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April 28, 2017

Marybeth Richardson, Hearing Officer
Department of Environmental Protection
312 Canco Road
Portland, ME 04103

Hearing Officer Richardson:

In accord with paragraphs 15, 16, 17 and 20 of your March 14, 2017 Second Procedural Order, please find enclosed two hard copies of the Maine Turnpike Authority ("MTA") pre-filed rebuttal testimony and associated exhibits for the Department and for Assistant Attorney General Peggy Bensinger as Counsel to the Department.

You will recall that in our direct pre-filed testimony, we compiled the testimony and exhibits into a single packet referencing a single set of exhibits A-BB. We have continued with this approach in this rebuttal package picking up with Turnpike Exhibit CC. It is our hope that this approach enhances the readability and cross-referencing efficiency while also reducing the overall volume of our filings.

An identical hard copy of this rebuttal testimony and exhibits will be delivered to Attorney Scott Anderson for the Coalition for Responsible Toll Collection. The entire package of testimony and exhibits will also be delivered by electronic mail to all entities identified on the service list maintained by the Maine Department of Environmental Protection website under "Major Projects before DEP."

Sincerely,

Joanna B. Tourangeau

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION
IN THE MATTER OF

MAINE TURNPIKE AUTHORITY	)	APPLICATION FOR A NATURAL
	)	RESOURCES PROTECTION ACT PERMIT
DEP #L-27241-TG-A-N	)	and NOTICE OF INTENT FOR SITE
DEP #L-27275-TP-A-N	)	LOCATION OF DEVELOPMENT GENERAL
	)	PERMIT FOR CONSTRUCTION OF A NEW
	)	TOLL PLAZA LOCATED IN YORK, MAINE

PRE-FILED REBUTTAL TESTIMONY OF PETER MILLS
EXECUTIVE DIRECTOR OF THE MAINE TURNPIKE AUTHORITY

1. In direct testimony, the Intervenor offers the following arguments to support their view that AET is a practicable alternative to ORT:

A. AET has a smaller footprint that would cause no environmental impacts;
B. The Maine Turnpike Authority ("MTA") has overstated the potential for lost toll revenue associated with AET by using a leakage percentage of 42%;
    a. Video equipment technology associated with AET has improved to near perfect license plate capture;
    b. The reciprocity agreements for toll enforcement among Maine, Massachusetts and New Hampshire will ensure collection from 75% of potential cash customers and reduce the potential for lost tolls to less than 27% for all other states and Canada;
    c. Massachusetts has experienced an AET leakage percentage of only 21%.
C. Diversion may be disregarded because it may attenuate over time.

Not one of these arguments is supported by fact or reasonable technical analysis, as this rebuttal testimony will demonstrate.

2. Mr. Smith is a retired systems analyst who worked in banking, health care and insurance. Mr. Jarvis is the chairperson of a manufacturing company. While each has a long history of engagement with the MTA at York, neither has, nor claims to have, experience or qualifications in traffic or toll engineering or financial analysis within the transportation industry.

AET is Not Without Environmental Impacts

3. Mr. Jarvis opens his testimony at Page 2 by alleging that AET is a practicable alternative because it has no environmental impacts. While it is true that an AET installation with its limited on site infrastructure would allow all traffic to go down the road at highway speed, ORT actually captures much of that benefit by permitting 87% of the trucks and two-thirds of the cars at York to do so. Mr. Jarvis ignores that an AET conversion would require the MTA to build (or rent) a major facility to house office workers and computers to support AET.

4. An additional detriment for AET is the huge volume of paper mail associated with collecting tolls from an office. Even if we adopt Mr. Smith's view that AET would require sending only one bill for every two trips through the York toll, that's two million initial bills per year, or 10,000 bills

to be mailed each business day, plus follow up bills, the processing of replies from customers, and the cumbersome handling of their checks, money orders, and accounting--all for a few dollars each.

5. Ignoring these impacts overestimates the practicability of AET as an alternative to ORT, even setting aside the technical, policy, and financial issues that make AET impracticable for the MTA.

Analogizing to Massachusetts

6. Mr. Smith and Mr. Jarvis both rely heavily on the Massachusetts conversion to AET as justification for AET being a practicable alternative for York. Most prominently, both of them assert that the Massachusetts system has an AET leakage rate of only 21% which, they claim, undermines the CDM Smith estimate of 42% for Maine (See Mr. Smith's testimony at pages 1, 4, and 9 and that of Mr. Jarvis at pages 6 and 7). As discussed in detail in the expert rebuttal testimony provided by Mr. Gary Quinlin of CDM Smith and Mr. Richard Gobeille of Jacobs Engineering Inc., the 21% figure used by Intervenor is wrong and the 42% used by the MTA is solidly supported.

7. The Massachusetts Department of Transportation (MassDOT) prepared a Preliminary Official Statement on November 23, 2016, to support bonds for the Metropolitan Highway System (Official Statement). Included within the Official Statement is an "investment-grade traffic and revenue study" (T&R Report) that describes the toll system offered as security for the intended bond issue. Pertinent extracts from the T&R Report are attached as Turnpike Exhibit CC. Although bonds for that project were not issued because of last minute market shifts, the T&R Report is significant for several reasons:

a. It is both thorough and recent.
b. It was prepared for bondholders under standards for accuracy required by the federal Securities and Exchange Commission. Thus, the T&R Report is one intended to be relied upon by reasonable persons in the conduct of serious affairs as required by the Department.
c. The analysis of Massachusetts tolls contained in the T&R Report is consistent with and supports CDM Smith's analysis for York.

8. The T&R Report contains a "waterfall" chart of actual and projected AET leakage rates for a number of U.S. toll systems including the Tobin Bridge in Massachusetts which converted to AET on July 1, 2014. Because the three Boston tunnels and the Boston Extension turnpike did not convert until October 28, 2016, the numbers in their columns contain projections used to create the present Massachusetts toll schedule. These areas are only beginning to encounter actual losses for toll-by-plate traffic. The reason that the waterfall chart contains separate projections for the tunnels and for the Boston Extension is to reflect differences in their traffic profiles and their tolling environments that are less favorable to AET than the Tobin.

9. Attached as Turnpike Exhibit DD is the same waterfall chart with another column added by Mr. Gary Quinlin to show how the estimated losses for Maine compare consistently with those for Massachusetts and for other systems in the U.S. that have converted to AET.

10. To maintain revenue neutrality, Massachusetts has adopted tolls and fees for toll-by-plate users throughout its system that are approximately double, on average, what the tolls are for in-state E-ZPass accounts. For reference, Turnpike Exhibit O contains the entire schedule for Massachusetts,

including fees as well as tolls. There is no responsible way to convert to AET without recovering losses through fees and a substantial surcharge, something that the MTA has decided not to do for the many and considered policy and financial reasons explained in our application, exhibits, direct and this rebuttal testimony.

11. The Western Turnpike is the section of Massachusetts toll road that most closely resembles Maine; but as it runs 123 miles from the Boston suburbs to the New York border near Albany, its interchanges also serve the metropolitan areas for both Worcester and Springfield. Boston, Worcester, and Springfield are, respectively, the first, second and fourth largest cities in New England. (Providence is number 3.) Thus, the Western Turnpike is dense with in-state commuter traffic.

12. Maine, by contrast, with its annual influx of 36 million tourists has a road that depends more heavily on seasonal, far-flung, and non-commuter traffic from all 50 states and 10 provinces. As discussed in the rebuttal testimony of Mr. Quinlin and Mr. Gobeille, the projected leakage rate of 42% for the York Toll Plaza compares very reasonably with the 38% used to set non-electronic tolls on Massachusetts's Western Turnpike.

13. Attached as Turnpike Exhibit EE is a list of the 64 toll highways in the United States where cash is still collected. A casual examination will stimulate anyone to acknowledge that tolling environments differ dramatically from one geographic setting to another. The chief criteria for success with AET are listed in paragraph 48 of my direct testimony. The two intervenor witnesses have glossed over these. In fact, by representing or implying that 21% is leakage for the whole Massachusetts system (Smith at pages 4 and 9; Jarvis at page 6), they have started with the wrong data and then ignored major differences even within the state that they offer as an AET prototype. It is telling that Mr. Smith begins his testimony by dismissing leakage as "an unproven concern," given that this is central to the concerns of any toll agency considering an AET transition.

10% Leakage for ORT?

14. A concern more truly unproven is the one Mr. Smith expresses on page 6 of his testimony where he assumes that ten percent of all the people who should pay cash in an ORT system will instead go under the E-ZPass gantry to become violators. Our four years of experience with the ORT plaza in New Gloucester proves this wrong. In our experience, ORT actually captures more traffic and revenue than our legacy system and it does so at lesser cost with greater efficiency.

Miscellaneous Assumptions by Peter Smith

15. Mr. Smith does not provide us with the benefit of his calculations. He simply changes a number of the assumptions upon which a model might be based and then abruptly concludes that AET produces a staggering profit even from its first year. There is no disclosure of an intervening process to arrive at this conclusion. However, he does include on page 6 an "administrative fee" that is roughly equivalent to a $2.50 surcharge on each toll. While there is apparent agreement that AET cannot work without making up lost revenue with a substantial surcharge, or its equivalent, his discussion of an appropriate model fails to deal with diversion and other factors that the MTA must include in any considered analysis.

Reliance on Claims by Raytheon

16. Among the companies seeking market share in the competition for electronic tolling is Raytheon, a Massachusetts company that was awarded the contract to install equipment on the Massachusetts Turnpike. They have otherwise only an insubstantial share of the international market for this business.

17. On page 6 of his testimony, Mr. Jarvis claims that Raytheon cameras have a "99.9% image capture accuracy." He concludes that "current video technology has essentially removed" unreadable license plates as a limiting factor and then repeats this conclusion on page 11 by stating "new video units are virtually flawless in reading license plates, with only 0.1% unreadable images."

18. At the same time on page 10, he acknowledges that 7% of Massachusetts images images are unreadable. In the "waterfall chart" of the T&R Report (Exhibit CC), non-useable images for the Tobin are recorded as 3.7% which compares favorably with other roads where the rate is between 4 and 10%. Given that reading conditions on the confined Tobin Bridge are more favorable than for the open road, the author of the T&R Report assigned 5% for this factor to the tunnel system and 7% to the Boston Extension.

19. The new cameras we use on the Turnpike take multiple images of each end of the vehicle as it passes through. This allows the reviewer to choose the best image for manual confirmation. Even at that, many photos cannot be deciphered. To complete the reading requires identifying three fields of data; (1) the state, (2) all of the license digits, and (3) the associated symbols or words that define the plate type. To read the plate, it is important to determine not just its number but whether it pictures a lobster, a chickadee, a Maine black bear, or a dog and cat. Maine has 58 different types. Massachusetts has many more. There are thousands of different plate types in the United States, many of which have the same license numbers within the same state.

20. Since AET was adopted in Massachusetts, we have received numerous complaints from Maine E-ZPass customers who are being falsely charged for trips taken by other motorists with the same plate numbers. This undermines public confidence in electronic tolling.

The Xerox "White Paper"

21. Exhibit E to Mr. Jarvis's testimony is a 2009 sales brochure from Xerox which at that time was attempting to capture the U.S. market to provide back office services for electronic tolling. Although labeled a "white paper," it is, in fact, a marketing flier to persuade states to turn over their toll facilities to Xerox. In 2016, Xerox spun off its toll subsidiary and is no longer in the business.

Diversion Issues

22. No one on behalf of the Intervenor will reasonably dispute that diversion will occur if a surcharge of any substance or in any form is imposed on traffic at York. One may question the severity of diversion, its likely duration, and the specific impacts on the many affected roads and intersections; but to ignore diversion and fail to account for it would be a breach of the Turnpike's public duty to the people of Maine and to the populations that live within range of Turnpike traffic impacts.

23. Traffic projection is one of the most challenging disciplines within highway engineering. We have asked some of the most experienced people in Maine to address it in consultation with Maine DOT and have confidence in their judgment as expressed in the testimony and rebuttal of Roland Lavallee.

In Closing

24. The MTA has presented extensive application materials and pre-filed direct and rebuttal testimony including reliable analysis from experts with sound credentials to support the technical, policy, and financial considerations that led MTA to make this application to build an ORT plaza. We have not seen from the Intervenor any credible evidence, technical or otherwise, to conflict with that decision.

Dated April 28, 2017

By: _____
Peter Mills, Executive Director
Maine Turnpike Authority

STATE OF MAINE
CUMBERLAND, ss. April 28, 2017

Personally appeared the above-named Peter Mills and made oath as to the truth of the foregoing pre-filed testimony.

Before me,

_____
Notary Public / Attorney at law
Jonathan Arey, Esq
Secretary – MTA

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION
IN THE MATTER OF

MAINE TURNPIKE AUTHORITY	)	APPLICATION FOR A NATURAL
	)	RESOURCES PROTECTION ACT
DEP #L-27241-TG-A-N	)	PERMIT and NOTICE OF INTENT FOR
DEP #L-27275-TP-A-N	)	SITE LOCATION OF DEVELOPMENT
	)	GENERAL PERMIT FOR
	)	CONSTRUCTION OF A NEW TOLL
		PLAZA LOCATED IN YORK, MAINE

PRE-FILED REBUTTAL TESTIMONY OF GARY QUINLIN
PROJECT MANAGER FOR CDM SMITH

1. I am a Senior Project Manager whose qualifications have been stated in my pre-filed direct testimony and in Exhibit BB. The purpose of this rebuttal testimony is to identify areas in which the information presented by Mr. Marshall Jarvis and Mr. Peter Smith is misleading or inaccurate.

Reliance on Raytheon and Image Capture Rates

2. On Page 6 of his testimony, Mr. Marshall Jarvis states, "Current video technology has removed unreadable license plates as a limiting factor." On Page 11, he claims "New video units are virtually flawless in reading license plates with only .1% unreadable images." Mr. Jarvis is basing these claims on Raytheon statements that appear to have been taken out of context. The 99.9% image capture accuracy rate reported by Raytheon is what we understand can be achieved in a controlled vehicle processing environment. This would include front and rear license plate capture, clearly visible license plates, vehicles remaining in their respective lanes through the toll zone, etc. In other words, this high value reflects the maximum achievable license plate capture in "perfect" conditions.

3. Under actual operating conditions, especially in a high-speed, multi-lane environment where vehicles are not required to travel directly beneath the license plate capture cameras and under or over the vehicle separation equipment, or where there is less than optimal license plate placement or where there is plate blocking (whether intentional or not), the capture success rate would certainly be less than the accuracy rate in a controlled setting.

4. There is good field experience on actual plate image capture rates. Table 23 on page 99 of the Jacob's Report (Turnpike Exhibit CC) provides some good examples. They report the actual experience at Tobin as a 3.7% image loss and the actual experience at four other agencies with loss rates ranging from 4.0 to 10.0%.

5. In our analysis of the York Toll Plaza, we based our assumption of 10.0% actual plate image loss on Maine Turnpike Authority's ("Turnpike") own experience and our judgment based on the higher percent of images affected by the snow, ice, and mud that would be common for locations in the northeast, especially during winter. This 10% assumption was consistent with our experience and is consistent with Jacob's estimate of license plate image loss for the Boston Extension at 7.0 percent.

Leakage Rates Assumptions Based on MA

6. Mr. Jarvis reports on page 6 of his testimony and Mr. Smith on page 4 of his testimony that the Commonwealth of Massachusetts is reporting leakage figures with its new AET system of approximately 4% of total revenue, which is approximately 21% of video transaction revenue.

7. The 4% of total revenue is an irrelevant figure for purposes of comparison to other facilities. The total toll revenue leakage rate for any system is highly dependent on the mix of E-ZPass versus video revenue on the facility being analyzed. For example, a 50% video revenue leakage rate will only account for a total leakage rate of 5% if video total video revenue accounts for 10% of total revenue. But if video transactions are 30% of total transactions (as is the case currently at York), then a 50% video leakage rate would result in a 15% combined revenue loss.

8. Regarding Mr. Jarvis' reference to the 21% loss assumptions by the Massachusetts Department of Transportation ("MassDOT") for their new AET system, this figure should be 26.5% based on the findings of Jacobs Engineering in their Traffic and Revenue Report of November 23, 2016 (Turnpike Exhibit CC).

9. Based on the experience of the Tobin Bridge, Jacobs estimated the video revenue leakage to be 31.6% for the Boston tunnels, 34.7% for the Boston Extension, and 38% for the Western Turnpike. They explain the higher rates for the Tunnels and roadways as follows:

> A. "Typically, facilities with very infrequent or out of state customers see fewer people paying their toll invoices. In addition, cameras are better at capturing images in slower-moving, narrow-width facilities like the Tobin Bridge than on wider roadways where the images may be off-center (page 97)."

10. It is inappropriate to cite experience at Tobin Bridge as a measuring stick by which to judge the York Toll Plaza, when MassDOT and its own traffic consultant adopt much higher video revenue leakage assumptions for other portions of the MassPike system which have limitations on collection technology performance like those of York.

11. York Toll Plaza has one of highest mixes of out-of-state and infrequent user profiles in the country. The 42% video revenue leakage rate we estimated is not excessive, even by the criteria developed by MassDOT to estimate leakage on their system.

Assumptions by Mr. Peter Smith

12. On Page 6 Mr. Smith outlines "assumptions" that he used in his analysis. He notes the following:

> *Initial expected "leakage" for vehicles without E-ZPass with either tolling method:*
> ~ *up to 20% of tolls from Maine, NH or Mass. will be uncollectable.*
> ~ *up to 40% of tolls from other states or Canada will be uncollectable.*

13. Based on the mix of current cash transactions in these two groups, his overall average weighted uncollectable amount of video transactions at York would be 25.4%. As noted above, Jacobs has estimated the total video revenue leakage at the Tobin Bridge (based on actual experience) to be 26.5%. The Tobin Bridge customer base is very different from that using the York Toll Plaza. As shown in the quote in Paragraph 9 above from the Jacobs report, higher out-of-state and infrequent users result in higher levels of non-payment. It is not reasonable that toll revenue leakage at the York Toll Plaza would be less than that at the Tobin Bridge.

14. It is CDM Smith's experience from actual AET operations that leakage typically ranges between 35 and 50% of potential video toll revenue. A 42% figure for York is appropriate. To further amplify this point, I prepared Turnpike Exhibit DD to provide a comparison of all of our video leakage assumptions for York to those collected by Jacobs for various agencies in Table 23 on page 99 of Exhibit CC. The cumulative effect of the various components of leakage shown in Table 23 yield total leakage rates ranging from 33% to 53% for the actual experience of the four agencies used by Jacobs. This is similar to what we see in agencies we have analyzed.

15. Based on the out-of-state and infrequent nature of travel through the York toll plaza, video revenue leakage rates will likely be on the higher end of the range. We believe that 42% is reasonable and that the 25% assumption used by Mr. Smith severely underestimates video revenue leakage at this location and is unsupported by actual data.

16. On Page 6 Mr. Smith outlines assumptions that he used in his analysis. He notes that a $5.00 administrative fee would be added to each round trip invoice. This amounts to an additional $2.50 surcharge per trip though the York toll plaza which is close to the $3.00 surcharge calculated in our report.

17. In outlining his assumptions on Page 6 of his testimony, Mr. Smith states as a fact that:

> "Even with Open Road tolling as proposed by the MTA, 10% of vehicles that should use cash lanes will accidently or intentionally use the highway-speed center lanes."

18. The impact of this assumption is to reduce ORT toll revenue by subjecting 10 percent of the cash traffic to the same revenue leakage assumptions as video transactions under AET.

19. Based on the four year experience with ORT at New Gloucester on the Maine Turnpike, there has been no loss of toll revenue upon conversion of the existing toll plaza to ORT. New Hampshire Turnpike and the New Jersey Turnpike have also reported no revenue losses when converting their plazas to ORT.

20. If cash violation rates approached the levels Mr. Smith assumes in an ORT environment, it would be worthwhile to place troopers at the plaza to stop violators. Under ORT, anyone then traveling through the non-stop E-ZPass lanes without a transponder would be stopped as a violator. Under AET, it is not possible to identify violators since all motorists (whether having E-ZPass or not) travel as customers through the tolling zone.

Revenue Projections with AET

21. On Page 7 Mr. Jarvis cites to CDM Smith's conclusion that AET could produce $24 million in net toll revenue at the end of ten years; but he neglects to state that this CDM Smith conclusion is would require the Turnpike to make the policy decision to impose a $3.00 video surcharge (compared to no surcharge with ORT).

22. In addition, Mr. Jarvis says that CDM Smith concluded that $24 million of net toll revenue occurs even with an assumed 30-60% video leakage rate, which he says is "significantly higher than occurring in the new Massachusetts system." As noted above, the video leakage rate of 21% that

Mr. Jarvis attributed to "the new Massachusetts system" is wrong. Further, CDM Smith did not use the 30-60% video leakage range Mr. Jarvis specifies to calculate net toll revenues. CDM Smith estimated leakage rates applicable to different categories of traffic passing through the York Toll Plaza. These rates ranged from 30% to 64%. The 30% video leakage rate was applied to Maine residents, while the higher 64% video leakage rate was applied to motorists outside of the Maine, New Hampshire, and Massachusetts region. As shown on page 14 of our report, CDM Smith's overall average video leakage rate estimate is 42% which compares appropriately with 26.5% for the Tobin, 31.6% for the three Massachusetts tunnels, 34.7% for the Boston Extension, and 38% for the Western Turnpike. It is inaccurate to conclude that CDM Smith used video leakage rate estimates other than 42% in calculating net toll revenue.

Other States Converting to AET

23. On Page 8, Mr. Jarvis states the following:

> "IBTTA notes that Colorado and Washington State have converted to AET, and as of 2015, California, Kentucky, Florida, North Carolina, Maryland, Delaware, Pennsylvania, and New York had converted toll facilities to AET or were planning to do so."

24. Mr. Jarvis mentions ten states as having AET conversions.

25. It should be noted that Kentucky only has toll bridges. These are not comparable to conversion to AET of a toll highway system.

26. Washington State has no traditional toll roads, but rather High Occupancy Toll (HOT) lanes. These are variably priced toll lanes alongside free roads that are not comparable to operating conditions in traditional toll road settings.

27. The remaining eight states mentioned have a combined total of approximately 2,110 miles of toll road. Of that total, only about 356 miles operate under AET conditions; the remaining 1,754 miles in those eight states accept cash payments. For these eight states, only about 17% of toll road mileage is devoted to AET collection. On the remaining 83%, cash collection is permitted.

28. Nationwide, the statistics are about the same. Of the approximately 5,011 miles of toll roads (excluding toll bridges and HOT lanes) in the US, only about 19% collect tolls by AET. The remaining 81% accept cash.

Thus, cash has been, is currently, and will be for the foreseeable future, a commonly accepted system for payment of tolls in the United States.

Dated April 27, 2017

By: _____
~~Gary T. Quinlin, Senior Project~~ Manager
CDM Smith

STATE OF CONNECTICUT
NEW HAVEN, ss. April 27, 2017

Personally appeared the above-named Gary T. Quinlin and made oath as to the truth of the foregoing pre-filed testimony.

Before me,

_____
Notary Public / Attorney at law

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

IN THE MATTER OF

MAINE TURNPIKE AUTHORITY	)	APPLICATION FOR A NATURAL
	)	RESOURCES PROTECTION ACT
DEP #L-27241-TG-A-N	)	PERMIT and NOTICE OF INTENT FOR
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	)	PLAZA LOCATED IN YORK, MAINE

PRE-FILED TESTIMONY OF RICHARD J. GOBEILLE
INFRASTRUCTURE CONSULTANCY DIRECTOR FOR JACOBS ENGINEERING INC

1. I am the Jacobs Infrastructure Consultancy Director with over 30 years of experience in toll facility projects including Bond Financing, Rate Setting, Policy Development, Collection Technology, Customer Service Center Operations and numerous other toll facility related studies and analyses. I have been personally responsible for some $18 Billion in toll financing. Most recently I managed the AET rate setting analysis for the Massachusetts Department of Transportation AET implementation program and several Traffic and Revenue Forecasting Studies for the Massachusetts Department of Transportation. The Exhibits include a resume of my experience.

2. In a competitive selection process, Jacobs Engineering Inc. ("Jacobs") was retained by the Massachusetts Department of Transportation ("MASSDOT") to perform Investment Grade Traffic and Revenue Services for MASSDOT. Activities performed under that contract included an AET Rate Setting Analysis and Forecasts of Traffic and Revenues after the implementation of AET on all MASSDOT Toll Facilities

3. Jacobs' role in the 2016 AET Rate Setting Analysis for MASSDOT was to prepare models that would be used to determine toll rates after AET implementation while considering several key parameters including: actual MASSDOT experience for AET at the Tobin Bridge; rate setting policy, legislatively mandated toll differentials; and Net Revenue neutrality. For both our 2016 Rate Setting Analysis and our November 2016 Traffic and Revenue Report we estimated that uncollectable tolls would be between 26.5% and 38% of all cash based toll transactions. The 26.5% of uncollectable transactions was applied to the Tobin Bridge. The 38% was applied to the Western Turnpike which constitutes I-90 west of I-95/128. The Exhibits include an August 22, 2016 presentation to the MASSDOT Board relative to the rate setting project.

4. I am the principal author of Metropolitan Highway System Traffic and Revenue Report dated November 23, 2016, to support bonds for the Metropolitan Highway System (MHS). In that report we applied uncollectable transaction rates of 26.5% for the Tobin Bridge, 31.6% for the Boston tunnels and 34.7% for the Boston Extension of the Massachusetts Turnpike. The Tobin Bridge rate was based on actual experience, while the two other rates are derived from actual experience and reflect the fundamental differences in the make-up of traffic on those facilities.

5. Mr. Peter Smith's testimony on behalf of the Coalition for Responsible Toll Collection indicates that Massachusetts reported a 21% leakage rate at the Tobin Bridge. It should be noted that MASSDOT is expressing the numbers in terms of expected revenues and not of uncollectable transactions and this 21% is therefore not directly comparable to the 42% rate of uncollectable transactions used in the CDM Smith analysis in the manner that Mr. Smith proposes.

6. I am the principal author of the Delaware Transportation Authority U.S. 301 Traffic and Revenue Report dated May 2015. That report is included in the December 2, 2015 Official Statement for the Delaware Transportation Authority's Series 2015 U.S. 301 Project Revenue Bonds. Sections 5 and 6 of that report detail the methodology used to estimate the number of uncollectable transactions for that planned AET facility. For that analysis, 46.1% of image based transactions were estimated to be uncollectable. That estimate was based on actual Delaware Department of Transportation experience with violations within Delaware and the specific travel characteristics of the U.S. 301 corridor.

7. I am the principal author of the New York State Thruway Authority Traffic and Revenue Report dated April 26, 2016. That report is included in the May 5, 2016 Official Statement for the New York State Thruway Authority's Series 2016A Junior Indebtedness Obligations. Section VII.D details the methodology used to estimate uncollectable tolls for AET implementation at the Tappan Zee Bridge. The estimate was based on actual experience with NYSTA violation transactions and an analysis of specific facility traffic characteristics. The estimate varied by vehicle class with some 40% to 43% of transactions being uncollectable.

8. There is a trend nationally towards converting to AET when it is feasible to do so. Currently, the conversion has generally not been feasible at facilities that are long distance, rural, and non-commuter in nature. In addition to MASSDOT, Jacobs is currently the Traffic Engineer for several long distance rural toll facilities including the New York State Thruway and the Ohio Turnpike. MASSDOT is the only agency that has found it feasible to convert all of its facilities to AET at this time.

9. Jacobs has completed numerous AET studies for toll agencies including the New Hampshire Department of Transportation, Rhode Island Turnpike and Bridge Authority, Rhode Island Department of Transportation, Massachusetts Department of Transportation, New York State Thruway Authority, Ohio Turnpike Commission, Delaware River Joint Toll Bridge Commission, and Maryland Transportation Authority among other agencies. In all cases there are several parameters that should be considered in the decision to pursue AET including, satisfying applicable bond covenants, providing fair and reasonable cost of travel for all motorists, the ability to collect tolls from a large percentage of total travelers, understanding of the specific characteristics of travelers on the specific facility, the specific characteristics of the facility being studied, and what provides the best overall benefit to the toll facility being studied. In my opinion, these factors were accurately considered in the CDM Smith analysis for the York Toll Plaza.

Dated: April 27, 2017

By: _____

Richard J. Gobeille,
Infrastructure Consultancy Director
Jacobs Engineering Inc

STATE OF NEW YORK
NEW York, ss.

April 27, 2017

Personally appeared the above-named Richard J. Gobeille and made oath as to the truth of the foregoing pre-filed testimony.

Before me,

_____

Notary Public / Attorney at law

04/27/17

BLANCA E. GARCIA
NOTARY PUBLIC
01GA6338858
COMMISSION EXPIRES
Bronx County
MARCH 21, 2020
STATE OF NEW YORK

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION
IN THE MATTER OF

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	)	PERMIT FOR CONSTRUCTION OF A NEW
	)	TOLL PLAZA LOCATED IN YORK, MAINE

PRE-FILED REBUTTAL TESTIMONY OF DOUGLAS DAVIDSON
CHIEF FINANCIAL OFFICER OF THE MAINE TURNPIKE AUTHORITY

1. I am the Chief Financial Officer for the Maine Turnpike Authority ("MTA") and my qualifications are set forth in my pre-filed direct testimony. The purpose of this rebuttal testimony is to identify major areas in which the information presented by Mr. Marshall Jarvis and Mr. Peter Smith is misleading or inaccurate.

Reliance on Raytheon and Image Capture Rates

2. On Page 6 of his testimony, Mr. Jarvis states, "Current video technology has removed unreadable license plates as a limiting factor." On Page 11, he claims "New video units are virtually flawless in reading license plates with only .1% unreadable images." Mr. Jarvis is basing these claims on statements taken out of context by Raytheon. When Raytheon claims "99.9% image capture accuracy," they are referring to the percentage of times when a nonpayment event can be associated with a photograph of the correct plate. The Raytheon statement can not properly be read to conclude that 99.9% of the images will be useable for collection. Snow, rain, fog, dirt, towed trailers, and other obstructions make many images unusable. The MTA uses the best available high resolution cameras in its ORT lanes, but still many of the images cannot be used because of issues external to the equipment. Cameras for the new ORT and side toll lanes on the Maine Turnpike are the same as those being installed in new AET facilities in Manhattan.

Reciprocity

3. On Page 7 of his testimony, Mr. Jarvis claims that the three state reciprocity agreements for toll enforcement eliminate leakage among Maine, New Hampshire and Massachusetts. This is a gross overstatement. Although the three state agreements provide a sound basis for discouraging free-riders, it has resulted in recovery of only about half of the tolls and fees actually submitted by each state for payment. The MTA recovered approximately 53% of its toll and fee submissions to Massachusetts and about 46% from New Hampshire.

4. However, these percentages are not the whole universe of unpaid tolls from the two states. There are significant limitations on when unpaid tolls may be submitted for recovery. New Hampshire will only pursue patrons who have had more than 10 MTA violations within one year, and they limit the total number of requests for enforcement to 20 per month. The MTA thus selects the most egregious violators to pursue and writes off the rest. Likewise, Massachusetts and Maine

have agreed not to request enforcement measures on each other's motorists unless there is a toll balance of at least $25 on the submitted plate. It is costly and inefficient to do otherwise.

Risks to Revenue through Leakage

5. On Page 12 of his testimony, Mr. Jarvis claims that Canadians (6% of users) are the only user category to present a significant leakage risk. This statement is wrong. The MTA has leakage related to license plate address searches for most domestic users.

6. New Hampshire and Massachusetts allow us to address searches directly to their DMV databases. New Hampshire charges $3.00 per license plate and Massachusetts is free. The direct database search allows the MTA the best results because it uses a three variable search to confirm each of the necessary identifiers: (1) license plate characters, (2) the state of issue, and (3) the plate type. All three are important because plate characters may be duplicated on various plate types within the same state.

7. All other state searches are through a service called Duncan Law Enforcement Services ("Duncan"). Duncan charges $1.25 per plate search. The Duncan database is a two variable search containing only the license plate characters and the state of issue. These searches result in multiple matches per plate search based on the number of plate types with the same plate characters. Maine has 58 types of passenger license plates. Most states have multiple plate types, and the plate characters are not unique. The Duncan database requires manual review of search results to establish a correct match. This represents a significant back office effort adding to leakage costs. The MTA cannot obtain any Canadian license plate data directly but can get some Quebec plates from the Duncan database.

Violations with an ORT System

8. On Page 6 of Mr. Peter Smith's testimony, he assumes 10% of all ORT lane traffic will be violators. This assumption is entirely inconsistent with MTA experience in its ORT lanes. I have done an analysis of traffic in the ORT lanes at the New Gloucester toll plaza for 2016 with results as follows:

A. Of the 5,210,897 vehicles that passed thru the ORT gantries in 2016, there were 223,005 (4.28%) with no initial payment event. Of these, 192,228 (86.20%) had usable plate images, and 30,777 (13.68%) did not.

B. Of the 192,228 vehicles with usable images and no initial payment, 161,226 (74.19%) had valid E-ZPass accounts to which the tolls were posted. Another 3,096 paid their tolls thru the MTA website or by mail for one of the transactions before it was sent to violation processing.

C. The remaining 27,906 usable images (.54%) were moved to the violation process, and about half were collected over the course of 2016 and into 2017.

9. The results show that the gross violation rate, including non-readable images, was 58,683 or 1.13% of transactions thru the ORT lanes. If you do not include the 30,777 unusable images, the rate is only .54%. More than half of the violations sent out for processing were collected over the ensuing 14 months. The violation rate within our ORT lanes is less than the violation rate we experience today in our legacy systems like the one in use at the York Toll Plaza.

Toll Increase Assumption

10. On Page 7 of his testimony, Mr. Peter Smith assumes "15% toll increases every five years." The MTA produces a 30-year financial plan that is updated twice annually. The current 30-year plan was approved by the MTA Board of Directors and published in November of 2016. The plan shows that the MTA has not had a toll increase since November 1, 2012, and does not plan to have another toll increase until February 1, 2031. Mr. Smith's toll increase assumption results in overstating the profitability of AET.

E-ZPass and Cash Transaction Trends

11. The intervenors devote substantial attention to E-ZPass usage trends on the Turnpike using data picked from different sources over odd spans of time and without understanding whether they should use data for revenue, for transactions, or for raw traffic counts. All three have their place in performing an analysis for different purposes; but transaction data is most useful for the AET conversion issue. In order to clarify E-ZPass trend data, we have prepared Turnpike Exhibit FF that contains a summary of raw transaction data over a six year span from 2011 through 2016, both for the York toll and for the highway as a whole. The current E-ZPass penetration rate for the highway is 73.2%.

12. For York alone, we have the E-ZPass penetration rate recorded as 71% with the caveat that this number does not include many of the northbound transactions for in-state E-ZPass customers whose transactions are allocated to the side tolls where they leave the Turnpike. The purpose for allocating the transaction to another toll is to bill the customer only for the length of the trip actually taken at the approximate rate of 7.7 cents per mile. For example, a Maine customer who passes through York going north and gets off at Wells is billed only 90 cents because the trip is 12 miles long. An out-of-state E-ZPass user, on the other hand, is billed at the cash rate for the same trip and the transaction is recorded at York. All southbound trips through York are counted at the York toll because all southbound trips must terminate there, regardless of where they originate.

13. The term "E-ZPass penetration rate" means different things on different roads depending on whether one is talking about transactions or revenue or even raw traffic counts within a given lane of travel. Even for transactions, it makes a difference whether motorists are tolled by the trip or by their passage under a single gantry. The term may not be used in the same way for all roads. The most important thing is the trend rate over time using data that is consistent from year to year. It is for that reason we have prepared Exhibit FF as a record of those trends over six years of recent history.

In Closing

14. The testimony from Mr. Jarvis and Mr. Smith contains assumptions that are inconsistent with the MTA's operations. These assumptions are unsupported by professional experience in the tolling industry. The information provided in the MTA's application and its testimony in these proceedings have been analyzed and produced by recognized engineering consultants in the same fashion as would be necessary to support any important MTA decision where bondholders and the general public are significantly impacted.

Dated April 28, 2017

By: _____
Douglas Davidson
Chief Financial Officer
Maine Turnpike Authority

STATE OF MAINE
CUMBERLAND, ss. April 28, 2017

Personally appeared the above-named Douglas Davidson and made oath as to the truth of the foregoing pre-filed testimony.

Before me,

_____
Notary Public / Attorney at law
Jonathan Arey, Esq
Secretary – MTA

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION
IN THE MATTER OF

MAINE TURNPIKE AUTHORITY	)	APPLICATION FOR A NATURAL
	)	RESOURCES PROTECTION ACT PERMIT
DEP #L-27241-TG-A-N	)	and NOTICE OF INTENT FOR SITE
DEP #L-27275-TP-A-N	)	LOCATION OF DEVELOPMENT GENERAL
	)	PERMIT FOR CONSTRUCTION OF A NEW
	)	TOLL PLAZA LOCATED IN YORK, MAINE

PRE-FILED REBUTTAL TESTIMONY OF ROLAND LAVALLEE OF HNTB CORPORATION

1. In his testimony, Mr. Marshall Jarvis provides a distorted history of the need to replace the aging toll plaza in York and implies that the Maine Turnpike Authority's ("MTA") proposed project fails to align with federal goals for the interstate highway system. This rebuttal testimony provides facts supporting the MTA need for a new toll plaza at York, applicable federal requirements, and corrections to other misstatements contained in the Intervenor's pre-filed direct testimony.

Need for a New Toll Plaza

2. On page 4 of Mr. Jarvis's testimony he states "I became involved in the York relocation Plaza in 2006 when the MTA was playing one town against another on the relocation project to build a new $60 million plaza where there were no rush hours or congestion except for a few weekends in the summer." Jarvis states that a $60 million plaza was proposed and claims that HNTB tried to justify the need for that plaza by manufacturing congestion issues.

3. I do not know where the figure of $60 million comes from and a source is not cited by Mr. Jarvis. There was early consideration of a 56 million dollar plaza to be built at the existing site. This was not proposed for construction but was one of four alternatives that the MTA required HNTB to review and assess in the alternatives analysis solely because it was the site that the Town and Think Again favored. The cost reflected what needed to be done to make that location comply with reasonable design guidelines. Not only was this alternative, Option 4A, the most expensive, it failed to meet three of the four basic engineering guidelines. The other three alternatives had costs in the 35 million dollar range and complied with all basic engineering guidelines. This historical figure is irrelevant to the current application for a plaza estimated to cost about $40 million except that it demonstrates MTA's commitment to years of attempts to satisfy Intervenors.

4. The claim by Mr. Jarvis that the new York plaza was proposed to relieve congestion is inaccurate and misleading. As stated in the permit documents, including the USACOE Project Purpose Statement:

> "The purpose of the project is to replace the existing barrier toll plaza on the Maine Turnpike at York, Maine with highway speed electronic tolling lanes and cash (non-EZpass) lanes to address safety deficiencies, settling/subsidence, facility deficiencies including substandard tolling equipment, existing and projected traffic volumes and traveler impacts and expectations."

The plaza requires replacement to eliminate an obsolete and deteriorated structure, to improve safety, and to increase customer service by taking advantage of modern technology.

EZ-Pass Growth

5. On page 6 of his testimony, Mr. Jarvis recaps E-ZPass growth statistics as follows:

> "In 2007 E-ZPass usage at the York tollbooth was 50%. In 2014, the year CDM Smith did the AET alternatives analysis, E-ZPass use had grown to 64%. Currently, the MTA states that E-ZPass use is at 76% at the York tollbooth. This increase is greater than all prior MTA predictions, as well as the figures used by both CDM Smith and HNTB in the AET assessments in the applications filed with DEP. As noted above, CDM Smith used the then-accurate figure of 64% although that figure is now outdated. The 2009 AET analysis by HNTB Report assumed the York Plaza would not achieve 75% use until 2030, and usage rates have already exceeded this figure. In other words, actual E-ZPass usage achieved the 75% goal 14 years before the MTA predicted it."

6. In fact, MTA E-ZPass growth rates have been good but in line with projections. First, the value of 76% is not an actual rate but a 2015 projection developed for the most recent revenue certificate model. Since less revenue is collected by in-state E-ZPass, it is industry practice to be conservative regarding revenue in preparing these models to assure that the change does not infringe upon the agency's ability to meet its financial obligations. The 76% (actually 75.8%), is somewhat higher than the actual rate. It must be noted that this value includes all E-ZPass use through the plaza including the "non-revenue" transponders used by emergency and maintenance vehicles which are not a revenue risk.

7. The projection for E-ZPass growth of 75% by 2030 is from the Phase 1 report submitted in 2009 and reads as follows in context:

> "The analysis has been based on an assumption of fairly modest growth in the share of E-ZPass usage. From 2010 **through 2030, it is assumed that the share of E-ZPass usage will grow by about 1.0-1.5% per year, reaching a share of** approximately 75% in 2030. If E-ZPass usage grows faster than expected, then the operational forecasts will change as well. In general, greater E-ZPass usage will yield improved performance of the toll facility in any configuration but more so in the ORT configurations."

From Phase 1 Report, Part 2 Existing Site Evaluation, Section 6, page 29, Conclusion #6.

8. Since increased E-ZPass use would minimize impacts by allowing a smaller overall plaza, a conservative growth of E-ZPass was used and demonstrated that the plaza would not require future expansion. Additionally, the plaza would be sized for the "peak condition" which is a weekend in the summer when E-ZPass utilization is lower.

9. While E-ZPass has grown significantly, the E-ZPass values from 2015 to 2016 increased by 2.08% which is in line with projections. The growth previously seen was a function of the conversion to E-ZPass from TransPass, and most significantly the modification of the toll structure by substituting a volume discount for the previous "Commuter Discount." In summary, the values

used in the studies are valid and do not change the basis of the filing. The difference in values cited by Mr. Jarvis arise from the different purposes of the studies he is reviewing. The important issue is actual trend data which is addressed in the testimony of Douglas Davidson and Exhibit FF.

Federal Government Mandate on AET

10. On page 8 of his testimony Mr. Jarvis states: "AET has become so widespread and so much more efficient than cash that the federal government mandated that all new toll plazas on federally funded roads must be AET starting in 2016."

11. There is no such federal mandate. The closest thing to it was the requirement for automated toll collection as part of the Express Lanes Demonstration Program (ELDP) as codified in 23 C.F.R. 950.5. Even that section allowed for toll booths and cash payment under certain circumstances. The ELDP was authorized under Section 1604(b) of Safe, Accountable, Flexible, Efficient Transportation Equality Act- a Legacy for Users (SAFTE-LU). It expired on September 30, 2012. The five tolling agreements that were executed by Federal Highway Administration (FHWA) and project sponsors under this program continued in place after expiration of the program. Projects that did not get tolling agreements in place were allowed to proceed under the Section 129 General Tolling Program. 23 U.S.C. 129 does not include a requirement for automated toll collection. However, 23 U.S.C. 166 which includes requirements for conversion of High Occupancy Vehicle (HOV) lanes does contain this requirement. Construction of new Interstate capacity and reconstructed Interstate bridges and tunnels may be tolled under 23 U.S.C. 129 where there is no requirement for automatic toll collection. None of these provisions apply to the MTA. In speaking to members of the FHWA tolling team they have also confirmed that there was no such mandate.

ACS/Xerox

12. On page 8 of his testimony, Mr. Jarvis states: "In September of 2009 ACS/Xerox issued a "white paper" on AET, noting that "even the most ardent skeptic would find it hard to argue against All Electronic Tolling, because it's one of those rare innovations that truly benefits everyone involved." (ACS Report page 2 in Jarvis Exhibit "E") ACS claimed that AET increases the efficiency of a toll collection system, while significantly lowering operating costs. ACS noted the growth in AET use in New Jersey and Maryland and certain improvements in video technology that accurately capture plate images 99% of the time.

13. The document from ACS/Xerox (now Conduent) is not a "white paper" but a promotional marketing piece with little technical information. Xerox has since spun off their tolling business into a company called Conduent, a System Integrator that operates Toll Service Centers. The company profits greatly from AET as it requires large toll service centers that they offer under contract to public agencies. The statement regarding AET in New Jersey is misleading. The work done there involved new cameras for violation enforcement. New Jersey has not converted any plazas to AET and has not indicated that they want to.

Environmental Assumptions with AET

14. On pages 9 and 10 of his testimony Mr. Jarvis states "Massachusetts also recognized the significant environmental benefits of AET, due to the reductions in idling and acceleration, which

the Commonwealth estimated would save between 500 and 2500 gallons of gasoline per day, and would reduce greenhouse gas emissions by up to 7,800 ton per year".

15. Proportionately similar results would be seen with an ORT plaza for York. The configuration of the proposed plaza aids in the deceleration and acceleration of cash paying vehicles, thus reducing fuel consumption. In the E-ZPass lanes, over 71% of all vehicles and a much higher percentage of trucks will pass through at highway speed. One item not mentioned is that of "social justice." AET affects the unbankables and poorer patrons in ways that ORT does not. The surcharge will more likely affect those who can least afford it and those who lack the ability to open an account by depositing funds.

HNTB Estimates for NH

16. On page 10 of his testimony Mr. Jarvis states:

> "Advocates for AET in New Hampshire noted that on the Tobin Bridge in Massachusetts, approximately 20% of image based revenue went uncollected, as compared with 50.7% predicted by the engineering firm HNTB for the New Hampshire tolls. HNTB also overestimated unreadable images at 25.6%, even though MassDOT reports only 7% unreadable images, with Washington State DOT reporting 10%."

17. Mr. Jarvis states this incorrectly. These values were not predicted by HNTB; rather, they were reported as data provided by the New Hampshire DOT Bureau of Turnpikes (NHBOT) and reviewed and accepted by them. The values were thought to be high but were in fact due to the equipment and protocols of the time. Some of this has been remedied with improvements made by NHBOT in recent years. Nevertheless, it is worth noting that the NHBOT was very forthcoming with accurate information. Many agencies do not report missed images as unreadable and often do not report them at all.

Diversion Issues

18. John Adams and David Sullivan (A&S) of Milone & MacBroom, Inc. (M&M) commented on HNTB's technical memorandum entitled "*Analysis of Traffic Impacts from AET in York*" dated September 14, 2016 (HNTB Traffic Impacts Memo). Initially, it is important to note that tolling traffic studies including diversion analyses represent a distinct subspecialty of traffic engineering, and those who make tolling decisions (tolling agencies, bond rating firms, etc.) rely only on firms that have extensive knowledge and experience in this area. HNTB meets this standard, as do all other firms relied upon by the MTA (CDM Smith and Jacobs). With respect, it is clear that both John Adams or David Sullivan are experienced engineers, but there is no indication in their resumes that they have experience with toll road traffic, toll diversion, fare diversion or other diversion studies.

19. On page 1 of their Pre-filed Direct Testimony, A&S state that "the methodologies utilized in the HNTB traffic studies . . . seem to be reasonable and consistent with industry practice . . ." Despite this acknowledgment, they comment that *"the diversion conclusions are problematic for two reasons. First, it's unclear if the inputs in the modeling have factored in the capacity constraints of the potential diversion routes. . . . . Second, even with the high projected delays and congestion at some of the diversion route study intersections, these studies assume that, in reality, motorists will tolerate these significant delays. In reality this may not be the case, and these studies*

do not provide any quantifiable assessment of the subjective decision-making of travelling motorists."

HNTB Response. As will be shown below, the HNTB Traffic Impacts Memo did take into account capacity constraints and motorist tolerance for delays using industry-accepted models and analysis as informed further by HNTB's extensive local knowledge of the Turnpike and related highways. As noted in my direct testimony, the HNTB Traffic Impacts Memo was prepared in consultation with the Maine Department of Transportation (MaineDOT). MaineDOT reviewed the HNTB Traffic Impacts Memo and considers it to be a reasonable engineering analysis of the traffic impacts that would occur from the estimated AET diversion levels.

HNTB specifically analyzed the impacts of diversion for two different time periods – an average summer weekday and the peak hour of an average day of the year. To analyze an average summer weekday, we used MaineDOT's travel demand model in collaboration with their staff regarding methodology and approach. The MaineDOT's travel demand model takes into consideration trip origin and destination, and logically assigns an alternate path of travel based on congested travel speeds that are a function of the traffic volume and roadway capacity (which is a function of its number of lanes, classification, posted speed limit, and access control). The MaineDOT Statewide model was not used for the peak hour analysis as the Statewide model only forecasts daily traffic volumes and not peak hour volumes.

The following paragraphs relate to comments contained in the Memorandum from A & S of Milone and MacBroom (M&M) to Scott Anderson entitled "*MTA York Toll Studies Review*" dated April 6, 2017 (M&M Memo), which was attached to the Direct Pre-Filed Testimony of A & S.

20. Page 1 - paragraph 3 of the M&M Memo reads: *"The average summer weekday analysis is largely based on the existing Maine DOT Travel Demand Model (TDM). The report states that the TDM is a planning-level tool and further provides measures of effectiveness both regionally and statewide. This method of analysis may not be the most appropriate, however, for detailed micro level analysis that is required to best define and determine impact along likely diversion routes between I-95 Exits 7 and 19."*

HNTB Response. Analyzing the traffic impacts of diversion on an average summer weekday requires a macro level or regional analysis due to the far-ranging trip origins and destinations that exist for vehicles that travel through the York Toll Plaza. Because the level of congestion already experienced on US Route 1 in the summer is high, diverting traffic will desire to move elsewhere to roadways that are less congested, such as State Route 236, State Route 109/9, and State Route 4.

The MaineDOT travel demand model was used to determine the likely path of travel of motorists estimated to divert the York Toll Plaza by CDM Smith (2014). The MaineDOT TDM takes into consideration trip origin and destination, and logically assigns an alternate path of travel based on congested travel speeds that are a function of the traffic volume and roadway capacity (which is a function of its number of lanes, classification, posted speed limit, and access control).

This comment in the M&M Memo implies that a micro-level analysis would better define impact along the diversion routes between I-95 Exits 7 and 19. However, the diversion that results is broader than these two interchanges and can only be quantified through the use of the TDM, which

is a macro level or regional analysis model. A micro-level analysis is not the appropriate way to analyze an average summer day as it typically measures operations for a peak hour only and not an entire day.

HNTB's experience in performing toll diversion analyses has shown that a micro level analysis is not appropriate to analyze the daily diversion given the regional affects that diverting traffic can cause. Furthermore, the travel demand model already factors in the capacity constraints of the potential diversion routes as noted above.

21. Page 1, paragraph 4 of the M&M Memo reads: "*To reach any certain conclusions, additional background and back-up information would be necessary regarding the inputs and methodologies that the TDM uses to make detailed determinations of changes in traffic volumes on particular roadways and intersections. Specifically, we would also request information on the TDM methodologies for accounting for existing excessive delays on particular roadways and intersections and how the TDM processes these factors.*"

HNTB Response. The MaineDOT TDM is calibrated to reflect existing conditions – meaning that if a roadway is either highly congested or lightly traveled, the TDM already reflects these conditions – even those roadways that have excessive delays. This is standard modeling practice that follows Report 716 from the National Cooperative Highway Research Program (NCHRP) for calibrating regional or statewide model areas.

When additional diverted volumes were distributed throughout the regional roadway network using the MaineDOT TDM in the HNTB analysis, the model takes into consideration the existing volumes and available capacity of the roadway in determining what routes the diverted traffic volumes will follow. Roadway capacity is a function of roadway functional classification, number of lanes, speed limit, and access control. In the model, as the volume of traffic increases and approaches capacity, the speed reduces. Congested routes become less desirable for diverting trips and they will seek other less congested routes. This dynamic process allows the TDM to reasonably forecast which roadways trips will be diverted and where to based on their origin and destination.

22. Page 2, paragraph 5 of the M&M Memo reads: "*The average summer weekday analysis predicts impacts in terms of changes in traffic volumes, vehicle miles traveled, and vehicle hours traveled, but it does not, however, capture traffic operations in terms of average delay, level-of-services, volume to capacity ratios and queues at specific intersections. This would likely indicate higher increases in average delay at key intersections such as; Route 1 at Shore Road & Beach Street in Ogunquit, and the Turnpike Connector at the SB Turnpike Ramps in York; when compared to the peak hour analysis that was completed for the peak hour of the average day.*

HNTB Response. The peak hour of the average day analysis performed generated traffic operations in terms of average delay, level-of-service, volume to capacity ratios, and queues at specific intersections. The analysis was performed for the average day as this is the period estimated by CDM Smith when the highest diversion is likely to occur and will result in the greatest change in traffic operations at key intersections.

Changes in traffic operations at key intersections will be less during summer peak hours, due to existing high levels of congestion and lower volume of diverting traffic. This means that most traffic will not be diverted to intersections that are experiencing lengthy delays and queues,

resulting in only minor additional increases. Other roadways and intersections that have less congestion and traffic that are logical, alternate routes receive higher levels of diverted traffic.

23. Page 2, paragraph 6 of the M&M Memo reads: *"Given the existing excessive average delays and congestion levels that exist at some intersections along the likely diversion routes, we feel this may be a limiting factor for the amount of traffic volumes that actually divert. We are in agreement that there likely will be some level of traffic volumes diverting from I-95 due to a potential Automated Electronic Tolling (AET) system, however due to the existing excessive increases in travel times and queues during the summertime conditions, especially during peak hour times of the summer, potential diverting traffic may be discouraged from exiting I-95. In other words diversion of traffic volumes from I-95 may be capacity constrained by the potential diversion routes.*

HNTB Response. HNTB's 2007 toll diversion analysis determined that some traffic today diverts from the York Toll Plaza, even during peak summer periods, to avoid the tolls. Toll elasticity, which measures the change in demand due to a change in toll rate, is measured and calibrated regularly by HNTB for the MTA in order to accurately predict effects of changes in toll rates. Previous toll increases implemented by the MTA have resulted in additional traffic diverting from the Turnpike to avoid the higher toll rate. Typically, this number is relatively small - corresponding with small, incremental toll increases - with some bounce back. The level of toll diversion calculated by CDM Smith is consistent with the current Turnpike toll elasticity and concludes that additional diversion will occur, even with the existing delays and congestion levels along logical diversion routes due to the significant "toll increase" that AET would impart.

CDM Smith developed a toll diversion model based on actual cash patron movements passing through the York toll plaza. The model compares the total cost of using the Turnpike versus using the best alternative route that would avoid the York toll plaza. Costs for both the Turnpike and alternative trips are developed based on a combination of travel time, travel distance, and toll rate. A value of time per minute of travel and cost per mile of travel, plus the cost of any toll, are used to develop total Turnpike and alternative route costs. CDM Smith has developed a toll road specific diversion curve which uses the total cost ratio between the Turnpike route and the alternative route to determine the estimated market share that each route will capture. The model tests the tradeoff between the faster travel times offered by the Turnpike routing, versus the toll savings offered by using the alternative route.

To further support the level of diversion estimated by CDM Smith AND the degree to which traffic will divert, even during peak summer days, we refer to the 2003 trial conducted by the New Hampshire Department of Transportation (NHDOT) that implemented one-way tolls at Hampton during a 10-week period. Starting in August 2003, the NHDOT doubled the $1.00 toll to $2.00 for passenger cars northbound and removed the toll southbound. This data, gathered and summarized by HNTB in its 2005 *One-Way Tolling Feasibility Study* for the MTA, identified that traffic was willing to divert and travel on already congested roads even during peak summer days. Data from NHDOT showed that 2003 daily traffic volumes were up to 4,000 vehicles less than similar days in 2002 as a result of the doubling of the toll by $1.00. Traffic in the southbound direction increased with the removal of tolls during the same time period, offsetting any notion that traffic levels may have been different in 2003 vs. 2002. The local, parallel route that these diverting northbound motorists shifted to during this 10-week period was Route 1. Over 12 miles long with over 20 signalized intersections, this study showed the level to which motorists are willing to divert based on a sizeable increase in toll rate. This trial's conclusion confirms the overall results of the

diversion analysis – that motorists are willing to divert a sizeable toll increase, even onto congested roadways.

Our analysis acknowledges that diversion will be lower during peak summer hours, but diversion will still occur as ocumented by NHDOT.

24. Page 2, paragraph 9 of the M&M Memo reads: *"We agree that during the average traffic volume times of the year such as May or September, when traffic volumes are lower than the summer peak times, that Route 1 and other diversion routes will have more available capacity to accept diverting traffic. However, based on the results of the Synchro traffic operations analyses at the study intersections, it is our opinion that motorists may not tolerate the levels of delay and congestion during peak hour travel times. For example, the intersections of Route 1 at Shore Road & Beach Street in Ogunquit, and the Turnpike Connector at the SB Turnpike Ramps in York, are forecasted to experience excessive delays. The Shore Road intersection in Ogunquit is expected to increase from the 2019 No-Build Condition average delay of 73.3 secs (LOS F), to 202.4 secs of delay under the average diversion condition and 326.2 secs under the 90th percentile diversion with AET. For the SB Turnpike Ramps in York, the average delay is forecasted to increase from 120.3 secs (LOS F) to 253.1 secs under the average diversion and 375.8 secs under the 90th percentile diversion condition. During peak hour times of the average time of year the diversion routes will be capacity constrained which may discourage traffic from diverting from I-95 at the levels that have been forecasted."*

HNTB Response. See previous responses. Our analysis and results of NHDOT's trial shows that traffic is willing to accept additional delays and queues on Route 1, both during peak and average travel times. This acceptance of additional queues and delays will spread into the shoulder months of May, June, September, and October as noted in our average day peak hour analysis.

HNTB would like to clarify that the travel delay at the SB Turnpike Ramps in York is not delay that diverting traffic will face. Rather it is delay that the non-diverting southbound ("SB")-off ramp traffic will be forced to tolerate as they wait for the diverting traffic to turn left onto the SB-on ramp from the Turnpike Connector.

25. Page 2, paragraph 10 of the M&M Memo reads: "*We would recommend that additional intersections be added to the study to more accurately depict issues with congestion along the potential diversion routes. Some additional suggested intersections would include: Route 1 at Mile Road and Route 1 at Route 9B in Wells; also potentially Route 109/9 at North Berwick Road in Wells; and in North Berwick - Route 9 (Well St) at Route 4 (Elm St) and Somersworth Road (Route 9) at Route 4 (Elm St).*"

HNTB Response. HNTB, in collaboration with MaineDOT staff, selected key intersections that are expected to have increased turning traffic volumes as a result of the toll diversion. Other intersections are also expected to be impacted, but the analysis focused on those key intersections that are likely to be most impacted. Adding more intersections to the study will only show that more intersections will be negatively impacted by the expected diversion. Doing this would not change the conclusions of the study. We are not trying to design a solution, but merely providing insight into what AET conversion will do

24. Page 2, paragraph 11 of the M&M Memo reads: *"The critical roadway analysis that was completed by HNTB on Route 1 near Captain Thomas Road indicated that route was at or over capacity for ten hours of the average weekday in August 0f 2014. This condition is only worsened by background growth and forecasted diversion increases. We are not sure the forecasted delays will be tolerated by potential diverting motorists. This condition may discourage and lessen the number of motorists diverting from I-95."*

HNTB Response. See previous responses, primarily the response that notes the findings from the NHDOT one-way tolling trial that documents a willingness by motorists to divert to a highly-congested Route 1 during the summer peak as a result of a $1.00 toll increase. We agree that diversion will be less during the summer peak than during other months. This is noted in CDM Smith's diversion numbers and our analysis results. As stated previously, the MaineDOT's travel demand model takes into consideration the capacity constraints as noted above. Because of the levels of congestion already experienced on Route 1 in the summer, diverting traffic will desire to move elsewhere to roadways that are less congested such as State Route 236, State Route 109/9, and State Route 4.

26. In summary, nothing contained in the A&S Direct Pre-Filed Testimony or the attached M&M Memo alters the basic diversion conclusions set forth in our direct Pre-filed testimony. If implemented, AET would cause diversion and will make already congested roads worse. Ten municipalities would experience significant impacts to key roadways and intersections: Ogunquit, York, Kittery, Eliot, Wells, South Berwick, Berwick, North Berwick, Sanford, and Kennebunk. During the peak tourism months of July and August, travelers on inland corridors would experience more delays at intersections already identified by MaineDOT as having a relatively poor level of service. In non-peak months, summer traffic conditions on Route 1 that are currently experienced in July and August would expand into the spring and fall.

Dated April 28, 2017

By: Roland A. Lavallee
Roland Lavallee
HNTB CORPORATION

STATE OF RHODE ISLAND

Providence, ss. April 28, 2017

Personally appeared the above-named Roland Lavallee and made oath as to the truth of the foregoing pre-filed testimony.

Before me,

Debra A. Thistle
Notary Public / Attorney at law

DEBRA A. THISTLE
Notary Public, State of Rhode Island
My Commission Expires Aug. 07, 2017

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION
IN THE MATTER OF

MAINE TURNPIKE AUTHORITY	)	APPLICATION FOR A NATURAL RESOURCES
	)	PROTECTION ACT PERMIT and NOTICE OF
DEP #L-27241-TG-A-N	)	INTENT FOR SITE LOCATION OF
DEP #L-27275-TP-A-N	)	DEVELOPMENT GENERAL PERMIT FOR
	)	CONSTRUCTION OF A NEW TOLL PLAZA
	)	LOCATED IN YORK, MAINE

LIST OF EXHIBITS SUBMITTED BY THE MAINE TURNPIKE AUTHORITY

A. MTA Southern Toll Plaza Initial AET Feasibility Review, HNTB 2/20/2009
B. ORT/AET Impact Analysis 4/14/14 CDM Smith (Quinlin) (pages are dated 3/18/14)
C. MTA Staff Report (Mills) 4/30/14
D. MTA Board Minutes & Order of 7/24/14 to retain cash
E. Description of MTA's toll protocols (Mills) 3/3/17

F. Extracts from Turnpike bond resolution
G. Quinlin letter on AET v ORT Conversion Variables for York 1/12/17

H. Letter from York Board of Selectmen 5/20/14
I. Jacobs's alternatives matrix for siting
J. MTA Staff's site recommendation (Mills) 11/16/15
K. Board Minutes & Order of 11/19/15 for siting at mile 8.8

L. AECOM Feasibility of a Statewide Tolling Strategy for MA (pages 1-5) July 2012
M. TollRoadsNews article on Massachusetts AET conversion 8/19/13
N. TollRoadsNews article on Allston interchange 10/23/13
O. Massachusetts current toll schedules (March 2017)
P. Quinlin comments on Massachusetts and AECOM report 9/9/15
Q. Quinlin email comments on N. Texas Toll Authority AET data 7/22/16

R. HNTB Tech memo on Conceptual Replacement Options for Existing Site (Lavallee) 1/26/17
S. Record of MTA public engagement 11/8/16
T. MTA (Mills) Answers to Questions from ACOE 1/26/17

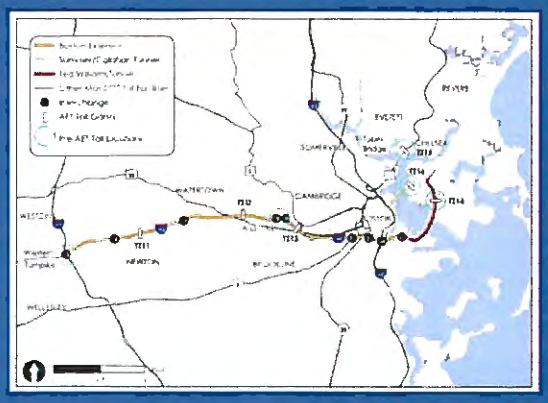
U. Fleming (eTrans) draft report of 2/7/16
V. Turnpike Comments of 2/10/16 on the Fleming draft of 2/7/16
W. Seacoast On-line article of 2/11/16
X. Fleming report final draft of 3/30/16
Y. Mills 4/1/16 review of Fleming report of 3/30/16
Z. Mills 4/2/16 narrative response to Fleming report
AA. Quinlin response to Fleming Report 7/22/16
BB. Resumes of Mills, Mallar and Quinlin

REBUTTAL EXHIBITS SUBMITTED BY THE MAINE TURNPIKE AUTHORITY

CC. MASSDOT Metropolitan Highway System Traffic and Revenue Report 11/23/16
DD. Waterfall Chart (Table 23) with York included
EE. Cash Toll Road List
FF. Toll Transaction History 2011-2016

Turnpike Exhibit CC

JACOBS™



Submitted to:

massDOT
Massachusetts Department of Transportation

Metropolitan Highway System

Traffic and Revenue Report

November 23, 2016

Submitted by:

Jacobs Engineering Group Inc.

2 Penn Plaza, Suite 603
New York, NY 10121

6.0 TRAFFIC AND GROSS TOLL REVENUE FORECASTS

This chapter details the methodology, inputs and assumptions used to forecast traffic and gross toll revenue from FY 2017 through FY 2022 on the Boston Extension and the Tunnels, and presents the traffic and revenue results.

6.1 Methodology Used for Forecasting

Given the long history of tolled traffic on the MHS, and available non-tolled traffic data, Jacobs developed spreadsheet models to forecast traffic and revenue on the MHS. The Boston Extension and the Tunnels were modeled separately, and each considered the new toll gantry locations and the projected collectability of revenues with AET.

6.1.1 Boston Extension

Jacobs' modeling methodology to forecast traffic and revenue for the Boston Extension can be summarized in four steps:

1) *We factored in the change in toll locations.* When AET began on October 28, 2016, the tolling points on the Boston Extension were relocated from one mainline and several ramps to three mainline gantries. This made it necessary to analyze "trips" instead of just "transactions," since a trip may pass through multiple toll locations, paying multiple tolls. We developed origin-destination matrices for each vehicle class and payment type using the known volumes at each pre-AET toll plaza, and recent count data on the free ramps and the mainline. We then used an iterative factoring process to develop a set of trip matrices, separated by vehicle class and payment type, for FY 2016 (actual) and FY 2017 (pro forma).

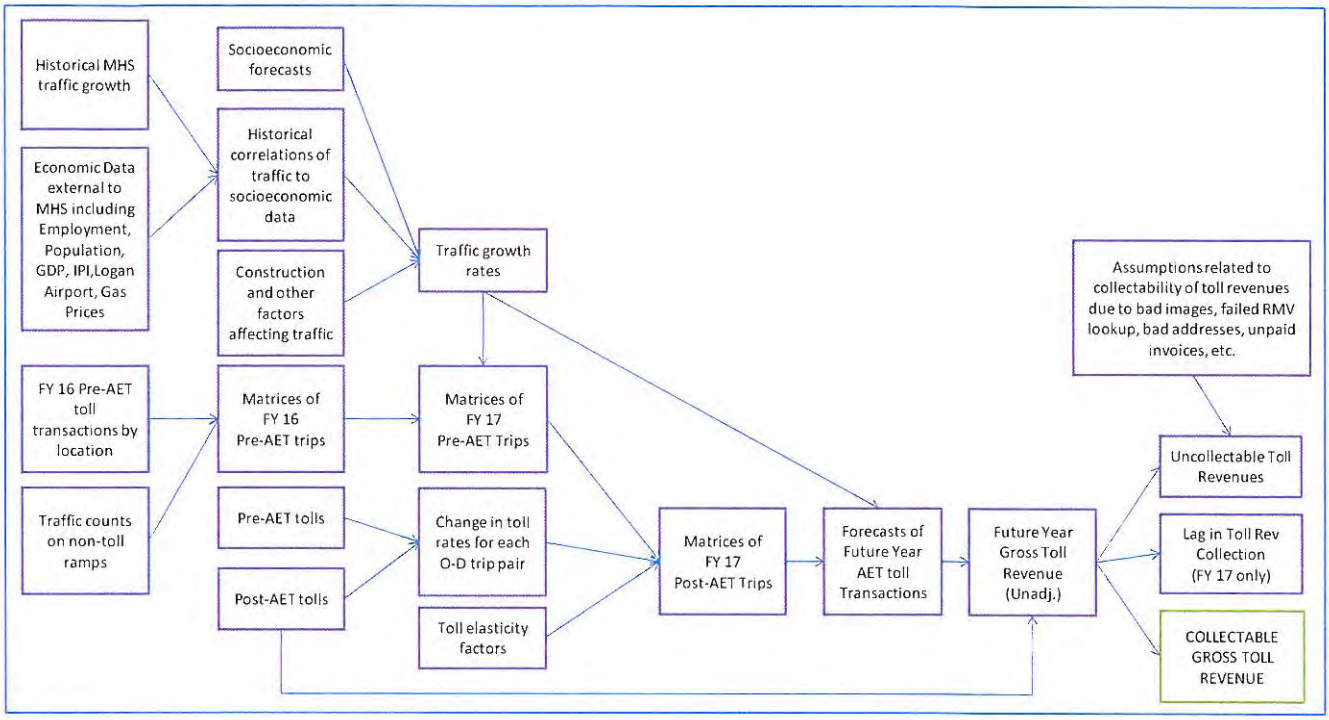
2) *Toll rates for the AET system were applied.* Based on the change in toll rates for each trip, some shifting from cash to E-ZPass was assumed, and some traffic was expected to leave the facility.

3) *Growth rates were applied.* We estimated growth using historical correlations to economic indicators and future forecasts of these indicators. Effects of roadway construction during the forecast period were factored in. We also estimated future growth in E-ZPass market share by observing its growth over the past decade.

4) *We calculated gross toll revenues accounting for uncollectability*. Revenue losses due to uncollectable Pay by Plate tolls were estimated using data from the Tobin Bridge Pilot Program, and from other relevant AET facilities around the country.

A diagram of the full modeling methodology for the Boston Extension is shown in Figure 40.

Figure 40: Modeling Methodology, Boston Extension



6.1.2 Tunnels

Methodology for modeling traffic and revenue from the Tunnels is the same for Step 2 through 4 listed for the Boston Extension; however, Step 1 – factoring in the changes in toll locations with AET - differs.

1. *We factored in the change of tolling from westbound only to two-directional tolling.* Before AET, the Tunnels were only tolled in the westbound direction. With AET, they are now tolled both ways, at half the toll rate as before, except for Pay by Plate vehicles which are charged an additional 30 cents each way in addition to the E-ZPass rate. The change in *round trip* toll rate was used and toll elasticity factors applied to determine toll diversion. Because most drivers do not see a change in their round trip toll, and there is little difference in total eastbound and total westbound traffic at the Tunnels, only minimal change is expected in the number of crossings.

2. *Toll rates for the AET system were applied as* noted previously for the Boston Extension.

3. *Growth rates were applied as* noted previously for the Boston Extension.

4. *We calculated gross toll revenues accounting for uncollectability* as noted previously for the Boston Extension.

More detail on the assumptions and inputs to the forecasting methodology for the MHS facilities are presented in the following sections.

6.2 AET Gantry Toll Rates

The AET gantry rates for all vehicle classes and payment methods are shown in Table 22. The upper table presents the E-ZPass rates and the lower table shows the Pay by Plate rates, which are 30 cents higher per gantry than the E-ZPass rates for non-Massachusetts accounts.

Table 22: AET Gantry Toll Rates

Gantry Rates for E-ZPass

	TOLL ZONE	2-Axle POVs with MA E-ZPass	RESIDENT Program	2-Axle POVs with Non-MA E-ZPass	2-Axle COVs E-ZPass	3-Axle E-ZPass	4-Axle E-ZPass	5-Axle E-ZPass	6-Axle E-ZPass	7-Axle E-ZPass	8-Axle E-ZPass	9-Axle E-ZPass
MHS Boston Ext.	11	$ 0.35		$ 0.70	$ 0.70	$ 1.20	$ 1.40	$ 1.85	$ 2.10	$ 2.55	$ 2.80	$ 3.25
	12	$ 1.00		$ 1.25	$ 1.25	$ 2.10	$ 2.50	$ 3.30	$ 3.80	$ 4.55	$ 5.05	$ 5.80
	13	$ 0.35		$ 0.70	$ 0.70	$ 1.20	$ 1.40	$ 1.85	$ 2.10	$ 2.55	$ 2.80	$ 3.25
Ted Wms Tun.	14	$ 1.50	$ 0.20	$ 1.75	$ 2.65	$ 2.65	$ 3.50	$ 4.40	$ 5.25	$ 6.15	$ 7.05	$ 7.95
Sumner/Callahan Tun.	16	$ 1.50	$ 0.20	$ 1.75	$ 2.65	$ 2.65	$ 3.50	$ 4.40	$ 5.25	$ 6.15	$ 7.05	$ 7.95

Gantry Rates for Pay by Plate

	TOLL ZONE			2-Axle POVs PBP	2-Axle COVs PBP	3-Axle PBP	4-Axle PBP	5-Axle PBP	6-Axle PBP	7-Axle PBP	8-Axle PBP	9-Axle PBP
MHS Boston Ext.	11			$ 1.00	$ 1.00	$ 1.50	$ 1.70	$ 2.15	$ 2.40	$ 2.85	$ 3.10	$ 3.55
	12			$ 1.55	$ 1.55	$ 2.40	$ 2.80	$ 3.60	$ 4.10	$ 4.85	$ 5.35	$ 6.10
	13			$ 1.00	$ 1.00	$ 1.50	$ 1.70	$ 2.15	$ 2.40	$ 2.85	$ 3.10	$ 3.55
Ted Wms Tun.	14			$ 2.05	$ 2.95	$ 2.95	$ 3.80	$ 4.70	$ 5.55	$ 6.45	$ 7.35	$ 8.25
Sumner/Callahan Tun.	16			$ 2.05	$ 2.95	$ 2.95	$ 3.80	$ 4.70	$ 5.55	$ 6.45	$ 7.35	$ 8.25

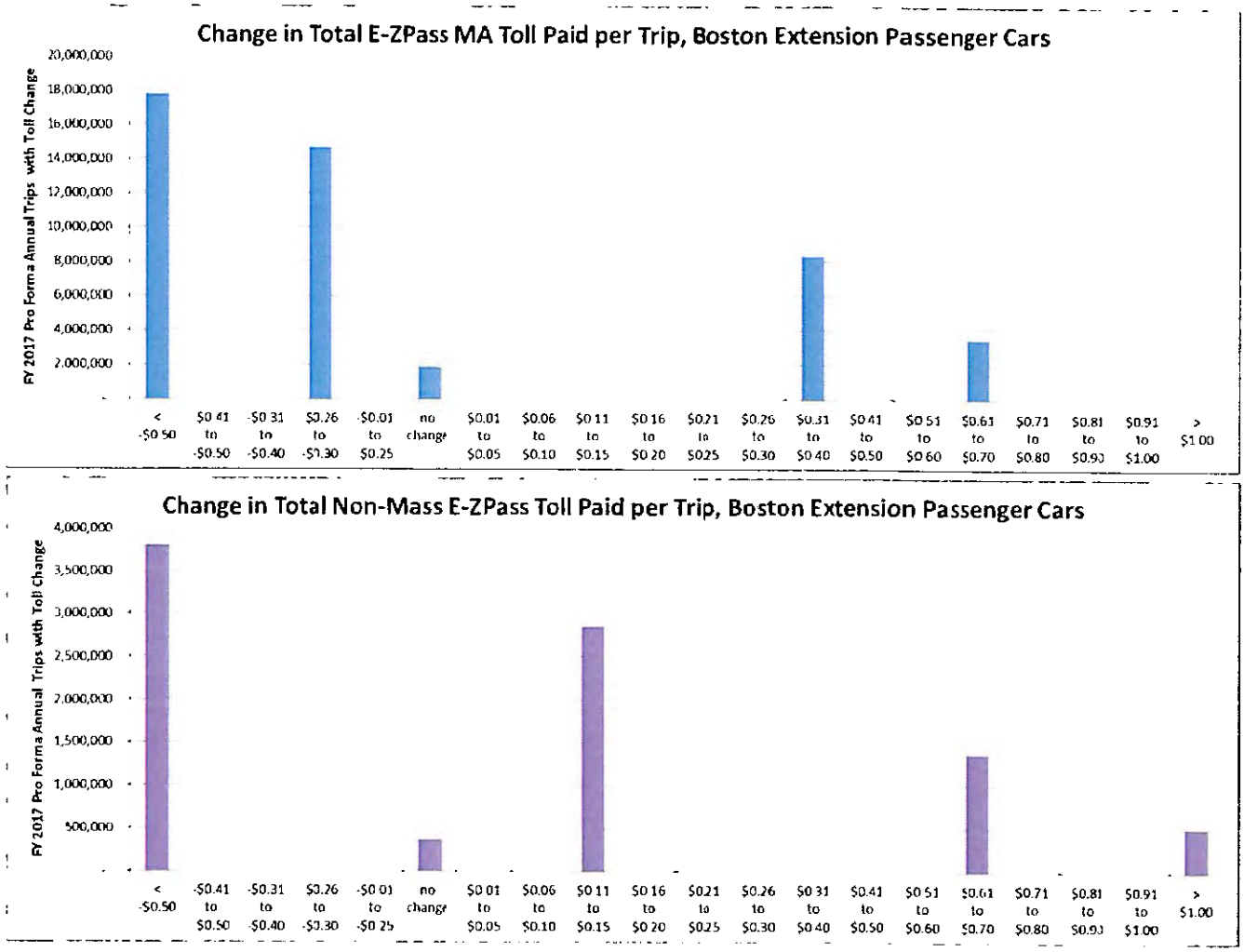
Note: AET tolls shown for the harbor crossings are by direction for both northbound and southbound trips

These toll rates were applied to all future years of the forecast; no future toll rate increases were assumed.

6.3 Toll Elasticity, Diversion and Switch of Payment Type with AET

While no future toll increases are planned during the forecast period, it was still necessary to estimate the changes that occur to FY 2017 traffic with the new AET system. While MassDOT set the Boston Extension full-length passenger car toll to be 30 cents lower than the pre-AET rate for their Massachusetts E-ZPass customers, and increased the full-length Boston Extension toll for other passenger cars, the placement of AET gantries in relation to the pre-AET system (as shown in Figure 2 on page 20) means that drivers will experience a wide range of toll changes based on where they enter and exit the roadway. Figure 41 shows the changes in tolls with AET for Boston Extension passenger cars with Massachusetts and non-Massachusetts E-ZPass.

Figure 41: Boston Extension E-ZPass Passenger Car Toll Changes with AET



The round trip tolls at the Tunnels did not change with AET, except for Pay by Plate customers who pay $0.30 per direction in addition to the non-Massachusetts E-ZPass rate.

The following bullet points summarize Jacobs' assumptions regarding toll elasticity and diversion, and the switch from cash to E-ZPass with the onset of AET.

On the Boston Extension:

- E-ZPass vehicles were estimated to have a toll elasticity of -0.08, based on past toll increases.

- An estimated 2 percent of cash vehicles were expected to leave the toll road due to AET alone. This 2 percent was added to the diversion due to the toll increase.

- At zero percent toll increase, 10.0 percent of cash-paying cars, and 5.0 percent of commercial vehicles (which already have a high E-ZPass market share) were estimated to switch to E-ZPass. The percent of vehicles making the switch increases further due to the higher gantry toll rates charged to Pay by Plate customers.

At the Tunnels:

- E-ZPass cars were estimated to have a toll elasticity of -0.10, based on past toll increases.

- E-ZPass commercial vehicles were estimated to have slightly less elasticity, at -0.08. A large portion of these vehicles are actually airport taxis, which do not have other route options.

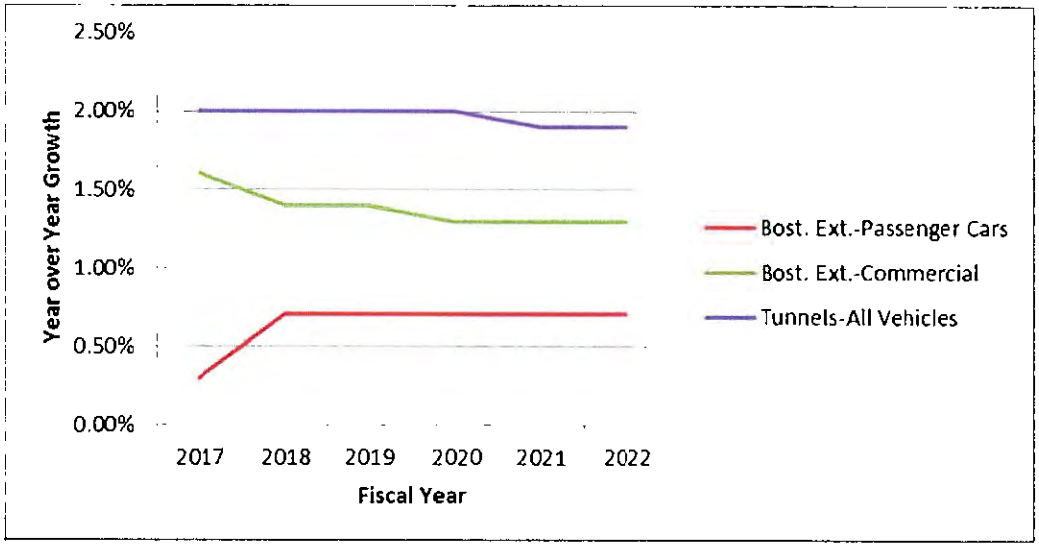
- An estimated 2 percent of cash vehicles were expected to leave the Tunnels due to AET alone. This 2 percent was added to the diversion due to the toll increases.

- At zero percent toll increase, 7.5 percent of cash-paying cars, and 3.8 percent of commercial vehicles (which already have a high E-ZPass market share) were estimated to switch to E-ZPass. The percent of vehicles making the switch increases further due to the higher gantry rates charged to Pay by Plate customers.

6.4 Future Traffic Growth Estimates

Future growth was estimated by correlating the historical traffic to historical economic indicators (mainly GDP for passenger cars and IPI for commercial vehicles), and considering future consensus forecasts of these economic indicators in the most recent *Blue Chip Economic Indicators* publication. Jacobs applied some dampening to these factors, as the consensus forecasts historically tend to be more optimistic than the actual outcome. Figure 42 shows the background growth rates applied to MHS traffic.

Figure 42: Background Traffic Growth Estimates



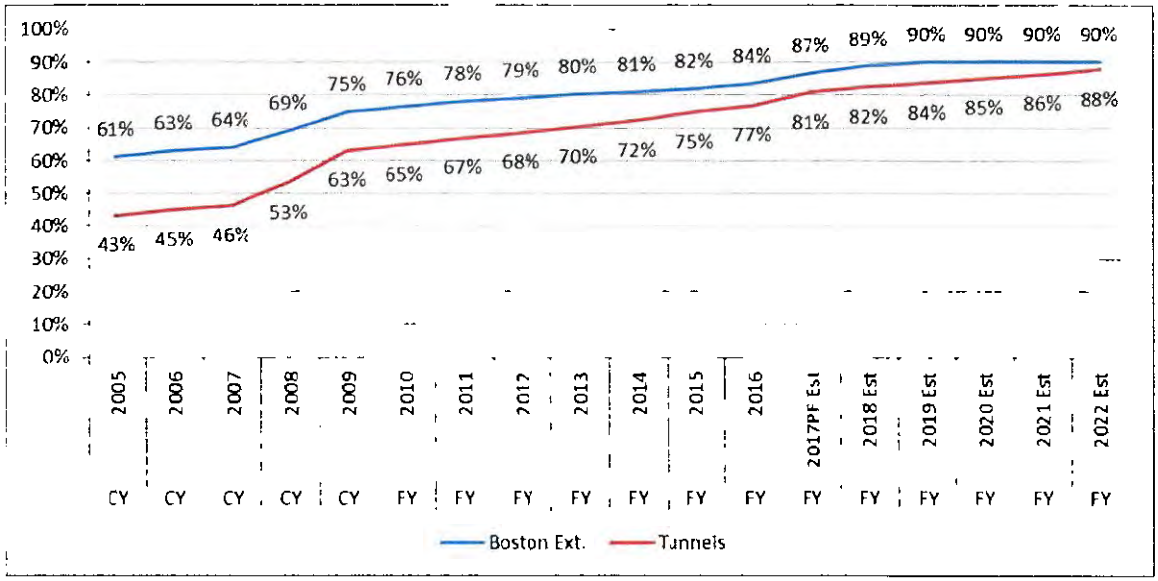
It was also necessary to consider the effects of construction projects on MHS traffic. Of all the planned construction projects, only one was identified that is both a) funded to be constructed within the forecast period, and b) will have a perceptible negative revenue impact on the MHS: the Commonwealth Avenue Bridge Reconstruction Project. This bridge, which crosses the Boston Extension near its easternmost toll gantry (TZ 13), will be reconstructed over two summers, in July/August 2017 (FY 2018) and the following summer (FY 2019). For each of the two summers, for 10 full days, four out of the eight lanes of I-90 will be closed near the bridge, and traffic in both directions will be funneled down from four lanes per direction to two lanes per direction. During this time, it will not be possible to collect tolls from opposite-direction traffic as the gantry E-ZPass readers and cameras are not positioned to do so. Jacobs reduced the traffic and revenue at TZ 13 accordingly during the construction periods, and also made reductions at TZ 12 because some of these drivers are also likely to avoid the Boston Extension during the bridge reconstruction.

6.5 Growth in E-ZPass Market Share

E-ZPass market share has continued to grow over recent years, and is expected to continue growing into the future. In FY 2016, 84 percent of Boston Extension transactions and 77 percent of Tunnel transactions were paid using E-ZPass. In FY 2017 after AET begins, the E-ZPass market share is estimated to jump to 87 percent on the Boston Extension and 81 percent at the Tunnels, due to the recent marketing campaign for AET and to avoid additional toll charges for Pay by Plate. By FY 2019, Jacobs estimates a maximum share of 90% E-ZPass will be reached on the Boston Extension; very few

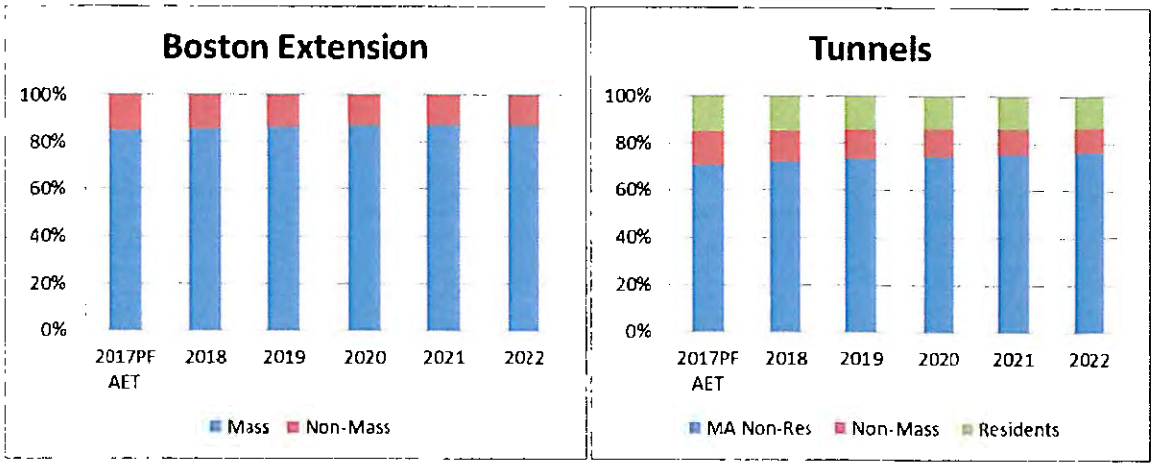
facilities in the northeastern U.S. have exceeded this market share. At the tunnels, we expect E-ZPass market share to grow to 88 percent by FY 2022.

Figure 43: Historical and Forecasted E-ZPass Market Share of Transactions



It was also necessary for forecasting purposes to estimate the share of Massachusetts versus non-Massachusetts E-ZPass transactions, since drivers of passenger cars with MassDOT-issued E-ZPass transponders pay discounted toll rates. As shown in Figure 44, the share of E-ZPass transactions made by Massachusetts E-ZPass transponders is expected to grow. The number of E-ZPass trips made by drivers who are part of the Resident Program at the Tunnels will grow; however, they will make up a smaller percent of total E-ZPass transactions, as most of the eligible customers (residents of East Boston, South Boston, and North End) who wanted these deeply discounted rates are likely to have been part of the Resident Program already. Note that to be part of the Resident Program, customers must have a non-commercial, 2-axle four-tire vehicle registered in Massachusetts, a Massachusetts driver's license, and must provide proof of residency when they fill out the annual application for the Program.

Figure 44: Estimated Split of Car E-ZPass Transactions by Type of E-ZPass



6.6 Collectability of Pay by Plate Tolls

With an AET system that includes Pay by Plate tolling, there are always going to be some uncollectable tolls. There are numerous independent variables that will affect the ultimate amount of revenue collected. Jacobs developed a "transaction waterfall" approach to estimating collectable Pay by Plate revenues as shown in Figure 45. This 'transaction waterfall' has been used for and calibrated with numerous tolling facilities across the US. Uncollectable revenues are mainly due to unreadable license plates, inability to contact the customer because of no RMV record or an invalid or incorrect address, or refusal to pay toll invoices.

Jacobs estimated the share of uncollectable toll revenue, or "leakage," using Tobin Bridge data along with information from other AET facilities throughout the country (see Table 23). The Tobin Bridge began operating with AET on July 1, 2014. Data from the bridge indicates that 26.5% of Pay by Plate toll revenue was not collected. For the MHS Boston Extension and the Tunnels, Jacobs estimates varying rates of uncollectable tolls based on the different mix of vehicle types and customer characteristics unique to the different locations. The percentage of uncollectable Pay by Plate toll revenue is estimated at 31.6 percent at the Tunnels, and 34.7 percent on the Boston Extension. There are a few factors contributing to these differences. Typically, facilities with very infrequent or out of state customers see fewer people paying their toll invoices. In addition, cameras are better at capturing images in slower-moving, narrow-width facilities like the Tobin Bridge than on wider roadways where the images may be off-center.

Figure 45: Waterfall of Collected vs. Uncollected Tolls

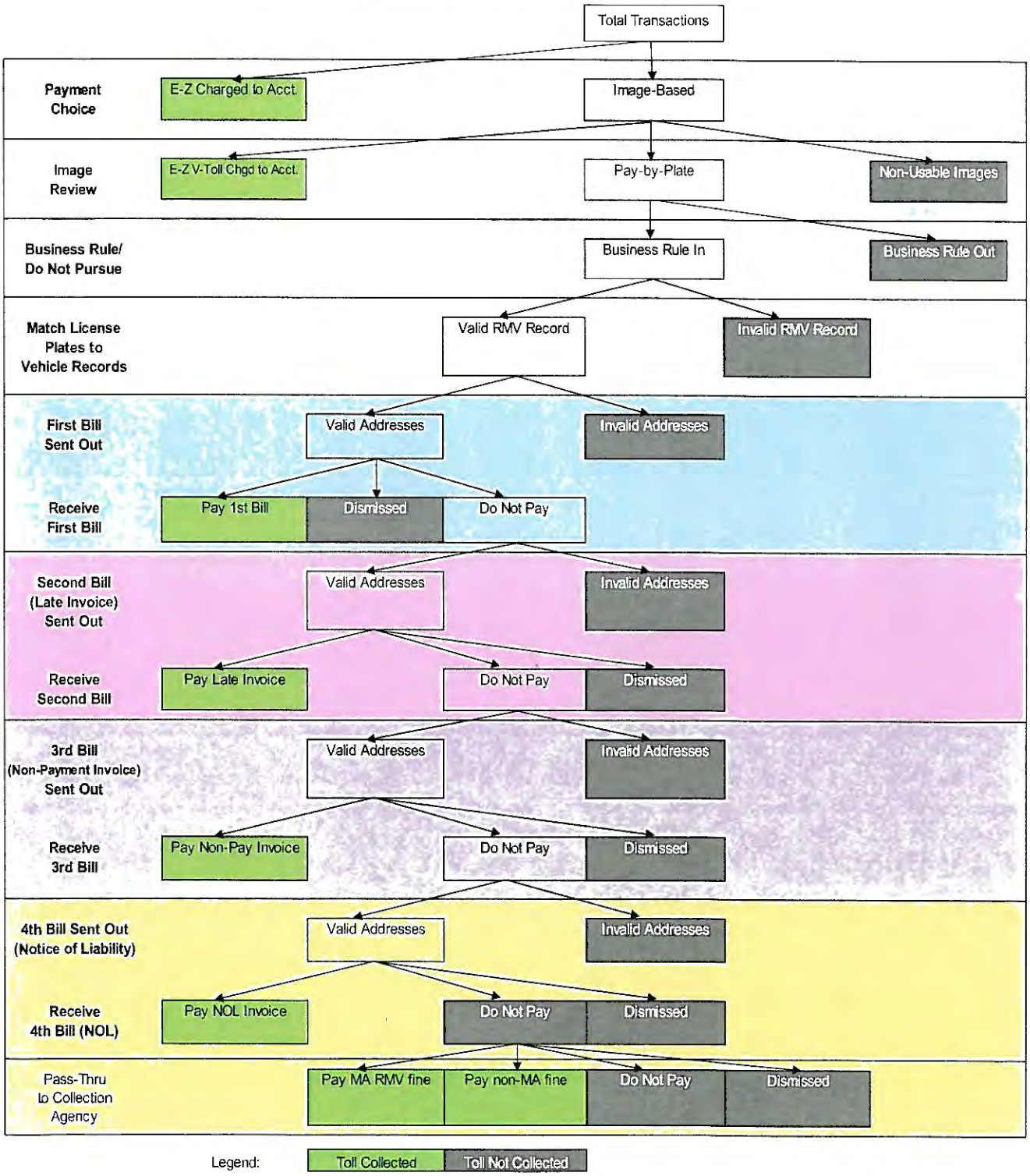


Table 23: Waterfall Factors Influencing Collectability of Pay by Plate Toll Revenue, Estimates for MassDOT and Actual Data from Other Agencies with AET

Waterfall Category	Current AET Agencies or Facilities					MHS Assumptions	
	Agency A	Agency B	Agency C	Agency D	TOBIN BRIDGE	Sumner/ Callahan & TW Tunnel	MHS Boston Ext.
Non-Usable Video Images	4%	6%	10%	5%	3.7%	5.0%	7.0%
Business Rule Out	1%	2%	N/A	1%	0%	2.0%	2.0%
Invalid DMV/RMV Record	4%	2%	16%	1%	1.1%	1.5%	2.5%
Invalid Addresses, 1st Invoice Sent	9%	N/A	Included in Invalid DMV	4%	7.5%	7.5%	7.5%
Invalid Addresses, 2nd Invoice Sent	3%	N/A	Included in Invalid DMV	9%	0%	0%	0%
Invalid Addresses, 3rd Invoice Sent	1%	N/A	Included in Invalid DMV	15%	0%	0%	0%
Invalid Addresses, 4th Invoice Sent	N/A	N/A	Included in Invalid DMV	N/A	0%	0%	0%
% Paying 1st Invoice (of those received)	44%	35%	28%	56%	51.4%	50.0%	50.0%
% Paying 2nd Invoice (of those received)	20%	Included in First Invoice Pail	40%	45%	33.9%	33.0%	33.0%
% Paying 3rd Invoice (of those received)	5%	26%	23%	27%	24.7%	23.0%	23.0%
% Paying 4th Invoice (of those received)	N/A	N/A	N/A	N/A	36.5%	35.0%	35.0%

Note: Agencies A-D requested anonymity with respect to their data.

Each of the elements that factor into the collectability of toll revenue is described in detail in the following sections.

6.6.1 Non-Usable Images

Not all license plates would be readable due to various reasons such as weather, dirt on the plate or other obstructions, a missing plate, or a temporary plate in the window of the vehicle. Current AET facilities, primarily located in the southern and western U.S., have about 4 to 10 percent non-usable images. Jacobs estimated 5 percent non-usable images at the tunnels and 7 percent on the Boston Extension. These estimates were higher than the Tobin Bridge, which has an estimated 3.7 percent bad images, because the narrow lanes on the Tobin Bridge channelize the traffic, making it easier for the cameras frame a license plate image.

6.6.2 Business Rule Out

We expect that, like most AET facilities, MassDOT may utilize business rules that will determine which Pay by Plate customers they will and will not pursue. For example, they may choose that it is not feasible to pursue a customer with a Canadian license plate. Though data from Tobin Bridge does not reveal any information related to this, other AET facilities do not pursue one to two percent of customers with readable license plates. We have assumed that MassDOT would 'business rule out' 2 percent of Pay by Plate vehicles on the MHS.

6.6.3 Invalid RMV record

Data from the Tobin Bridge, which caters mainly to local traffic, shows that an estimated 1.1 percent of Pay by Plate vehicles have invalid RMV records, and are therefore not sent a toll invoice. The other MHS locations have more long distance and out-of-state travelers; Jacobs estimated that 1.5 percent of Tunnel traffic and 2.5 percent of Boston Extension traffic would not have a valid RMV record. Other AET facilities have a range of one percent to four percent of total vehicles with invalid DMV records.

6.6.4 Invalid Addresses

Many people who move do not change their address attached to their RMV vehicle registration and do not have mail forwarded; therefore, they could not receive a Pay by Plate invoice in the mail. On current AET facilities where information is available, 4 to 9 percent of Pay by Plate vehicles who have a valid RMV record would not receive their first invoice. Jacobs estimated this share to be 7.5 percent on the MHS Facilities, the same share of invalid addresses for Pay by Plate customers at the Tobin Bridge.

When the first invoice is returned to MassDOT because of a bad address, another invoice would not be sent. Because of this, it was assumed that the share of invalid addresses on subsequent invoices would be zero.

6.6.5 Percent of Invoices Paid

The most difficult factors to pinpoint when projecting revenue for AET facilities are the percent of toll invoices paid on each level of invoicing. On current AET facilities there is a wide range in the share of transactions that are paid on the first toll invoice. Jacobs assumed that 50 percent of MHS transactions would be paid on the first invoice. This was estimated based on the 51.3 percent paid at the Tobin Bridge and the range of 28 to 56 percent on other AET facilities.

On both the MHS Facilities and on current AET facilities a late fee is incurred for transactions that have not yet been paid when the second invoice is sent; on the MHS it is $1 per trip on the second invoice, growing to $2 per trip on the third invoice, and $3 per trip on the fourth invoice.

Almost 34 percent of second invoice toll transactions at the Tobin Bridge are paid. On other AET facilities, it ranges from 20 to 45 percent. Jacobs estimated 33 percent of MHS transactions that appear on the second toll invoice ("late invoice") will be paid.

Almost 25 percent of third invoice toll transactions at the Tobin Bridge are paid. On other AET facilities, it ranges from 5 to 27 percent with a median of 24.5 percent. Jacobs assumed that 23 percent of MHS transactions that appear on the third toll invoice ("non-payment invoice") will be paid.

At the Tobin Bridge, 36.5 percent of fourth invoice transactions are paid. At other AET facilities there is no fourth invoice. Jacobs estimates 35 percent of MHS transactions will be paid on the fourth invoice ("notice of liability").

If the fourth invoice is not paid, the transactions are sent to a collection agency, who keeps part of the revenue that they are able to collect. The toll revenue collected at this level is expected to be de minimus, and is not included in our forecasts.

6.6.6 Dismissals and Forgiveness of Tolls and Late/Violation Fees

While there is little available data on how many Pay by Plate toll transactions have been dismissed at current AET facilities (including the Tobin Bridge), there are reasons why this may happen, such as incorrect license plate identification. Based on AET experience, Jacobs assumed that 1 percent of toll invoices at each level would be fully dismissed.

On the Tobin Bridge, there are many cases where tolls are paid but late fees are dismissed. Data from other AET facilities on this is unavailable. Jacobs reviewed Tobin Bridge data since the inception of the $1/$2/$3 late fees in mid-2015, and applied a similar share of late fee dismissals to the new MHS AET system. From the data, we estimated that of second invoice transactions where a toll is collected on the MHS Facilities, 18 percent of late fees are dismissed (similar to the 19 percent observed at the Tobin Bridge). Of third invoice MHS transactions where tolls are collected, we estimated that 53 percent of late fees are dismissed (similar to the 49 percent at the Tobin Bridge). Of fourth invoice MHS transactions where tolls are collected, 40 percent of late fees are estimated to be dismissed (similar to the 40 percent at the Tobin Bridge). Note that these dismissals only affect the late fee revenue collected, and not the toll revenue.

It should also be noted that customers who use Pay by Plate will have a six-month grace period after the onset of AET to acquire an E-ZPass transponder. These customers will be forgiven for the additional toll amounts they paid during the grace period in the form of a rebate.

6.6.7 Resulting Uncollectable Pay by Plate Tolls

After applying all of the various factors, the resulting share of uncollectable Pay by Plate toll revenue is estimated at 31.6 percent at the Tunnels and 34.7 percent on the Boston Extension. During the first full fiscal year of AET (FY 2018), this calculates to 6.5 percent of total revenue at the Tunnels and 6.6 percent of total revenue at the Boston Extension. As the E-ZPass market share grows throughout the forecast period, the amount of uncollectable toll revenue will decrease.

6.7 Traffic and Revenue Forecasts

Table 24 presents Jacobs' forecasts of annual toll transactions and gross toll revenue. Only revenue that is expected to be collected has been shown; leakage has been factored into these results. The increase in E-ZPass market share also has been factored in, including the lower toll rates applicable to E-ZPass transactions. Note that FY 2017 includes four months with the old, pre-AET toll collection system, and eight months with the new AET system. Because Pay by Plate revenue is not collected immediately, we have built three months of "lag" into the forecast for FY 2017. The effects in FY 2018 and FY 2019 of the Commonwealth Bridge Reconstruction Project on Boston Extension traffic and revenue have been included in the forecasts.

Table 23: Waterfall Factors Influencing Collectability of Pay by Plate Toll Revenue, Estimates for MassDOT and Actual Data from Other Agencies with AET

	Jacobs' Findings							
	Current AET Agencies or Facilities					MHS Assumptions		
Waterfall Category	Agency A	Agency B	Agency C	Agency D	TOBIN BRIDGE	Sumner/ Callahan & TW Tunnel	MHS Boston Ext.	CDM Smith York Assumptions
Non-Usable Video Images	4%	6%	10%	5%	3.70%	5.00%	7.00%	10.00%
Business Rule Out	1%	2%	N/A	1%	0%	2.00%	2.00%	0.00%
Invalid DMV/RMV Record	4%	2%	16%	1%	1.10%	1.50%	2.50%	10.90%
Invalid Addresses, 1st Invoice Sent	9%	N/A	Included in Invalid DMV	4%	7.50%	7.50%	7.50%	Included in Invalid DMV
Invalid Addresses, 2nd Invoice Sent	3%	N/A	Included in Invalid DMV	9%	0%	0%	0%	Included in Invalid DMV
Invalid Addresses, 3rd Invoice Sent	1%	N/A	Included in Invalid DMV	15%	0%	0%	0%	Included in Invalid DMV
Invalid Addresses, 4th Invoice Sent	N/A	N/A	Included in Invalid DMV	N/A	0%	0%	0%	Included in Invalid DMV
% Paying 1st Invoice (of those received)	44%	35%	28%	56%	51.40%	50.00%	50.00%	45.00%
% Paying 2nd Invoice (of those received)	20%	Included in First Invoice Pail	40%	45%	33.90%	33.00%	33.00%	40.10%
% Paying 3rd Invoice (of those received)	5%	26%	23%	27%	24.70%	23.00%	23.00%	22.80%
% Paying 4th Invoice (of those received)	N/A	N/A	N/A	N/A	36.50%	35.00%	35.00%	N/A

Note: Agencies A-D requested anonymity with respect to their data.

Turnpike Exhibit EE

State	Authority	Name of Highway	Length
UT	Adams Avenue Parkway, Inc	Adams Avenue Parkway	1
TX	Harris County Toll Road Authority	Fort Bend Parkway Extension	1.3
FL	Central Florida Expressway Authority	Goldenrod Road Extension	2.3
VA	Richmond Metropolitan Transportation Auth.	Powhite Parkway	3.4
VA	Richmond Metropolitan Transportation Auth.	Downtown Expressway (SR 195)	3.4
FL	Florida Turnpike Enterprise	Southern Connector Extension	6
FL	Central Florida Expressway Authority	John Land Apopka Expressway (SR 414)	6
PA	Pennsylvania Turnpike Commission	Southern Beltway	6
SC	South Carolina Department of Transportation	Cross Island Parkway	6.8
IL	Skyway Concession Company	Chicago Skyway	7.8
FL	Florida Turnpike Enterprise	Martin Andersen Beachline Expressway West	8
VA	DBi Services	Pocahontas Parkway	8.8
FL	Florida Turnpike Enterprise	Martin Andersen Beachline Expressway East	9
CA	San Diego Association of Governments	South Bay Expressway (SR 125)	10
VA	Virginia Department of Transportation	Powhite Parkway Extension	10
DE	Delaware Department of Transportation	Delaware Turnpike - JFK Memorial Highway	11
FL	Florida Turnpike Enterprise	Daniel Webster Western Beltway (SR 429)	11
FL	Osceola County	Osceola Parkway	12.4
PA	Pennsylvania Turnpike Commission	Amos K. Hutchinson Bypass	13.4
VA	Metropolitan Washington Airports Authority	Dulles Toll Road	13.4
NY	New York State Thruway Authority	Niagara Thruway	14
VA	Toll Road Investors Partnership II	Dulles Greenway	14
NY	New York State Thruway Authority	New England Thruway	15
FL	Florida Department of Transportation	Pinellas Bayway System	15.2
SC	Connector 2000 Association	Southern Connector	16
VA	City of Chesapeake	Chesapeake Expressway	16
NH	New Hampshire Department of Transportation	Blue Star Turnpike	16.2
FL	Florida Turnpike Enterprise	Seminole Expressway (SR 417)	17
OK	Oklahoma Turnpike Authority	Chickasaw Turnpike	17.3
PA	Pennsylvania Turnpike Commission	James E. Ross Highway	17.5
FL	Central Florida Expressway Authority	East-West Expressway (SR 408)	22
FL	Central Florida Expressway Authority	Martin Andersen Beachline Expressway Central	22.7
FL	Central Florida Expressway Authority	Daniel Webster Western Beltway (SR 429)	23
FL	Florida Turnpike Enterprise	Polk Parkway	25
OK	Oklahoma Turnpike Authority	John Kilpatrick Turnpike	25.3
IL	Illinois State Toll Highway Authority	Veterans Memorial Tollway	29.8
OK	Oklahoma Turnpike Authority	Cherokee Turnpike	32.8
NH	New Hampshire Department of Transportation	Spaulding Turnpike	33.2
FL	Central Florida Expressway Authority	Central Florida Greenway (SR 417)	33.4
OK	Oklahoma Turnpike Authority	Creek Turnpike	34.4
NH	New Hampshire Department of Transportation	F. E. Everett Turnpike	39.5
FL	Florida Turnpike Enterprise	Suncoast Parkway	42
NJ	South Jersey Transportation Authority	Atlantic City Expressway	44
PA	Pennsylvania Turnpike Commission	Mon-Fayette Expressway	48
MD	Maryland Transportation Authority	John F. Kennedy Memorial Highway	50
DE	Delaware Department of Transportation	Korean War Veterans Memorial Highway (SR 1)	51.4
OK	Oklahoma Turnpike Authority	Muskogee Turnpike	53.1
OK	Oklahoma Turnpike Authority	Cimarron Turnpike	67.7
IL	Illinois State Toll Highway Authority	Jane Addams Memorial Tollway	76.3
IL	Illinois State Toll Highway Authority	Tri-State Tollway	77.2
FL	Florida Department of Transportation	Alligator Alley	78
OK	Oklahoma Turnpike Authority	Turner Turnpike	86
WV	WV Parkways, Econ. Dev., and Tourism Auth	West Virginia Turnpike	88
OK	Oklahoma Turnpike Authority	Will Rogers Turnpike	88.5
OK	Oklahoma Turnpike Authority	Bailey Turnpike	94.6
IL	Illinois State Toll Highway Authority	Ronald Reagan Memorial Tollway	96.3
OK	Oklahoma Turnpike Authority	Indian Nation Turnpike	105.2
PA	Pennsylvania Turnpike Commission	Pennsylvania Turnpike Northeastern Extension	110
ME	Maine Turnpike Authority	Maine Turnpike	110.9
NJ	New Jersey Turnpike Authority	New Jersey Turnpike	118
IN	Indiana Toll Road Concession Company	Indiana Toll Road	157
NJ	New Jersey Turnpike Authority	Garden State Parkway	173
KS	Kansas Turnpike Authority	Kansas Turnpike	236
OH	Ohio Turnpike and Infrastructure Commission	Ohio Turnpike	241.26

Transactions

This table summarizes the number of transactions in millions for calendar years 2011 through 2016.

Whole Road	2011	2012	2013	2014	2015	2016
Total transactions on whole road	72.410	72.831	72.496	75.036	79.026	83.156
Cash transactions on whole road	27.896	26.509	24.241	23.233	22.782	22.286
Percent that are cash on whole road	38.5%	36.4%	33.4%	31.0%	28.8%	26.8%
York						
Total transactions at York	13.668	13.727	13.506	13.801	14.415	15.128
Cash transactions at York	5.757	5.446	4.877	4.599	4.480	4.387
Percent that are cash at York	42.1%	39.7%	36.1%	33.3%	31.1%	29.0%