers use transponders through prepaid accounts or Day Passes (either pre- or post-arranged). As a result, customer accounts receivables represent an insignificant portion of their business. However, for 407 ETR, ETC accounts are not prepaid and 407 ETR sends monthly bills to both ETC and non-ETC (i.e., video) customers. Consequently, 407 ETR manages a significant volume of accounts receivables. However, un-collectible accounts receivable generally occur with the non-ETC video customer rather than the customer with a transponder. Based on discussions, it is estimated that approximately 10% of the non-ETC customers will not pay their bill.

Regarding system errors or problems encountered identifying the customer (i.e., unreadable and un-billable revenue losses), a toll facility operating a similar system could expect a revenue loss ranging between 1-6%. This range is due to whether an “open” or “closed” system is utilized and the level of ETC participation. Generally, higher ETC levels prompt lower levels of revenue loss. However, it should be noted that while systems that limit customer choice (i.e., do not recognize non-ETC and/or non-Day Pass motorists as customers) may result in higher levels of ETC participation, such systems may also result in less traffic and gross revenue. Regarding un-collectible revenue losses, if everyone is considered a customer then one could expect a 10% revenue loss from non-ETC and non-Day Pass customers who do not pay their bill.

Currently, the Florida Department of Transportation’s Office of Toll Operations reports that toll violations and system errors represent approximately a 3% loss of total revenue. Such percentage includes unreadable and un-billable revenue losses. However, as bills are not sent to non-ETC customers, such percentage does not include revenue losses from un-collectibles. The following table discloses revenue loss by type for the existing system and for a proposed ORT system that is either “open” or “closed.” The unreadable revenue loss is based on the midpoint of the previously mentioned range. Furthermore, it should be mentioned that 407 ETR requires that trucks that use the toll facility must be equipped with a transponder. Because of this restriction, the 407 ETR notes that a portion of the unreadable revenue loss is directly attributable to large trucks. As a result, for toll facilities that are off limits to trucks (i.e., THCEA’s Reversible

Express Lane Project), the estimated total revenue loss could be further dampened.

Table 4.13 – Projected ORT Revenue Loss by Type

Revenue Loss Assumptions (%)				
Type of Revenue Loss	Toll Methodology			
	Current Overall	Open Road Tolling		
		Closed¹	Open	Open (Trucks not Allowed)
Unreadable	2.5%	2.5%	2.5%	1.5%
Unbillable	0.5%	2.0%	0.0%	0.0%
Uncollectible ²	0.0%	4.0%	3.0%	3.0%
Revenue Loss	3.0%	8.5%	5.5%	4.5%

¹ Per mile tolling.
² Based on 35% and 50% non-ETC participation for an open coin system and closed ticket system, respectively.

Summarizing, the percent of revenue loss for an “open” system may possibly range between 1.5% (without trucks) and 2.5% (i.e., unreadable and un-billable revenue losses). Additionally, the added procedure of billing non-ETC customers produces another 3% revenue loss from un-collectible accounts for a total revenue loss ranging between 4.5-5.5%. For systems that are “closed” (i.e., Florida’s Turnpike Ticket System), the revenue loss may be as high as 8.5%.

Estimated Revenue Loss

Based on the experience of the two existing ORT systems mentioned earlier, Table 4.14 applies these percentages to the revenue estimates provided by the toll agencies. Of course, such revenue losses may or may not occur depending on the final system and approach selected.

Table 4.14 – ORT Revenue Effects by Toll Agency

Florida's Turnpike, MDX and THCEA Estimated Revenue Loss				
Scenario	Florida's Turnpike (closed/open)	MDX (open)	THCEA¹ (open)	OOCEA² (open)
Without ORT:				
FY 2010 Revenue (millions)	\$540.3	\$60.0	\$40.3	NA
Less Unreadable and Unbillable losses	(16.2)	(1.8)	(1.2)	
Net Revenue	\$524.1	\$58.2	\$39.1	
Percent Revenue Loss	3.0%	3.0%	3.0%	
With ORT:				
FY 2010 Revenue (millions)	\$570.1	\$62.6	\$42.4	\$225.5
Less Unreadable and Unbillable losses	(16.5)	(1.6)	(1.1)	(5.2)
Less Uncollectibles	(19.7)	(1.7)	(1.2)	-
Net Revenue	\$533.9	\$59.3	\$40.2	\$220.3
Percent Revenue Loss	6.4%	5.3%	5.4%	2.3%
Difference	+\$9.8	+\$1.1	+\$1.1	-

¹ For the entire facility including the Reversible Express Lane Project.
² Percent revenue loss based on current OOCEA levels of 2.3%.

As is evident from Table 4.14, ORT with a \$0.50 per-transaction surcharge to non-ETC customers provides significantly more gross revenue, and slightly more net revenue as the “without” ORT scenario. Should the percent revenue loss for the “without” ORT scenario exceed 3%, then net revenues for the “with” ORT scenario become convincingly more favorable.

It is important to note, however, that the additional operating costs associated with processing non-ETC transactions are not included in the above analysis. It may well be, for example, that the \$0.50 surcharge is only sufficient to simply offset the incremental operating costs associated with video processing. In fact, based on discussions with the two existing ORT systems, operating costs



typically range between \$0.08 and \$0.10 for an ETC transaction and between \$0.50 and \$0.75 for a non-ETC transaction.

Engineering

Potential Capital Cost Issues

There are significant capital costs involved in the construction or reconstruction of a toll facility that are not associated with a non-toll facility. Although tollbooths and an administration building are two that are immediately apparent, there are numerous other items that contribute to the cost of a toll plaza. To understand what costs might be avoided, these traditional plaza costs are enumerated.

The unit costs are derived from the Miami-Dade Expressway Authority’s toll plaza preliminary construction estimates, and are specific to that agency’s project. The unit costs can be used however, to understand orders of magnitude statewide.

Table 5.1 – Toll Plaza Construction Unit Costs

Construction Item	Unit	Unit Cost
Impact Attenuators	Ea.	\$27,000
Plaza Computer	Ea.	\$90,000
Manual Toll Equip.	Ea.	\$61,800
Automatic Toll Equip.	Ea.	\$80,000
SunPass Equip	Ea.	\$90,000
SunPass Equip. - Mixed	Ea.	\$25,000
Toll Plaza Canopy	Sq. Ft.	\$50
Tunnel	Lin. Ft.	\$1,800
Concrete Island	Ea.	\$15,000
Toll Booth	Ea.	\$40,000

The widening of the highway to “flare” for the toll plaza, the administration building, the plaza and booths, canopy, access tunnels and the electronic equipment are noteworthy. A recent estimate for an MDX project yields a cost of over \$8 million for a 14-lane plaza, not including the roadway work, right of way, pavement, and drainage (nearly \$600,000 per lane.) The estimate just to provide a tollbooth, equipped with manual and ETC equipment and a concrete barrier is roughly, \$260,000 each.

The subcommittee reported that it was not appropriate to attempt to calculate a factor of capital cost increase or decrease for use across all toll plazas because of the significant differences at each site. For example, to compare a mainline plaza to an all-electronic gantry collection point would require establishing many assumptions. Is it fair to attribute the horizontal roadway alignment adjustments that are required to provide for an access tunnel in the plaza? If an agency were contemplating a brand new plaza then, these cost avoidance figures would be valid. Given the most relevant situation for Florida toll agencies is a retrofit of a traditional toll plaza to an open road system, there are too many variables to make a blanket statement about capital costs.

There are some costs that can be generalized when contemplating a retrofit:

1. *Demolition of an Existing Toll Plaza* - The demolition of an existing toll plaza is estimated to be in the range of \$25-\$30 per square foot. This figure could vary significantly based on maintenance of traffic issues and to the extent a tunnel is present and needs to be removed.
2. *Geometric Modifications to an Existing Plaza* - The introduction of AETC where a traditional plaza exists, presents the need for extensive geometric changes to the approaches to the plaza to be removed. In general the cost for this work can be estimated to be \$45-\$60 per square foot. Depending on the facility, removal or addition of any impervious area could result in changes to the existing storm water characteristics. Design parameters such as approaches to the toll facility will require reconstruction of the mainline roadway facility to conform to design standards. The project limits could extend to one mile on each side of the facility.

The requirement for rights of way to build a toll plaza, or expand one, along with issues mentioned earlier, result in a true comparison having the points of collection being physically in different locations when comparing open road to traditional toll collection. Miami-Dade Expressway Authority did perform these in-depth planning and engineering studies on several locations of their system. Again, while the comparisons may not be directly applied to other toll plazas, they are instructive.

**Table 5.2 Open Road Tolling vs. Conventional Toll Plaza
Preliminary Comparative Analysis**

Project No.	Project Description	Final Construction Costs	Design Allocation	Project Development Allocation	Demolition Cost	Total Project Cost
836-014	SR 836 Extension-Toll Plaza Section	\$51,649,055	\$3,656,727	\$1,863,694	N/A	\$57,169,476
836-014	Open Road Tolling Scenario	\$13,900,283	\$984,133	\$501,575	N/A	\$15,385,991
874-005	SR 878/SR 874 Interchange	\$51,121,563	\$3,619,380	\$1,844,660	\$259,200	\$56,844,803
874-005	Open Road Tolling Scenario	\$22,360,898	\$1,583,140	\$806,866	\$259,200	\$25,010,104
874-006	SR 874 Northbound Toll Plaza	\$18,787,059	\$1,330,114	\$677,908	\$301,200	\$21,096,281
874-006	Open Road Tolling Scenario	\$8,838,752	\$625,779	\$318,936	\$301,200	\$10,084,667
112-005	Interconnector Ramps from MIA to SR 112	\$167,501,368	\$11,859,011	\$6,044,085	\$210,000	\$185,614,464
112-005	Open Road Tolling Scenario	\$142,911,817	\$10,118,083	\$5,156,801	\$210,000	\$158,396,701
	TOTAL EXISTING COST	\$289,059,045	\$20,465,232	\$10,430,347	\$770,400	\$320,725,024
	TOTAL OPEN ROAD TOLLING SCENARIO	\$188,011,750	\$13,311,135	\$6,784,178	\$770,400	\$208,877,463

Assumptions:

*Estimate does not include ORT Equipment costs.

*Final Construction Costs include:

- 20% Conceptual estimate contingency;
- 10% Construction contingency;
- Project Insurance;
- CE&I
- CE&I Management

As can be seen in Table 5.2 the ranges in cost differences are wide. In all cases the all-electronic option is less expensive than the conventional toll plaza. The potential reduction in construction costs for the open road tolling option ranges from 14-74 %. Again these comparisons are only valid for the specific projects analyzed and represent significant capital cost reductions.

In the case of the SR 836 Extension project, most of the estimated savings is associated with having no toll plaza, a \$6 million difference in paving, and a reduction in drainage costs. In the case of the SR 874/SR 878 interchange plaza, over half of the cost difference is avoidance of building the plaza. In the case of the SR 874 toll plaza project, the ability to avoid a \$3.6 million noise wall accounts for a significant portion of the cost differential.

The cost analysis of these four complex projects, illustrates that the potential for cost savings and cost avoidance can be realized in many different areas of a project.

Additional Costs of Open Road Tolling

Offsetting some of these potential savings are additional costs for AETC. The estimates above do not include the equipment costs for the ORT scenario. Conservatively, one can add \$100,000 to \$200,000 for an equipment gantry spanning the highway and roughly \$200,000 per lane for the ORT equipment not included in the estimates in Table 5.2.

Another significant cost that needs to be considered is the fiber optic communications network. This critical component of an AETC system can range from \$300,000 to \$400,000 per mile. The cost includes materials, installation and the system components required to accurately transmit data and video.

Toll Plaza Traffic Throughput

Another important dimension of AETC is the impact that it may have in moving traffic through Florida's toll plazas. Creating the right mix and placement of manual lanes, automatic coin lanes, mixed manual and ETC lanes, and dedicated ETC lanes varies by physical limitations of plazas and traffic mix. The following figures attempt to demonstrate the throughput capacities of various toll lane configurations.

The figures used are theoretical and presented here for illustrative purposes. All figures attempt to represent a 6-lane expressway with one-way toll collection. Three freeway lanes would warrant a 9-lane toll plaza using traditional industry rules of thumb. Figure 5.1 illustrates that the 9-lane plaza has a theoretical throughput of 4050 vehicles per hour (vph) or about 60% of the maximum capacity of the three lanes feeding it.

Figure 5.2 illustrates the additional vehicles that could be handed through the toll plaza with the introduction of automatic coin machines. With an additional per lane capacity of 100 vph for each of the three lanes with a coin machine, a 5% (to 4350 vph) gain in theoretical throughput is achieved.

The introduction of dedicated ETC lanes into the plaza results in almost a balance between the capacity of the highway and the capacity of the toll plaza. The 9-lane plaza is capable of moving 6950 vph in the ideal circumstance (Figure 5.3).

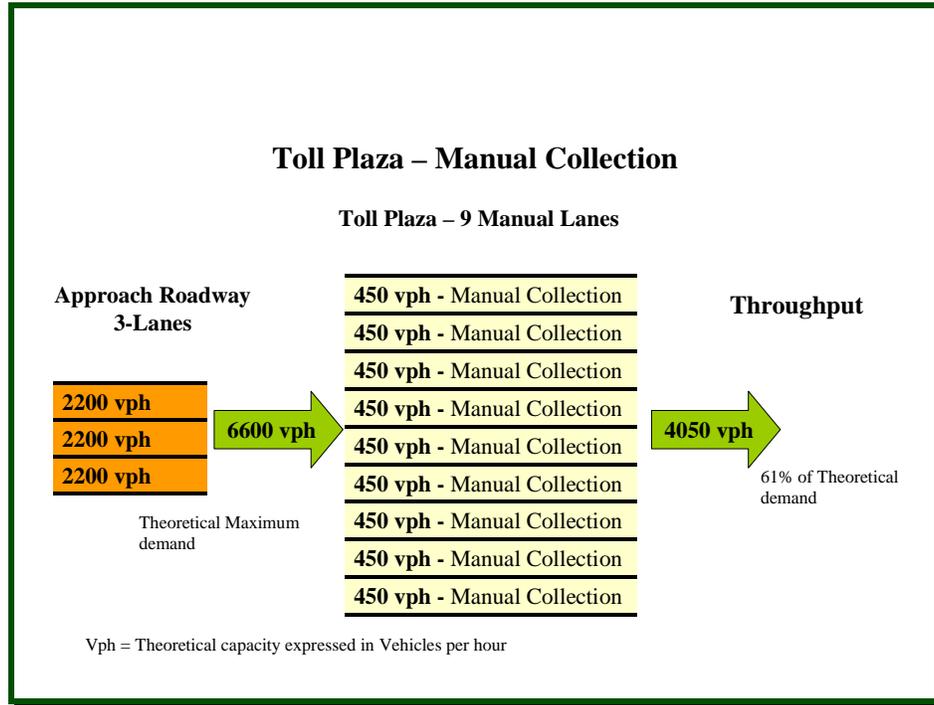


Figure 5.1 Theoretical Toll Plaza Throughput – Manual Collection

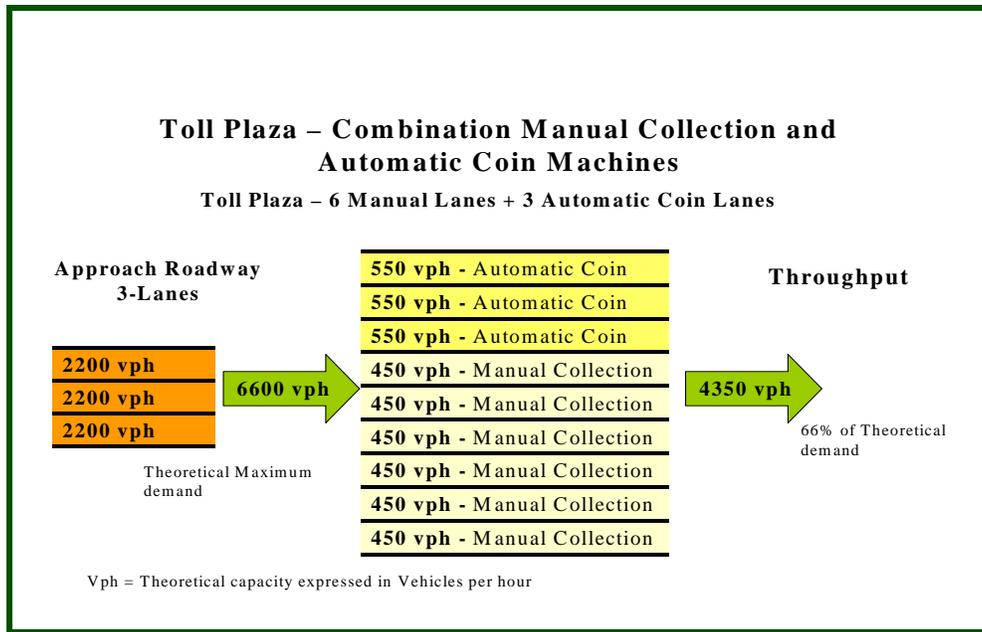


Figure 5.2 Theoretical Toll Plaza Throughput – Manual and Coin Machines

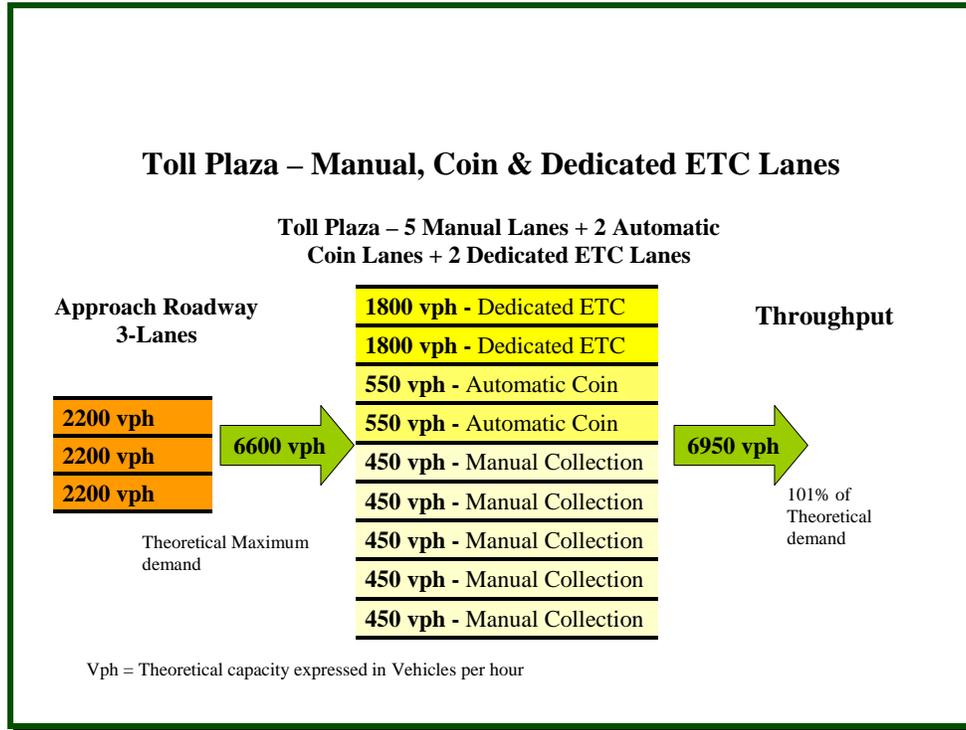


Figure 5.3 - Theoretical Throughput – Manual, Coin and Dedicated ETC Lanes

When high-speed express lanes are added to the facility the throughput of the plaza actually exceeds the approach roadway. It is not practical to build such a plaza but the increase in capacity is certainly relevant if the roadway has reached capacity and a highway widening is contemplated. One fallacy of this theoretical example is that as plazas reach capacity the ETC equipped vehicles can get trapped in the roadway queue and cannot access the dedicated or express lanes. The true efficiency of the plaza drops far below the theoretical. In Figure 5.4 the express lane concept is shown. What is notable is that the use of express lanes causes the loss of one manual lane because of the need for wider travel lanes and shoulders, yet it exceeds the input traffic in the same physical space as all earlier combinations. What is more significant is that the plaza would be able to handle over 80% of the maximum theoretical demand even when an additional highway lane is introduced i.e. widening the approach roadway from three to four lanes.

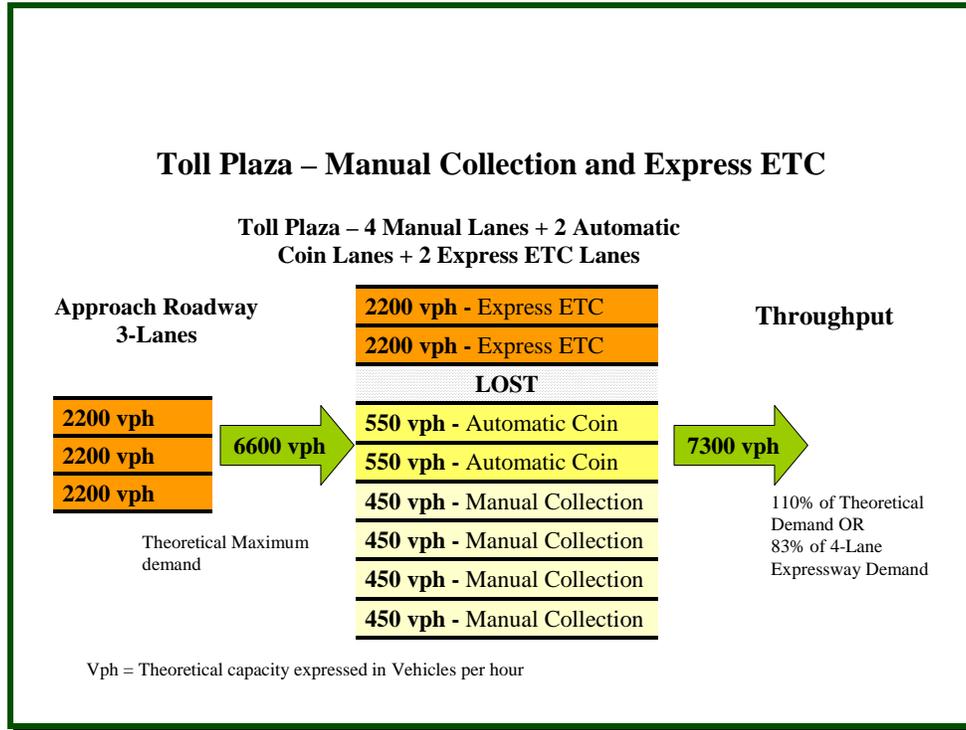


Figure 5.4 - Theoretical Throughput – Manual, Coin and Express ETC Lanes

When open road tolling is viewed in this way, the throughput always equals the demand. Figure 5.5 illustrates this graphically. The big advantage is that the theoretical highway demand can always be matched in much less physical space. The 6600 vph can be processed in approximately the area of four to five traditional toll lanes. These reduced land and pavement requirements explain some of the cost differentials revealed in the MDX comparisons. There is an additional advantage in the flexibility of the placement of the collection point when reconstructing an existing facility in order to mitigate potential impacts and costs.

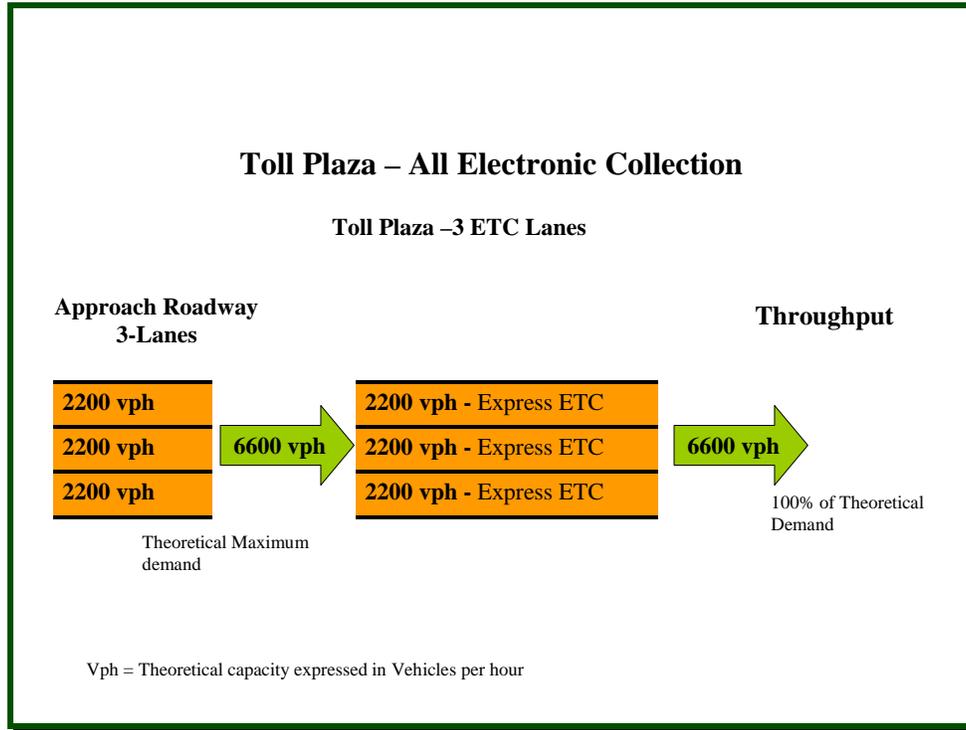


Figure 5.5 - Theoretical Toll Plaza Throughput – All Electronic Toll Collection

While the cost analysis performed for this study cannot be transformed into a single factor that can be applied to any toll lane in the State, there seems to be a clear opportunity for AETC to offer some capital cost savings. The practicality of actually realizing those savings is dependent on the implementation of open road tolling in a large-scale manner. There may be applications for the barrierless plaza prior to any decision to proceed with a statewide program. As already mentioned, the THCEA will use open road tolling on its new facility. Another potential application for the Tampa-Hillsborough County Expressway Authority may be on an Interstate 4 connector project that they are now contemplating. This is a project where the financial viability may hinge on the capital cost of a traditional toll plaza. A fully automated collection system may help the important project become a reality.

Organizational and Legal

Organization

Given the myriad of issues already identified in this report, and the suggested approaches for addressing them, a new relationship between and among the toll agencies seems to be in order. The different AVI systems, discount programs and toll plaza configurations around the state beg the need for some commonality while maintaining flexibility for individual agencies. The efforts that have begun through the dialogue facilitated through TEAMFL, and the working subcommittees that participated in this study need to be strengthened and formalized.

No “off the shelf” model exists that appears to be able to be overlaid on Florida although elements of multi-state arrangements can be borrowed. The Interagency Group (IAG) is perhaps the most well known in North America. The group is comprised of the Toll Agencies mainly in the northeastern United States. Its current membership is comprised of:

1. MTA Bridges and Tunnels (Triborough Bridge & Tunnel Authority)
2. New Jersey Highway Authority
3. South Jersey Transportation Authority
4. New Jersey Turnpike Authority
5. Delaware River Port Authority
6. New York State Thruway Authority
7. Port Authority of New York/ New Jersey
8. Pennsylvania Turnpike Authority
9. Delaware Department of Transportation
10. Maryland Transportation Authority
11. New York State Bridge Authority
12. Massachusetts Turnpike Authority

These twelve agencies are responsible for the operations of toll facilities in six states with a total population of over 52 million and an area in excess of 123,000 square miles. While the comparison to Florida may not seem valid, consider that the north to south interstate corridor from Massachusetts to Maryland is only 450 miles long. The long and rich history of toll facilities in that part of the country led to many “interstate” facilities prior to the creation and construction of the National

System of Interstate and Defense highways. Toll highways have long comprised key elements of the highway network.

It can be argued that with so many agencies in such a concentrated area, working under the auspices of so many different governing entities, the need for an interagency arrangement was more compelling than it is in Florida. Consider that Florida has at least 13 different entities responsible for some aspect of toll operations. These agencies range from a local bridge authority to Florida's Turnpike. While the 700 plus miles of tolled highways and bridges in the state are significant, what is more compelling is that the new center line mileage that is being constructed in the state to serve the explosive growth is essentially all tolled.

A recent analysis by THCEA for TEAMFL shows that some \$4 billion worth of toll projects have been completed since 1975 and an additional \$2.6 billion are now being developed. Many of the projects under development involve not additional capacity to existing facilities, but new facilities closing critical gaps in the State's Intrastate Highway System. The strain on "traditional" transportation funding resources to preserve the existing "free" road system and to fund the growing needs of other critical modes of transport demands that more emphasis will continue to be placed on toll financing for new highway facilities. All of these factors coupled with the evolution to more electronic toll collection point to the need for increased cooperation and a shared common vision for the future of toll operations in Florida. A strategic vision for the industry needs to be constructed so that individual advancements of agencies are implemented within some forward-looking context.

Several significant events have already begun to move Florida in this direction. The state's transportation leadership should be recognized and applauded for the integration of Orlando-Orange County Expressway Authority's well-established EPass system with the more recent and statewide SunPass subscription systems. In fact, the interagency agreement establishing roles and responsibilities is an excellent foundation for building an even more interconnected web of agencies and functions. Also significant is the creation of TEAMFL and the routine and regular forum for the exchange of ideas and information. Lastly, the on-going deliberations and planning for the integration of the FDOT Office of Toll Operations with the Florida Turnpike District cannot be overlooked. While the rejoining of these two inseparable functions will not ensure improved service to toll customers (both individuals and agencies buying the collection service), the merger has the greatest potential to move FDOT toll facilities operations and management to a higher level.

While there may be resistance to a more formalized body to deal with open road tolling and “all electronic collection,” the independence of the local toll authorities becomes the central reason for this consideration. If a strong centralized approach to these issues were taken, the need for such an organization would be negated. An organization with a charter to respect and maintain the individual needs of various toll agencies while taking advantage of the economies that may be available for purchase of hardware, software, account processing and other services seems prudent.

Areas of common interest that could be addressed by such an organization include but are not limited to:

- Reciprocity with other states for collection/violation
- A single point of contact to negotiate with rental car agencies/commercial vehicle operators etc.
- A “critical mass” to deal with issues like reciprocity and rental agencies
- Account reconciliation across agencies
- Joint procurements of services and equipment
- Maintenance of the integrity of ETC brand/logo/trademarks
- Interagency dispute resolution
- Maximizing value from customer service centers or other “back room” operations
- Toll plaza signing and configuration
- Future technologies employed for toll collection
- Speaking with a common voice to industry
- Consistency regarding other uses for transponders
- Input from all toll agencies into the issues associated with ETC
- Consensus on the use of any and all information made available through the widespread use of ETC and AETC systems

Membership into the body should be voluntary and obviously subject to the approval of the governing bodies of the agencies. There should be a cost of entry and an annual fee that is substantive enough to demonstrate commitment but not exorbitant for smaller agencies. These fees would be used to create an operating fund for the entity to carry out the mission of the organization without having to seek a sponsor each time an activity is to be conducted.

The concept of a weighted vote could be employed on certain policy issues. While the voices of all agencies are important, statewide policy cannot be imposed on the largest agencies by a small group that represent a small fraction of the state’s toll revenue and customers. This is a controversial issue but an

important one given the wide disparity of toll agencies' span of control and extent in Florida.

OPERATOR	FY '99-'00 Revenue (In millions)
Florida's Turnpike	\$348.0
Orange County- Orlando Expressway Authority	\$125.4
Florida DOT	\$33.9
Miami-Dade Expressway Authority	\$34.3
Lee County	\$28.0
Tampa- Hillsborough Expressway Authority	\$21.4
Osceola County	\$7.2
Mid-Bay Bridge	\$6.9
Other Facilities*	\$13.4

*Includes Miami-Dade County facilities, Broad Causeway, Card Sound Toll Bridge, Pensacola Beach Bridge, and Treasure Island Causeway.

Perhaps a 501 3(c) private non-profit organization could be formed in order to accomplish the charter and goals. Several standing committees could be established to tackle issues assigned by the Board. Recommendations that would be adopted would then be the responsibility of the respected agencies to implement.

A different approach to organizing for future toll collection would be to adopt an even more formalized and more centralized approach. One agency or organization would have sole responsibility for toll collection statewide. While efficiencies may be gained in this approach, the loss of local effectiveness may result. An interesting balance seems to have been achieved in the multi-state, public-private approach of the Heavy Vehicle License Plate Inc., or HELP Inc.

Help Inc. is the operator of the "Pre-Pass" system for commercial vehicle operations, and *"is a non-profit partnership between motor carriers and government agencies whose mission is to develop and deploy advanced technology systems to create a cooperative operating and regulatory environment which improves the efficient and safe movement of commercial vehicles and the performance of highway systems."*

Their structure is very different than that of the IAG and the approach seems to have been less than successful in the area of ETC. Essentially, a group of governmental agencies agrees to have a private sector partner team for the provision of roadway services. The private partner provides the up-front capital required to outfit the highway and charges customers on a per-transaction basis.

After selection of the private sector partner(s) a Board of Directors is established that includes all stakeholders. In the case of Florida Open Road Tolling this could potentially include representatives from the rental car and trucking industries to address the issues mentioned earlier in the report relating to these two sectors. State and local toll entities would make up at least fifty percent of the Board in order to assure their interests and customers are served.

A third approach to consider is to regionalize certain portions of “all electronic” or traditional ETC. This would involve a core agency or organization for the true “backroom” operations but create regional “nodes” to deal with customer issues. The advantages of this approach are that customer questions and hardware issues could be handled by people in the area with local knowledge of the specific nuances of the system. The processing of accounts and video billing functions could occur at a central location to maintain the economies that are inherent to a central processing function.

Any of these models would serve to create a more consistent and comprehensive approach to toll collection and could be beneficial as the state moves towards “all electronic toll collection.” The key to success in any more formalized arrangement will be in the willingness and commitment of the respective agencies to the organization and its mission. It must also be recognized that some of the very small entities may never be able to realize any savings or customer enhancements by moving in this direction. Although the smaller agencies stand to benefit from the technological advances that would be funded and tested by the larger agencies, the highly localized and very specific requirements of their operations may never lend themselves to incorporation of any statewide approach.

Legal Review

A subset of the Organizational and Legal subcommittee was assigned the task of investigating potential legal issues. Attorneys engaged by the toll authorities performed the work. Specifically, this work group was asked to look into the following subjects:

- Identify existing statutes that relate to all electronic toll collection
- Outline any existing laws or rules that may impede enforcement or reciprocity
- Review existing agreements and identify any impediments to ORT e.g., bond agreements
- Summarize the legal collection methods that can be used
- Identify any privacy or public record issues

While there was much discussion over several of the issues, the following report excerpted from the Legal Committee's report does a good job framing them and in offering an opinion.

Viewing a non-prepaid toll road user initially as a customer, rather than as a violator, based on when a toll has to be paid, only adds an after-the-fact payment component to what already occurs with electronic toll collection processes. Several constitutional issues and the existing statutes on tolls and traffic violations are addressed.

Constitutional Issues

Pledging Credit - Is allowing a vehicle to use an expressway and turnpike and pay for usage after the fact an extension of credit that is prohibited by Article VII, Section 10, Florida Constitution? (This issue does not address individual bond covenants.)

Article VII, Section 10 states that “[n]either the state nor any county, ... municipality, special district, or agency of any of them, shall become a joint owner with, or stockholder of, or give, lend or use its taxing power or credit to aid any corporation, association, partnership or person....”

The word “credit” as used in the constitutional prohibition against pledging credit implies imposition of some new financial liability upon the state or political subdivision thereof. Nohrr v. Brevard Co. Educational Facilities Auth., 247 So. 2d 304 (Fla. 1971). The purpose of the constitutional provision is to keep state out of private business, to insulate state funds against loans to individual corporations or associations and to withhold state's credit from entanglement to private affairs. Dade Co. Bd. of Public Instruction v. Michigan Mut. Liability Co., 174 So. 2d 3 (Fla 1965).

Constitutional prohibition acts to protect public funds and resources from being exploited in assisting or promoting private ventures when the public would be at

most only incidentally benefited. Bannon v. Port of Palm Beach Dist., 246 So. 2d 737 (Fla. 1971). Where there is no direct or indirect undertaking by a public body to pay an obligation from public funds and no public property is placed in jeopardy by default of a third party, there is no lending of public credit within the meaning of the Constitution. State v. Housing Auth. of Polk Co., 376 So. 2d 1158 (Fla. 1979).

In that ORT does not eliminate the toll but merely alters how it is to be paid, and collected if not paid, ORT would not appear to contravene Article VII, Section 10.

Impairment of Contract - Is allowing payment of tolls after the fact of use of an expressway or the turnpike a violation of Article I, Section 10, United States and Florida Constitutions?

Article I, Section 10 states that "No... law impairing the obligation of contract shall be passed." This provision has relevance to whether Florida's statutes can be amended to address ORT in light of revenue bonds and other contractual relationships that are relevant to expressways and the turnpike.

The legislature may, , change terms and conditions of redemption from tax certificates but as against bondholders, may not make change to the substantial detriment of a contract without consent of the bondholders. Wall v. McNee, 87 F. 2d 768 (1937). (Such verbiage is set forth in the enabling legislation for expressways.) Payment of contractual obligations, such as bonds, that are valid and enforceable in a particular way and from specified resources, against a public corporation when incurred, cannot be hampered, delayed, or avoided by subsequently adopted constitutional or statutory enactments. Humphreys v. State, 108 Fla. 92, 145 So. 858 (1933). A statute contravenes the constitutional prohibition against impairment of a contract when it has the effect of rewriting antecedent contracts, meaning that it changes substantive rights of parties to existing contracts. State Farm Mut. Ins. Co. v. Hassen, 650 So. 2d 128 (Fla. 2d DCA 1995), rev. granted 662 So. 2d 932, appr. 674 So. 2d 106, reh. den. Obligation of a contract in a constitutional sense is the means provided by law whereby a contract can be enforced, which are methods whereby parties obligated can be compelled to perform a contract, and any legislation which lessens efficiency of means, and any conduct on the part of one party which attempts to place it beyond the power of the other party to enforce the contract, impairs the obligation. State ex. rel. Simmons v. Harris, 139 Fla. 375, 161 So. 374 (1935).

Will ORT be a breach of the bond obligations that financed expressways. ?

Article I, Section 1, Florida Constitution, states that all natural persons have the right to acquire, possess, and protect property. A suit for breach of a bond obligation is an action to protect property. The bond documents establish the agreement between the issuer and the bondholders. Whereas Article I, Section 10 of the two constitutions act as a constraint on the legislature's changing the law, toll facilities must still adhere to the terms and conditions of bond covenants.

With regards to impairment of contract and potential breach of bond obligations, if draft legislation is needed to implement ORT, the text of the various bonds will have to be reviewed to determine whether the draft legislation would contravene the text of any bond that would depend on ORT for revenue. Further, if an All Electronic Toll Collection System is implemented, a similar review must take place. It should be noted that these conclusions regarding the legal issues surrounding ORT represent the majority of the views held by the attorneys that participated in the project. For an in-depth discussion of the issues, refer to Appendix F, Open Road Tolling Legal Memoranda.

Statutes

Interstate Traffic Violation Enforcement - Section 322.44, Florida Statutes, *Drivers License Compact*, and Section 322.50, Florida Statutes, *Non-resident Violator Compact*, are two compacts that are in force in Florida and most states. The American Association of Motor Vehicle Administrators is close to having a revised compact drafted that addresses in one compact what the two existing compacts now address. The revised compact will be submitted to the states for consideration. The enforcement of one state's traffic laws in other states throughout the nation and in Canada is on going. The compacts, apparently, have not been declared unconstitutional but there has been litigation concerning not following the letter of the law and the equivalency of violations between states. The compacts are enforced at the vehicle registration/license point in each state.

Public Records - Section 119.07(3)(bb), Florida Statutes, and 18 U.S.C 2721 apply to information in motor vehicle records. The state statute was passed to bring Florida law into compliance with the federal law. The federal law was recently amended and the Florida law has not followed suit will have to be amended. Currently, the Florida law authorizes a person to make personal information in motor vehicle records exempt from disclosure but non-personal information may be disclosed. The federal law exempts disclosure unless authorization to disclose is granted. Under both laws, personal and non-personal information in motor vehicle records are generally usable for traffic violation

purposes. It should be understood that federal appropriations are tied to compliance with privacy requirements in the federal law.

Non-payment of Toll as a Traffic Violation in Florida - Section 318.1001(1), Florida Statutes, requires every person that uses an expressway to pay a toll (without specifying when the toll has to be paid) and makes non-payment of a toll a moving violation under Chapter 318, Florida Statutes. Subsection (2) authorizes expressways to authorize toll enforcement officers to issue traffic citations and a toll enforcement officer is the designee of an expressway. Section 316.640 (1)(b)2.b., Florida Statutes, empowers expressways to employ independent contractors as toll enforcement officers.

Subsection (3) authorizes the issuance of a traffic citation for non-payment of tolls by certified mail, return receipt requested, to the vehicle owner's address. The notice of the violation must be sent within 14 days of the violation and must notify the recipient that, per Section 318.18(7), Florida Statutes, the fine is \$100 but that prompt payment of \$30 to the clerk of court will result in withholding of adjudication and assessing of points. The majority of the fine goes to the appropriate expressway authority. Subsection (2) also states that the vehicle owner is responsible for paying the fine unless the owner can establish that the vehicle, at the time of the violation, was in the care, custody or control of another. Such a claim has to be made within 14 days of receipt of the registered letter in the form of an affidavit that either provides the other person's name and address or a police report indicating the vehicle was stolen at the time of the violation. Issuance or withdrawal of a violation based on an affidavit is authorized. Lastly, subsection (2) makes either a written report or photographic evidence admissible in any proceeding to enforce a claim of non-payment of a toll.

Subsection (3) makes a false affidavit a misdemeanor. Subsection (4) authorizes supplying the Department of Highway Safety and Motor Vehicles with machine-readable data concerning persons who have three violations for the purpose of precluding the re-issuance of a driver's license or a re-validation sticker.

In conclusion, there are several organizational models that would be appropriate to forward the cause of AETC and open road tolling. The Steering Committee reached quick consensus that something more formal than the existing TEAMFL arrangement is needed and that the IAG model seemed to be the best fit. Those participating in this study seem to support an organization that would focus on interoperability, consensus and respect for individual business practices and operating needs. While there is no compelling legal obstacle to the implementation of AETC, the technology needs to be of sufficient reliability in order to satisfy the requirements of the bondholders of the various authorities. As



new debt issuances are contemplated, particular attention must be paid to the Operating Statement development and other documents if an agency is seriously considering the implementation of AETC.

Implications on Other and Smaller Toll Agencies

In an attempt to get a broader perspective of the potential implications of open road tolling and all electronic toll collection, agencies outside of the participating group were also consulted. The other agencies contacted, visited and interviewed were: *Treasure Island Causeway* (City of Treasure Island Department of Public Works), *Lee County* and the *Miami-Dade Public Works – Causeway Division*.

While many of the issues raised by the four participating toll operators are also concerns of these agencies, others did emerge. For example, the desire to collect toll at high speeds is in conflict with some of the operating environments that were reviewed. Just as the toll plaza acts as a traffic meter in some of the high volume plazas operated by the larger agencies, the plaza is used to calm traffic at some smaller facilities. The character of the surrounding land use changes dramatically on either side of the toll plaza, and in some cases so does the function of the highway.

There is neither the need nor the desire to promote high-speed traffic at plazas like the Treasure Island or the Venetian Causeways, although all six of the facilities have a form of AVI for toll collection. The systems range from Lee County's state of the art ETC system where the organization is experimenting with cutting-edge applications of road pricing to the tried and true bar code system at Treasure Island. One thing that all three agencies have in common is the need for a resident discount program, which usually features a flat annual or semi-annual fee. In several cases, the toll facility is the only access to or from a residential area and in fact may have been constructed to allow that development to occur. It may be discovered that the residents would resist any actions to increase accessibility.

Another difference from the smaller facility perspective is certainly the issue of cost. Although all indicated a desire to be compatible with the SunPass – E-Pass system, the cost benefit is not there for some of them. In many cases the vast majority of their revenue comes from occasional users. Under an AETC scenario these transactions represent the highest cost. It is impractical to assume that an organization funded by an enterprise fund within a municipal or county government will shift from a leased system that may be costing them only several hundred dollars (including system maintenance) per day to one that could cost millions of dollars to install.

Several of the facilities serve tourist destinations and the multi-lingual customer base that they serve makes signing a plaza for dedicated ETC or coins a problem today. The challenge of explaining the video tolling concept while not limited to these facilities, is certainly one that will require some creativity.

Several operators indicated concerns that their customer profile includes a disproportionate number of seniors who may not be as receptive to a non-cash system as other age groups.

Although the facilities varied in size, many of them are not facing the prospect of toll plaza expansion that could result in capital cost avoidance with AETC. In fact, several are at their practical limit today, which could argue for the increased throughput that AETC offers in the future.

These agencies are critical when thinking about the statewide nature of an AETC system. Early and continuous consultation is recommended so that a system can be devised to accommodate the uniqueness of these operations in the development stage. It may not be practical or even desired to pursue a course that could accommodate all of the different local business practices, but an understanding of the issues will be valuable.

Finally, while the cost benefit may not be apparent to the local or county operator, it may be thought by the policy makers that statewide interoperability is a goal worth subsidizing.

Conclusion and Recommendations

The test for feasibility of open road tolling in Florida in this effort has been to identify any fatal flaws in the concept. While there have been many potential obstacles revealed that must be addressed before implementing a system across the State, none has emerged as fatal.

The myriad of issues that have been identified represent challenges that need to be overcome before the deployment of a statewide, “barrierless” toll collection system can be successful. Based on this analysis, none of the challenges appear to be technologically insurmountable. Several of the social and political ramifications present formidable issues. What has become clear through this study is the uniqueness of each of the participating agencies and the differences between facilities operated by the same agency. Open road tolling with all electronic toll collection is, however, feasible.

One very significant difference between the Highway 407 and Melbourne experiences used as comparisons is that these facilities opened with an AETC system in place. Marketing the concept and educating the customers on the use of a brand new highway with a new method of toll collection is significantly different than removing manual toll collection from an existing facility. In addition, financing a new facility with AETC imbedded into its original design and plan of finance represents a very different scenario than a retrofit approach where “revenue losses” must be addressed.

The recommended approach for Florida to move to AETC is an evolutionary path. It is recommended that Florida begin to offer high speed, non-stop toll collection at as many locations as possible thereby reducing customer demand for traditional toll collection. As the demand for manual collections wanes, the resistance to all electronic collection will diminish. This evolution will occur at a different pace in the various locations and facilities. The next step for many agencies is to remove the traditional tollbooths from the centers of mainline toll plazas in order to create express lanes.

Commit to as Many Express Lanes as Feasible as Quickly as Possible

One conclusion of the study is that a key to moving towards statewide AETC is to aggressively promote the construction of high-speed express lanes. This form of open road tolling (although not AETC) will attract more customers to participate in the ETC programs. Offering more non-stop collection opportunities will not only provide a more attractive option to the customer, it will also allow toll agencies and their private sector partners to work on the revenue loss issues discussed

earlier. As the leakage rates come more in line with other methods of collection, toll operators, their Boards of Directors and the financial community will become increasingly more confident with an All Electronic Toll Collection model.

As mentioned earlier, the OOCEA is already operating express lanes and MDX and THCEA are on this path. The express lanes on the Turnpike District's Suncoast Parkway are about to become operational. The Turnpike is contemplating the recommendations of an initiative, the "SunPass Challenge," to double the use of SunPass on its facilities. The results of the "SunPass Challenge" are almost final and will include additional steps to increase ETC participation including a doubling of dedicated toll lanes and will consider retrofitting existing plazas with express lanes.

The widespread express lane approach is the next logical step in the evolution of the toll plaza and associated toll customer enhancements. Manual lanes evolved to automatic coin lanes, to AVI, and to dedicated ETC lanes. Express ETC lanes represent the next move to total barrier free collection or AETC. The increased plaza capacity afforded by these lanes in conjunction with the attendant increase in ETC participation could help defer some of the plaza expansion that would otherwise be required. As ETC participation rates warrant, lanes in existing plazas can be converted to match local demand and coincide with toll agency reconstruction plans.

Toll Agencies Must Work More Closely To Achieve Consensus-Based Strategic Evolution

Although TEAMFL and the collaboration on this study represent a level of cooperation among toll entities that is commendable, an even closer relationship needs to be established if the goal is to address many of the challenges outlined in this report. One good example, and there are many, is the issue of electronically collecting tolls from customers in rental cars. While there are ongoing attempts to arrive at a solution, this is not an issue that should be negotiated or settled by one of the toll agencies alone. The policy and business practice implications are too important. Another issue is trying to capture a large percentage of the commercial vehicle market for ETC.

As mentioned in the Organization and Legal section of this report, the need to formalize a relationship between those agencies interested in pursuing any or all of the attributes of a system that was studied here, i.e. a "barrierless" toll collection system that is fully electronic, has the capability of collecting tolls from every customer at highway speeds, to identify all vehicles regardless of the owner's subscription to an electronic toll collection program, be interoperable

statewide, and easily understood and embraced by Florida's toll facility customers.

The chief executives of the four agencies that participated in this study would create a formidable alliance in this endeavor and send an even stronger message that movement towards a seamless more convenient system of toll facilities in Florida is a top priority.

Steps Should be Taken Now to Establish Tiered Pricing

It seems apparent from this study that for the reasons of customer acceptance, revenue protection, and good management practice, a course needs to be set to eventually establish a toll schedule bearing a closer relationship to the cost of collection. All of the agencies have programmed a planned increase into their long-range financial forecasts. It is recommended that these plans be reviewed to examine the timing of future increases to perhaps create a "discount" for ETC customers. This may take the form of postponing the ETC increase or accelerating the cash toll increase. This could establish a precedent for a differential where none now exists (some operators already have established differential).

For those agencies planning to employ video tolling before the others, it would be wise to establish the practice of pegging the toll to the relative differences in collection costs. As agencies follow in implementing a form of video tolling, again, the precedent will have been set. These variances in rates should not be characterized as surcharges; rather, the customers using the least expensive method of payment should enjoy the benefit of a reduced toll i.e. less of an increase.

Prepare a Legislative Proposal for the 2003 Legislative Session

Several legislative actions will not only help the evolution of toll collection in Florida, but can also help to create a more efficient and reliable system based on today's practices. It is recommended that the general and bond counsels of the participating agencies review this report, particularly the Operations and Collection Reliability section, and work with a group that was involved in this effort to draft any desired statutory changes.

Topics for consideration include "OCR friendly" license tag provisions, payment enforcement, law enforcement vehicle access to account status and Florida compliance with federal information disclosure laws. The Florida Transportation

Commission should be consulted to determine if they have an interest in assisting in this effort.

The effort involved by dozens of staff and consultants in the analysis cannot be overstated. While some of the conclusions and recommendations may appear to be obvious to the reader, the data collection, analysis, discussion, debate and finally consensus-building were no small tasks. The Management Committee should be acknowledged for their commitment of time and patience. The Steering Committee should be applauded for the attention and time that they devoted to making this a comprehensive look at the feasibility of open road tolling in Florida.

List of Appendices

Appendix A – List of Subcommittee Members

Appendix B – Open Road Tolling Telephone Survey Results

Appendix C – *Resource Systems Group* Summary of Focus Group Results

Appendix D – Operations and Collection Reliability Subcommittee Report

Appendix E - Traffic and Revenue Subcommittee Report

Appendix F – Open Road Tolling Legal Memoranda