Staff Report on the Present Status of Tolling on the Maine Turnpike

Early History

For its first 50 years, the Maine Turnpike collected tolls by issuing a ticket to each motorist at the beginning of a trip and charging a cash toll at departure based on distance traveled. At midnight on September 16, 1997, this ticket system was replaced by charging tolls only at plazas on the mainline or at entrance ramps.

At the same time, the Turnpike introduced the option either to pay cash or to pay electronically using Transpass, a system that required a participating motorist to lease a transponder that sent and received signals to and from an overhead antenna and allowed for tolls to be calculated. The account holder was required to maintain funds on deposit from which tolls were withdrawn.

In the ensuing years, a competitor called "E-ZPass" became the dominant electronic toll system in the northeast after adoption by authorities in New York, New Jersey, and Pennsylvania. As Transpass became obsolete, the Maine Turnpike responded in 2005 by switching from Transpass to E-ZPass and joining the E-ZPass Interagency Group (IAG) as a voting member.

The IAG presently includes 25 tolling authorities in 15 states, from Maine west to Illinois and south to North Carolina. It is the largest interoperable toll network in the world, has 25 million transponders in use, and processes 2.4 billion transactions per year. All 25 members reciprocate in promptly crediting tolls for one another each day. The system accounts for 70% of all tolls collected in the United States.

Toll System Obsolescence

Electronic components installed in 2005 to support Maine's E-ZPass toll plazas are now obsolete. The computer and software systems are no longer supported and the vehicle sensors are expensive to maintain. New electronics are needed to improve operations in cash as well as E-ZPass lanes.

In 2011, the Turnpike began replacing its outmoded components with a system called "Infinity" made by UTS/Transcore. The New Gloucester barrier toll was converted to the new system on April 1, 2013. Seven side ramps are presently being converted; and several more are in design.

The Infinity system produces many tangible improvements for both cash and E-ZPass collections:

- The system offers full violation and video audit capability in all lanes. When fully installed, it will enable the Turnpike to reduce uncollectible tolls by about 500,000 transactions per year equal in value to $2.4 million.
- For vehicle classification, the old system uses pressure sensitive treadles and in-lane laser light curtains that are vulnerable to physical damage. Repairs to them cost the Turnpike approximately $390,000 in 2012. The new system replaces them with components that are less susceptible to damage and cheaper to repair.
- The new system employs video auditing that will greatly enhance toll collector audit functions and eliminate external contracts for services that currently cost approximately $90,000 per year.
- The annual cost of contracts to maintain the new system will be reduced by about $124,000.

Annual savings and enhanced revenue from the new components recently installed are already offsetting the amortized capital costs of their purchase.

At most of the Turnpike's 19 toll sites, it is possible to install the new system as a retrofit to an existing plaza without changing locations. However, at three of the barrier tolls --York, Exit 44/I-295, and West Gardiner/I-295 -- there is need to consider new plazas at different or modified sites. Any alternative site must be chosen in a permitting process guided by federal and state agencies.

The new vehicle sensory systems function to a degree of reliability approaching 100% -- even at highway speeds -- as has recently been proven in New Gloucester where electronic tolls are collected at 65 mph. New Gloucester employs Open Road Tolling (ORT) in which motorists with transponders travel at highway speed under an overhead gantry of antennas that record the toll electronically. Motorists who need to pay cash, move right to a separated lane to stop and pay an attendant.

Conditions at York

Among the sites in need of upgrade is the 17-lane toll plaza at York, where the Turnpike collects 38% of its revenue. York was constructed in 1969 near mile 7, the first point on the Maine Interstate where tolling is permitted. Because federal funds were used to build or widen the highway south of mile 7, federal law prohibits tolls on this part even though the state requires the Turnpike to maintain it.

The York plaza was designed to last until 1982, when bonds were to be repaid, tolls were to cease, and the Turnpike was to be turned over to Maine DOT for perpetual maintenance. However, the oil shocks of 1973 and 1978 caused such a significant decline in gas tax revenue that the Legislature had inadequate funds in 1982 with which to support the general highway budget -- let alone the Turnpike. The Legislature directed the Turnpike to continue collecting tolls not only to maintain itself but also to contribute substantial sums to Maine DOT, a practice that continues to this day in reduced form under different statutory directives.

The York toll plaza, now 45 years old, is beyond its useful life and suffers from numerous operational and structural deficiencies. The highway in this location is built on deep compressible clays. The plaza itself rests on piles, but the approach and departure pads have been sinking by nearly 1 inch per year.

A sensitive component of the new Infinity system is an antenna loop that is carefully set in concrete within the approach to each lane. These loops are necessary to classify vehicles. They help to distinguish between cars that owe a $3 toll from trucks that may owe as much as $13.50 at York, depending on vehicle size and the number of axles. To work effectively over time, the loops must be set within a rigid pad on stable ground, a condition difficult to maintain at the present York plaza

In addition, the curves, elevation changes, and close proximity of ramps at mile 7 make it highly undesirable for Open Road Tolling, which, for safety reasons, requires straight lines of sight along clear approach and departure zones.

York's Procedural History

Cognizant of the need to replace the deteriorating York plaza and to provide the public with high speed tolling, the Maine Turnpike Authority voted eight years ago (2006) to install Open Road Tolling in York at a location to be selected north of the existing plaza. It was then anticipated that the project would be complete by 2010, ahead of a similar facility being planned for Hampton, New Hampshire.

After a lengthy evaluation, the Turnpike filed a Phase I Report in November of 2009 with the Army Corps of Engineers (ACOE) to initiate a process for obtaining environmental and wetland permits for a new toll plaza location.

Many citizens of York who opposed a new physical facility raised the following question:

> Is it feasible to collect tolls at the York plaza by means of All Electronic Tolling (AET) and avoid the need to build or maintain any physical facilities for the collection of cash?

Under AET, cash collection is abandoned and all motorists proceed down the highway under the antenna that registers tolls for electronic customers. For a customer without a transponder, collection is

attempted by taking high resolution photos of the license plate, looking up the registered owner's address through a back office inquiry, and mailing a bill to the owner's residence.

Although AET had been ruled out in the Phase I report, the ACOE replied to the report on May 5, 2010, by seeking clarification on a number of further points about the AET option.

As answers to these questions were being prepared, new Turnpike management took over in March of 2011. With support from the Board, three measures relevant to the York toll issue were initiated:

1. Expansion of E-ZPass. The first initiative was to embark on an aggressive program to expand electronic toll collection (ETC) on the Maine Turnpike. AET is generally implemented only on those toll roads where ETC has reached high percentages of traffic penetration. Conditions for AET are most favorable on toll roads where daily commuters are the dominant revenue source. The Maine Turnpike has fewer commuters than most toll roads, especially at York. Nevertheless, expansion of E-ZPass in Maine would help to improve the Turnpike's financial condition regardless of future choices. And if the decision were made to continue cash collection capacity at York, it might be done with a smaller plaza if more vehicles paid by E-ZPass.

2. Cash lane survey. In 2012, the Turnpike initiated a license plate survey to document where vehicles in the cash lanes come from. To collect tolls by mail under AET depends on the feasibility and cost of obtaining addresses from jurisdictions in which vehicles are registered. This information is important for modeling AET losses and costs and for pursuing violators under any system.

3. Another Opinion on AET. The Turnpike decided to obtain a fresh opinion on the feasibility of AET at York. The study was later expanded to include West Gardiner/I-295 as well. After a request for proposals was issued to five prominent toll consultants, the Turnpike chose Wilbur Smith (now CDM Smith) to perform a financial risk analysis based on conditions specific to Maine.

E-ZPass Expansion

As part of a legislative reform bill in the spring of 2011, the Turnpike obtained authority to form reciprocity contracts with other jurisdictions to collect tolls. By August of 2011, Maine, New Hampshire, and Massachusetts became the first three states in the union to enforce collection against each other's citizens by suspending or holding vehicle registrations. While collections under the program have been modest, it is assumed that many motorists from the tri-state area who once avoided tolls are now paying. 23% of traffic in Maine's cash lanes comes from these two neighboring states.

In 2012, the IAG switched to a new E-ZPass transponder that costs only $10 rather than $25. The Maine Turnpike, which sells its transponders at cost, dropped its prices accordingly on February 1, 2012, and used the price drop to promote the opening of many new electronic accounts.

Later in the spring of 2012, the Legislature gave the Turnpike permission to eliminate a cumbersome commuter discount program that had been mandated by law since 1982. It was designed for the paper ticket system. So long as the Turnpike was required to administer this outmoded program, it was nearly impossible to sell E-ZPass over the Internet. On November 1, 2012, the Turnpike did away with the old program, adopted a new volume discount, and began selling transponders on-line. The effort was extraordinarily successful. The Internet now accounts for more than half of all E-ZPass sales.

Also in 2012, state law was changed to permit the Turnpike to send notices of liability by ordinary mail rather than by certified mail, which cost $5.79 more. This has saved the Turnpike over $50,000 per year within its present violation enforcement system. The added cost of certified mail might alone have been fatal to any high volume toll-by-mail system like AET.

On November 1, 2012, the Turnpike passed a 20% toll increase that greatly favors Maine E-ZPass account holders in two respects: (1) Rates for cash were generally raised higher than rates for E-ZPass,

and (2) a new volume discount program was offered to Maine E-ZPass customers. Under the new discount, the Turnpike is returning $6.5 million per year to Maine motorists in contrast to $2 million per year under the former commuter program.

As the Turnpike created these incentives to adopt E-ZPass, it launched a series of successful sales campaigns, with a focus on drive-time radio, to promote electronic tolling.

In addition to efforts here in Maine, both New Hampshire and Massachusetts have promoted E-ZPass. New Hampshire, for example, offers a 30% toll discount for its version of E-ZPass, and Massachusetts gives away its transponders. Because these two states are the most prominent contributors to out of state traffic on Maine highways, their efforts have helped to raise the percentage of E-ZPass revenue in Maine; and Maine's efforts have helped them as well.

In 2006, the electronic toll percentage on the Maine Turnpike was 40%. By 2010, it was 59%. As a product of recent initiatives, it has risen to 66% and will likely continue rising, but more slowly as the level reaches or exceeds 70%. For a state like Maine with fewer commuters, it is difficult to raise the electronic penetration rate into ranges much beyond 75% or 80%. This is partly because so many travelers, even from Maine, use the Turnpike infrequently, for only one or two round trips per month.

Cash Survey

From August of 2012 through June of 2013, the Turnpike sampled license plate data from 407,332 motorists who passed through cash lanes at five locations: York, Exit 44, New Gloucester, West Gardiner/I-295, and the southbound on-ramp in Gray. The survey revealed that license plates came from states and provinces in the following percentages at the plazas listed:

	Maine	Massachusetts	New Hampshire	Canada	All other states
All five toll plazas	55.4%	15.5%	7.5%	5.2%	16.4%
York	37.0%	24.7%	10.5%	4.8%	22.7%
W. Gardiner/I-295	75.0%	5.7%	2.6%	6.9%	10.1%

This information helped to determine where to focus further E-ZPass sales efforts and it formed an important component of the model prepared by CDM Smith for the AET evaluation.

The CDM Smith Risk Analysis of AET

A principal purpose of the CDM Smith study is to assist the Turnpike in determining whether to install either Open Road Tolling (ORT) or All Electronic Tolling (AET) at the York plaza. Because the Turnpike is concerned about the future of its tolling system, not just for York but for the entire road, CDM Smith was also asked to evaluate AET for the I-295 plaza in West Gardiner, which has a $1 toll that is more representative of other plazas on the road.

Under ORT, the capacity to collect cash at each plaza is preserved. Under AET, collection from a former cash customer is attempted by finding the owner's address and sending a bill by mail. Experience with AET from other states reveals that at least 40% of former cash tolls are likely to be lost for a variety of reasons including: traffic diversion, plates obscured by snow or dirt, unwillingness of states or provinces to supply an address, invalid addresses, customers' failure to respond to small invoices, and lack of enforcement reciprocity with other jurisdictions.

Conversion to ORT preserves cash collection at a lower operating cost, creates less risk to the Turnpike, and requires no change to present toll rates. AET presents a greater risk, requires a substantial surcharge

to preserve revenue, and imposes heavy traffic diversion on other roads. Bondholder approval for AET would require a revenue certificate based on conservative financial assumptions.

On November 1, 2012, the Turnpike raised tolls by 20% after eight months of intense public hearings, studies, and deliberations. The cash toll at York was raised from $2 to $3. The Turnpike foresees that no further increase will be necessary for many years if the present toll regime is kept.

A transition to ORT may be accomplished without changing current toll rates because ORT preserves cash collection in its present form. In fact, with new electronics, maintenance costs are reduced by replacing old and inefficient equipment, and revenue in the cash lanes is enhanced by installing detection equipment to capture "run through" violators.

The primary financial impediment to ORT at York or West Gardiner is the cost of building a new plaza. In other toll plazas where existing cash lanes are kept in use, ORT can be installed at relatively modest expense. For example, the mainline toll in New Gloucester, the Turnpike's second largest revenue source, was converted to ORT for $8.5 million. Seven side tolls are presently being converted to the same electronic system for an aggregate cost of $4.4 million.

At York, however, an ORT plaza will likely need nine new cash lanes in a different location. While the estimate for a new ORT plaza is $36 million, an AET facility may be built for as little as $4.8 million. AET also eliminates the cost of toll collectors and field cash management. However, AET leaves at least 40% of the former cash tolls uncollected and adds to operating costs for back office support, license plate lookup fees, postage, mail preparation, accounting follow through, and penalty administration.

In terms of financial risk, introducing AET at York without a toll surcharge would reduce revenue by $4.55 million in the first year and increase maintenance and operation costs by $2 million for a net loss of $6.55 million. Because ORT would produce a net revenue gain of $.95 million, the first year's difference in net impact between AET and ORT would be $7.5 million. If the difference in capital cost is about $31 million, the added investment for ORT could be recovered in just over four years.

To recover losses under AET, it is necessary to increase existing tolls with a surcharge. Doubling the toll to $6 for unregistered passenger vehicles (or to $24 for 5-axle trucks) and increasing it by 50% for those willing to register their plates with the Turnpike would raise first year's net revenue to just above the break even point when compared with present conditions. However, it would still fall $.6 million behind an ORT system with no surcharge.

A chief consequence of adding a $3 surcharge to the AET toll is to divert between 3,400 and 5,500 vehicles per day onto adjoining roads like Route 1, with higher levels at peak times. These diversions amount to between 30% and almost 50% of current cash traffic. Summer traffic on Route 1 in York already averages 14,000 cars per day. At Ogunquit, it averages 21,000.

Because of conflicts in business protocols between AET and cash collection, it would likely be necessary to adopt AET for the entire Turnpike rather than to use it in only one location and attempt to run two parallel systems with different collection and violation rules.

Therefore, to better understand the consequences of adopting AET for the entire road, the Turnpike engaged CDM Smith to perform an additional risk analysis for the plaza at West Gardiner/I-295. Of all locations on the highway, this toll appears at first blush to be the most favorable place to implement AET as a pilot. The West Gardiner plaza is on a separate spur of the Turnpike. It can be isolated financially from the rest of the toll system and accounts for only 7% of total Turnpike revenue. An AET toll system could be tried there with only modest risk.

75% of cash toll payers at West Gardiner/I-295 are from Maine -- twice what the percentage is for York. Addresses of Maine vehicle owners can be freely obtained from InforME, the state's data repository. For Maine motorists who don't pay, the Turnpike can suspend vehicle registrations. Administration of a pay-by-mail system would seem easier for West Gardiner/I-295 than for York.

However, the cash toll at West Gardiner is only $1, hardly worth the cost of mailing a letter. Even when several tolls can be aggregated into a single statement, the back office cost of producing a bill, applying postage, and following up for collection and enforcement exceeds the value of what may be recovered.

6.9% of the traffic through West Gardiner is from Canada. Tolls based on plates from New Brunswick and Nova Scotia would be written off immediately for lack of an address to mail a bill to.

The aggregate value of all cash tolls presently collected at West Gardiner/I-295 is $3.677 million per year. Under AET without a surcharge, gross toll revenue becomes $3.692 million ($2.311 million in reduced tolls plus $1.381 million in collected late fees). However, the cost to capture that revenue would grow from $2.68 million in the present system to $4.127 million under AET, resulting in a significant net loss.

With a surcharge of 75¢, net revenue would turn positive, but at that level an estimated 9% of present cash traffic would divert to other roads.

Policy Considerations

Studies of the York and West Gardiner plazas raise the following policy issues:

Fairness and equity. Under AET, substantial leakage is inevitable. Because many trips will not be paid for, a key issue is how to make up for the lost tolls. A common solution is to impose a surcharge on the basic toll so that the burden of paying the loss falls on those who formerly paid cash. Unfortunately, a surcharge at York would cause substantial diversion of traffic onto other roads and further aggravate the revenue loss.

Alternatively, if the loss is allocated to those who pay by E-ZPass, it will discourage people from using E-ZPass and motorists will question why it is fair to charge the Turnpike's best customers to subsidize those who pay nothing. At hearings prior to the 2012 toll increase, many members of the public, including the Legislature's Transportation Committee, insisted that equity in tolling be a primary policy goal. Equity is not achieved when many ride free at the expense of those who dutifully pay.

Diversion onto state roads. ORT creates no diversion and may even attract motorists back onto the toll road because of improved convenience. Under AET, diversion depends on the level of surcharge. If a surcharge is imposed at York sufficient to balance losses, it would create a 30% diversion of former cash traffic onto adjacent roads, where capacity is already strained. In the absence of a surcharge, the resulting revenue losses would need to be absorbed inequitably by those who pay by E-ZPass.

Customer service. Customers using the Hampton Toll in New Hampshire and the New Gloucester Toll in Maine have come to appreciate the value of high speed electronic tolling. In addition to convenience, it saves on fuel and cuts emissions. One company that uses the New Gloucester toll many times a day estimates that it saves a quarter of a gallon of diesel fuel (worth a dollar) every time one of its trucks passes through the toll at 65 miles per hour rather than slowing and accelerating again.

While this convenience is available to E-ZPass customers under either ORT or AET, there is a difference in other aspects of service. For those who pay cash, there is the difference between paying on site at the moment of use or paying later by mail, phone, or credit card. From a customer service perspective, the opportunity to pay on site seems preferable even if it requires the patron to stop.

Safety. AET is clearly the safest solution and is a reason often given by other agencies for considering AET. Because ORT separates cash traffic to lanes behind a protective barrier, it is far safer than conventional slow speed tolling but less safe than AET because ORT divides traffic into two streams and then integrates them again after the toll is paid similar to an interchange.

Landowner impacts. An AET gantry makes use of no land outside of the existing right of way except to bring power and communications to the site. While most of an ORT facility at York can be constructed within the right of way, it also requires a support building with associated utilities and parking for staff. A small strip of adjacent land would be necessary at York, but there would be no need to take homes or structures.

Environmental impact. An AET gantry can be erected with negligible environmental impacts. A new ORT plaza in York would require widening of the highway in the vicinity of the plaza, some changes in road elevation and the filling of any small areas of wetland that are immediately adjacent to the road. Impacts to streams and other environmental features would depend on the site chosen.

Consistency with existing toll plazas. If York were converted to AET but the remaining plazas up the road retained their capacity to collect cash, it would set up two conflicting business protocols for non-E-ZPass tolls. When a vehicle passes through a conventional toll point without paying, the motorist becomes a violator. If the vehicle owner is identified, a notice goes out and enforcement starts.

If the same vehicle passes under an AET gantry, on the other hand, then the motorist is a presumptive customer. If the owner can be identified, then a bill is mailed with a surcharge. Remedies for violation and enforcement are deferred until time has passed without payment or response.

It is possible under this scenario to be both a customer and a violator in the same trip. For example, if only the York plaza were configured for AET, the northbound motorist would be a customer at York but a violator at New Gloucester and West Gardiner. A southbound motorist who pays cash to enter in South Portland would incur a bill by mail when passing through York -- without knowing it and with no apparent choice in the matter.

While these conflicting protocols do not rule out the possibility for using both systems on one road, they do create an ambiguous context in which to provide acceptable customer service. Confusion and frustration are likely.

Privacy. A significant number of motorists refuse to set up an E-ZPass account because of privacy concerns or because they have no relationship to a banking institution and do not want to deposit cash in an E-ZPass account. So long as participation in electronic tolling is voluntary, E-ZPass will never be universal. There will continue to be an upper limit on the extent to which E-ZPass is accepted and used by travelers, even in a region like ours with only one dominant toll regime. Retaining cash lanes deals with the issue without the privacy concerns generated by either electronic or video tolling under AET.

Staffing and employment. Adoption of AET at York would permit the Turnpike to reduce fare collection staff by about 23 full time equivalent employees (FTEs) but would require about 32 new employees with slightly higher salaries to support back office operations.

At West Gardiner/I-295 the reduction in fare collection FTEs would be about 9. The required increase in back office staff would be almost as large as for York because the percentage of motorists without E-ZPass is much higher at West Gardiner and diversion would be less than at York.

If AET were adopted for the whole road, the entire fare collection team of 117 full time employees and 145 part timers would be let go or transferred. On the basis of present data, it is difficult to project how many back office employees would be needed to manage AET for the entire road.

Credit. Under the Turnpike's bond resolutions, a change to the toll structure requires an investment grade study by an independent consultant to certify that a new schedule will produce the revenue needed to keep promises to bond holders. The bond resolutions also require that "no free vehicular passage will be permitted over the turnpike, or any portion thereof, . . ." with narrow exceptions.

A proposal to convert to AET would not be approved by the bond trustee without certification that tolls are sufficient to overcome leakage losses, pay for added collection costs, and compensate for the uncertainties of an AET toll environment. A conversion to ORT, on the other hand, introduces few changes or uncertainties except for the capital cost of construction that can be amortized over the facility's service life.

Flexibility. The center of an ORT plaza is the functional equivalent of AET. The essential difference between the two systems is that ORT preserves the opportunity to collect cash on side lanes at the moment of passage. It also imposes immediate liability on those who fail to pay. If advances in technology or changes in federal law bring us closer to universal collection by electronic means, then an ORT plaza can be converted to AET by closing the cash lanes.

Summary of Pros & Cons. The pros and cons of AET may be outlined as follows:

Pros:	Low capital cost	Cons:	Higher operating cost
	Little environmental impact		Uncollectible tolls -- leakage
	Enhanced safety		Toll surcharge & fairness issues
			Traffic diversion caused by surcharges
			Unsuitability to Maine's traffic mix

AET is more viable for toll roads where high volumes of daily commuters pay electronically, where the motorists are predominantly from within the same state for ease of enforcement, where the toll is high enough to justify the cost of postage and back office processing, where land constraints make it difficult to build cash facilities next to the road, or where the capital expense of building new cash plazas outweighs future leakage and collection costs.

Conclusion

Because critical electronic components within its 19 toll plazas are becoming obsolete, the Maine Turnpike must move swiftly to complete necessary upgrades in cash and E-ZPass lanes.

In the past two years, the Turnpike has converted several side tolls to the new system and has installed the system as an ORT plaza for the mainline toll in New Gloucester. These conversions have yielded improved levels of service in a fashion that is both cost effective and free of substantial risk.

The York plaza presents a special challenge because it is difficult to retrofit modern electronics and vehicle sensor systems into a deteriorating structure at a poor site unsuitable for high speed tolling.

Over several years, the Turnpike has made substantial strides in expanding E-ZPass. One purpose for this effort was to enhance the possibility of considering AET for York or West Gardiner/I-295.

After careful study of the relative costs, financial risks, toll equities, and traffic impacts, Turnpike staff do not regard it as presently feasible to abandon cash collection for AET at either location.

Public Hearing

The board of the Turnpike Authority has yet to decide how to proceed at York or West Gardiner/I-295. The board will hold a public hearing on the AET issue at Turnpike Headquarters (Exit 46) on Thursday, June 19, 2014, at 6:00 PM. Turnpike staff and authors of the CDM Smith study will be present.