



Fiscal Years 2013 & 2014 Letter of Interest Form

All projects wishing to apply for Transportation Infrastructure Finance and Innovation Act (TIFIA) credit assistance must first submit a Letter of Interest using this revised form. Pursuant to the recently enacted Moving Ahead for Progress in the 21st Century Act (MAP-21), the application process, which includes the submission of Letters of Interest, will now be conducted on a rolling basis by the Department of Transportation (DOT). Applicants for Federal credit assistance for Federal Fiscal Years 2013 and 2014 (or any other credit assistance which may be available through the TIFIA program during these two fiscal years) must complete an acceptable Letter of Interest and meet all eligibility criteria to be permitted to submit a formal application.

Projects that previously submitted Letters of Interest for a prior fiscal year's funding, but have not been asked by DOT to submit an application as of July 27, 2012, must submit a new Letter of Interest. In the context of a public-private partnership, where multiple bidders may be competing for a concession such that the obligor has not yet been identified, the procuring agency must submit the project's Letter of Interest on behalf of the eventual obligor. DOT will not consider Letters of Interest from entities that have not obtained the legal rights to develop the project.

This revised Letter of Interest form reflects changes made to the TIFIA program by MAP-21. To be considered for TIFIA assistance, projects must submit a Letter of Interest that: (i) describes the project and the location, purpose, and cost of the project, (ii) outlines the proposed financial plan, including the requested credit assistance and the proposed obligor, (iii) provides a status of environmental review, and (iv) provides information regarding satisfaction of other eligibility requirements of the TIFIA credit program. Please reference the Notice of Funding Availability posted in Summer 2012 in the Federal Register. At this time, the TIFIA Program Guide is being updated. Please check the TIFIA website regularly to identify updated program guidance, Letter of Interest, and application materials. Applicants should refer to the TIFIA website often to ensure that the most up-to-date Letter of Interest form is used (file date is included in the footer).

DOT will review each Letter of Interest and may contact project sponsors for clarification of specific information included in the Letter of Interest. DOT will notify project sponsors if DOT determines that their projects are not eligible, or if DOT will not be able to continue reviewing their Letter of Interest until eligibility requirements are addressed. If DOT does not determine a project to be ineligible based on its initial review, DOT will request additional information to supplement the Letter of Interest and complete its eligibility determination. This information may include, among other things, more detailed descriptions of the project, applicant and its organizational structure, the project's readiness to proceed, the project's financial plan (including financial model), revenue feasibility studies, and financial commitments to the project from sources other than TIFIA. DOT will also request that the applicant provide a preliminary rating opinion letter at this time and the project sponsor will be required to submit a fee to continue the evaluation process. Once the fees have been received, DOT will engage an independent financial advisor to prepare a report and recommendation acceptable in form and substance to DOT. DOT may also engage an independent legal advisor to help complete its evaluation of a project's eligibility.

The increased demand on TIFIA's resources has led to the discontinuation of the practice of advancing the entire cost of financial and legal advisors engaged to assist DOT in determining a project's creditworthiness and overall eligibility and having those costs reimbursed to DOT after execution of a credit agreement. As such, upon request, project sponsors must pay fees in the amount of \$100,000 before DOT hires financial and/or legal advisors as part of the Letter of Interest review process. These fees are due upon request. Additional fees will be charged after the credit instrument is executed, including additional amounts required to fully cover TIFIA's financial and legal advisory services costs in connection with the evaluation and negotiation of the terms of TIFIA credit assistance for the project. By submitting this Letter of Interest, the applicant certifies that it will pay all required fees.

After concluding its review of each Letter of Interest and related information submitted by the project, along with the independent financial analysis report from DOT's independent financial advisor, DOT will permit sponsors of eligible projects to submit complete applications. DOT will conduct a rolling application process where project sponsors may submit Letters of Interest at any time and DOT will permit project sponsors to apply once a favorable eligibility determination is made.

The boxes below expand as needed to facilitate provision of a sufficient amount of detail to demonstrate to DOT the project's satisfaction of all eligibility criteria. If you have questions regarding completing this form, please contact the TIFIA program office at (202)366-1059. Please complete all applicable information using this Letter of Interest form and attach this request via email to TIFIAcredit@dot.gov.



A) Describe the Project, Location, Purpose, and Cost of the Project.

1. Describe the project:

The Authority proposes to replace the Tappan Zee Bridge ("Bridge"), a critical Hudson River crossing north of New York City that carries approximately 50 million vehicles per year. In addition to being a major metropolitan New York transportation asset, the Bridge is a key economic generator for New York, New Jersey, Connecticut, and Southern New England. The structure itself is three miles long and has seven lanes of traffic (currently incongruous with the eight lanes of traffic on the landings) and its interstate highway approaches are complex, making replacement a challenging undertaking. It is the only major crossing of the Hudson River for 50 miles north of New York City. Engineering and economic analysis has determined that replacement of the Bridge is now necessary to:

- Correct structural deficiencies that are requiring ongoing extraordinary maintenance,
- Address longstanding safety concerns, and
- Provide sufficient capacity to serve current usage safely and allow for future economic growth.

The new Bridge will be designed to provide:

- At least a 100-year design life with more efficient operating and lower life-cycle costs,
- Four travel lanes in each direction to match the highway approaches on either side of the Hudson River,
- Dedicated bus lanes during commuter rush hour,
- A structural envelope that will not preclude the introduction of future transit modes, including commuter rail and/or Bus Rapid Transit service,
- Conformance with current seismic, safety and geometric requirements,
- Adequate shoulders to properly manage traffic incidents and emergencies,
- Open road tolling and reconfigured toll plazas to reduce barrier-related congestion, and
- Accommodation for bike/pedestrian use.

Both the NEPA and procurement process for the construction of a new Tappan Zee Bridge have been greatly accelerated and significant new Project milestones have been achieved since our original LOI was submitted. This application stands as our effort to accelerate our financial planning process and decisions on TIFIA financing. We are prepared to immediately remit \$100,000 to ensure the TIFIA process moves on the same expedited schedule.

2. Describe the project location:

The Bridge is located on Interstate 87/287 between Rockland and Westchester Counties, New York. The Project limits generally extend between Interchange 9 (Route 9) in Tarrytown and Route 10 (Route 9W) in the Village of South Nyack. See Exhibit I for maps showing the Project's location.

3. Describe the project's purpose, including quantitative and qualitative details on public benefits the project will achieve:

State of Good Repair

The Tappan Zee Bridge, completed in 1955, has surpassed its 50 year useful life. Deterioration of the existing structure has required costly and disruptive heavy maintenance, including ongoing deck replacement. Since the late 1980's, approximately \$750 million in New York State Thruway Authority funds has been spent on capital repairs beyond regular maintenance of the Bridge (no Title 23 federal assistance has been spent for these repairs). The only viable alternative to replacement – rehabilitation of the Bridge – does not provide comparable value relative to its cost. The estimated construction cost of the rehabilitation alternative is \$3.4 billion. In addition, the cost of maintenance is expected to increase over time at a greater rate than would be expected under replacement. Rehabilitation would not correct all of the vulnerabilities or any of the operational and safety deficiencies of the Bridge. Remaining issues include:



- The Bridge's 3% grades slow climbing trucks and reduce the capacity of the Bridge;
- The geometry and configuration of the Bridge causes accident rates that are twice the average rate for the entire Thruway System statewide; and
- A lack of shoulders and narrow travel lanes make it difficult to respond to accidents on the Bridge, often causing delays and lengthy back-ups.

As a result, the rehabilitation alternative neither improves mobility, nor maximizes flexibility or adaptability for the long term. Rehabilitation does not allow for additional lanes of traffic necessary to serve current and future needs arising from economic growth nor does it allow for future transit expansion. Of more immediate concern, it does not improve safety or security. Furthermore, rehabilitation work on the existing Bridge will add to congestion and traffic disruptions due to lane closures and detours.

Regional Significance

An origin-destination survey revealed that one-third of the eastbound traffic over the Bridge originated in New Jersey or points outside the region, and one in six vehicles was traveling to Connecticut and other parts of the Northeast. Any weight restrictions or closure of the Bridge would have severe impacts on the movement of goods throughout the Northeast Region, including access to the Port of New York and New Jersey. Over 1.4 million commercial vehicles cross the Tappan Zee Bridge annually. Losing any functional capacity of the Bridge resulting from either seismic vulnerabilities, vessel impact or a major rehabilitation project, either temporarily or permanently, will trigger economic and livability impacts over the entire New York Metropolitan Area and Southern New England because alternative routes are distant and currently over capacity (see Benefit-Cost Analysis attached as Exhibit II). The regional planning agency, the New York Metropolitan Transportation Council ("NYMTC"), is projecting that the corridor served by the Bridge will experience a 17% increase in population and a 33% increase in jobs over the next 30 years.

Safety and Congestion

The Bridge has accident rates that are twice that of comparable highways in New York State, in large part due to an abrupt change in grade between the causeway sections and the main span. To accommodate daily travel by 138,000 vehicles, 40% above the Bridge's original design capacity, utilization of the existing deck area has been maximized by using a movable barrier to create a reversible lane to meet peak hour requirements. As a result, the seven travel lanes do not include shoulders or emergency access lanes and any accident, breakdown or lane closure for maintenance results in long delays extending for miles both on the Bridge and its approaches. The existing structure and approach road configuration cannot be modified to add reserved capacity for transit service, introduce managed lanes, or provide for pedestrian and bicycle access.

Project Benefits

Construction of the Project would yield approximately 45,000 direct jobs, many more indirect jobs, and foster economic development. In March 2012, a Benefit-Cost Analysis was performed to compare the Project to both a No Build scenario and a No Build with Bridge Closure scenario, and in both cases, the benefits were found to outweigh the costs of the Project. Please see the full Benefit-Cost Analysis attached as Exhibit II.

4. Provide the estimated capital cost of the project:

The Project has an official capital cost estimate of \$5.4 billion in year-of-expenditure dollars. This cost estimate was independently reviewed and affirmed by FHWA at the 70% confidence interval and includes: the Design-Build Contract, right of way, and owner's costs (contingency, construction inspection, etc.). A financial plan assuming a capital cost estimate of \$4.6 billion is also considered in order to reflect the range of capital costs included in the Final Environmental Impact Statement ("EIS") and the resolutions adopted by NYMTC on August 20, 2012 to amend the Transportation Improvement Plan (see Exhibit VII). The actual price of the Design-Build Contract will be known in October 2012 upon selection of a preferred bidder and will become the basis of the TIFIA loan agreement.

5. Provide the design features, development schedule, and other relevant descriptions of the project:



Please note that the Design-Build procurement now in progress may yield best-value solutions within the envelope of the environmental process that differ in some respects to the planning efforts performed to date. The project cost, design features, and schedule will be updated when the procurement process is completed in October 2012.

Design Features

The Project would consist of two parallel structures to the north of the existing Bridge. The main span over the navigable channel would provide a minimum horizontal clearance of 1,042 feet and a minimum vertical clearance of 139 feet, similar to existing conditions.

A total of eight general traffic lanes (four in each direction) will be provided to match the number of lanes at the existing landings, as well as left and right shoulders in both directions. The north side of the northern structure will include a shared-use bicycle and pedestrian path. The existing toll plaza will be reconfigured and would continue to toll eastbound traffic. The toll plaza will be upgraded with three highway-speed E-ZPass lanes.

The Project is being procured using the Design-Build project delivery method. The Project will be the Authority's first major Design-Build undertaking and will serve as a showcase for future efforts. Almost all of the engineering, design and construction work will be performed under a single Design-Build Contract. Sequencing for the Project is being determined by the Design-Build Contractor, and final design will be completed by the Contractor after the contract has been awarded, in October 2012.

The new design for the Bridge is intended to maximize the public investment by optimizing the flexibility for future transportation modes, given that its lifespan will extend over a century. Certain transit provisions will be included to maximize the public investment. These provisions could incorporate features such as: added width, a gap between structures, providing certain grades and increased design loadings. Through the inclusion of design features that maximize the public investment, the Bridge design will provide the flexibility to potentially allow for both Bus Rapid Transit ("BRT") and Commuter Rail Transit ("CRT").

Development Schedule

On February 7, 2012 a short-list of four proposers was announced based upon a Request for Qualifications ("RFQ") issued in November 2011. Proposals from three teams were received on July 27, 2012, and the evaluation and selection of a preferred bidder is currently underway. Final design will be completed by the Design-Build Contractor after the contract has been awarded in October 2012. The entire Project is anticipated to be open for traffic in 2018.

Only limited right of way ("ROW") purchases are anticipated, and the start of construction is not dependent upon completion of ROW acquisition.

Below are the anticipated milestone dates in the Project's development and construction timeline:

FHWA Notice of Intent	October 2011 (completed)
Release RFQ	November 2011 (completed)
Draft EIS	January 2012 (completed)
Shortlist of Proposers	February 2012 (completed)
Release RFP	March 2012 (completed)
Proposals Due	July 2012 (completed)
NYMTC to modify TIP / STIP for Tappan Zee	August 2012 (completed)
Initiate TIFIA Application	September 2012
> Record of Decision / Commence ROW Acquisition	September 2012
> Selection and Award of Preferred Bidder	October 2012
FHWA Financial Plan approval	October 2012
Notice to Proceed	October 2012
TIFIA Agreement and Financial Close	October / November 2012
Short-term Financing Close (if needed)	October / November 2012
Completion of ROW Acquisition	December 2012 – September 2013
Repay Short-Term Financing (if needed)	March 2013
North Span Open to Traffic	TBD by selected Design-Build Contractor
End Construction / South Span Open to Traffic	TBD by selected Design-Build Contractor



“>” denotes current status on timeline

B) Outline the Proposed Financial Plan, including the Requested Credit Assistance.

1. Detail the plan of finance in sufficient detail to assist the DOT in its creditworthiness assessment:

The Project has an official capital cost estimate of \$5.4 billion in year-of-expenditure dollars. This cost estimate was independently reviewed and affirmed by FHWA at the 70% confidence interval and includes: the Design-Build Contract, right of way, and owner’s costs (contingency, construction inspection, etc.). A financial plan assuming a capital cost estimate of \$4.6 billion also is considered in order to reflect the range of capital costs included in the Final EIS and the resolutions adopted by NYMTC to amend the Transportation Improvement Plan on August 20, 2012 (see Exhibit VII). The actual price of the Design-Build Contract will be known in October 2012 upon selection of a preferred bidder and will become the basis of the TIFIA loan agreement.

The Authority plans to use a mix of toll revenue bonds, a TIFIA loan, and pay-as-you-go revenues, and is prepared to pursue any additional federal support that may become available to fund the Project costs. TIFIA-eligible costs are assumed to be slightly higher than the figures above to account for capitalized interest, debt reserves, and other financing costs (see table under question #5 below). Assuming TIFIA-eligible Project costs of \$5.0 billion and \$5.9 billion, and using the maximum 49% allowable amount, would result in a TIFIA loan of \$2.4 billion and \$2.9 billion under the two cases.

The financial plans assume that the TIFIA loan will be rated investment grade due to anticipated coverage levels and a system-wide pledge from the Authority, whose senior bonds are currently rated A+/A1 by Standard & Poor’s and Moody’s, respectively. TIFIA debt service coverage is targeted to be a minimum of 1.35X.

TIFIA LOAN SCENARIOS (\$ millions)		
	<u>\$4.6B Capital Cost Case</u>	<u>\$5.4B Capital Cost Case</u>
Project Capital Cost	4,600	5,400
Total TIFIA-Eligible Project Costs	4,996	5,864
TIFIA Loan - FY2013	1,284	1,377
TIFIA Loan - FY2014	1,164	1,497
Total TIFIA Loans	2,448	2,873

In addition, the Authority will issue toll revenue bonds to finance the balance of Project costs. Bonds for the Project will be issued over the course of construction for a maximum of 40 years. Note that the existing Bridge will continue to generate revenue during construction of the Project and will then be demolished when the replacement bridge is completed. In 2011 the Tappan Zee Bridge generated \$127 million in toll revenues, about 20% of the total toll revenues of the Thruway system.

Given the rapid pace of cash flow requirements for construction once the Notice-to-Proceed to the Design-Build Contractor is given, the Authority is prepared to issue Bond Anticipation Notes (“BANs”) for initial funding requirements if the TIFIA loan cannot be processed in time to support a Notice to Proceed in October 2012. A portion of the TIFIA credit assistance requested will be used to “take out” this interim financing, if it is necessary.

2. Detail the sources and uses of funds:

The following is the estimated sources and uses of funds for the Project based upon the current scenarios and will be updated when the cost of the Project is known in October 2012:



TIFIA-ELIGIBLE COSTS: SOURCES & USES OF FUNDS (\$ millions, year-of-expenditure dollars)		
	<u>\$4.6B Capital</u>	<u>\$5.4B Capital</u>
	<u>Cost Case</u>	<u>Cost Case</u>
<u>Sources</u>		
Paygo	206	243
BANs net proceeds	7	7
TIFIA proceeds	2,448	2,873
Toll Revenue Bonds	2,333	2,743
Interest income	15	14
Capital Funds reserve	(14)	(16)
Total Sources	4,996	5,864
<u>Uses</u>		
TZ Project Capital Costs	4,600	5,400
Non-TIFIA financing fees	35	40
BAN interest fund deposits	9	9
Toll Revenue Bonds DSRF deposits	146	171
Toll Revenue Bonds interest during construction	206	243
Total Uses	4,996	5,864

The Project will be funded by toll revenues from the Bridge. The primary sources of financing consist of toll revenue bonds and TIFIA proceeds. As noted previously, if necessary, funds from the issuance of short-term financing in the form of BANs will be used to pay for initial Project costs prior to the receipt of TIFIA proceeds. The TIFIA proceeds will then be used to repay the BANs and fund additional Project costs. Toll revenue bonds will be issued to pay for the balance of Project costs. Pay-as-you-go operating funds from the existing Bridge will supplement the Project's sources of funding.

The BANs are assumed to be issued at a premium which accounts for the \$7 million of net proceeds shown in the Sources and Uses table above.

3. Type of credit assistance:

Direct Loan

The Authority is prepared to take advantage of the new features enacted by Congress providing for direct loans up to 49% of eligible project costs, multi-year commitments and potential interest rate "buy-downs" to lock in current interest levels for 30-year US Treasuries if a multi-year commitment is required.

4. Amount of credit assistance sought from DOT:

The Authority is seeking 49% of total TIFIA-eligible Project costs of \$5.0 - \$5.9 billion which equates to \$2.4 - \$2.9 billion of TIFIA credit assistance (see table of TIFIA-eligible Project costs below). The actual loan amount will be based upon the construction cost that is determined upon completion of the Design-Build procurement in October 2012. It is important to note that the Authority is offering TIFIA a strong, investment-grade credit with the intent of minimizing the federally-funded credit reserve required to support such a significant loan amount. By reducing the credit reserve required to support the Tappan Zee Bridge Replacement Project, other projects across the country will enjoy similar access to TIFIA assistance than if a smaller, but below-investment grade loan was being requested.

A TIFIA loan at 49% of Project cost will maximize the economic impact of the Project, provide an essential regional link supporting mobility and commerce in New York, New Jersey and Southern New England, and stabilize toll rates for commuters, residents and local businesses as well as interstate passenger and truck traffic.

5. Provide a rationale for the amount of TIFIA credit assistance requested, as a percentage of reasonably anticipated eligible project costs (e.g., a project sponsor can demonstrate that traditional sources of financing are not available at



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feasible rates without the TIFIA assistance, or that the costs of traditional financing options would constrain the sponsor's ability to deliver the project, or that delivery of the project through traditional financing approaches would constrain the sponsor's ability to deliver a group of related projects, or a full capital program):

The Project's TIFIA-eligible capital costs are estimated as follows:

TIFIA-ELIGIBLE PROJECT COSTS (\$ millions, year-of-expenditure dollars)		
	<u>\$4.6B Capital</u>	<u>\$5.4B Capital</u>
	<u>Cost Case</u>	<u>Cost Case</u>
TZ Project Capital Costs	4,600	5,400
Non-TIFIA financing fees	35	40
BAN interest fund deposits	9	9
Toll Revenue Bonds DSRF deposits	146	171
Toll Revenue Bonds interest during construction	206	243
Total TIFIA-Eligible Project Costs	4,996	5,864
 TIFIA max % of Eligible Costs	 49%	 49%
Maximum TIFIA Loan	2,448	2,873

A TIFIA credit reserve requirement of between 5.0 and 7.5% is being targeted for this request for federal credit assistance, rather than the 10% more typically assumed for TIFIA loans. This target range will allow USDOT to maintain the ability of the TIFIA program to leverage infrastructure investment nationally. Please see the discussion in the sections that follow regarding the creditworthiness of the revenues which will be pledged to the TIFIA loan and which we believe justifies the loan amount requested.

TIFIA CREDIT ASSISTANCE REQUEST (\$ millions)		
	<u>\$4.6B Capital</u>	<u>\$5.4B Capital</u>
	<u>Cost Case</u>	<u>Cost Case</u>
Project Capital Cost	4,600	5,400
Total TIFIA-Eligible Project Costs	4,996	5,864
TIFIA Eligible Costs	4,996	5,864
49% of TIFIA Eligible Costs	2,448	2,873
 TIFIA Loan - FY2013	 1,284	 1,377
TIFIA Loan - FY2014	1,164	1,497
Total TIFIA Loans	2,448	2,873
 Credit Reserve Subsidy	 7.5%	 7.5%
FY2013 Subsidy for TZ	96	103
FY2014 Subsidy for TZ	87	112
% of TIFIA FY2013 Appropriations (\$750M)	12.8%	13.8%
% of TIFIA FY2014 Appropriations (\$1B)	8.7%	11.2%

TIFIA credit assistance at the 49% level will maximize the economic impact of the Project, provide an essential regional link supporting mobility and commerce in New York, New Jersey and Southern New England, and stabilize toll rates for commuters, residents and local businesses as well as interstate passenger and truck traffic. It will also permit the Authority to preserve the financial capacity necessary to fully operate and maintain the balance of its 570-mile system over the next 10 years.

6. Explain the flexibility in the financial plan to finance the project with a reduced percentage of TIFIA credit assistance:



The Authority could implement the Project with a reduced percentage of TIFIA credit assistance by issuing additional toll revenue bonds. However, reductions in the level of TIFIA assistance from the 49% level that is requested herein would require the Authority to implement significantly higher, earlier and more frequent toll increases at the Bridge, impacting the regional economy and job-creating benefits of the Project. Recognizing the impact of a request this large on the TIFIA program, the Authority is proposing a credit structure that can be rated investment grade, lowering the budget impact of the proposed level of credit assistance and still preserving the leveraging capacity of TIFIA nationally.

7. Description of revenue source(s) pledged to repayment:

The TIFIA Loan will be secured by a system-wide general revenue bond pledge of Authority revenues. However, consistent with commitments made in the NEPA process, the Project is intended to pay for itself from increases in Tappan Zee Bridge tolls. Thus, the Project is expected to be funded from Bridge revenues, but the creditworthiness of the Project will benefit from the system-wide pledge of Authority revenues. In 2011, the Authority collected \$127 million in toll revenue on the Bridge and \$634 million in system-wide toll revenue (\$665.3 million when non-toll revenues are included).

The Thruway Authority Board has the statutory authority, and has covenanted with its bond holders, to raise tolls as necessary to meet its financial obligations. On May 30, the Board made a commitment to the Project and to raise the funds necessary to complete it (see Exhibit III). The Authority's toll setting powers are not subject to other governmental approvals (see Exhibit IV) and a series of toll increases has been enacted by the Board in recent years. Despite these toll increases, the Authority's toll rates remain among the lowest of its peer agencies.

The interstate highway and bridge system along the Hudson River offers limited diversion alternatives - the diversion analysis performed for the Final EIS (Chapter 4, Page 15) concluded that an increase in tolls of over 300% would result in less than a 9% decline in traffic on the Bridge. The George Washington Bridge to the south is already overcrowded; the four-lane, twin span Newburgh-Beacon Bridge (itself in need of a \$100 million deck replacement), is 40 miles to the north; and the two-lane Bear Mountain Bridge which lies in between, lacks direct connections to the interstate highway system. As noted in the project description, the Bridge carries 138,000 vehicles per day and serves a strong, growing market. These factors, combined with significant efforts to contain operating costs and a commitment to maintaining the overall Thruway System in a state of good repair, have contributed to the Authority's healthy financial condition, as evidenced by its strong credit ratings (A1 from Moody's and A+ from Standard and Poor's that were confirmed for the July 2012 bond issue). In particular, on May 30, the Board initiated actions to implement an increase in commercial toll rates and an operational streamlining program to help the Authority maintain fiscal stability (see Exhibit III).

It is contemplated that the TIFIA loan will be a subordinated lien payable from funds available after Operations and Maintenance, Senior Lien Debt Service, and the fulfillment of all reserve obligations for Senior Lien debt but before Canal operating and capital expenses. The financial plan targets coverage levels for the Junior Lien TIFIA debt at 1.35X. The Authority currently does not have any Junior Lien debt. See Exhibit V for the flow of funds proposed.

On July 11, 2012, the Authority closed on \$1.1 billion of general revenue bonds which repaid \$885 million of 2011A Bond Anticipation Notes (BANs) and provided \$250 million of funding for the Thruway's capital program. These bonds were rated investment grade at A+ (S&P) and A1 (Moody's), further reflecting the Authority's financial strength.

8. Address the status of any revenue feasibility studies:

The Tappan Zee Bridge and Authority as a whole have an extensive operating history that has demonstrated the ability of the Thruway System to generate consistent annual toll revenues. Furthermore, the Authority has an unfettered statutory ability to raise tolls on its facilities to cover its debt obligations (see Exhibit IV).

The most recent traffic and revenue study was prepared in June 2012 as part of the Board-2012 Series I Bond issuance and is attached as Exhibit VI. Additional revenue feasibility studies will be performed and released as necessary prior to any future toll adjustment process.



C) Status of Environmental Review.

1. Summarize the status of the project's environmental review:

FHWA, as lead federal agency, published a Notice of Intent on October 12, 2011 in the Federal Register. An agency scoping meeting was held in late October 2011 followed by public meetings in early November 2011. An administrative draft of the EIS is under review by State and federal cooperating agencies. The Draft EIS was released for public review on January 24, 2012 and the Final EIS was released on August 3, 2012. A National Environmental Policy Act Record of Decision is anticipated in September 2012. An extraordinary and unique partnership exists between FHWA and project participants that has included regular meetings and rapid response protocols to address issues in real time.

2. Discuss whether the project has received a Categorical Exclusion, Finding of No Significant Impact, or Record of Decision or whether a draft Environmental Impact Statement has been circulated:

See above response – the Final EIS was published on August 3, 2012 and a Record of Decision is expected in September 2012.

D) Information Regarding Satisfaction of TIFIA Eligibility Requirements.

Please demonstrate the following:

1. Creditworthiness:

a. Ability to satisfy applicable creditworthiness standards:

On May 30, the Board made a commitment to the Project and to raise the funds necessary to complete it. The Authority has an unfettered statutory ability to raise tolls on its facilities to cover its debt obligations (see Exhibit IV) and has consistently raised tolls in order to secure the necessary revenues to meet its bond and financial commitments. Over the past decade total Authority revenues increased at a compound annual growth rate of 4.1%. During this period, tolls were increased three times. A Board-recommended toll increase was voted on May 30, 2012 and was the subject of recent public hearings. See Exhibit III for the May 30th Board resolutions which document the Authority's commitment to funding the Project and recommended toll increase.

The Authority has a strong record of financial performance in large part due to its Board-established Fiscal Management Guidelines that strengthen the covenants to bondholders and ensure financial viability while maintaining infrastructure and providing high levels of safety and customer service. The Authority also operates under a General Revenue Bond Resolution, which includes various provisions to protect the interests of the Authority's bondholders and includes security features including toll covenants, additional bonds tests, and reserve accounts. The financial plans assume that the TIFIA loan will be rated investment grade due to the anticipated TIFIA debt service coverage levels (targeted at 1.35X) and a system-wide revenue pledge from the Authority in order to minimize the cost to the DOT for federal credit assistance. The Authority's senior bonds are currently rate A+/A1 by Standard & Poor's and Moody's, respectively.

b. Rate covenant, if applicable:

Not applicable

c. Adequate coverage requirements to ensure repayment:

The Authority is pledging its system-wide revenues for the repayment of the loan, resulting in targeted 1.35X minimum debt service coverage levels that should permit the TIFIA tranche to be rated investment grade.

d. Ability to obtain two investment grade ratings on senior debt: two ratings on the TIFIA debt (investment grade if senior); if project costs are less than \$75 million only one rating on the senior debt and the TIFIA debt are needed):



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The Authority successfully issued over \$1.1 billion of Series I Bonds in July 2012 with strong investment grade ratings of A1 and A+ by Moody's and Standard & Poor's, respectively. As noted above, the Authority expects the TIFIA debt to be rated investment grade. The Authority will provide the requisite rating letters when the actual cost of the Project is known in October 2012.

2. Foster partnerships that attract public and private investment for the project:

After many years of debate, the State adopted Design-Build legislation in December, 2011 and the Authority will implement the Tappan Zee Replacement Project utilizing this innovative project delivery mechanism. The Project will be the Authority's first major Design-Build undertaking and will serve as a showcase for future efforts. It is anticipated that use of the Design-Build method will allow significant construction risks to be shared with private partners, accelerate project delivery, open opportunities for innovative designs, and demonstrate the use of non-traditional project delivery methods on one of the largest and most visible transportation construction projects in the U.S.

3. Enable the project to proceed at an earlier date or reduced lifecycle costs (including debt service costs):

The Project is listed by the Obama Administration as one of 14 infrastructure projects to be expedited through the permitting and environmental review processes (October 11, 2011). The Agencies released the Draft EIS on January 24, 2012 and released the Final EIS on August 3, 2012. The Record of Decision is expected in September 2012. The TIFIA Loan will permit the Authority to continue implementing the Project at a rapid pace by entering into a single, multi-billion dollar, Design-Build contract to accelerate delivery over conventional, Design-Bid-Build methods.

TIFIA's low cost of borrowing and allowance for debt sculpting are highly advantageous compared to conventional toll revenue bonds. The TIFIA loan will facilitate construction of a new facility, allowing the Authority to avoid large outlays for reconstruction of the existing bridge which has outlived its planned life expectancy and is requiring inordinate amounts of heavy maintenance. A TIFIA loan at 49% of Project cost will maximize the economic impact of the Project, provide an essential regional link supporting mobility and commerce in New York, New Jersey and Southern New England, and stabilize toll rates for commuters, residents and local businesses as well as interstate passenger and truck traffic.

4. Reduce the Contribution of Federal Grant Assistance for the Project:

The Tappan Zee Bridge and the Thruway System are self-supporting from toll revenues (in 2011 federal funds represented approximately 0.3% of the Authority's budget). The TIFIA credit assistance will permit a reduced need for future federal grant assistance for the replacement project, or for extraordinary repairs on the current Bridge that could result from seismic or other events it is not designed to withstand.

5. Construction contracting process can commence no more than 90 days from execution of a TIFIA credit instrument:

The Authority has already complied with this requirement and will be **completing** the Design-Build procurement process that began in November 2011 within 60 days of the receipt of this letter. The Authority will be ready to draw funds as of November 2012, with execution of the Design-Build Contract scheduled for October 2012.

E) Project Participants.

1. Name of Applicant/Borrower:

New York State Thruway Authority is the applicant and borrower.



2. Overall Organizational Structure:

The Authority, created in 1950, is the owner of the Bridge. The Authority is empowered under law to construct, improve, operate and maintain the Thruway System and independently establish, set and collect tolls. The Authority is governed by a Board of seven members appointed by the Governor of the State, with the advice and consent of the State Senate, and each member serves for a term of nine years. The Authority is one of the oldest and most recognized of the nation's toll agencies and has consistently maintained high levels of patron safety, customer service and financial strength.

3. If applicable, detail how the project meets MAP-21's definition of a rural infrastructure project (a surface transportation infrastructure project located in any area other than a city with a population of more than 250,000 inhabitants in the city limits):

Not applicable

4. What entity (i.e., public-sector agency/authority or private-sector company) will serve as the applicant?

The Authority is a public-sector authority and is the applicant.

5. Will the applicant and the borrower be the same entity? Who are the members of the project team?

The Authority is both the applicant and the borrower.

The Authority is undertaking the Project as a collaborative initiative with the New York State Department of Transportation ("NYSDOT"). The project team will continue to utilize support from FHWA and will be supported by consultant assistance. The consultant team includes: Arup & AECOM, world leaders in bridge design and engineering; AKRF, environmental consultants and Sive Paget & Riesel, environmental legal advisors; Ernst & Young Infrastructure Advisors, LLC and Acacia Financial, financial advisors; and Nossaman legal advisors.

6. Project Website or Applicant/Borrower Website:

Project: www.newnybridge.com

Applicant/Borrower: www.thruway.ny.gov

F) Other Information.

Briefly discuss any other issues that may affect the development and financing of the project, such as community support, pending legislation or litigation:

Enactment of Design-Build legislation at a special session of the Legislature in December 2011 was a major accomplishment that removed a key risk from the Project. The Transportation Improvement Plan was unanimously amended by NYMTC to include the Project on August 20, 2012. No further legislation is required to undertake the Project. The Project is vital to adjacent communities and enjoys strong support from the entire multi-state region, including receiving public endorsements from approximately 100 former and current local elected officials. There is no litigation pending.



G) Inclusion in Transportation Plans and Programs.

Is the project consistent with the State Transportation Plan and, if applicable, the metropolitan plan?

☐ No

☒ Yes

☐ Not applicable

Please briefly elaborate:

NYMTC voted the required actions regarding the transportation plan unanimously on August 20, 2012 (see Exhibit VII for the adopted resolutions).

H) Readiness to Apply.

Is the project prepared to submit an application within a short timeframe after receiving an invitation from DOT?

☐ No

☒ Yes

☐ Unsure

Yes, the Authority is prepared to submit any requested additional information immediately based upon the plan to obtain a Record of Decision in September 2012 and execute the Design-Build Contract in October 2012. The urgency of advancing TIFIA credit assistance is consistent with the Project's accelerated schedule as one of the Obama Administration's 14 infrastructure projects to be expedited through the permitting and environmental review processes (October 11, 2011). In addition, the Project was designated for accelerated review during the last solicitation of TIFIA loan requests. Finally, we are prepared to submit a \$100,000 check to DOT to demonstrate the Authority's readiness and willingness to proceed immediately.

What factors could impact this timetable or the applicant's ability to provide all required information?

The Authority does not foresee any factors which could reasonably impact the timetable or ability to provide all documents required.

I) Additional Information.

Please provide any other additional information necessary:

The Project is likely to be among the largest job-creating infrastructure undertakings in the nation. Innovative design characteristics and delivery methods are expected to result in a Project that will favorably impact transportation and livability in a large section of the Northeastern United States for generations. Direct jobs will result from construction and indirect jobs will be created through manufacturing opportunities fostered by Buy America contract provisions.

J) Key Contact Person.

Identify a key contact person with whom all communication should flow:

Name: John M. Bryan
Title: Chief Financial Officer, New York State Thruway Authority
Street Address: 200 Southern Boulevard
City/State: Albany, NY 12201-0189
Phone: 518-436-2820
Fax: 518-471-5974
E-mail: John.Bryan@thruway.ny.gov

K) Additional information requested.



Fiscal Years 2013 & 2014 Letter of Interest Form

DUNS: 002429355

Project Location:

State: New York

County: Rockland and Westchester

City: South Nyack, Grandview-on-Hudson, Orangetown, Tarrytown

Congressional Districts Impacted by the Project: NY 17, NY 18

Type of Jurisdiction (e.g., rural, urban): Urban



Fiscal Years 2013 & 2014 Letter of Interest Form

Fees. The increased demand on TIFIA's resources has led to the discontinuation of the practice of advancing the entire cost of financial and legal advisors engaged to assist DOT in determining a project's creditworthiness and overall eligibility and having those costs reimbursed to DOT after execution of a credit agreement. As such, upon request, project sponsors must pay fees in the amount of \$100,000 before DOT hires financial and/or legal advisors as part of the Letter of Interest review process. These fees are due upon request. Additional fees will be charged after the credit instrument is executed, including additional amounts required to fully cover TIFIA's financial and legal advisory services costs in connection with the evaluation and negotiation of the terms of TIFIA credit assistance for the project. For projects that enter credit negotiations, the undersigned further certifies a transaction fee will be paid at closing or, in the event no final credit agreement is reached, upon invoicing by the DOT, in the amount equal to the actual costs incurred by the DOT in procuring the assistance of outside financial advisors and legal counsel. This fee is due whether or not the loan closes.

Debarment. The undersigned certifies that it is not currently, nor has it been in the preceding three years: 1) debarred, suspended or declared ineligible from participating in any Federal program; 2) formally proposed for debarment, with a final determination still pending; 3) voluntarily excluded from participation in a Federal transaction; or 4) indicted, convicted, or had a civil judgment rendered against it for any of the offenses listed in the Regulations Governing Debarment and Suspension (Governmentwide Nonprocurement Debarment & Suspension Regulations: 49 C.F.R. Part 29).

Default/Delinquency. The undersigned further certifies that neither it nor any of its subsidiaries or affiliates are currently in default or delinquent on any debt or loans provided or guaranteed by the Federal Government.

Signature: By submitting this Letter of Interest, the undersigned certifies that the facts stated herein are true, to the best of the applicant's knowledge and belief after due inquiry, and that the applicant has not omitted any material facts. The undersigned is an authorized representative of the applicant.

Submitted by:

Applicant/Borrower Name s/s John M. Bryan

Title Chief Financial Officer

Organization New York State Thruway Authority

Date September 5, 2012

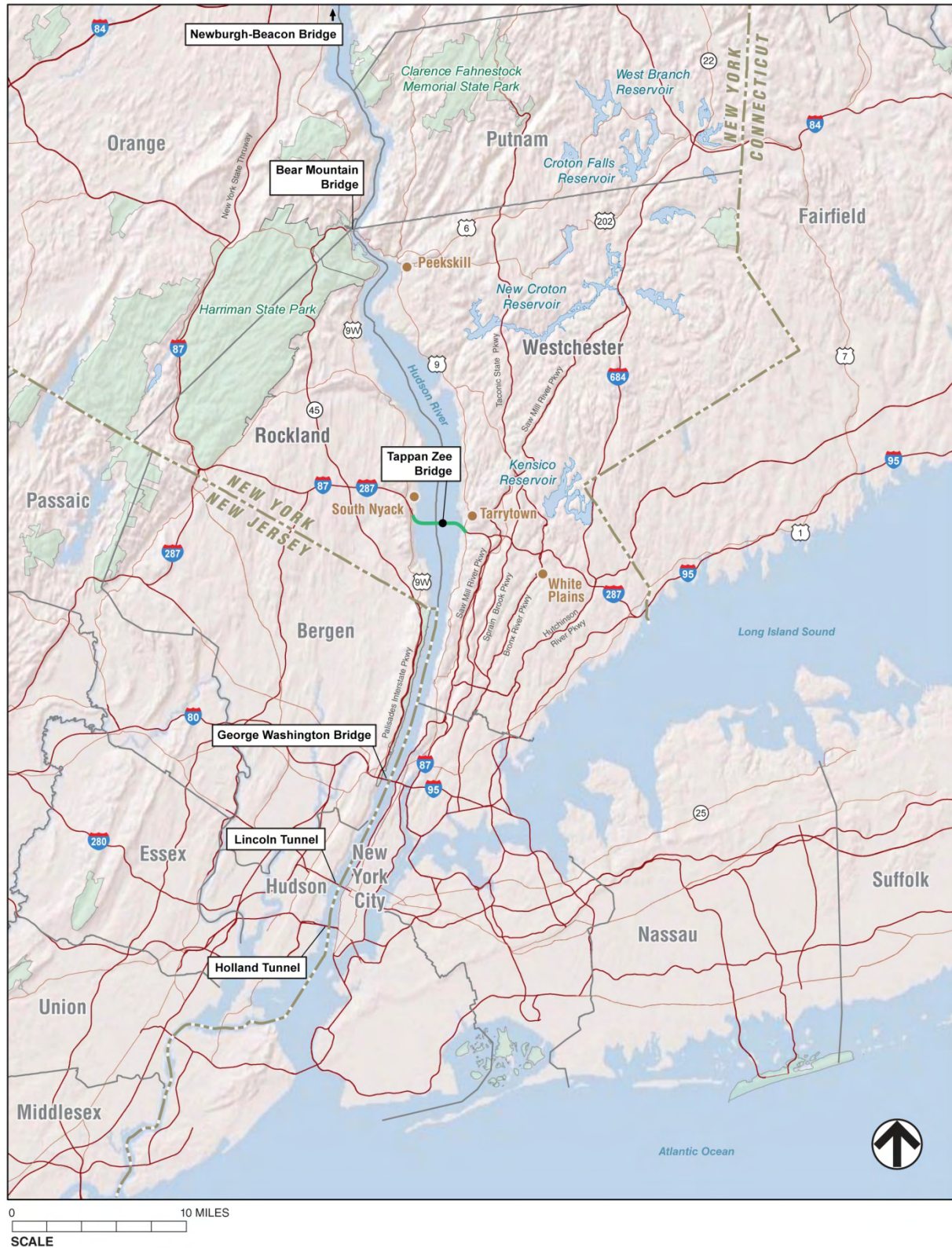
Please attach any relevant documents (e.g., maps, organization charts, etc.).



List of Exhibits

- I. Project Map
- II. Project Benefit-Cost Analysis (“BCA”) prepared in March 2012
- III. NYSTA May 30, 2012 Board Meeting Resolutions regarding the Authority’s commitment to fund the Project with necessary toll increases, initial steps to implement recommended commercial toll increases, and to implement an operational streamlining program
- IV. Bond counsel opinion regarding the Authority’s unfettered ability to raise tolls
- V. Flow of Funds per the Authority’s General Revenue Bonds Resolution
- VI. Traffic and Revenue Report prepared by Jacobs Civil Consultants, June 18, 2012
- VII. NYMTC August 20, 2012 Resolutions documenting adoption of the Project in the Regional Transportation Plan, Transportation Improvement Program, and Conformity Determination

Exhibit I - Project Maps



Tappan Zee Hudson River Crossing Project

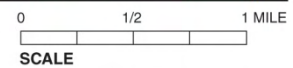
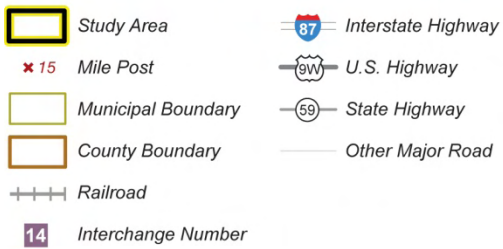
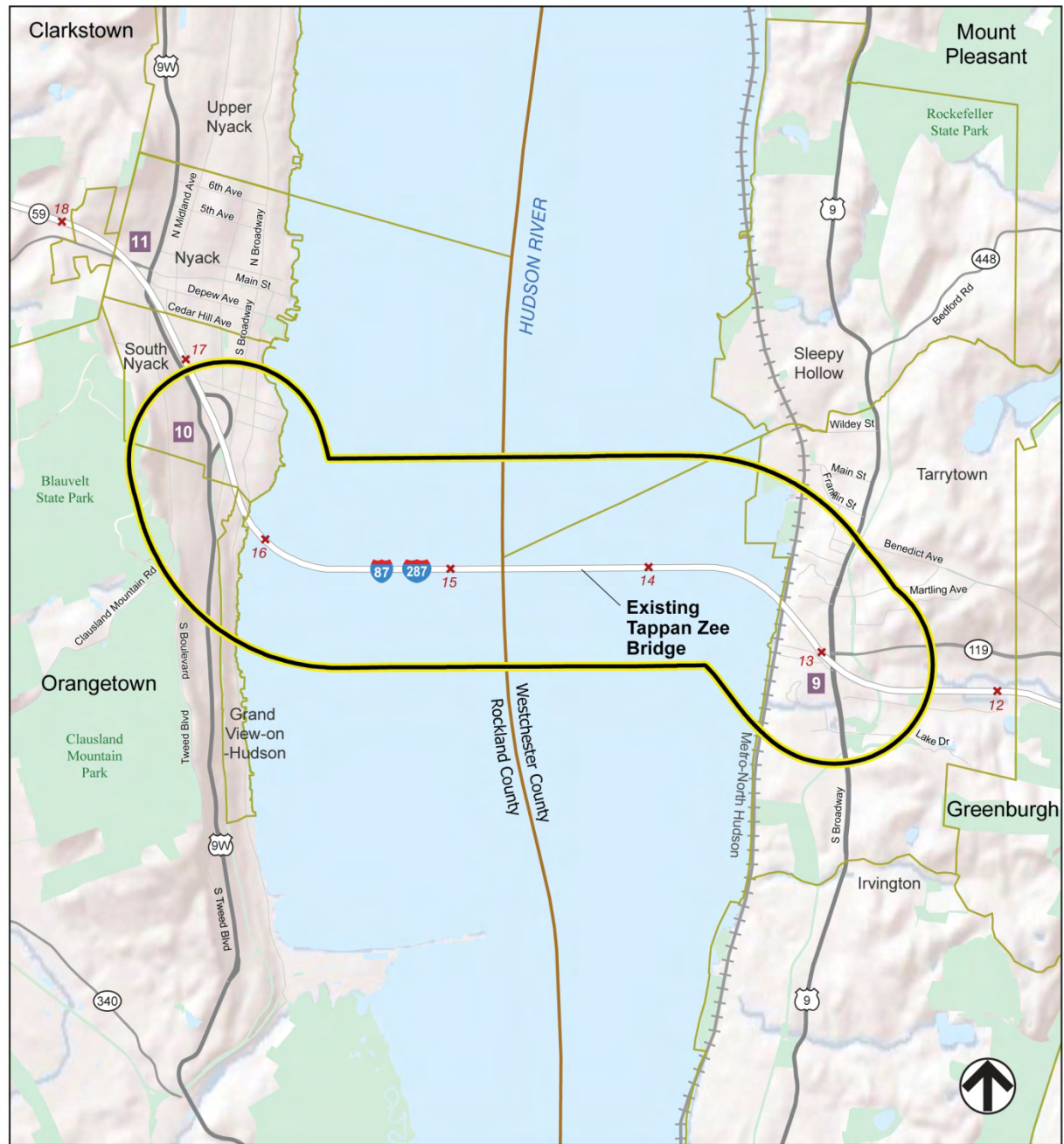


Exhibit II - Project Benefit-Cost Analysis (“BCA”) prepared in March 2012

The following report quantifies the public benefits associated with the Project as part of an earlier effort in March 2012. This analysis will be updated as the Project moves forward.

A. EXECUTIVE SUMMARY

The proposed Tappan Zee Hudson Replacement Project (the project) is likely to be among the largest infrastructure undertakings in the nation and a significant transportation infrastructure investment that lives up to the spirit of the TIGER grant program that leverages federal transportation investments that will benefit New York State and the region. Its significance is marked by its inclusion by the Obama administration as one of the 14 infrastructure projects to be expedited through the permitting and environmental review processes (October 11, 2011).

This attachment to the application provides a comprehensive and quantitative review of the likely benefits accruing based on the project's implementation and presents a benefits-to-cost analysis. The analyses contained in this report adhere to the guidance for Benefit-Cost Analysis (BCA) developed by U.S. Department of Transportation (USDOT) as part of the TIGER application process, most notably as set forth in Appendix A: Additional Information on Benefit-Cost Analysis of the Federal Register Notice of Funding Availability for the Department of Transportation's National Infrastructure Investments (Vol. 77, No. 20 pages 4875 to 4879.).

As a bridge replacement for a vital regional transportation link, the BCA focuses on showing just how critical the link is by presenting the incremental benefits of the proposed Hudson River Tappan Zee Crossing project in comparison with two No Build scenarios: a baseline scenario in which the existing bridge remains in use for the foreseeable future; and, a bridge closure scenario where the existing bridge is closed at some theoretical point in the future requiring existing traffic to be diverted to alternative routes while a replacement bridge is built. The benefits stemming from the replacement bridge project are measured in terms of the improvement and cost avoidance over the No Build Baseline and the No Build Bridge Closure scenarios.

In summary, the quantified valuation of potential benefits resulting from the proposed project indicates that the project will generate sufficient transportation and economic benefits to users of the bridge and to the overall economy that are greater than the cost of the bridge itself.

NO BUILD: BASELINE SCENARIO (CURRENT BRIDGE REMAINS)

In the No Build Baseline scenario, the Tappan Zee Bridge would remain in its current configuration where the life-cycle costs for major capital repairs and maintenance will increase significantly due to the ongoing deterioration of the 56-year-old Bridge. The deterioration of the existing structure has created "punch throughs" or holes in the steel deck annually that result in extraordinary maintenance and repair operations above and beyond routine maintenance. Since the late 1980s, approximately \$700 million in New York State Thruway Authority (NYSTA) funds have been spent on capital repairs beyond regular maintenance of the Bridge. NYSTA estimates that over the next decade that about \$1.3 billion will be necessary to maintain the Bridge in a state of good repair.

The Bridge has accident rates that are twice that of comparable highways in New York State, in large part due to an abrupt change in grade between the causeway sections and the main span. To accommodate daily travel by over 130,000 vehicles—40 percent above the Bridge's original design capacity—utilization of the existing deck area has been maximized by using a movable barrier to create a reversible lane to meet peak hour requirements. As a result, the seven travel lanes on the existing bridge do not include shoulders or emergency access lanes and any accident, breakdown, or lane closure for maintenance results in long delays extending for miles both on the Bridge and its approaches.

NO BUILD/BRIDGE CLOSURE SCENARIO

The No Build Bridge Closure scenario examines what the potential costs would be if at some unknown future time the existing bridge is closed, requiring a diversion of traffic to the George Washington Bridge, Bear Mountain Bridge, and the Newburgh-Beacon Bridge. This would create

tremendous burdens on regional mobility and create a large negative impact on lost time and productivity for the regional economy. Given the large and abstract potential costs associated with such a scenario, this BCA is limited to the analysis to the most direct effects of how traffic detours would add travel time and costs to users of the Bridge and to the overall economy and environment.

PROPOSED REPLACEMENT BRIDGE SCENARIO

The Hudson River Tappan Zee Crossing proposes a replacement bridge that will ensure the long-term viability of the Hudson River crossing between Rockland and Westchester Counties, and provide benefits to local and regional populations and workforce through improved operational mobility and safety. It will have lower operating and maintenance costs as compared with the No Build Baseline scenario and will have a useful life of at least 100 years.

This scenario assumes that while the replacement bridge is under construction (an estimated five-year period), the existing bridge would remain in operation. The existing bridge has a number of limitations that will be addressed by the replacement bridge, including the provision of eight 12-foot wide general traffic lanes (four in each direction) with left and right shoulders in both directions, and improved grades and sight-distances. These features would improve emergency access and response times, enhance mobility, decrease congestion delays, reduce accidents and the associated response time, and reduce the amount of emissions related to congestion. The new bridge will also address existing nonstandard structural and seismic designs, yielding a replacement bridge constructed in accordance with current seismic design criteria.

AFFECTED POPULATION

The Tappan Zee Bridge serves a regional population of users (cars and trucks) and the proposed new bridge will greatly improve regional mobility and provide societal benefits that include:

- Improved emergency access & response times
- Reduced number of accidents
- Decreased congestion related to accidents and major repairs
- Reduced emissions related to congestion
- Lower operating and maintenance costs

BENEFITS—LONG-TERM OUTCOMES

The BCA focuses on the benefits of avoiding costly regional issues now associated with the Bridge: high costs for ongoing maintenance and upgrades, safety, congestion and delay, and potential disruptions to regional travel if the Bridge were closed. The BCA examines and quantifies elements of the key five long-term outcomes specified by USDOT:

- **State of Good Repair:** Cost avoidance of ongoing and increasingly expensive costs to retain the existing bridge in a state of good repair as well as the potential of having to maintain a bridge that still may ultimately be required to be closed in the future.
- **Economic Competitiveness:** The proposed project will avoid and reduce or eliminate existing and future delays created by land closures from extraordinary repairs and accidents on the bridge. The analysis estimates total Vehicle Hours of Delay and a time value to monetize this cost.
- **Livability:** Per USDOT guidance, livability benefits accrue with transportation projects that offer a positive impact of qualitative measures of community life and can reduce the average cost of user mobility and enhance modal choice.

- Sustainability: The cost of delay, congestion, and potential route detours add not only a loss of economic productivity and increased household expenses, but also create an environmental cost associated with increased air emissions of pollutants of concern.
- Safety: As noted above, the existing Tappan Zee Bridge is one with a high rate of accidents and accidents that create delay and congestion resulting from lane closures and long clearance times.

KEY ASSUMPTIONS*PROJECT COSTS AND ANALYSIS PERIOD*

Pursuant to USDOT guidance, the BCA examines the year-to-year comparison of project benefits to project costs and then examines the net benefit in terms of Net Present Value (NPV) over the established analysis period. The analysis period is based on the size and longevity of the transportation improvement, and the BCA typically applies a 20- to 50-year time frame. Since the proposed Hudson River Crossing is a large investment that is expected to provide at least a 100-year life cycle, this BCA uses an analysis period of 50 years and a residual value is not included. Based on the most current NYSTA cost estimates, the cost of the proposed project used in this BCA is based on the long-span option with a cost allocation over the five to six year period as set forth in the summary of the year-to-year allocations highlighted in the chart below, and also summarized in Section B. State of Good Repair worksheets. Construction costs are in 2012 dollars and do not include finance and interest expenses.

DISCOUNT RATE

NPV is based on the discounted value of money spent in the future. Pursuant to USDOT guidance, all costs and benefit values are presented in current 2012 dollars and a discount rate is applied in future years to express what the value of money spent in the future would be worth today. Based on clearly defined guidance from USDOT, a standard discount rate of 7 percent is utilized in the BCA unless otherwise noted (such as USDOT guidance that recommends using 3 percent specifically for the Social Cost of Carbon). An alternative scenario is to utilize a discount rate of 3 percent specifically when the alternative use of funds would also be public expenditures. The analysis is based on using constant 2012 dollars.

BRIDGE CLOSURE ASSUMPTIONS

One of the critical factors in expediting construction of a new Tappan Zee Hudson River Crossing is that it is uncertain the existing Bridge can actually be sustained through continuation of extraordinary repair and maintenance. The potential need to close or greatly diminish the capacity of the existing bridge in the future would have severe impacts on the overall mobility and economy of the region. The far-reaching impact on the larger economy is beyond the scope of this BCA in terms of trying to identify and quantify the implications, but it would fundamentally affect the way goods are transported, curtail the mobility of a workforce in an already congested environment, and have potentially devastating effects on property values and business location-making decisions within the Hudson Valley region.

Within the context of this BCA, a theoretical estimate to isolate certain hardship costs specific to existing bridge users in the event of a bridge closure has been undertaken in order to begin to understand the level of magnitude its effects.

A framework of analysis was established to provide a theoretical basis for evaluating the impacts of a bridge closure in the future. It is important to note that in reality, there is no predictable basis that would identify a point in the future when such an occurrence would be likely. Therefore, the analysis targets a mid-point of the 50-year NPV analysis to consider a bridge option and the cost analysis assumes that a theoretical decision to close the bridge would occur in Year 20, or 2031 with a new

PROPOSED PROJECT CONSTRUCTION COST

INPUTS & ASSUMPTIONS:
Construction costs over time shown in "Project Construction Cost" tab of workbook.

Proposed Replacement Bridge Scenario			Calendar Year:	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
			Analysis Year:	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Cost to construct a new bridge				\$80,200,000	\$1,134,130,953	\$1,214,665,760	\$962,930,886	\$931,060,910	\$582,018,947	\$0	\$0	\$0	\$0
TOTAL:				\$	4,404,607,159	\$	3,843,348,972						

Calendar Year:	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Analysis Year:	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Calendar Year:	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
Analysis Year:	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30
	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Calendar Year:	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051
Analysis Year:	Year 31	Year 32	Year 33	Year 34	Year 35	Year 36	Year 37	Year 38	Year 39	Year 40
	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Calendar Year:	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061
Analysis Year:	Year 41	Year 42	Year 43	Year 44	Year 45	Year 46	Year 47	Year 48	Year 49	Year 50
	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
										Cumulative Total
										\$ 4,905,007,456

PROJECT MATRIX

Table A-1
Project Matrix

March 16, 2012

SUMMARY OF BENEFITS AND COSTS

Results from the benefit-cost analysis are summarized in the tables below and show that for any given comparison at either prescribed discount rate of 3 or 7 percent, the BCA estimates a positive net benefit-to-cost ratio. As shown in **Table A-2**, the benefits to costs for the new bridge which quantifies avoided costs as compared with the No Build Baseline provides a NPV of about \$4.7 billion using a 3 percent discount rate and \$0.573 billion using a 7 percent discount rate. This yields a positive Benefit-to-Cost ratio of 2.07 and 1.15, respectively. **Table A-3** compares the benefits to costs for new bridge as compared with the No Build Bridge Closure scenario which estimates a net NPV of \$7.1 billion using a 3 percent discount rate and \$2.7 billion using a 7 percent discount rate. This yields a positive Benefit-to-Cost ratio of 2.61 and 1.54, respectively. The full analysis can be found in each of the subsequent technical sections of the BCA as well as the detailed Excel files accompanying this report.

Table A-2
Proposed Project Benefit Compared with No Build Baseline Scenario

Cost/Benefits	NPV of Benefits (Costs)	
	3% Discount Rate	7% Discount Rate
Project Cost	(\$4,404,607,159)	(\$3,843,348,972)
State of Good Repair	\$1,308,225,137	\$738,006,607
Economic Competitiveness	\$6,419,652,249	\$3,043,940,833
Livability	\$1,223,303,826	\$543,805,959
Sustainability	\$26,920,452	\$25,655,987
Safety	\$121,761,235	\$65,309,418
Total Project Benefit	\$9,099,862,897	\$4,416,718,803
Total Net Benefit	\$4,695,255,739	\$573,369,831
Benefit-to-Cost Ratio	2.07	1.15

Table A-3
Proposed Project Benefit Compared with No Build Bridge Closure Scenario

Cost/Benefits	NPV of Benefits (Costs)	
	3% Discount Rate	7% Discount Rate
Project Cost	(\$4,404,607,159)	(\$3,843,348,972)
State of Good Repair	\$3,989,651,794	\$1,941,139,218
Economic Competitiveness	\$5,321,770,047	\$2,966,490,783
Livability	\$2,006,757,787	\$866,352,477
Sustainability	\$44,063,994	\$42,196,181
Safety	\$82,404,423	\$55,148,375
Total Project Benefit	\$11,444,648,045	\$5,871,327,035
Total Net Benefit	\$7,040,040,887	\$2,027,978,063
Benefit-to-Cost Ratio	2.60	1.53

B. STATE OF GOOD REPAIR

As set forth in TIGER Discretionary Grants guidance, one of the primary selection criterion associated with the Long-Term Outcomes is to measure whether a project will have a meaningful benefit in improving the condition of transportation facilities, minimizing life-cycle costs, and providing for an opportunity to rehabilitate, reconstruct or upgrade surface transportation assets that, if left unimproved, threaten transportation network efficiency. Throughout this application as well as in related grant applications and the recently released Draft EIS for the Hudson River Tappan Zee Crossing Project (January 2012 and available online at <http://www.thenewtzb.ny.gov/deis>), the replacement of the existing Tappan Zee Bridge has been identified as a critical infrastructure improvement that will benefit the region and avoid considerable future economic and transportation network hardship. This section of the BCA identifies the benefit of the project in terms of avoiding costly expenditures that would have to happen in the absence of the new bridge.

REPLACEMENT BRIDGE BENEFITS COMPARED WITH NO BUILD BASELINE SCENARIO

The recently released Draft EIS contains a comprehensive statement of the purpose and need driving the bridge replacement project. It identifies and defines the chronic inefficiencies of maintaining the existing Bridge into the foreseeable future. This includes operating and safety deficiencies of a bridge that was never designed to carry the volume of traffic it presently carries as well as the extraordinary maintenance and ongoing repairs necessary to ensure a state of good condition. The obsolescence of the bridge not only requires considerable ongoing capital investment but, as described in subsequent sections of the BCA, is also causing substantial losses to economic productivity and hardship to households and businesses that rely on this vital transportation link. The BCA analysis utilizes NYSTA historic and planned capital expenditures as the basis for estimating future year expenses that would be required to keep the existing bridge in a sufficient state of good repair. The analysis focuses on the incremental costs associated with the extraordinary expenses that NYST has and will continue to spend. In general, it is assumed for analysis purposes that the basic operation and maintenance of the bridge and roadway would be present in any future bridge scenario so this cost has not been added to either the No Build Baseline scenario or the proposed Build condition. There are two basic cost of good repair assumptions carried into the BCA.

First, as reported in the Draft EIS, NYSTA anticipates that about \$1.3 billion (in 2012 dollars) will need to be spent over the next decade to ensure that the existing Bridge has seismic upgrades and other major repairs. For purposes of the NPV analysis, the year by year allocation reflects that the majority of this budgeted amount would occur towards the end of the decade when the seismic work could be implemented. Therefore, \$780 million, or 60 percent of the budget was allocated evenly to Years 8, 9, and 10 (or 2020, 2021, and 2022) while the remaining \$520 million was evenly distributed in Years 1 through 7 (about \$75 million per year).

Second, NYSTA reported in the DEIS that about \$700 million was spent on repairs and upkeep of the existing Bridge over the past 30 years, although an exact year-by-year distribution was not available. To arrive at an estimated 2012 dollar value of that expense, a year-by-year allocation was created based an escalation of spending per year that accounted for both inflation and the increase in repairs associated with the progressive aging of the Bridge and prior rehabilitation efforts. The annual increase was proportioned from the HDR Engineering report that forecast an increasing rate of extraordinary repairs over a 15-year period between 2005 and 2020 (**Attachment A**). As shown in **Table B-1**, this allocation was then adjusted to 2012 dollars using the BLS Consumer Price Index (CPI) for the northeast region to obtain a 2012 value of about \$966 million. This amount was assumed to be the amount that NYST would have to begin

Table B-1
40-Year Allocation Based

Year	Cost Distribution	Actual NYSTA Spending	2012 Dollar Value NYSTA Spending	BCA Year Allocation	BCA Allocation Amount	BCA Year Allocation	BCA Allocation Amount
1981				2022	\$11,630,942	2054	\$44,141,951
1982	1%	\$8,471,986	\$21,478,783	2023	\$12,357,875	2055	\$46,900,823
1983	1.3%	\$9,001,485	\$21,906,530	2024	\$13,130,243	2056	\$49,832,124
1984	1.4%	\$9,564,078	\$22,228,839	2025	\$13,950,883	2057	\$52,946,632
1985	1.5%	\$10,161,833	\$22,768,411	2026	\$14,822,813	2058	\$56,255,797
1986	1.5%	\$10,796,947	\$23,603,526	2027	\$15,749,239	2059	\$59,771,784
1987	1.6%	\$11,471,756	\$24,019,385	2028	\$16,733,566	2060	\$63,507,520
1988	1.7%	\$12,188,741	\$24,305,330	2029	\$17,779,414	2061	\$67,476,740
1989	1.9%	\$12,950,537	\$24,458,893	2030	\$18,890,627		
1990	2.0%	\$13,759,946	\$24,519,457	2031	\$20,071,292		
1991	2.1%	\$14,619,943	\$24,918,435	2032	\$21,325,747		
1992	2.2%	\$15,533,689	\$25,613,081	2033	\$22,658,607		
1993	2.4%	\$16,504,545	\$26,476,931	2034	\$24,074,769		
1994	2.5%	\$17,536,079	\$27,460,640	2035	\$25,579,443		
1995	2.7%	\$18,632,084	\$28,443,380	2036	\$27,178,158		
1996	2.8%	\$19,796,589	\$29,389,827	2037	\$28,876,793		
1997	3.0%	\$21,033,876	\$30,481,424	2038	\$30,681,592		
1998	3.2%	\$22,348,493	\$31,929,292	2039	\$32,599,192		
1999	3.4%	\$23,745,274	\$33,240,509	2040	\$34,636,641		
2000	3.6%	\$25,229,353	\$34,156,522	2041	\$36,801,431		
2001	3.8%	\$26,806,188	\$35,307,267	2042	\$39,101,521		
2002	4.1%	\$28,481,575	\$36,756,516	2043	\$41,545,366		
2003	4.3%	\$30,261,673	\$37,984,108	2044	\$44,141,951		
2004	4.6%	\$32,153,028	\$39,007,468	2045	\$46,900,823		
2005	4.9%	\$34,162,592	\$39,987,355	2046	\$49,832,124		
2006	5.2%	\$36,297,754	\$41,004,475	2047	\$52,946,632		
2007	5.5%	\$38,566,363	\$42,478,231	2048	\$56,255,797		
2008	5.9%	\$40,976,761	\$43,402,243	2049	\$59,771,784		
2009	6.2%	\$43,537,809	\$46,107,444	2050	\$63,507,520		
2010	6.6%	\$46,258,922	\$48,041,291	2051	\$67,476,740		
2011	7.0%	\$49,150,104	\$49,533,929	2052	\$39,101,521		
2012				2053	\$41,545,366		
TOTAL	100%	\$700,000,000	\$961,009,523				
Notes: BCA allocation by year based on percent distribution of years 1982 to 2011 by 2012 total dollar value. Year 41 (2052) resets to 4.1 percent allocation.							
Sources: NYSTA, AKRF							

spending after the first 10 years of the more specific \$1.3 billion program described above. The \$966 million was assigned in the same ascending scale for Years 11 to 40 in the NPV analysis. For years 41 to 50 a mid-point value was utilized in order to account for the fact that such a future reset of a repair cycle would be starting with a bridge that was 50 years older.

The detailed year-to-year allocation of costs and benefits based on State of Good Repair is presented at the end of this section. As shown, the 50-year allocation of costs necessary to keep the No Build baseline existing bridge in a state of good repair has an aggregate total in 2012 dollars of about \$2.8 billion dollars. At a 3 percent discount rate this aggregate value yields an NPV of \$1.6 billion and at a 7 percent discount rate, the NPV is just under \$1 billion.

Overall, the net NPV benefit of the project is \$1.3 billion at a 3 percent discount rate and is \$0.738 billion and at 7 percent discount rate.

REPLACEMENT BRIDGE BENEFITS COMPARED WITH NO BUILD BRIDGE CLOSURE SCENARIO

To test a theoretical scenario in which NYSTA could potentially have to close the bridge for any of the risks cited elsewhere in this application and the Draft EIS, the most notable aspect from the BCA assessment of State of Good Repair costs would be that a new bridge would have to be built at some unknown point in the future.

The BCA analysis has assumed such a theoretical closure in Year 20 of the BCA 50-year analysis period. In term of a cost analysis, it is assumed that the proposed bridge would be a reasonable proxy for any new bridge that might be required in the future; thus, the allocation of 2012 construction costs over the 5- to 6-year construction period was assumed to be the same, with construction starting in Year 20. The existing construction budget was increased by 25 percent to account for the emergency implementation aspect of the future scenario as well the trend that construction costs for major infrastructure initiatives tend to increase faster than the annual rate of inflation. It is also very likely that an overall increase in repair and maintenance to the other roads and bridges that must absorb the diverted demand would occur, thereby adding even more costs to this scenario (although no estimate has been monetized for this BCA).

From the point this future potential bridge is completed and open, it is assumed to operate the same as with the proposed Build scenario. No incremental increase in state of good repair spending has been included in the cost model.

As shown in the year-to-year worksheet presented below, adding this future year construction to the No Build Bridge Closure scenario results in a total aggregate cost of about \$7.6 billion. At a 3 percent discount rate, this yields an NPV of about \$4.3 billion and at a 7 percent rate, the NPV is \$2.2 billion.

Overall, the net NPV benefit of the project is \$4.0 billion at a 3 percent discount rate and \$1.9 billion at 7 percent discount rate.

STATE OF GOOD REPAIR

QUANTIFIED COSTS/BENEFITS

- [1] Value of avoiding costs of ongoing extraordinary maintenance in No Build Baseline Scenario (existing bridge for 50 years) and No Build No Bridge Scenario (while existing bridge in operation)
- [2] Value of avoiding construction costs for a new bridge starting in year 20 under No Build No Bridge Scenario

INPUTS & ASSUMPTIONS

\$ 1,300,000,000

= Total estimated cost for capital expenditures on existing bridge over the next 10 years. (Source: NYSTA)

Percentage distribtution of above amount is as follows (assumes majority of spending in final three years, during seismic upgrades) (Source: AKRF/NYSTA)

2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
5.38%	5.77%	5.77%	5.77%	5.77%	5.77%	5.77%	20.00%	20.00%	20.00%

\$ 329,223,305

= Total repair/maintenance costs for existing bridge during proposed bridge construction (Analysis years 1-6)

Distribution as follows (carries historic repair costs forward, assumes average percentage increase in costs from last 30 years):

2012	2013	2014	2015	2016	2017
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
\$ 50,985,652	\$ 52,479,921	\$ 54,017,985	\$ 55,601,125	\$ 57,230,663	\$ 58,907,960

25%

= percentage increase in cost for building "emergency bridge" under No Bridge No Build Scenario

AKRF:
Year 11 forward based on
analysis in "Historic
Maintenance Costs" tab.

CALCULATIONS:

			2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
No Build Baseline Scenario - Existing bridge for next 50 years														
	NPV @ 3% Discount Rate	NPV @ 7% Discount Rate	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12
[1] Expenditures for extraordinary repairs and maintenance	\$1,604,730,277	\$998,064,875	\$70,000,000	\$75,000,000	\$75,000,000	\$75,000,000	\$75,000,000	\$75,000,000	\$75,000,000	\$260,000,000	\$260,000,000	\$260,000,000	\$11,630,942	\$12,357,875
TOTAL	\$1,604,730,277	\$998,064,875	\$70,000,000	\$75,000,000	\$75,000,000	\$75,000,000	\$75,000,000	\$75,000,000	\$75,000,000	\$260,000,000	\$260,000,000	\$260,000,000	\$11,630,942	\$12,357,875
No Build No Bridge Scenario - Bridge Closure in Year 20														
	NPV @ 3% Discount Rate	NPV @ 7% Discount Rate	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12
[1] Expenditures for extraordinary repairs and maintenance	\$1,146,299,540	\$872,799,965	\$70,000,000	\$75,000,000	\$75,000,000	\$75,000,000	\$75,000,000	\$75,000,000	\$75,000,000	\$260,000,000	\$260,000,000	\$260,000,000	\$11,630,942	\$12,357,875
[2] Cost to construct a new bridge	\$3,139,857,395	\$1,328,397,522	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
TOTAL	\$4,286,156,935	\$2,201,197,487	\$70,000,000	\$75,000,000	\$75,000,000	\$75,000,000	\$75,000,000	\$75,000,000	\$75,000,000	\$260,000,000	\$260,000,000	\$260,000,000	\$11,630,942	\$12,357,875
Proposed Replacement Bridge Scenario			Proposed replacement bridge under construction						Proposed replacement bridge in operation - year 7 forward					
	NPV @ 3% Discount Rate	NPV @ 7% Discount Rate	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12
[1] Expenditures for extraordinary repairs and maintenance	\$296,505,141	\$260,058,268	\$ 50,985,652	\$ 52,479,921	\$ 54,017,985	\$ 55,601,125	\$ 57,230,663	\$ 58,907,960	\$0	\$0	\$0	\$0	\$0	\$0
TOTAL	\$296,505,141	\$260,058,268	\$50,985,652	\$52,479,921	\$54,017,985	\$55,601,125	\$57,230,663	\$58,907,960	\$0	\$0	\$0	\$0	\$0	\$0
Net Benefit (Cost): Proposed Replacement Bridge Scenario vs. No Build Baseline Scenario														
	NPV @ 3% Discount Rate	NPV @ 7% Discount Rate	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12
	\$1,308,225,137	\$738,006,607	\$ 19,014,348	\$ 22,520,079	\$ 20,982,015	\$ 19,398,875	\$ 17,769,337	\$ 16,092,040	\$ 75,000,000	\$ 260,000,000	\$ 260,000,000	\$ 260,000,000	\$ 11,630,942	\$ 12,357,875
Net Benefit (Cost): Proposed Replacement Bridge Scenario vs. No Build No Bridge Scenario														
	NPV @ 3% Discount Rate	NPV @ 7% Discount Rate	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12
	\$3,989,651,794	\$1,941,139,218	\$19,014,348	\$22,520,079	\$20,982,015	\$19,398,875	\$17,769,337	\$16,092,040	\$75,000,000	\$260,000,000	\$260,000,000	\$260,000,000	\$11,630,942	\$12,357,875

2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	Year 31	Year 32	Year 33
\$13,130,243	\$13,950,883	\$14,822,813	\$15,749,239	\$16,733,566	\$17,779,414	\$18,890,627	\$20,071,292	\$21,325,747	\$22,658,607	\$24,074,769	\$25,579,443	\$27,178,158	\$28,876,793	\$30,681,592	\$32,599,192	\$34,636,641	\$36,801,431	\$39,101,521	\$41,545,366	\$44,141,951
\$13,130,243	\$13,950,883	\$14,822,813	\$15,749,239	\$16,733,566	\$17,779,414	\$18,890,627	\$20,071,292	\$21,325,747	\$22,658,607	\$24,074,769	\$25,579,443	\$27,178,158	\$28,876,793	\$30,681,592	\$32,599,192	\$34,636,641	\$36,801,431	\$39,101,521	\$41,545,366	\$44,141,951
							Existing bridge closure and new bridge construction							New bridge in operation						
Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	Year 31	Year 32	Year 33
\$13,130,243	\$13,950,883	\$14,822,813	\$15,749,239	\$16,733,566	\$17,779,414	\$18,890,627	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$ 100,250,000	\$ 1,417,663,692	\$ 1,518,332,200	\$1,203,663,607	\$ 1,163,826,137	\$ 727,523,683	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
\$13,130,243	\$13,950,883	\$14,822,813	\$15,749,239	\$16,733,566	\$17,779,414	\$18,890,627	\$100,250,000	\$1,417,663,692	\$1,518,332,200	\$1,203,663,607	\$1,163,826,137	\$727,523,683	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	Year 31	Year 32	Year 33
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	Year 31	Year 32	Year 33
\$ 13,130,243	\$ 13,950,883	\$ 14,822,813	\$ 15,749,239	\$ 16,733,566	\$ 17,779,414	\$ 18,890,627	\$ 20,071,292	\$ 21,325,747	\$ 22,658,607	\$ 24,074,769	\$ 25,579,443	\$ 27,178,158	\$ 28,876,793	\$ 30,681,592	\$ 32,599,192	\$ 34,636,641	\$ 36,801,431	\$ 39,101,521	\$ 41,545,366	\$ 44,141,951
Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	Year 31	Year 32	Year 33
\$13,130,243	\$13,950,883	\$14,822,813	\$15,749,239	\$16,733,566	\$17,779,414	\$18,890,627	\$100,250,000	\$1,417,663,692	\$1,518,332,200	\$1,203,663,607	\$1,163,826,137	\$727,523,683	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	
Year 34	Year 35	Year 36	Year 37	Year 38	Year 39	Year 40	Year 41	Year 42	Year 43	Year 44	Year 45	Year 46	Year 47	Year 48	Year 49	Year 50	Cumulative Total
\$46,900,823	\$49,832,124	\$52,946,632	\$56,255,797	\$59,771,784	\$63,507,520	\$67,476,740	\$39,101,521	\$41,545,366	\$44,141,951	\$46,900,823	\$49,832,124	\$52,946,632	\$56,255,797	\$59,771,784	\$63,507,520	\$67,476,740	\$2,782,489,780
\$46,900,823	\$49,832,124	\$52,946,632	\$56,255,797	\$59,771,784	\$63,507,520	\$67,476,740	\$39,101,521	\$41,545,366	\$44,141,951	\$46,900,823	\$49,832,124	\$52,946,632	\$56,255,797	\$59,771,784	\$63,507,520	\$67,476,740	\$2,782,489,780
Year 34	Year 35	Year 36	Year 37	Year 38	Year 39	Year 40	Year 41	Year 42	Year 43	Year 44	Year 45	Year 46	Year 47	Year 48	Year 49	Year 50	Cumulative Total
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,435,045,601
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$6,131,259,320
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$7,566,304,921
Year 34	Year 35	Year 36	Year 37	Year 38	Year 39	Year 40	Year 41	Year 42	Year 43	Year 44	Year 45	Year 46	Year 47	Year 48	Year 49	Year 50	Cumulative Total
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$329,223,305
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$329,223,305
Year 34	Year 35	Year 36	Year 37	Year 38	Year 39	Year 40	Year 41	Year 42	Year 43	Year 44	Year 45	Year 46	Year 47	Year 48	Year 49	Year 50	Cumulative Total
\$ 46,900,823	\$ 49,832,124	\$ 52,946,632	\$ 56,255,797	\$ 59,771,784	\$ 63,507,520	\$ 67,476,740	\$ 39,101,521	\$ 41,545,366	\$ 44,141,951	\$ 46,900,823	\$ 49,832,124	\$ 52,946,632	\$ 56,255,797	\$ 59,771,784	\$ 63,507,520	\$ 67,476,740	\$2,453,266,474
Year 34	Year 35	Year 36	Year 37	Year 38	Year 39	Year 40	Year 41	Year 42	Year 43	Year 44	Year 45	Year 46	Year 47	Year 48	Year 49	Year 50	Cumulative Total
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$7,237,081,616

C. ECONOMIC COMPETITIVENESS

Perhaps the most significant aspect of this BCA is the analysis of economic competitiveness, which emphasizes how the proposed new Hudson River Tappan Zee Crossing project can greatly improve the reliability of the Bridge and avoid the lost time associated with chronic and worsening delays from safety and operational impairments to the current Bridge. The BCA analysis presented below shows that the value of lost time to households and businesses far outpaces the actual cost to NYSTA of extraordinary repair and capital expenses.

REPLACEMENT BRIDGE BENEFITS COMPARED TO NO BUILD BASELINE

As evidenced by the project's overarching purpose and need as expressed in this application as well as in the Draft EIS, the rebuilding of the Tappan Zee Bridge is essential to ameliorating the chronic delay and congestion associated with the current Bridge and its structural and operational deficiencies. This section of the BCA examines two critical sources of delay and congestion now and into the future should the existing Bridge remain: the ongoing extraordinary maintenance and repair associated with keeping the existing structure open and the high rate of accidents on the existing structure.

EXTRAORDINARY MAINTENANCE AND REPAIR

The existing Tappan Zee Bridge is aging and experiences numerous punch throughs, resulting in extraordinary maintenance and repair operations that have both emergency components (i.e., isolate and temporarily cover newfound holes) and scheduled repair operations. The trend has been a steady increase in the number of such repairs and the resulting congestion and delay associated with the repairs. Section D: "Livability" provides an additional assessment of household costs associated with the additional fuel purchases necessary to accommodate the slower speeds and travel times associated with delay and Section E: "Sustainability" assesses the environmental cost due to the extra pollutant emissions associated with the traffic delays.

Estimate of Delay

The BCA assessment of the economic value of time lost from the delay and congestion associated with maintenance and repair operations necessary to keep the Bridge functioning is based on extensive research conducted by HDR Engineering, in 2005 at the request of NYSTA (see Attachment A). This analysis of user delays and costs was also incorporated in a 2009 TIGER Grant application seeking to re-deck that existing span in anticipation of a longer-term start-up of the current Bridge replacement effort.

The HDR study was a comprehensive assessment that examined a "No Build" or continued maintenance scenario that characterized existing conditions and a projected growth in the number of repair operations over a 15-year period. The mid-point of that analysis coincides with the current 2012 framework and this is used as a baseline and future year forecast, since for the duration of this NPV analysis, the Bridge is likely to go through several cycles of ramping up repair operations and then restarting a new repair cycle thereafter. This is a conservative approach given that the continued aging of the Bridge would likely accelerate repair requirements over time, even after a full 15-year cycle of repair activities.

The basis for the user delay analysis was a determination of Vehicle Hours of Delay (VHD) as determined by a rigorous analysis that characterized the location and severity of punch throughs (that almost always occur in the two outermost lanes) as well as the frequency and duration of repair events in order to develop closure profiles for each direction and with different lane configurations to reflect various peak periods and the relatively random requirement for emergency repairs. Bridge volume characteristics were combined with lane closure profiles in various combinations (108 volume profiles and 54 closure profiles, or 2,916 combinations) to calculate delay associated with each combination by the number of times the combination might occur per year. Delays were

estimated using queuing analyses including a basic queue of arriving vehicles minus departing vehicles leaving the queue and a shockwave-based queue which accounts for the fact that the queue will telescope because vehicles will displace other vehicles that “want” to occupy that space in the queue during that hour. They delay and queue projections were spot-checked using a CORSIM microsimulation of bridge closure conditions. Project volume increases were applied over the 2005 to 2020 period although the analysis omitted volumes that would have resulted in capacity exceedance in order to have the delay analysis only account for the disruptions and closures associated with repair operations.

Table C-1 summarizes the VHD analysis as completed by HDR which shows that bridge repair operations over the 15-year period would accrue to over 109 million VHD with roughly two-thirds of the delay associated with scheduled repairs and one-third with emergency plating. On average, this is about 7.3 million VHD per year.

Table C-1
Lane Closure Related Delay—Continued Maintenance Scenario 2005–2020

Type of Repair	Northbound	Southbound	Total
Scheduled	36,951,495	37,556,627	74,508,121
Emergency – Weekday	15,111,676	10,825,151	25,936,827
Emergency – Weekend	3,226,412	5,347,849	8,614,260
TOTAL	55,329,582	53,729,626	109,059,208
Notes: Vehicle Hours of Delay, Road Closure Only			
Sources: HDR Engineering, Inc.			

As shown in **Figure C-1**, the current year estimate is that the Bridge will have about 60 repair operations and will generate about 6 million VHD. As noted above, since the long-term duration of maintaining the existing bridge would likely go through several cycles of “catching up” and “falling behind” in terms of keeping up with punch through repairs, the BCA utilizes this midpoint estimate a reasonable proxy of an annual delay created by the extraordinary repairs necessary to maintain the bridge. This is considered the incremental cost avoidance for which the new bridge will add substantial benefit to the regional economy. As noted above under Section B “State of Good Repair,” this extraordinary delay represents isolated cost avoidance as opposed to general operation and maintenance costs that would accrue with either bridge scenario in the future (and is therefore considered a “wash” with no net difference between the proposed bridge and the no build scenarios examined in this BCA).

Monetization and Net Present Value Assessment

As established by USDOT guidance, a value per hour of vehicle or person hour of delay is used to calculate a monetary value for the estimated annual VHD of 6 million hours. Based on the unique characteristics of the New York City Metropolitan Area, this BCA substitutes a locally derived value as opposed to the national recommended value of time savings as presented in the TIGER BCA Resource Guide. A value of \$26.69 per hour is used based on the 2005 dollar estimate of \$23.00 as utilized in the New York Metropolitan Transportation Council’s (NYMTC) 2005 Status Report on Congestion Management.¹ Applying this value of time to the annual VHD that results from

¹ http://www.nymtc.org/project/CMS/CMSfiles/CMS_2005Status.pdf

3.14.12

SOURCE: HDR ENGINEERING, INC.

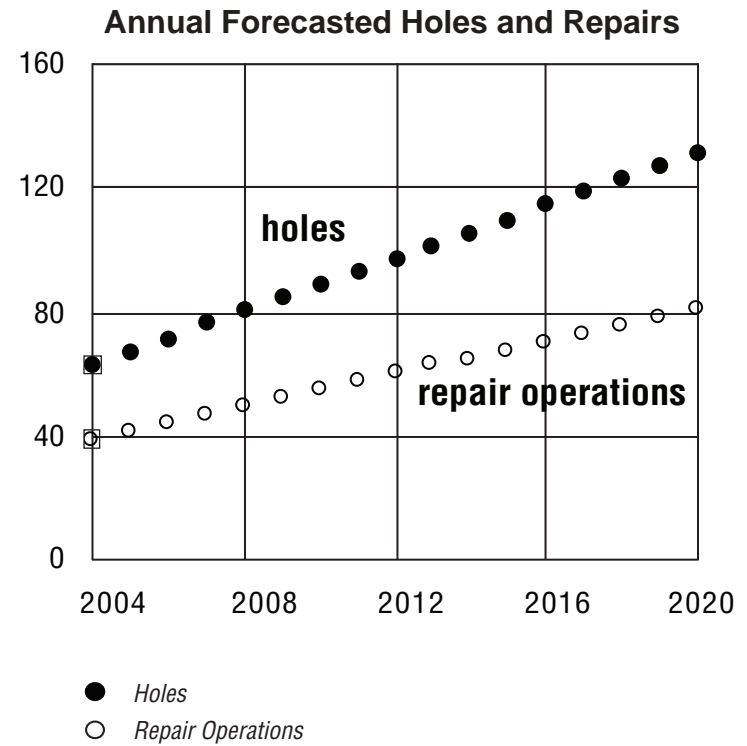
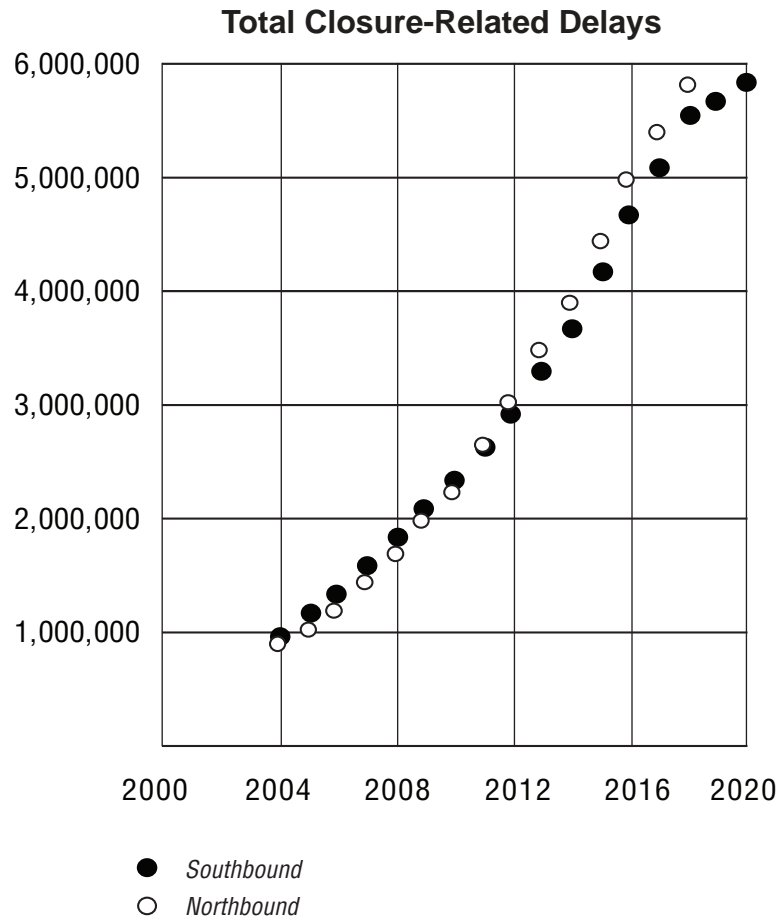


Figure C-1
**Forecasted Closure-Related Delay (veh-hrs)
No-Build/Continued Maintenance Alternative**

extraordinary delays from repair operations generates a potential cost avoidance of approximately \$160 million per year. As summarized in the year-to-year worksheet at the end of this section, over the 50-year analysis period the No Build Baseline would result in substantial cost in economic productivity, with a NPV of almost \$8.4 billion at a 3 percent discount rate and \$4.5 billion at a 7 percent discount rate.

Table C-2
Cost of Extraordinary Repair Delay

Cost Avoidance	Total Annual VHD	Value of Lost Time	Annual Value of Lost Time
Delay Resulting from Extraordinary Repairs	6,000,000	\$26.69	\$160,140,000
Sources: NYMTC, HDR Engineering, Inc.			

HIGH RATE OF ACCIDENTS

As noted in the main narrative to this TIGER application, existing Bridge operations generate accidents at a rate twice the average rate for other parts of the NYSTA system. Accidents on the Bridge have several root causes based on the original design capacity compared with actual volumes as well as the operating constraints discussed further below. When accidents occur, they are also very problematic and cause undue delay and congestion since the Bridge operates with no shoulder or breakdown lanes, which creates lane closure situations that are difficult to access and clear. With over 450 accidents per year on the Bridge (the annual average over the past three years), this is a chronic source of delay, congestion, and hardship to users of the Bridge.

This section of the BCA examines accidents from the perspective of additional economic cost and lost productivity, while Section D: “Livability” identifies the extra cost to consumers in terms of additional fuel purchases associated with slower speeds and congestion, Section E: “Sustainability” examines the environmental costs associated with the additional pollutant emissions, and Section F: “Safety” provides an analysis of costs associated specifically with the avoidance of accidents. The last provides a comprehensive assessment of the Bridge’s current accident profile and the analysis of accident reduction to be realized with the new bridge.

In terms of the lost productivity and value that can be avoided with construction of the new bridge, the BCA examines two tiers of cost avoidance: (1) reduction in delays resulting from the anticipated reduction in the number of accidents occurring; and, (2) the ability to reduce the delay from the time necessary to clear accidents and reopen travel lanes. The estimate of this cost avoidance is presented below.

Estimating Accident Related Delays

Because the Tappan Zee currently operates with no shoulder or breakdown lanes, any type of accident essentially results in a lane closure until the road crews can be dispatched to clear the accident by towing vehicles fully off the bridge. Any level of more severe accidents with injuries and requiring accident investigations can add substantial duration and additional lane closures to any given accident.

Determining a VHD per Hour of Accident Incident

Under this operating condition, any given accident is going to be similar in lane closure profile to the repair operations that were evaluated extensively in the 2005 HDR study as noted above (and found in the Appendices). To use the delay calculations derived from the HDR analysis, the first step is to determine an overall VHD per hour of lane closure since an accident event is considered to generally be shorter than a repair event. The analysis involved a post-processing of the HDR estimated VHD by using the number of events and typical duration of events to calculate a VHD “per hour of operation,” as set forth in **Tables C-3 and C-4**, below. Table C3 summarizes the first step of determining the average time duration per emergency or schedule repair operation. Table C4 provides the calculation of total VHD per hour of operation.¹

Table C-3
Estimated Duration Per Emergency or Scheduled Event

Event Type	Duration	Frequency (Percent)	Weighted Average Duration
Emergency	3 hours	100%	3 hours
Scheduled – Short	4 hours	30%	1.2 hours
Scheduled – Medium	6 hours	15%	0.9 hours
Scheduled – Long	8 hours	55%	4.4 hours
Schedule Average Duration			6.5 hours
Sources: HDR Engineering, Inc. 2005			

Table C-4
Estimated VHD per Operation

	Total VHD	Total Events	Average VHD per event	Hours per Operation	VHD per all Operations	VHD per Hour of Operation
	A	B	C	D	E	F
2012 Estimated Scheduled VHD	4,000,000			6.5	615,385***	
2012 Estimated Emergency VHD	2,000,000			3.0	666,667***	
2012 Estimated TOTAL	6,000,000	60.0	100,000*	4.7**	1,282,052	21,368^
Notes: * A / B ** C / F *** A / D ^ E / B						
Sources: HDR Engineering, Inc. 2005 (Figures 1 and 8).						

Estimate of Duration of Accident Incident

As noted above, an accident on the Bridge has direct and immediate effects on traffic flow since there are no shoulders or breakdown lanes so that any incident creates a lane closure until it is fully cleared. Therefore, while NYSTA and NYSDOT employ cutting edge Traffic Incident Management (TIM) techniques, clearance times (particularly for accident clearance off the travel lane) are greatly

¹ Note that because the HDR study did not breakdown the number of events by emergency or scheduled but did provide the total number of VHD by type of operation, the table has an interim step of aggregating VHD per all operations by type in order to more realistically estimate the final calculation of VHD per hour of operation.

hampered compared with available national average data. (NYSTA accident data were used for this analysis but no actual on-bridge response and clearance times were available).

The Federal Highway Administration's (FHWA) Office of Operations/Traffic Incident Management Resource Management¹ data reported that incident duration estimates from highly developed TIM programs ranged from 45 to 90 minutes, with an average reported duration of 64 minutes. For less developed programs, duration estimates ranged from 40 to 180 minutes, with an average reported duration of 66. Transportation personnel from two jurisdictions estimated the incident duration to be between 90 and 120 minutes. Overall, the study indicated some consistency in that 12 of the 15 (80 percent) jurisdictions responding to this question estimated the incident duration to be between 40 and 60 minutes.

Given the difficulty of clearing accidents off the travel lane on the Tappan Zee Bridge and the restricted access afforded emergency vehicles, for the BCA it is assumed that the duration of an accident lane closure would be between 60 and 90 minutes and that resulting VHD would be based on a 75 minute (1 hour 15 minutes, or 1.25 hours). On average, the closure for an accident incident would add about 26,730 VHD ($21,368 * 1.25$) based on the calculation presented in **Table C-4**. For the majority of incidents which occur during the busiest 12 hours of the day, roughly 7 AM to 7PM, these delay estimates are consistent actual volumes and conditions. Interviews with NYSTA operations staff indicate that any given incident will often result in 4 miles or more of traffic congestion and delays, and given that there are over 400 accidents on the bridge per year, the regularity of such backups is common knowledge to users of the Bridge and to the businesses that rely on workers or goods using it.

It is also assumed that accidents could be cleared from travel lanes substantially faster with the addition of shoulders and breakdown lanes in the Bridge. To estimate that time-savings and a quicker opening of travel lanes, the analysis assumes the average duration would be reduced by 30 minutes from 75 to 45 minutes. This would reduce the average VHD from 21,369 to 16,026, a net reduction of 5,343 VHD.

Therefore, for analysis purposes in this BCA the new bridge's annual time loss avoidance is assumed to be 26,730 VHD per avoided accident and a reduction of 5,340 VHD for the accidents likely to remain on the new bridge.

Monetization and Net Present Value Assessment

As summarized in Section F: "Safety," the new bridge is expected to result in a potential reduction of 121.5 accidents per year, or a decrease of about 27 percent over the existing baseline. Given the already high volumes and accident rates, no projected increases in annual accidents and this anticipated avoidance is considered a steady-state over the analysis period, starting in Year 6 (2018) when the bridge opens. At 26,730 VHD per accident, the annual time avoidance is approximately 3.25 million VHD per year. At the hourly value of \$26.69 noted above, the cost avoidance is approximately \$86.7 million dollars per year. Over the analysis period, this annual cost to the local and regional economy has a net present value of about \$4.1 billion at a 3 percent discount rate and \$2.2 billion at a 7 percent discount rate.

Of the potential 335.8 accidents per year that are likely to be experienced on the new bridge, the anticipated faster clearance time of 5,340 VHD per incident yields an annual time lost avoidance of about 1.8 million VHD per year. At the hourly value of \$26.69 noted below, the cost avoidance is approximately \$47.8 million dollars per year. Over the analysis period, the combined annual cost avoidance as a result of the new bridge is about \$134.2 million per year (see **Table C-5**).

¹ <http://ops.fhwa.dot.gov/publications/fhwahop08060/50.htm>

Table C-5

Value of Lost Time Avoidance with New Bridge due to Accident Reduction

Cost Avoidance	No. Per Year*	VHD Avoidance per Accident	Total Annual VHD Avoidance	Value of Lost Time	Total Annual Value of Lost Time Avoidance
Accidents Avoided	121.5	26,730	3,247,695	\$26.69	\$86,680,979
Accidents Cleared Faster	333.5	5,340	1,780,890	\$26.69	\$47,531,954
Total	455.0		5,028,585		\$134,212,933
Sources: NYSTA, AKRF, NYMTC, HDR Engineering, Inc.					

As shown in the year-to-year worksheet presented at the end of this section, the overall net accrued benefit comparing the value of lost time is estimated at \$13.4 billion which has a NPV of \$6.4 billion using a discount rate of 3 percent and \$3.0 billion using a discount rate of 7 percent.

REPLACEMENT BRIDGE BENEFITS COMPARED WITH NO BUILD BRIDGE CLOSURE SCENARIO

OVERVIEW

The potential closure of the existing Tappan Zee Bridge would likely result in significant disruptions to regional mobility and create economic hardships affecting businesses dependent on access to a regionally dispersed workforce and an efficient movement of goods as well as households confronted with limited commute options. These large-scale and macro-economic shifts are beyond the scope of this limited BCA in terms of a reasonable quantification of the potential costs associated with such an occurrence but clearly the benefit of avoiding such cost is an overarching long-term outcome of the proposed project.

To focus the effort of the BCA, the analysis is limited to defining a potential impact and cost to a portion of the direct users of the Bridge if they were required to find a different route to and from their current origins and destinations. The following assessment is conservative in that it only includes the most basic shift in terms of additional time and distance of a theoretical diversion. The detour analysis does not add a cost of additional congestion and delay for the alternate roadways or crossing that would conceptually have to absorb the diverted traffic.

The first step in determining the time lost estimate associated with Bridge closure and route deviation was to conservatively isolate and identify those trips most likely to experience extended trip re-routing. While all users of the Bridge are likely to experience hardship and diversion to other routes (creating additional congestion and delay and costs throughout the region on other roadway and Hudson River crossings), this analysis is limited to the trips originating and destined for locations relatively locally defined by the counties to the east and west of the Tappan Zee Bridge. As shown in **Figure C-2**, these trips account for about half the bridge's current traffic.

This targeted portion of the current traffic profile was selected to account for the general assessment that, for longer distance trips using the Tappan Zee Bridge, the route diversions on a per mile basis are not as significant. For example, a truck routing from the west or south and heading towards New England could take the George Washington Bridge, the Tappan Zee, or the Newburgh-Beacon Bridge and each route is relatively similar in mileage. **Table C-6** provides an overview of typical out-of-region origins and out-of-region destinations.

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NYSTA

Table C-6
Typical Out-of-Region Trip Lengths by Route Choice

Origin	Destination	Via Tappan Zee Bridge		Via Bear Mountain Bridge		Via George Washington Bridge		Via Newburgh-Beacon Bridge	
		Distance (mi)	Time (hrs/mins)	Distance (mi)	Time (hrs/mins)	Distance (mi)	Time (hrs/mins)	Distance (mi)	Time (hrs/mins)
Manhattan, NY	Albany, NY	161	3 hrs 5 mins	164	3 hrs 18 mins	150	2 hrs 53 mins	163	3 hrs 11 mins
Parsippany, NJ	Stamford, CT	65.6	1 hr 18 mins	NA	NA	61.8	1 hr 18 mins	NA	NA
Providence, RI	Philadelphia, PA	294	5 hrs 30 mins	324	6 hrs	277	5 hrs 11 mins	335	5 hrs 57 mins
Hartford, CT	Philadelphia, PA	224	4 hrs 9 mins	229	4 hrs 24 mins	218	3 hrs 53 mins	241	4 hrs 22 mins

Sources: Google Maps

ESTIMATING MILES AND TIME OF DIVERSIONS

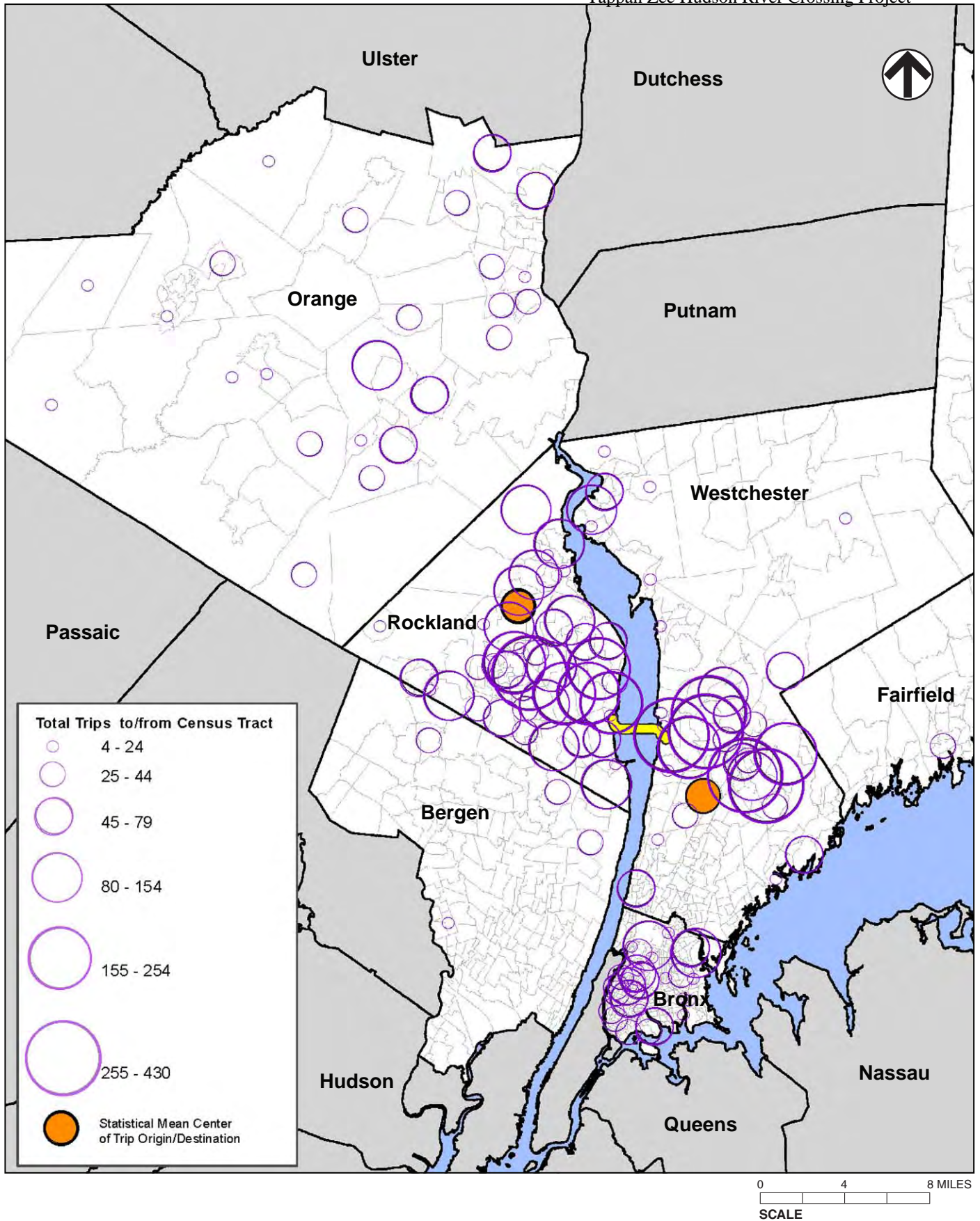
Based on NYSTA data of general origins and destinations for bridge traffic (see **Figure C-2**), about half of the Bridge traffic has origins and destinations within the counties that are nearby or immediately or adjacent to and connected by the Bridge. Approximately 52 percent of the Bridge volumes have an origin in Rockland County, 13 percent in Orange County, 24 percent in New Jersey and the remaining 11 percent from other external areas. The estimated destinations include approximately 51 percent to Westchester County, 31 percent to the New York City area, a combined 11 percent to Putnam County, Dutchess County and Connecticut and the remaining 7 percent to other external areas. Since a majority of trips on the Tappan Zee Bridge have local origins and destinations, a focus was placed on the impact the Bridge closure would have on trips originating in Rockland and Orange Counties with destinations east of the Hudson River. A reverse trip was assumed for the westbound direction.

To provide an aggregate basis for determining a typical trip length currently and into the future should the Bridge close, U.S. Census data was examined to identify basic trends in east-west commuting travel across the bridge to serve as a proxy for estimating typical travel mileage and time under base line conditions. In brief, the analysis utilized Census Transportation Planning Package (CTTP) 2000 journey-to-work data to determine the statistical centers of trips originating or terminating on the west and east sides of the Hudson River. The distance between these two points was considered to be the average, or typical, trip length.

The analysis included six counties surrounding the Tappan Zee Bridge where trips to and from work are most likely to traverse the Bridge. Three of the counties—Rockland, Bergen, and Orange—are west of the Hudson River, and three —Stamford, Westchester and Bronx—are on the east side of the Hudson River.

Journey-to-work tables were collected for all census tracts in the study area from the CTTP 2000. All trips originating from a census tract in the study area on one side of the Hudson and terminating in a census tract in the study area on the other side were considered, with the exception of trips between Bergen and Bronx Counties. It was assumed the trips originating in either of these counties and terminating in the other would traverse the Hudson River via the George Washington Bridge rather than the Tappan Zee. After collecting the CTTP data, the total number of vehicular commute trips to or from census tracts in the study area was joined in ESRI ArcMAP to U.S. Census Tract boundary files.

The mean geographic center of census tracts east and west of the Hudson was determined through ArcMap spatial statistics tools, using the previously calculated total commute trips as a weighted measure for all tracts (see **Figure C-3**). The shortest distance between the two resulting points was used as the average length for local trips that cross the Tappan Zee Bridge as a baseline estimate which resulted in a trip length of about 20 miles. On the west side of the Hudson River, the centroid



was identified as the intersection of South Mountain Road and NY State Route 45 in Ramapo, New York. On the east side of the Hudson River the centroid was identified in Westchester County at 190 Hawthorne Way, in Hartsdale, New York. From these locations detour routes were mapped utilizing the George Washington Bridge, Bear Mountain Bridge, and Newburgh-Beacon Bridge. Due to the travel restrictions on the local parkways, separate detour routes were mapped for passenger cars and commercial vehicles. The vehicle miles traveled and estimated travel times were then compared with the preferred direct route utilized when the Bridge is in service (see **Figure C-4**).

A number of planning assumptions were made as part of this analysis. The overall Average Annual Daily Traffic (AADT) volume on the Tappan Zee Bridge was used for 2009 (134,162) and split by direction (approximately 45 percent eastbound and 55 percent westbound) and vehicle class (approximately 85 percent passenger car and 15 percent commercial). Informational sources to support these assumptions include the NYSDOT Historical Trends Report and the NYSDOT Traffic database.

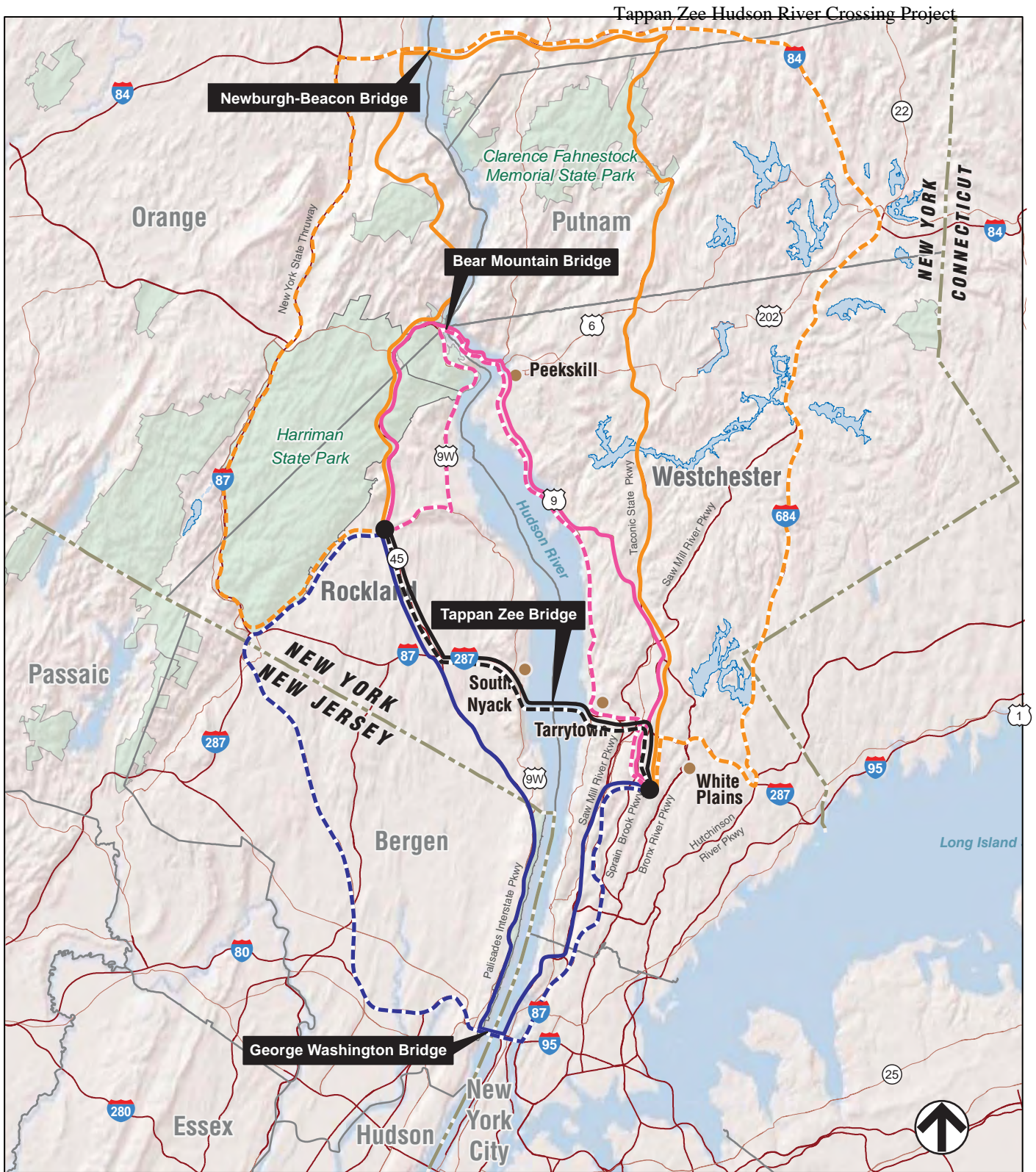
The volume of traffic assigned to the alternative bridge crossings was determined based on the destinations, bridge location and available capacity of the alternative bridge. For the purpose of this analysis, approximately 64 percent of the Tappan Zee Bridge AADT was assigned to the George Washington Bridge, 25 percent to the Bear Mountain Bridge and 11 percent to the Newburgh-Beacon Bridge. It was estimated that the George Washington Bridge would absorb the drivers with destinations in New York (31 percent), half of the Westchester County destinations (26 percent) and all of the external trips (7 percent). The Bear Mountain Bridge was assumed to absorb the remaining Westchester County trips (25 percent) and the Newburgh Beacon Bridge was estimated to absorb the combined Putnam County, Dutchess County and Connecticut trips (11 percent).

In support of these assumptions, a high-level capacity check was conducted at the alternative bridges to verify their ability to absorb the additional traffic. AADT traffic volumes and temporal distributions were obtained for each crossing and capacities were determined based on the number of lanes available and a theoretical capacity of 1,700 passenger cars, per lane per hour. Although the actual design capacity for a highway lane is a function of a number of variables including free-flow speed, volume, and density. The theoretical capacity reflects the average capacity over a full day including the high levels of congestion experienced during AM and PM peak commuter periods. It is interesting to note that the capacity analysis indicated the alternative bridges could accommodate the additional traffic during most periods of the day with the exception of the westbound direction during the PM peak period. The capacity analysis indicated 7 to 18 percent of the total diverted Tappan Zee Bridge traffic could not be accommodated at the alternative bridges between 3:00 to 7:00 PM. This unmet traffic demand was assumed to contribute to greater congestion and create traffic shifts to the adjacent hours. Alternatively, it could be assumed that some trips would not be made or postponed due to these extenuating circumstances. Delays and potential capacity constraints experienced at the approaches to the bridges were not taken into consideration.

Detour distances and travel times were determined utilizing Google Maps, GPS based smart-phone applications, engineering judgment and the experience of commuters on staff who live in the study area and use the bridge crossings on a routine basis. In summary, a minimum level of disruption to current bridge users would be essentially to double their distance traveled and their time spent commuting. On average per the analyses presented above, this would add about 1 million miles of vehicle travel per day on the regional highway network and about 378 million miles per year (see **Table C-6**). This would add about 22,955 hours of travel per day, or about 8.4 million hours per year.

MONETIZATION AND NET PRESENT VALUE ASSESSMENT

Using the NYMTC value of \$26.69 per hour to estimate the value of lost time and productivity, the additional travel time would have a lost productivity value of about \$496.9 million per year (see **Table C-7**). As set forth in the detailed year to year NPV tables presented at the end of this, it is



DETOUR ROUTES FROM RAMAPO TO HARTSDALE:

George Washington Bridge	Bear Mountain Bridge	Newburgh-Beacon Bridge
— Car (43.2 Miles)	— Car (41.6 Miles)	— Car (88.5 Miles)
- - - Truck (52.1 Miles)	- - - Truck (43.0 Miles)	- - - Truck (107.0 Miles)

EXISTING ROUTE Tappan Zee Bridge

— Car (21.17 Miles)
- - - Truck (23.0 Miles)



TAPPAN ZEE HUDSON RIVER CROSSING

Figure C-4
**Potential Detour Routes
to Tappan Zee Bridge**

assumed that this disruption and lost productivity would occur from the year that the Bridge is closed (Year 20 in this theoretical scenario) and would begin to restore to normal once the Bridge is open. It is assumed that it could take up to three years to return to a normal regional traffic flow so the maximum diverted VMT and travel hours has been reduced by a third in Year 27, half in Year 28, and two-thirds by Year 29 and fully eliminated in Year 30 and thereafter. Over the 50-year analysis period, the proposed new bridge would offer a significant benefit compared with the No Build Bridge Closure scenario with a NPV of almost \$5.3 billion at a 3 percent discount rate and just below \$3.0 billion at a 7 percent discount rate.

Table C-6

Estimated Baseline and Diverted VMT and Travel Hours with Bridge Closure

VMT	Per Day			Per Year		
	Baseline	Diverted	Increment	Baseline	Diverted	Increment
Cars	1,584,523	3,464,995	1,880,471	578,350,989	1,264,723,018	686,372,029
Trucks	296,373	719,852	423,479	108,176,249	262,745,999	154,569,750
Total	1,880,897	4,184,847	2,303,950	686,527,238	1,527,496,017	840,941,779
Hours	Per Day			Per Year		
	Baseline	Diverted	Increment	Baseline	Diverted	Increment
Cars	37,678	80,056	42,378	13,752,494	29,220,584	15,468,090
Trucks	8,376	17,008	8,632	3,057,155	6,207,765	3,150,610
Total	46,054	97,064	51,010	16,809,648	35,428,349	18,618,700
Notes: VMT based on AADT base x 365 days per year. Hours based on AADT x estimated trip duration.						
Sources: Google, NYSDOT, NYSTA, AKRF, Inc.						

Table C-7

Cost of Time for Extra Travel with Bridge Closure

Cost	Annual Hours	Value of Lost Time	Annual Value of Lost Time
<i>Additional Travel Time</i>	18,618,700	\$26.69	\$496,933,103
Notes: See NPV Worksheet for per year analysis.			

ECONOMIC COMPETITIVENESS

QUANTIFIED COSTS/BENEFITS:

- [1] Value of avoidance of delay from accidents
- [2] Value of avoidance of delay due to more efficient accident response
- [3] Value of avoidance of traffic delays due to extraordinary maintenance activities
- [4] Value of avoidance of delays due to extra travel time associated with bridge closure (under No Build No Bridge Scenario)

INPUTS & ASSUMPTIONS:

FOR ACCIDENTS	
457.33	= Annual number of accidents with existing bridge
26,730	= Vehicle Hours of Delay per Accident - Existing Bridge
\$ 326,272,439	= Annual cost of delay from accidents with existing bridge
335.83	= Annual number of accidents with a new bridge
21,390	= Vehicle Hours of Delay per Accident - New Bridge
\$ 191,723,142	= Annual cost of delay from accidents with a new bridge

FOR EXTRAORDINARY MAINTENANCE	
6,000,000	= Annual vehicle hours of delay from extraordinary maintenance - existing bridge
\$ 160,140,000	= Annual cost of delay from extraordinary maintenance - existing bridge

FOR RE-ROUTING DELAY (NO BUILD NO BRIDGE SCENARIO)	
18,366,132	= Incremental annual vehicle hours of delay due to re-routing during bridge closure

\$ 26.69	= NYSDOT Pricing factor for hours of delay (per vehicle hour of delay)
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CALCULATIONS:

				2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
No Build Baseline Scenario - Existing bridge for next 50 years																
	NPV @ 3% Discount Rate	NPV @ 7% Discount Rate		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13
[1&2] Cost Associated with Accident Delays	\$8,394,912,852	\$4,502,803,151	\$	326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439
[3] Cost Associated with Extraordinary Maintenance Delays	\$4,120,364,408	\$2,210,051,512	\$	160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000
TOTAL	\$12,515,277,260	\$6,712,854,662	\$	486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439
No Build No Bridge Scenario - Bridge Closure in Year 20																
	NPV @ 3% Discount Rate	NPV @ 7% Discount Rate		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13
[1&2] Cost Associated with Accident Delays	\$7,275,917,973	\$4,213,903,863		\$326,272,439	\$326,272,439	\$326,272,439	\$326,272,439	\$326,272,439	\$326,272,439	\$326,272,439	\$326,272,439	\$326,272,439	\$326,272,439	\$326,272,439	\$326,272,439	\$326,272,439
[3] Cost Associated with Extraordinary Maintenance Delays	\$2,293,813,189	\$1,655,142,222	\$	160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000
[4] Cost Associated with Delays due to Re-Routing when Bridge is Unavailable	\$1,847,663,897	\$766,358,528		\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
TOTAL	\$11,417,395,059	\$6,635,404,613	\$	486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439
Proposed Replacement Bridge Scenario																
	NPV @ 3% Discount Rate	NPV @ 7% Discount Rate		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13
[1&2] Cost Associated with Accident Delays	\$5,661,870,493	\$3,287,256,999		\$326,272,439	\$326,272,439	\$326,272,439	\$326,272,439	\$326,272,439	\$326,272,439	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142
[3] Cost Associated with Extraordinary Maintenance Delays	\$433,754,519	\$381,656,831	\$	80,070,000	\$ 80,070,000	\$ 80,070,000	\$ 80,070,000	\$ 80,070,000	\$ 80,070,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0
TOTAL	\$6,095,625,012	\$3,668,913,829	\$	406,342,439	\$ 406,342,439	\$ 406,342,439	\$ 406,342,439	\$ 406,342,439	\$ 406,342,439	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142
Net Benefit (Cost): Proposed Replacement Bridge Scenario vs. No Build Baseline Scenario																
	NPV @ 3% Discount Rate	NPV @ 7% Discount Rate		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13
	\$6,419,652,249	\$3,043,940,833	\$	80,070,000	\$ 80,070,000	\$ 80,070,000	\$ 80,070,000	\$ 80,070,000	\$ 80,070,000	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297
Net Benefit (Cost): Proposed Replacement Bridge Scenario vs. No Build No Bridge Scenario																
	NPV @ 3% Discount Rate	NPV @ 7% Discount Rate		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13
	\$5,321,770,047	\$2,966,490,783	\$	80,070,000	\$ 80,070,000	\$ 80,070,000	\$ 80,070,000	\$ 80,070,000	\$ 80,070,000	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297

AKRF:
For costs associated with accident delays when the bridge is closed under this scenario, drivers would have the new accidents at about half the rate (at other locations), but would be traveling about double the mileage so accident incidence would be about the same.

2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046
Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	Year 31	Year 32	Year 33	Year 34	Year 35
\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439
\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000
\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439
						Existing bridge closure and new bridge construction					Traffic flow returns to normal conditions over 3 years										
Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	Year 31	Year 32	Year 33	Year 34	Year 35
\$326,272,439	\$326,272,439	\$326,272,439	\$326,272,439	\$326,272,439	\$326,272,439	\$326,272,439	\$326,272,439	\$326,272,439	\$326,272,439	\$326,272,439	\$326,272,439	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142
\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
\$0	\$0	\$0	\$0	\$0	\$0	\$ 490,192,069	\$ 490,192,069	\$ 490,192,069	\$ 490,192,069	\$ 490,192,069	\$ 490,192,069	\$ 326,794,712	\$ 245,096,034	\$ 163,397,356	\$0	\$0	\$0	\$0	\$0	\$0	\$0
\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 816,464,507	\$ 816,464,507	\$ 816,464,507	\$ 816,464,507	\$ 816,464,507	\$ 816,464,507	\$ 518,517,854	\$ 436,819,176	\$ 355,120,498	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142
Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	Year 31	Year 32	Year 33	Year 34	Year 35
\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142
Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	Year 31	Year 32	Year 33	Year 34	Year 35
\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297
Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	Year 31	Year 32	Year 33	Year 34	Year 35
\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 624,741,366	\$ 624,741,366	\$ 624,741,366	\$ 624,741,366	\$ 624,741,366	\$ 624,741,366	\$ 326,794,712	\$ 245,096,034	\$ 163,397,356	\$0	\$0	\$0	\$0	\$0	\$0	\$0

2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	
Year 36	Year 37	Year 38	Year 39	Year 40	Year 41	Year 42	Year 43	Year 44	Year 45	Year 46	Year 47	Year 48	Year 49	Year 50	Cumulative Total
\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 326,272,439	\$ 16,313,621,940
\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 160,140,000	\$ 8,007,000,000
\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 486,412,439	\$ 24,320,621,940
Year 36	Year 37	Year 38	Year 39	Year 40	Year 41	Year 42	Year 43	Year 44	Year 45	Year 46	Year 47	Year 48	Year 49	Year 50	Cumulative Total
\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 12,949,889,514
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$ 3,042,660,000
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$ 3,676,440,514
\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 19,668,990,028
Year 36	Year 37	Year 38	Year 39	Year 40	Year 41	Year 42	Year 43	Year 44	Year 45	Year 46	Year 47	Year 48	Year 49	Year 50	Cumulative Total
\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 10,393,452,870
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$ 480,420,000
\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 191,723,142	\$ 10,873,872,870
Year 36	Year 37	Year 38	Year 39	Year 40	Year 41	Year 42	Year 43	Year 44	Year 45	Year 46	Year 47	Year 48	Year 49	Year 50	Cumulative Total
\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 294,689,297	\$ 13,446,749,070
Year 36	Year 37	Year 38	Year 39	Year 40	Year 41	Year 42	Year 43	Year 44	Year 45	Year 46	Year 47	Year 48	Year 49	Year 50	Cumulative Total
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$ 8,795,117,158

D. LIVABILITY

Long-Term Outcomes relative to Livability look to maximize transportation benefits in a manner that are designed and planned in such a way that they have a positive impact on qualitative measures of community life. As a bridge replacement project, the USDOT guidance on determining or quantifying benefits to livability is limited, since the project does not substantively provide opportunities to improve modal connectivity by increasing transportation options for travelers. Nonetheless, the proposed Hudson River Tappan Zee Crossing can be expected to accrue several important regional livability benefits, two of which have been quantified in this BCA:

- The replacement bridge will reduce average cost of user mobility by creating a more efficient and reliable crossing. For the BCA, the time savings that effect overall economic competitiveness are quantified in Section B, above, but the actual savings to householders and business through the reduced consumption of gasoline are presented in this section.
- The replacement bridge will have a fully dedicated bicycle and pedestrian walkway along the north side of the north span, achieving a long-term benefit of improved non-motorized transportation choices. This additional infrastructure is expected to have substantial benefits to the region in terms of the growing connectivity of bike trails and recreational opportunities, which, in turn, is expected to generate additional tourism and economic development opportunities. However, given the long span of the bridge and based on the traffic analyses presented in the Draft EIS, the new bicycle and pedestrian infrastructure is not likely to greatly change modal choice of critical journey-to-work trips or otherwise enhance job commuting options. Therefore, no quantified benefit has been included in this analysis.
- A public investment in future transit options has been incorporated into the proposed replacement bridge in terms of the load-bearing capacity and provision of design parameters such that transit infrastructure could be implemented on the new bridge at a future time when a regional system may be implement. As set forth in the Draft EIS (Chapter 2: “Project Alternatives”), and compared to the No Build Baseline scenario, including this potential capacity would avoid the need to build a separate transit bridge in the future. That bridge is expected to cost between \$2.5 and \$3.0 billion (in 2012 dollars). This incremental cost has been included in the livability analysis of the BCA.

REPLACEMENT BRIDGE BENEFITS COMPARED WITH NO BUILD BASELINE SCENARIO

BENEFIT FROM FUEL CONSUMPTION SAVINGS

As noted in Section B, the principal economic cost of delay and congestion on the existing Bridge is created by a high level of lane closures associated with extraordinary repair and maintenance operations and by a high incidence of accidents. In addition to the lost time and productivity already analyzed, the BCA has estimated the actual household or business cost based on the higher consumption of fuel due to the slower speeds associated with the delay and congestion currently experienced on the and expected to increase over time if the Bridge is not replaced.

As originally developed in the HDR Engineering assessment of repair-related delays, lane closures on the Bridge have dramatic adverse impact on congestion with long queues that occur on a regular basis. Based on the delay hours estimated in the study and overall traffic volumes, long queues and slow speeds greatly diminish the fuel efficiency of vehicles on the Bridge. As presented in more detail in Section E: “Sustainability,” the slower speeds and frequency of occurrences in the No Build Baseline scenario can be expected to result in considerable fuel consumption compared with the proposed bridge replacement. For each year of the BCA analysis period, the fuel consumption of trips affected by accident and repair delays has been estimated based on a congested versus free highway

speed as well as current trends in vehicle mileage and emissions standards. The detailed calculations and assumptions are set forth in the Excel files that accompany this report.

As vehicle fleets achieve better efficiency, overall fuel consumption can be expected to decrease over time, even if the rate of delay and congestion remains unchanged. As summarized in detailed in the year-by-year summary at the end of this section, the No Build Baseline scenario with the existing Bridge remaining for the next 50 years can be expected to result in the consumption of about 7 million gallons of fuel specific to the estimated VHD in Year 1 down to 5.63 million gallons in Year 50. A mid-point of Year 25 is summarized in **Table D-1**, and shows a total fuel consumption of 5.64 million gallons. By contrast, the proposed replacement bridge avoids extended land closures from extraordinary repairs and is expected to reduce the number and duration of accidents on the bridge. Based on the remaining delay associated with accidents, it is anticipated that the Year 25 consumption with the replacement bridge is estimated at 523,452 gallons. Based on long-term gasoline price analyses prepared by Jacobs Engineering for NYSTA, a singular price of \$3.57 in 2012 dollars has been used for this analysis, which yields a cost avoidance of about \$9 million per year.

Table D-1
No Build Baseline Comparison of Estimated Fuel Consumption

Scenario	Year 25 Fuel Consumption (gallons)	Price per gallon	Cost
No Build Baseline	5,643,034	3.57	\$20,145,631
Replacement Bridge	962,156	3.57	\$3,434,898
Net Cost Avoidance	4,680,878		\$16,710,733

TRANSIT INFRASTRUCTURE BENEFIT

To incorporate the benefit of the public investment in making the replacement bridge usable for a future transit system, a future expenditure of \$2.5 billion has been added to the No Build Baseline scenario. This amount is reduced by the estimate average of \$850 million that would be required to actually implement transit on the proposed replacement bridge (Draft EIS, Chapter 2: “Project Alternatives,” page 2-6). With no known proposal or timeline, a mid-point in the 50-year analysis has been assumed with a new, separate transit bridge built over four years in Years 20 to 24 (2031 to 2035) with a net expenditure of \$412.5 million in each of the four years. Other than the cost of an independent transit bridge, not other cost or benefit of a potential future transit system has been incorporated into the analysis.

SUMMARY

In summary, a comparison of the proposed replacement bridge with the No Build Baseline scenario yields a NPV benefit of about \$1.2 billion and \$0.543 billion at a 3 percent and 7 percent discount rate, respectively.

REPLACEMENT BRIDGE BENEFITS COMPARED WITH NO BUILD BRIDGE CLOSURE SCENARIO

To estimate the accrued benefit should the Bridge be closed in the future, the primary effect would be the additional fuel consumption based on the detour of intra-regional trips as described in Section B, above. Up to the point of closure (Year 20 for this theoretical BCA analysis), the comparison between the No Build and Replacement Build scenarios would be the same as above. After the Bridge is replaced and traffic patterns resume to a pre-closure base, this future bridge replacement would be expected to perform the same as the proposed bridge with no incremental costs or benefits.

As summarized in Table C-6, the total incremental VMT could reach about 840 million miles for each year there is no river crossing. The additional cost of vehicle operation (including gasoline) has been calculated using the 2012 dollar value of \$0.60 per mile vehicle-operating costs estimate by the Automobile Association of America (AAA). This would generate additional household costs of about \$506 million per year of bridge closure. For the theoretical closure of the bridge, this annual detour cost to consumers would have a NPV of \$1.9 billion at 3 percent discount rate and \$0.791 billion at a 7 percent discount rate.

Overall, as shown in the year-by-year analysis presented below, the net incremental cost comparing a No Build Bridge Closure scenario to the proposed Replacement Bridge scenario yields an accrued NPV benefit of \$2.0 billion and \$0.866 billion at 3 percent and 7 percent discount rates, respectively.

LIVABILITY

QUANTIFIED COSTS/BENEFITS:

- [1] Value of avoiding cost of additional gasoline expenditures generated by congestion on existing bridge (specific to extraordinary maintenance and accidents)
- [2] Value of avoiding household vehicle cost for extra travel under No Build No Bridge Scenario
- [3] Value of avoiding cost of a separate transit bridge under the No Build Baseline Scenario

INPUTS & ASSUMPTIONS:

- \$0.58

AAA Composite national average cost per-mile for 2010 (<http://www.aaaexchange.com/Main/Default.asp?CategoryID=16&SubCategoryID=76&ContentID=353>) From footnote 8 page 17 of Tiger Resource Guide.
- \$0.60

AAA Composite national average cost per mile inflated to 2012 dollars
- \$3.57

Cost of a gallon of gas (per Jacobs Updated Toll Traffic and Revenue Forecast for 2011 – 2016 Memo to New York State Thruway Authority). Gasoline cost assumed to stay constant over 50 year period.

CALCULATIONS:

			2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
No Build Baseline Scenario - Existing bridge for next 50 years														
	NPV @ 3% Discount Rate	NPV @ 7% Discount Rate	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12
[1] Gallons of gas consumed specific to delay:			7,049,726	6,968,343	6,886,960	6,805,577	6,686,061	6,566,546	6,447,030	6,327,515	6,207,999	6,136,337	6,064,675	5,993,012
[1] Cost to Users:	\$552,806,614	\$306,335,007	\$25,167,523	\$24,876,985	\$24,586,447	\$24,295,908	\$23,869,238	\$23,442,568	\$23,015,898	\$22,589,227	\$22,162,557	\$21,906,723	\$21,650,888	\$21,395,054
[3] Cost of New Transit Bridge	\$874,421,328	\$386,344,257	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
TOTAL	\$1,427,227,942	\$692,679,264	\$25,167,523	\$24,876,985	\$24,586,447	\$24,295,908	\$23,869,238	\$23,442,568	\$23,015,898	\$22,589,227	\$22,162,557	\$21,906,723	\$21,650,888	\$21,395,054
No Build No Bridge Scenario - Bridge Closure in Year 20														
	NPV @ 3% Discount Rate	NPV @ 7% Discount Rate	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12
[1] Gallons of gas consumed specific to delay:			7,049,726	6,968,343	6,886,960	6,805,577	6,686,061	6,566,546	6,447,030	6,327,515	6,207,999	6,136,337	6,064,675	5,993,012
[1] Cost to Users:	\$346,961,859	\$242,207,620	\$25,167,523	\$24,876,985	\$24,586,447	\$24,295,908	\$23,869,238	\$23,442,568	\$23,015,898	\$22,589,227	\$22,162,557	\$21,906,723	\$21,650,888	\$21,395,054
[2] Additional Vehicle Miles Traveled during Bridge Closure:			0	0	0	0	0	0	0	0	0	0	0	0
[2] Household cost of additional VMTs:	\$1,863,720,044	\$773,018,162	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
TOTAL	\$2,210,681,904	\$1,015,225,782	\$25,167,523	\$24,876,985	\$24,586,447	\$24,295,908	\$23,869,238	\$23,442,568	\$23,015,898	\$22,589,227	\$22,162,557	\$21,906,723	\$21,650,888	\$21,395,054
Proposed Replacement Bridge Scenario														
	NPV @ 3% Discount Rate	NPV @ 7% Discount Rate	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12
[1] Gallons of gas consumed by previously-delayed volumes:			7,049,726	6,968,343	6,886,960	6,805,577	6,686,061	6,566,546	1,100,990	1,080,072	1,059,153	1,046,825	1,034,497	1,022,169
[1] Cost to Users:	\$203,924,116	\$148,873,305	\$25,167,523	\$24,876,985	\$24,586,447	\$24,295,908	\$23,869,238	\$23,442,568	\$3,930,535	\$3,855,856	\$3,781,178	\$3,737,166	\$3,693,155	\$3,649,143
TOTAL	\$203,924,116	\$148,873,305	\$25,167,523	\$24,876,985	\$24,586,447	\$24,295,908	\$23,869,238	\$23,442,568	\$3,930,535	\$3,855,856	\$3,781,178	\$3,737,166	\$3,693,155	\$3,649,143
Net Benefit (Cost): Proposed Replacement Bridge Scenario vs. No Build Baseline Scenario														
	NPV @ 3% Discount Rate	NPV @ 7% Discount Rate	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12
	\$1,223,303,826	\$543,805,959	\$0	\$0	\$0	\$0	\$0	\$0	\$19,085,363	\$18,733,371	\$18,381,379	\$18,169,556	\$17,957,733	\$17,745,910
Net Benefit (Cost): Proposed Replacement Bridge Scenario vs. No Build No Bridge Scenario														
	NPV @ 3% Discount Rate	NPV @ 7% Discount Rate	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12
	\$2,006,757,787	\$866,352,477	\$0	\$0	\$0	\$0	\$0	\$0	\$19,085,363	\$18,733,371	\$18,381,379	\$18,169,556	\$17,957,733	\$17,745,910

2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	
							Build New Transit Bridge													
Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	Year 31	Year 32	
5,921,350	5,849,688	5,817,231	5,784,775	5,752,318	5,719,862	5,687,405	5,678,877	5,670,348	5,661,820	5,653,291	5,644,762	5,643,034	5,641,305	5,639,577	5,637,849	5,636,120	5,635,779	5,635,438	5,635,096	
\$21,139,219	\$20,883,385	\$20,767,515	\$20,651,646	\$20,535,776	\$20,419,907	\$20,304,037	\$20,273,590	\$20,243,143	\$20,212,696	\$20,182,249	\$20,151,802	\$20,145,631	\$20,139,460	\$20,133,290	\$20,127,119	\$20,120,949	\$20,119,730	\$20,118,512	\$20,117,294	
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$412,500,000	\$412,500,000	\$412,500,000	\$412,500,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
\$21,139,219	\$20,883,385	\$20,767,515	\$20,651,646	\$20,535,776	\$20,419,907	\$20,304,037	\$432,773,590	\$432,743,143	\$432,712,696	\$432,682,249	\$20,151,802	\$20,145,631	\$20,139,460	\$20,133,290	\$20,127,119	\$20,120,949	\$20,119,730	\$20,118,512	\$20,117,294	
							Build New Replacement Bridge Construction								Transition years (to previous flows)					
Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	Year 31	Year 32	
5,921,350	5,849,688	5,817,231	5,784,775	5,752,318	5,719,862	5,687,405	0	0	0	0	0	0	0	0	0	960,977	960,919	960,861	960,803	
\$21,139,219	\$20,883,385	\$20,767,515	\$20,651,646	\$20,535,776	\$20,419,907	\$20,304,037	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$3,430,689	\$3,430,482	\$3,430,274	\$3,430,067	
0	0	0	0	0	0	0	820,874,614	820,874,614	820,874,614	820,874,614	820,874,614	820,874,614	547,249,743	410,437,307	273,624,871	0	0	0	0	
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$494,451,824	\$494,451,824	\$494,451,824	\$494,451,824	\$494,451,824	\$494,451,824	\$329,634,549	\$247,225,912	\$164,817,275	\$0	\$0	\$0	\$0	
\$21,139,219	\$20,883,385	\$20,767,515	\$20,651,646	\$20,535,776	\$20,419,907	\$20,304,037	\$494,451,824	\$494,451,824	\$494,451,824	\$494,451,824	\$494,451,824	\$494,451,824	\$329,634,549	\$247,225,912	\$164,817,275	\$3,430,689	\$3,430,482	\$3,430,274	\$3,430,067	
Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	Year 31	Year 32	
1,009,841	997,513	991,957	986,400	980,844	975,288	969,732	968,276	966,820	965,364	963,907	962,451	962,156	961,862	961,567	961,272	960,977	960,919	960,861	960,803	
\$ 3,605,132	\$ 3,561,120	\$ 3,541,285	\$ 3,521,450	\$ 3,501,614	\$ 3,481,779	\$ 3,461,944	\$ 3,456,745	\$ 3,451,547	\$ 3,446,348	\$ 3,441,149	\$ 3,435,951	\$ 3,434,898	\$ 3,433,846	\$ 3,432,794	\$ 3,431,741	\$ 3,430,689	\$ 3,430,482	\$ 3,430,274	\$ 3,430,067	
\$ 3,605,132	\$ 3,561,120	\$ 3,541,285	\$ 3,521,450	\$ 3,501,614	\$ 3,481,779	\$ 3,461,944	\$ 3,456,745	\$ 3,451,547	\$ 3,446,348	\$ 3,441,149	\$ 3,435,951	\$ 3,434,898	\$ 3,433,846	\$ 3,432,794	\$ 3,431,741	\$ 3,430,689	\$ 3,430,482	\$ 3,430,274	\$ 3,430,067	
Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	Year 31	Year 32	
\$17,534,088	\$17,322,265	\$17,226,230	\$17,130,196	\$17,034,162	\$16,938,128	\$16,842,093	\$429,316,845	\$429,291,596	\$429,266,348	\$429,241,100	\$16,715,851	\$16,710,733	\$16,705,614	\$16,700,496	\$16,695,378	\$16,690,259	\$16,689,249	\$16,688,238	\$16,687,227	
Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	Year 31	Year 32	
\$17,534,088	\$17,322,265	\$17,226,230	\$17,130,196	\$17,034,162	\$16,938,128	\$16,842,093	\$490,995,079	\$491,000,277	\$491,005,476	\$491,010,675	\$491,015,873	\$491,016,926	\$326,200,703	\$243,793,118	\$161,385,533	\$0	\$0	\$0	\$0	

2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	
Year 33	Year 34	Year 35	Year 36	Year 37	Year 38	Year 39	Year 40	Year 41	Year 42	Year 43	Year 44	Year 45	Year 46	Year 47	Year 48	Year 49	Year 50	Cumulative Total
5,634,755	5,634,414	5,634,397	5,634,379	5,634,362	5,634,345	5,634,327	5,634,327	5,634,327	5,634,327	5,634,327	5,634,327	5,634,327	5,634,327	5,634,327	5,634,327	5,634,327	5,634,327	293,504,283
\$20,116,076	\$20,114,857	\$20,114,796	\$20,114,734	\$20,114,672	\$20,114,610	\$20,114,548	\$20,114,548	\$20,114,548	\$20,114,548	\$20,114,548	\$20,114,548	\$20,114,548	\$20,114,548	\$20,114,548	\$20,114,548	\$20,114,548	\$20,114,548	\$1,047,810,290
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,650,000,000
\$20,116,076	\$20,114,857	\$20,114,796	\$20,114,734	\$20,114,672	\$20,114,610	\$20,114,548	\$20,114,548	\$20,114,548	\$20,114,548	\$20,114,548	\$20,114,548	\$20,114,548	\$20,114,548	\$20,114,548	\$20,114,548	\$20,114,548	\$20,114,548	\$ 2,697,810,290
Year 33	Year 34	Year 35	Year 36	Year 37	Year 38	Year 39	Year 40	Year 41	Year 42	Year 43	Year 44	Year 45	Year 46	Year 47	Year 48	Year 49	Year 50	Cumulative Total
960,745	960,687	960,684	960,681	960,678	960,675	960,673	960,673	960,673	960,673	960,673	960,673	960,673	960,673	960,673	960,673	960,673	960,673	139,808,191
\$3,429,859	\$3,429,652	\$3,429,642	\$3,429,632	\$3,429,621	\$3,429,611	\$3,429,601	\$3,429,601	\$3,429,601	\$3,429,601	\$3,429,601	\$3,429,601	\$3,429,601	\$3,429,601	\$3,429,601	\$3,429,601	\$3,429,601	\$3,429,601	\$499,115,243
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6,156,559,608
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$3,708,388,680
\$3,429,859	\$3,429,652	\$3,429,642	\$3,429,632	\$3,429,621	\$3,429,611	\$3,429,601	\$3,429,601	\$3,429,601	\$3,429,601	\$3,429,601	\$3,429,601	\$3,429,601	\$3,429,601	\$3,429,601	\$3,429,601	\$3,429,601	\$3,429,601	\$ 4,207,503,923
Year 33	Year 34	Year 35	Year 36	Year 37	Year 38	Year 39	Year 40	Year 41	Year 42	Year 43	Year 44	Year 45	Year 46	Year 47	Year 48	Year 49	Year 50	Cumulative Total
960,745	960,687	960,684	960,681	960,678	960,675	960,673	960,673	960,673	960,673	960,673	960,673	960,673	960,673	960,673	960,673	960,673	960,673	84,027,952
\$ 3,429,859	\$ 3,429,652	\$ 3,429,642	\$ 3,429,632	\$ 3,429,621	\$ 3,429,611	\$ 3,429,601	\$ 3,429,601	\$ 3,429,601	\$ 3,429,601	\$ 3,429,601	\$ 3,429,601	\$ 3,429,601	\$ 3,429,601	\$ 3,429,601	\$ 3,429,601	\$ 3,429,601	\$ 3,429,601	\$299,979,787
\$ 3,429,859	\$ 3,429,652	\$ 3,429,642	\$ 3,429,632	\$ 3,429,621	\$ 3,429,611	\$ 3,429,601	\$ 3,429,601	\$ 3,429,601	\$ 3,429,601	\$ 3,429,601	\$ 3,429,601	\$ 3,429,601	\$ 3,429,601	\$ 3,429,601	\$ 3,429,601	\$ 3,429,601	\$ 3,429,601	\$ 299,979,787
Year 33	Year 34	Year 35	Year 36	Year 37	Year 38	Year 39	Year 40	Year 41	Year 42	Year 43	Year 44	Year 45	Year 46	Year 47	Year 48	Year 49	Year 50	Cumulative Total
\$16,686,216	\$16,685,205	\$16,685,154	\$16,685,102	\$16,685,050	\$16,684,999	\$16,684,947	\$16,684,947	\$16,684,947	\$16,684,947	\$16,684,947	\$16,684,947	\$16,684,947	\$16,684,947	\$16,684,947	\$16,684,947	\$16,684,947	\$16,684,947	\$2,397,830,502
Year 33	Year 34	Year 35	Year 36	Year 37	Year 38	Year 39	Year 40	Year 41	Year 42	Year 43	Year 44	Year 45	Year 46	Year 47	Year 48	Year 49	Year 50	Cumulative Total
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$3,907,524,136

E. SUSTAINABILITY

The proposed Hudson River Tappan Zee crossing will provide many opportunities to generate long-term benefits in terms of environmental sustainability through implementation of many design features and mitigation measures for identified impacts. In summary:

- The improvements to highway dimensions, sight distances, and toll plaza performance, as well as other infrastructure upgrades associated with the proposed replacement bridge, would result in a number of environmental benefits. Pollutant emissions would be reduced through improved mobility and reduced congestion. The project would also provide a shared-use bike and pedestrian path, linking trailways in Westchester and Rockland Counties and providing greater opportunities for non-motorized transport, which is not currently provided on the Tappan Zee Bridge. The project would include stormwater treatment facilities at the Rockland and Westchester County landings, where stormwater runoff is currently untreated. In addition, the project would address existing nonstandard structural and seismic designs. Further, the project would create jobs during construction and would foster future economic development.
- In line with federal and state goals to reduce greenhouse gas (GHG) emissions, the project would incorporate, where practicable, several energy efficiency and renewable energy components, including heat exchange pumps and efficient lighting. In addition, the applicant will consider options to incorporate renewable energy production to support operations associated with the replacement bridge. As design progresses, the feasibility of these measures would be explored and incorporated where practicable.
- The project would avoid or minimize adverse environmental effects to the extent practicable. Where adverse effects cannot be avoided, mitigation measures would be implemented to reduce impacts. In order to minimize adverse effects during construction, the applicant has committed to a number of Environmental Performance Commitments (EPCs) that would reduce impacts primarily related to air quality, noise, traffic, water quality, and ecological resources. These EPCs are detailed in the Draft EIS.

For this BCA, with its focus on direct reduction in delay and congestion associated with extraordinary repairs and high rates of accidents, the analysis presented below limits the quantified benefits analysis to the avoidance of future air emissions in comparison with No Build scenarios.

REPLACEMENT BRIDGE BENEFITS COMPARED WITH NO BUILD BASELINE SCENARIO

This section of the BCA estimates the environmental cost of that congestion and delay by monetizing the key emissions in accordance with USDOT guidance. Like the costs of delay examined in Sections B and C, above, the analysis focuses specifically on the emissions generated by VHD as a result of lane closures. The detailed worksheets and input assumptions utilized in this analysis are contained in the accompanying Excel files submitted with this report. In summary, this includes:

- Annual VMT at congested speeds on the existing Bridge was estimated at 33,000,000 based on 11 million hours per year of delay due to the existing Bridge conditions (repairs and accidents) and a congested speed of 3 miles per hour. It was assumed that improvement in speed with the new bridge would have an effect on emissions for this VMT (33,000,000). While there would be some delay on the new bridge, this was assumed to be a "wash" as the 11 million hours of delay account only for the "unusual" delay that would be eliminated with the construction of a new bridge. The 3 miles per hour speed was estimated using the length of the bridge (approximately 3.1 mile) and duration of typical delay (which is 1 hour or greater).
- The uncongested speed on the new bridge, using NYMTC data and Google Map estimated travel times for the average detour distances.
- All vehicles were conservatively assumed to be light duty (passenger) vehicles.

- The exhaust emission factors of NO_x and VOCs were obtained from the NYSDOT Environmental Procedures Manual (<https://www.dot.ny.gov/divisions/engineering/environmental-analysis/mobil6>) at a speed of 2.5 mph (closest available for 3 mph) and for 40 mph, for Westchester and Rockland counties for years 2012, 2015, and then for every 5 years until 2035. These values are based on the MOBILE6.2 emissions model. For the "in between" years for which data were not directly obtained, emission factors were linearly interpolated. Post 2035 emission factors are not tabulated by NYSDOT and emission factors from 2036 to 2061 were assumed to be equal to the emission factors for 2035. For each year the Westchester and Rockland County factors were averaged.
- CO₂ emission factors by speed were obtained for passenger vehicles from the EPA MOVES model, using generic EPA inputs.
- CO₂ construction emissions were obtained by apportioning the total construction emissions as reported in the Draft EIS for the Long Span scenario (see Chapter 18: "Construction") to each year of construction using the percent of the construction cost in each year.
- The vehicle fuel consumption was calculated for each year and scenario using the CO₂ emissions and the EPA conversion factor of 8.92 x 10⁻³ metric tons of CO₂ per gallon of gasoline. Note that it did not account for the fuel used in construction.

Additional benefits not quantified:

- If trucks were considered separately, greater VOC, NO_x, and CO₂ benefits would be reported.
- There would be PM and some SO₂ savings, especially from trucks. These benefits were not accounted for.
- GHG emission savings other than CO₂ were not accounted for.
- Benefits from avoided upstream greenhouse gas emissions (emissions from fuel extraction and distribution) were not accounted for. It is estimated that including upstream emissions would increase the estimated CO₂ benefits by approximately 20 percent.

SUMMARY

As can be seen in the detailed year-by-year analysis worksheet presented below, the No Build Baseline scenario generates considerably more emissions than as modeled for the proposed Replacement Bridge scenario. This results from the considerably lower VHD resulting from the reduced number of accidents, the ability clear accidents faster, and the avoidance of extraordinary maintenance required to keep the existing bridge in a state of good repair. It is noted that the incremental NPV analysis includes the GHG costs generated by the construction of the replacement bridge as estimated in the Draft EIS, Chapter 18: "Construction," with a total of 542,000 metric tons of CO₂ and using the Social Costs of CO₂ set forth in the USDOT's *TIGER Benefit-Cost Analysis Resource Guide* (February 2012). The CO₂ generation associated with building a separate transit bridge in the future has been estimated by a pro-rated amount based on the total cost of that potential future bridge at \$2.5 billion compared with the proposed bridge at approximately \$5 billion.

Overall, it is estimated that the benefit of the proposed Hudson River Tappan Zee Crossing by avoiding the future cost of GHG and other pollutants of concern could reach an aggregate total of about \$74.9 million over the 50-year analysis period yielding a NPV of \$26.9 million and \$25.6 million at 3 percent and 7 percent discount rates, respectively.¹

¹ Pursuant to USDOT's BCA Resource Guide, the social cost of carbon is treated uniformly with a 3 percent discount rate for the NPV analysis, thereby minimizing the difference between the 3 and 7 percent calculations.

REPLACEMENT BRIDGE BENEFITS COMPARED WITH NO BUILD BRIDGE CLOSURE SCENARIO

In the No Build Bridge Closure scenario with a theoretical closure of the existing Bridge, the BCA has estimate the additional pollutant emissions generated by the detour VMT during the period of bridge closure, using the same vehicle emissions assumptions described above. All incremental detour VMT is estimated to be traveling at 40 mph.

As shown in the detailed year-by-year analysis, the combination of additional VMT-generated emissions with the future CO₂ generated by construction of the replacement bridge in the future increases the overall social cost of pollutants. In the net comparison of the No Build Bridge Closure scenario to the proposed Build conditions, there would be an aggregate total benefit of about \$93.0 million over the 50-year analysis period yielding a NPV value of \$44.0 million and \$42.2 million for a 3 percent and 7 percent discount rate, respectively.

SUSTAINABILITY

QUANTIFIED COSTS/BENEFITS:

- [1] Value of emissions reductions from reduced VMTs under the No Bridge No Build Scenario
- [2] Value of emissions reductions from reduced congestion (due to reduced accidents, reduced extraordinary maintenance, and more efficient accident response and maintenance)
- [3] Cost of CO2 emissions from construction of a new bridge (under Proposed Replacement Bridge Scenario and No Build No Bridge Scenario) and transit bridge (under the No Build Baseline Scenario)

INPUTS & ASSUMPTIONS:

Cost per Metric Ton	
\$ 1,280	= Volatile Organic Compounds (VOCs) in 2007 \$ (Recommended Monetized Values in Tiger BCA Resource Guide
\$ 1,410	=Volatile Organic Compounds (VOCs) in 2012 \$ (Using CPI index factors above)
\$ 5,217	= Nitrogen oxides (NOx) in 2007 \$ (Recommended Monetized Values in Tiger BCA Resource Guide
\$ 5,746	= Nitrogen oxides (NOx) in 2012 \$ (Using CPI index factors above)
\$ 285,469	= Particulate Matter (PM) in 2007 \$ (Recommended Monetized Values in Tiger BCA Resource Guide
\$ 314,425	= Particulate Matter (PM) in 2012 \$ (Using CPI index factors above)
\$ 30,516	= Sulfur Dioxide (SOx) in 2007 \$ (Recommended Monetized Values in Tiger BCA Resource Guide
\$ 33,611	= Sulfur Dioxide (SOx) in 2012 \$ (Using CPI index factors above)

Other Inputs/Assumptions	
542,000	= Metric tons of CO2 from new bridge construction (Source: EIS analysis)
33,085,755	= Annual VMT on existing bridge at delay speed, assumed 3 mph (Source: annual VHD that would be eliminated, delay duration and bridge length)
8.92E-03	= metric tons CO2/gallon of gasoline (Source EPA: http://www.epa.gov/cleanenergy/energy-resources/refs.html)
1.10E-04	= metric tons CO2/\$ of transit bridge construction cost

CALCULATIONS:

			2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	
No Build Baseline Scenario - Existing bridge for next 50 years			Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	
<div>AKRF: Estimate of CO2 emissions from transit bridge applies the same \$construction cost/CO2 emissions ratio as proposed replacement bridge.</div>	[2] Emissions in Metric Tons due to delays		VOC	104	96	87	79	75	72	69	65	62	61	60	59	58	57	57	57	
			NOx	25	23	21	19	18	16	15	14	13	12	12	12	11	11	11	11	
			PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			SO2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			CO2	62,884	62,158	61,432	60,706	59,640	58,574	57,508	56,441	55,375	54,736	54,097	53,458	52,818	52,179	51,890	51,600	
	[3] CO2 Emissions from transit bridge construction			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	NPV @ 3% Discount Rate																			
	NPV @ 7% Discount Rate																			
	[2&3] Social Cost of Emissions		VOC	\$2,314,611	\$1,331,784	\$146,467	\$134,727	\$122,988	\$111,249	\$106,398	\$101,547	\$96,696	\$91,845	\$86,994	\$85,594	\$84,195	\$82,796	\$81,396	\$79,997	\$79,904
NOx			\$1,913,535	\$1,152,991	\$143,538	\$131,497	\$119,456	\$107,416	\$100,572	\$93,727	\$86,883	\$80,039	\$73,195	\$70,913	\$68,632	\$66,351	\$64,069	\$61,788	\$61,408	
PM			\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
SO2			\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
CO2 from delays			\$49,063,659	\$49,063,659	\$1,551,468	\$1,560,943	\$1,576,544	\$1,591,345	\$1,596,244	\$1,599,968	\$1,602,518	\$1,603,893	\$1,604,095	\$1,627,779	\$1,644,520	\$1,666,304	\$1,681,284	\$1,701,167	\$1,726,020	
CO2 from transit bridge construction			\$3,658,378	\$3,658,378	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
TOTAL COST:			\$56,950,184	\$55,206,812	\$1,841,473	\$1,827,167	\$1,818,989	\$1,810,011	\$1,803,213	\$1,795,242	\$1,786,097	\$1,775,777	\$1,764,283	\$1,784,287	\$1,797,347	\$1,815,450	\$1,826,750	\$1,842,952	\$1,867,331	
No Build No Bridge Scenario - Bridge Closure in Year 20			Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	
<div>AKRF: Total CO2 estimate for bridge construction is allocated over the course of construction by the annual construction cost (as a percentage of total construction cost).</div>	[1&2] Emissions in Metric Tons due to delay and re-routing		VOC	104	96	87	79	75	72	69	65	62	61	60	59	58	57	57	57	
			NOx	25	23	21	19	18	16	15	14	13	12	12	12	11	11	11	11	
			PM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
			SO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
			CO2	62,884	62,158	61,432	60,706	59,640	58,574	57,508	56,441	55,375	54,736	54,097	53,458	52,818	52,179	51,890	51,600	
	[3] CO2 Emissions from bridge construction			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	NPV @ 3% Discount Rate																			
	NPV @ 7% Discount Rate																			
	[1,2,3] Social Cost of Emissions		VOC	\$2,157,422	\$1,358,103	\$146,467	\$134,727	\$122,988	\$111,249	\$106,398	\$101,547	\$96,696	\$91,845	\$86,994	\$85,594	\$84,195	\$82,796	\$81,396	\$79,997	\$79,904
NOx			\$3,341,673	\$1,794,273	\$143,538	\$131,497	\$119,456	\$107,416	\$100,572	\$93,727	\$86,883	\$80,039	\$73,195	\$70,913	\$68,632	\$66,351	\$64,069	\$61,788	\$61,408	
PM			\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
SO2			\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
CO2 from delays and re-routing			\$57,856,154	\$57,856,154	\$1,551,468	\$1,560,943	\$1,576,544	\$1,591,345	\$1,596,244	\$1,599,968	\$1,602,518	\$1,603,893	\$1,604,095	\$1,627,779	\$1,644,520	\$1,666,304	\$1,681,284	\$1,701,167	\$1,726,020	
CO2 from bridge construction			\$10,738,477	\$10,738,477	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
TOTAL COST:			\$74,093,726	\$71,747,007	\$1,841,473	\$1,827,167	\$1,818,989	\$1,810,011	\$1,803,213	\$1,795,242	\$1,786,097	\$1,775,777	\$1,764,283	\$1,784,287	\$1,797,347	\$1,815,450	\$1,826,750	\$1,842,952	\$1,867,331	
Proposed Replacement Bridge Scenario			Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	
<div>AKRF: Total CO2 estimate for bridge construction is allocated over the course of construction by the annual construction cost (as a percentage of total construction cost).</div>	[2] Emissions in Metric Tons from previously-congested volumes		VOC	104	96	87	79	75	72	8	7	7	6	6	6	5	5	5	5	
			NOx	25	23	21	19	18	16	6	5	4	4	4	4	4	4	4	4	
			PM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
			SO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
			CO2	62,884	62,158	61,432	60,706	59,640	58,574	9,821	9,634	9,448	9,338	9,228	9,118	9,008	8,898	8,848	8,799	
	[3] CO2 Emissions from bridge construction			8,862	125,321	134,220	106,403	102,882	64,313											
	NPV @ 3% Discount Rate																			
	NPV @ 7% Discount Rate																			
	[1,2,3] Social Cost of Emissions		VOC	\$820,708	\$659,068	\$146,467	\$134,727	\$122,988	\$111,249	\$106,398	\$101,547	\$11,475	\$10,635	\$9,796	\$9,376	\$8,956	\$8,536	\$8,116	\$7,696	\$7,650
NOx			\$1,093,504	\$776,237	\$143,538	\$131,497	\$119,456	\$107,416	\$100,572	\$93,727	\$32,700	\$29,658	\$26,616	\$25,856	\$25,095	\$24,335	\$23,574	\$22,814	\$22,434	
PM			\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
SO2			\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
CO2 from previously-congested volumes			\$15,459,787	\$15,459,787	\$1,551,468	\$1,560,943	\$1,576,544	\$1,591,345	\$1,596,244	\$1,599,968	\$273,670	\$273,776	\$273,676	\$277,690	\$280,518	\$284,205	\$286,730	\$290,090	\$294,322	
CO2 from bridge construction			\$12,655,733	\$12,655,733	\$218,645	\$3,147,135	\$3,444,531	\$2,789,263	\$2,753,605	\$1,756,735	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
TOTAL COST:			\$30,029,732	\$29,550,825	\$2,060,118	\$4,974,303	\$5,263,519	\$4,599,273	\$4,556,819	\$3,551,977	\$317,844	\$314,069	\$310,088	\$312,922	\$314,569	\$317,076	\$318,421	\$320,600	\$324,405	
Net Benefit (Cost): Proposed Replacement Bridge Scenario vs. No Build Baseline Scenario			NPV @ 3% Discount Rate	NPV @ 7% Discount Rate	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	
			\$26,920,452	\$25,655,987	-\$218,645	-\$3,147,135	-\$3,444,531	-\$2,789,263	-\$2,753,605	-\$1,756,735	\$1,468,252	\$1,461,708	\$1,454,195	\$1,471,365	\$1,482,778	\$1,498,374	\$1,508,329	\$1,522,351	\$1,542,926	
Net Benefit (Cost): Proposed Replacement Bridge Scenario vs. No Build No Bridge Scenario			NPV @ 3% Discount Rate	NPV @ 7% Discount Rate	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	
			\$44,063,994	\$42,196,181	-\$218,645	-\$3,147,135	-\$3,444,531	-\$2,789,263	-\$2,753,605	-\$1,756,735	\$1,468,252	\$1,461,708	\$1,454,195	\$1,471,365	\$1,482,778	\$1,498,374	\$1,508,329	\$1,522,351	\$1,542,926	

2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054
Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	Year 31	Year 32	Year 33	Year 34	Year 35	Year 36	Year 37	Year 38	Year 39	Year 40	Year 41	Year 42	Year 43
56 10 0 0 51,021 0	56 10 0 0 50,732 0	56 10 0 0 50,656 45,581	56 10 0 0 50,580 45,581	56 10 0 0 50,503 45,581	56 10 0 0 50,427 45,581	56 10 0 0 50,351 0	56 10 0 0 50,336 0	56 10 0 0 50,320 0	56 10 0 0 50,305 0	56 10 0 0 50,290 0	56 10 0 0 50,274 0	56 10 0 0 50,271 0	56 10 0 0 50,268 0	56 10 0 0 50,265 0	56 10 0 0 50,262 0	56 10 0 0 50,259 0	56 10 0 0 50,259 0	56 10 0 0 50,259 0	56 10 0 0 50,259 0	56 10 0 0 50,258 0	56 10 0 0 50,258 0	56 10 0 0 50,258 0	56 10 0 0 50,258 0	56 10 0 0 50,258 0	
\$79,624 \$60,267 \$0 \$0 \$1,803,903 \$0 \$1,943,794	\$79,530 \$59,887 \$0 \$0 \$1,832,781 \$0 \$1,972,198	\$79,530 \$59,697 \$0 \$0 \$1,863,509 \$1,676,825 \$3,679,561	\$79,530 \$59,506 \$0 \$0 \$1,899,707 \$1,711,968 \$3,750,712	\$79,530 \$59,316 \$0 \$0 \$1,930,226 \$1,742,091 \$3,811,163	\$79,530 \$59,126 \$0 \$0 \$1,966,198 \$1,777,234 \$3,882,088	\$79,530 \$58,936 \$0 \$0 \$1,996,507 \$0 \$2,134,973	\$79,530 \$58,936 \$0 \$0 \$2,034,704 \$0 \$2,173,171	\$79,530 \$58,936 \$0 \$0 \$2,067,336 \$0 \$2,205,802	\$79,530 \$58,936 \$0 \$0 \$2,099,947 \$0 \$2,238,413	\$79,530 \$58,936 \$0 \$0 \$2,138,077 \$0 \$2,276,543	\$79,530 \$58,936 \$0 \$0 \$2,170,645 \$0 \$2,309,112	\$79,530 \$58,936 \$0 \$0 \$2,203,736 \$0 \$2,342,203	\$79,530 \$58,936 \$0 \$0 \$2,236,823 \$0 \$2,375,289	\$79,530 \$58,936 \$0 \$0 \$2,264,369 \$0 \$2,402,836	\$79,530 \$58,936 \$0 \$0 \$2,297,448 \$0 \$2,435,915	\$79,530 \$58,936 \$0 \$0 \$2,330,523 \$0 \$2,468,990	\$79,530 \$58,936 \$0 \$0 \$2,358,194 \$0 \$2,496,661	\$79,530 \$58,936 \$0 \$0 \$2,391,401 \$0 \$2,529,868	\$79,530 \$58,936 \$0 \$0 \$2,424,607 \$0 \$2,563,074	\$79,530 \$58,936 \$0 \$0 \$2,457,814 \$0 \$2,596,280	\$79,530 \$58,936 \$0 \$0 \$2,485,484 \$0 \$2,623,951	\$79,530 \$58,936 \$0 \$0 \$2,485,484 \$0 \$2,623,951	\$79,530 \$58,936 \$0 \$0 \$2,485,484 \$0 \$2,623,951	\$79,530 \$58,936 \$0 \$0 \$2,485,484 \$0 \$2,623,951	
		Bridge closure and new bridge construction				Traffic flow returns to normal conditions over 3 years																			
Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	Year 31	Year 32	Year 33	Year 34	Year 35	Year 36	Year 37	Year 38	Year 39	Year 40	Year 41	Year 42	Year 43
56 10 - - 51,021 -	56 10 - - 50,732 -	131 90 - - 214,289 8,862	131 90 - - 213,967 125,321	131 90 - - 213,644 134,220	131 90 - - 213,322 106,403	131 90 - - 213,000 102,882	131 90 - - 212,935 64,313	88 60 - - 141,913 -	66 45 - - 106,402 -	44 30 - - 70,913 -	5 4 - - 8,572 -	5 4 - - 8,571 -	5 4 - - 8,571 -	5 4 - - 8,570 -	5 4 - - 8,570 -	5 4 - - 8,569 -	5 4 - - 8,569 -	5 4 - - 8,569 -	5 4 - - 8,569 -	5 4 - - 8,569 -	5 4 - - 8,569 -	5 4 - - 8,569 -	5 4 - - 8,569 -	5 4 - - 8,569 -	
\$79,624 \$60,267 \$0 \$0 \$1,803,903 \$0 \$1,943,794	\$79,530 \$59,887 \$0 \$0 \$1,832,781 \$0 \$1,972,198	\$185,167 \$518,857 \$0 \$0 \$7,883,227 \$326,015 \$8,913,267	\$185,167 \$518,857 \$0 \$0 \$8,036,340 \$4,706,900 \$13,447,264	\$185,167 \$518,857 \$0 \$0 \$8,165,424 \$5,129,838 \$13,999,287	\$185,167 \$518,857 \$0 \$0 \$8,317,579 \$4,148,735 \$13,170,339	\$185,167 \$518,857 \$0 \$0 \$8,445,776 \$4,079,416 \$13,229,216	\$185,167 \$518,857 \$0 \$0 \$8,607,363 \$2,599,684 \$11,911,071	\$123,445 \$345,905 \$0 \$0 \$5,830,268 \$0 \$6,299,618	\$92,584 \$259,429 \$0 \$0 \$4,441,678 \$0 \$4,793,690	\$61,722 \$172,952 \$0 \$0 \$3,014,885 \$0 \$3,249,560	\$7,463 \$20,913 \$0 \$0 \$370,102 \$0 \$398,478	\$7,463 \$20,913 \$0 \$0 \$375,744 \$0 \$404,121	\$7,463 \$20,913 \$0 \$0 \$381,386 \$0 \$409,762	\$7,463 \$20,913 \$0 \$0 \$386,083 \$0 \$414,459	\$7,463 \$20,913 \$0 \$0 \$391,723 \$0 \$420,099	\$7,463 \$20,913 \$0 \$0 \$397,362 \$0 \$425,738	\$7,463 \$20,913 \$0 \$0 \$402,080 \$0 \$430,456	\$7,463 \$20,913 \$0 \$0 \$407,742 \$0 \$436,118	\$7,463 \$20,913 \$0 \$0 \$413,404 \$0 \$441,780	\$7,463 \$20,913 \$0 \$0 \$419,066 \$0 \$447,442	\$7,463 \$20,913 \$0 \$0 \$423,784 \$0 \$452,160	\$7,463 \$20,913 \$0 \$0 \$423,784 \$0 \$452,160	\$7,463 \$20,913 \$0 \$0 \$423,784 \$0 \$452,160	\$7,463 \$20,913 \$0 \$0 \$423,784 \$0 \$452,160	
5 4 - - 8,700	5 4 - - 8,650	5 4 - - 8,637	5 4 - - 8,624	5 4 - - 8,611	5 4 - - 8,598	5 4 - - 8,585	5 4 - - 8,582	5 4 - - 8,580	5 4 - - 8,577	5 4 - - 8,575	5 4 - - 8,572	5 4 - - 8,571	5 4 - - 8,571	5 4 - - 8,570	5 4 - - 8,570	5 4 - - 8,569	5 4 - - 8,569	5 4 - - 8,569	5 4 - - 8,569	5 4 - - 8,569	5 4 - - 8,569	5 4 - - 8,569	5 4 - - 8,569	5 4 - - 8,569	
\$7,510 \$21,293 \$0 \$0 \$307,582 \$0 \$336,385	\$7,463 \$20,913 \$0 \$0 \$312,499 \$0 \$340,875	\$7,463 \$20,913 \$0 \$0 \$317,737 \$0 \$346,113	\$7,463 \$20,913 \$0 \$0 \$323,909 \$0 \$352,285	\$7,463 \$20,913 \$0 \$0 \$329,111 \$0 \$357,488	\$7,463 \$20,913 \$0 \$0 \$335,244 \$0 \$363,620	\$7,463 \$20,913 \$0 \$0 \$340,411 \$0 \$368,787	\$7,463 \$20,913 \$0 \$0 \$346,924 \$0 \$375,300	\$7,463 \$20,913 \$0 \$0 \$352,488 \$0 \$380,864	\$7,463 \$20,913 \$0 \$0 \$358,048 \$0 \$386,424	\$7,463 \$20,913 \$0 \$0 \$364,549 \$0 \$392,925	\$7,463 \$20,913 \$0 \$0 \$370,102 \$0 \$398,478	\$7,463 \$20,913 \$0 \$0 \$375,744 \$0 \$404,121	\$7,463 \$20,913 \$0 \$0 \$381,386 \$0 \$409,762	\$7,463 \$20,913 \$0 \$0 \$386,083 \$0 \$414,459	\$7,463 \$20,913 \$0 \$0 \$391,723 \$0 \$420,099	\$7,463 \$20,913 \$0 \$0 \$397,362 \$0 \$425,738	\$7,463 \$20,913 \$0 \$0 \$402,080 \$0 \$430,456	\$7,463 \$20,913 \$0 \$0 \$407,742 \$0 \$436,118	\$7,463 \$20,913 \$0 \$0 \$413,404 \$0 \$441,780	\$7,463 \$20,913 \$0 \$0 \$419,066 \$0 \$447,442	\$7,463 \$20,913 \$0 \$0 \$423,784 \$0 \$452,160	\$7,463 \$20,913 \$0 \$0 \$423,784 \$0 \$452,160	\$7,463 \$20,913 \$0 \$0 \$423,784 \$0 \$452,160	\$7,463 \$20,913 \$0 \$0 \$423,784 \$0 \$452,160	
Year 18 \$1,607,409	Year 19 \$1,631,323	Year 20 \$3,333,448	Year 21 \$3,398,428	Year 22 \$3,453,676	Year 23 \$3,518,468	Year 24 \$1,766,186	Year 25 \$1,797,871	Year 26 \$1,824,939	Year 27 \$1,851,989	Year 28 \$1,883,618	Year 29 \$1,910,634	Year 30 \$1,938,082	Year 31 \$1,965,527	Year 32 \$1,988,377	Year 33 \$2,015,816	Year 34 \$2,043,251	Year 35 \$2,066,205	Year 36 \$2,093,749	Year 37 \$2,121,294	Year 38 \$2,148,838	Year 39 \$2,171,791	Year 40 \$2,171,791	Year 41 \$2,171,791	Year 42 \$2,171,791	Year 43 \$2,171,791
Year 18 \$1,607,409	Year 19 \$1,631,323	Year 20 \$8,567,153	Year 21 \$13,094,979	Year 22 \$13,641,799	Year 23 \$12,806,719	Year 24 \$12,860,429	Year 25 \$11,535,771	Year 26 \$5,918,754	Year 27 \$4,407,266	Year 28 \$2,856,635	Year 29 \$0	Year 30 \$0	Year 31 \$0	Year 32 \$0	Year 33 \$0	Year 34 \$0	Year 35 \$0	Year 36 \$0	Year 37 \$0	Year 38 \$0	Year 39 \$0	Year 40 \$0	Year 41 \$0	Year 42 \$0	Year 43 \$0

2055	2056	2057	2058	2059	2060	2061	
Year 44	Year 45	Year 46	Year 47	Year 48	Year 49	Year 50	Cumulative Total
56	56	56	56	56	56	56	3,034
10	10	10	10	10	10	10	592
0	0	0	0	0	0	0	-
0	0	0	0	0	0	0	-
50,258	50,258	50,258	50,258	50,258	50,258	50,258	2,618,058
0	0	0	0	0	0	0	
\$79,530	\$79,530	\$79,530	\$79,530	\$79,530	\$79,530	\$79,530	\$4,276,916
\$58,936	\$58,936	\$58,936	\$58,936	\$58,936	\$58,936	\$58,936	\$3,400,232
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
\$2,485,484	\$2,485,484	\$2,485,484	\$2,485,484	\$2,485,484	\$2,485,484	\$2,485,484	\$102,464,762
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$6,908,118
\$2,623,951	\$2,623,951	\$2,623,951	\$2,623,951	\$2,623,951	\$2,623,951	\$2,623,951	\$117,050,028
Year 44	Year 45	Year 46	Year 47	Year 48	Year 49	Year 50	Cumulative Total
5	5	5	5	5	5	5	2,386
4	4	4	4	4	4	4	1,031
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
8,569	8,569	8,569	8,569	8,569	8,569	8,569	2,847,474
-	-	-	-	-	-	-	542,000
\$7,463	\$7,463	\$7,463	\$7,463	\$7,463	\$7,463	\$7,463	\$3,364,421
\$20,913	\$20,913	\$20,913	\$20,913	\$20,913	\$20,913	\$20,913	\$5,922,825
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
\$423,784	\$423,784	\$423,784	\$423,784	\$423,784	\$423,784	\$423,784	\$103,279,817
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$20,990,687
\$452,160	\$452,160	\$452,160	\$452,160	\$452,160	\$452,160	\$452,160	\$133,557,650
Year 44	Year 45	Year 46	Year 47	Year 48	Year 49	Year 50	Cumulative Total
5	5	5	5	5	5	5	757
4	4	4	4	4	4	4	290
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
8,569	8,569	8,569	8,569	8,569	8,569	8,569	749,529
\$7,463	\$7,463	\$7,463	\$7,463	\$7,463	\$7,463	\$7,463	\$1,067,107
\$20,913	\$20,913	\$20,913	\$20,913	\$20,913	\$20,913	\$20,913	\$1,663,519
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
\$423,784	\$423,784	\$423,784	\$423,784	\$423,784	\$423,784	\$423,784	\$25,332,797
\$0	\$0	\$0	\$0	\$0	\$0	\$0	
\$452,160	\$452,160	\$452,160	\$452,160	\$452,160	\$452,160	\$452,160	\$42,173,337
Year 44	Year 45	Year 46	Year 47	Year 48	Year 49	Year 50	Cumulative Total
\$2,171,791	\$2,171,791	\$2,171,791	\$2,171,791	\$2,171,791	\$2,171,791	\$2,171,791	\$74,876,692
Year 44	Year 45	Year 46	Year 47	Year 48	Year 49	Year 50	Cumulative Total
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$91,384,314

F. SAFETY

The proposed Tappan Zee Hudson River Crossing project is expected to generate substantial benefits in terms of improved safety that will save users of the Bridge considerable time and money compared with the No Build Baseline or Bridge Closure scenarios. This section of the BCA presents a comprehensive review of Bridge accident data and identifies likely accident reduction opportunities as a result of the replacement bridge. Using the USDOT guidance, the accident reduction profile is used to estimate a monetized benefit of the proposed bridge. The accident data and analysis presented below has also been used in other sections of the BCA in order to calculate lost time due to delay from accidents, additional household expenses due to additional fuel purchases resulted based on the slower travel speeds created by accidents.

REPLACEMENT BRIDGE BENEFITS COMPARED TO NO BUILD BASELINE

BASELINE DATA ANALYSIS

Accident data was obtained from the NYSTA for the most recent three-year history of accidents on the Tappan Zee Bridge (2008 to 2010). The accident data was summarized by year and location and further divided by cause of collision. The study area was identified to capture the segment of roadway that would be affected by the proposed replacement bridge. Accident data was collected for a 3.7 mile segment on I-87/I-287 from milepost 12.9 to milepost 16.6. The footprint of the Tappan Zee Bridge extends approximately between milepost 13.1 to milepost 16.2.

A total of 1,372 accidents were recorded within the study area during this three-year period, including 908 accidents in the eastbound direction and 464 accidents in the westbound direction, or about 302 eastbound and 154 westbound accidents per year. As noted elsewhere, this is an accident rate well in excess of the New York statewide average for comparable facilities. Improving the safety of this Hudson River crossing is an important objective that is well documented in the Draft EIS.

In support of the BCA, the accident data was summarized by cause of collision by milepost and direction. A detailed review of the accident data indicated approximately 85 percent of all accidents could be attributed to drivers using unsafe speed, conducting unsafe lane changes, following too closely or colliding with obstructions or roadway debris. Approximately, 208 of the 1,372 recorded accidents, or 15 percent, involved injuries. Approximately, 1,074 recorded accidents, or 78 percent, involved property damage only. And the remaining 29 accidents or 7 percent were recorded as unknown. One automobile related fatality was recorded over the three-year studied period. The fatality occurred at noon on August 2, 2010 in the eastbound direction at milepost 14.5, which is approximately mid-span of the bridge structure. A defective tow hitch was identified as the cause of the accident.

As shown in **Figure F-1**, a high number of accidents are observed in both directions between mileposts 14.2 and 13.8. This highway segment is of interest because the bridge's main span extends from milepost 13.8 to milepost 14.2. At the approaches to the main span, the roadway grade increase by more than 3 percent. This steep grade reduces sight distances as well as the speeds of trucks. At both approaches, impatient drivers behind slower-moving trucks aggressively attempt to pass, and often find a lack of available gaps in traffic to execute the pass. This results in weaving movements that create a greater potential for conflicts and an increase in accidents. Other contributing factors include sun glare in the early morning between eastbound milepost 16.0 to 15.0 and braking and weaving maneuvers as vehicles approach the toll plaza at milepost 13.1.

PROPOSED BRIDGE IMPROVEMENTS

The proposed replacement bridge will result in a number of geometric improvements that will result in a reduction in accidents and driver delays and arrival times for the emergency response vehicles. The geometric changes include a correction of non-standard features including improvements to:

3.14.12

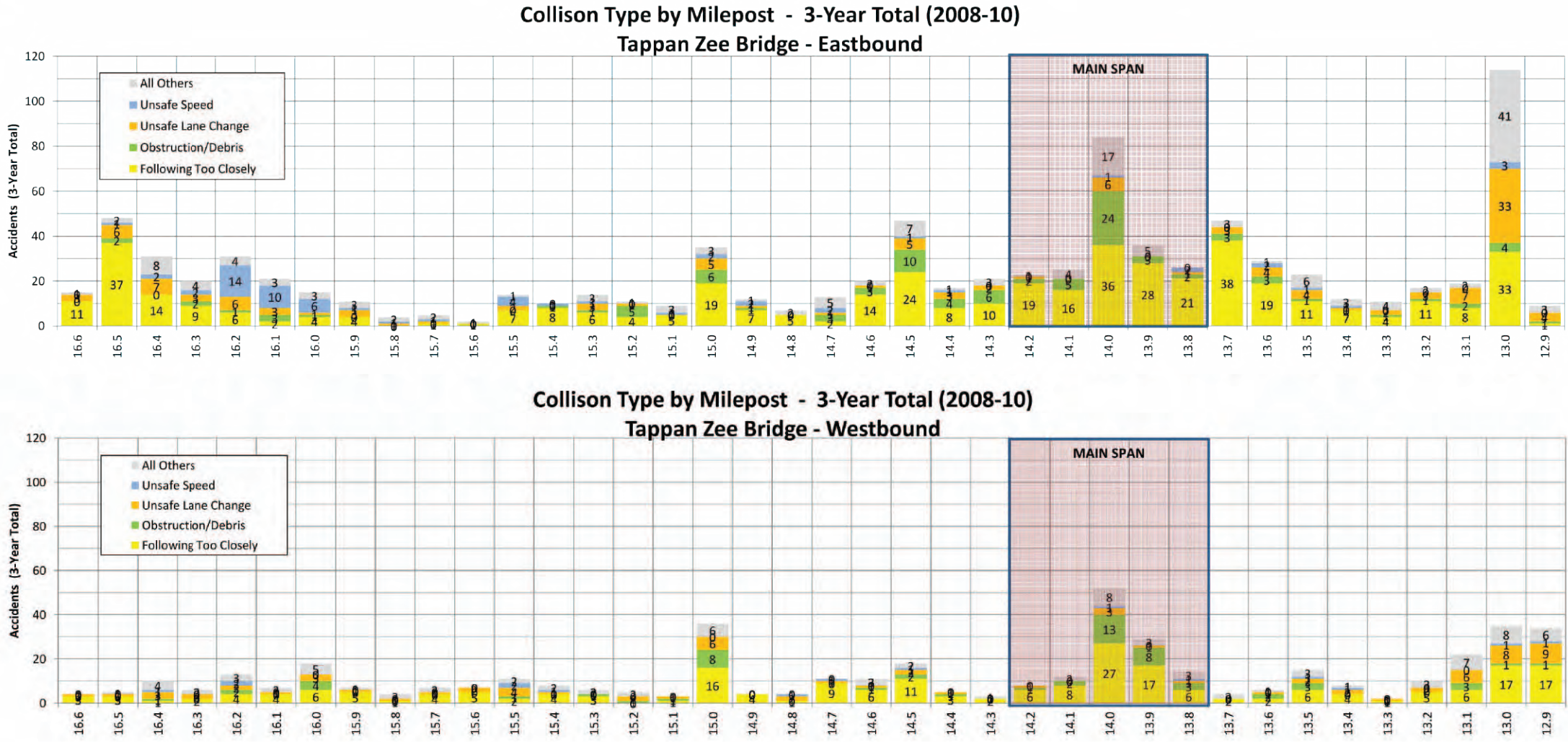


Figure F-1
Accident Types by Mile Post

- The horizontal and vertical alignments improvements along the full length of the bridge and approaches, which will significantly improve sight distances and create more uniform travel speeds for commercial and passenger vehicles;
- Improved signage, especially at the approach to the toll barrier, allowing drivers a greater opportunity to align themselves at the egress from the bridge; and
- The implementation of highway speed tolling, which has been estimated to create a significant reduction in accident clusters at the approach to the toll barrier.

Collectively these improvements are projected to decrease accidents within the study area by approximately 27 percent, or roughly 121 accidents per year. These projections are based on accident reduction factors presented in the ITE's Manual of Transportation Engineering Studies, 2nd Edition, and the USDOT FHWA Desktop Reference for Crash Reduction Factors, September 2008. Since accident reductions are influenced by a number of different factors caution was exercised when identifying appropriate accident rates. The percent reduction for the various areas of improvement ranged from 7 percent for roadway widening to 49 percent for full bridge replacement. A full list of improvements and the accident reduction factors is presented in **Table F-1**.

Table F-1

Percent Reduction in Accident Rates after Improvements

Type of Improvement	Fatal	Injury	Fatal+Injury
G. Widen Travel Way	H. 9%	I. 7%	J. 7%
K. Shoulder Widening or Improvements	L. 28	M. 11	N. 12
O. Lanes Added	P. --	Q. 13	R. 13
S. Skid Resistant Overlay	T. 26	U. 18	V. 19
W. Minor Structural Replacement	X. 36	Y. 20	Z. 21
AA. Bridge Widen or Modified	BB. 49	CC.22	DD.23
EE. Obstacle Removal	FF. 49	GG.22	HH.23
II. Roadway Realignment	JJ. 61	KK. 32	LL. 34
MM. Bridge Replacement	NN.72	OO.47	PP. 49
Sources: ITE Manual of Transportation Studies, 2nd Edition, p. 374			

In an effort to be conservative, the accident analysis applied engineering judgment to assign a reduction factor for each milepost by direction taking into consideration the proposed improvement and accident types experienced on that segment of roadway. As presented in **Table F-2**, it is anticipated that the new bridge will provide for an annual reduction of about 121.5 accidents per year which is about a 27 percent reduction over the existing baseline profile.

Table F-2
Estimated Accident Reduction with New Bridge

Accident Type	Existing Baseline		New Bridge		
	3-Year Total	Annual Average	Reduction Factor	Annual Average	Annual Reduction
Killed	1	0.3	0.33	0.2	0.1
Injury - Severity Unknown	268	89.3	0.33	59.9	29.5
PDO	1,074	358.0	0.25	268.5	89.5
Unknown if Injured	29	9.7	0.25	7.3	2.4
Total	1,372	457.3		335.8	121.5
Sources: NYSTA.					

ESTIMATE OF MONETIZED VALUE OF ACCIDENT REDUCTION AND AVOIDANCE

In accordance with USDOT guidance, the accident profile completed above was converted to Abbreviated Injury Scale (AIS) and monetized values using the conversion templates provided in the USDOT's *TIGER Benefit-Cost (BCA) Resource Guide*. AIS values for the Value of Statistical Life are provided in 2011 dollars while National Highway Traffic Safety Administration (NHTSA) value for Property Damage Only (PDA) accidents is provided in 2010 dollars. As presented in **Table F-3**, and based on the Bureau of Labor Statistics for the Northeast, these variables have been converted to 2012 dollars.

No Build Baseline Scenario

Table F-3 presents the conversion of the unknown accident type to the AIS standard while **Table F-4** provides the AIS monetized value for this accident profile. For the No Build Baseline scenario, the AIC cost estimate of the 457.3 accidents per year is \$14,961,975.

Table F-3
No Build Baseline Current Bridge: Unknown to AIS Data Conversion

AIS	O		K		U		# Non-fatal Accidents		Total
	<i>No Injury</i>		<i>Killed</i>		<i>Injured Severity Unknown</i>		<i>Unknown if Injured</i>		
	AIS Probability Factor ¹	Baseline	AIS Probability Factor ¹	Baseline	AIS Probability Factor ¹	Baseline	AIS Probability Factor ¹	Baseline	
AIS 0	0.92534	331.3	0.00000	0.0	0.21538	19.2	0.43676	4.2	354.7
AIS 1	0.07257	26.0	0.00000	0.0	0.62728	56.0	0.41739	4.0	86.1
AIS 2	0.00198	0.7	0.00000	0.0	0.10400	9.3	0.08872	0.9	10.9
AIS 3	0.00008	0.0	0.00000	0.0	0.03858	3.4	0.04817	0.5	3.9
AIS 4	0.00000	0.0	0.00000	0.0	0.00442	0.4	0.00617	0.1	0.5
AIS 5	0.00003	0.0	0.00000	0.0	0.01034	0.9	0.00279	0.0	1.0
AIS 6	0.00000	0.0	1.00000	0.3	0.00000	0.0	0.00000	0.0	0.3
Total	1.00000	358.0	1.00000	0.3	1.00000	89.3	1.00000	9.7	457.3
Sources: (1) National Highway Traffic Safety Administration, July 2011									

Table F-4
Annual Cost of Accidents Per Year: Current Bridge

AIS	# Accidents Reduced/Year	VSL Value (\$2012) ^{1,3}	Cost of Accidents
0 (PDO)	354.7	\$3,311	\$1,210,202
1	86.1	\$18,745	\$1,613,063
2	10.9	\$293,676	\$3,188,475
3	3.9	\$656,084	\$2,585,471
4	0.5	\$1,662,079	\$755,409
5	1.0	\$3,705,311	\$3,562,348
6	0.3	\$6,248,417	\$2,082,806
Total	457.3		\$14,997,775
Notes: (1) <i>Treatment of the Economic Value of a Statistical Life in Departmental Analyses (2008 revised guidance and 2011 update)</i> (\$2011) - Converted to \$2012. (2) PDO determined from <i>The Economic Impact of Motor Vehicle Crashes 2000</i> (in \$2010) - Converted to \$2012.			
Sources: <i>National Highway Traffic Safety Administration, July 2011.</i>			

Proposed Replacement Bridge

Based on the reduction of 121.5 accidents per year, the proposed replacement bridge would result in an AIS conversion chart as set forth in **Table F-5**. The AIS costs associated with this number of accidents is summarized in **Table F-6** and would total approximately \$10,240,245 million.

Table F-5
Proposed Bridge: Unknown to AIS Data Conversion

AIS	O		K		U		# Non-fatal Accidents		Total
	<i>No Injury</i>		<i>Killed</i>		<i>Injured Severity Unknown</i>		<i>Unknown if Injured</i>		
	AIS Probability Factor ¹	Baseline	AIS Probability Factor ¹	Baseline	AIS Probability Factor ¹	Baseline	AIS Probability Factor ¹	Baseline	
AIS 0	0.92534	248.5	0.00000	0.0	0.21538	12.9	0.43676	3.2	264.5
AIS 1	0.07257	19.5	0.00000	0.0	0.62728	37.5	0.41739	3.0	60.1
AIS 2	0.00198	0.5	0.00000	0.0	0.10400	6.2	0.08872	0.6	7.4
AIS 3	0.00008	0.0	0.00000	0.0	0.03858	2.3	0.04817	0.3	2.7
AIS 4	0.00000	0.0	0.00000	0.0	0.00442	0.3	0.00617	0.0	0.3
AIS 5	0.00003	0.0	0.00000	0.0	0.01034	0.6	0.00279	0.0	0.6
AIS 6	0.00000	0.0	1.00000	0.2	0.00000	0.0	0.00000	0.0	0.2
Total	1.00000	268.5	1.00000	0.2	1.00000	59.9	1.00000	7.3	335.8
Sources: (1) National Highway Traffic Safety Administration, July 2011									

Table F-6

Annual Cost of Accidents Per Year: Proposed Bridge

AIS	# Accidents Reduced/Year	VSL Value (\$2012) ^{1,3}	Cost of Accidents
0 (PDO)	264.5	\$3,311	\$875,706
1	60.1	\$18,745	\$1,125,763
2	7.4	\$293,676	\$2,173,081
3	2.7	\$656,084	\$1,758,209
4	0.3	\$1,662,079	\$514,055
5	0.6	\$3,705,311	\$2,397,951
6	0.2	\$6,248,417	\$1,395,480
Total	335.8		\$10,226,939
Notes: (1) <i>Treatment of the Economic Value of a Statistical Life in Departmental Analyses (2008 revised guidance and 2011 update) (\$2011)</i> - Converted to \$2012. (2) PDO determined from <i>The Economic Impact of Motor Vehicle Crashes 2000</i> (in \$2010) - Converted to \$2012.			
Sources: <i>National Highway Traffic Safety Administration, July 2011.</i>			

As presented in the year-to-year worksheet at the end of this section, the comparison of the proposed project with the No Build: Baseline scenario shows a net benefit of \$4.7 million per year and represents an aggregate value of \$236.6 million over the 50-year analysis period, which yields a positive NPV of \$121.8 million using a 3 percent discount rate and \$65.3 million using a 7 percent discount rate.

REPLACEMENT BRIDGE BENEFITS COMPARED WITH NO BUILD BRIDGE CLOSURE SCENARIO

To estimate the accident reduction benefit comparing the proposed project with the No Build Bridge Closure scenario, it is assumed that the accident rate would remain the same through the bridge closure and construction of a replacement bridge in the future. The rate and expense of accidents associated with the current bridge were considered a proxy for the fact that diverted traffic would basically be doubling their miles traveled for a typical trip within the region and would likely increase the number of accidents occurring elsewhere based on higher VMT. After the crossing is reopened, the future replacement bridge would be expected to experience the same accident rate as with the proposed Project.

As shown in the year-to-year worksheets, the comparison of the proposed project to the No Build Bridge Closure scenario shows a net benefit of \$4.7 million per year through Year 25, with an aggregate value of \$118.3 million and a NPV of \$82.4 million using a 3 percent discount rate and \$55.2 million using a discount rate of 7 percent.

ATTACHMENT A: HDR ENGINEERING 2005 ANALYSIS

Please note, although the Attachment is marked DRAFT, this is the final version on file.

DRAFT**Memo**

To: Tom McLaughlin

From: Christopher Kinzel

Project: Tappan Zee Bridge User Delay Costs

CC: Michael Trueblood, Stefanie Cassin, Molly Nick, Kyle Evans, Ralph Batenhorst

Date: 7.07.05

Job No: 23820

Subject: Tappan Zee Bridge User Delay Cost Analysis – REVISED DRAFT

HDR was asked by the New York State Thruway Authority (NYSTA) to analyze the user delay cost on the Tappan Zee Bridge between Nyack and Tarrytown related to closures associated with ongoing deck repair and future deck replacement. HDR was also asked to analyze NYSTA's Lane Availability Chart relative to current traffic volumes, and to expand it from hour-based thresholds to a seasonal 15-minute basis in order to determine the time period(s) for a lane closure that causes the least delay. This memo summarizes the processes used and the results obtained.

The following is a summary of the activities and findings addressed by this memo:

- On weekdays, the bridge carries approximately 63,000 to 72,000 vehicles per day (vpd) in the northbound direction, and approximately 67,000 to 75,000 vpd in the southbound direction. On weekends, daily volumes vary from approximately 57,000 to 73,000 vpd in the northbound direction, and approximately 63,000 to 75,000 vpd in the southbound direction.
- The bridge deck experienced an average of 56 “punch-throughs” (holes) per year in 2000, 2003 and 2004. If the deck is not replaced, over 130 punch-throughs are forecasted annually by 2020.
- Under the “No-Build/Continued Maintenance” scenario, closures related to repairs of the increasing number of punch-throughs are expected to result in a cumulative 109 million vehicle-hours of delay between 2005 and 2020, costing users approximately \$2.5 billion.
- HDR investigated the lane-closure delay resulting from three potential deck repair alternatives with construction beginning in mid-2006 and ending in mid-2008. Alternative 1, which would involve weekday closures on the West Causeway and weekend closures on the Main Span/Deck Truss, would have the least closure-related delay (4.6 million vehicle-hours) and user delay cost (\$106 million). Alternative 2, which would involve weekend closures for all of the bridge work, would result in a closure-related delay of 19 million vehicle-hours and a user delay cost of \$437 million. Alternative 3, which would involve weekend closures for all of the bridge work except spans 0-81, would result in a closure-related delay of 11 million vehicle-hours and a user delay cost of \$263 million. These alternatives are described in more detail beginning on Page 8.
- HDR updated the Lane Availability Chart, which illustrates the number of lanes that should remain open during repair/construction work on the bridge by time of day and day of week. The updated chart is broken into 15-minute increments for four different seasons (Figures 11a-d). The chart further illustrates why 36-hour weekend closures are expected to result in heavy delays and lengthy queues on the Main Span/Deck Truss, because three to four lanes are needed in each direction for most of the afternoon and early evening on weekends.

The remainder of the memo provides more detail on the analysis and conclusions described above.

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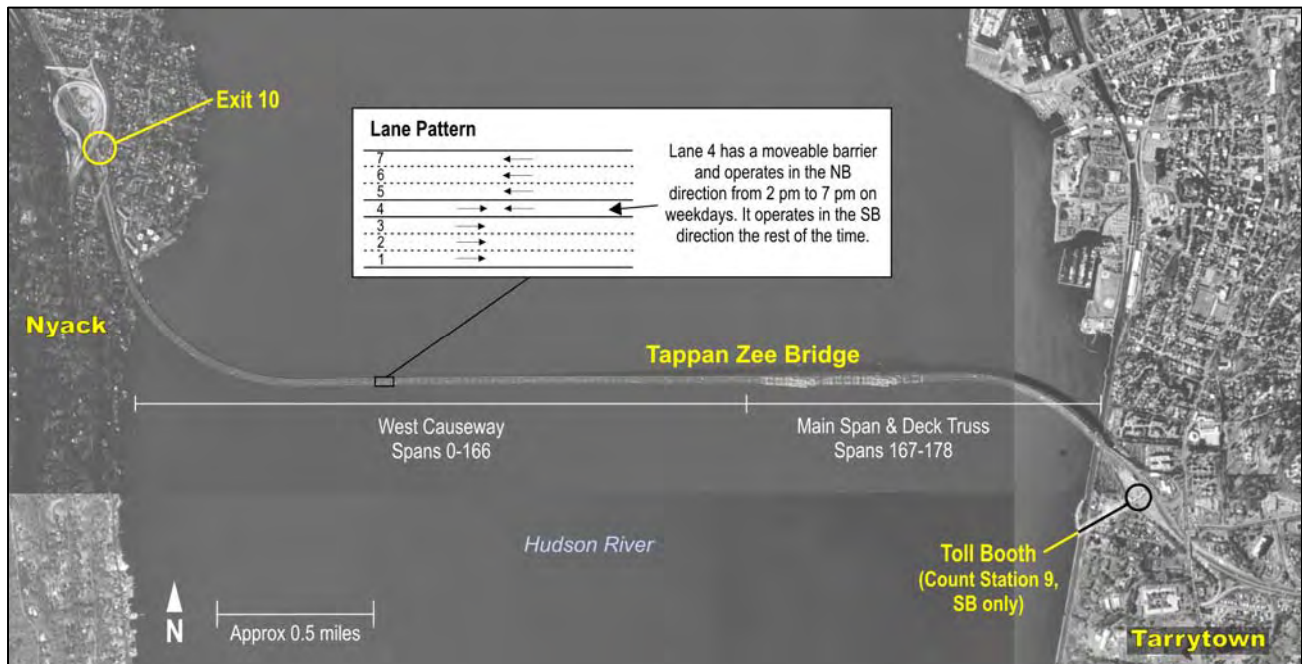
Existing Conditions

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Physical Layout

Figure 1 is an aerial photograph of the Tappan Zee Bridge. The bridge is divided into two sections: the West Causeway, consisting of 167 spans that are each 50 feet in length, and the Main Span and Deck Truss, consisting of 12 spans that are each 250 feet in length. The southbound direction of the bridge is tolled, with toll collection occurring on the south end of the bridge. The bridge carries seven lanes of traffic (numbered as shown in Figure 1), with a movable barrier in the middle that is adjusted on weekdays to provide four lanes in the peak direction (morning: southbound, evening: northbound). The bridge currently carries 130,000 to 147,000 vehicles per day (vpd) on weekdays, with the heaviest volumes occurring during the summer months.

Figure 1: Tappan Zee Bridge – Physical Layout



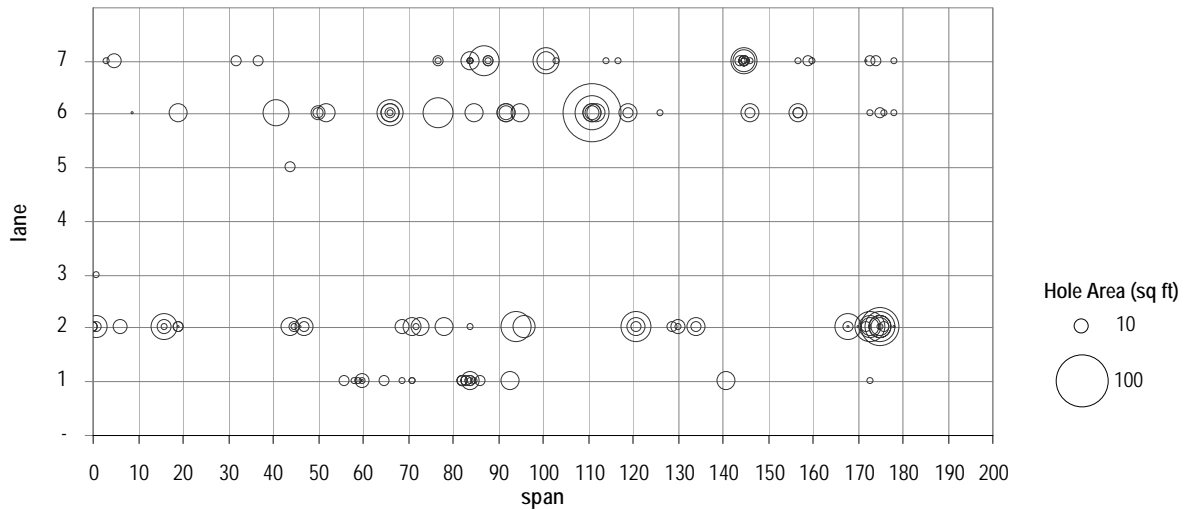
No-Build/Continued Maintenance Scenario

The bridge deck is aging, and experiences numerous “punch-throughs” (holes) annually. When a hole develops, maintenance crews temporarily cover it with a steel plate until a scheduled deck repair procedure can be performed. During both the plating and repair operations, lanes are closed, temporarily reducing the bridge’s traffic-carrying capacity. HDR was asked to forecast the user delay costs associated with continuing this practice through the year 2020. The delay forecast had two key components: the frequency/duration of lane closures over time (i.e. capacity), and the growth of traffic volumes over time (i.e. demand). The following sections address these items.

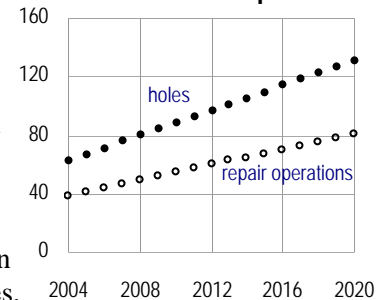
Closure Frequency – No-Build/Continued Maintenance Scenario

Figure 2 charts the location and size of bridge-deck holes from 2002 to 2004. The number of scheduled repair operations was less than the number of holes because most repairs addressed more than one hole (1.63 holes per repair on average). As the figure indicates, all but two of the punch-throughs occurred in the outside lanes (1, 2, 6, and 7) – this is largely attributable to the fact that trucks are restricted to these lanes.

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DRAFT**Figure 2: Area of Hole by Span and Lane, 2002-2004 (150 holes)**

HDR linearly extrapolated the recent historical experience with punch-throughs to forecast the expected number and size of holes through the year 2020. Figure 3 illustrates these forecasts, as well as the expected annual number of repair operations (based on the historical ratio of 1.63 holes per repair operation). The forecast is based on totals from 2000, 2003, and 2004 – because repair operations from late 2001 and early 2002 were reduced in response to the terrorist attacks of September 11, 2001.

Figure 3: Annual Forecasted Holes and Repairs

Closure Scenarios – No-Build/Continued Maintenance

Both the emergency plating operations and the deck repair operations result in lane closures on the bridge. To forecast delays associated with these closures, the following assumptions were used based on information provided by NYSTA:

- Emergency Plating:** Once a hole is discovered, maintenance crews are dispatched as quickly as possible to apply the temporary plating. Based on information from the NYSTA, this process is estimated to take three hours on average (including closing the lanes, installing the plating, and reopening the lanes). It is assumed that the incidence of punch-throughs is a random event; therefore, the day and start time for the emergency plating procedure are also treated as random for the purposes of this analysis. Note that every punch-through is assumed to result in a unique emergency-plating lane closure (unlike scheduled repairs, as reiterated below). Closures are assumed to always leave two (and only two) lanes available to traffic in the direction of the closure.
- Scheduled Deck Repairs:** Repairs occur on weekdays during Maintenance Shift 2 (8:30 a.m. to 4:30 p.m.). As mentioned earlier, some repair operations address multiple holes. NYSTA repair records from 2002/2003 indicate that repair durations varied from four to eight hours in length. Like the emergency plating operations, the repair operations are assumed to occur randomly throughout the year. Unlike the plating procedures, the repairs have a known start time but an unknown duration (from a forecasting standpoint). For the purposes of this analysis, it was assumed that all repairs start at the beginning of Shift 2. Based on an examination of the NYSTA repair records, the repair duration was divided into three categories – short, medium, and long – as shown in Table 1 at right, which also indicates the assumed relative frequency

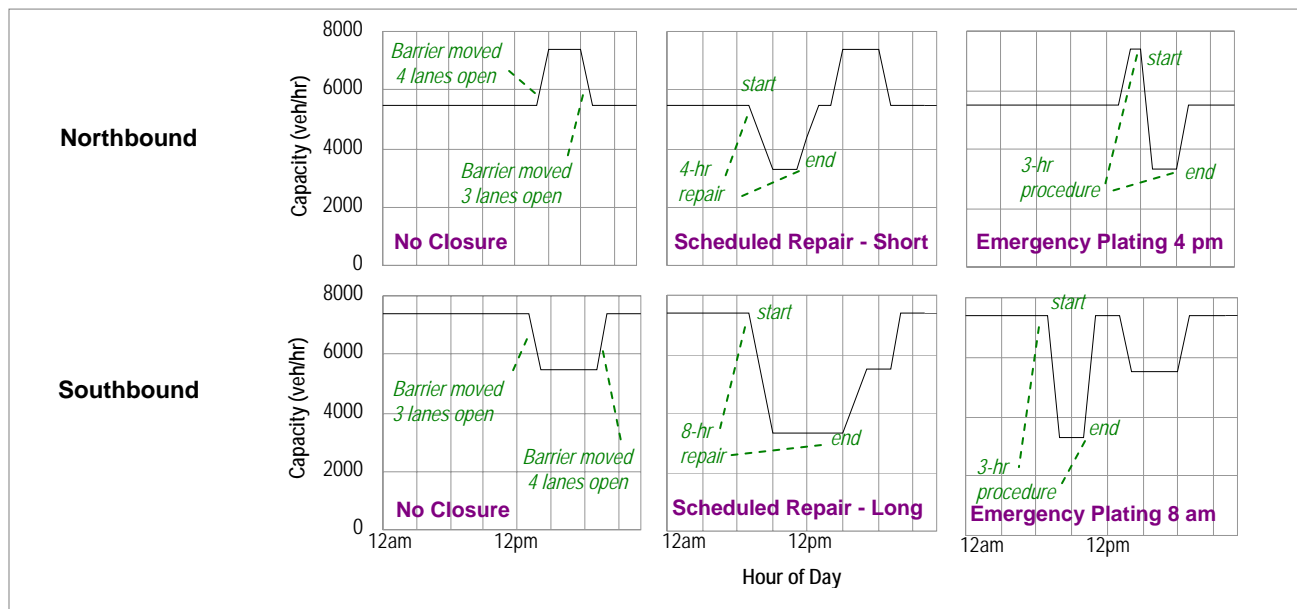
**Table 1:
Assumed Frequency
of Repair Closure
Durations**

	Frequency of Occurrence
Short – 4 hours	30%
Medium – 6 hours	15%
Long – 8 hours	55%

of each of these durations based on historical trends. As with the plating procedures, repair-based closures are assumed to leave two (and only two) lanes available to traffic in the direction of the closure.

The above assumptions were used to develop “closure profiles”: hourly graphs indicating the available capacity per direction for each potential closure event. Figure 4 illustrates some examples of the closure profiles that were developed, including comparisons with non-closure days. NYSTA indicated that when all lanes are open, the capacity of the bridge is 1,850 vehicles per hour per lane (vphpl). On Monday, February 28, 2005, an incident occurred that allows the examination of capacity during lane closure events. (See Attachment B.) In the southbound direction, Lanes 1 and 2 (the outside lanes) were closed from about 6:45 a.m. until about 8:00 a.m. Lanes 3 and 4 remained opened to southbound traffic. Based on data from this event, HDR derived a capacity of 1,650 vphpl for the closure scenario – a decrease related primarily to “rubbernecking”.

Figure 4: Examples of Hourly Closure Profiles



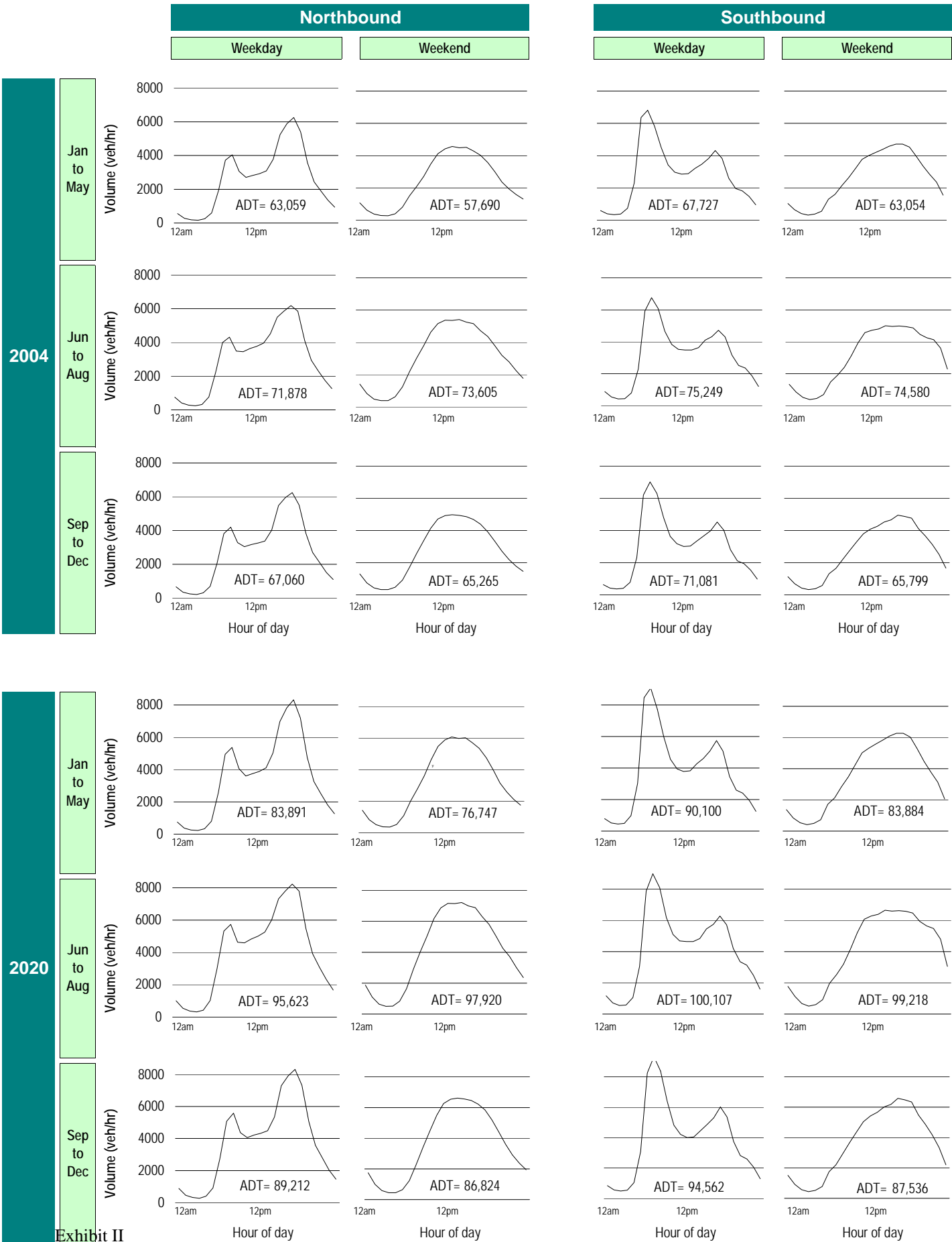
Existing and Forecasted (2005-2020) Traffic

Using data provided by NYSTA, HDR was able to develop typical 2004 hourly volume profiles for each direction on the bridge. Attachment A describes the process used to develop these profiles. For each direction, both weekday and weekend profiles were developed. The profiles were further divided by season – January to May, June to August, and September to December – to reflect the 10 to 20 percent variation that occurs throughout the year, thereby improving the accuracy of the delay forecasts. The upper half of Figure 5 illustrates the 2004 volume profiles.

To forecast future traffic, a compounding growth factor of 1.8 percent per year, developed by HDR as part of previous studies for NYSTA¹, was applied to each of the profiles. Thus, it was possible to develop a set of hourly profiles for each future year between 2005 and 2020. The lower half of Figure 5 illustrates the resulting profiles for the year 2020, the “end condition” of this forecast. Note that the forecasts represent unconstrained demand; there are future years in which the basic bridge capacity is forecasted to be inadequate to accommodate forecasted traffic volumes (regardless of any closures). It was assumed that the basic shapes (diurnal distribution) of the volume profiles would not change; in other words, motorists would not alter their travel start times in response to the congestion. The delays related to this non-closure congestion were subtracted from the delays of the closure scenarios, so that these scenarios would solely reflect closure-related delay.

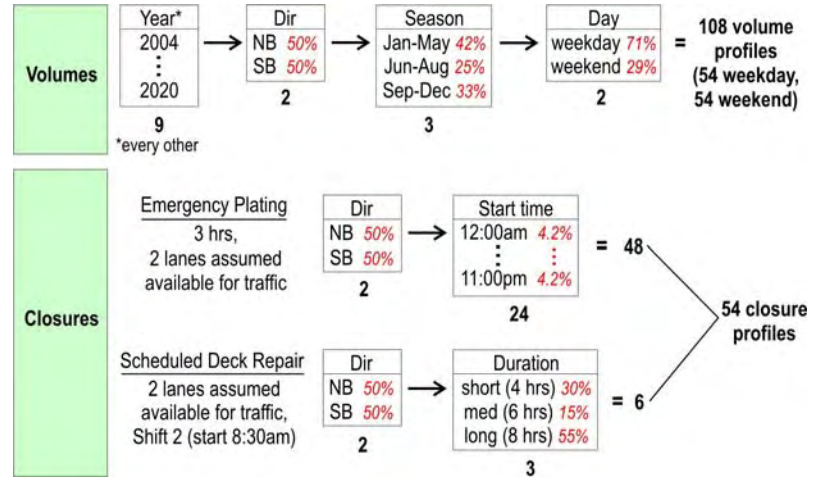
¹ Memo to Tom McLaughlin from Christopher Kinzel, 2/17/04: “Woodbury Barrier Project - Forecasting Methodologies (REVISED)”

Figure 5: Tappan Zee Seasonal Hourly Demand Profiles



DRAFT**Delay Calculation Methodology – No-Build/Continued Maintenance**

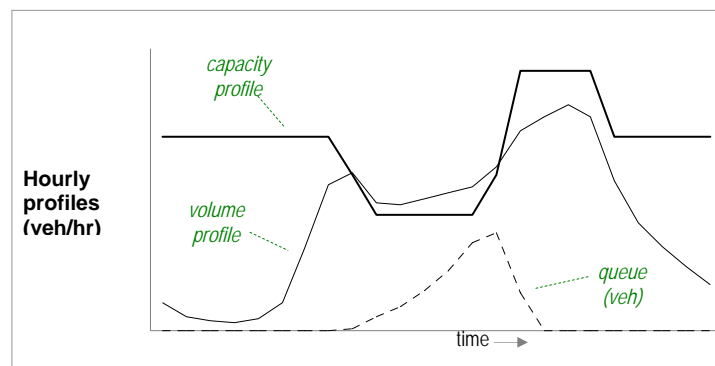
Delay forecasts were developed for each year from 2005 to 2020. A spreadsheet was used to evaluate possible combinations of volume and closure. Figure 6 illustrates the combinations analyzed. The 108 volume profiles and 54 closure profiles resulted in 2,916 combinations. This number was reduced from a potentially larger total by completing detailed calculations for even-numbered years only, and interpolating the results for odd-numbered years.

Figure 6: Volume/Closure Combinations Analyzed – No Build

The % figures relate to the assumed event frequency. They are described in detail on the following page.

The basic process used to calculate the total 15-year delay (2005 through 2020) was to (1) compute the delay associated with each volume/closure combination, (2) multiply that delay by the number of times the volume/closure combination would be expected each year, and (3) sum the results for all years. The first two steps are described below; the third is described in the next section.

- Delays for Volume/Closure Combinations:** To derive delay values for possible combinations, the procedures of elementary queueing theory (deterministic fluid approximation), supplemented by basic shockwave theory, were employed. Figure 7 graphically illustrates the basic theory. The graph includes both an hourly volume profile and hourly capacity profile. When the volume is greater than the capacity, congestion and queueing develop. The queue is illustrated in the graph, and is derived essentially in two parts: (1) the basic queue, which is equal to the cumulative amount of vehicle “arrivals” at a given point in time minus the cumulative amount of vehicle “departures”; and (2) the shockwave-based queue, which accounts for the fact that the queue will “telescope” because vehicles in queue will displace other vehicles that “wanted” to occupy that space during that hour. The total delay for all vehicles during the congested period is equal to the area under the queue curve. The telescoping effect of shockwave theory, when left unconstrained, can result in massive queue buildups that motorists would not be reasonably expected to endure if alternative routes were available. Therefore, for the purposes of this analysis, some diversion of traffic was assumed when queues stretched so far back that they affected vehicles forecasted to be on the bridge two or more hours in the future.

Figure 7: Basic Queue/Delay Graphical Formulation**DRAFT**

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- **Expected Closures per Year:** As Figure 3 illustrated, the forecasted number of closures per year is a function of the expected number of punch-throughs per year. To compute the total annual delay associated with continued maintenance closure events, HDR multiplied the expected number of closures (by type) per year by the delay associated with each closure. Some assumptions underlay this calculation:

- Punch-throughs would be distributed evenly over the year (42% January–May; 25% June–August, 33% September–December).
- Punch-throughs would be distributed evenly by direction (50% northbound, 50% southbound).
- Punch-throughs would be distributed evenly throughout the week (71% weekdays, 29% weekends).
- The duration of scheduled repairs would be distributed as shown in Table 1 (30% short, 15% medium, 55% long).

Delay Results – No-Build/Continued Maintenance

Figure 8 summarizes the results of the No-Build analysis, and shows that roughly 109 million vehicle-hours of delay would be attributed to closures between 2005 and 2020. Scheduled repairs constitute over two-thirds of the forecasted total delay. The graphs in Figure 8 show the annual delay totals for the various closure types.

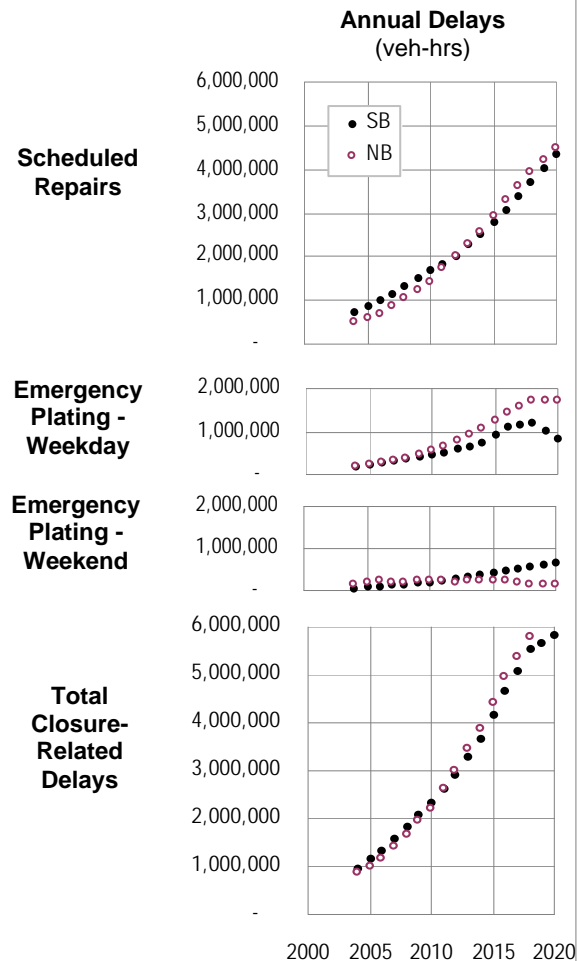
Note that the traffic volume on the bridge is forecasted to exceed its capacity - regardless of closures - by 2008 in the southbound direction during the a.m. peak hour, and by 2014 in the northbound direction during the p.m. peak hour. This delay was excluded from the closure delay totals – therefore, the delays presented in Figure 8 are above and beyond any delays associated with basic capacity constraints.

The delay and queue projections were also spot-checked using a CORSIM (microsimulation) model of bridge closure conditions. The CORSIM model was adjusted to reflect the constrained and unconstrained capacities of the bridge as appropriate.

**Figure 8:
Forecasted Closure-Related Delay (veh-hrs)
No-Build/Continued Maintenance Alternative
2005-2020**

	Northbound	Southbound	Total
<i>Scheduled repairs</i>	36,951,495	37,556,627	74,508,121
<i>Emergency plating</i>			
weekday	15,111,676	10,825,151	25,936,827
weekend	3,266,412	5,347,849	8,614,260
Total	55,329,582	53,729,626	109,059,208

Note: Delays are solely closure-related, and not related to the basic capacity of the bridge (which is forecasted to be exceeded in future years – see text).

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MPT Alternatives

NYSTA also asked HDR to examine delays related to three alternatives under which portions of the bridge deck (see Table 2) would be replaced sequentially, span by span (first in one direction, then the other). These are referred to as Maintenance and Protection of Traffic (MPT) alternatives, because the bridge would remain open to traffic during construction – although lanes would be closed and traffic shifted to facilitate the bridge work.

Assumptions – MPT Alternatives

Table 2 illustrates some of the basic assumptions for the MPT Alternatives. On Spans 0 through 81, lanes 1, 2, 3, 5, 6, and 7 would be replaced. On Spans 82 through 178, only lanes 1, 2, 6 and 7 would be replaced.

The majority of the bridge repairs would require three-lane closures (during which the two outside lanes would be replaced and the adjacent lane would be needed for construction activities). However, spans 0 through 81 on the West Causeway would require four-lane closures, because Lanes 3 and 5 would also be replaced on these spans.

Table 2: Assumptions for MPT Alternatives

	Spans		
	West Causeway (50' span length)		Main Span & Deck Truss (250' span length)
	0-81	82-166	167-178
Closure window requirement	1 span per 10-hr weeknight closure or 5 spans per 36-hr weekend closure		1 span per 36-hr weekend closure
Number of lanes to be closed	4	3	3
Lanes to be replaced	1 2 3 5 6 7	1 2 6 7	1 2 6 7

The West Causeway work (Spans 0 through 166) could be done in ten-hour periods on weeknights or in 36-hour periods over weekends. Due to the 250-foot span length on the Main Span and Deck Truss (Spans 167-178), the work on this portion of the bridge could only be done in 36-hour periods over weekends.

Description of MPT Alternatives

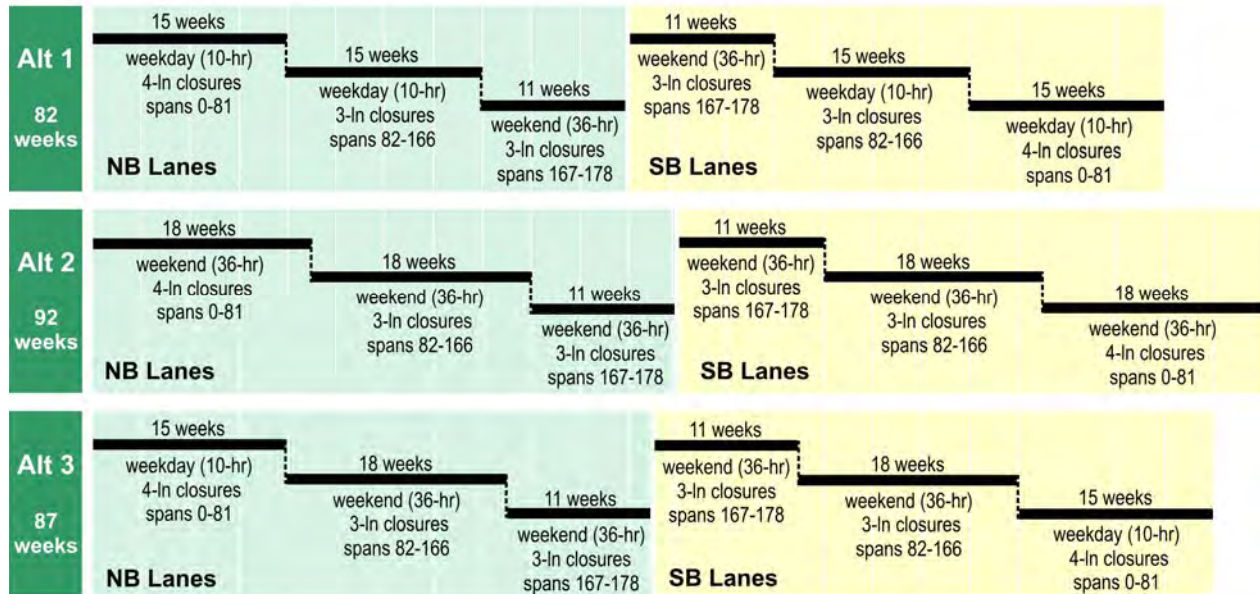
The three MPT alternatives are listed below. Under all three scenarios, the work on the Main Span and Deck Truss would occur on weekends – therefore, the differences among the alternatives relate to the scheduling of work on the West Causeway. In each case, the lanes being replaced would be closed, plus one additional lane for maintenance activities. For three-lane closures, it was assumed that the remaining four lanes of the bridge would be split evenly between northbound and southbound traffic. For four-lane closures, it was assumed that two open lanes would be assigned to the higher-volume direction, and the remaining open lane would be assigned to the lower-volume direction. This assignment was allowed to vary to reflect volume variations over the closure period. Based on these assumptions, the closure “time windows” would not differ based on which direction was being worked on, because the same number of open, adjacent lanes would be provided in both cases.

- *Alternative 1: Weeknight Closures on the West Causeway.* Work on the West Causeway would be performed during 10-hour windows on weeknights (Monday through Thursday). Based on the traffic volume analysis, it was determined that the optimum 10-hour “window” for this work would be from 8:00 p.m. to 6:00 a.m. This alternative would take approximately 82 weeks to complete.
- *Alternative 2: Weekend Closures on the West Causeway.* Work on the West Causeway would be performed during 36-hour windows on weekends. Based on the traffic volume analysis, it was determined that the optimum 36-hour “window” for this work would be from 9:00 p.m. on Friday to 9:00 a.m. on Sunday. This alternative would take approximately 92 weeks to complete.
- *Alternative 3: Weeknight Closures on Spans 0-81; Weekend Closures on Spans 82-166.* Spans 0-81 require a four-lane closure. This alternative was designed to avoid having four lanes closed for 36

hours. The time “window” assumptions for 36-hour and 10-hour closures were the same as described for the other Alternatives. This alternative would take approximately 87 weeks to complete.

Figure 9 illustrates the assumptions and the estimated timeline for each alternative. The work in the northbound lanes would be completed first (moving from north to south), followed by the work in the southbound lanes (moving from south to north).

Figure 9: Timelines for MPT Alternatives

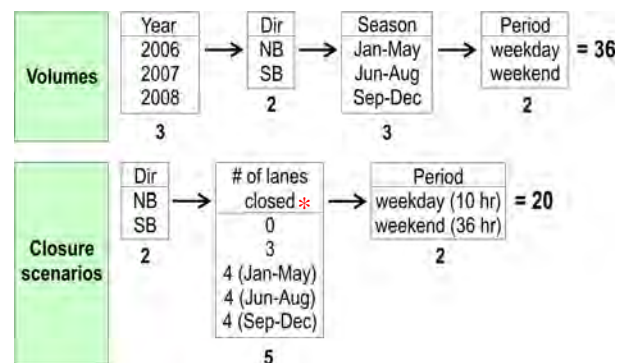


Delay Calculations- MPT Alternatives

Delays for the MPT alternatives were calculated in much the same manner as those for the No-Build alternative. Volume profiles were developed for 2006 through 2008 for both 36-hour weekend scenarios (actually coded from Friday through Monday to aid “window” selection) and the 10-hour weekday scenarios (a full 48 hours were coded, again for “window” selection). Closure profiles were also developed for each direction, closure size and period (weekday/weekend). Figure 10 illustrates the volume/closure profile combinations developed for the MPT alternatives.

The MPT alternatives differed from the No-Build alternatives in that they each had a definitive timeline associated with them; therefore, no “random” elements were used in the analysis. Assuming a start date of July 2006 (per discussions with NYSTA), the schedule for each alternative (see Figure 9) was used to identify which volume/closure combinations would occur during the construction of the alternative, and the number of days that combination would be expected to occur. The number of days was multiplied by the delay associated with the combination, and this product was summed for all such combinations included under each alternative.

Figure 10: Volume/Closure Combinations Developed – MPT Alternatives



* The four-lane closures are subdivided by season because the direction that is assigned two of the three open lanes can vary during the closure period, and this variation differs by season.

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Using the queueing methodology described in previous sections, HDR computed expected vehicular delays for the three MPT alternatives. The queue lengths (in miles) assumed 25 feet of storage per vehicle, and also assumed that 3 lanes were continuously available. Table 3 summarizes the results of the delay and queueing analysis. Of the three, Alternative 1 would result in the least amount of delays and shortest queues. However, queues would still be lengthy (approximately 16 miles) during work on the Main Truss and Deck Span due to the constrained capacity being exceeded during the middle of the day on Saturday and Sunday.

Table 3: Delays and Queues - MPT Alternatives

Alt	Total closure-related delay (veh-hrs)			Maximum queue (miles) during work on given span					
				West Causeway				Main Truss/Deck Span	
				0-81		82-166		167-178	
	NB	SB	Both	NB	SB	NB	SB	NB	SB
1	1,551,129	3,068,615	4,619,744	0.26	4.69	0	0	16.4	15.9
2	8,078,977	10,921,235	19,000,212	16.1	16.1	16.4	15.9	16.4	15.9
3	4,798,888	6,641,059	11,439,947	0.26	4.69	16.4	15.9	16.4	15.9

User Delay Cost Comparison – No-Build/Continued Maintenance versus MPT Alternatives

Based on the delays calculated above, HDR compared expected user delay costs for the No-Build scenario and the MPT scenarios. Based on information provided by the New York Metropolitan Transportation Council (NYMTC) and agreed upon by NYSTA, \$23.00 (in 2005 dollars) was used as the average value of time for the New York Metropolitan Area. This average accounts for a truck/passenger car vehicular mix similar to that found on the Tappan Zee Bridge. The value of time was multiplied by the forecasted user delays for each scenario to result in an estimated user delay cost. User costs were developed in 2005 dollars.

Table 4 summarizes the results of the user delay cost comparison. As the table indicates, closure-related delays from the No-Build alternative would result in a total 15-year user delay cost of roughly \$2.5 billion, split roughly evenly per direction of travel.

Among the three MPT scenarios, Alternative 1 would result in the least closure-related user delay cost - \$106 million. Roughly two-thirds of this cost would be borne by southbound users. The primary reason for this is that the weekday closures, which account for 60 weeks of the Alternative's 82-week construction period, affect the early part of the morning rush hour, which is heavier in the southbound direction.

Table 4: User Delay Cost Comparison
(Assumed value of time = \$23.00 for 2005)

	Delay (veh-miles, 000s)			User Delay Cost (\$2005, millions)		
	NB	SB	Both	NB	SB	Both
No-Build	55,329	53,730	109,059	1,273	1,235	2,508
MPT Alt 1	1,551	3,069	4,620	36	71	106
MPT Alt 2	8,079	10,921	19,000	186	251	437
MPT Alt 3	4,799	6,641	11,440	110	153	263

The forecasted closure-related delay costs from Alternative 2 are roughly 4 times greater than those of Alternative 1. Roughly 40 percent of these costs would be incurred during the four-lane weekend closures on Spans 0 through 81. Eliminating the four-lane weekend closures from Alternative 2 would therefore reduce the delay costs by roughly 40 percent, as reflected in Alternative 3.

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It is important to note that the costs developed in this analysis do not reflect the *complete* cost associated with each scenario. Costs that are not reflected include:

- User delay costs associated with the basic (non-closure-related) capacity of the bridge being exceeded in future years.
- Labor/material costs of punch-through repair and emergency plating.
- Construction costs for the MPT Alternatives.
- Maintenance-related costs for the MPT Alternatives.

Lane Availability Chart

NYSTA also asked HDR to update the Lane Availability Chart for the Tappan Zee Bridge, using 2004 data and 15-minute increments. The purpose of the Chart is to provide guidance to contractors regarding how many lanes must remain open on the bridge in each direction at a given time on a given day of the week. The current Chart used by NYSTA is based on 2002 data and is broken down by hour. To help update this chart, NYSTA provided 15-minute traffic volume data for the southbound direction for all of 2004. HDR subdivided this data into four seasons, and computed 85th-percentile volumes for each day of the week in a given season - resulting in four 24-hour 15-minute volume profiles for the southbound direction.

No 15-minute volume data was available for the northbound direction. HDR developed 15-minute profiles based on the hourly data provided by NYSTA.

Several assumptions underlay the development of the Chart:

- Based on the “rubbernecking factor” capacity developed in Attachment B, a capacity of 1,650 vehicles per hour per lane (vphpl) was used for one- and two-lane situations. A capacity of 1,850 vehicles was used for three- and four-lane configurations.
- No additional “cushion” factors were applied to the capacities. In other words, the lane requirements were based on a volume-to-capacity (v/c) ratio of 1.0.
- The chart was constrained to require no more than four lanes per direction, and no more than seven lanes for both directions.

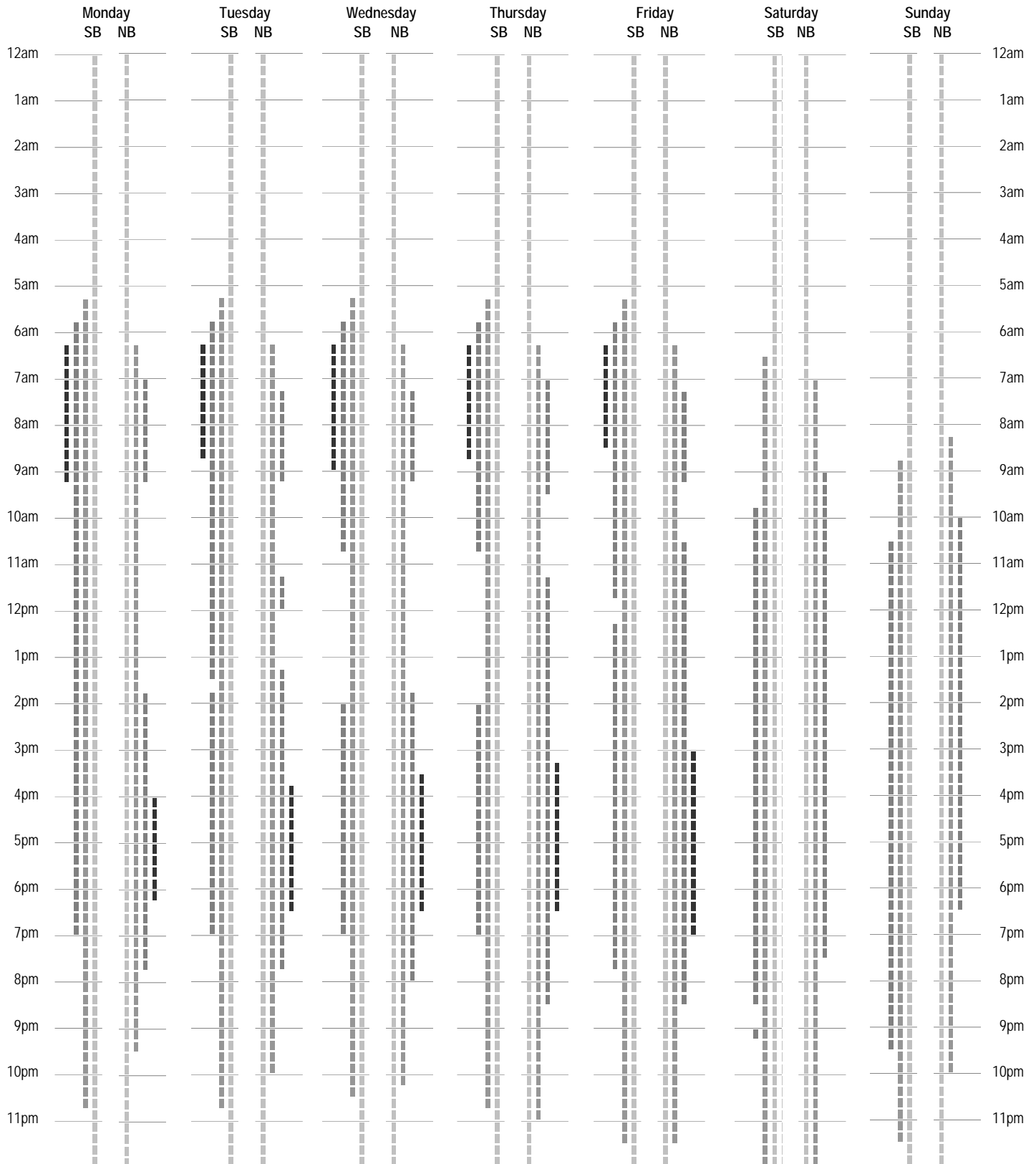
Figures 11a-d contain the seasonal charts, which use vertical bands to show the number of lanes required at any given time; hourly and 15-minute increments are illustrated by horizontal tick marks.

Figure 11a: Winter Lane Availability Chart (Dec-Feb), Tappan Zee Bridge

I-87: Tappan Zee Bridge - Station 9

Lanes required to be Maintained for Traffic Management by Day of Week & Time of Day (15-minute increments)

Based on 2003/2004 Data



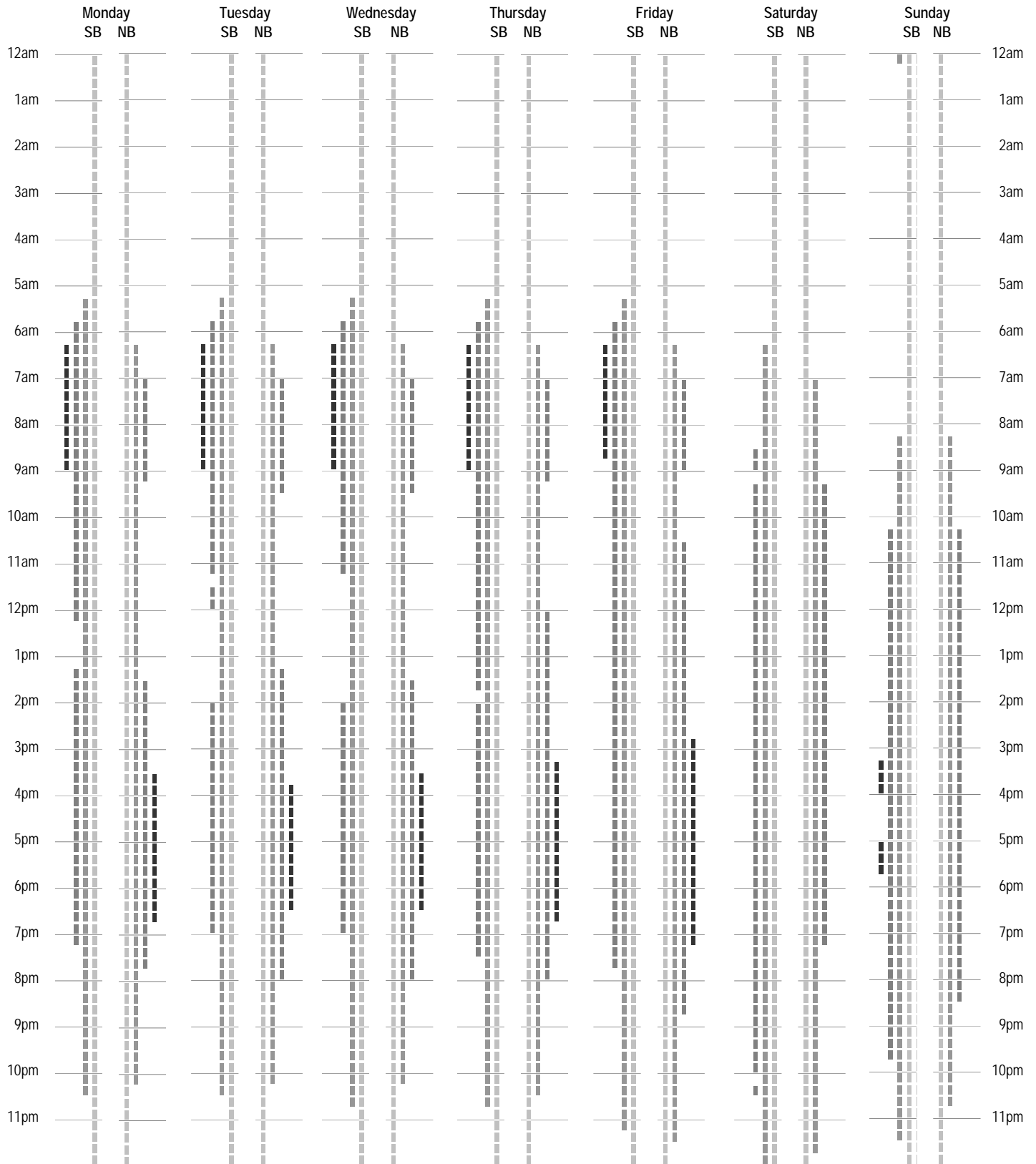
Each vertical line represents a lane that is required to remain open at the time indicated by the horizontal tick-marks.

Figure 11b: Spring Lane Availability Chart (Mar-May), Tappan Zee Bridge

I-87: Tappan Zee Bridge - Station 9

Lanes required to be Maintained for Traffic Management by Day of Week & Time of Day (15-minute increments)

Based on 2003/2004 Data

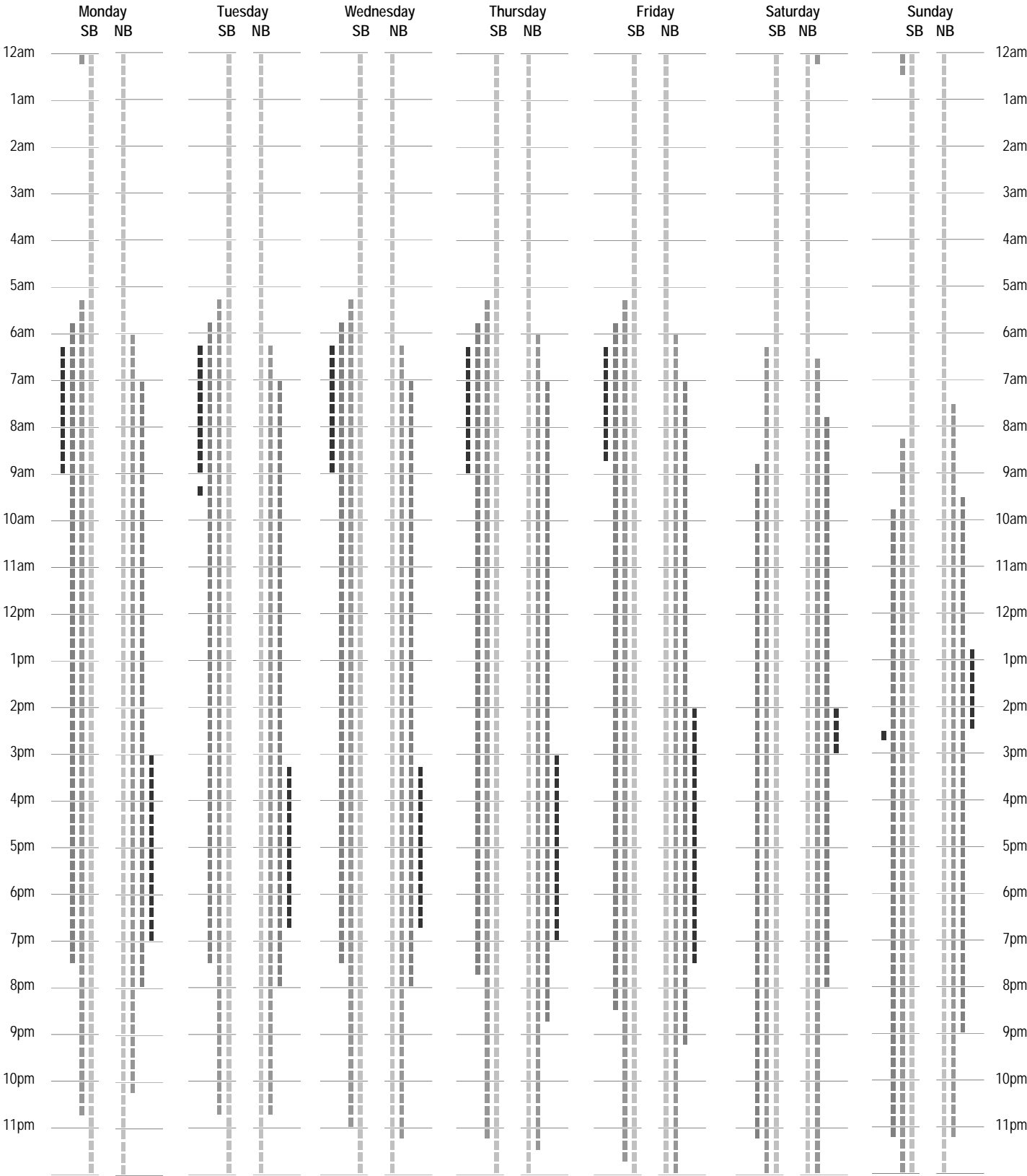


Each vertical line represents a lane that is required to remain open at the time indicated by the horizontal tick-marks.

Figure 11c: Summer Lane Availability Chart (Jun-Aug), Tappan Zee Bridge

I-87: Tappan Zee Bridge - Station 9

Lanes required to be Maintained for Traffic Management by Day of Week & Time of Day (15-minute increments)
Based on 2003/2004 Data

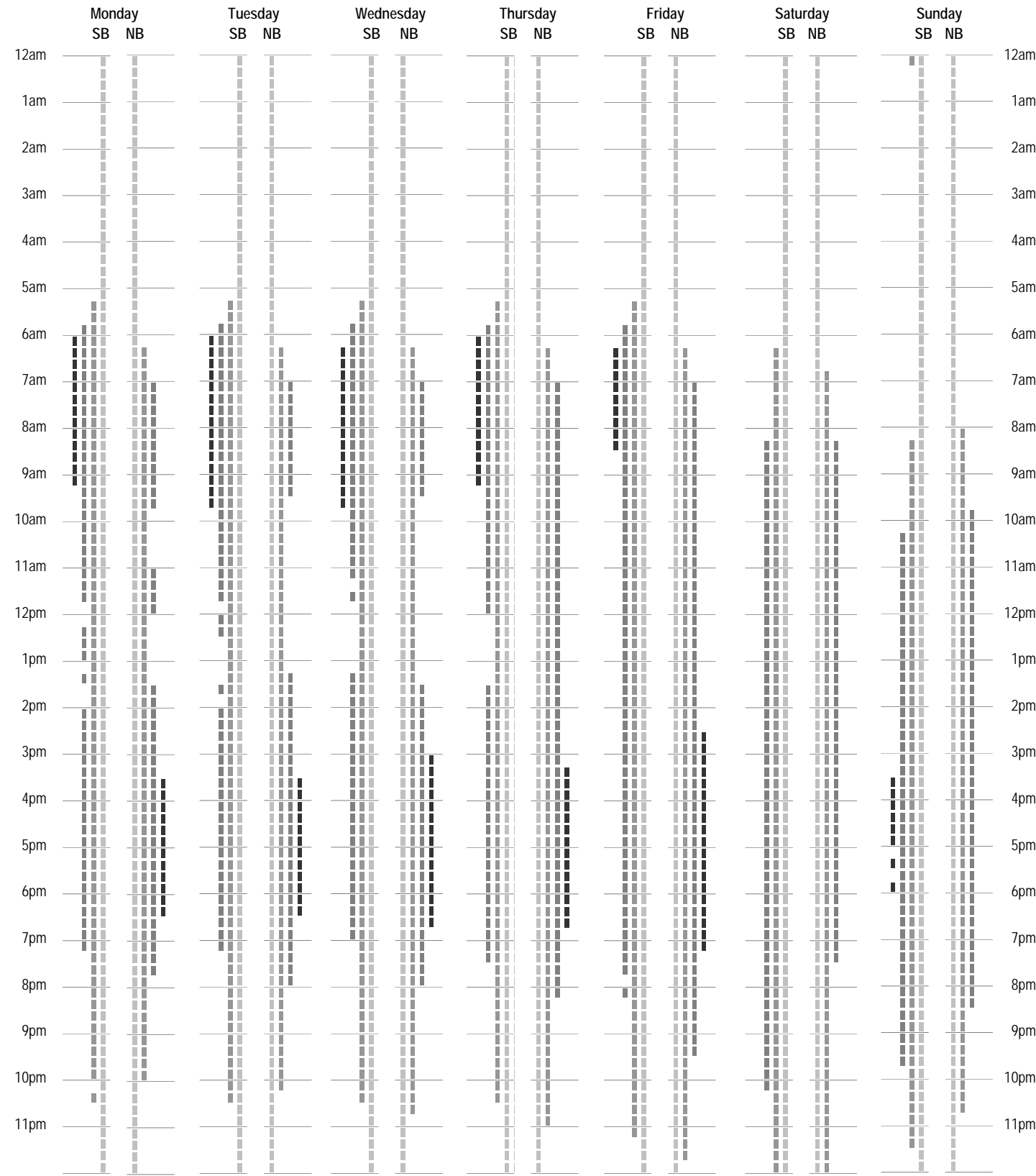


Each vertical line represents a lane that is required to remain open at the time indicated by the horizontal tick-marks.

Figure 11d: Fall Lane Availability Chart (Sept-Nov), Tappan Zee Bridge

I-87: Tappan Zee Bridge - Station 9

Lanes required to be Maintained for Traffic Management by Day of Week & Time of Day (15-minute increments)
Based on 2003/2004 Data



Each vertical line represents a lane that is required to remain open at the time indicated by the horizontal tick-marks.

Attachment A: Development of Tappan Zee Bridge Traffic Volume Profiles

Southbound

To aid in the analysis of traffic volumes on the bridge, NYSTA was able to provide continuous 15-minute count data for the southbound direction (counted at the Station 9 – Tappan Zee Bridge – toll booth) for all of 2004. To assess the data, HDR first subdivided it into days of the week, and then plotted the hourly profiles for each day in an offset stacked layout (Figure A-1). Vertically stacking the profiles allowed HDR to visually select outliers: days with apparent incidents that constrained or displaced the counts, as indicated by atypical “kinks” in the graphs. These outliers, illustrated with a lightly colored dashed line-style in Figure A-1, were excluded from the construction of typical volume profiles. The remaining profiles were considered valid for use in the averaging process.

Once the set of valid profiles had been established, the volumes were stratified and averaged in various ways depending on the analysis purposes, including seasonal and weekday/weekend stratifications. The six upper-right graphs in Figure 5 illustrate the resulting southbound volume profiles. The availability of continuous current southbound data resulted in a fairly straightforward process of developing the southbound profiles.

Northbound

Developing northbound volume profiles was more complicated than developing the southbound profiles, because the same coverage and currency of data was not available. NYSTA provided the following information:

- 2004 continuous hourly northbound counts at MP 16-8 (north of the bridge, and north of the off-ramp at Exit 10). HDR again filtered outliers, which also included days with incomplete counts. Figure A-2 illustrates, via stacked profiles, the data available and the outliers discarded.
- A week-and-a-half of continuous hourly count data at Exit 10, which is the only northbound “source” or “sink” of traffic volumes between the northern end of the bridge and MP 16-8. The data covered 4/21/99 through 5/3/99.
- Northbound count data from 1998 through 2001 for former count-station MO 130N. The number of valid days from these counts is fairly limited.

To create 2004 northbound profiles, HDR consolidated/averaged/stratified the 2004 MP 16-8 counts, used the previously derived compounding growth factor of 1.8 percent per year to inflate the 1999 Exit 10 volumes to 2004 volumes, and added the derived 2004 Exit 10 volumes to the 2004 MP 16-8 counts. The six upper-left graphs in Figure 5 illustrate the resulting northbound volume profiles.

Figure A-1: Tappan Zee Bridge: Daily Traffic Profiles - SB (Sta 9) 2004

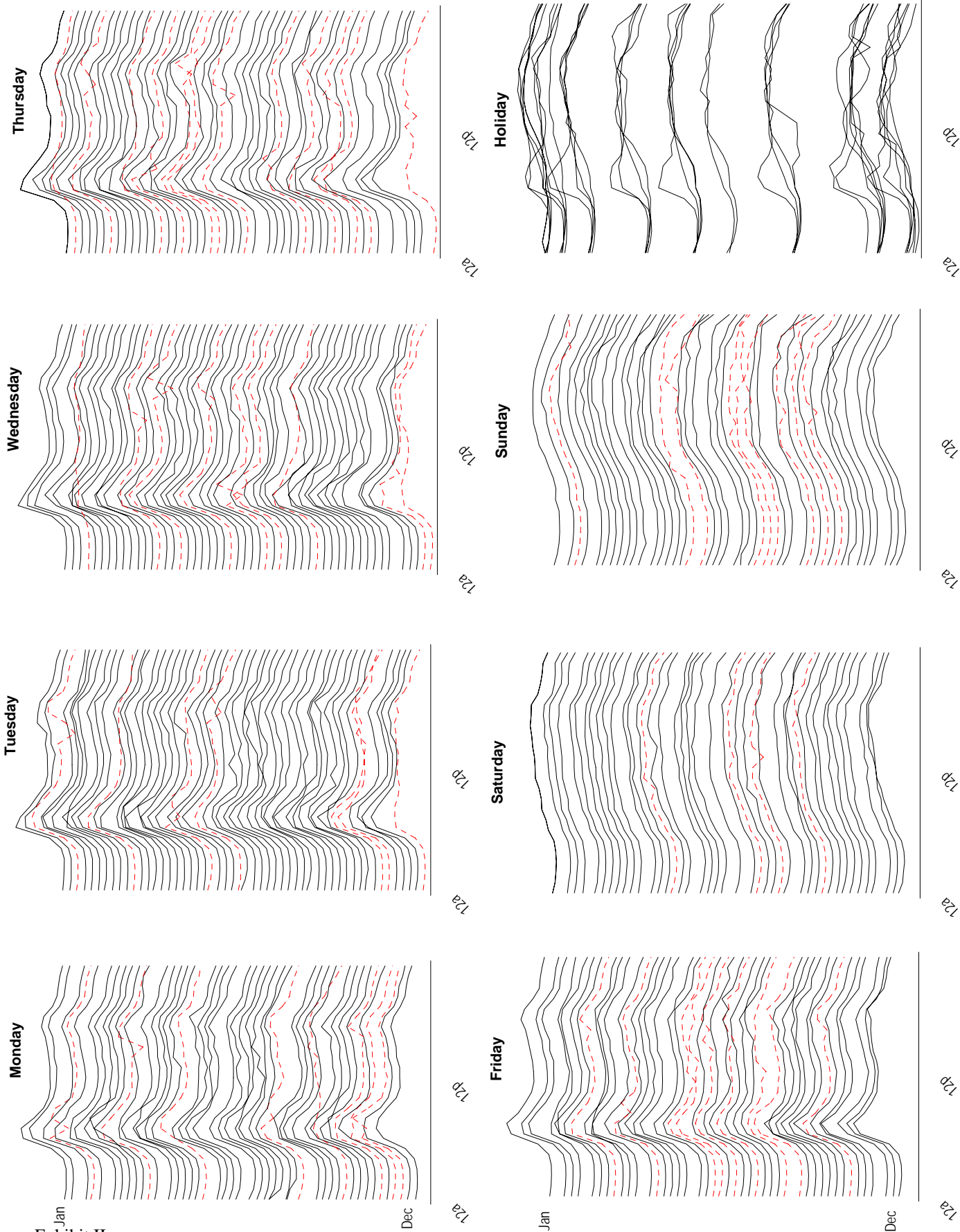
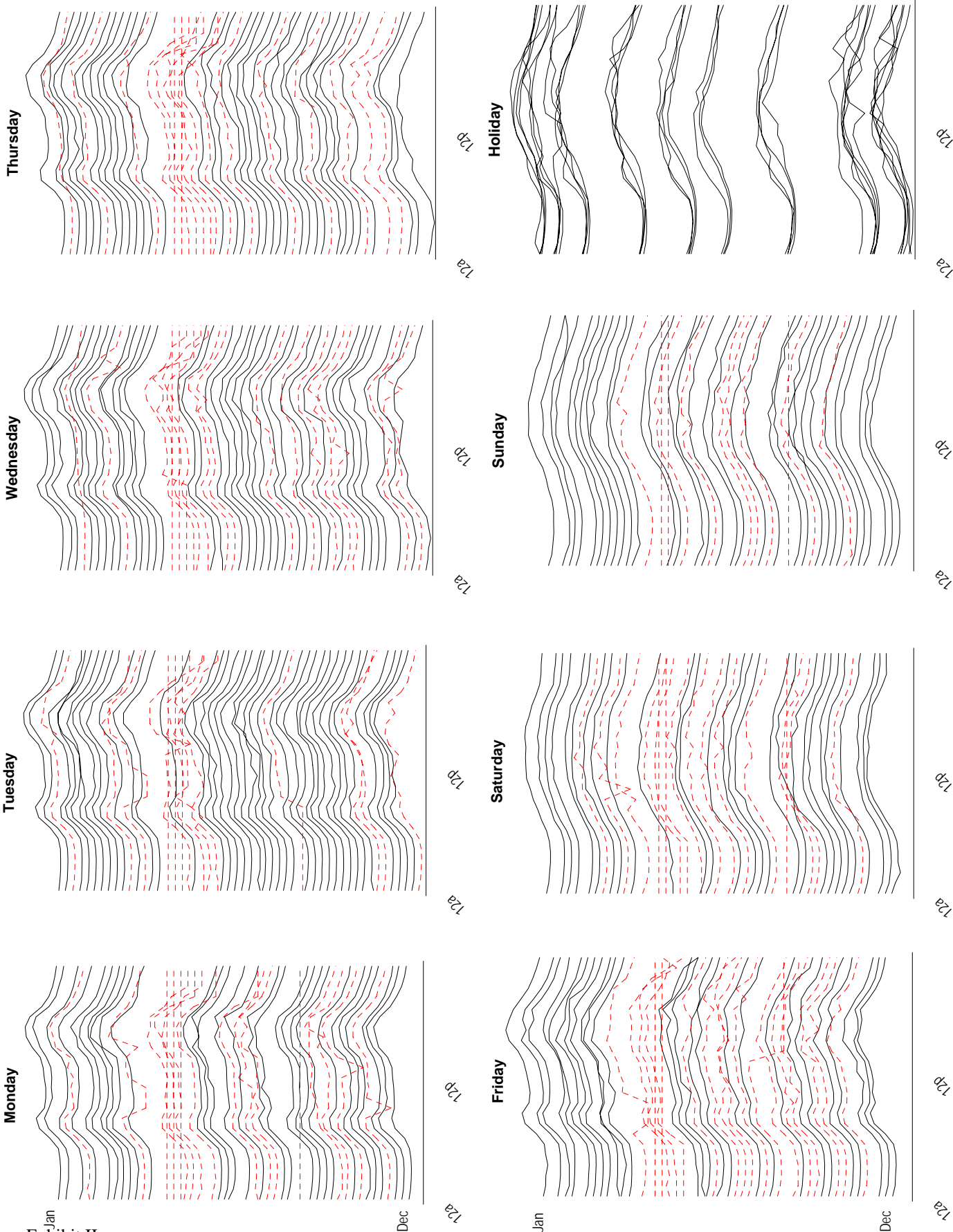


Figure A-2: Tappan Zee Bridge: Daily Traffic Profiles - NB (MP 16-8) 2004 [Note: These volumes require the addition of the Exit 10 volumes to construct northbound volume profiles for the bridge.]

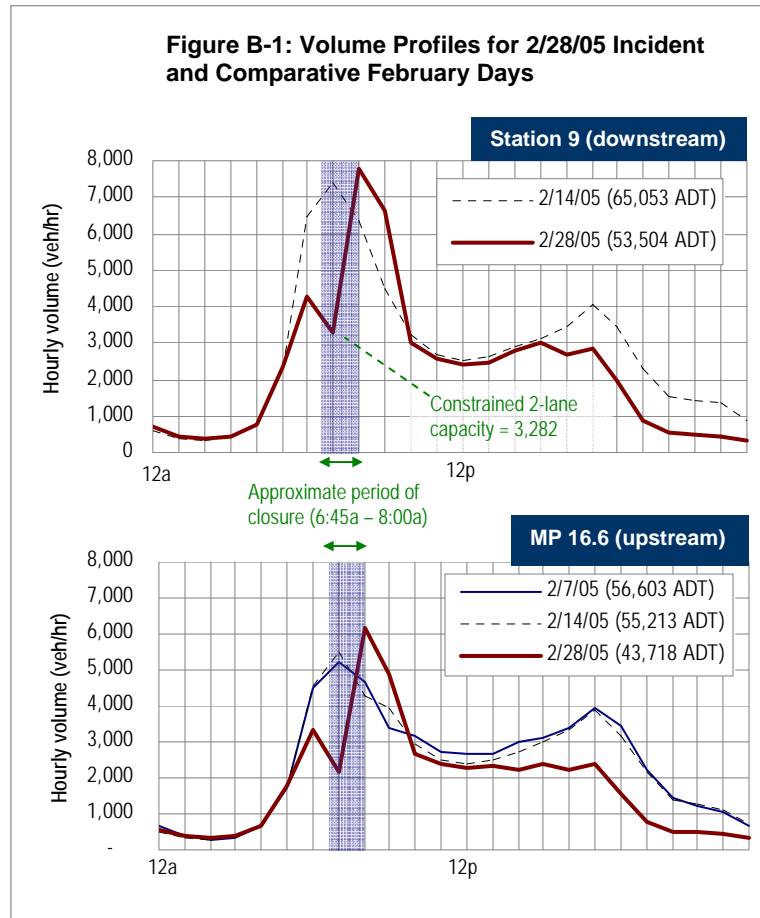


Attachment B: Effects of Incident – February 28, 2005

On Monday, February 28, 2005, an incident occurred in the southbound direction of the Tappan Zee Bridge that forced the closure of Lanes 1 and 2 (the outside lanes) from about 6:45 a.m. until about 8:00 a.m. Lanes 3 and 4 remained opened to southbound traffic. The closure resulted in substantial delays and queues, and can be used to examine capacities during closure events.

Figure B-1 illustrates the effects of the closure in comparison to other, “typical” February days. The upper graph shows data recorded at the southbound toll booth (Station 9), downstream of the incident. The lower graph shows volume data from MP 16.6, north of the incident and also north of a southbound on-ramp (Exit 10). Therefore, the upper graph is more representative of conditions on the bridge, but the lower graph provides an additional comparison point.

In comparison with neighboring incident-free Mondays, 2/14/05 (---) and 2/7/05 (—), the volume profile of 2/28/05 (—) shows a sharp dip during the period of the incident – as would be expected. In the upper graph, the volume of 3,282 between 7:00 a.m. and 8:00 a.m. occurs under congested, queued conditions – meaning that this volume can be used as an estimate of the capacity of the two open lanes. Rounding to the nearest hundred vehicles, the capacity of 3,300 vehicles for the two lanes, or 1,650 vehicles per lane, was used for the closure analyses described in the body of this memo.



The graphs also indicate some apparent secondary effects later in the day on 2/28/05, when volumes were lower than what appears to be the typical profile. Since the analysis of the incident was focused on the immediate effects of the capacity constraint, no further analysis was conducted related to the events of the afternoon and evening.

Exhibit III - NYSTA May 30, 2012 Board Meeting Resolutions regarding the Authority's commitment to fund the Project with necessary toll increases, initial steps to implement recommended commercial toll increases, and to implement an operational streamlining program

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TO: The Thruway Authority Board DATE: May 30, 2012

FROM: Thomas J. Madison, Jr.
Executive Director

SUBJECT: Authorizing the Executive Director to Proceed with Necessary Actions to
Implement Toll Rate Adjustments and Develop an Operational Streamlining
Program

Jacobs Engineering Group Inc. (“Jacobs”), the Authority’s independent traffic engineer, estimates that traffic and revenue growth will soon become insufficient for the Authority to maintain fiscal balance and debt service coverage ratios above the minimum established in the Authority’s Fiscal Management Guidelines and the minimum pledged to its bondholders in the General Revenue Bond Resolution.

Prior toll adjustments, cost containment efforts, capital program re-evaluations and the issuance of Bond Anticipation Notes were designed to provide financing to fund the Authority’s operating, capital and other needs through the end of the recently completed 2005-2011 Capital Program. As a result, it has long been expected that the Authority would need to take decisive action by 2012 to meet its future needs. Considering the significant role the Thruway and Canal Systems play in the New York State and regional economies, it is imperative that actions be taken now to enhance operational efficiency and ensure the reliability of the respective systems.

This item recommends that the Board authorize the Executive Director to develop a new operational streamlining program and begin the public process required to implement a toll adjustment, the combination of which will provide fiscal stability until a long-term financial plan is developed to finance the Tappan Zee Hudson River Crossing Project and the Authority’s other long-term needs.

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The need to generate additional cost savings and revenues is compelled by the Authority's General Revenue Bond Resolution. Pursuant to Section 609 of the Resolution, the Authority has covenanted with bondholders to place in effect as soon as practicable a schedule of tolls, fees and charges which provides sufficient net revenue in ensuing Authority fiscal years to comply with the rate covenant to eliminate any deficiency in funds and accounts at the earliest practicable time. Without taking action to adjust toll rates and streamline operations, the Authority's debt service coverage ratio is projected to drop below 1.2 in 2013, which is the minimum established by the General Revenue Bond Resolution. In addition, the Authority's Fiscal Management Guidelines adopted by the Board require a minimum 1.5 debt service coverage ratio and without taking action, the debt service coverage ratio will drop below 1.5 in 2012. Pursuant to the Resolution, any schedule of tolls, fees and charges must be concurred with by an independent consultant's certificate.

Considering the foregoing, Authority staff requested that Jacobs perform the following services:

1. Estimate the revenues required to meet the Authority's capital, operating, maintenance and other needs;
2. Review revenues and expenditures under the Authority's existing toll rates and take into consideration operational streamlining efforts identified by the Authority for the period 2011-2016; and
3. Recommend a plan to implement a new schedule of toll rates which will provide sufficient net revenues to the Authority and comply with 2 NYCRR Part 203, the

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General Revenue Bond Resolution and the Authority's Fiscal Management
Guidelines.

As noted in the attached report provided by Jacobs (Exhibit A1), a 45 percent upward adjustment to commercial toll rates and the Authority's implementation of an operational streamlining program will provide sufficient net revenues to close anticipated operational deficits and provide debt service coverage ratios that comply with the General Revenue Bond Resolution. In an effort to lessen the impact on local businesses that rely on the Thruway System, the recommended toll adjustment would exclude 2H commercial vehicle types. Large commercial trucks cause nearly 10,000 times the damage to the road system as do passenger cars. Yet, commercial tolls are only 5 times greater than passenger tolls on the Thruway. The proposed adjustment begins to address this disparity. Even with the implementation of this recommended toll adjustment, the Thruway's toll rates on commercial vehicles will remain lower than similar rates on the New Jersey Turnpike, the Pennsylvania Turnpike and all Port Authority and MTA crossings.

The combination of operational streamlining and the commercial toll adjustment will offer the Authority an opportunity to maintain its current, favorable investment grade credit ratings until the financing plan for the Tappan Zee Bridge Project is finalized in late 2012 or early 2013.

Attached is an opinion from the Authority's bond counsel (Exhibit B) that summarizes the Authority's unfettered ability to set toll rates and to issue its bonds. However, in order to implement a toll adjustment, the Authority will need to follow procedures set forth in the Public

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Authorities Law, the Executive Law, the State Administrative Procedure Act, and the State Environmental Quality Review Act. The following describes the specific requirements:

Public Authorities Law Section 2804 (PAL)

The PAL establishes the procedures governing any prospective “increase in fees, tolls or other charges for the use of the highway, bridge or tunnel facilities” and provides that any proposed statewide toll increase be accompanied by at least 3 public hearings.

In addition, the PAL provides that the financial reports indicating the need for the toll increase be submitted to the Governor, Comptroller, Chairman of the Senate Finance Committee, Chairman of the Assembly Ways and Means Committee, and the Ranking Minority members of the Senate Finance Committee and the Assembly Ways and Means Committee 120 days prior to the increase taking effect. The financial reports required by the PAL have been completed and are attached as Exhibit A1 and A2.

State Administrative Procedures Act (SAPA)

SAPA requires the Authority to undertake a formal rule making process to modify the Authority’s toll structure. Proposed toll schedules, based on the recommended 45 percent upward adjustment to commercial toll rates, that will be considered as part of the rule making process are attached as Exhibit C. These rule making documents will be submitted to the Secretary of the State for publication, the Temporary President of the Senate, the Speaker of the Assembly, and the Administrative Regulations Review Commission.

State Environmental Quality Review Act (SEQRA)

Rule making regarding toll modifications constitutes an action under SEQRA. Environmental review relating to the implementation of toll adjustments will be conducted concurrently with rule making and satisfaction of the PAL hearing requirements. A consultant will assist the Authority with satisfaction of the SEQRA process within the same 120-day time frame as is needed to comply with the PAL requirements.

As the aforementioned toll adjustment process will take a minimum of 120 days, it is recommended that the Executive Director be authorized to immediately proceed with the necessary action preparatory to the toll adjustments, including but not limited to filing the proposed rule making, submission of the required reports, conducting public hearings and all other action necessary to fulfill the statutory, regulatory and other requirements for the toll adjustment.

The Finance Committee considered this item at its May 30, 2012 meeting and recommended that this item be presented to the full Board for consideration.

RECOMMENDATION:

It is recommended that the Board adopt the following resolution:

RESOLUTION NO. 5926

AUTHORIZING THE EXECUTIVE DIRECTOR TO PROCEED
WITH NECESSARY ACTIONS TO IMPLEMENT TOLL RATE
ADJUSTMENTS AND DEVELOP AN OPERATIONAL
STREAMLINING PROGRAM

RESOLVED, that the Executive Director, or his designee,
be, and hereby is, authorized to take all steps necessary to evaluate
and propose to the Board those actions that require Board approval
in order to reduce Thruway and Canal operating expenses to
enhance operational efficiency; and be it further

RESOLVED, that the Executive Director, or his designee,
be, and hereby is, authorized to take all actions necessary for the
implementation of the toll adjustments and that such actions shall
conform with the General Revenue Bond Resolution and the
applicable statutory procedures outlined in the Public Authorities
Law, the Executive Law, the State Administrative Procedure Act,
and the State Environmental Quality Review Act; and be it further

RESOLVED, that the financial documents satisfying the
financial reporting requirements of Public Authorities Law Section
2804 be completed; and be it further

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RESOLVED, that after the necessary actions have been taken, the Executive Director shall present a recommendation to the Board regarding a specific schedule for the toll adjustments necessary to meet the requirements of 2 NYCRR Part 203, the General Revenue Bond Resolution, the Authority's Fiscal Management Guidelines and determining the environmental significance of any such actions; and be it further

RESOLVED, that the recommendation regarding the environmental significance of this action authorizing the Executive Director to perform and distribute studies, conduct preliminary planning and hearings and file the documents necessary to formulate a proposal for action be, and hereby is, approved; and be it further

RESOLVED, that under the New York State Public Authorities Law, the Authority has the definitive and unfettered ability to independently fix and collect fees for use of the Thruway system, as it deems necessary, to produce sufficient revenues to cover expenses and fulfill obligations to its bondholders; and be it further

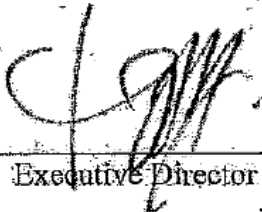
RESOLVED, that under New York State and Federal law, the State of New York has expressly pledged to Authority bondholders that it will not limit or alter the rights vested in the

Authority to fix and collect fees for use of the Thruway system;
and be it further

RESOLVED, that the Authority Board recognizes that
future action to fund the Tappan Zee Hudson River Crossing
Project shall be required once a build alternative is selected and
upon completion of the NEPA/SEQRA environmental review
process; and be it further

RESOLVED, that the Authority Board is committed to the
advancement of the Tappan Zee Hudson River Crossing Project
and the funding necessary to complete it; and be it further

RESOLVED, that this Resolution be incorporated in full in
the minutes of the meeting.



Executive Director

Exhibit IV - Bond counsel opinion regarding the Authority's unfettered ability to raise tolls

Hawkins Delafield & Wood LLP

ONE CHASE MANHATTAN PLAZA
NEW YORK, NY 10005
WWW.HAWKINS.COM

May 24, 2012

Thomas J. Madison, Jr.
Executive Director
New York State Thruway Authority
200 Southern Boulevard
Albany, New York 12201-0189

Dear Mr. Madison:

You have requested our opinions, as bond counsel to the New York State Thruway Authority (the "Authority"), with respect to two issues arising under New York State (the "State") law and the Authority's General Revenue Bond Resolution adopted on August 3, 1992, as amended (the "Resolution").

First, is the Authority's power, operating through its Board, to adjust and raise tolls subject to the approval or veto of any third party or process? Second, is the Authority subject to any statutory or other cap or limitations on the amount of general revenue bonds (or any other evidences of indebtedness backed by its toll revenues) it might issue or incur?

On the first question, it is our opinion that the Authority has the power to fix, adjust and raise tolls on the tolled portions of the Thruway without the approval of any third-party. Nor may any third-party, including any governmental officer of the State, veto the Board's resolution or its implementation of a toll adjustment. There can, of course, be recourse to the courts of the State or the United States for a challenge to any action by the Authority, including toll adjustments. In addition, in adopting a toll adjustment, the Authority is subject to applicable public hearing requirements, State and federal environmental processes, as well as the State Administrative Procedures Act. We note that tolls on the Tappan Zee Bridge and the Grand Island Bridges, which were constructed pursuant to the General Bridge Act of 1946, as amended, may be subject to the standard imposed by Section 135 of the Surface Transportation and Uniform Relocation Assistance Act of 1987, Pub. L. 100-17 to the effect that such tolls be "just and reasonable". However, as further discussed below, the Authority's enabling act (*Pub. Auth. Law § 350, et seq.*) and the Resolution provide express power to the Authority to adjust tolls, and such power is afforded constitutional protection at both the State and federal level.

With regard to the second inquiry, there is no statutory cap or other limitation on the principal amount of general revenue bonds or other toll-backed evidences of indebtedness that may be issued or incurred by the Authority in support of its statutory and contractual obligations to maintain the entire Thruway in a state of good repair. Under the Resolution the Authority has covenanted to “construct, reconstruct, improve, maintain, operate and repair the Facilities [Thruway] and to fix and collect concessions, charges, fees, fares, receipts, rents, and tolls for its use” (Section 608 of the Resolution). The additional bonds test in the Resolution in Section 204 imposes a familiar practical limit on the issuance of additional bonds, which read together with the Resolution toll covenant in Section 609, compels the Authority to review the schedule of tolls to insure that the debt service coverage requirements are met prior to the issuance of bonds.

There are effective statutory, Resolution and practical limits on the Authority’s issuance of toll-backed debt for any purpose other than the maintenance and improvement of the Thruway. For example, there are both statutory and Resolution limits on the Authority issuing such debt for canal capital purposes.

The Authority is constituted and functions as a self-liquidating entity whose general revenue bonds are intended to be and are payable solely from (i) net revenues from the Authority’s operation, jurisdiction and control of the Thruway and (ii) certain reserve funds. By far the single most important source of net revenues to the Authority from the Thruway is derived from Thruway vehicular tolls. Since the adoption of the Resolution, the Authority has issued multiple series of general revenue bonds to support the capital improvement programs for the Thruway and its related facilities. As of December 31, 2011, in excess of \$3.1 billion of general revenue bonds and notes were outstanding.

The Authority in issuing its general revenue bonds has covenanted with prospective purchasers of such bonds that all the revenues, including all tolls, fees, charges, rent and other income and receipts, derived from the operation, jurisdiction and control of the Thruway shall be pledged for the payment of bonds issued under the Resolution. Under the Resolution, the Authority also has covenanted, *inter alia*, that it:

- (i) has good right and lawful authority to fix and collect tolls, fees, rentals and other charges as provided in the Resolution;
- (ii) shall at all times, fix, charge and collect such tolls, fees and charges for the use of the Thruway sufficient to meet certain minimum financial tests set forth in the Resolution;
- (iii) has the power to and has pledged such tolls and other revenues free and clear of any encumbrance thereon;
- (iv) shall at all times defend, preserve and protect such pledge of tolls and other revenues against all claims and demands of any person; and
- (v) will not permit free vehicular passage over any portion of the Thruway, with certain limited exceptions.

The Authority's ability and obligation to fix and maintain tolls and to fulfill the provisions of the toll covenant and the covenant to maintain the Thruway as a revenue-generating asset go to the essence of the Authority's contract with its bondholders. The toll or rate covenant for a toll-road authority is fundamental to the credit and security for its bondholders. As assurance of the Authority's right to make the covenants described above, and to assure the purchasers of its bonds relying upon such covenants, the State in Subdivision 1 of Section 373 of the enabling act specifically pledged and agreed with the Authority's bondholders as follows:

The state does pledge to and agree with the holders of notes, bonds or other obligations of the authority . . . that the state will not limit or alter the rights hereby vested in the authority to establish and collect such fees, rentals or charges as may be convenient or necessary to produce sufficient revenue to meet the expense of maintenance and operation and to fulfill the terms of any agreements made with . . . [bondholders] or in any way impair the rights and remedies of such holders until such . . . bonds . . . are fully met and discharged.

The State's covenant embodied in Section 373 was included in each of the Authority's official statements prepared in connection with the sale of its general revenue bonds to fully disclose such commitment and induce purchases of such bonds.

Any material interference with the Authority's power to make an independent decision with respect to either the setting of tolls or the power to issue its bonds backed by toll revenues to keep the entire Thruway in a state of good repair would give rise to potential contract impairment. There is strong legal authority from United States Supreme Court and New York State Court of Appeals prohibiting the impairment of contract and the Authority has a fiduciary obligation to its bondholders to fulfill its material obligations under the Resolution.

The leading decision in New York on contractual impairment is the State Court of Appeal's ruling in *Patterson v. Carey*, 41 N.Y. 2d 714 (1977). *Patterson* declared unconstitutional in its entirety a provision of the Public Authorities Law which rescinded a toll increase imposed by the Jones Beach State Parkway Authority in the toll charged motorists for the use of the Southern State Parkway and provided that such tolls could be increased only upon the filing of a report with the State Comptroller 120 days prior to any proposed increase. In conjunction with the reconstruction of the parkway, the authority had issued bonds that were sold to the general investing public. The authority was empowered to charge tolls sufficient to pay the cost of "constructing, reconstructing, operating and maintaining" the parkway, and toll receipts were pledged to secure the authority's obligation on its bonds. The Court of Appeals found that where toll revenues are the sole source of funds for bond repayment, the discretionary power to set tolls was "an important security provision." *Id.* at 721. The Court of Appeals noted:

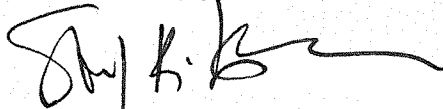
Bondholders were guaranteed that the authority would have the necessary power to raise tolls in order to pay authority obligations. This, obviously, was no small concession, nor was it superfluous . . . *Intercession by others outside the authority is not what the bondholders contracted for.* *Id.* at 721-22 (emphasis added).

Patterson followed the rationale of the federal case law, and concluded that interference by the State in that authority's toll setting powers eliminated an important security provision for bondholders and impaired the State's contract with bondholders and concluded that the legislation violated the contract clause.

This opinion letter is rendered solely with regard to the matters expressly opined on above and does not consider or extend to any documents, agreements, representations or other material of any kind not specifically opined on above. No other opinions are intended nor should they be inferred. This opinion letter is issued as of the date hereof, and we assume no obligation to update, revise or supplement this opinion letter to reflect any facts or circumstances that may hereafter come to our attention, or any changes in law, or in interpretations thereof, that may hereafter occur, or for any other reason whatsoever.

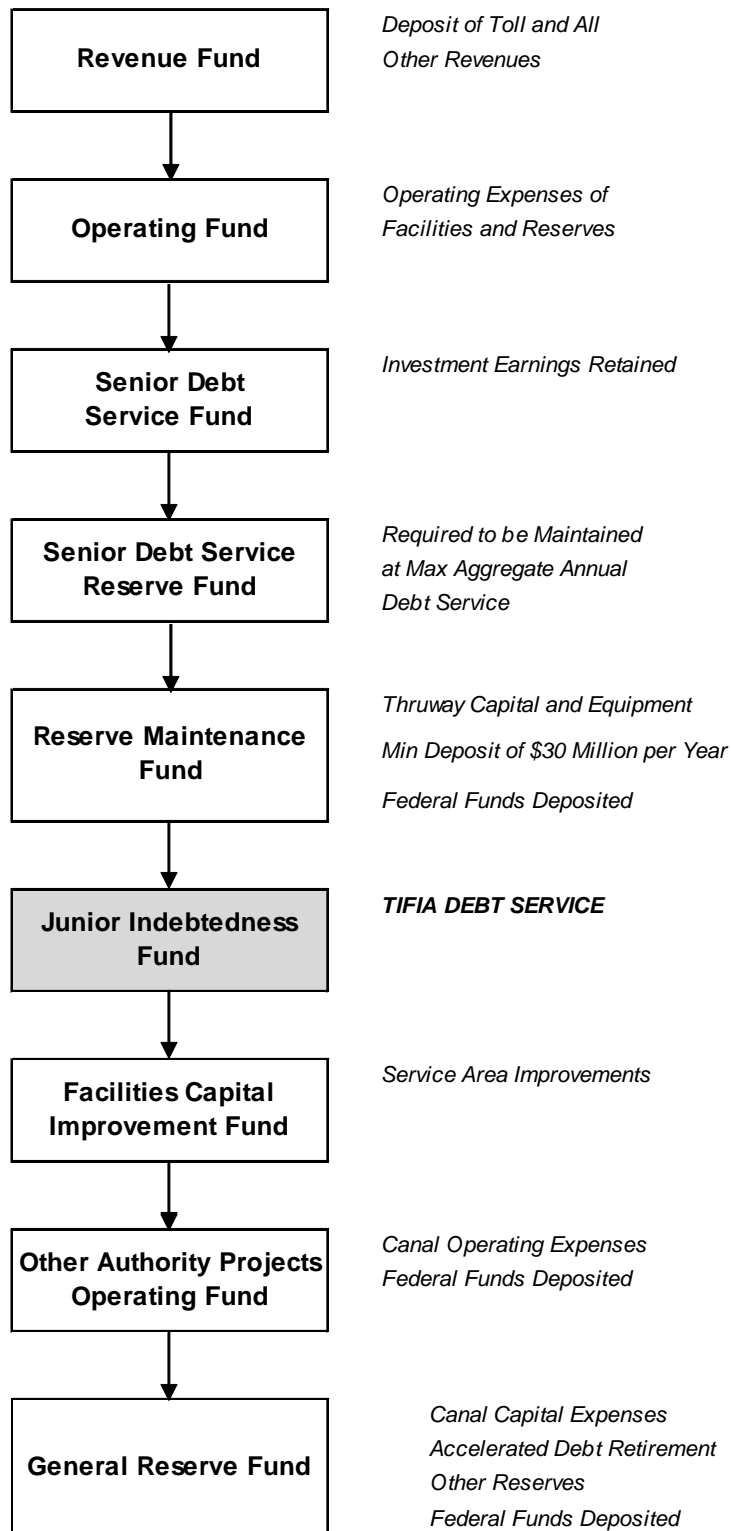
If you require any further examination of these issues, please do not hesitate to call upon me.

Very truly yours,



Stanley R. Kramer

Exhibit V – Flow of Funds per the Authority’s General Revenue Bonds Resolution



**Exhibit VI - Traffic and Revenue Report prepared by Jacobs Civil
Consultants, June 18, 2012**



Submitted to:
**New York State
Thruway Authority**

Traffic and Revenue Report Including Review of Operating Expenses and Physical Condition

June 18, 2012

Submitted by:

Jacobs Civil Consultants Inc.
2 Penn Plaza, Suite 603
New York, NY 10121



To: Members of the New York State Thruway Authority

You have requested this traffic and revenue study (“T&R Study”) – including a review of operating and other expenses, revenues and the physical condition of the Authority’s infrastructure – for use in connection with the sale and issuance by the New York State Thruway Authority (“Authority”) of its General Revenue Bonds, Series I.

This Study identifies the general characteristics of the Thruway customers; describes current toll rates and those proposed to be changed; historical levels of traffic, revenues and expenses; and projections of future levels through 2016, including the 2012-2015 Multi-Year Capital Program.

The projections of future traffic, revenues and expenses are based on the toll schedule and operational streamlining program that were approved by the Authority Board on May 30, 2012. On the basis of studies and analyses made, we have reached the following conclusions:

- The Authority has the ability to provide significant amounts of additional revenues through increases in toll rates.
- The Authority’s operational streamlining efforts will have a positive impact by limiting future operating expense growth.
- Capacity constraints on the Thruway will not affect the projected growth of traffic and toll revenues.
- The Authority’s facilities have been maintained in high standards over the years with resulting overall good conditions.
- The Authority’s planned extensive and regular maintenance programs and Five-Year Capital Program will ensure the overall operational and structural integrity of the facilities will be maintained.
- Toll revenues will be sufficient, assuming the proposed toll increases and operational streamlining initiatives are implemented and increases in Federal aid to allow the Authority to fund the 2012-2015 Multi-Year Capital Plan and programs as detailed in the Traffic Engineer’s Report.
- Although a further review of the proposed financial plan for the Tappan Zee Bridge Project will be required when the proposed financing plan is developed in late 2012, the Authority has the ability to generate additional toll revenues through the implementation of toll rates that are higher than those proposed for the September 30, 2012 toll modification to support the additional capital needs of the Tappan Zee Bridge Project once the plan of finance is advanced in late 2012.

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I. Introduction

Since its opening more than 55 years ago, the New York State Thruway (“Thruway”) has served as the central artery of the State’s transportation system, providing a vital link between its major cities from the Atlantic Ocean to Canada and the Great Lakes. Over the years, the New York State Thruway Authority (“Authority”) has taken actions that have allowed for safe and efficient travel for millions of passenger and commercial customers.

The Thruway serves travelers with a variety of needs and purposes, including commuters, business travelers, recreational travelers, and commercial vehicle traffic. The Authority has provided a dependable roadway system for these travelers, sustaining and encouraging economic growth, fostering job creation and generating tax revenues to the State and its local governments. Underscoring its importance to the state, region and nation, Thruway customers traveled approximately 8.1 billion vehicle-miles on the highway in 2011, averaging almost 22.1 million vehicle-miles per day.

Significant capital improvements and maintenance work is undertaken each year to keep the Thruway highways and bridges in a state of good repair, ensuring safe and efficient travel for the heavy traffic demands of today’s world. In addition to on-going capital and maintenance tasks, the Authority is also continually evolving to better serve its patrons, improving customer service with advances in technology and adding new capacity to highways and bridges in the corridors with high travel demand. Furthermore, the Authority has the responsibility of maintaining the reliability of the historic Canal System, ensuring that it remains a viable waterway for boating, shipping and recreation and an important component of New York State’s economy.

Over the last several years, the Authority has faced substantial challenges that have strained its ability to maintain its financial strength while financing the capital needs of the aging Thruway and Canal Systems. Principal among these challenges, the Authority had to manage budgets with historic declines in traffic and toll revenues resulting from volatile fuel prices, a deep and lengthy national and state recession and a slow and protracted recession recovery period. As experienced by other toll facilities across the nation, the number of trips and the length of trips taken by Thruway patrons have markedly declined over the past four years and traffic is not expected to reach pre-recession levels for many years to come. In addition, the prevalence of high fuel and construction commodity prices has placed enormous pressure on the Authority’s operating budgets and capital programs, as have considerable declines in Federal aid allocated to support its growing infrastructure and service needs.

During these times of financial stress, the Authority downsized and reconfigured its capital program, implemented operational cost controls and issued short-term notes to bridge capital funding gaps. It is important to note that prior toll adjustments were originally designed to only provide sufficient revenues to finance the recently completed 2005-2011 Capital Program. As a result, in order for the Authority to successfully meet its future growing capital needs, refinance outstanding short term debt and provide reliable service to its patrons, additional revenues are needed at this time to complement enhanced operational streamlining efforts.

Based on that need for additional revenues, the Authority Board began the process of modifying toll rates by proposing a 45 percent adjustment to commercial toll rates to be implemented on September 30, 2012. However, in an effort to lessen the impact on local businesses that rely on the Thruway System, the toll adjustment would exclude commercial vehicle with two-axles and over seven feet six inches in height (2H). The impact of the streamlining program and the proposed toll action on the Authority's revenues and long-term financial plan is described in more detail herein.

It is important to understand that the current design-build procurement process for the replacement of the Tappan Zee Bridge is underway and a better understanding of the cost of the new Tappan Zee Bridge and any potential Federal aid or financing assistance for this important project or other capital purposes will not be available until later this year. At that time, the Authority intends to advance a long-term plan to finance the construction of the new replacement Tappan Zee Bridge and allow the Authority to meet its other future capital, operational, and maintenance needs.

II. The New York State Thruway & Canal System

The following sections provide an overview of the Thruway System and the Authority's responsibilities.

A. The Thruway System

At 570 miles in length, the New York State Thruway is one of the largest tolled highway systems in the United States and is a critical component in the national interstate network. The Thruway connects the principal cities of the State from New York City to Albany, and on to Utica, Syracuse and Rochester through to Buffalo and the Pennsylvania State Line. The Thruway corridor serves 37 of the State's 62 counties and the majority of the State's population. Approximately 245.2 million toll transactions occurred on the Thruway in 2011, generating about \$634.1 million in toll revenues.

The Thruway is an important interstate connector, joining with the Massachusetts Turnpike (I-90), Connecticut Turnpike (I-95), and New Jersey's Garden State Parkway, as well as several other Interstate routes such as I-287 from New Jersey; I-90 in Pennsylvania; I-290 around the north side of Buffalo; I-390 and I-490 serving Rochester; I-81, I-481 and I-690 at Syracuse; I-790 in Utica; I-87 (the Northway), I-88, I-90, I-787, and I-890 at Albany; and I-84 at Newburgh. It also makes direct connections with numerous major State highways.

The Thruway is comprised of two types of toll systems – a controlled (ticket) system and a barrier system. The controlled system (approximately 481 miles) makes up the largest portion of the Thruway, running from Woodbury (in the southeast corner of the State) north along I-87 to Albany, then west on I-90 to Buffalo and south of Lake Erie to the Pennsylvania border. In addition to this main stretch of the controlled system, there is a small branch south and east of Albany providing a connection to the Massachusetts border and the I-90 Massachusetts Turnpike.

On the controlled system, tolls are charged based on the actual distance traveled by the customer. Meanwhile, barrier toll plazas have a fixed toll rate for each vehicle class and payment type (e.g., Cash, *E-ZPass*, as well as Commuter and other *E-ZPass* Discounts). The barrier systems (one located in the southeast corner of the State and the other located in the northwest corner of the State) are comprised of the Tappan Zee Bridge, Yonkers Barrier, New Rochelle Barrier, Spring Valley Barrier, Harriman Barrier and the Grand Island Bridges. Under the toll structure, toll rates across the system are based on the vehicle classification, related to the number of axles per vehicle and the height of the vehicle over the first two axles.

It is important to note that there are portions of the roadways under the Thruway jurisdiction that are currently toll-free. These include a nine-mile section in the Buffalo area between the controlled sections; I-190 between Buffalo and Grand Island; I-90 between Albany (Interchange 24) and I-88 (Interchange 25A); and the Cross-Westchester Expressway (I-287). In addition, there are stretches of roadway on the sections with fixed-toll barriers where short trips can be made without passing through a toll barrier.

Figure II-1: New York State Thruway Toll Systems



1. Roadways

The original 2,800-lane mile Thruway roadway system was constructed between 1949 and 1960 and is one of the oldest components of the national Interstate Highway System. In 1991, State legislation made the Authority additionally responsible for the operation and maintenance of 11 miles of the Cross-Westchester Expressway (I-287). The New York State Department of Transportation (NYSDOT) remains responsible for capital improvements to this roadway. The Thruway System is now over 570 total miles in length and includes 134 interchanges. The various sections of roadway currently maintained by the Authority are listed in Table II-1.

Thruway pavements are typically nine inches of reinforced Portland cement concrete placed on 12 inches of granular sub-base. Shoulders are made up of treated granular material with asphaltic wearing surface. A large portion of the roadway's base dates back to its original construction, highlighting the need for heavy maintenance, reconstruction and rehabilitation activities to retain the riding surface in a state of good repair.

Table II-1: The Thruway System

Section	Controlled Section	Barrier Section	Length (in Miles)
The Mainline (New York City - Buffalo)	x	x	426
Erie Section (Buffalo - Pennsylvania Line)	x		70
Niagara Section I-190 (Buffalo - Niagara Falls)		x	21
Berkshire Section (Selkirk - Massachusetts Line)	x		24
New England Section (I-95) (Bronx - Connecticut Line)		x	15
Garden State Parkway Connection (Spring Valley - New Jersey)			3
Cross-Westchester Expressway (I-287) (Mainline I-87 in Tarrytown - I-95 in Rye)			11
Total			570

2. Bridges

The Authority has maintenance responsibility for 811 bridges that carry local roads and state highways over the Thruway System. The structural characteristics of these bridges vary: about 15 percent are concrete structures, either pre-stressed girder, arch, rigid frame or box culverts. The remaining 85 percent of the bridges are steel structures with asphalt overlaid, reinforced concrete decks. As with the roadway, an overwhelming majority of the structures date back to the original opening of the Thruway System in the 1950's and require continual and significant repair, rehabilitation and reconstruction investments to prevent deteriorating conditions.

By far, the largest bridge on the Thruway System is the Tappan Zee Bridge over the Hudson River, located approximately 20 miles north of New York City. The Tappan Zee Bridge was opened to traffic in 1956 and is a three-mile long multi-span steel truss, deck truss and girder type structure. Due to its size and importance, a permanent Authority maintenance team is assigned to the Tappan Zee Bridge. The Tappan Zee Bridge routinely experiences peak hour traffic volumes that are 40 percent higher than normal operational volumes and to increase the Bridge's one-way traffic capacity, a movable barrier provides for the reversal of one of the seven traffic lanes to help accommodate directional peak traffic volumes. As described in more detail later in this report (on page VI-3), the Tappan Zee Bridge is scheduled to be replaced in the near future.

Besides the Tappan Zee Bridge, the Thruway consists of seven other major bridge structures. These include the Castleton-on-Hudson Bridge across the Hudson River on the Berkshire Section; the four Grand Island Bridges spanning branches of the Niagara River north of Buffalo; the mile long Niagara Viaduct, and the Byram River Bridge on the New England Section.

3. Service Areas and Buildings

There are 393 buildings of various types owned by the Authority along the Thruway, which are summarized in Table II-2. These buildings include large maintenance and administrative facilities as well as smaller structures, such as storage sheds, utility buildings, and other minor facilities. The buildings include four administrative headquarters and 55 centralized maintenance buildings; 148 maintenance section buildings; 64 service area buildings, 67 toll facilities, 12 police barracks and 43 miscellaneous use buildings.

Table II-2: Thruway Authority Buildings

Thruway Authority Buildings	
Description	Number
Administrative Headquarters	4
Centralized Maintenance	55
Maintenance Section	148
Service Areas	64
Toll Facilities	67
Police Barracks	12
Miscellaneous Use	43
Total	393

The Authority's Administrative Headquarters is located just off Interchange 23 at 200 Southern Boulevard in Albany, overlooking the Thruway mainline and the Albany Division maintenance complex. This building was constructed in 1972.

The Thruway's maintenance responsibility is divided into four divisions, with each division having its own headquarters complex. These Division headquarters are located in Suffern, Albany, Syracuse, and Buffalo. The Division headquarters complexes serve several functions that include housing the administrative staff for the maintenance program, as well as providing offices for State police, toll collection, traffic and customer service, and various personnel.

Toll booth facilities (toll buildings) are an important part of the Authority's physical plant. The Thruway system contains over 250 toll lanes. The toll booths have all of the characteristics of individual buildings, with each having its own heating and lighting systems, windows and doors.

Service areas providing fuel, restaurants and other amenities for the 27 travel plazas are operated through concessionaire agreements. The buildings, parking areas, and waste water treatment plants are maintained by Thruway staff.

The Authority owns 27 travel plazas located at intervals along the Thruway System, operated by three food service concessionaires: HMS Host Family Restaurants, Inc. (12 plazas), McDonald's Corporation (11 plazas) and Delaware North Companies Travel Hospitality Services, Inc. (4 plazas); and two fuel service operators: Lehigh Gas Corporation (12 plazas) and Sunoco, Inc. (R&M) (15 plazas).

To provide maximum customer service, all food and fuel centers are open 24 hours daily, 7 days per week and offer parking, fuel, public restrooms (including family assist restrooms equipped for persons with disabilities), ATMs, and free Wireless Internet Service. There is also a brand name food vendor at each travel plaza open to the public 24 hours per day, 7 days per week. Further, many travel plazas have seasonal farm markets, gift shops, fax machines, sell *E-ZPass* On-the-Go (retail *E-ZPass* transponders) and staff a number of Tourist Information Centers.

The Authority and its concessionaires continue to make various improvements at the travel plazas, including updating food concepts and the overall appearance of the interiors and exteriors of the buildings, gas station renovations, adding trucker's lounges and increased tractor trailer parking.

4. Safety, Incident Response and Traveler Information Systems

The Thruway Statewide Operations Center ("TSOC"), housed at the Authority's Administrative Headquarters in Albany, is the central location for the coordination of all traffic incident response, emergency management, and dissemination of traveler information along the entire Thruway. The TSOC operates 24 hours per day, 7 days per week, 365 days per year. The Authority exchanges traffic and Intelligent Transportation Systems ("ITS") data with NYSDOT through the Regional Traffic Operation Centers, providing the public with a view of traffic operations across New York State so they may make more informed travel choices.

To increase the functionality of the TSOC, the Authority recently implemented an Advanced Traffic Management System to integrate and control all current and future ITS devices and systems. Such devices include 73 Permanent Variable Message Signs, 154 Closed Circuit Television cameras, 13 Highway Advisory Radio stations, 119 real-time vehicle detector sites, and 26 Portable Variable Message Signs. The Authority also offers an email alert service (TRANSalert) to its customers to inform them of major unscheduled incidents that may affect their travel plans and the Thruway website (www.thruway.ny.gov) offers a centralized location to access a multitude of traveler information.

Finally, a troop of New York State Police (Troop T) is entirely dedicated to policing on the Thruway System. The principal mission concern for Troop T is to increase safety on the roadway and reduce fatal and personal injury auto accidents. They address the issue through enforcement and education. Through the years, Troop T has participated in traffic enforcement initiatives directed at drivers who engage in behavior known to cause fatalities or exacerbate the fatality rate: speed, failure to use

seatbelts and drunk and/or drugged driving. However, the greatest proven method to reduce fatalities is the day-to-day visible enforcement of traffic laws by the patrol troopers on the highway.

In 2011, good overall highway conditions, traveler access to online and radio information services, good incidence and weather response and the efforts of Troop T contributed to a very low fatality rate. The fatality rate on the Thruway is among the lowest in the nation at 0.44 fatalities per 100 million miles traveled. This compares to an index of 1.13 for the national average and 0.8 for all of New York State.

5. Annual Routine Maintenance Activities

Over the years, the Authority has developed comprehensive plans for the maintenance of its facilities. Formal pavement and bridge management systems have been developed to address maintenance issues and provide input into the development of long-term infrastructure management programs. Routine maintenance activities are performed by Authority staff from 21 maintenance locations grouped into four divisions.

Additional specified routine maintenance activities are provided by the four division highway and bridge maintenance headquarters and by the Tappan Zee Bridge maintenance team. Responsibilities include snow and ice removal, pavement and bridge repair and maintenance, guiderail and safety work, responding to incidents and accident damage, and right-of-way maintenance. Additional specialized maintenance activities are provided by the four centralized division maintenance crews and the Tappan Zee Bridge crews. Maintenance activities also include innovative preventative maintenance operations to preserve the highway system and minimize added capital improvement costs.

In addition, environmental stewardship has become an important factor in on-going maintenance decisions. Some examples of what is included in these types of enhancements by the Authority are the use of solar-powered ITS elements, the planting of living snow fencing, the purchase of flex fuel vehicles and the planned construction of five wind turbines along the Thruway section south of Lake Erie between Buffalo and the Pennsylvania border, for the generation of electric power to provide heat and light for Thruway facilities.

B. Mandated Additions to the Authority

In addition to the original mandate of the Authority to operate and maintain the controlled ticket, bridge and barrier systems along the Thruway, the Authority was given responsibility over several other transportation facilities in the early 1990's, described below:

- In 1991, the Cross-Westchester Expressway (I-287), which starts at I-87 near Tarrytown and travels east for 11 miles to the Thruway's New England Section (I-95) in Rye became the Authority's responsibility for maintenance and operational expenditures only. Capital improvements remained the responsibility of NYSDOT.

- In 1991, the Authority began to operate and maintain I-84, a 71-mile section of roadway that connects the Pennsylvania State Line to the Connecticut State Line. After November 2007, the Authority was fully reimbursed by NYSDOT for all operating and maintenance costs. The operation and maintenance responsibility of I-84 was transferred back to NYSDOT as of October 11, 2010.
- In 1992, the New York State Canal Corporation was formed, as a subsidiary of the Authority, and the Authority assumed control of the maintenance and operation of the 524-mile New York State Canal System. The Authority is also responsible for capital improvements to the Canal System. The Canal System is composed of the Erie, Champlain, Oswego, and Cayuga-Seneca canals. Since the Authority assumed such responsibility, federal funds have offset a portion of the Authority's related capital costs.

Financially the Canal System has been considered to be in the category of "Other Authority Projects." Funds for the maintenance and operations of these types of projects can only be provided through the Other Authority Projects Operating Fund, which are junior to Thruway operations, debt service, and Thruway System capital responsibilities.

C. The New York State Canal System

For two centuries, the New York State Canal System has played a very important role in the history and development of the State and the nation. The ability to efficiently move people and goods across the State proved instrumental in the westward expansion of the nation, and the development of major cities in upstate New York including Buffalo, Rochester, Syracuse and Albany, as well as hundreds of smaller cities, towns and villages. The construction of the Erie Canal and the subsequent Canal System was primarily responsible for the dominance of New York City as the country's premier shipping port for many years.

Today, New York State's 524-mile Canal System is a world class recreation-way and tourist destination that cultivates historic preservation and spurs economic development in upstate New York. The Canal System links the Hudson River with Lake Champlain, Lake Ontario, the Finger Lakes, the Niagara River and Lake Erie, passes through 25 counties and is in close proximity to more than 200 villages, hamlets and towns. Previous reports estimated that this extensive waterway network supports nearly \$400 million in economic activity throughout the Canal corridor. For much of its length, it closely parallels the Thruway System.

The current Canal System, which began construction in 1905, provides extensive inter-modal linkages within and beyond the State's borders and includes four major canals, canalized natural waterways, five lakes, feeder reservoirs and numerous shipping terminals. It consists of 57 locks, 20 lift bridges, 22 reservoirs, 203 buildings, 114 dams and over 1,500 other structures critical to the maintenance and operations of the waterways and its feeder systems (water control devices, fixed bridges over the Canal

System, terminals, terminal walls, aqueducts, culverts, roads and reservoirs). Due to the age of the infrastructure, substantial maintenance activities are required to ensure system reliability.

Figure II-2: New York State Canal System



In addition to maintaining these important facilities, the Authority also maintains more than 260 miles of multi-use, recreational trails across upstate New York that are adjacent to the waterways of the Canal System or follow remnants of the historic original canals that date back to the early 1800s.

According to a recent study, an estimated 2.4 million people use the trail network each year for bicycling, walking, jogging and other activities, providing an economic impact of more than \$41 million per year. More information on the Canal System and Trail Network can be found at <http://www.canals.ny.gov/>.

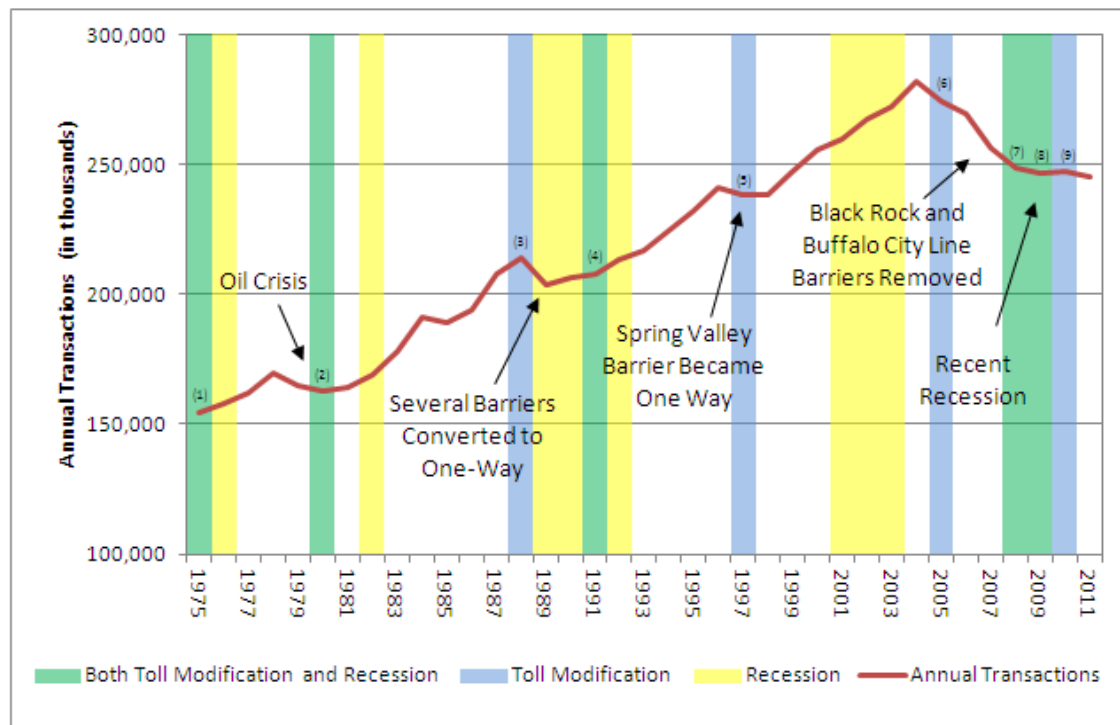
III. Historical Review of Thruway Traffic & Revenue

The following sections provide an overview of past Thruway traffic and revenue.

A. Traffic

Figure III-1 shows historical total traffic on the Thruway since 1988. It is important to note that the volumes shown are not adjusted for various toll collection changes on the Thruway. For example, the 2005 toll modification resulted in the elimination of several commercial vehicle classes that were based on a single vehicle receiving two toll transactions, resulting in an apparent decrease in commercial traffic counts. This was a one-time occurrence that did not represent a decrease in actual number vehicle trips made on the Thruway. Similarly, in October 2006, tolls were removed from the Buffalo City Line and Black Rock toll barriers which reduced total annual trips on the Thruway by approximately 17 million annually.

Figure III-1: Historical Thruway Traffic Volumes



- (1) 1975 - Toll Increase varied by location
- (2) 1980 - Average Toll Increase of 25% Passenger Cars, 30% Commercial
- (3) 1988 - Average Toll Increase of 32% Passenger Cars, 38% Commercial
- (4) 1991 - Spring Valley Toll Adjustment, Passenger Cars Only
- (5) 1997 - Tappan Zee Corridor Relief (Congestion Pricing)
- (6) 2005 - System Reclassification, Average Toll Increase of 25% Passenger Cars, 35% Commercial
- (7) 2008 - Average Toll Increase of 10% for all vehicles, plus reduction in E-ZPass discount in July
- (8) 2009 - Average Toll Increase of 5% for all vehicles
- (9) 2010 - Average Toll Increase of 5% for all vehicles (not apparent in all toll schedules, due to rounding)

Table III-1 summarizes passenger and commercial traffic trends from 2005 through 2011.

Table III-1: Traffic Trends (millions of transactions)

Year	Passenger		Commercial		Total	Percent Change
	Control	Barrier	Control	Barrier		
2005	125.8	115.7	19.9	12.5	274.0	-
2006	127.8	112.6	17.7	11.3	269.4	-1.7%
2007	127.7	100.6	17.7	10.1	256.0	-5.0%
2008	125.5	96.5	16.9	9.7	248.5	-2.9%
2009	128.2	94.3	15.4	8.8	246.7	-0.7%
2010	129.0	93.8	15.7	9.1	247.6	0.4%
2011	126.6	93.5	15.8	9.3	245.0	-1.0%

Note: Numbers may not add due to rounding.

1. Thruway Trips and Customers

The Thruway provides service to urban, suburban, and rural areas with a substantial amount of out-of-state travel on certain sections. The traffic is composed of short and long trips; commuters and occasional users; recreational and business travelers; local delivery and long-distance trucking; and those traveling for many other purposes. Customers of the Thruway are composed of people making a large mix of trip purposes, trip lengths, trip frequency and payment methods; and portions of the Thruway serve the major population areas of the state including New York City, Albany, Syracuse, Rochester and Buffalo. These urban areas provide a strong commuter and commercial component to the overall traffic on the System. Similarly, the prevalence of recreational areas such as the Catskills, Adirondacks, Finger Lakes, Niagara Falls, and various casinos and other attractions support a strong recreational component to traffic. Additionally, the location of the Thruway along major north-south and east-west corridors support a large component of long-distance travel and freight movement. This balance generally minimizes the negative effects of economically driven downturns.

Travel time savings, high levels of safety and service, and reliable maintenance gives the Thruway an advantage over other nearby competing routes. There are several major employers located within the Thruway corridor that contribute to the Thruway's broad traffic base. These include General Electric, IBM, Woodbury Commons and United Technologies. In addition, several commercial distribution centers such as those for Wal-Mart, Price Chopper, and Target are located close to the Thruway in order to easily transport goods to stores. Finally, Tappan Zee Bridge is a major interstate river crossing linking the Mid-Atlantic States to New England.

An understanding of the diverse service provided by the Thruway can be obtained from an analysis of the users of different portions of the system which can be described as follows:

a) Westchester-Harriman

The southern section of the Thruway mainline, part of I-87, serves local traffic as well as commuters and long-distance traffic from New York City through Westchester County to the Tappan Zee Bridge at Tarrytown. Across the Tappan Zee Bridge, the mainline passes through Rockland County to the Harriman area where the controlled system commences. The New England Section of the Thruway, part of I-95 along the Long Island Sound shore between the Bronx and Connecticut, serves both local and long-distance traffic.

In Westchester County, the Saw Mill River Parkway to the west and Sprain Brook and the Hutchinson River Parkways to the east provide competitive toll-free routes to the Thruway and serve a high percentage of the regular commuting traffic. Trucks, prohibited from using the Parkways, account for some 11 percent of Thruway traffic in this area. The toll-free Cross-Westchester Expressway (I-287) connects the mainline Thruway at Elmsford with the Thruway's New England section at Port Chester and carries heavy volumes of commuting and other local traffic to and from the White Plains area. It also serves as the principal corridor between points west of the Hudson River via the Tappan Zee Bridge to Connecticut and the rest of New England.

Unlike the Thruway within Westchester County, the primary alternate routes to the Tappan Zee Bridge are a significant distance away from the Bridge. Optional routes to the north include the Bear Mountain Bridge, about 22 miles to the north. However, this bridge is not connected to any major routes and heavy trucks are prohibited. About 40 miles to the north of the Tappan Zee is the Newburgh-Beacon Bridge which carries Interstate Route 84. Similarly, there are options south of the Tappan Zee Bridge including the heavily congested George Washington Bridge 17 miles to the south, or one of the two Hudson River Tunnels 25 and 27 miles south.

Thruway users in Rockland County, the section between the Tappan Zee Bridge and the Harriman Barrier to the north, include a large number of local Rockland and Orange County travelers and Rockland-to-Westchester commuters as well as longer distance business and recreational traffic going to and from the Catskill region and points farther north. The Thruway in Rockland County also serves a high portion of all local east-west travel as it offers a faster and more convenient route than parallel Route 59, which is often congested. Substantial volumes of long-distance passenger car and commercial traffic to and from New Jersey and beyond enter and leave the Thruway system at Suffern.

In years of average weather conditions, passenger car traffic at the New Rochelle and Yonkers Barriers in Westchester County during the lowest winter month and the highest summer month does not vary by more than 15 percent from the monthly average, a remarkably consistent pattern. That highlights the essentiality of the Thruway in this area.

b) Hudson Valley

Between Albany and the southern terminus of the controlled system near the Harriman Barrier, the Thruway traffic includes substantial flow to, from, and between the local communities as well as business and recreational long-distance travel. Relatively heavy movements - particularly involving trucks - occur on and off at the Newburgh Interchange, connecting the Thruway with I-84. I-84 traverses New York State between Connecticut and Pennsylvania and intersects with the Thruway-controlled system at Newburgh. Route 9W is the primary alternate route on the western side of the Hudson River and for most of its distance it features low speed limits and passes through numerous local communities. The Taconic State Parkway a passenger-vehicle-only parkway on the east side of the Hudson River, offers a toll-free alternative route for passenger cars between the New York City area and Albany but like 9W is characterized by lower speeds and longer travel times.

c) Albany-Buffalo

Between Albany and Buffalo, the Thruway serves local and commuting traffic for the cities and communities along it as well as serving long-distance traffic traveling across the State. In the Albany area, the Thruway is heavily used by local commuters, particularly between Albany and Schenectady. Major interstate and other routes converge in the Capital District with the Thruway's Berkshire Section connecting to the Massachusetts Turnpike (I-90 to the east), the Taconic State Parkway, and Route I-90 to the west. This latter route extends around Albany to the north, connecting back to the Thruway at its intersection with the Northway, I-87, the principal route to/from the north. I-88, an interstate route connecting to the Southern Tier at Binghamton, terminates at the Thruway in the Schenectady area. These routes carry long-distance traffic to and through the area; they are also used by commuting and other local traffic as they serve the nearby suburban areas.

The Thruway between Albany and Buffalo serves the principal upstate cities of Utica, Syracuse and Rochester and is the main route for heavy trucking across the State. It provides connections to several interstate routes, among them I-790 in Utica; I-81 in Syracuse, the principal north-south route between Binghamton and Watertown, and I-690 and I-481, circumferential routes around Syracuse; I-390 and I-490 serving Rochester; and I-290 to the north of Buffalo. This section of the Thruway is the primary East-West route in the area.

This section of the Thruway also serves many of the State's recreational areas. Summer traffic is extremely important and levels are well above average in this area. Conversely, due to the amount and frequency of heavy snow and ice events, traffic during the winter months is typically below average. In the urban areas, however, this variation is less extreme as the local commuters and frequent users represent a greater percentage of the traffic than on other sections. The historical trend has shown a higher rate of growth of those drivers who regularly use the road at all times of the year. For long distance trips the primary alternate routes are US Route 20 and State Route 5. Similar to Route 9W and the Taconic Parkway in the Hudson Valley Region, these roadways have lower speeds and pass through local communities, adding to travel times and fuel usage.

d) Buffalo Area

The Niagara Section (I-190) is heavily used for local travel to and from the region's cities and localities. It also provides the only highway access to Grand Island and serves some longer-distance travel to and from Canada either via the bridges in Niagara Falls or the Peace Bridge in Buffalo. The Erie Section of the mainline, which is a continuation of I-90, serves the lakeshore communities as well as long-distance through traffic.

Similar to the other sections of the Thruway, the alternate routes are limited featuring much lower speeds and travel through local communities. In addition, the Buffalo region of the Thruway is situated in the lake effects snow-belt recording high snowfall amounts annually. The Thruway is generally better equipped to handle the higher snowfall amounts and is often the one of the only roadways in the area that is cleared and free of snow and ice.

2. The Make-Up of Traffic on the Thruway System

As shown in Figure III-2, in 2011 the majority of traffic on the Thruway System was comprised of passenger cars, making up roughly 90 percent of traffic. The remaining ten percent of traffic is from a variety of different commercial vehicle types. Though commercial traffic comprises only a small percentage of system-wide traffic, they accounted for 37 percent of Thruway revenues. In addition, in 2011 approximately 66 percent of vehicles paid a toll with an E-ZPass transponder. For passenger cars, the E-ZPass market share equaled approximately 65 percent, while trucks utilized E-ZPass more frequently, averaging a market share of about 82 percent.

Also, in 2011 approximately 72 percent of the Thruway's toll revenues were generated by the Authority's E-ZPass customers. Customers that had a transponder issued by a New York State toll agency (the Authority or the Metropolitan Transportation Authority) accounted for about 78 percent of total E-ZPass toll revenues. As a result, 22 percent of E-ZPass toll revenues were collected from customers that had a non-New York issued transponder, underscoring the importance of the Thruway System in the regional and national economy.

Figure III-2: 2011 System Wide Traffic and Revenue Distribution

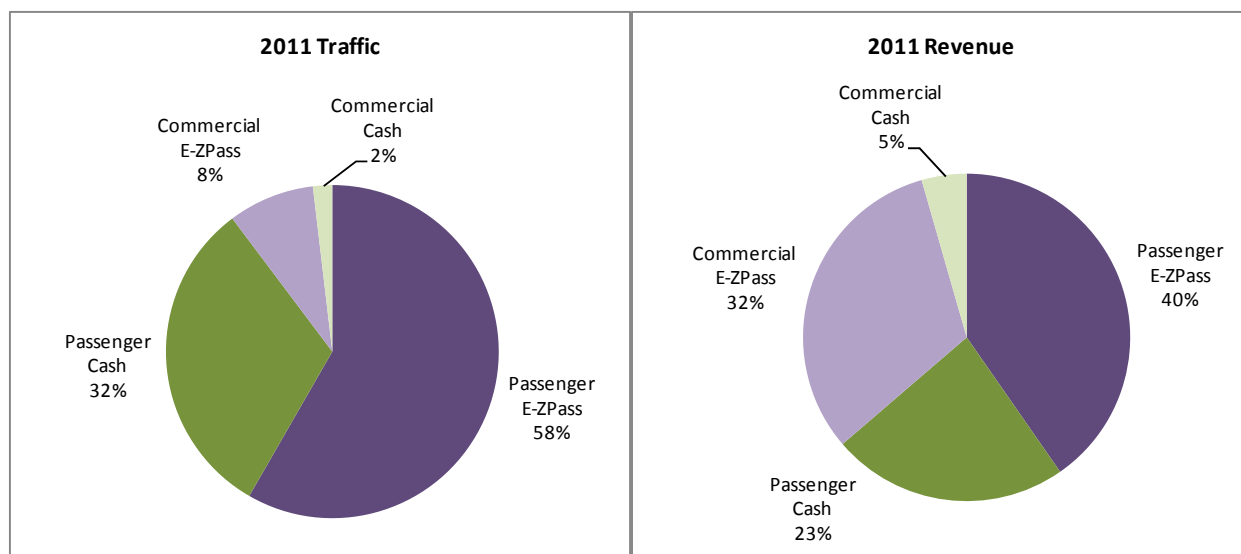


Table III-2 shows the amount and percentage of total 2011 traffic and revenue realized at the separate Thruway pay points for both passenger cars and commercial vehicles. The controlled system, with tolls collected based on the distance traveled, serves 58 percent of total trips through pay points and provides over 63 percent of the total toll revenues (exclusive of the volume discount being applied).

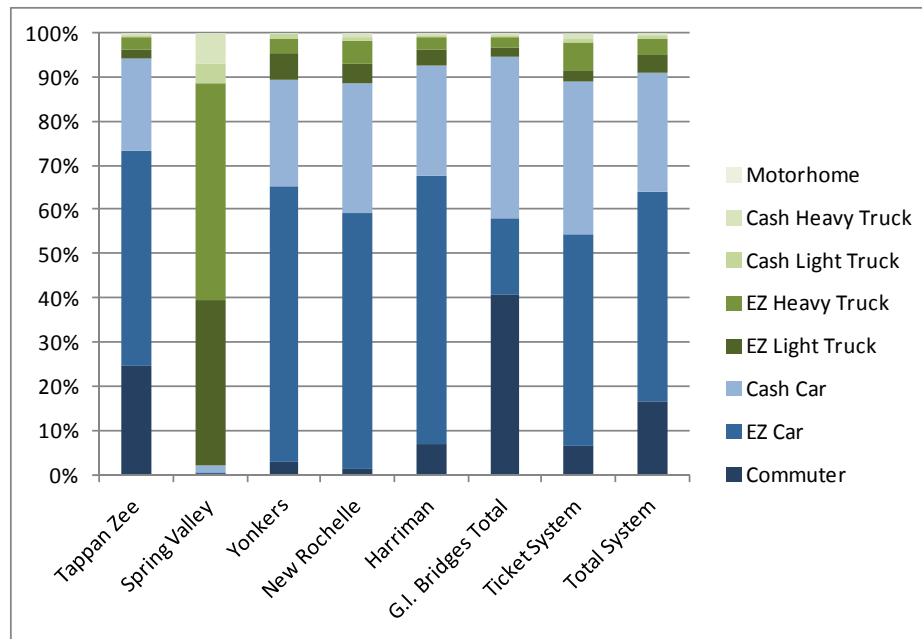
Table III-2: 2011 Traffic and Revenue Geographical Distribution

Traffic in Thousands by Region	Passenger Cars				Commercial Vehicles			
	Controlled System	Barriers	Total Passenger Car Traffic		Controlled System	Barriers	Total Commercial Vehicles Traffic	
			Traffic	% of Total			Traffic	% of Total
NYC Sub-Area	-	71,926	71,926	32.7%	-	8,117	8,117	32.3%
Hudson Valley	20,080	-	20,080	9.1%	2,447	-	2,447	9.7%
Albany	35,973	-	35,973	16.3%	3,894	-	3,894	15.5%
Utica	3,284	-	3,284	1.5%	638	-	638	2.5%
Syracuse	16,572	-	16,572	7.5%	1,793	-	1,793	7.1%
Rochester/Buffalo	33,505	21,543	55,048	25.0%	4,282	1,203	5,485	21.8%
Erie	17,189	-	17,189	7.8%	2,781	-	2,781	11.1%
Total	126,603	93,468	220,072	100.0%	15,835	9,320	25,156	100.0%
Revenue in Thousands by Region	Passenger Cars				Commercial Vehicles			
	Controlled System	Barriers	Total Passenger Car Revenue		Controlled System	Barriers	Total Commercial Vehicles Revenue	
			Revenue	% of Total			Revenue	% of Total
NYC Sub-Area	-	\$169,384.09	\$169,384.09	41.9%	-	\$53,017.91	\$53,017.91	23.0%
Hudson Valley	\$46,215.06	-	\$46,215.06	11.4%	\$29,080.38	-	\$29,080.38	12.6%
Albany	\$53,037.13	-	\$53,037.13	13.1%	\$45,214.53	-	\$45,214.53	19.6%
Utica	\$9,861.60	-	\$9,861.60	2.4%	\$10,973.73	-	\$10,973.73	4.8%
Syracuse	\$29,491.36	-	\$29,491.36	7.3%	\$24,199.97	-	\$24,199.97	10.5%
Rochester/Buffalo	\$57,913.50	\$14,342.10	\$72,255.61	17.9%	\$56,029.51	\$3,547.18	\$59,576.69	25.9%
Erie	\$20,981.39	-	\$20,981.39	5.2%	\$30,790.95	-	\$30,790.95	13.4%
Sub-Total ¹	\$215,772.93	\$183,726.20	\$399,499.13	98.9%	\$196,289.07	\$56,565.09	\$252,854.15	109.9%
Permits	\$4,433.15	-	\$4,433.15	1.1%				
Volume Discount					(\$22,696)	-	(\$22,696)	-9.9%
Grand Total	\$220,206.08	\$183,726.20	\$403,932.28	100.0%	\$173,592.73	\$56,565.09	\$230,157.81	100.0%

¹ Does not include \$2.7 Million Annual Cost of Permit

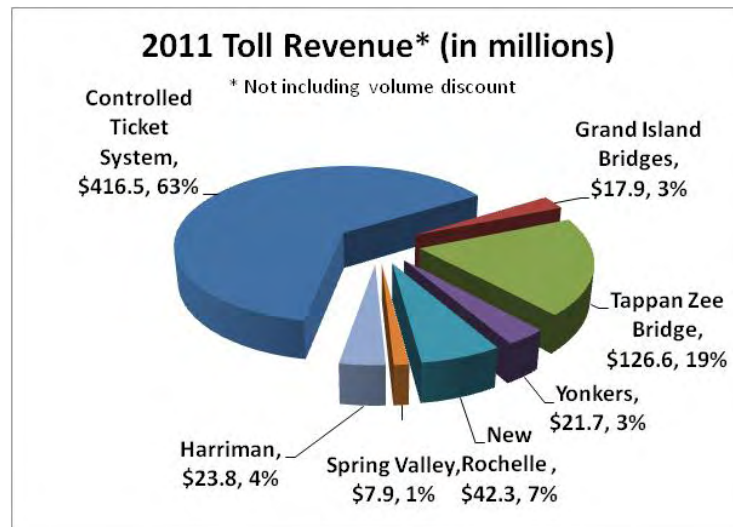
The distributions of vehicle class and payment type vary by facility, as shown in Figure III-3. The highest passenger car participation in *E-ZPass* is seen at the Tappan Zee Bridge, while the highest truck participation rate in *E-ZPass* payment is seen at the nearby Spring Valley Barrier, which is a truck-only toll facility that offers open road tolling. It should be noted that although *E-ZPass* transactions account for about two-thirds of annual transactions on the Thruway, the majority of customers (individual people) using the Thruway over the course of a year travel infrequently and pay with cash.

Figure III-3: 2011 Traffic Distribution by Facility



Jacobs further analyzed the breakdown of 2011 annual toll revenues by Thruway facility, as presented in Figure III-4. Of the Thruway's facilities, the Ticket System and the Tappan Zee Bridge generate the most significant portion of the Thruway's traffic and revenue. In 2011, the Ticket System generated \$416.5 million or approximately 63 percent of all Thruway toll revenues, and the Tappan Zee Bridge generated \$126.6 million (approximately 19 percent) of toll revenues. The New York Metropolitan area barrier tolls (other than the Tappan Zee Bridge) generated about \$95.7 million or a combined 15 percent of 2011 revenues. In the Buffalo area – the Grand Island Bridges plus the Erie Section of the mainline - generated approximately 11 percent of 2011 revenues.

Figure III-4: Distribution of 2011 Toll Revenues by Thruway Facility



Details of the relative importance of each of the existing interchanges of the controlled system are provided in Table III-3, which shows the exiting traffic through each of the interchanges in 2011. All of the interchanges are ranked according to total exiting volume. The busiest interchanges are at the urban areas and at the ends of the ticket or controlled system. It is important to note that the ten busiest interchanges account for almost 50 percent of all passenger car and commercial vehicle trips on the controlled system.

For passenger cars, the busiest interchange on the Thruway controlled system is Washington Avenue (#24) at Albany, which is also the connection to the Northway (I-87) and I-90 around Albany. Almost one out of ten of all controlled system trips passes through this interchange. The next busiest point is Williamsville (#50) adjacent to Buffalo at the northern end of the controlled system, followed by Lackawanna (#55), the northern end of the Erie Section, then Woodbury (#15), the southern end of the controlled system, and Schenectady (#25). Of the ten busiest interchanges, the remaining locations are adjacent to upstate cities (Rochester #45, Newburgh #17, and Albany #23) with the exception of the ninth busiest at Canaan (#B3) on the Berkshire Section, which connects to the Massachusetts Turnpike, and the tenth-busiest location at Depew (#49). The seventh-busiest at Newburgh (#17) also serves as a connection to I-84.

Table III-3: Controlled System Traffic Summary, Exiting Traffic at Interchanges, 2011

Interchange No.	Interchange Name	Mile Post	Passenger Cars	Commercial Vehicles	Grand Total	% of Grand Total	Grand Total Rank
15	Woodbury	45	6,131,033	1,078,451	7,209,484	5.1%	4
16	Harriman - Rte 17	45	1,011,505	55,904	1,067,409	0.7%	43
17	Newburgh (I-84)	60	4,808,622	773,959	5,582,581	3.9%	7
18	New Paltz	76	2,386,716	136,893	2,523,609	1.8%	22
19	Kingston	91	2,939,486	197,137	3,136,623	2.2%	16
20	Saugerties-East and West	101	1,359,373	79,184	1,438,557	1.0%	35
21	Catskill	114	1,442,858	125,649	1,568,507	1.1%	32
21B	Coxsackie	124	983,021	122,368	1,105,389	0.8%	42
B1	Hudson-Renss. (I-90)	B 7	2,286,148	411,850	2,697,998	1.9%	19
B2	Taconic Pkwy	B 15	717,924	8,817	726,741	0.5%	48
B3	Canaan (Mass Line)	B 18	3,184,652	787,677	3,972,329	2.8%	9
22	Selkirk	135	636,067	96,734	732,801	0.5%	47
23	Albany (Downtown) I-787	142	4,255,087	375,609	4,630,696	3.3%	8
24	Albany(Northway)I-87,I-90	148	11,909,527	1,028,447	12,937,974	9.1%	1
25	Schenectady (East) I-890	154	6,450,431	215,328	6,665,759	4.7%	5
25A	Schenectady I-88	159	2,893,649	551,148	3,444,797	2.4%	12
26	Schenectady (West) I-890	162	1,117,498	107,012	1,224,510	0.9%	37
27	Amsterdam	174	1,538,973	189,228	1,728,201	1.2%	28
28	Fultonville	182	535,071	266,561	801,632	0.6%	45
29	Canajoharie	194	390,819	44,969	435,788	0.3%	50
29A	Little Falls	211	195,367	28,756	224,123	0.2%	52
30	Herkimer	220	652,292	72,274	724,566	0.5%	49
31	Utica	233	1,510,300	225,002	1,735,302	1.2%	27
32	Westmoreland-Rome	243	1,068,256	78,529	1,146,785	0.8%	40
33	Verona-Rome	253	2,317,846	175,256	2,493,102	1.8%	23
34	Canastota	262	1,353,627	93,640	1,447,267	1.0%	34
34A	Syracuse I-481	277	3,041,715	293,367	3,335,082	2.3%	14
35	Syracuse (East)	279	1,687,022	211,726	1,898,748	1.3%	25
36	Syracuse I-81	283	2,395,349	362,447	2,757,796	1.9%	18
37	Electronics Pkwy	284	1,116,505	75,863	1,192,368	0.8%	38
38	Syracuse-Liverpool	286	1,057,853	99,527	1,157,380	0.8%	39
39	Syracuse (West) I-690	290	2,533,769	402,732	2,936,501	2.1%	17
40	Weedsport	304	967,956	146,086	1,114,042	0.8%	41
41	Waterloo	320	1,129,768	329,850	1,459,618	1.0%	33
42	Geneva	327	1,509,173	192,665	1,701,838	1.2%	29
43	Manchester	340	1,257,033	96,445	1,353,478	1.0%	36
44	Canandaigua	347	3,329,946	143,637	3,473,583	2.4%	11
45	Rochester (East) I-490	351	5,776,187	281,641	6,057,828	4.3%	6
46	Rochester I-390	362	2,922,840	455,742	3,378,582	2.4%	13
47	Leroy I-490	379	2,335,378	275,225	2,610,603	1.8%	21
48	Batavia	390	1,462,261	220,764	1,683,025	1.2%	30
48A	Pembroke	401	1,486,893	378,207	1,865,100	1.3%	26
49	Depew	417	3,503,359	293,767	3,797,126	2.7%	10
50	Buffalo I-290	420	7,824,578	1,468,172	9,292,750	6.5%	2
55	Lackawanna	429	7,136,860	1,178,566	8,315,426	5.8%	3
56	Blasdell	432	2,467,967	167,775	2,635,742	1.9%	20
57	Hamburg	436	2,145,592	100,808	2,246,400	1.6%	24
57A	Eden-Angola	445	718,548	42,457	761,005	0.5%	46
58	Silver Creek	456	825,366	83,085	908,451	0.6%	44
59	Dunkirk-Fredonia	468	1,395,851	183,285	1,579,136	1.1%	31
60	Westfield	185	244,869	27,881	272,750	0.2%	51
61	Ripley (Penna. Line)	496	2,254,407	997,195	3,251,602	2.3%	15
TOTAL			126,603,193	15,835,297	142,438,490	100.0%	-

3. Comparison of Thruway Traffic to Other Regional Toll Facilities

A performance comparison of regional toll facilities with the Thruway was developed for the June 2006 to December 2011 period, during which the nation experienced a historic recession and slow and protracted recovery period, impacting travel on all highway transportation facilities across the nation. Figure III-5 presents the comparison of traffic on selected regional toll facilities to the Thruway, with the black line representing total traffic on the New York State Thruway. As shown, in terms of traffic trends, the Thruway performed comparably well to and in some cases better than other Northeastern US toll facilities. The broad diversity of traffic across the Thruway system is a contributor to its relatively good performance.

Figure III-5: Comparison of the Thruway System to Regional Toll Facilities

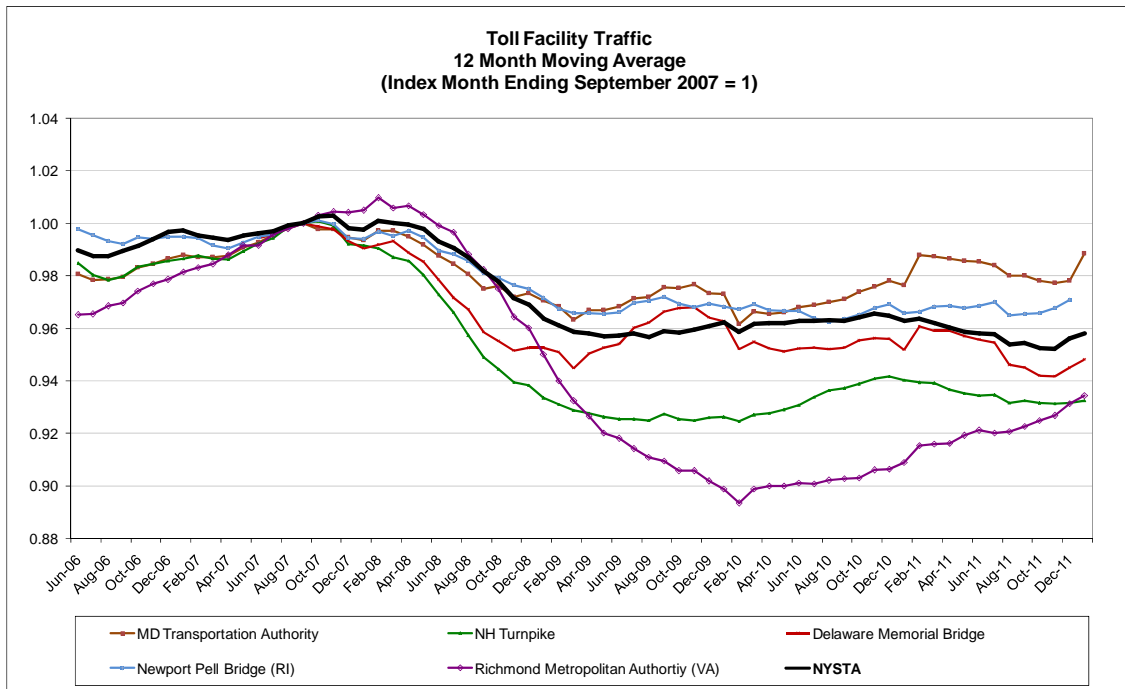
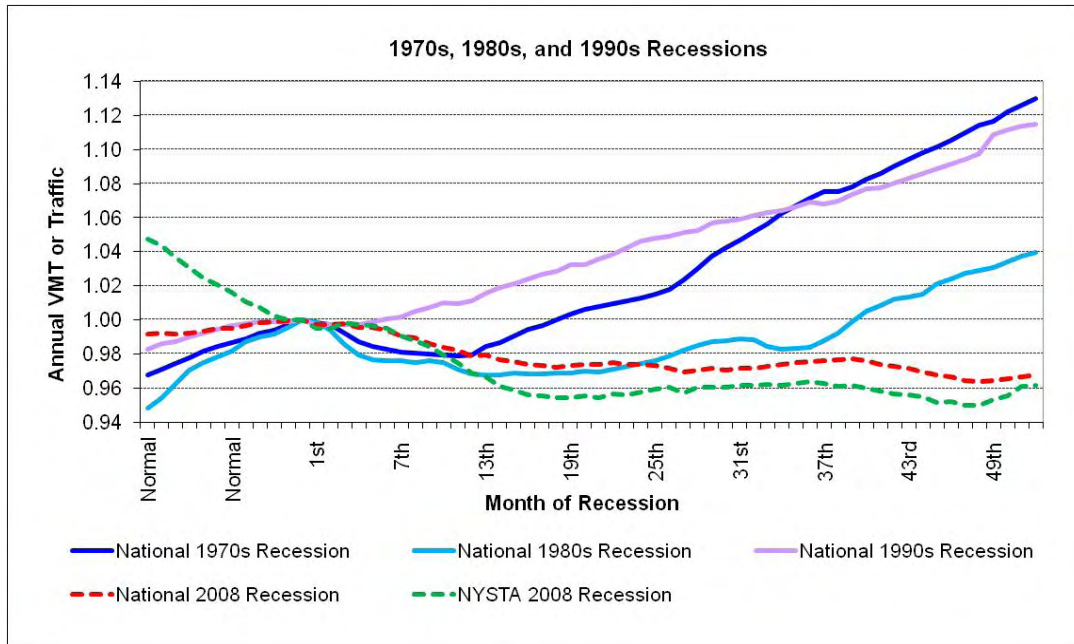


Figure III-6 is a plot of the actual traffic on the Thruway along with total vehicles miles travelled (VMT) at the national level, both of which were indexed to the first month of the three most recent significant national recessions. As shown, the current Thruway and national traffic trend most closely matches that of the 1980's national recession and suggests that there will be a longer and more gradual return to historical trend lines from this recent recession than during previous recessions.

Figure III-6: National Vehicle Miles Travelled (VMT) and the Thruway's Tolloed Traffic - Indexed to Recessions



B. Current Toll Rates

The toll rates set in 2010 continue to be in effect today and the Authority's current toll rate structure is outlined in Table III-4. Toll collections for passenger and commercial vehicles from 2005 through 2011 are summarized in Table IV-6.

Table III-4: Current Thruway Toll Structure (\$)

2010	Controlled (Cents/Mile)		Yonkers		Harriman		Spring Valley		New Rochelle		Tappan Zee		Grand Island	
	Cash	E-Z Pass	Cash	E-Z Pass	Cash	E-Z Pass	Cash	E-Z Pass ⁽¹⁾	Cash	E-Z Pass	Cash	E-Z Pass ⁽¹⁾	Cash	E-Z Pass
Commuter	-	*	-	0.55	-	0.55	-	-	-	1.10	-	3.00	-	0.28
Motor Cycle	-	0.0235	-	0.63	-	0.63	-	-	-	0.88	-	2.50	-	0.50
2L	0.0470	0.0447	1.25	1.19	1.25	1.19	-	-	1.75	1.66	5.00	4.75 / 4.75	1.00	0.95
3L	0.0728	0.0691	1.50	1.43	1.50	1.43	3.00	3.00 / 1.50	2.50	2.38	11.50	11.50 / 5.75	1.50	1.43
4L	0.0864	0.0821	1.75	1.66	1.75	1.66	4.50	4.50 / 2.25	3.00	2.85	13.75	13.75 / 6.88	1.75	1.66
2H	0.0933	0.0886	2.00	1.90	2.00	1.90	5.25	5.25 / 2.63	3.50	3.33	14.75	14.75 / 7.38	2.00	1.90
3H	0.1604	0.1524	2.25	2.14	2.75	2.61	8.25	8.25 / 4.13	4.25	4.04	20.75	20.75 / 10.38	2.25	2.14
4H	0.1768	0.1680	2.75	2.61	3.00	2.85	8.25	8.25 / 4.13	5.00	4.75	24.75	24.75 / 12.38	2.75	2.61
5H	0.2390	0.2271	4.25	4.04	4.25	4.04	13.50	13.50 / 6.75	8.00	7.60	32.75	32.75 / 16.38	4.25	4.04
6H	0.2963	0.2815	4.50	4.28	5.00	4.75	14.75	14.75 / 7.38	8.75	8.31	41.00	41.00 / 20.50	4.50	4.28
7H	0.3536	0.3359	5.00	4.75	5.75	5.46	16.50	16.50 / 8.25	9.75	9.26	49.25	49.25 / 24.63	5.00	4.75

¹⁾ Peak/Off Peak E-ZPass Rates

The Authority offers several specialized discount programs administered through the E-ZPass program. Among these are a series of commuter plans designed specifically for frequent users of the Thruway that use one or more of the barrier toll stations. Users can pre-pay a monthly minimum for each facility that

they choose and then receive discounted travel for each trip taken in excess of the minimum charge. In addition to the barrier commuter discounts, the control system offers an annual permit that when purchased allows for the first 30 miles of each trip to be free of tolls.

Other passenger car specialized plans include a Tappan Zee Bridge car-pool commuter plan that further reduces the cost of travel for vehicles with three or more occupants, and residents of Grand Island are eligible for a special resident discount when crossing through either of the Grand Island toll barriers. The Authority also offers a green discount that is available to certain high mileage vehicles that both achieve MPG ratings greater than 45 MPG and meet certain emission standards. Motorcycles, motor homes and “5th wheel” or “gooseneck” vehicles or vehicle combinations are also eligible for discounts. These programs are administered through the E-ZPass program and proof of residency or registration for the various plans and vehicle combinations must also be provided.

For commercial vehicles, there are currently two types of discount program offered. The S-Discount is for non-tandem commercial vehicles less than or equal to 48 feet in length and requires a Thruway E-ZPass issued transponder. The second discount program is a commercial volume discount that offers progressively higher discounts based on the monthly toll charges on an account basis. The discount caps at 20 percent for all tolls in excess of \$3,000 in each month.

1. Comparison of Thruway Toll Rates to Other Regional Toll Facilities

Figure III-7 and Figure III-8 compare the cash toll rates and discounted electronic toll rates of several toll roads in the Northeast. Of note is the comparatively low per-mile passenger car toll rate of the Thruway’s controlled system when compared to other toll facilities, as shown in Figure III-7. The published 5-axle truck rate, as seen in Figure III-8, is also comparatively low to that of other regional facilities, and is effectively lower than the rate shown due to the commercial volume discount program.

Figure III-7: Peak Toll Rates Per-mile on Toll Roads in the Northeast, Passenger Cars

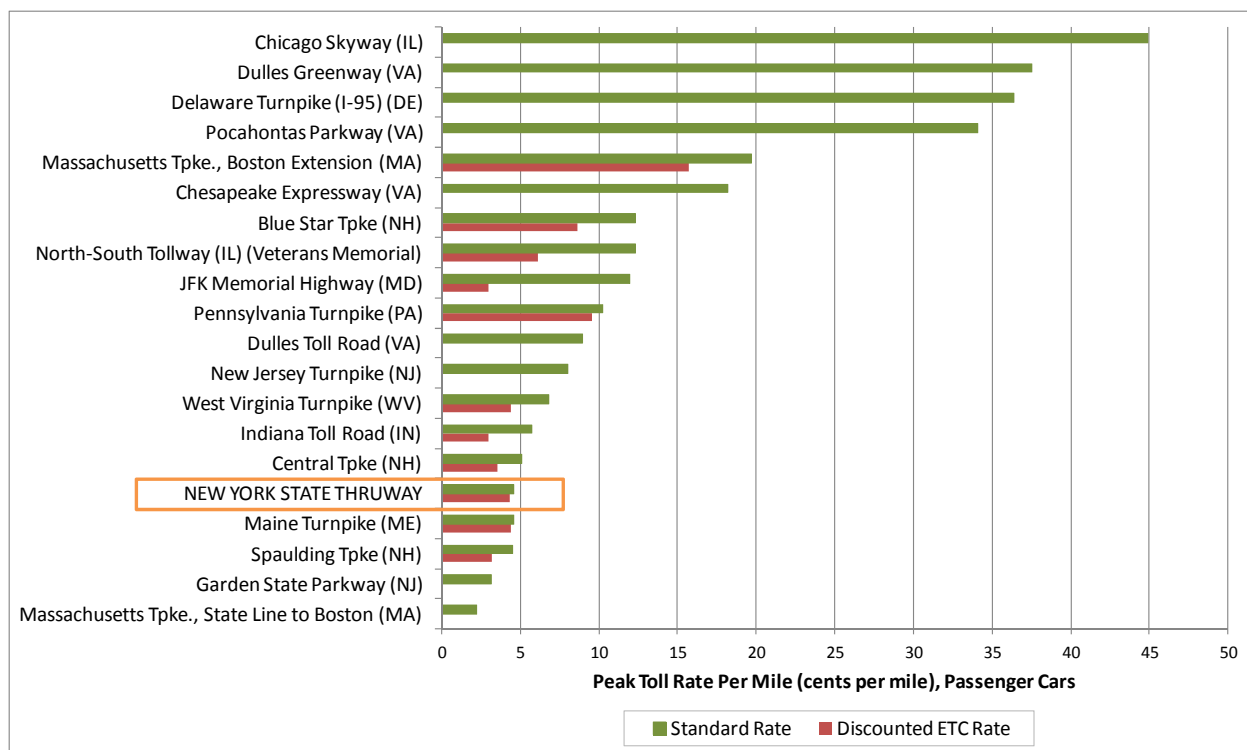


Figure III-8: Peak Toll Rates Per-mile on Toll Roads in the Northeast, 5-Axle Trucks

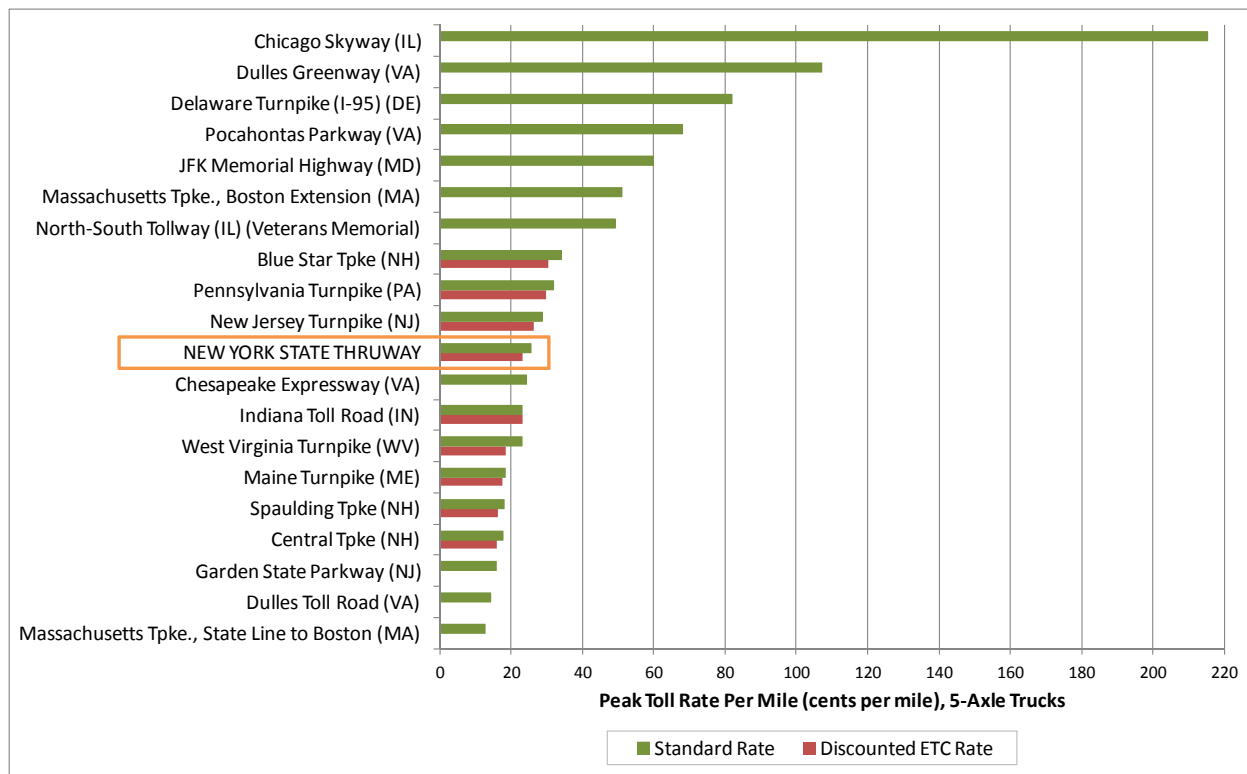


Figure III-9 and Figure III-10 compare cash toll rates and discounted electronic toll rates of several toll crossings in the Northeast. Of note is the Tappan Zee Bridge tolls are below that of the other Metro-New York crossings and comparable to other major crossings on the interstate highway system, as shown in Figure III-9. Similar to the controlled system, the published 5-axle truck rate is also comparable to that of other regional facilities. A majority of the commercial vehicles travel in off-peak periods and pay using E-ZPass that is one-half of the peak period and cash rate. In addition to the lower off-peak rates, many vehicles effectively lower the effective rate further through the additional volume discount program. These reductions in the effective rate make the Tappan Zee Bridge commercial toll rate significantly below that of other metro New York tolled crossings.

Figure III-9: Round Trip Peak Toll Rates on Major Toll Crossings in the Northeast, Passenger Cars

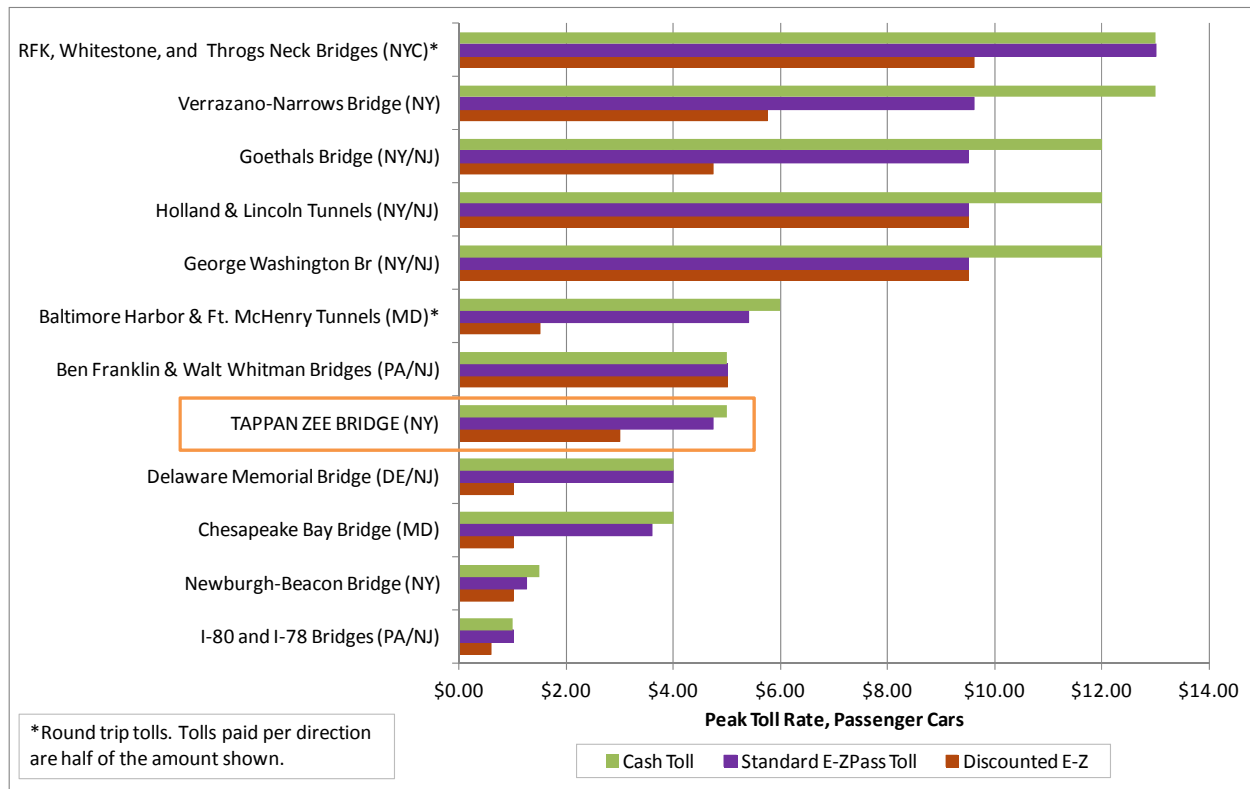
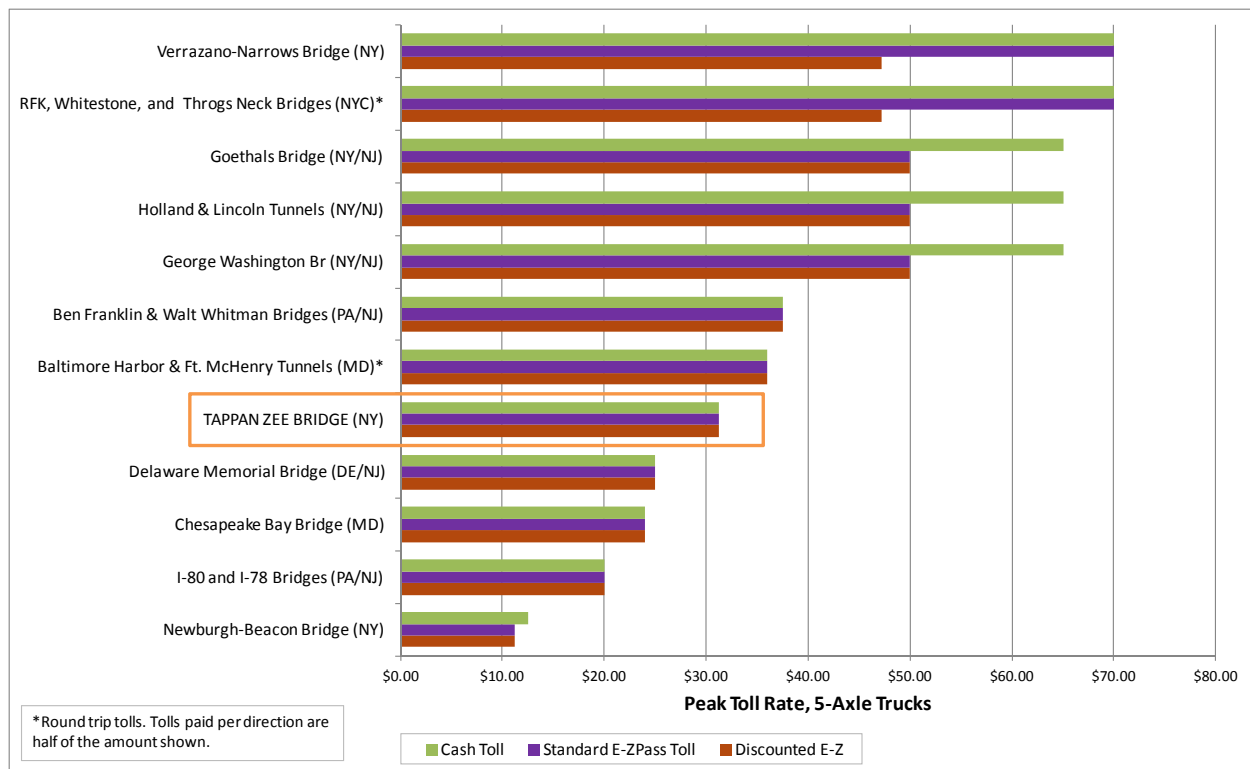


Figure III-10: Round Trip Peak Toll Rates on Major Toll Crossings in the Northeast, 5-Axle Trucks

C. Revenues

With the exception of a small amount of Federal aid and other funds, tolls collected on the controlled system and through toll barriers support an overwhelming majority of the Authority's budget. As a result, the Authority closely monitors traffic volumes and toll revenues for the various Thruway sections.

The Authority had originally planned to finance operating, maintenance and capital responsibilities from 2005 through 2011 through a series of two-staged toll rate adjustments approved in 2005. This was the first toll adjustment that was implemented in 17 years and was designed to only provide sufficient funding for the Authority's operating, capital and maintenance needs through the end of the 2005-2011 Capital Program.

The 2005 toll adjustment generally increased toll rates by 25 percent for passenger vehicles and 35 percent for commercial customers in 2005 and increased cash tolls for both passenger and commercial vehicles by 10 percent in 2008. In addition, the toll adjustment also implemented a new vehicle classification system (reducing the number of classifications from 43 to 9), created a new *E-ZPass* discount program, continued a graduated volume discount program for commercial customers and expanded the availability of commuter plans to bridges and barriers on the Thruway System.

In late 2007, rising fuel prices and the recession's impact on employment, industrial production, housing starts and other aspects of the economy significantly impacted passenger and commercial traffic

patterns nationwide. As noted previously in Figure III-5, total traffic on the Thruway System and on other selected toll facilities began to decline significantly at that time, as travelers reduced the number and distance of their trips.

In response to the financial pressures brought on by fuel prices and the state of the national economy, the Authority implemented another series of staged, though smaller adjustments to toll rates in 2008. This adjustment was only designed to provide additional funding to assist the Authority in financing operational, maintenance and capital commitments made in the 2005-2011 period. The 2008 toll adjustment maintained a five percent *E-ZPass* discount for all patrons and added two five percent across-the-board increases, which took effect in 2009 and 2010. Table III-5 presents historical toll revenue for the period 2005-2011.

Table III-5: Summary of Gross Toll Revenues (Millions)

Year	Passenger	Commercial	Total Gross Toll Revenues
2005 ⁽¹⁾	\$311.1	\$200.1	\$511.2
2006	333.7	220.7	554.4
2007	324.7	215.6	540.3
2008 ⁽¹⁾	347.1	215.6	562.7
2009 ⁽¹⁾	400.8	210.8	611.6
2010 ⁽¹⁾	413.1	228.1	641.2
2011	403.9	230.2	634.1
2005-2011 Total	\$2,534.4	\$1,521.1	\$4,055.5

Note: Numbers may not add due to rounding.

(1) Toll Adjustments were implemented in 2005, 2008, 2009, and 2010.

IV. Historical Review of the Authority's Finances

The following section provides an overview of the Authority's operating, capital and debt service costs and revenue trends from 2005 through 2011. The section concludes with an overall view of the financial health of the Authority during this period.

A. Operating and Maintenance Expenses

The Authority's operating expenses include the non-capitalized costs for the maintenance of highway, building and canal facilities; equipment purchases; snow and ice removal; Thruway toll collection; policing; administrative costs and fringe benefits; Thruway traffic operations; and provisions for funding environmental and other liability reserves. Table IV-1 summarizes the Authority's operating and maintenance (O&M) expenses for the period 2005 through 2011, including the Cross-Westchester Expressway (I-287), I-84 and the Canal System for the period in which these facilities have been the responsibility of the Authority.

Table IV-1: Operating and Maintenance Expenses, Thruway System (millions)

Year	Thruway Operations	Reserves ⁽¹⁾	I-84 ⁽²⁾⁽⁴⁾	Canal System ⁽²⁾	Total Operating Expenses
2005	\$303.8	\$3.5	\$12.5	\$38.2	\$358.0
2006 ⁽³⁾	310.7	13.0	11.5	42.8	378.0
2007 ⁽³⁾⁽⁴⁾	332.2	6.8	10.3	45.9	395.2
2008 ⁽⁴⁾	334.8	2.5	-	45.2	382.5
2009	339.4	7.3	-	48.7	395.4
2010 ⁽⁵⁾	358.2	6.0	-	46.0	410.2
2011	365.4	4.6	-	51.3	421.3
2005-2011 Total	\$2,344.5	\$43.7	\$34.3	\$318.1	\$2,740.6

Note: Numbers may not add due to rounding.

⁽¹⁾ The provisions for legal claims and indemnities and environmental remediation reserves.

⁽²⁾ Canal and I-84 operating expenses are paid out of the Other Authority Projects Operating Fund and funds required are net of Federal aid reimbursements.

⁽³⁾ Operating expenses in 2006 and 2007 were adversely impacted due to the liability of two legal claims and increases in health insurance and snow and ice removal costs.

⁽⁴⁾ As of November 2007, expenditures for I-84 were fully reimbursable from NYSDOT. As noted above, since 2010, the Authority has no operational or funding responsibility related to I-84.

⁽⁵⁾ In 2010, operating expenses include \$13.3 million for the special early retirement surcharge of which \$11.4 million was for the Thruway and \$1.9 million in Canal operating expenses. Also in 2010, \$5.6 million in Federal funds was received for Canal operations.

Despite the intense pressure that rising benefit, fuel and other commodity prices caused since 2007, the Authority was able to enhance the efficiency of its operations through a cost containment strategy that limited operational expense growth to at or below the rate of inflation, depending on what inflation measure is utilized. After excluding indemnity and reserve allocations and the impacts of Tropical

Storms Irene and Lee on Thruway and Canal operations and benefit costs, core operating expenses increased by an average of only 2.6 percent per year from 2007-2011. This rate of growth compares to an annual average increase of 3.7 percent in construction costs and 2.5 percent in consumer price inflation over the same time frame. In addition, as noted in Table IV-2, 2011 was the fifth consecutive year in which Thruway and Canal operating expenses were below budget estimates.

Table IV-2: Thruway & Canal Operating Expenses – Net of Reserves, Storm, Pension and Health Insurance Costs (in millions)

Year	Original Thruway & Canal Operations Budget	Actual Thruway & Canal Operating Budget ⁽¹⁾	Less:			Net Expenses	Annual Change	Annual % Change
			Reserves	Storm (Irene & Lee) Costs	Pension & Health Insurance			
2005	\$344.0	\$350.0	\$3.5	\$0.0	\$73.6	\$272.9		
2006	372.0	376.2	13.0	0.0	75.9	287.3	14.4	5.3%
2007	391.4	390.8	6.8	0.0	79.8	304.2	16.9	5.9%
2008	404.6	386.5	2.5	0.0	81.0	303.0	-1.2	-0.4%
2009	412.1	398.9	7.3	0.0	79.2	312.4	9.4	3.1%
2010	420.6	416.8	6.0	0.0	101.7	309.1	-3.3	-1.1%
2011	443.3	426.6	4.6	6.8	98.4	316.8	7.7	2.5%

Note: Numbers may not add due to rounding.

⁽¹⁾ Excludes I-84 costs that are no longer an Authority expense, as has been reimbursed since 2007 and eliminated in their entirety since 2010.

From 2005 through 2011, the Authority was able to limit the level of growth in Thruway and Canal operating costs primarily through staffing reductions and a stronger workforce management program. During this period, the Authority eliminated 314 positions, representing a workforce reduction of nearly 10 percent. In addition, the Authority reduced or eliminated expenditures for equipment and projects, cancelled scheduled salary increases and other employee benefits, relied more heavily upon part-time and seasonal workforces, reduced toll lane staffing hours, enhanced energy efficiency measures, reduced overtime and discretionary expenses and other actions.

As noted later in this report, the Authority will be significantly enhancing the efficiency of its operations through a new operational streamlining program, scheduled to begin in 2012. This new program will play an important role in the maintenance of future fiscal balance, involving structural reforms and other measures that will generate real reductions in Thruway operating expenses.

B. Capital Expenditures

Given the age of the Thruway and Canal Systems and the high percentage of their infrastructure that dates back to original construction, significant capital investments have been necessary to complement maintenance activities for the system to remain reliable and in a state of good repair. While the Authority's recently completed 2005-2011 Capital Program was primarily focused on maintaining infrastructure conditions, it did include some heavy reconstruction and capacity improvement activities.

The 2005-2011 Capital Program was intended to address several key objectives that were critical to Thruway and Canal customers. Those goals were reliability, increased customer service, improved safety and mobility and environmental stewardship. The program included projects that addressed the need for reconstruction and rehabilitation of roadway, bridges, facilities and support systems of the Thruway; congestion relief and mobility enhancements; equipment replacement needs; critical canal capital projects; and higher/highway speed *E-ZPass* lanes.

However, beginning in 2007, the fiscal distress resulting from declining traffic and high fuel and construction commodity prices required the Authority to re-examine the capital and equipment needs of the Thruway and Canal systems. As a result of this re-evaluation, a significant number of project scopes were reduced, projects were eliminated and others were delayed. These actions reduced the level of planned infrastructure and equipment investments in the 2005-2011 Capital Program by \$300 million, reducing capital expenses from \$2.6 billion to \$2.3 billion during this period. Despite these actions, as noted in Figure VI-1 and Figure VI-2 later in this report, the Authority was able to maintain good overall highway and bridge conditions during this period.

Total capital expenditures and funding sources for the 2005-2011 Capital Program are shown in Table III-3 and Table IV-4.

Table IV-3: Capital Expenditures, Thruway Authority (millions)

Year	Highway and Bridge	Facilities, Travel Plaza and Equipment	Canal System and Economic Development Projects ⁽¹⁾	Total Capital Expenditures
2005	\$97.1	\$27.3	\$21.0	\$145.4
2006	179.3	50.9	14.4	244.6
2007	267.3	59.0	44.2	370.5
2008	288.7	36.2	30.3	355.2
2009	259.6	35.4	26.1	321.2
2010	311.0	39.9	26.8	377.7
2011	367.6	49.5	27.4	444.5
Total	\$1,770.6	\$298.2	\$190.2	\$2,259.1

Note: Numbers may not add due to rounding.

⁽¹⁾ As noted above, these costs are payable only after Thruway operating and maintenance and debt service costs.

Table IV-4: Funding Sources, Thruway Authority (millions)

Year	Funding Sources					
	Federal Aid	Other	Bond / Note Proceeds	Subtotal Exclusive of Thruway Revenues on Pay-As-You-Go Basis	Revenues Required from Tolls, etc.	Pay-As-You-Go %
2005	\$43.1	\$0.8	\$60.4	\$104.3	\$41.1	58.5%
2006	22.7	7.4	154.8	184.9	59.7	36.7%
2007	30.9	1.2	198.3	230.4	140.1	46.5%
2008	17.6	1.3	299.5	318.4	36.8	15.7%
2009	10.0	2.7	258.4	271.1	50.1	19.6%
2010	8.7	4.9	305.8	319.4	58.3	19.0%
2011	0.0	6.4	366.0	372.4	72.1	17.6%
Total	\$133.0	\$24.7	\$1,643.2	\$1,800.9	\$458.2	27.3%

Note: Numbers may not add due to rounding.

It is important to note from Table IV-4 that Federal aid allocated by the NYSDOT to the Authority declined significantly from 2005 through 2011. This decline is predominately the result of the expiration of an agreement with NYSDOT in 2005, which had previously authorized the allocation of Federal Interstate Maintenance Aid (I-M) and Transportation Enhancement Program (TEP) assistance to the Authority that supported its capital and operational needs. As noted, declining Federal aid and low revenue growth led to a reduction in the level of Pay-as-you-go financing for the 2005-2011 Capital Program.

C. Debt Service Expenses

As a result of reduced Pay-as-you-go financing from reduced revenues and Federal aid, the Authority had to rely on greater levels of debt to finance commitments made in the 2005-2011 Capital Program. As noted in Table III-5, the elevated reliance on bonds and the issuance of short-term notes to finance programmed capital improvements resulted in annual debt service payments increasing from \$108.4 million in 2005 to over \$181.8 million in 2011, even in a recent low interest rate environment.

Table IV-5: Debt Service, Thruway System (millions)

Year	Service on Outstanding Debt
2005	\$108.4
2006	128.5
2007	135.8
2008	163.5
2009	176.9
2010	191.2
2011	181.8
2005-2011 Total	\$1,086.1

Note: Numbers may not add due to rounding.

D. Revenues

The Authority is primarily funded by toll revenues (some 95 percent of its revenues comes from toll revenues). The Authority also collects a variety of non-toll revenues derived from payments received from concessionaires at the Thruway service areas restaurant and gasoline stations, sales of surplus property, revenues from special hauling permits, *E-ZPass* fees, fiber optic agreements, interest on various invested funds, and other miscellaneous sources. These revenues have varied considerably over the last fifteen years. The Authority's income from all other revenue sources was \$31.4 million in 2011, including interest earnings. Interest earnings have dropped substantially due to several factors including the reduced level of funds available for investment and lower market interest rates. Historical collections of revenues are outlined in Table IV-6.

Table IV-6: Summary of Total Thruway System Revenues (Millions)

Year	Passenger	Commercial	Total Toll Revenue	Other Revenue	Total Revenue
2005 ⁽¹⁾	\$311.1	\$200.1	\$511.2	\$36.4	\$547.6
2006	333.7	220.7	554.4	39.6	594.0
2007	324.7	215.6	540.3	41.4	581.7
2008 ⁽¹⁾	347.1	215.6	562.7	33.5	596.2
2009 ⁽¹⁾	400.8	210.8	611.6	26.7	638.3
2010 ⁽¹⁾	413.1	228.1	641.2	31.3	672.5
2011	403.9	230.2	634.1	31.4	665.5
2005-2011 Total	\$2,534.4	\$1,521.1	\$4,055.5	\$240.3	\$4,295.8

Note: Numbers may not add due to rounding.

(1) Toll Adjustments were implemented in 2005, 2008, 2009, and 2010.

E. Historical Flow of Funds Analysis

Table IV-7 presents total revenue and expenses for 2005 through 2011 in a format that is consistent with the flow of funds required by the Authority's Bond Resolution. Debt Service Coverage Ratios are a principal financial metric in understanding an entity's financial health. The ratio is closely monitored by the credit rating agencies who utilize this ratio to determine an issuer's general financial condition, evaluate its long-term ability to pay outstanding debt obligations and establish a credit rating on the issuer's debt obligations. The Authority's Debt Service Coverage Ratio is defined in its Bond Resolution as Net Revenues (Total Revenues less Operating Expenses) over Debt Service. The Authority's Fiscal Management Guidelines, as adopted by the Board in 1997, require the Authority's Debt Service Coverage Ratio to be a minimum of 1.5 times and the Authority's Bond Resolution requires a minimum of 1.2 times.

As noted in this table, from 2005 through 2011 the Authority was able to maintain fiscal stability and a debt service coverage ratio that warranted its current favorable credit investment grade credit rating. This was accomplished by the aforementioned capital program reductions, operational cost containment efforts and toll rate adjustments. However, these actions were insufficient to fully maintain net revenues at a level that would result in good coverage and fiscal balance. As a result the Authority relied on the issuance of short term notes to bridge financing gaps in lieu of taking other actions. The combination of these measures allowed the Authority to maintain a balanced flow of funds and achieve budget surpluses that were used to enhance its working capital reserves.

Table IV-7: Revenues, Operating Expenses and Reserve Fund Requirements, 2005 – 2011 (in millions)

	Actual 2005	Actual 2006	Actual 2007	Actual 2008	Actual 2009	Actual 2010	Actual 2011	Total 2005-2011
Total Revenues	\$ 547.3	\$ 594.0	\$ 581.6	\$ 596.2	\$ 638.3	\$ 672.5	\$ 665.5	\$ 4,295.4
Less: CWE Debt Service & Reserve	0.3							0.3
Available Revenues	547.6	594.0	581.6	596.2	638.3	672.5	665.5	4,295.7
Less:								
Operating Expenses	305.3	310.7	332.2	334.8	339.3	358.2	365.5	2,346.1
Operating Reserves	2.0	13.0	6.8	2.5	7.3	6.0	4.6	42.1
Total	307.3	323.7	339.0	337.3	346.7	364.2	370.0	2,388.2
Net: Revenues	240.3	270.3	242.6	258.9	291.7	308.3	295.5	1,907.5
Less: Debt Service	103.8	127.4	135.8	163.5	166.3	167.3	167.4	1,031.5
Net: Revenues After Debt Service	136.5	142.9	106.8	95.4	125.4	141.0	128.1	876.0
Less: Retained for Operating Reserves	5.2	-5.0	-5.0	5.1	(1.8)	2.3	(4.3)	(3.6)
Net: Revenues	141.7	137.9	101.8	100.5	123.5	143.2	123.8	872.4
Less:								
Reserve Maintenance Provisions (2)	60.9	69.8	20.7	30.7	34.5	31.0	10.0	257.6
Other Authority Projects (3)	50.7	54.3	53.7	45.2	48.7	46.0	51.3	349.9
General Reserve Fund	24.9	12.8	26.8	24.4	25.1	21.2	48.2	183.5
General Reserve Fund - CP1, CP 2 & BAN's	4.6		-	-	10.6	23.8	14.4	53.4
Balance After Reserve Maintenance Provisions, Other Authority Projects and General Reserve Fund	0.5	1.0	0.6	0.0	4.7	21.1	-0.1	28.0
Adjustments for Cash Basis	(0.6)	(1.0)	(0.6)	-	0.2	(0.1)	0.1	(1.9)
Net: Balance Available for Working Capital	\$0.0	\$0.0	\$0.0	\$0.0	\$5.0	\$21.1	\$0.0	\$26.1
Debt Service Coverage Ratios	2.31	2.12	1.79	1.58	1.75	1.84	1.77	
Pay-As-You-Go Percentage	58.5%	36.7%	46.5%	15.7%	19.6%	19.0%	17.6%	

(1) Totals may not add due to rounding.

(2) Shows the Reserve Maintenance Fund provision will be funded from debt proceeds when sufficient revenues are not available.

(3) As of 10/31/2007, expenditures for I-84 are to be funded from NYSDOT.

V. Socio-Economic Conditions

The following sections discuss the current state and forecasted trends of the economy and other factors that will impact future traffic growth on the Thruway System.

A. Economics

Our national economic outlook calls for relatively flat economic growth with real GDP expected to increase by 2.1 percent for 2012 and 2.4 percent for 2013. These estimates represent the median of the selected economic forecasts developed by financial institutions and business associations in the short term, as reported in the Blue Chip Economic Indicators publication. Our forecast assumed “reasonable” increases in gasoline pricing, determined to be not unlike those in the recent past, up to and including \$5.00 per gallon during the forecast period. Our forecasts recognize and take into account the current variations in gas pricing and the probability of high prices to the extent possible.

Additionally, the makeup of the motor vehicle fleet in the United States is transforming. In the first quarter of 2012, the average gas mileage rate of new vehicles was the highest ever. These higher-gas-mileage vehicles are replacing vehicles that may have had half the effective gas mileage, halving the effective price of gasoline to certain users. Because of this, we believe that a consistent increase in the price of gas will not result in major declines in traffic, as the consumer is already modifying their vehicle choice to mitigate these increases. However, a significant, quick spike in gas prices, as had occurred in 2008, would likely have a negative impact on traffic.

The Authority and the facilities it operates have certainly experienced the effects of economic cycles that have characterized the economy over the past few decades. Any forecast of toll traffic and revenues will, of necessity, recognize the significant variations that can and do occur in the national, regional and local economies and population changes within the Thruway corridors. The forecasting of traffic and toll revenues for time periods that coincide with major modifications to the toll rate structure must take into account the changes in motorist behavior that occur in response to economic changes and changes in work environments due to technological advances not seen in the past. With this in mind, Jacobs performed a detailed analysis of the historical economic trends seen over the last few decades, particularly as they relate to the recessionary economic influences that occurred and how the Authority's facilities reacted to those trends. The following sections provide synopses of those findings from the larger report document being prepared for this work effort.

1. Long-Term Structural Trends

Prior to the most recent recession, there were also a number of longer-term structural changes in the U.S. and the international community which impeded national economic growth and employment creation. First, there have been significant productivity improvements through advances in information technology, computing power, transportation, and communications. Initially, these advances encouraged the transfer of manufacturing facilities and jobs to areas with lower wages and higher

unemployment. This also shifted the economic growth engine from manufacturing (31 percent of GDP in 1970 versus 23 percent GDP in 2010) to services (32 percent of GDP in 1970 versus 47 percent of GDP in 2010). These trends intensified after the technology boom of the late 1990s and the subsequent bubble that took place during the early 2000's, which encouraged the rapid and widespread expansion of inexpensive communications technologies and further flattened factor costs and labor costs. Increasingly, this has led to the outsourcing of professional services from the US to overseas-based entities. It is expected that this structural trend will continue in the medium to long-term.

Second, there has been a restructuring of the international economy with traditional trading partners (Europe and Japan) generating a decreasing share of global GDP, with other emerging economies including Brazil, Russia, India and China ("the BRIC countries"), comprising a larger share of the global economy. For the U.S., this has resulted in greater competition not just in manufacturing, but also in professional services, which has reduced direct and indirect employment.

A third trend has been the aging of the U.S population. The median age has increased from 27.9 in 1970 to 37.2 in 2010. This trend has also taken hold in Europe and Japan and is expected to eventually impact China due to its one-child policy. Finally, there has been a rapid and significant expansion in consumer credit, which has reached unsustainable levels during the previous decade.

These factors tend to further dampen economic growth and employment over the short-term and result in a general slowing of underlying long-term growth trends.

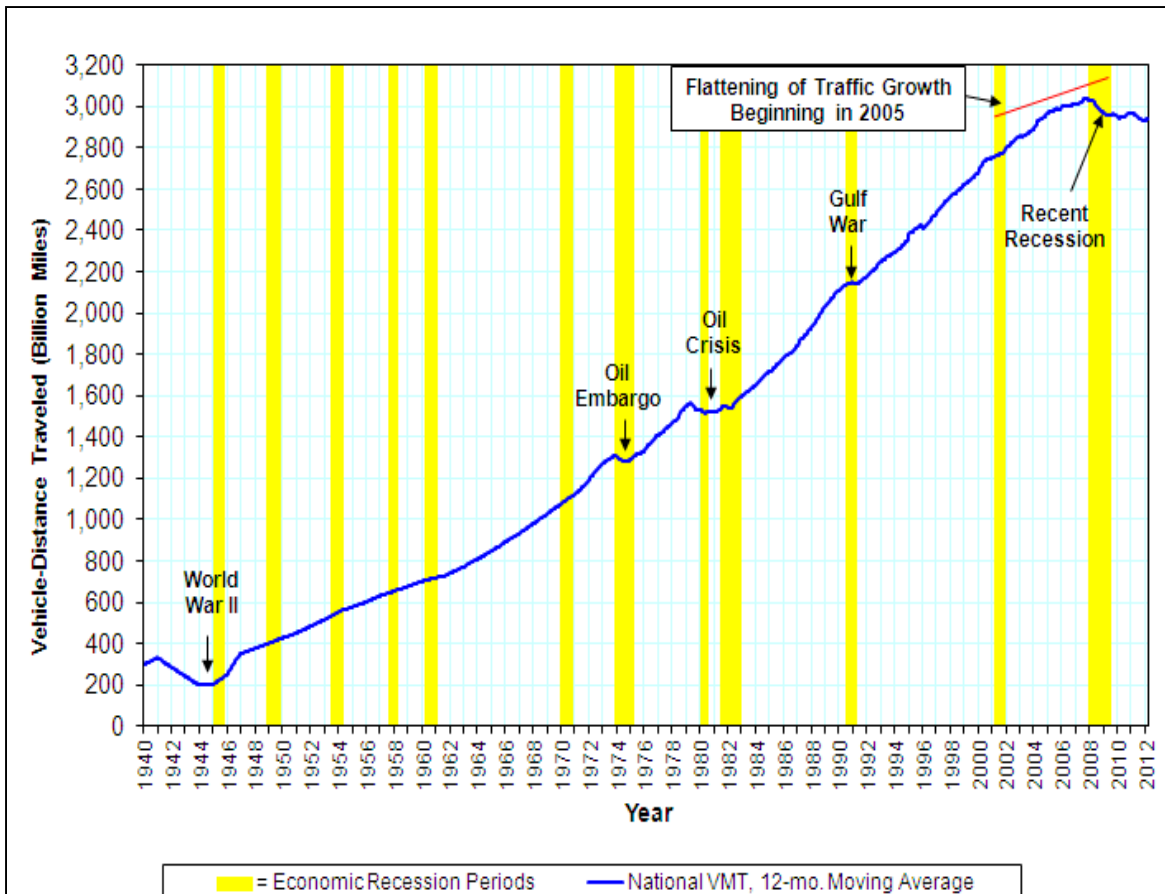
2. Short-Term Economic Forecast

Forecasts of changes in real GDP in 2012 prepared in April 2012 are roughly similar to or lower than the August 2011 forecasts with those levels being +2.3 and +2.1 percent, respectively. Although there has generally been better than expected increase in employment in recent months, analysts remain concerned about the strong possibility of a recession in Europe, the risk to gasoline prices due to political instability in the Middle East, high unemployment levels, and slower than expected growth in income. Analysts have steadily lowered the possibility of a second or "double-dip" recession within the next 2-3 years, which could be triggered due to severe recessionary conditions in Europe and/or increased tensions in the Middle East. Again, these forecasts suggest a more tempered view on near-term traffic growth and this is reflected in our forecast.

B. National Trends in Vehicle Miles Traveled (VMT)

The United States has experienced a slowing and subsequent decrease in vehicle miles traveled (VMT) on its highways over the past six years, as shown in Figure V-1. This reduction in VMT has resulted in a substantial decrease in revenues generated from fuel taxes and tolls, which are the major sources of funding for transportation projects in the US. There are several factors that have contributed to this phenomenon, including volatility in oil and gasoline prices, aging of the population, periodic decreases in output and employment, and changes in technology which render some commuter and discretionary trips unnecessary.

Figure V-1: Rolling Average Annual National Vehicle Distance Traveled, 1940 - 2012

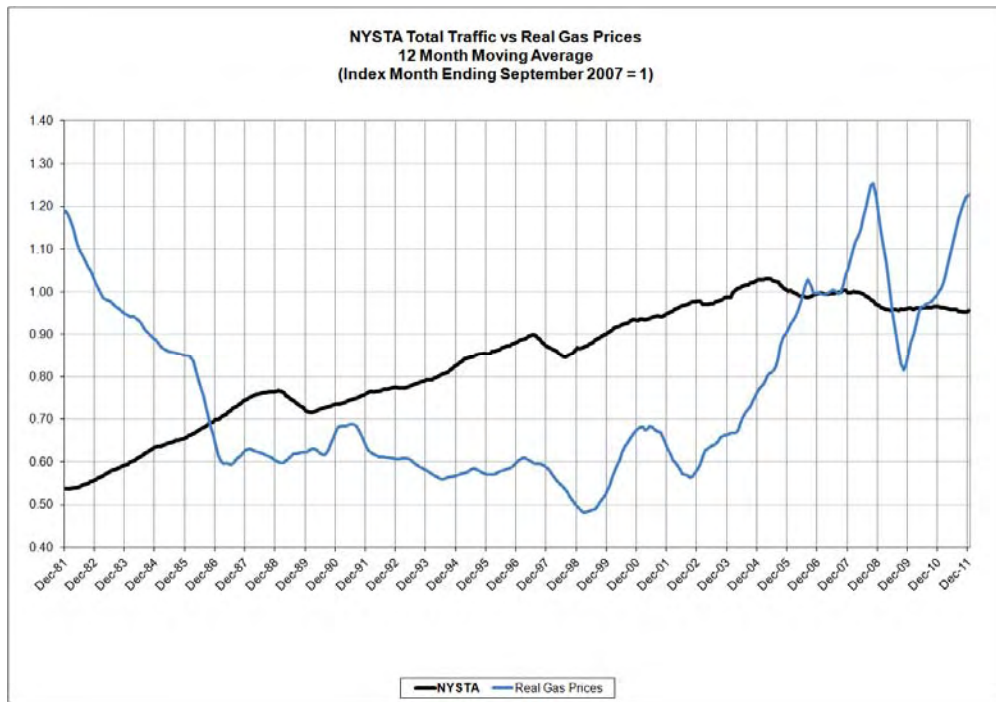


1. Fuel Costs

A number of factors may have caused the recent drop in VMT; the jump in gas prices is often cited as a key factor. Until the significant reduction in gasoline prices in late 2008, inflation-adjusted (real) gas prices had approached, then exceeded, the 1981 levels that were caused by the 1979 oil shock. This was followed by another spike that began in May of 2011.

Fuel costs continue to experience significant fluctuations in pricing because of perceived stresses on the oil supply which are continually inputted to the marketplace. Figure V-2 illustrates a comparison of tolled traffic on the Thruway versus with real national gasoline prices (i.e. gas prices adjusted for inflation), both of which were indexed to the September 2007 national recession. Historical Thruway traffic is based on the total number of toll paying trips on all facilities except for the Black Rock and City Line toll plazas, where tolls were removed in 2006. Thruway traffic tends to react to spikes in the price like that in 2008 more than in the gradual increase in price over time.

Figure V-2: Thruway Tolled Traffic vs. Real Gasoline Prices



2. Other Factors

Previous studies have shown that individuals tend to gradually drive less as they age, especially after the age of 40. Results from the 2009 National Household Travel Survey shows that with the aging of the population, the average VMT per person had been decreasing over the past decade. This factor, when added to the observed increased longevity of drivers in the U.S., is expected to have a long-term detrimental effect on VMT; traffic growth is not expected to return to the rates achieved in the 1980s and 1990s.

These demographic factors, combined with higher, more volatile gas prices and the reduced necessity of travel due to widespread internet access (which eliminates the need for discretionary trips such as shopping), imply that VMT growth in general will not return to the levels it had reached in the 1980s and 90s. However, at specific locations, there may be periods of higher growth due to local development or other economic activities.

VI. 2012-2015 Multi-Year Capital Program

In order to better understand the Authority's current and future financial condition, consideration must be given to the size, complexity and capital needs of its highway, bridge and canal infrastructure. The Authority's Thruway and Canal Systems are vast and aging and require considerable investments to remain reliable. This section summarizes the Authority's 2012-2015 Multi-Year Capital Program, the infrastructure investments and program changes that are to be made therein, and the impact that these investments will likely have on facility condition ratings.

A. Program Details

The 2012-2015 Multi-Year Capital Program will complete major, job-sustaining reconstruction projects that were let during the previous 2005-2011 Capital Program and include new highway, bridge and canal construction projects and equipment purchases. The program was originally planned at \$1.8 billion, and excluded the new Tappan Zee Bridge Project described in the next section of this report. However, due to fiscal constraints brought on by continued high fuel and construction commodity prices and a sluggish economic recovery, many projects contained in the original plan have been delayed, reduced or eliminated. These actions resulted in the program being reduced by \$300 million, to its current investment level of \$1.5 billion. In essence, fiscal constraints required the Authority to pursue a more balanced approach to the program's project mix, focusing more on high priority and high impact investments to maintain the useful life of Thruway and Canal infrastructure rather than pursuing major reconstruction, rehabilitation and capacity improvements that were familiar in the 2005-2011 Capital Program.

New Thruway projects included in the 2012-2015 four-year program include:

- Grand Island Bridge Deck Replacements and Repairs (2012 and 2013 lettings);
- Exit 59 (Dunkirk) to Exit 60 (Westfield) Pavement Resurfacing (2013 letting);
- Exit 17 (Newburgh) to Exit 18 (New Paltz) Pavement Rehabilitation (2013 letting);
- Exit 33 (Verona) to Exit 34 (Canastota) Pavement Resurfacing (2014 letting);
- I-95, Exit 8B (New Rochelle) to Port Chester Pavement Restoration (2014 letting); and
- Exit 54 (West Seneca) to Lackawanna Barrier Pavement Resurfacing and Bridge Replacements (2015 letting).

Since the transfer of the Canal System to the Authority in the 1990s, the Authority has made significant maintenance and capital investments into the waterway's infrastructure. However, given the age of the Canal System, revitalization of infrastructure is necessary to meet the demands of recreational boaters, tour and rental boats and a resurgent commercial shipping sector. While the Authority undertakes an

ambitious annual maintenance program, Canal structure conditions continue to deteriorate, with nearly 50 percent of critical Canal structures rated in the fair and poor categories. Complicating efforts to reduce this rate of deterioration, a substantial portion of the Canal's current floating plant equipment consists of a variety of vessels that need to be replaced, and in 2011 Tropical Storms Irene and Lee caused nearly \$100 million in damages to many components of the Canal System. In April 2012, the Authority entered into a \$60 million loan agreement with Citibank, N.A. to finance a portion of these emergency capital repairs and expects Federal Emergency Management Agency to reimburse a substantial portion of the loan.

Due to fiscal restraints, new Canal projects in the 2012-2015 Capital Program are limited and primarily focused on repairing storm damaged facilities. They include the following:

- Canal Dredging, Lock Repairs and Other Contracts – Tropical Storms Irene and Lee Recovery Projects (2012 lettings);
- Utica Taintor Gate and Dam Rehabilitation (2012 letting)
- Amsterdam Movable Dam Rehabilitation (2012 letting);
- Scotia Moveable Dam Rehabilitation (2014 letting); and
- Oswego Lock Rehabilitation (2015 letting).

It is also important to note that a considerable portion of the 2012-2015 Capital Program (some \$400 million) is dedicated to financing several ongoing and large-scale Thruway reconstruction and rehabilitation improvement projects that were contained in the 2005-2011 Capital Program. Thruway projects currently underway that have a financial impact in 2012 and beyond include:

- Exit 39 (I-690) to Exit 40 (Weedsport) Pavement Reconstruction;
- Exit 23 (I-787) to Exit 24 (Northway) Pavement Reconstruction and Capacity Improvements;
- Exit 57 (Hamburg) to Exit 58 (Silver Creek) Pavement Reconstruction and Bridge Rehabilitations; and
- Phase 2 of the Tappan Zee Bridge Deck Replacement.

As the Authority progresses through the 2012-2015 Capital Program, it will rely on existing and enhanced asset management and capital program management systems to ensure that changes to the program maintain the proper project mix, to maximize investment value and impact as the economy and pricing environments change.

B. The New Tappan Zee Bridge Project

The Authority has moved toward undertaking a massive transportation project: the replacement of the Tappan Zee Bridge. This project is one of the Country's most extensive transportation enhancement projects ever envisioned and, in 2011 the Tappan Zee Bridge Project became one of fourteen infrastructure projects that President Obama tapped for expedited Federal environmental review, with construction estimated to begin in late 2012. Pursuant to new statutory authority for the Authority to undertake procurements on a design build contracting basis, in February 2012, four separate private joint ventures made up of large domestic and international firms were short-listed and have recently been invited to submit Design-Build bids under a recently released formal Request for Proposals.

The newly authorized design-build procurement process being followed allows the private sector to compete and offer innovative, cost-effective designs for this major transportation infrastructure replacement project. The design-build process further permits an expedited construction schedule which can take advantage of significant cost savings and provides for less risk if delays and cost overruns should occur during the process.

The Authority had previously focused on earlier concepts for the Tappan Zee Bridge project and included a significant public involvement process over the last decade. The re-launch of the process in October 2011 has resulted in numerous public presentations and meetings which have been heightened by the hearings on the Draft Environmental Impact Statement for the project. The Project is currently in the federal environmental process and no formal action regarding its financing or construction can occur until a decision is made under the NEPA process in late summer 2012.

The estimated Project cost is \$5.4 billion in year-of-expenditure dollars. The Federal Highway Administration has conducted an independent review of the Authority's cost estimate to verify its reasonableness and to estimate a range of probability that represents the current stage of design for the project. That process estimated a range of \$4.6 billion to \$5.6 billion. Design and construction would begin in late 2012, subject to approval under the federal environmental process.

The Authority continues to guide the process forward. As noted earlier, a specific financing plan for this project will be developed in late 2012 when more information is available on the cost of the Project (i.e. when the design-build procurement process has been completed) and when there is more certainty on the level of Federal aid or financing assistance that will be received for this Project. As a result, Tappan Zee Bridge Project costs are not reflected in the financial analysis of this report.

C. Planned Capital Program Expenditures

Table VI-1 shows the total planned expenditures over the period 2012 to 2016 excluding the costs of the Tappan Zee Bridge project. Actual expenditures from 2011 are included as a reference point and the figures shaded in green make up the adopted 2012-2015 Capital Program.

Table VI-1: Projected Total Capital Program Expenditures (millions)

Year	Thruway Highway and Bridges Capital Expenditures	Equipment Replacement and Other Facility Capital Needs	Canal Capital Program	Total Capital Program Expenditures
2011 (A)	\$367.6	\$49.5	\$27.4	\$444.5
2012	285.4	47.1	51.4	384.0
2013	263.1	48.8	62.1	374.0
2014	282.5	43.7	50.8	377.0
2015	291.6	40.7	51.2	383.5
Capital Program Total	\$1,122.6	\$180.3	\$215.5	\$1,518.5
2016	380.8	39.2	54.4	474.3
Total 2012-2016	\$1,503.4	\$219.5	\$269.9	\$1,992.8

Note: Numbers may not add due to rounding.

D. The Impact of the 2012-2015 Capital Program on Conditions

As previously noted, the main goals of the Authority's capital and maintenance program is to preserve a high level of patron safety and service, maintain facilities in a state of good repair and ensure the overall reliability of the highway system. One measure of the effectiveness of these maintenance and capital programs is the condition ratings of highway and bridge facilities.

Figure VI-1 displays the historic average rating of Thruway pavement surface conditions since 1988 and the projected ratings as a result of the current Capital Program. During the life of the proposed capital program, it is projected that the pavement ratings for the Thruway facilities will remain in the "good" range, though at a level slightly below that of previous years. Similarly, the Authority maintains ratings of all of the Bridge Structures. The Authority is responsible for the maintenance and capital expenditures for 811 bridges, and by agreement with the state the inspection of 812, those 811 plus one additional. Figure VI-2 shows the bridge condition ratings since 1988. The current plan will maintain the average rating of all Bridges at an average rating of "good". However, it is important to note that the average bridge condition rating is closely approaching the "fair" category. Table VI-2 presents a summary of Bridge and Pavement ratings on the Thruway as of December 31, 2011. Roughly half of the bridges are in poor or fair condition and almost all pavement miles (shown as a two directional total miles) are in good or excellent condition. The Authority strictly complies with all State and Federal bridge inspection requirements and the assessments in this report reflect results of such inspections. It should be noted that the bridge "condition rating" is calculated by a specific formula containing separate components for each of the bridge elements. For a multi span structure, the lowest rated pier, the lowest rated deck, the lowest rated bearing, et cetera, are used to calculate the "condition rating". For example, if a bridge has eight bearing, seven of which are rated "good" and one of which is rated "fair", the rating of "fair" would be applied as the rating for bearings into the formula for the overall bridge condition.

Table VI-2: Current Bridge and Pavement Conditions

Condition	Number of Bridges	Pavement Miles
Excellent	35	340
Good	364	771
Fair	363	7
Poor	49	0
Total	811	1.118

Figure VI-1: Thruway Pavement Condition Ratings, 1988 – 2016

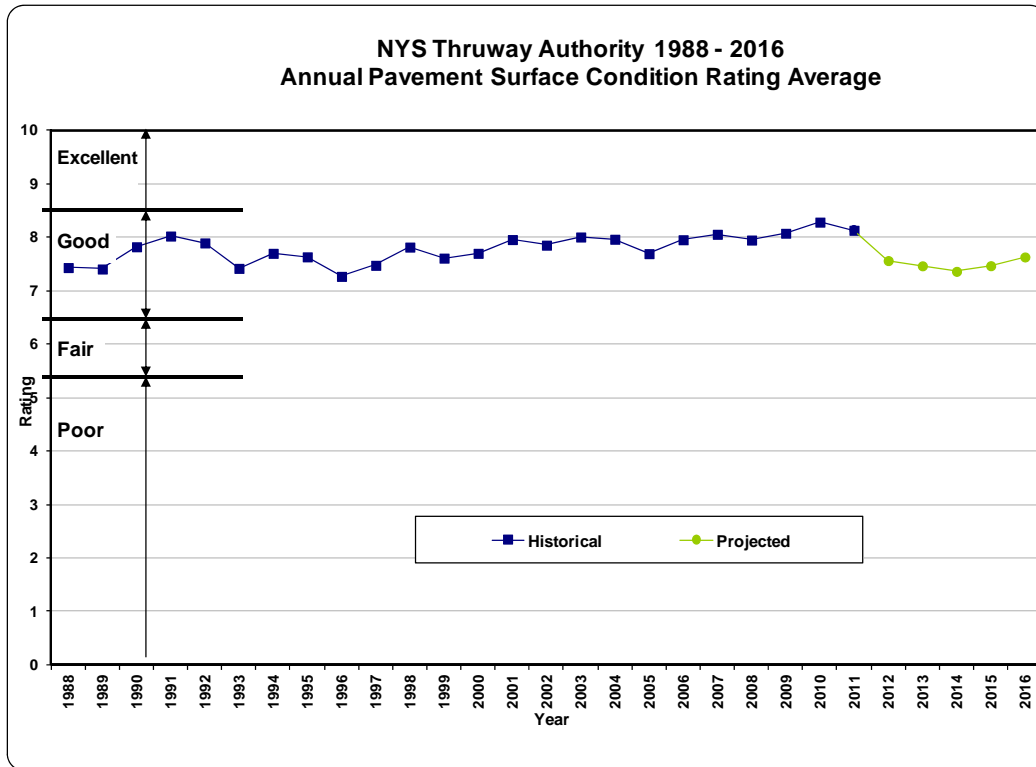
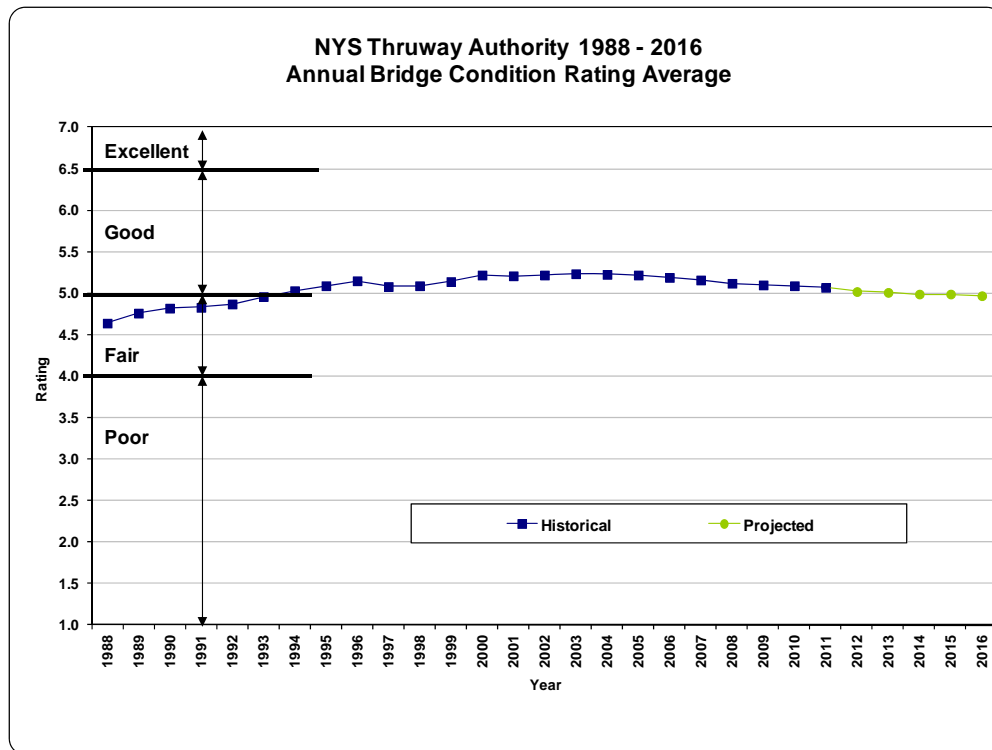


Figure VI-2: Thruway Bridge Condition Ratings, 1988 – 2016



VII. Toll Adjustments

This section discusses the proposed toll adjustment that was adopted by the Board on May 30, 2012. As proposed, the adjustment will compliment operational streamlining efforts and additional Federal aid commitments that will provide fiscal stability and healthy financial metrics until a longer-term financing plan, that includes the Tappan Zee Bridge Project, is developed later in 2012.

A. Proposed Increase to Commercial Tolls

The Board-adopted toll adjustment proposal advances a 45 percent increase on commercial toll rates as an additional means to meet the Authority's financial requirements through 2015. This proposed toll adjustment would exclude 2H commercial vehicle types. The proposed toll adjustment that was adopted by the Board is currently progressing through the regulatory process mandated by the State's Public Authorities Law Section 2804 that includes certain filings, public hearings, and a SEQRA review among other activities.

Figure VII-1 compares five-axle trucks' toll rates per mile on the Thruway ticket system to those charged on other toll roads in the Northeast. Figure VII-1 compares Tappan Zee Bridge five-axle truck tolls to round-trip tolls on other major river crossings in the Northeast. It is important to note that many of the other toll facilities analyzed are not as old nor do they experience the same heavy weather conditions as the Thruway. As seen from these figures, current commercial toll rates on both the ticket system and the Tappan Zee Bridge are comparatively low against those of other regional facilities, and are effectively lower than the rate shown due to the commercial volume discount program..

As noted, considering the proposed 45 percent increase, ticket system commercial tolls will still remain below the average for toll roads and the commercial toll rate in the Tappan Zee Bridge toll increase will remain below the rates currently charged at the MTA Bridges & Tunnels and Port Authority of NY and NJ crossings. It is important to keep in mind that large toll increases are either planned or are likely to occur at many of the other facilities shown in these figures. As a result, the proposed 45 percent commercial toll adjustment will maintain the Thruway's position as a relatively inexpensive toll facility.

Figure VII-1: NYSTA Ticket System Toll Rates Compared to Other Toll Roads in the Northeast, 5-Axle Trucks

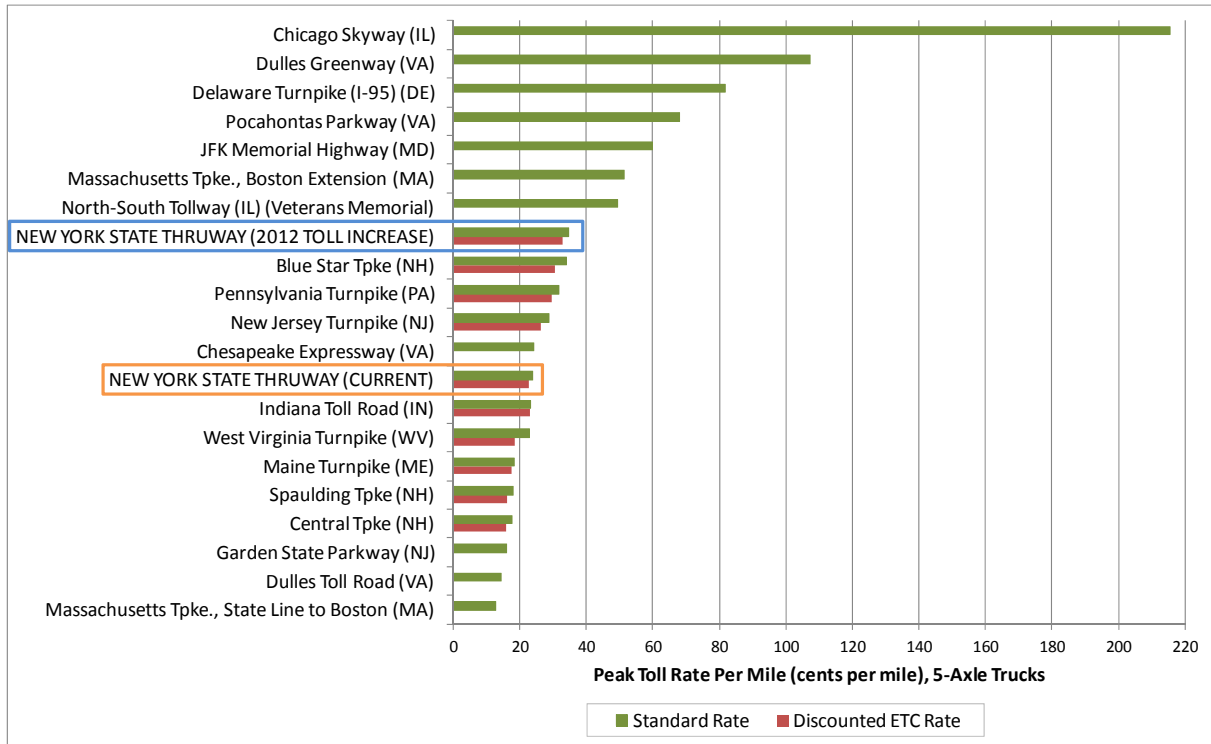
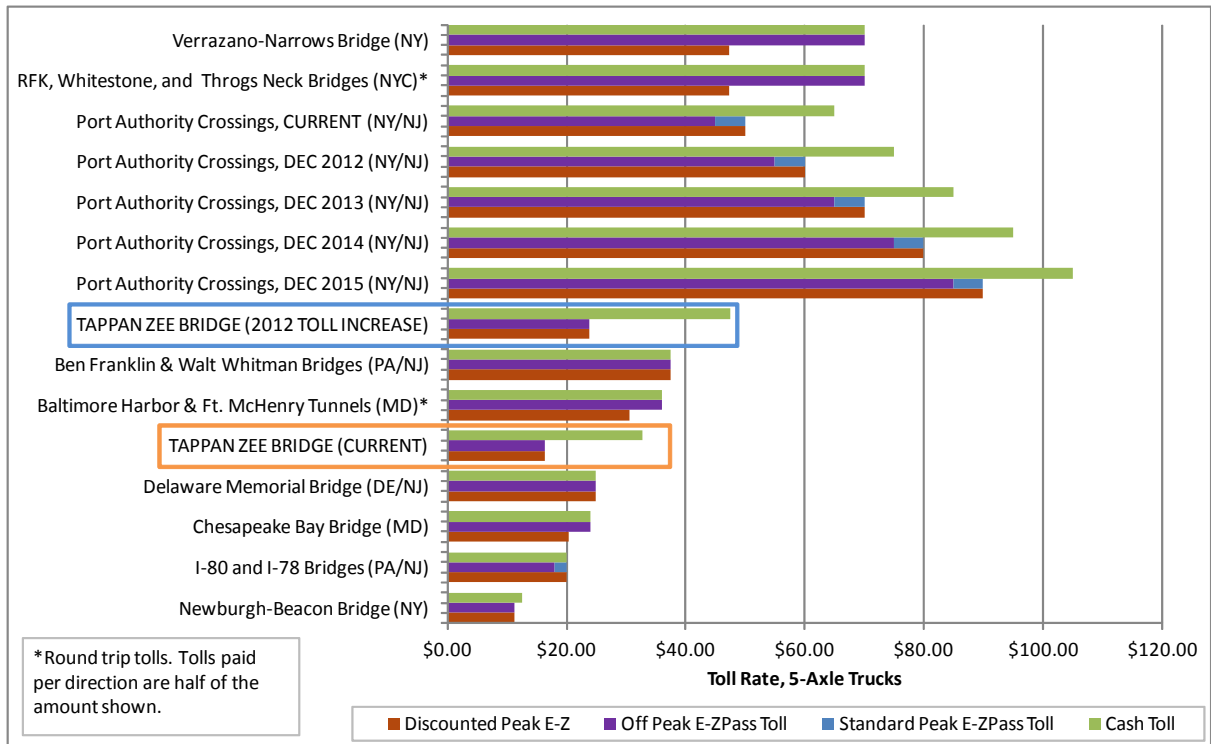


Figure VII-2: Tappan Zee Bridge Toll Rates Compared to Other Tolled Crossings in the Northeast, 5-Axle Trucks



It is important to note that previous toll increases indicate that Thruway traffic is relatively insensitive to increases in the toll rates. This is due in part to the fact that there are few effective competitive routes, that the physical condition of the Thruway is generally better than that of alternative routes, and that the Thruway's toll rates are comparable to or relatively lower than other tolled facilities in the Northeast. In addition, the safety and security related services, such as snow plowing and police patrols, are better on the Thruway than on alternative routes. Moreover, travel plazas along the length of the Thruway provide 24-hour fuel, rest stop, and food services without the need to exit the system. As a result, slight declines in traffic volumes are expected from any toll increase. The amount of diverted commercial vehicle traffic from the proposed 45 percent adjustment to certain commercial toll rates is not expected to be significant as a result of the proposed toll modifications. The decline in traffic from the toll change includes operators that choose an alternative route, combine trips or choose not to travel at all. Table VII-1 presents the proposed commercial toll schedule.

Table VII-1: Proposed Commercial Toll Rates, 2012

2012	Controlled		Yonkers		Harriman		Spring Valley		New Rochelle		Tappan Zee		Grand Island	
	Cash	E-Z Pass	Cash	E-Z Pass	Cash	E-Z Pass	Cash	E-Z Pass ⁽¹⁾	Cash	E-Z Pass	Cash	E-Z Pass ⁽¹⁾	Cash	E-Z Pass
2H	0.0933	0.0886	2	1.9	2	1.9	5.25	5.25 / 2.63	3.5	3.33	14.75	14.75 / 7.38	2	1.9
3H	0.2326	0.221	3.5	3.33	4	3.8	12	12.00/6.00	6.25	5.94	30.25	30.25/15.13	3.5	3.33
4H	0.2564	0.2436	4	3.8	4.5	4.28	12	12.00/6.00	7.25	6.89	36	36.00/18.00	4	3.8
5H	0.3466	0.3293	6.25	5.94	6.25	5.94	19.75	19.75/9.88	11.75	11.16	47.5	47.50/23.75	6.25	5.94
6H	0.4296	0.4081	6.75	6.41	7.25	6.89	21.5	21.50/10.75	12.75	12.11	59.5	59.50/29.75	6.75	6.41
7H	0.5127	0.4871	7.25	6.89	8.5	8.08	24	24.00/12.00	14.25	13.54	71.5	71.50/35.75	7.25	6.89
5S, 6S, 7S	-	0.3922	-	4.34	-	5.08	-	7.44/14.86	-	8.31	-	23.75/47.49	-	4.34

⁽¹⁾ Peak/Off Peak E-ZPass Rates

Table VII-2 provides a comparison of existing and proposed toll rates for sample trips along the Thruway Control System for Class 5H vehicles.

VII-3

Table VII-2: Current and Proposed Toll Rates for Sample Class 5H Trips

Sample Trip	Payment Type	Class 5H Trip Toll			
		Current	Proposed	\$ Change	% Change
Woodbury (15) to Newburgh (17)	Cash	\$7.10	\$10.30	\$3.20	45.1%
	E-ZPass	\$6.75	\$9.79	\$3.04	45.1%
Woodbury (15) to Albany (24)	Cash	\$28.10	\$40.75	\$12.65	45.0%
	E-ZPass	\$26.70	\$38.71	\$12.02	45.0%
Albany (23) to Schenectady (26)	Cash	\$4.90	\$7.05	\$2.15	43.9%
	E-ZPass	\$4.66	\$6.69	\$2.04	43.7%
Syracuse (36) to Rochester (45)	Cash	\$16.30	\$23.60	\$7.30	44.8%
	E-ZPass	\$15.49	\$22.42	\$6.93	44.8%
Geneva (42) to Rochester (45)	Cash	\$5.75	\$8.30	\$2.55	44.3%
	E-ZPass	\$5.46	\$7.89	\$2.43	44.5%
Leroy (47) to Williamsville (50)	Cash	\$10.00	\$14.50	\$4.50	45.0%
	E-ZPass	\$9.50	\$13.78	\$4.28	45.0%
Lackawanna (55) to Hamburg (57)	Cash	\$1.65	\$2.35	\$0.70	42.4%
	E-ZPass	\$1.57	\$2.23	\$0.67	42.4%
Massachusetts State Line (B3) to Williamsville (50)	Cash	\$77.05	\$111.75	\$34.70	45.0%
	E-ZPass	\$73.20	\$106.16	\$32.96	45.0%

VIII. Development of Toll Traffic and Revenue Forecasts

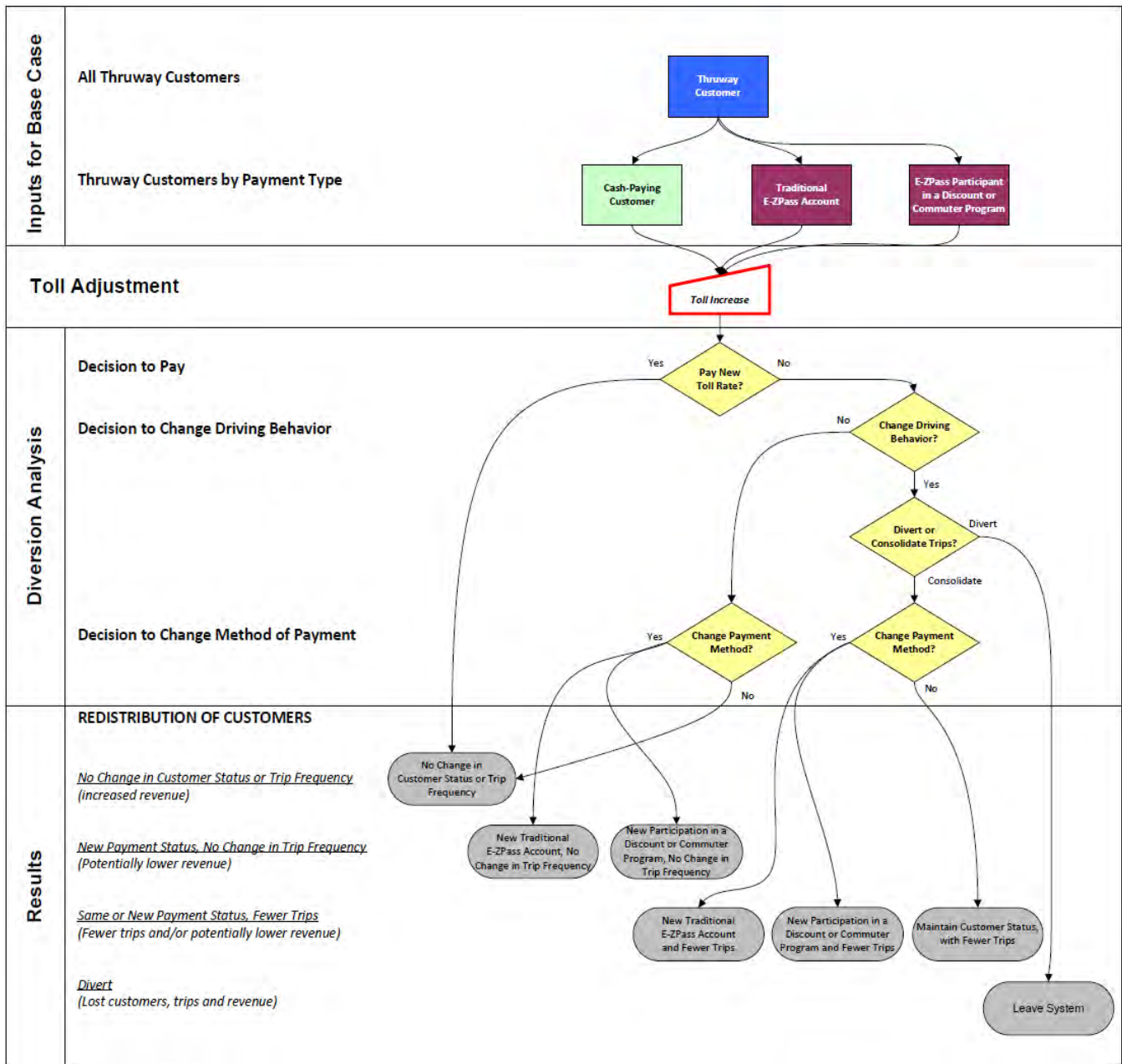
Toll Traffic and Revenue forecasts were developed with the aid of a computerized modeling platform created specifically by Jacobs for the Thruway. The base function of this model is to take current traffic volumes by general payment class (car, truck; cash, E-ZPass, and commuter) for each Thruway facility and adjust them for various factors such as underlying socio-economic/demographic growth in the project corridor, both historic and current, as well as overall inflationary pressures and applicable customer reactions to anticipated toll adjustments. These adjustments result in forecasted traffic volumes being developed for each year of the forecast period. Toll Revenues are then calculated based on these new adjusted traffic volumes by applying average toll rates to each payment class volume.

To develop traffic forecasts for a given toll increase scenario, customer reaction curves are applied to the base traffic forecast (after applying growth rates), to divert some amount of traffic during periods of toll increases which results in a lower traffic forecast than the base forecast. Figure VIII-1 presents a diagram detailing the general inputs that go into the toll rate analysis portion of the model, the driver decisions that are approximated by the analysis, and the resulting categories of drivers.

The toll increase modeling process executes the diversion analysis by approximating the driver decisions based on the assumed conditions for each payment and vehicle type. For instance, a cash-paying passenger car who travels occasionally may react differently to a toll increase than would a commuter who participates in the E-ZPass program, or a five-axle commercial vehicle who travels the facility as part of their usual cargo route.

The model estimates how many of the trips that were projected for the no-toll increase (base case) condition would modify their driving or payment behavior in reaction to a given toll increase, resulting in adjusted traffic volumes for the toll increase condition. These adjusted traffic volumes would be charged an adjusted toll rate per the toll increase, resulting in adjusted revenue forecasts from the base case.

Figure VIII-1: Driver Decision Path



A. Inputs to the Base Case

Inputs to the base case analysis include the historical traffic distribution of customers for the current toll condition. To develop base toll traffic projections for the Thruway for the five year period 2012-2016, historical traffic data through March 2012 were analyzed and trends in growth were considered for a variety of geographic regions and payment classes. Relevant socio-economic data were collected, including economic factor consensus forecasts and trends, which were used as an aid in Jacobs' assessment of when the Thruway traffic and toll revenue might recover from the recent economic

recession. Traffic growth rates were estimated separately for cars and trucks, as historical trends have pointed to correlations with different economic factors between the two. Passenger car growth is influenced more by local factors than National economic factors, whereas trucks have been shown to correlate reasonably well with the corresponding growth in the Industrial Production Index (IPI).

B. Inputs to Diversion Analysis

The toll increase carries with it several sub-categories of inputs that affect how large of an impact it will induce, such as inflation and customer sensitivity to toll changes. The following sub-sections provide more detail on these inputs and assumptions:

- **Customer Frequency of Travel:** The frequency with which customers are traveling on the Thruway's facilities and paying tolls must also be considered when developing customer reaction curves. The sensitivity of a customer to a toll increase, large or small, is likely to depend on how often they use the facility, and how often they will have to pay the larger toll. In general, a vacationer who travels on the Thruway once per year is less likely to feel the impact of a toll increase than a commuter who drives the Thruway and pays the toll on a daily basis. General (high, medium, low) frequency assumptions by class and facility were developed based on the findings of prior Thruway system studies.
- **Average Toll Rates:** An analysis of traffic trends on the Thruway has shown that over time, the average length of a trip on the Thruway has been slowly decreasing. The impact of this decrease is that over time, the average toll rates on some of the Thruway's facilities are gradually falling. Trends in both average toll rate and average trip length were considered and, in some cases, average toll rates were adjusted for the forecast years to reflect these trends.
- **Customer Reaction to Toll Adjustments:** In the face of a toll increase, some customers opt to change their travel behavior. Jacobs developed customer reaction curves based on travel frequency, payment type, and experience from previous toll increases on the Thruway (and on similar projects elsewhere) to estimate the number of customers that might react and modify their travel behavior if a toll increase occurs. These curves are used to estimate the number of customers reacting to a given toll increase, based on the relative adjustment of the toll increase.
- **Inflation:** The development of customer reaction curves for each payment class and facility is also contingent upon inflation of the dollar versus the proposed toll increase. In the process of developing these curves, Jacobs made every effort to account for inflation and multiple toll increases by considering the cumulative effective toll increase in comparison to today's toll rates and today's weight of the dollar. To do this, it was necessary to assume future rates of inflation. For the purpose of this analysis, inflation was assumed to be two percent annually based on the Blue Chip Economic Indicators, for the duration of the forecasts.

C. Diversion Analysis

The following sub-sections provide a discussion of customer's reactions to toll adjustments, and the potential for diversion.

1. Discussion of Customers' Reactions to Toll Adjustments

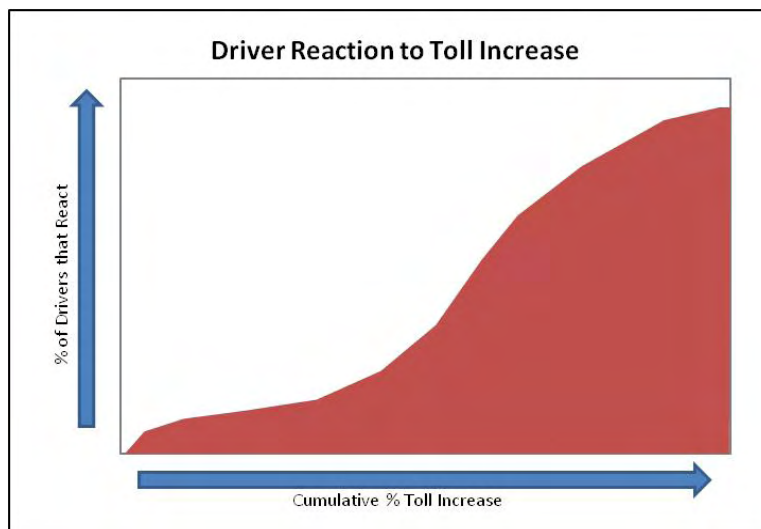
The toll traffic and revenue model developed for the Thruway by Jacobs evaluates for the impact of the assumed toll schedule on traffic volumes, and estimates the resulting revenue. Generally, increases in toll rates will cause tolled traffic volumes to decrease, either because motorists switch to alternate routes to avoid paying the higher toll or reduce their number of trips as a result of the price elasticity of travel demand.

Not all customers will react to a toll increase in the same way. Some customers may not change their behavior at all, while others might decide to use a different route, combine trips, or not make that trip at all anymore. Still other customers might decide to change how they pay for a trip (e.g., current cash-paying customers may open *E-ZPass* accounts) to lessen the impact to their wallet.

This effect has been observed at the Thruway and many other national toll facilities that also offer multiple payment methods and discount plans, often resulting in an overall lower diversion of traffic from the facility than may have been experienced in the past when tolls were increased and there was a single method of payment.

Jacobs developed toll reaction curves to estimate the total number of trips that would be impacted by a given toll increase, and to determine those trips that would remain on the toll facility and pay the new toll rate, those that would divert off of the toll facility, and those that would switch toll payment methods. Figure VIII-2 shows a representative illustration of how customers might react to toll increases of varying degrees.

Figure VIII-2: Representative Driver Reaction to Toll Increase

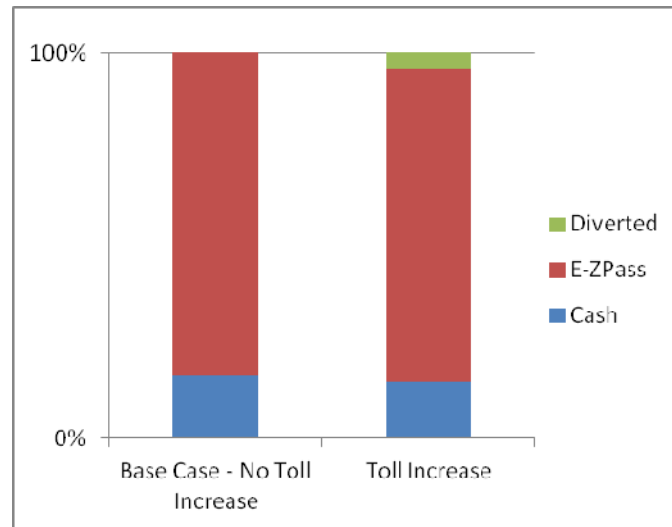


VIII-4

2. Discussion of Potential for Shifts in Traffic due to Toll Adjustment

Figure VIII-3 shows a sample of how system wide commercial traffic may shift due to toll increase, either off the system or how customers would switch to another payment type with the toll increase.

Figure VIII-3: Sample Payment Type Distribution of Traffic, both with No Toll Increase and With Toll Increase



Drivers familiar with their travel route options are likely to weigh their travel time versus their trip cost when choosing how to get from point A to point B, or whether to make the trip at all. The proposed commercial vehicle toll increases on the Thruway System will cause a certain amount of traffic to leave the facilities. Of this traffic, many will travel on another route to their destination; however, a number of trips will also no longer be made. Often times, customers will initially test alternate routes, only to revert back to their original path after finding the alternate route less desirable.

Viable alternate routes for some of the Thruways facilities do exist today and are limited, as discussed previously in Section III.A.1. Previous studies have identified the major travel corridors for Thruway commercial traffic. Also, all diversions are not necessarily negative to the Authority. Though not considered in this analysis, for example, a trip to New England previously using the Tappan Zee Bridge that diverted to the George Washington Bridge would still need to pay a toll to the Authority either at Yonkers or New Rochelle to complete their trip.

We also considered other factors in our analysis of diversions of traffic from the facility. We assumed that tolls would also continue to increase at the other competing Hudson River crossings. Annual toll increases on those other Hudson River crossings have already been approved for 2012 through 2015 and are already in place for the George Washington Bridge. Considering the Bear Mountain and Newburgh Beacon Bridges, there has been a differential in tolls between those facilities and the Tappan Zee Bridge for many years. When considered as a whole, many of the motorists have already chosen not to use the Tappan Zee Bridge, so the potential of large percentages of traffic diverting from the Tappan Zee Bridge are mitigated by those that are remaining. For many of the trips, the travel time for one of the alternative routes will be significantly longer than by remaining on the Tappan Zee Bridge.

In addition to diversion from the Thruway, some motorists will also convert to different payment methods to incur a smaller increase. For example, the 2012 toll increase of 45 percent for commercial vehicles with three or more axles results in increases at the Tappan Zee Bridge of \$14.75 for 5H cash and peak E-ZPass, and \$7.37 for off-peak E-ZPass. Because the off-peak E-ZPass toll increase is comparatively low, it may spur some eligible customers (i.e., those with schedule flexibility) who currently travel during the peak period to change the time of day during which they travel. Similarly, because today's difference between cash and E-ZPass of \$16.37 would increase to \$23.75 after the increase, some current cash or peak period customers may be additionally motivated to make the change to off-peak E-ZPass.

D. Model Summary

The process of estimating traffic and revenue for a toll scenario builds upon a variety of factors, primarily consisting of existing traffic characteristics, toll assumptions, and driver sensitivity to toll changes. In summary, customers react to toll adjustment increases in various ways:

- some stay on the toll facility and pay the new higher toll rate,
- some choose to change their method of payment for one that has a lower toll rate, and
- some choose to leave the facility, either temporarily or permanently.

Based on the variety of toll scenarios Jacobs has analyzed in the development of the model and for the Thruway in the process of developing the proposed toll increase, it is apparent that the Thruway has sufficient additional capacity to raise tolls further to generate additional revenues as needed. This is further evidenced by the fact that the proposed toll increase will not impact passenger cars or two-axle trucks, as well as the fact that some of the larger revenue generating facilities, such as the Tappan Zee Bridge, are less sensitive to toll increases than the system as a whole.

IX. Future Authority Finances with Proposed Modifications to Current Toll Rates

The following section provides an overview of the Authority's operating, capital and debt service costs and revenue trends with the proposed toll increase.

A. Toll and Other Revenues

Table IX-2 presents the projected toll revenues based on the proposed 45 percent increase in commercial vehicle tolls. The forecast assumes that commercial traffic will be tempered in 2012 and 2013 as the proposed toll increase takes effect later in 2012, prompting some commercial customers to reduce their driving on the Thruway, either by using a different route, combining trips, or not making their trip. As noted earlier, diversion off the Authority system in response to toll changes has been historically low and temporary. Modest passenger and commercial traffic growth is projected after 2013 as the economy recovers from the recent recession, and travelers adjust to the change in toll rates. Traffic estimates, inclusive of the proposed commercial rate adjustment, are contained in Table IX-1. Figure IX-1 and Figure IX-2 show corresponding graphs of historical and projected traffic and revenue for passenger, commercial and total vehicles. It is estimated that commercial traffic volumes in 2013 (first year of full toll increase) will be lower than the non-toll increase (base case) scenario by approximately 4.4 percent on the Control System and 4.3 percent on the Barrier System. This works out to a diversion of only around one-half of one percent of overall traffic on the Thruway System.

Table IX-1: Estimated Traffic with Proposed Toll Schedule (millions)

Year	Passenger Cars		Commercial Vehicles		Total	Percent Change
	Control	Barrier	Control	Barrier		
2010 ⁽¹⁾	129.0	93.8	15.7	9.1	247.6	-
2011 ⁽¹⁾	126.6	93.5	15.8	9.3	245.1	-1.0%
2012 ⁽²⁾	128.0	94.6	15.9	9.4	247.9	1.1%
2013	128.5	94.9	15.4	9.3	248.1	0.1%
2014	129.7	95.8	15.7	9.4	250.6	1.0%
2015	131.5	97.0	16.0	9.6	254.2	1.4%
2016	133.3	98.4	16.3	9.8	257.8	1.4%

Note: Numbers may not add due to rounding.

(1) Actual

2) Toll Increase September 30, 2012

Table IX-2: Estimated Annual Revenues with Proposed Toll Schedule (millions)

Year	Passenger Revenue	Commercial Revenue	Total Toll Revenue	Other Revenue ⁽¹⁾	Total Revenue
2012 ⁽²⁾	\$409.4	\$254.5	\$663.9	\$31.9	\$695.8
2013	410.4	320.9	731.3	32.5	763.8
2014	413.8	326.1	739.9	33.9	773.7
2015	418.9	331.5	750.4	34.9	785.2
2016	424.2	336.6	760.7	35.9	796.7
Total 2012-2016	\$2,076.6	\$1,569.6	\$3,646.1	\$169.1	\$3,815.2

Note: Numbers may not add due to rounding.

(1) Due to interest earnings on additional revenue

(2) Toll Increase September 30, 2012

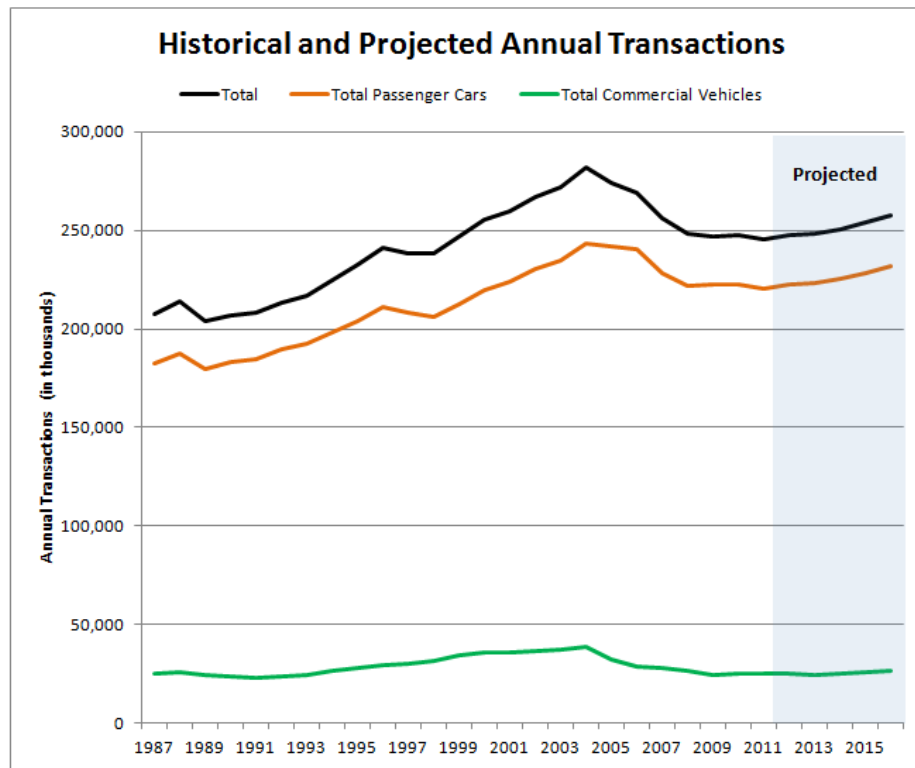
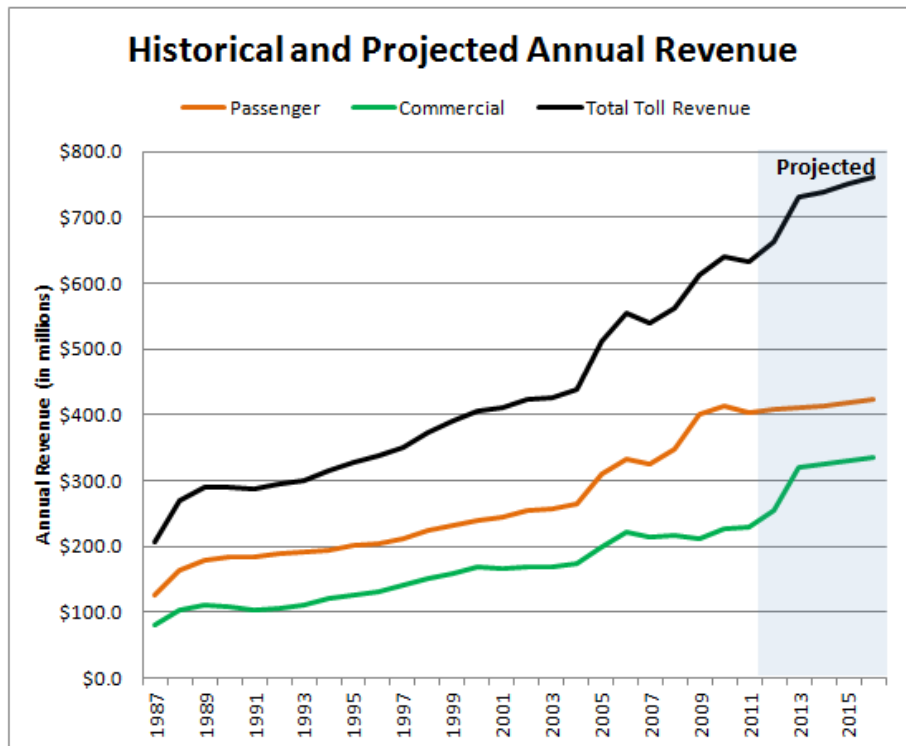
Figure IX-1: Historical and Projected Toll Traffic with Proposed Toll Schedule, Thruway System, 1987 - 2016

Figure IX-2: Historical and Projected Toll Revenue with Proposed Toll Schedule, Thruway System, 1987 - 2016



B. Funding Requirement and Sources

Table IX-3 shows estimated operating and maintenance expenses for the Thruway and Canal Systems assuming the impact of the Authority's new operational streamlining program. As noted earlier in this report, over the last five years the Authority has been able to limit core operating expense growth. However, the Authority is currently initiating a new operational streamlining program that is expected to significantly reduce future operating expenses in 2012 and beyond. Underscoring the significance of this program, as seen in Table IX-3, the Authority expects to hold operating costs at relatively the same level from 2011 through 2014, involving a reduction in operating costs by some \$119.5 million over prior forecasts from 2012 through 2016.

The Authority's streamlining program will likely consist of further workforce reductions, a realignment of employee benefits reductions to comport with the State benefit plans, additional departmental consolidations and reorganizations, reductions in vehicle and equipment fleets, further reductions in overtime and the number of toll lanes that are staffed, bulk purchasing of goods and services with other entities to reduce pricing, and many other initiatives. Based on the recent actions taken by the Authority and the Authority Boards continued commitment to controlling operating costs, Jacobs finds these estimates of operating cost provided by the Authority to be reasonable and achievable.

Table IX-3: Projected Operating and Maintenance Expenses (millions)

Year	Thruway	Enhanced Operating Cuts	Total Thruway Operating Costs	Canal System	Enhanced Operating Cuts	Federal Aid for Capital Operations ⁽¹⁾	Total Operating and Maintenance Expenses
2011 (A)	\$370.0	\$0.0	\$370.0	\$51.3	\$0.0	\$0.0	\$421.3
2012	375.3	0.0	375.3	55.7	0.0	2.5	428.5
2013	389.9	-21.0	368.9	53.2	-0.5	5.0	416.7
2014	401.5	-31.0	370.5	54.8	-1.0	5.0	419.4
2015	413.5	-31.0	382.5	56.5	-1.6	2.5	434.9
2016	425.7	-31.8	393.9	58.2	-1.6	0.0	450.5
Total 2012-2016	\$2,005.9	-\$114.8	\$1,891.1	\$278.4	-\$4.7	\$15.0	\$2,150.1

Note: Numbers may not add due to rounding.

⁽¹⁾ Anticipated Federal aid reimbursement for Canal Operations

Table IX-4 shows the estimated projected expenses for the Authority, based on the proposed 45 percent commercial toll adjustment and the operational streamlining actions outlined earlier. Operating costs are adjusting for federal funds that are anticipated to be made available for 2012 – 2015 to reimburse Canal Operating and Canal Capital for \$20 million and \$80 million for eligible Thruway projects. These funds have not yet been officially authorized.

Table IX-4: Total Projected Annual Requirements with Proposed Toll Schedule (millions)

Year	Capital Program	Operating and Maintenance (1)	Debt Service	Total Requirements
2012	\$384.0	\$428.5	\$202.8	\$1,015.3
2013	374.0	416.7	245.2	1,035.9
2014	377.0	419.4	260.5	1,056.9
2015	383.5	434.9	278.7	1,097.1
2016	474.3	450.5	304.7	1,229.6
Total 2012-2016	\$1,992.8	\$2,150.1	\$1,291.9	\$5,434.8

Note: Numbers may not add due to rounding.

⁽¹⁾ This is net of reimbursement of federal funds for Canal Operations

The Authority receives funding from various sources. These include Federal aid, proceeds from bonds and notes, income on investments, revenue from tolls and concessions, and other miscellaneous items. The estimated funding sources are set forth in Table IX-5. As noted in Table IX-5, the 45 percent toll adjustment will provide the revenues required to meet expenses and meet the requirements of the Bond Resolution.

Table IX-5: Projected Funding Sources with Proposed Toll Schedule (millions)

Year	Total Sources	Funding Sources				
		Federal Aid	Other	Debt Proceeds	Subtotal Exclusive of Thruway Revenues	Revenues Required from Tolls, etc.
2012	\$1,015.3	\$2.9	\$37.5	\$274.8	\$315.2	\$700.0
2013	1,035.9	16.0	41.9	214.2	272.1	763.8
2014	1,056.9	30.7	12.2	240.3	283.2	773.7
2015	1,097.1	30.0	12.4	269.5	311.9	785.2
2016	1,229.6	10.0	13.1	409.8	432.9	796.7
Total 2012-2016	\$5,434.8	\$89.6	\$117.1	\$1,408.6	\$1,615.3	\$3,819.4

Note: Numbers may not add due to rounding.

X. Summary of Findings

Table X-1 shows the projected Flow of Funds, as defined by the Authority's Bond Resolution, inclusive of a 45 percent commercial toll adjustment implemented on September 30, 2012. The Authority's Fiscal Management Guidelines, as adopted by the Board in 1997, require the Authority's Debt Service Coverage Ratio to be a minimum of 1.5 times and the Authority's Bond Resolution requires a minimum of 1.2 times.

As noted, this adjustment, coupled with operational streamlining, will allow debt service coverage to be 1.6x in 2012, 1.6x in 2013 and decreasing to 1.55x in 2014, 1.45x in 2015 and 1.32x in 2016. As a result, Jacobs believes that the revised toll rate structure will allow the Authority to build a strong foundation under which it can maintain its system in a state of good repair, fulfill its critical role in supporting the State's growing economy, preserve its strong financial credit rating and comply with bond holder covenants until a financing plan is developed to address the Tappan Zee Bridge Project and the Authority's long-term capital needs in late 2012.

Table X-1: Flow of Funds with the Proposed Toll Schedule

	ACTUAL	PROJECTED					Total (2012 to 2016)
	2011	2012	2013	2014	2015	2016	
Available Revenues	\$665.5	\$695.8	\$763.8	\$773.7	\$785.2	\$796.7	\$3,815.2
Less:							
Operating Expenses	365.5	372.3	365.9	367.5	379.5	390.9	1,876.2
Operating Reserves	4.6	3.0	3.0	3.0	3.0	3.0	15.0
Total	370.0	375.3	368.9	370.5	382.5	393.9	1,891.2
Net Revenues	295.5	320.5	394.8	403.2	402.7	402.7	1,924.0
Less: Debt Service	167.4	200.8	244.6	259.9	278.0	304.1	1,287.5
Net Revenues After Debt Service	128.1	119.7	150.2	143.3	124.7	98.6	363.5
Less: Retained for Operating Reserves	(4.3)	4.2	-	-	-	-	4.2
Net Revenues	123.8	123.8	150.2	143.3	124.7	98.7	640.7
Less:							
Reserve Maintenance Provisions ⁽²⁾	10.0	63.6	73.2	65.5	41.1	4.8	248.2
Other Authority Projects	51.3	53.2	47.7	48.8	52.4	56.6	258.7
General Reserve Fund	48.2	5.2	28.6	28.3	30.4	36.7	129.2
General Reserve Fund - BAN's/Line of Credit	14.4	1.9	0.6	0.6	0.6	0.6	4.3
Balance After Reserve Maintenance Provisions, Other Authority Projects and General Reserve Fund	-0.1	0.0	0.0	0.0	0.0	0.0	0.0
Adjustments for Cash Basis	0.1	-	-	-	-	-	-
Net Balance Available for Working Capital	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0

(1) Totals may not add due to rounding.

(2) Shows the Reserve Maintenance Fund provision will be funded from debt proceeds when sufficient revenues are not available.

Debt Service Coverage	1.77	1.60	1.61	1.55	1.45	1.32
Pay go %	17.6%	28.4%	42.7%	36.3%	29.7%	13.6%

XI. Actions Potentially Affecting Thruway Revenues

Highway programs that may affect Thruway traffic and revenue in the near years are limited, as few facilities are currently planned or under construction. Any potential new competing routes that may be under consideration across the state are not currently funded and were therefore not considered. It is anticipated that if any new route were to be constructed it would be complimentary rather than competitive to the Thruway, serving as a feeder route.

As roadways have aged, major reconstruction of portions of the State's highway system has become an annual requirement and will continue in future years. We are not aware, however, of any major reconstruction that will significantly affect Thruway traffic either positively or negatively, through the period of the projections in this report.

Through a review of current and planned transportation projects in the state, the following transportation projects are noted as possibly influencing Thruway traffic volumes:

1. New Tappan Zee Bridge Project

This project is discussed within this document. Commencement of this project may affect Thruway traffic and revenue for periods of time depending on the specific construction phasing program implemented by the selected constructor. No consideration is made for changes in future volumes as the projected completion date is outside of the range of this forecast.

2. Buffalo Corridor Study

A Corridor Study is being conducted on I-90 between Interchanges 49 (Transit Road) and 53 (I-190) and on the Youngmann Memorial Highway (I-290) between (I-90) and Interchange 7 (Main Street). The purpose of this study is to develop a plan to address capacity, structural, safety, and operational needs for this section of the Interstate Highway System over the next 30 years.

3. Route 17 upgrade to I-86

This project has been on-going for several years and when completed it may increase traffic volumes at Interchange 16.

4. Empire Corridor High Speed Rail

This Project will examine and recommend ways of introducing higher passenger train speeds on the Empire Corridor and ways to improve reliability, travel times, service frequency, and passenger amenities, with the goal/objective of attracting additional passengers and being more competitive with other modes of intercity travel. One of the objectives of the project is to attracting riders from other modes of travel; highway and air travel. This improvement would result in diminimus changes to Thruway traffic

XII. Limits and Disclaimers

It is Jacobs' opinion that the traffic and toll revenue estimates provided herein represent reasonable and achievable levels of traffic and toll revenues that can be expected to accrue at the Authority's toll facilities over the forecast period and that they have been prepared in accordance with accepted industry-wide practice. However, as should be expected with any forecast, and given the uncertainties within the current economic climate, it is important to note the following assumptions which, in our opinion, are reasonable:

- This limited synopsis presents the highlighted results of Jacobs' consideration of the information available as of the date hereof and the application of our experience and professional judgment to that information. It is not a guarantee of any future events or trends.
- The traffic and toll revenue estimates will be subject to future economic and social conditions, demographic developments and regional transportation construction activities that cannot be predicted with certainty.
- The estimates contained in this document, while presented with numeric specificity, are based on a number of estimates and assumptions which, though considered reasonable to us, are inherently subject to economic and competitive uncertainties and contingencies, most of which are beyond the control of the Authority and cannot be predicted with certainty. In many instances, a broad range of alternative assumptions could be considered reasonable with the availability of alternative toll schedules, and any changes in the assumptions used could result in material differences in estimated outcomes.
- Jacobs' traffic and toll revenue estimations only represent our best judgment and we do not warrant or represent that the actual toll revenues will not vary from our estimates.
- The standards of operation and maintenance on all of the system will be maintained as planned within the business rules and practices.
- The general configuration and location of the Thruway system and its interchanges will remain as discussed in the report.
- Access to and from the system will remain as discussed in the report.
- No other competing highway projects, tolled or non-tolled are assumed to be constructed or significantly improved in the project corridor during the project period, except those identified within the report.
- Major highway improvements that are currently underway or fully funded will be completed as planned.
- The system will be well maintained, efficiently operated, and effectively signed to encourage maximum usage.
- No reduced growth initiatives or related controls that would significantly inhibit normal development patterns will be introduced during the estimate period.
- There will be no future serious protracted recession during the estimate period.
- There will be no protracted fuel shortage during the estimate period.
- No local, regional, or national emergency will arise that will abnormally restrict the use of motor vehicles.

- We do not express any opinion on the following items: socioeconomic and demographic forecasts, proposed land use development projects and potential improvements to the regional transportation network.

In Jacobs' opinion, the assumptions underlying the projections provide a reasonable basis for the toll revenue projections. However, any financial projection is subject to uncertainties. Inevitably, some assumptions used to develop the projections will not be realized, and unanticipated events and circumstances may occur. There are likely to be differences between the projections and actual results, and those differences may be material. Because of these uncertainties, Jacobs makes no guaranty or warranty with respect to the traffic and toll revenue projections in this Study.

XIII. Conclusion

The proposed toll schedule would increase, on average, commercial toll rates for all classes, except 2H, by 45 percent. We have estimated the effects of these proposed toll adjustments on traffic, both in terms of the potential loss off traffic and shifts of traffic. In our opinion, if implemented in full, the toll adjustments will result in small changes to traffic patterns and provide adequate revenues to fund, to a reasonable level, the Pay-as-you-go portion of the capital program, to pay for the necessary maintenance and operating expenses, to maintain the necessary levels of coverage on the revenue bond debt service, to meet the covenants of the of the General Revenue Bond Resolution and the requirements of the Authority's Fiscal Management Guidelines for the forecast period through the end of 2014. Specifically, we concur with the Authority that the proposed toll adjustments analyzed in this report will comply with the covenant set forth in Section 609(1)(b) of the General Revenue Bond Resolution for the duration of the Multi-Year Capital Program through 2015. It will also allow the Authority to comply with the operating and maintenance covenants of the Thruway set forth in Section 608 of the General Revenue Bond Resolution.

With the proposed toll adjustments, additional Federal aid, and planned operational streamlining, the Authority's Capital Program exclusive of the new Tappan Zee Bridge Project can be fully implemented, providing for the needed reconstruction and assuring the maintenance of the current condition of the highways and bridges. As a result, we believe the Authority will continue to be able to provide good service to its customers and will continue to fulfill its critical role in supporting the State's economy through the forecast period. It is anticipated that further actions may be taken to address the financing of the new Tappan Zee Bridge and may also be required during the final year of the 2012-2015 Multi-Year Capital program when the debt service coverage ratios fall below the Authority Board's adopted Fiscal Management Guidelines. We are of the opinion that sufficient toll revenues can be generated by the proposed toll increase to fund the programs that are detailed in this report.

As discussed earlier in Section V-B of the report, a financing plan will be developed by the end of 2012 for the estimated \$5.4 billion New Tappan Zee Bridge Project. The financing plan will require additional toll revenues along with various alternative funding sources that may include: additional Revenue Bonds, TIFIA funding and a Pay-as-you-go component of the total project cost. The proposed modification includes no adjustments for passenger cars and two-axle commercial vehicles. The limited alternative routes and the relative differential in tolls to competing river crossings will continue to provide value to a majority of the Thruway users.

The Authority Board has publically expressed their intention to address the additional financing needs when the financing plan to address the Tappan Zee Bridge project is developed in late 2012. This report does not opine on that future financing plan and its compliance with the provisions of the General Bond Resolution, but rather anticipates a further review when the plan is developed. However, we are also of the opinion that the Thruway System has the ability to generate additional toll revenues through the implementation of additional toll modifications to support the additional capital needs of the Tappan Zee Bridge Project.

We would like to thank the Authority staff for all of their assistance in the preparation of this report.

Sincerely,

A handwritten signature in black ink, appearing to read "Richard J. Gobeille". The signature is fluid and cursive, with the first name "Richard" and last name "Gobeille" clearly distinguishable.

Richard J. Gobeille, P.E.

National Toll / Finance Unit Manager

Jacobs Civil Consultants, Inc.

Exhibit VII - NYMTC August 20, 2012 Resolutions documenting adoption of the Project in the Regional Transportation Plan, Transportation Improvement Program, and Conformity Determination

NEW YORK METROPOLITAN TRANSPORTATION COUNCIL

Joel P. Ettinger
Executive Director

THE NEW YORK METROPOLITAN TRANSPORTATION COUNCIL

RESOLUTION #2012-5: COUNCIL ADOPTION OF AN AMENDMENT TO INCLUDE THE TAPPAN ZEE HUDSON RIVER CROSSING PROJECT IN THE FISCALLY-CONSTRAINED ELEMENT OF THE 2010-2035 REGIONAL TRANSPORTATION PLAN

WHEREAS, the New York Metropolitan Transportation Council (NYMTC) is a regional council of governments which is the metropolitan planning organization for New York City, Long Island and the Lower Hudson Valley, and

WHEREAS, pursuant to 23 U.S.C. 450.322, NYMTC is responsible for the development of a long-range Regional Transportation Plan (the Plan) for its planning area, and

WHEREAS, NYMTC's current 2010-2035 Plan, entitled *A Shared Vision for a Shared Future*, was adopted by the Council on September 24, 2009, having addressed all federal planning requirements set forth in 23 U.S.C. 450.322; and

WHEREAS, as required by federal planning regulations, the 2010-2035 Plan forecasts the long-range financial resources and needs of NYMTC's planning area and includes a financial assessment which defines the fiscal constraint parameters of both the Plan and of NYMTC's Transportation Improvement Program; and

WHEREAS, the Tappan Zee Hudson River Crossing Project has been proposed as a regionally-significant major bridge project within the Interstate 287 corridor in the lower Hudson Valley, which does not preclude future transit; and

WHEREAS, as described in Attachment 1 of this resolution, the Tappan Zee Hudson River Crossing Project proposes to provide two structures as a replacement for the existing Tappan Zee Bridge. The proposed structures would include twelve foot wide travel lanes and oversized shoulders in each direction for emergency vehicle access. A shared-use path for pedestrians and bicycles is proposed for the northern structure. In addition to addressing the non-standard elements of the current bridge, the proposed replacement structures will have improved grades and sight distance and meet current seismic design criteria, and the design will maximize the public investment and will optimize the flexibility for future transportation modes; and

WHEREAS, the estimated total project cost to complete the proposed Tappan Zee Hudson River Crossing Project ranges from \$4.6 billion to \$5.6 billion in year-of-expenditure dollars; that represent the 20th percentile and 80th percentile of the probability range for the project cost, respectively. For planning purposes a 70% confidence level is often used as a baseline cost and in this case that cost is \$5.4 billion; and

WHEREAS, federal planning regulations call for the locally preferred alternative for a major project to be adopted into the fiscally-constrained Plan as a condition for required federal actions and/or federal funding; and

WHEREAS, the long-range financial assessment of the Plan has been revised to include this project into the Plan's fiscally-constrained element within the long-range state-of-good-repair/normal replacement forecast for the region; and

WHEREAS, the continued fiscal constraint of the Plan is demonstrated through the tables in Attachment 2 of this resolution.

NOW, THEREFORE, BE IT RESOLVED, that the fiscally-constrained element of NYMTC's 2010-2035 Regional Transportation Plan is amended to reflect the addition of the Tappan Zee Hudson River Crossing Project as described above.

This resolution shall take effect on the twentieth day of August, two thousand and twelve.

ADOPTED: August 20, 2012

"I hereby certify that the above is a true copy of Resolution #2012-5, Council Adoption of an Amendment to Include the Tappan Zee Hudson River Crossing Project in the Fiscally-Constrained Element of the 2010-2035 Regional Transportation Plan, and was motioned by Deputy County Executive Kevin Plunkett for County Executive Robert Astorino, Westchester County, and seconded by Joseph Lhota, Chair & C.E.O., Metropolitan Transportation Authority. This Resolution was adopted and passed unanimously by the New York Metropolitan Transportation Council."

Ron Epstein for Robert Zerillo, Secretary to the Council

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NEW YORK METROPOLITAN TRANSPORTATION COUNCIL

Joel P. Ettinger
Executive Director

NEW YORK METROPOLITAN TRANSPORTATION COUNCIL

RESOLUTION #2012-6: COUNCIL ADOPTION OF A REGIONALLY-SIGNIFICANT AMENDMENT TO INCLUDE THE TAPPAN ZEE HUDSON RIVER CROSSING PROJECT IN THE 2011-2015 TRANSPORTATION IMPROVEMENT PROGRAM

WHEREAS, the New York Metropolitan Transportation Council (NYMTC) is a regional council of governments which is the metropolitan planning organization for New York City, Long Island and the Lower Hudson Valley, and

WHEREAS, pursuant to 23 U.S.C. 450.300, NYMTC is responsible for the development of a medium-range Transportation Improvement Program (the TIP) for its planning area that includes capital and non-capital surface transportation projects (or phases of projects) within the boundaries of the metropolitan planning area proposed for funding under 23 U.S.C. Chapters 1 and 2 and 49 U.S.C. Chapter 53 and also includes regionally-significant projects requiring an action by the Federal Highway Administration or the Federal Transit Administration, whether or not the projects are to be funded under title 23 U.S.C. Chapters 1 and 2 or title 49 U.S.C. Chapter 53, and

WHEREAS, NYMTC's current 2011-2015 TIP was adopted by the Council on August 4, 2011, having addressed all relevant federal planning requirements; and

WHEREAS, as required by federal planning regulations, the 2011-2015 TIP is fiscally-constrained based on the anticipated federal funding in each of its constituent fiscal years; and

WHEREAS, the Tappan Zee Hudson River Crossing Project has been proposed as a regionally-significant major bridge project within the Interstate 287 corridor in the lower Hudson Valley, which does not preclude future transit; and

WHEREAS, as described in Attachment 1 of this resolution, the Tappan Zee Hudson River Crossing Project proposes to provide two structures as a replacement for the existing Tappan Zee Bridge. The proposed structures would include twelve foot wide travel lanes and oversized shoulders in each direction for emergency vehicle access. A shared-use path for pedestrians and bicycles is proposed for the northern structure. In addition to addressing the non-standard elements of the current bridge, the proposed replacement structures will have improved grades and sight distance and meet current seismic design criteria, and the design will maximize the public investment and will optimize the flexibility for future transportation modes; and

WHEREAS, the estimated total project cost to complete the proposed Tappan Zee Hudson River Crossing Project ranges from \$4.6 billion to \$5.6 billion in year-of-expenditure dollars; that represent the 20th percentile and 80th percentile of the probability range for the project cost, respectively. For planning purposes a 70% confidence level is often used as a baseline cost and in this case that cost is \$5.4 billion; and

WHEREAS, per federal planning regulations that call for the locally preferred alternative for a major project to be included in the fiscally-constrained Plan as a condition for federal funding and/or required federal actions, the proposed Tappan Zee Hudson River Crossing Project has been adopted into the fiscally-constrained element of the Plan; and

WHEREAS, federal planning regulation also mandate that a regionally-significant project subject to required federal actions and/or using federal funds be included in a fiscally-constrained TIP, and

NOW, THEREFORE, BE IT RESOLVED, that the fiscally-constrained 2011-2015 NYMTC TIP is amended to reflect the addition of the Tappan Zee Hudson River Crossing Project as described in the attached documents.

This resolution shall take effect on the twentieth day of August, two thousand and twelve.

ADOPTED: August 20, 2012

"I hereby certify that the above is a true copy of Resolution #2012-6, Council Adoption of a Regionally-Significant Amendment to Include the Tappan Zee Hudson River Crossing Project in the 2011-2015 Transportation Improvement Plan, and was motioned by County Executive Edward Mangano, Nassau County, and seconded by Mr. Samuel Horpick representing Ms. Amanda Burden, Director, NYC Department of City Planning. This Resolution was adopted and passed unanimously by the New York Metropolitan Transportation Council."

Ron Epstein for Robert Zerrillo, Secretary to the Council

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NEW YORK METROPOLITAN TRANSPORTATION COUNCIL

Joel P. Ettinger
Executive Director

NEW YORK METROPOLITAN TRANSPORTATION COUNCIL

RESOLUTION #2012-7: COUNCIL ADOPTION OF A TRANSPORTATION CONFORMITY DETERMINATION FOR THE 2011-2015 TRANSPORTATION IMPROVEMENT PROGRAM AND 2010-2035 REGIONAL TRANSPORTATION PLAN, AS AMENDED

WHEREAS, the New York Metropolitan Transportation Council (NYMTC) is a regional council of governments which is the metropolitan planning organization for New York City, Long Island and the lower Hudson Valley; and

WHEREAS, per the requirements of 23 CFR 450.324, NYMTC is responsible for adopting and maintaining a Transportation Improvement Program (TIP) which lists projects which are to be funded through federal sources and is fiscally-constrained within current funding allocations; and

WHEREAS, on November 8, 2011, NYMTC received notice from the New York State Department of Transportation that an interim update of NYMTC's 2011-2015 TIP was needed to address new funding assumptions issued by New York State on August 19, 2011; and

WHEREAS, in response, NYMTC is in the process of updating its 2011-2015 TIP to establish fiscal constraint under these new funding assumptions through administrative modifications and amendments adopted either by each Transportation Coordinating Committees or by the Council; and

WHEREAS, NYMTC is also amending the 2010-2035 Regional Transportation Plan (the Plan); and

WHEREAS, in conjunction with these TIP and Plan actions, NYMTC has undertaken a regional mobile source emissions analysis for a new Transportation Conformity Determination in consultation with the New York State Interagency Consultation Group; and

WHEREAS, NYMTC has coordinated its Transportation Conformity Determination with the Poughkeepsie-Dutchess County Transportation Council and Orange County Transportation Council as required for the Poughkeepsie Ozone Non-attainment Area and the New York-New Jersey-Connecticut Fine Particulate Matter (PM_{2.5}) Non-Attainment Area; and

WHEREAS, relevant emissions results from the Poughkeepsie-Dutchess County Transportation Council and the Orange County Transportation Council have been incorporated into NYMTC's regional emissions analysis in order to demonstrate conformity with federal and state air quality milestones; and

WHEREAS, NYMTC's draft Transportation Conformity Determination has been reviewed publicly for 30 days; and

WHEREAS, the Transportation Conformity Determination and supporting analyses demonstrate NYMTC's compliance with appropriate federal planning and air quality regulations.

NOW, THEREFORE, BE IT RESOLVED, that the New York Metropolitan Transportation Council adopts the Transportation Conformity Determination for the 2011-2015 Transportation Improvement Program and the 2010-2035 Regional Transportation Plan, as amended, and

BE IT FURTHER RESOLVED, that the Council acknowledges that, when completed, the update of the 2011-2015 TIP will fiscally constrain it to the new funding assumptions issued by New York State.

This resolution shall take effect on the twentieth day of August, two thousand and twelve.

ADOPTED: August 20, 2012

"I hereby certify that the above is a true copy of Resolution #2012-7, Council Adoption of a Transportation Conformity Determination for the 2011-2015 Transportation Improvement Program and 2010-2035 Regional Transportation Plan, as Amended, and was motioned by Mr. Thomas B. Vanderbeek, representing County Executive C. Scott Vanderhoef, Rockland County, and seconded by Joseph Lhota, Chair & C.E.O., Metropolitan Transportation Authority. This Resolution was adopted and passed unanimously by the New York Metropolitan Transportation Council."

Ron Epstein for Robert Zerrillo, Secretary to the Council

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